

An illustrated translation of Bleeker's Fishes of the Indian Archipelago Part II Cyprini.

Oijen, M.J.P. van & G.M.P. Loots

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Zool. Med. Leiden 86 (1), 8.vi.2012: 1-469, figs 1-131.— ISSN 0024-0672, ISBN 978-90-6519-003-1.

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Keywords: Bleeker's Cyprini; Cypriniformes; Cyprinodontiformes; Indian Archipelago; Dr P. Bleeker; Atlas Ichthyologique.

Pieter Bleeker's first revision of the Order Cyprini is translated and completed by including the figures from the Atlas Ichthyologique that were intended to be published with this revision.

Introduction

One and a half century ago, in 1860, Dr Pieter Bleeker published Volume II of his "Ichthyologiae Archipelagi Indici Prodrromus", literally translated "a precursor of the Fishes of the Indian Archipelago". On the Dutch title page (see p. 9) no equivalent of the word "Prodrromus" is present. Here the title reads: "De Visschen van den Indischen Archipel beschreven en toegelicht [Fishes of the Indian Archipelago described and elucidated].

Like Volume I, in which the catfishes were treated, Volume II on the Order Cyprini was both a compilation of all Bleeker's papers and a review of the then existing knowledge of the group. Bleeker's Order Cyprini is now considered to be a combination of the two unrelated orders Cypriniformes and Cyprinodontiformes.

In the present volume Bleeker gives extensive descriptions of 130 species. It is clear from the headings of these descriptions that Bleeker did not only possess coloured drawings of all of the species, but also that he had them arranged on 53 plates ready for printing. (Probably cut out and pasted onto larger sheets similar to the plates for his unpublished Atlas Volumes). Already in 1856 Bleeker had reached the conclusion that it would not be possible to publish a large illustrated work in a more or less reasonable way in the East Indies (Boeseman, 1973). Bleeker finished the manuscript of Volume II in October 1859 and had the text printed in Batavia before September of 1860, when he returned to the Netherlands.

Just like Volume I of Bleeker's Prodrromus, Volume II was published as an issue of the Acta Societatis Scientiarum Indo-Neerlandicae (Vol. X) and as a separate book.

After his return to the Netherlands, Bleeker did not publish a separate Atlas with plates for the two Prodrromus volumes. Instead Bleeker started a new series; the "Atlas Ichthyologique des Indes Orientales Néerlandaises", for which he rewrote both publications, adapting the classification to the latest insights and reducing the number of plates. For the Cyprini the number of plates was reduced from 53 to 43, while 3 new figures were added (Bleeker, 1862, 1863).

Bleeker's Introduction

The content of the introduction with a list of collectors published in Bleeker's *Siluri* (Bleeker, 1858) also exactly fits his *Cyprini*. It may have been written as an introduction to both volumes. As *Prodromus* Volume I has already been translated by Oijen et al. (2009) and is available online at <http://www.repository.naturalis.nl/document/169632>, we decided not to include it in this paper.

Bilingual papers

Like many papers that formed the basis of the revisions, both *Prodromus* Volumes were bilingual. The diagnostic keys and the descriptions of genera and species were written in Latin, the (waning?) scientific language in that period, whereas the taxonomic reviews of the families, the history of Bleeker's own systematic research, information on the specimens used for the description, the explanation of the scientific name, distinguishing characters, distribution of the species, and data on stomach content, fishery and fish consumption were in Dutch. As a consequence more than half of the text was not accessible to non-Dutch ichthyologists.

One may wonder why Bleeker did not write his papers in a language that was more widely readable. However, in the first place we should acknowledge the fact that Bleeker wrote at least part of his publications in Latin. The period when whole papers were written in Latin was over, at least in ichthyology, and many famous ichthyologists in those days published only in their native language (e.g. Cuvier & Valenciennes, 1828-1849; Day, 1875-1878, Günther, 1859-1870; Richardson, 1846). Maybe patriotic feelings formed the basis for writing in the language of the mother country (or the country of employment in Günther's case), but probably Bleeker explicitly wanted to reach a Dutch audience. Bleeker owned most of his specimens to donations of his countrymen distributed all over the Indian archipelago (see list of collectors in Bleeker, 1858a, b). By writing in Dutch he could both publically show them his gratitude and stimulate them to continue sending him specimens.

In the *Atlas Ichthyologique*, printed in the Netherlands after Bleeker's return, the descriptions of the species were still in Latin, but for additional remarks French was used instead of Dutch. However, the French parts in the *Atlas* are much more condensed than the Dutch parts in the *Prodromus* volumes that preceded them.

The Dutch parts of the *Prodromus* volumes are unique as they contain valuable information on type specimens sometimes mentioned neither in the original species descriptions nor in the *Atlas*. In some of his early papers (e.g. Bleeker, 1846), Bleeker did not give any information at all on the number and size of specimens used for descriptions of new species, therefore additional information given in the *Prodromus* volumes is indispensable for designating specimens from the Bleeker collection as types.

Notes on the translation

The translation was made from the book version of Vol. II (i.e. Bleeker, 1860b). In the translation the unnumbered page containing the errata has been deleted after the errata were applied.

Generally the layout of the book was followed. However, all parts that were originally in Latin have been given a slightly smaller corps than the parts that were originally in Dutch. The lay-out of the tables in a few places has been adjusted to make them more lucid.

The page numbers of the original publication have been incorporated in the text in grey squares. The index refers to the original page numbers.

Bleeker uses italics for species names rather haphazardly. In Bleeker's days it was not yet the official standard to write Latin scientific names in italics. The same holds for the parentheses enclosing the author's name when a species name is combined with a generic name other than the original one. In the translation we have followed Bleeker's "standards". Similarly no corrections were applied to Bleeker's inconsistencies in abbreviations of names of journals, the application of dieresis, etc. Only mistakes in the spelling of scientific names were corrected.

Notes on Bleeker's measurements

Apparently Bleeker assumed that everyone was familiar with his measuring techniques and abbreviations defined in earlier publications. For example, in his species descriptions Bleeker (1858a, b, 1860a, b) behind the number of caudal fin ray uses the abbreviation "et lat. brev." without explanation. Earlier (a.o. in Bleeker, 1846) he used c. lat brev.", "cum later. brev." and "c lat." or "c later." Only once Bleeker gives the full text as "cum lateralibus brevioribus." (Bleeker, 1846: 150; 1847: 22), Translated literally this is "with the lateral ones shorter". As strictly speaking there are no lateral rays on the caudal fin we have translated this as "short flanking ones."

The same holds for some measurements. According to Bleeker (1846: 143) [translated] "With regard to the clarification of length and width measurements of the head, which occur in the diagnosis of most of the species, it must be pointed out that the length is taken from the tip of the upper jaw to the most posterior extension of the gill cover. Only in species of Clarias that length is taken from the upper jaw to the posteriormost part of the interparietal [= supraoccipital] bone. The head width in all species is taken over the gill covers. Wherever the length of the body is discussed it is the total length of the body, including the head and the caudal fin, unless the reverse is said." In the present paper Bleeker gives an explanation of several taxonomic characters terms used in his descriptions.

In his earliest paper in which the lengths of described specimens are mentioned (Bleeker, 1947) and in his first 12 publications in the *Verhandelingen van het Bataafs Genootschap* (Vols XXII & XXIII, 1847-1849) Bleeker gives the length of his specimens in mm. In subsequent papers he always uses the notation '''', which gives the impression he does not use the metric system. However, in his first paper in the *Natuurkundig Tijdschrift voor Nederlandsch Indie*, Bleeker (1851: 8) states [translated]: "Of all species I have added in the diagnosis the length of the specimens used for the description expressed in millimetre measure." This measure is indicated as: '''. A comparison of the size of Bleeker specimens and the measurements given in the descriptions makes clear that Bleeker always gives the total length expressed in mm. Only rarely another length measurement indicated as "absque pinna caudalis" [without caudal fin] is used.

The figures

For the identification as well as for the relationships of the species, Bleeker attached much value to head and body shape, shape of bony elements, fins and fin spines, teeth and tooth patches. He often must have had problems when trying to express these shapes in words, especially in Latin. Bleeker realized that figures were indispensable for illuminating both morphology and coloration. In *Prodromus* volume II, apart from a left lateral habitus figure for many species ventral views and details of head and/or mouth are given.

Bleeker was very critical of the achievements of his artists (drawings for this volume were made by Ludwig Speigler and Chris Engel) and even wrote that the resulting figures should be considered more his own work than that of his artist (Bleeker, 1878; van Oijen, 2005).

It must be realized that a drawing represents a single individual and therefore only gives one example (and usually not even a modal one) of the morphological range within one species. In order to get a fair idea of the morphology of the species it is essential that the both the description and the figures are studied.

As in Bleeker's time facilities for publishing large coloured plates using chromolithography in Netherlands East India were limited, the printing had to be postponed till Bleeker's return to the Netherlands. For this reason the figures were published two years later than the text. In our translation these figures are published with the text. For an easy comparison the plates have been placed close to the description.

The figures were scanned from the *Naturalis'* copies of Volumes II and III of the *Atlas Ichthyologique* (Bleeker, 1862, 1863). In the *Atlas* the figures are life size unless specimens were larger than page size in which case they were reduced in size by the lithographer. The page size of the *Zoologische Mededelingen* forced us to reduce the size of many habitus figures to maximal page width. The original size of the figures in the *Atlas* is here given in the captions of the figures. Only in a few cases very small figures were slightly enlarged.

Species names

After his return to the Netherlands, Bleeker continued his research on the Cypriniformes and Cyprinodontiformes of his collection and of the collection of 's Rijks Museum van Natuurlijke Historie in Leiden (especially those collected by Kuhl & Van Hasselt). As a result of new research some descriptions and names had to be adapted. In the caption to the figures of the present paper the names of the species are given as they were published in the *Atlas Ichthyologique*.

Bleeker's use of Latin

Bleeker's descriptions of fishes are written in the kind of technical Latin that was common amongst scientists of that period.

Characteristic of the extensive species descriptions (in contrast to the short descriptions in the keys) is the use of the *ablativus*. In Latin the ablative case is mainly used in

the function of an adverbial adjunct, i.e. a way of introducing additional information in a sentence. Translated literally Bleeker's descriptions say [a fish] *with* an elongate body, *with* a slightly depressed head, etc. Since the ablative also has other functions, which are used by Bleeker as well, – for instance the *ablativus comparationis* (in a comparison the object with which the comparison is made) is frequently used – this results in a text filled with nouns in the same case. This sometimes makes it hard to understand the meaning of the text, especially in longer sentences.

This use of the ablative case in descriptions was not restricted to Bleeker, but seems to have been widespread in scientific descriptions.

In his species descriptions, Bleeker clearly tries to be very precise when describing the shape of elements or the way that e.g. the length of one element differs from that of another. Terms he frequently uses are *sub-* (as in *subtrigonus* = nearly triangular), *-iusculus* (as in *depressiusculus* = slightly depressed), *vix* (= hardly), *fere* (= nearly), and *paucum* (a little).

In his introduction Bleeker states he disapproves of the comparative descriptions of preceding ichthyologists, as they are of limited use for ichthyologist like himself, who have no access to large museum collections, but occasionally he makes the same mistake.

In the descriptions of the coloration of the species the gradations are rendered equally carefully, with a variation in terms that sometimes is difficult to translate. Besides standard colours like *flavus* and *flavidus* (yellow), Bleeker uses varieties like *flavicans* and *flavescens* (yellowish, slightly yellow) and besides *albus* and *albidus* (white) also *albescens* and *albicans* (whitish).

In the colour descriptions Bleeker exhibits a kind of effusiveness as one also finds appreciative comments besides objective observations. Bleeker occasionally even states that a species has a beautiful (e.g. a beautifully purple) colour.

Recommendation

As Bleeker in this work gives an overview of all his papers on Cyprinids and Cyprinodonts from 1846 through 1860, it provides an excellent account of his development from an amateur - to a respected ichthyologist. His changing view on this group of fishes is exemplary of his treatment of other groups. Therefore many parts of this work are of interest to a broader circle of ichthyologists. In this work on the Cyprinids of the Indian archipelago Bleeker expresses more than once his amazement about the peculiarities in the distribution of the group.

We hope this translation may contribute to the appreciation of Dr Pieter Bleeker as an ichthyologist and systematist and that it may stimulate further research on the fishes of the Indonesian Archipelago.

Acknowledgements

Many thanks are due to Niko Korenhof for scanning pages of the original publication, adapting the scans of the original figures of the plates of the Atlas Ichthyologique and his meticulous corrections of several draft versions of this paper.

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ICHTHYOLOGIAE
ARCHIPELAGI INDICI

PRODROMUS,

AUCT.

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Praefect.; Ordin. Leon. Neêrl., Ordin. Imperial. Austriac. Coron. Ferr. et Ord.
Reg. Boruss. Aquil. Rubr. Eg. Class. Sup.; Societ. Reg. Scient. Ind.
Neêrl. Praes.; Acad. Reg. Scient. Neêrland. etc. etc. Soc.*

VOLUMEN II.

CYPRINI.

BATAVIAE,

TYPIS LANGEI ET SOC.

1860.

DE
VISSCHEN
VAN DEN
INDISCHEN ARCHIPEL

BESCHREVEN EN TOEGELICHT

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DEEL II.

CYPRINI.

BATAVIA,

LANGE & CO.

1860.

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1 ORDER CYPRINI. CARPS.

Bony fishes. Gills free, simple. Soft finned. Body oblong or elongate, scaled or bare, never armoured. Subopercular bone not missing. Margin of the upper jaw formed by the intermaxillary bones, palatine bones toothless, lower pharyngeal bones not united, dentate. One rayed, free dorsal fin. Stomach without blind sac. No pyloric appendages.

Remark. In the large series of bony fishes the Cyprines are little less sharply characterized than the so strongly related Silures. The presence of the subopercle, the edge of the upper jaw being completely formed by the intermaxillary bones, the not being grown together of the lower pharyngeal bones, a free standing, single, rayed dorsal fin and toothless palatal bones are characters, which in combination, are not found in any of the remaining orders of soft finned fishes.

The definition of the order given by other authors, are not of absolute value. To those definitions I count such, which comprise the Cyprinoids and the Cyprinodontoids as a single family or order. In these one refers to characters, which are not found in all Cyprines and which therefore are only of relative value. Thus sometimes scales are lacking (*Aulopyge* Heck.) and the swimbladder (*Homaloptera* V. Hass., *Lepidocephalus* Blkr., *Acanthopthalmus* V. Hass.). The jaws are not always weak and the mouth cleft is not always small (*Macrochirichthys* Blkr, *Hampala* V. Hass.), and upper pharyngeal jaw teeth are found in the entire family of the Cyprinodontoids. The lower pharyngeal jaw teeth are not always large and strong (*Cobitiformes*, *Homalopteraeformes*, *Catastomini* and *Cyprinodontoidei*); the scales are not always smooth edged (species of *Homaloptera*) and the scales are not even steadily missing on the head (*Lepidocephalus* Blkr). The belly, which according to some writers is always rounded, in some genera is knife-like compressed, and sharp, although not spine-like 2 keeled (*Chela* Buch., *Laubuca* Blkr, *Macrochirichthys* Blkr), etc. However, there is no Cyprinid species, on which, according to the present state of science, the here [above] given characters do not fully fit and on the other side they exclude all other related orders.

The Cyprinids have made their appearance on earth rather late. Although they populated fresh waters already in prehistoric times, their origin does not reach further than the tertiary formation and in that era the Cyprinoids were even preceded by the Cyprinodontoids. Half a dozen species of *Cyprinodon* and *Poecilia* are known from the Molasse-period, whereas the number of species of the real Cyprinoids belonging to the genera of the *Cobitiformes*, *Cyprinines* and *Barbines*, thus far found in tertiary layers, amount to only 35, so that nowadays in total only about 40 species of fossil Cyprines are known.

Although it is now likely, that further knowledge of more freshwater formations in the tertiary era will lead to the discovery of new fossil forms of the order, it is not to be expected, that its number will come anywhere near that of the species of Cyprines of the now living creation.

Indeed they are the most numerous order of fishes represented in the now existing order of things and the in the registers of science, described species are nowadays already more than 1100 in number, of which more than 1000 are Cyprinoids. They account

for more than one eighth part of the now known, still living fish species, and when one takes into account all fossil forms in this relation, their number accounts still for more than one tenth of the whole. This proportion is the more remarkable, when one keeps in mind that the Cyprinoids, which contain more than 91% of the total number of the now living Cyprines, are totally lacking in Australia, Polynesia and South America and in Africa are only present in a small number of species.

One century ago one did not yet know so many living species of Cyprines, as nowadays of fossils ones.

Artedi knew only 22 or 23 species, and at the end of last century hardly 50 species were written down in the registers of science.

Lacepède, in his *Histoire naturelle des Poissons*, and Schneider, in the *Systema posthumum* of Bloch, described not even 70 species. Since then, although principally in last two decades, the knowledge of this group increased with giant steps.

3 Asia, the Indian archipelago and North America have gradually delivered their rich contributions. South America revealed many forms of Cyprinodonts, and even Africa added a few tens of species to those of the other continents.

Nevertheless, less than 30 years ago, the number of known species did not account for a fourth part of the present number.

In 1843 the number of species had risen to about 500.

At the beginning of the present decade, one estimated it already at over 650, and the numerous new forms, that have become known in the youngest years from the Indian archipelago and East Asia and from North America, predict that the now reached number of more than 1100 species by far not expresses the real number of species living on earth. Without any doubt hundreds of new forms will be placed in light in future times.

The most important recent discoveries have spread a new light on the geographic distribution of the Cyprines. It was believed earlier that they were restricted to the northern hemisphere. Mr Agassiz even still in 1850 (*Lake Superior* p. 352) wrote, "I am not aware that any of these fishes have ever been noticed in the waters of the southern hemisphere; nor do they extend anywhere far beyond the limits of the temperate zone, as it is well ascertained that they are most numerous in the rivers and lakes of Central Europe and Central Asia and northern America. Indeed, it is so much their natural home, that they do not seem to occur in the northernmost freshwater streams nor anywhere in the tropics, except in very high altitudes, where recently a few have been found in the Andes." Although this opinion of one of the greatest ichthyologists apparently was not founded on the state of knowledge in the said year, as it was already proven that the low countries of Bengal and Hindustan and Pegu [Birma] fed several Cyprinids, whereas also already South African and Javanese forms of the order, thus from the southern hemisphere, were described, the thesis, that principally the temperate areas of the northern hemisphere, where to be regarded as the cradle of the Cyprinids, remained unfounded. However, this thesis for the most part seems to have lost its value as well, since it appeared, that the equatorial areas of the Sunda Islands not only accommodate a certain number of Cyprinids, but that they are even so numerous there, that the species of Cyprinid account for more than 13 percent of the total number of now living known

species; a proportion, which, taking into account the relatively still few investigations of the freshwaters of the Sunda Islands, most certainly does not express by far the true richness in Cyprinoids of these waters. Which proportion moreover must appear very remarkably, when one realises that the investigations in Europe carried out for centuries ⁴ by numerous naturalists have led only to the recognition of an equal number of species of this order.

The limits of the Cyprinids therefore not only have to be taken more amply than has been done, but the distribution of the species within those limits does not seem to be as was presumed.

Sir J. Richardson went to the other extreme by stating, and this already in 1836 (*Fauna Boreli-Americana III Fish.* p. 109), that the Cyprinids “abound in the freshwaters of all quarters of the world” a statement, which neither was based on the then existing knowledge, nor that of Mr Agassiz in 1815, and which neither has been maintained a long time by the principal ichthyologist of the Australian waters.

As far as we know at present, the Cyprinids are excluded from Australia, and Polynesia. They inhabit all other continents.

In the northern hemisphere, they occur between the 60th and 70th degree of latitude, but they seem not to pass the northern polar circle. No species have become known from Greenland and Iceland. They are found generally on the continent of the northern hemisphere, both on that of the old and that of the new world, however, they also reach the islands that fringe both continents. Great Britain has its cyprinids just like the Japanese, Philippine and the Sunda Islands and Ceylon, and also on the Antilles they are not lacking. However, most species seem to occur in the middle part of South Asia and in the large drainage-areas of North America, whereas they seem to be sparsely represented in Africa.

In the southern hemisphere the Cyprinids seem to extend far less. In Africa, they extend further than the 30th, in South America, till the 35th degree of latitude. They are still numerous on Java and the parts of Sumatra and Borneo situated south of the equator, however, Java (with Bali) and Borneo form also its southeastern border. In the eastern part of the southern hemisphere they do not occur beyond 9° latitude and 118° longitude from Greenwich. On the large island of Celebes they are already lacking, just as on Timor and on the Moluccas, and continuing in the eastern or south-eastern direction, one does not recover them, until one reaches South America, were however, the Cyprinoids are still totally lacking and make room for the Cyprinodontoids.

The borders of both families differ still more.

The Cyprinoids extend further to the north than the Cyprinodontoids.

In North America the Cyprinodontoids do not seem to cross the 45th degree of latitude. Equally in Europe they do not extend further northwards and there they are restricted to Spain and Italy. In Asia it is not different and it even seems that they do not reach the 40th degree of latitude as till now the northern most known ⁵ locality is Jedo [Tokyo], the capital of Japan, in the freshwaters of which one *Aplocheilos* is living.

In the southern hemisphere this relation is somewhat different. In Africa the Cyprinodontoids seem to go little less southwards than the Cyprinoids, as a *Hydrargyra* is reported from Qualimane in Mozambique. In the Indian archipelago the Cyprinodontoids, just like the Cyprinoids, have their southern and eastern limits in Borneo and Sumatra.

In the new world however, the limits are drawn entirely different. Whereas the Cyprinoids do not cross southern Mexico, and do not reach the Antilles, and so remain far northerly from the Equator, the Cyprinodontoids pass through Central America and the Antilles to South America, to find their limits only in Uruguay and La Plata. Although more species have become known from North America than from South America, it is to be expected, that the southern half of the New world does not feed less species than the northern half. Any way they possess the most curious forms, the Orestiasines and the Anablepines.

The Old world, relative to the New one, is poor in Cyprinodontoids, as nowadays from America already three times as much species are known as from the entire Eastern hemisphere.

As long as only a few species of Cyprinids were known, one could contend oneself with placing them in only very few genera.

Artedi accepted only three genera of Cyprinids, *Cyprinus*, *Cobitis* and *Anableps*, genera that answer to the subfamilies Cypriniformes and to the family of the Cyprinodontoids. His genus *Cyprinus* from the species known to him was excellently characterized by 3 branchiostegal rays, the swimbladder constricted in the middle, a toothless mouth and “*ossa duo in faucibus inferioribus serrata et dura pro dentibus, quibus superne unicum os ovale seu mollius respondet*” [“instead of teeth, two bones in the inferior part of the throat, serrated and hard, to which corresponds superiorly a single oval or softer bone”]. Artedi placed *Cobitis* next to *Cyprinus*, but the relationship of *Anableps* with both [genera] was noticed by him.

Linnaeus resolved the genus *Anableps* in *Cobitis* and spoiled the genus further, by including in it a *Poecilia*, as well as Houttuyn’s *Cobitis japonica*. Moreover, Linnaeus placed *Cobitis* and *Cyprinus* in his division *Abdominales*, as far apart as possible, and changed the diagnosis of *Cyprinus* of Artedi without improving it.

In his “*Historia piscium naturae promovendae missus quintus*” (1749), J.Th. Klein distinguished the genera *Cyprinus*, *Brama*, *Mystus* and *Leuciscus*. The first one, he restricted to the real Cyprinines, in which however he also included some ⁶ Pomacentroids. His *Brama* there contains *Abramis* Cuv., *Carassius* Nilss., *Tinca* Cuv. and *Scardinius* Bp. *Mystus* is synonymous with *Barbus* Cuv., and his *Leuciscus* contains the remaining species of *Leuciscus* Cuv. and moreover also *Alausa* Cuv. He thus indicated the basic principles for the splitting of the Artedian genus *Cyprinus*, on which only Cuvier continued to build. Klein placed the *Cobitiformes* known to him in his very complicated genus *Enchylopus*.

L.T. Gronovius in his *Museum ichthyologicum*, which was published in the year 1754, accepted the genera proposed by Artedi, although he placed *Anableps* far away from *Cobitis* and *Cyprinus*. He divided the species of *Cyprinus* in those with, and those without barbels. Later, in his *Zoöphyliacium* (published in 1763) he placed *Cobitis* in his order *Branchiostegi* and *Cyprinus* and *Anableps*, separately, in his order *Branchiales*.

In the *Systema ichthyologicum* of Bloch and Schneider (1801) the Cyprines were enriched with the genus *Poecilia*. *Anableps* stands there separated by the genera *Notacanthus*, *Esox*, *Salmo*, *Clupea* and a number of others removed from *Cobitis* and *Cyprinus* and *Amia* is placed between *Cyprinus* and *Poecilia*.

Lacépède in the fifth part (of XI) of his *Histoire des Poissons* already went a little further, and described 7 genera, *Cobitis*, *Misgurnus*, *Anableps*, *Fundulus*, *Hydrargyra*, *Cyprinodon* and *Cyprinus*. With the exception of *Misgurnus*, which genus was defined completely erroneously and later was resolved in *Acanthopsis*, these generic names, partly however under a changed meaning, have been retained.

Lacépède however, no more than his predecessors, hit upon the idea to gather them together in one natural group, and he placed them very scattered in his system.

Mr C. Duméril in the year 1809, placed the Cyprines known to him for the first time in certain families; – *Cobitis*, *Misgurnis*, *Anableps* and *Fundulus*, with other very heterogenous genera in his family *Cylindrosomen*; – *Hydrargyra* and *Cyprinus*, similarly mixed with very divergent genera, in his family *Gymnopomen*. Neither of these families can be considered as even slightly natural, and the knowledge of the Cyprines did not improve.

Rafinesque was the first one, who, in his *Indice d'Ittiologia Siciliana* (1810) proposed the family name *Ciprinidi*, but he placed therein *Mugil* next to *Cyprinus*, by which the naturalness of the family got totally lost. In his work on nature, published in Paris in 1815, he proposed the *Cyprinia* as a family, in a still less natural way and split it in three subfamilies, one of which he named *Gymnopomia*, and which, just like his family *Cylindrosomia*, concur with the families with the same names of Mr Duméril.

The natural relationships of the Cyprines were understood for the first time by Georges Cuvier. He contained the Cyprinoids and the Cyprinodontoids in a single family, his *Cyprinoides* (which in my view [7](#) however, has a higher value) and in 1817 split the genus *Cyprinus* Art. in various genera, in *Cyprinus*, *Barbus*, *Gobio*, *Tinca*, *Cirrhina*, *Abramis*, *Labeo* and *Leuciscus*. Unjustly however, he also placed the genus *Gonorhynchus* Gron. in the same family. The genus *Lebias* that was proposed by him in the first edition of his *Règne animal*, has since been brought back to *Cyprinodon* Lac.

After Cuvier, more specifically than Klein, had paved the way for analysing of the genus *Cyprinus* Art., and after numerous new forms of Cyprinids had come to the light, one understood that the splitting had to be carried further.

In 1816 Lessueur founded the genus *Catostomus*, and in 1821 moreover the genus *Mollienisia*.

After having travelled through North-America, Rafinesque recognized with a sharp eye a number of new generic forms, partly insufficiently characterized and initially not included in the system, but in recent times, by the investigations of especially Mr Agassiz, valued as natural genera. These genera all seem to have been described in his *Prodromus* of 70 new genera (1818) and in his *Ichthyologia Ohiensis* (1820), which works are not available to me, but they are indicated in the newest ichthyological publications about North-America more precisely under the names *Exoglossum*, *Pimephales*, *Moxostoma*, *Carpiodes*, *Cycleptus*, *Luxilus* and *Ichthyobus*, which have received civil rights, and under the names *Decactylus*, *Eurystomus*, *Hypentelium*, *Rutilus* and *Teretulus*, which have not been accepted by recent ichthyologists.

Whereas Lesueur and Rafinesque described new generic names in North America, Buchanan Hamilton discovered still other genera in British India and Kuhl and Van Hasselt discovered new genera on Java.

Buchanan however, was not very lucky in the determination of genera. In his *Account of Fishes found in the river Ganges and its branches*, published in 1822 in Edinburgh,

he has placed the Cypriniformes in nine groups, which he named Chela, Barilius, Bangana, Cyprinus, Puntius, Danio, Morulius, Cabdio and Garra, but he characterized them so incompletely and defective, that none of them has been retained as generic form, except for Chela.

Kuhl and Van Hasselt distinguished with keen insight the world of the Cyprines, which unfolded itself before them on Java, but they did not have the time to publish their observations in a sufficient way. Together they discovered the genera Hampala, Crossocheilos and Lobocheilos, while Van Hasselt moreover erected under his own name the genera Labiobarbus, (Rohita and Dangila Val.), Diplocheilus (subgenus of Labeo Val.), Acanthopthalmus, Acanthopsis, Homaloptera and Odontopsis or Homalopsis (Panchax Val.). Van Hasselt also ⁸ distinguished the genus Chela, without knowing the work of Buchanan and named it Oxygaster.

In the second edition of the Règne animal (1829) Cuvier has changed little in the generic division of the Cyprines, notwithstanding the fact that he was familiar with the work of Buchanan, and he must also not have been ignorant with regard to the research of Rafinesque and Kuhl and Van Hasselt. In the second edition he has only increased the genera of Cyprines with both ones proposed by Lesueur, i.e. Catostomus and Mollisia.

Mr J. Van der Hoeven in 1833, in the first edition of his excellent "Handboek der Dierkunde" [Manual of Zoology] gave a more detailed description of the genus Homaloptera V. Hass., which in the mean time was named Balitoria by Gray, and of Chela Buch., which he treats there as a subgenus. Mr Van der Hoeven reduced the Cyprines to five types, to Cobitis, Homaloptera, Anableps, Cyprinodon and Cyprinus, which he considers as genera. The then already known genera of Cyprinodontoids he places, with the exception of Anableps, as subgenera in Cyprinodon, and the genera of Cypriniformes, with the exception of Homaloptera, as subgenera in Cyprinus. – The types of Mr Van der Hoeven are very well chosen, but have a higher value than that of genera. Only Gonorrhynchus, whose characters do not only fall outside the types but also outside the family, should be removed from it.

Whereas the intention of Mr Van der Hoeven apparently was a simplification of the splitting of the Cyprines and a reduction of the genera to the value Artedi had given them, other zoologists deemed it necessary to split the then accepted genera even further.

Indeed the necessity of that should become apparent with the increasing accumulation of building material, and it was not surprising that in a group of fishes, in which nature had used only relatively few characters to produce a hundredfold diversity, one considered those character of higher value, than one would in families, that are little rich in species, but well defined by a multitude of striking characters

After 1834 the investigations concerning the Cyprines increased on a more extensive scale and resulted in a rich booty of new generic forms.

In 1835 Mr Rüppell (Neuer Nachtrag von Beschreibungen und Abbildungen neuer Fische, im Nil entdeckt) proposed two new genera, with the names Labeobarbus and Varicorhinus.

Mr Agassiz was the first to propose to split the Cyprines in two families, and in imitation of this most ichthyologists nowadays use the families ⁹ Cyprinoids and Cyprinodontoids. In the family of the Cyprinoids itself, he proposed already in 1835,

in the first part of the *Mémoires de la Société des Sciences naturelles de Neuchatel*, some new genera, i.e. *Rhodeus*, *Phoxinus*, *Chondrostomus* and *Aspida*. The then also by him from *Cobitis* and *Leuciscus* separated genera *Acanthopsis* and *Pelecus* have the same value as *Acanthopsis* of Van Hasselt and *Chela* of Buchanan. Mr Agassiz also was the first to make the Artedean character of the pharyngeal bones fruitful for the recognition of genera.

Nilson (in 1837?) separated the genus *Carassius* from *Cyprinus*.

In the year 1838 J. Heckel enriched the family of Cyprinoids with the genus *Schizothorax*, which however included two other natural genera, which only later were defined as such.

To colonel W.H. Sykes one owed the genus *Rohtee*, of which he made known a number of species in the year 1838 in his publication "On the Fishes of the Dukhun."

In the same year 1838, a third important work of Mr J. McClelland was published on the South Asiatic Cyprines, entitled "Indian Cyprinidae."

He conceived the Cyprines as a family, entirely in the spirit of Cuvier and split it in three subfamilies, which he named: *Paeoniminae*, *Sarcoborinae* and *Apalopterinae*. This splitting was less fortunate than the one proposed by Mr Agassiz. His *Paeoniminae* contain the *Labeonines*, the *Catastomines*, the *Cyprinines* and the *Barbines*, and therefore form part of my subfamily *Cypriniformes*. The *Sarcoborinae* comprise only a part of the *Barbines*. In the *Apalopterinae* however, one finds the *Cyprinodontoids* united not only with the *Cobitiformes* and *Homalopteriformes*, but even with the *Labeonines*.

Mr McClelland succeeded even less in a just definition of the genera, and he misunderstood the Cuvierian genera, because of which he for instance, unjustly brought a number of Indian species to *Gonorhynchus* Gron., *Cirrhinus* Cuv. and even to *Catastomus* Les.

Nevertheless his work has placed in light, numerous new generic forms, and although he as a rule has very insufficiently defined the new genera proposed by him, almost all of them can retain their place in the system when they are more carefully delimited. With regard to the Cyprinoids these genera are *Cymenophysa*, *Psilorhynchus*, *Platycara*, *Oreinus*, (*Schizothorax* Heck.), *Systemus*, *Perilampus* and *Opsarius*, and concerning the *Cyprinodontoids*, *Aplocheilos*. His genus *Schistura* completely overlaps with *Cobitis* Art.

The first proofs of a natural system of fishes of Charles Lucien Bonaparte, Prince of Canino, similarly originate from the fourth decade of this century. He accepted the families of Mr Agassiz, changing only the name *Cyprinodontes* in *Poecilidae*. The Cyprinoids properly he first split in three ¹⁰ subfamilies, *Anableptini*, *Cyprinini* and *Leuciscini*, however in 1839 he rightfully brought back the *Anableptini* to the *Cyprinodontoids*, so that he divided each family in two subfamilies, the *Poecilidae* namely in the *Anablepini* and the *Poecilini*. Still later just like Swainson, he isolated also the *Cobitiformes* from his *Cyprinidae* as a proper family under the name *Cobitidae*.

William Swainson, in 1839, in his "Natural History of Fishes, Amphibians and Reptiles or Monocardian animals", proposed a different division of the Cyprines. However, in this he was as little successful as with many other parts of his system.

Not only did he separate the *Cobitiformes* and the *Homalopteraeformes* (*Balitorinae*) from the Cyprinoids, but he brought the remaining Cyprinoids to the value of even less than a subfamily, as his *Cyprinae* are found there as a subfamily of the *Salmonidae*,

and *Erythrinus* and *Arapaima* J. Müll. figure as two of his five genera of the Cyprinae. Moreover, he elevates the Cobitidae to a proper family, and brings under it four subfamilies, his Cobitinae, Anablepinae, Poecilinae and Balitorinae, so that his Cobitidae is a mixture of Cypriniformes, Cobitiformes and Cyprinodontoids.

With regard to his genera Swainson equally followed a view that differed from that of his predecessors.

His Cyprinae without teeth answer almost entirely to the proper Cyprinoids and he accepts therein only the genera *Cyprinus*, *Catostoma* and *Leuciscus*. In *Cyprinus* he then brings as subgenera *Cyprinus*, *Barbus*, *Labeobarbus* and *Salmostoma* or *Salmophasia* (Chela Buch.); in *Catostomus* as subgenera *Labeo*, *Catostomus* and *Chedrus*; and in *Leuciscus* as subgenera once again *Chela* and moreover *Esomus*, *Leuciscus*, *Tinca*, *Abramis* and *Gonorhynchus* Gron.

The Cobitinae of Swainson contain two genera: *Cobitis*, with the subgenera *Cobitis* and *Acouris*; and *Canthophrys* (*Acanthopsis* V. Hass.) with the subgenera *Canthophrys*, *Diacanthus* and *Somileptus*, subgenera, which are based partly on the erroneous assumption that scales would be lacking. In the remaining subfamilies of the Cobitidae no new generic divisions are proposed.

Although Swainson's divisions are based on unobtainable grounds, two of his subgenera can be maintained as natural genera, i.e. *Esomus*, which a few years later, was described in more detail by Mr Valenciennes under the name *Nuria*, and *Chedrus*, which seems to me to be a natural genus as well.

A. Smith in his (1839-1845?) "Illustrations of the zoology of South Africa" erected a number of new types, which he named *Abrostomus*, *Cheilobarbus* and *Pseudobarbus*.

The Prince of Canino in 1841 added the genera *Scardinius*, *Squalius* and *Telestes*, which he described in the *Fauna Italica*.

J.E. De Kay erected in 1842, in his *Zoology of New York*, the genus *Stilbe*, which however does not differ from *Luxillus* Raf.

11 The most important contemporary works on Cyprines surely are those of Mr Valenciennes and of J. Heckel.

The three parts of the large *Histoire naturelle de Poissons*, dealing with Cyprines, date from 1842 till 1846, and Heckel's *Fische Syriens* and his "Nachträge" [additions] to it, from the years 1843-1847.

Mr Valenciennes did not accept the families of Mr Agassiz, no more than many other genera that had already been introduced in science. Just like Cuvier, he kept considering the Cyprines as a single family, but he brought about a remarkable reform in the diagnosis of the genera, and added to the Cyprinoids the genera *Dangila*, *Rohita*, *Capoëta*, *Catla* and *Sclerognathus*, and to the Cyprinodontoids the remarkable genus *Orestias*, as well as the genus *Panchax* which had been placed by him outside the Cyprinoids and which Van Hasselt had already named, but not described, *Homalopsis*.

Heckel's work, in his *Fische Syriens*, as far as it deals with Cyprines in general, is of a more purely systematic nature, and is confined to the subfamily of the Cypriniformes.

Misters Agassiz and MacClelland had preceded Heckel in the appreciation of peculiarities of the dentition and of the relative length of the intestinal canal, for the determination of the genera, and their mutual relationships. However, Heckel went much further with regard to the dentition, and even tried to characterize the numerous genera accepted by him by the special form and arrangement of the pharyngeal teeth.

In the review, given by Heckel in 1843, he first separates the Cypriniformes in two main groups, the Macroentri and Brachyentri. Then he divides the Macroentri in two groups, in those with “dentes excavati” [scraping teeth] and those with “dentes masticatorii. [biting/chewing teeth]” Likewise, he divides the Brachyentri in those with “dentes uncinato-submolares” [hooked, submolariform teeth] and those with “dentes uncinato-subconici [hooked, subconical, teeth].” Thereafter he splits each of these subgroups further in smaller groups, primarily after the special form of the teeth, so that the whole is divided in 13 such smaller groups.

Although the pharyngeal teeth of the Cyprines in this way offer an excellent help for the identification of many genera, and even of their mutual relationships, Heckel went too far by basing various new genera almost exclusively on minor differences of the dentition and he has recognised this himself afterwards.

The number of new genera proposed by Heckel in 1843 is considerable. Even after subtraction of *Osteobrama*, *Cyrene*, *Scaphiodon*, *Leucosomus* and *Glossodon*, of which the four first mentioned already had been introduced in science by other scientists under the names *Rohtee*, *Dangila*, *Oreinus* and *Luxilus*, while the last falls entirely outside the order, the genera *Cyprinodon*, *Luciobarbus*, *Isocephalus*, ¹² *Tylognathus*, *Discognathus*, *Carpio*, *Aulopyge*, *Rhytidostomus*, *Chondrochylus*, *Chondrorhynchus*, *Phoxinellus*, *Leucos*, *Acanthobrama*, *Devario*, *Blicopsis*, *Blicca*, *Argyreus*, *Pachystomus* and *Idus* which he added to the already existing ones, remain. Not all of these genera could be retained and later have also partly been withdrawn by Heckel himself.

Apart from that, Heckel did not present his groups based on dentition characters as natural ones, and behind his synoptic table he even placed an arrangement of the 54 genera he accepted, in the way they would follow after each other in his opinion. An arrangement, which since then has experienced important changes.

In the same year and the same work Heckel presented even a third classification, for which he also took the mouth parts and fin structure as the basis. According to this classification the Cypriniformes are divided in ten tribes, which are not delimited precisely enough and have also remained unnamed. He placed the genera in these tribes as follows:

- Tribus I. *Cyprinus* Cuv., *Carpio* Heck., *Carassius* Nilss., *Gibelion* Heck., *Cyprinion* Heck., *Cyclurus* Ag. = *Amia* L?.
- “ II. *Devario* Heck., *Rhodeus* Ag,
- “ III. *Systomus* McCl., *Barbus* Cuv., *Labeobarbus* Rüpp., *Luciobarbus* Heck., *Schizothorax* Heck., *Scaphiodon* Heck., *Aulopyge* Heck., *Abrostomus* Smith.
- “ IV. *Catostomus* Les., *Rhytidostomus* Heck.?, *Exoglossum* Raf.
- “ V. *Labeo* Cuv., *Cyrene* Heck., *Rohita* Val., *Tylognathus* Heck., *Discognathus* Heck.
- “ VI. *Gobio* Cuv., *Tinca* Cuv., *Isocephalus* Heck.
- “ VII. *Gymnostomus* Heck., *Chondrostoma* Ag., *Chondrochylus* Heck., *Chondrorhynchus* Heck.
- “ VIII. *Abramis* Cuv., *Blicca* Heck., *Blicopsis* Heck., *Acanthobrama* Heck., *Osteobrama* Heck., *Glossodon* Heck., *Ballerus* Heck.
- “ IX. *Chela* Buch., *Esomus* Swns., *Pelecus* Ag., *Perilampus* McCl., *Alburnus* Rond., *Aspius* Ag.

- " X. Scardinius Bp., *Idus* Heck., *Leucos* Heck., *Pachystomus* Heck., *Leuciscus* Klein, *Phoxinellus* Heck., *Phoxinus* Ag., *Argyreus* Heck., *Squalius* Bp., *Leucosomus* Heck., *Opsarius* McCl.

In the year 1847 Heckel reconsidered his classification, and adopted a different basis for the main division of the Cypriniformes. He found this in the structure of the mouth parts, parts which are just as much related to the way of living of the species involved as the pharyngeal teeth and the relative lengths of the intestines, but which have the advantage that they show this way of living in an external and easily recognisable character.

13 Herewith a large step was taken in the natural classification of the Cypriniformes.

Heckel placed all species in which the lower jaw turns into a thin cartilaginous edge, in his *Temnochilae*, and all remaining ones in his *Pachychilae*. The last mentioned he left unchanged, but he split his *Temnochilae* in two subdepartments, based on the presence or absence of lips. In the group in which lips are present he placed the genera *Labeo* Cuv., *Rohita* Val., *Tylognathus* Heck., *Discognathus* Heck. and *Cyrene* Heck. – in the group without lip (lower lip), the genera *Cyprinion* Heck., *Dillonia* Heck., *Schizopyge* Heck., *Scaphiodon* Heck., *Gymnostomus* Heck., *Aspidoparia* Heck. and *Chondrostoma* Ag., genera, which he still subclassified according to the presence or absence of a bony fin ray in the dorsal fin and according to the shape and tooth formula of the pharyngeal teeth.

Apart from the genera *Dillonia*, *Schizopyge* and *Aspidoria*, Heckel, in 1847, erected another new genus of the *Pachychilae*, which he stamped with the name *Mola* in the *Addenda* and *Corrigenda*.

The better knowledge of the Cypriniformes is largely due to Heckel's studies, and without any doubt his classification would have been elaborated in more details if he could have disposed over the many South Asiatic, Indian archipelagic and North American forms with a peculiar jaw and lip structure, which have only become known for the first time or better known after the publication of his work.

Between the years 1842 and 1846 Prince Charles Lucien Bonaparte erected the genus *Gardonus* with the subgenera *Pigus*, *Gardonus* and *Cephalus* and moreover, in the genus *Leucos* the subgenus *Cenisophius*, in the genus *Scardinius* the subgenus *Hegerius* and in the genus *Leuciscus* the subgenus *Microlepis*. None of those names have been accepted by later ichthyologists.

In the year 1848 Heckel enriched the Cyprinodontoids with the genus *Xiphophorus*, and in the same year Mr Agassiz proposed in the Cyprinoids his genus *Rhinichthys*.

In the present decade again great progress was made in the knowledge of the Cyprines.

Very numerous forms, especially from North America and the Indian archipelago, came to double the number of known ones and again numerous new genera were erected.

The ideas concerning the value of these genera diverged greatly, and whereas on the one hand one was inclined to reject almost all of the numerous new genera and at most dissolve them with the rank of subgenera in the thirty old genera, on the other hand one went to the other extreme, by finding generic characters in such unimportant details of the organisation, that it indeed threatened to become difficult to set other than specific borders to the number of genera to be erected.

14 Mr Van der Hoeven in the second edition (1850) of his "Handboek der Dierkunde" remained a supporter of the retaining of the Artedean genera. He only conferred generic value to two remarkable recent types that had remained unknown to Artedi, *Aulopyge* Heck. and *Homaloptera* V. Hass. According to him all Cobitiformes belong to *Cobitis* Art. as a genus, and all Cypriniformes, with the exception of *Homaloptera* and *Aulopyge*, belong to *Cyprinus* Art. as a genus. Similarly, in the Cyprinodontoids he accepts only three genera, *Anableps*, *Cyprinodon* and *Orestias*, whereas he recognises all remaining types of this family only as subgenera of *Cyprinodon*.

Most specialists in the knowledge of the Cyprinids, Heckel and Misters Agassiz, Baird and Girard, continued to attach new generic names to the many new types observed by them, and Misters Gervais, Ayres, Poey and Basilewski proposed new genera as well. As a result the number of genera of the Cyprinids was almost doubled.

In this decade the Cyprinodontoids received from Mr Poey (1851) the genera *Gambusia*, *Limia* and *Girardinus*; from Misters Baird and Girard the genus *Heterandria*; from Mr Agassiz the genus *Zygonectes*, and from Mr Gervais (1853) the genus *Tellia*.

The Cypinoids received even much richer additions.

The Catastomines already had been considered as a complex of different genera by Rafinesque. Mr Agassiz still added to this the genera *Bubalichthys*, *Hylomyzon* and *Ptychostomus*, and Mr Girard added the genera *Minomus* and *Acomus*.

As for the remaining Cypriniformes, the new proposed genera were much more numerous.

It was, just like for the Cyprinodontoids and Catostomines almost exclusively the New World that yielded these types.

Only *Tellia* formed an exception for this for the Cyprinodontoids, just like *Leucaspis* Heck. and *Culter* Bas. for the Cyprinoids.

The types of the New World, and especially of North America gave Mr Baird occasion to the erection of *Ceratichthys*, *Cheilonemus* and *Hypsopsis*; Misters Baird and Girard to those of *Cochlognathus*, *Gila* and *Pogonichthys*; Mr Agassiz to those of *Acrocheilus*, *Campostoma*, *Hybognathus*, *Hybopsis*, *Hyborhynchus*, *Mylocheilus* and *Ptychocheilus*; Mr Ayres to those of *Mylopharodon*, and at last still Mr Girard to not less than 23 genera, which he named *Agosia*, *Alburnops*, *Alburnoides*, *Algoma*, *Algansea*, *Cheonda*, *Chrosomus*, *Clinostomus*, *Cliola*, *Codoma*, *Cyprinella*, *Dionda*, *Hudsonius*, *Lavinia*, *Meda*, *Moniana*, *Nocomis*, *Orthodon*, *Richardsonius*, *Semotilus*, *Siboma*, *Tigoma* and *Tiaroga*.

15 Judging from the indeed little sufficient descriptions given for most of these genera, one could expect that several of them would coincide with genera that were already known and that for many other ones the civil rights will be refused.

The genera that I myself have deemed to propose will be treated in more detail below.

Notwithstanding the doubling of the number of genera in the youngest decade, the natural classification of the Cyprines in the same period has not made the progress that one rightfully might expect after so numerous new forms had become known. In the meantime, many data to this end have been gathered, especially in the results of the last investigations of Mr Agassiz concerning the Catastomines and the North American Labeonines.

Mr C. Girard in 1856 split the Cypriniformes in the Cyprini, the Catastomi, the Chondrostomi and still in two more groups, which he indicated with the numbers IV and V.

His ideas of the groups named by him Cyprini and Chondrostomi however, differ remarkably from the usual ones, without being better. The natural classification of the Cypriniformes has gained nothing by it, just like his groups IV and V, which are based on the presence of *dentes raptatorii* and the presence or absence of barbels.

Half a century after the publication of his *Zoölogie analytique*, Mr Duméril reconsidered his old classification of the Cyprines, and in his new work gave a new classification, a classification that can boast more on originality than on naturalness.

In it the Cyprines are placed in his families Gymnopomes-Cyprinoides, Pogonophores and Lépidopomes. Of these families those of the Gymnopomes-Cyprinoides has the signification of the entire order in as much it contains the genera *Cyprinus*, *Tinca*, *Abramis*, *Pelecus*, *Leuciscus*, *Chondrostoma*, *Catostoma*, *Cyprinodon*, *Poecilia*, *Fundulus* and *Hydrargyra*.

Remarkably however, the genera *Barbus*, *Gobio*, *Anableps* and *Orestias* are excluded from this family. They are placed further on in the system. First the Clupeoiden (*Gymnopomes-Clupéides* Dum.) follow immediately after the *Gymnopomes-Cyprinoides*. Then the first four mentioned genera are placed in the family *Pogonophores*, in which also *Trichomycterus*, *Eremophilus*, *Vandellia* (all Siluroids) and *Gonorhynchus* are placed, the last mentioned, once again with *Fundulus* and *Hydrargyra*, after the family *Opisthoptères*, in the family *Lépidopomes*, which is a strange composition of *Cyprinodontoids*, *Mugiloids*, *Polynemoids*, *Tetragonuriformes*, *Scombresocioids* and *Notopteroids*.

16 Nothing more needs to be remarked about the classification of Mr Duméril, to make apparent how little it answers to a natural one.

The last proposed change in the classification of the Cyprinids know to me is that of Heckel and Mr R. Kner in their work "*Die Susswasserfische der österreichischen Monarchie*", which was published in 1858 in Vienna and on which I only recently set my eyes. However, it only concerns the separation of the Cobitines from the *Cyprinoids* and their elevation simultaneously with some real Siluroids, like *Cetopsis*, *Paraiondon* and *Trichomycterus*, to a proper family stamped with the name *Acanthopsidea*, a family that appears to me not to be acceptable on grounds that have to be further developed.

I believe the Cyprines consist of two families, the already by Mr Agassiz proposed *Cyprinoids* and *Cyprinodontoids*.

These families are, in my opinion, natural and moreover, sharply separated from each other, apart from the dentition also by the branchial apparatus.

Using the work of my predecessors, especially that of Heckel and of Mr Agassiz, I have tried to improve the subdivisions of the families, especially those of the *Cyprinoids*.

I split the *Cyprinoids* in three subfamilies, the *Cobitiformes*, *Homalopteraeformes* and *Cypriniformes*.

In the *Cobitiformes* I accept various well defined genera, two of which, *Lepidocephalus* and *Cobitichthys* have first been proposed by me.

The Cypriniformes comprise two major groups, the Phalocrognathines and Cheilognathines, already indicated by Heckel with the names Temnochilae and Pachychilae.

The Phalocrognathines comprise two smaller groups, the Labeonines and the Chondrostomines.

It was necessary to erect various new genera in the group of the Phalocrognathines. I have named these *Epalzeorhynchos*, *Discognathichthys*, *Schismatorhynchos*, *Morulus*, (formerly *Chrysophekadion*), *Rohitichthys*, *Barbichthys*, *Morara*, *Opisthcheilos*, *Pseudogobio*, *Acheilognathus* and *Mrigala*.

The main group of the Cheilognathines contains three sharply characterized groups in the Catastomines, the Cyprinines and the Barbines.

Only in the Barbines, the group which contains the most numerous forms, I believed I should propose new genera. I named these *Cylocheilichthys* [*Cyclocheilichthys*], *Balantiocheilos*, *Amblyrhynchichthys*, *Albulichthys*, *Hypselobarbus*, *Hemibarbus*, *Chanodichthys*, *Pseudoculter*, *Hemiculter*, *Elopichthys*, *Leptobarbus*, *Sarcocheilichthys*, ¹⁷ *Pseudophoxinus*, *Thynnichthys*, *Hypophthalmichthys*, *Gnathopogon*, *Rasbora*, *Pseudorasbora*, *Rasborichthys*, *Luciosoma*, *Laubuca* and *Macrochirichthys*.

The family of the Cyprinodontoids by far does not contain the diversity of types of Cyprinoids.

One can properly class them in the four groups Cyprinodontines, Aplocheilines, Anablepines and Orestiasines.

Only in the Cyprinodontines I believe to have found new generic types in *Fundulichthys* and *Pseudoxiphophorus*.

All these subfamilies, main groups, groups and genera are treated in detail below.

I also have, as far as my resources admitted, critically examined all the numerous new genera proposed by the more recent writers.

Often I met with the incompleteness, yes, frequently even the total insufficiency of the data written down in existing descriptions and illustrations, and these have long retarded me in formulating the results of that research.

In the mean time I have dared to sift those numerous genera, to unite some, even to separate others, and generally to point out fixed characters for their proper separation.

I believe to have sufficiently succeeded in this for numerous genera, and I am also convinced, that further and more careful observation of nature will learn, that for other genera the data have been written down insufficiently, and partly incorrect by ichthyologists.

But this review has often led to such large changes or limitations of the existing diagnosis of the genera, that maybe it would have been better to use none of the names of those genera, and to design a series of entirely new names in order to avoid the increase of the already now existing confusion.

I have not done this, primarily out of respect of my predecessors, and also, because there would be no end to the name changes when the principle would be adopted, that a once given names should be changed, as soon as it appears that the diagnosis attached to it is insufficient or incorrect.

Every naturalist is liable to the incorrect formulating of a genus, as long as he does not know all species belonging to that genus. And it is exactly this knowledge, which can be expected only in a far future.

The Indian Archipelago only has Cyprinids in its western half. As indicated above, they do not pass further east than Borneo and Bali. If however, ¹⁸ one also includes the Philippines in the Indian Archipelago, its border can be brought a little further to the east. Luçon still has its Cyprines, whereas Celebes, which lies on the same latitude, seems to be completely devoid of them.

In the Sunda archipelago, the Cyprines are very numerous in species, and remarkable types. But this is only applies to the Cyprinoids, not to the Cyprinodontoids.

Of the Cyprinoids I know now 141 archipelagic species; of the Cyprinodontoids only 2.

The poverty of Cyprinodontoids therefore strongly contrasts to the richness in Cyprinoids, and the last ones will appear to be even more numerous in species, when the higher parts of the large river basins of Java, and especially of Sumatra and Borneo will be better investigated.

In the meantime, the already gathered knowledge is not to be reconsidered as unimportant, especially when one takes into account the small time space in which it was gathered.

One searches in vain for certain species of archipelagic Cyprinids in the works of the older authors.

In Bont and Niehof one only finds superficial indications of Carps. These writers comprised under Carps also certain sea fishes. Bont even indicated the Notopterus depicted by him as *Tinca marina*.

Even in first two decades of this century one does not find a trace of knowledge concerning this subject.

One has to proceed to the year 1822, the time when H. Kuhl and C.J. van Hasselt dedicated their sharp observations to Java's nature, to get to the first knowledge of the archipelagic Cyprinids.

Stricken by the unexpected wealth of Cyprinids in the Javanese rivers, unexpected because two centuries of European settlement in these provinces had not placed in light any of these species, Kuhl and Van Hasselt, but especially Van Hasselt, plunged themselves with apparent predilection on the observation of curious forms, which the Javanese Cyprinids offered. It did not escape their critical view, that those forms differ in so many aspects from those of the European Cyprinids, and without doubt a large part of the work of later ichthyologist would have been superfluous, if they, who nowadays still could have flowered in science, would not have been wrested from it in their youth.

In a letter in the last part of December 1822, addressed to C.J. Temminck, and included as an abstract in the first part of the volume of 1823 of the "Algemene ¹⁹ Konsten Letterbode", the first results of the observations of Kuhl and Van Hasselt concerning the Javanese Cyprinids have been written down.

They had also already noted that the rivers in their different parts, depending of the transparency of the water and vertical extension [depth], feed different species.

They indicated a number of species, partly made known in more detail by Mr Valenciennes, and which almost without any exception have been rediscovered by me.

These species are

Cobitis fasciata Val. = *Nemacheilos fasciatus* K. v. H.

Acanthopsis dialyzona V. Hass. = *Cobitis macrorhynchos* Blkr.

- Acanthopthalmus fasciatus* V. Hass. = *Cobitis Kuhlii* Val.
 " *javanicus* V. Hass. = *Cobitis oblonga* Val.
Lepidocephalus Hasseltii Blkr. = *Cobitis octocirrhus* V. Hass. = *Cobitis Hasseltii* Val.
Homaloptera fasciata V. Hass. = *Homaloptera Wassinkii* Blkr.
 " *javanica* V. Hass. = *Homaloptera Zollingeri* Blkr.
Crossocheilos oblongus K. v. H. = *Labeo oblongus* Val.
Labeo (*Diplocheilos*) *erythropterus* Blkr. = *Diplocheilos erythropterus* V. Hass.
Lobocheilos falcifer K. v. H. = *Labeo falcifer* Val.
Dangila leptocheila Val. = *Labiobarbus leptocheilos* V. Hass.
 " *lipocheila* Val. = *Labiobarbus lipocheilos* V. Hass.
Cyprinus flavipinnis K. v. H. = *Cyprinus floripenna* (err. typogr.) V. Hass.
Labeobarbus tambra Blkr. = *Barbus tambra* K. v. H.
Systemus (*Barbodes*) *hypselonotus* Blkr. = *Barbus hypselonotus* V. Hass.
 " (") *maculatus* Blkr. = *Barbus maculatus* V. Hass. = *Barbus*
binotatus Kuhl.
 " (") *obtusirostris* Blkr. = *Barbus obtusirostris* V. Hass.
 " (") *rubripinnis* Blkr. = *Barbus rubripinnis* V. Hass.
Barbus striatus V. Hass. (clearly an unknown species, or perhaps
Rohita Hasseltii Val.?).
Hampala macrolepidota K. v. H.
Rasbora lateristriata Blkr. = *Leuciscus lateristriatus* K. v. H.
Chela anomalurus Blkr. = *Clupea anomalura* V. Hass. =
Oxygaster anomalura V. Hass.
Panchax Buchanani Val. = *Homalopsis javanica* K. v. H. =
Odontopsis armata V. Hass.?

Except for the above mentioned species Kuhl and Van Hasselt knew still a number of others like *Homaloptera erythrorhina* V. Hass., *Homaloptera ocellata* V. Hass., *Rohita vittata* Val. (*Labiobarbus vittatus* K. v. H.), *Cirrhina breviceps* Val. (*Labiobarbus breviceps* K. v. H.), *Barbichthys laevi* Blkr. (*Barbus nudicephalus* K. v. H.), *Cyclocheilichthys apogon* Blkr. (*Barbus apogon* Kuhl) and *Luciosoma setigerum* Blkr, however the names of those species have not been made public by them.

20 The rich collections sent to the Natural History Museum in Leiden by Kuhl and Van Hasselt and their successors of the former Commission of Natural History, have contributed much to a more detailed knowledge of the Javanese Cyprinids. Mr Valenciennes was able to see the material gathered there and has written down the results of it in the large *Histoire naturelle des Poissons*. I notice in the parts of the large work dealing with the Cyprinids 46 Javanese species of the order described, but the [actual] number of those species is less because various species have been introduced under different names two or three times as different species. After reduction of those species to their real significance, the remaining ones are the 38 species mentioned below.

- Cobitis fasciata* Val. = *Cobitis chrysolaimos* K. v. H., Val. = *Nemacheilos fasciatus*
 K. v. H. = *Cobitis suborbitalis* Val.
Acanthopthalmus fasciatus V. Hass. = *Cobitis oblonga* Val.
 " *javanicus* V. Hass. = *Cobitis oblonga* Val.
Lepidocephalus Hasseltii Blkr. = *Cobitis Hasseltii* Val.

- Homaloptera erythrorhina V. Hass. = Balitora erythrorhina Val.
 " pavonina Blkr. = Balitora pavonina Val.
 " Valenciennesi Blkr. = Balitora ocellata Val.
 Crossocheilos (Crossocheilos) oblongus V. Hass. = Labeo oblongus Val.
 Labeo (Diplocheilos) erythropterus Blkr. = Labeo erythropterus Val.
 " ?(" ?) hispidus Blkr. = Labeo hispidus Val.
 Lobocheilos (Lobocheilos) falcifer V. Hass. = Labeo falcifer Val.
 " (Gobionichthys) lipocheilos Blkr. = Chondrostoma lipocheilos Val.
 " ? or Rohita ?? = Cirrhina breviceps Val. = Labiobarbus breviceps K. v. H.
 Rohita (Rohita) Hasseltii Val.
 " (") microcephalus Val.
 " (") vittata Val. = Labeobarbus vittatus K. v. H. = Rohita erythrura Val.
 Dangila leptocheila Val. = Labiobarbus leptocheilus K. v. H. = Dangila Cuvieri Val.
 " Kuhlii Val.
 " lipocheila Val. = Labiobarbus lipocheilus K. v. H.
 Barbichthys laevis Blkr. = Barbus laevis Val. = Barbus nudicephalus K. v. H.
 Cyprinus flavipinnis K. v. H., Val. = Cyprinus vittatus Val.
 Labeobarbus douronensis Blkr. = Barbus douronensis Val.
 " soro Blkr. = Barbus soro Val.
 " tambra Blkr. = Barbus tambra Val.
 Cyclocheilichthys (Cyclocheilichthys) armatus Blkr. = Barbus armatus Val.
 " (Anematchthys) apogon Blkr. = Barbus apogon Kuhl = Systemus apogon Val.
- 21** Systemus (Barbodes) bramoides Blkr. = Barbus bramoidea Val.
 " (") hypselonotus Blkr. = Barbus hypselonotus V. Hass., Val.
 " (") lateristriga Blkr. = Barbus lateristriga Val.
 " (") maculatus Blkr. = Barbus maculatus V. Hass. =
 Barbus binotatus Kuhl, Val.
 " (") marginatus Blkr. = Barbus marginatus Val.
 " (") obtusirostris Blkr. = Barbus obtusirostris V. Hass.
 " (") rubripinnis Blkr. = Barbus rubripinnis V. Hass. Val. = Barbus
 orphoides Val. = Barbus gardonides Val. Javanese specimens
 Hampala macrolepidota K. v. H. = Capoëta macrolepidota Val.
 Luciosoma (Luciosoma) setigerum Blkr. = Barbus setigerum Val.
 Chela anomalurus Blkr. = Oxygaster anomalurus V. Hass. = Leuciscus oxygaster Val.
 Macrochirichthys? macrochir Blkr. = Clupea macrochira K. v. H. =
 Leuciscus macrochirus Val.
 Panchax Buchanani Val. = Homalopsis javanica K. v. H. = Odontopsis armata V. Hass.
- The knowledge of the Javanese Cyprinids was thereby increased with 20 species, making a total of 42 Cyprinids remaining to be inscribed in the registers of Java, only *Barbus striatus* V. Hass. excepted as totally uncertain species.
- Almost simultaneously with Mr Valenciennes, Heckel, in his *Fische Syriens*, made public some archipelagic Cyprinids.
- All species of Kuhl and Van Hasselt and Mr Valenciennes were exclusively from the western part of Java, whereas those of Heckel are all found outside Java, on Borneo and

the Philippines. With exception of the species for which I have not seen descriptions, they are briefly described in the aforementioned work. They are:

Systemus? (*Barbodes*) *carassiodes* Blkr. = *Barbus carassiodes* Heck., from Borneo.

Dangila festiva Blkr. = *Cyrene festiva* Heck., from Borneo.

" *ocellata* Blkr. = *Cyrene ocellata* Heck., from Borneo.

" *cyanopareja* Blkr. = *Cyrene cyanopareja* Heck., from the Philippines.

" *philippinia* Blkr. = *Cyrene philippinia* Heck., from the Philippines.

With these species the occurrence of Cyprinids on other islands of the Indian archipelago was proven for the first time.

In 1849 Mr Th. Cantor proved the occurrence of Cyprinids on the really more to the geographical area of Malacca belonging island Pinang, where he found the following species.

Hampala macrolepidota V. Hass. = *Capoëta macrolepidota* Val.

22 *Rasbora rasbora* Blkr? = *Leuciscus rasbora* Cuv., Cant.

Panchax Buchanani Val.

The knowledge of the Cyprinids had advanced this far when I started my investigations with regard to this order.

In total only 48 species were known for the entire archipelago, and the descriptions of these species for the greater part were to be considered as insufficient, which partly was to be expected as they had been made from specimens that had been preserved for a long time in spirit or as stuffed or dried objects.

If the knowledge concerning this of the largest island was not worth mentioning, apart from Java one knew virtually nothing about the remaining Sunda Islands.

The privilege befell to my share to supplement much of the lacking knowledge of the archipelagic Cyprinids, and to be the first to spread light over the Cyprinids of Sumatra, Bali, Biliton, Banka and Singapore.

Moreover, for numerous species I was the first to add them to science. And although various earlier erected species later, after penetrating deeper into this branch of research and after receiving a richer supply of materials, have appeared to belong to earlier known but insufficiently described species, after deducting of those species still 84 remain, which were described by me between 1859 [1849] and 1858 of which science earlier had no knowledge.

The descriptions of those species are spread over numerous contributions. I will show the names of these species in the order in which their descriptions were made public from 1849 to the present with the addition of newer names that differing insights in their generic relations have made necessary.

1849. *Systemus* (*Barbodes*) *gonionotus* Blkr. = *Barbus gonionotus* Blkr.

" (") *erythropterus* Blkr. = *Barbus erythropterus* Blkr.

Cyclocheilichthys (*Cyclocheilichthys*) *enoplos* Blkr. = *Barbus enoplos* Blkr.

Morulus chrysophekadion Blkr. = *Rohita chrysophekadion* Blkr. = *Rohita polyporos* Blkr. = *Rohita koilogeneion* Blkr. = *Rohita cyanomelas* Blkr. = *Chrysophekadion polyporos* Blkr.

Systemus (*Capoëta*) *brevis* Blkr. = *Capoëta brevis* Blkr.

Rasbora argyrotaenia Blkr. = *Leuciscus argyrotaenia* Blkr. = *Leuciscus cyanotaenia* Blkr. = *Leuciscus Schwenkii* Blkr.

1850. *Balantiocheilos melanopterus* Blkr. = *Barbus melanopterus* Blkr. = *Systemus melanopterus* Blkr.
Rohteichthys microlepis Blkr. = *Barbus microlepis* Blkr. = *Systemus microlepis* Blkr. = *Rohtee microlepis* Blkr.
 23 *Amblyrhynchichthys truncatus* Blkr. = *Barbus truncatus* Blkr. = *Systemus truncatus* Blkr.
Epalzeorhynchos kallopterus Blkr. = *Barbus kalopterus* Blkr.
Macrochirichthys uranoscopus Blkr. = *Leuciscus uranoscopus* Blkr.
Rasbora dusonensis Blkr. = *Leuciscus dusonensis* Blkr.
Dangila spilurus Blkr.
Rasbora kallochroma Blkr. = *Leuciscus kallochroma* Blkr.
1851. *Cyclocheilichthys (Siaja) microlepis* Blkr. = *Capoëta microlepis* Blkr.
Systemus (Systemus) bulu Blkr.
Leptobarbus Hoevenii Blkr. = *Barbus Hoevenii* Blkr.
Cyclocheilichthys (Siaja) siaja Blkr. = *Capoëta enoplos* Blkr. = *Capoëta siaja* Blkr.
Rohita (Rohita) Schlegeli Blkr.
Rasbora Einthoveni Blkr. = *Leuciscus Einthovenii* Blkr.
Cobitichthys barbatuloides Blkr. = *Cobitis barbatuloides* Blkr.
Rasbora cephalotaenia Blkr. = *Leuciscus cephalotaenia* Blkr.
1852. *Rohita (Rohita) melanopleura* Blkr.
Chela oxygastroides Blkr. = *Leuciscus oxygastroides* Blkr.
Systemus (Capoëta) padangensis Blkr. = *Capoëta padangensis* Blkr.
Hampala ampalong Blkr. = *Capoëta ampalong* Blkr.
Dangila sumatrana Blkr.
Rohita (Rohita) enneaporos Blkr.
 " (") *triporos* Blkr.
Thynnichthys thynnoides Blkr. = *Leuciscus thynnoides* Blkr.
Luciosoma (Trinematichthys) trinema Blkr. = *Leuciscus trinema* Blkr.
Rasbora sumatrana Blkr. = *Leuciscus sumatranus* Blkr.
Hymenophysa MacClellandi Blkr. = *Cobitis hymenophysa* Blkr.
 " *macracanthus* Blkr. = *Cobitis macracanthus* Blkr.
Cobitis Jaklesi Blkr.
Rohita (Rohita) Waandersi Blkr.
Homaloptera ophiolepis Blkr.
 " *salasur* Blkr.
 " *gymnogaster* Blkr.
1853. *Systemus (Barbodes) Huguenini* Blkr. = *Barbus Huguenini* Blkr.
Cyclocheilichthys (Cyclocheilichthys) repasson Blkr. = *Barbus repasson* Blkr.
Systemus (Capoëta) oligolepis Blkr. = *Capoëta oligolepis* Blkr.
Dangila fasciata Blkr.
Systemus (Barbodes) fasciatus Blkr. = *Barbus fasciatus* Blkr.
Rohita (Rohita) oligolepis Blkr.
Rasbora bankanensis Blkr. = *Leuciscus bankanensis* Blkr.
 24 *Cyclocheilichthys (Siaja) heteronema* Blkr. = *Barbus heteronema* Blkr.
 " (Anematichthys) *janthochir* Blkr. = *Systemus janthochir* Blkr.

- " (Cyclocheilichthys) macracanthus Blkr. = Barbus macracanthus Blkr.
 Systemus (Barbodes) Schwanefeldi Blkr. = Barbus Schwanefeldii Blkr, partly.
 Crossocheilos (Crossocheilichthys) cobitis Blkr. = Lobocheilos cobitis Blkr.
 Lobocheilos (Lobocheilos) Schwanefeldi Blkr.
 Schismatorhynchos heterorhynchos Blkr. = Lobocheilos heterorhynchos Blkr. =
 Schismatorhynchos lobocheilioides Blkr.
1854. Labeobarbus tambroides Blkr. = Barbus tambroides Blkr.
 Rasbora lateristriata Blkr. = Leuciscus lateristriatus V. Hass. in ms.
 Acanthopsis choirorhynchos Blkr. = Cobitis choirorhynchos Blkr.
 Lepidocephalus macrochir Blkr. = Cobitis macrochir Blkr.
 Aplocheilus javanicus Blkr.
 Systemus (Barbodes) amblycephalus Blkr. = Barbus amblycephalus Blkr.
 " (Capoëta) sumatranus Blkr. = Capoeta tetrazona Blkr.
1855. Luciosoma (Luciosoma) spilopleura Blkr.
 Rohita (Rohita) brachynotopterus Blkr.
 Diplocheilichthys pleurotaenia Blkr. = Lobocheilos pleurotaenia Blkr.
 Rasbora leptosoma Blkr. = Leuciscus leptosoma Blkr.
 Systemus (Barbodes) javanicus Blkr. = Barbus javanicus Blkr.
 " (") macrophthalmus Blkr. = Barbus macrophthalmus Blkr.
 " (") platysoma Blkr. = Barbus platysoma Blkr.
 " (Systemus) lawak Blkr.
 Cyclocheilichthys (Anematchthys) apogonoides Blkr. = Systemus apogonoides Blkr.
 " (Siaja) Deventeri Blkr. = Capoëta Deventeri Blkr.
 Systemus (Capoëta) leiacanthus Blkr. = Capoëta javanica Blkr.
 Albulichthys albuloides Blkr. = Systemus albuloïdes Blkr.
1856. Systemus(Barbodes) tetrazona Blkr. = Barbus tetrazona Blkr.
 Rasborichthys Helfrichi Blkr. = Leuciscus Helfrichii Blkr.
 Rohita (Rohita) borneënsis Blkr.
 " (") kahajanensis Blkr.
 " (") Kappenii Blkr.
1856. Systemus (Barbodes) koilometopon Blkr.
1857. " (") bunter Blkr. = Barbus bunter Blkr.
 Lobocheilos? (Lobocheilos?) Hasseltii Blkr. = Barbus Hasseltii Blkr.
 " (Gobionichthys) microcephalus Blkr. = Gobio microcephalus Blkr.
 Labeo (Diplocheilos) lucas Blkr. = Lobocheilos lucas Blkr.
 " (") rohitoides Blkr. = Lobocheilos rohitoides Blkr.
- 25 1858. Systemus (Systemus) Waandersi Blkr.
 Except for these 84 species my cabinet contains still some others, which have not been described before. I have named these:
 Crossocheilos (Crossocheilichthys) Langei.
 Lobocheilos (Lobocheilos) lehat.
 Rohita (Rohita) Kuhli.
 Cyclocheilichthys (Siaja) macropus.
 Systemus (Barbodes) belinka.
 " (") goniosoma.

Thynnichthys polylepis.
 Rasbora borneënsis.
 Chela hypophthalmus.

The last mentioned species will be made known for the first time in this work and will bring the number archipelagic species of Cyprinids discovered by myself to 95, and that of the total observed species to 141.

Only two of those species belong to the family of the Cyprinodontoids and therein to the group of the Aplocheilines, which group is restricted to the Old world and therein to South and East Asia and the Japanese and Indian Islands.

Of the remaining 139 Cyprinoids 11 species belonged to the subfamily of the Cobitiformes, which subfamily is also restricted to the Old world, however stretches across the entire width of Asia and Europe, whereas it has no representatives in Africa.

The Homalopteraeformes have 9 species on the Sunda Islands. Other species of this subfamily are only known from South Asia.

The Cypriniformes, numbered 119, all except for two species, belong to the groups of the Labeoines and the Barbines.

The Catastomines, one neither finds in the Indian archipelago nor in Europe, Africa and almost all of Asia, of which part of the world till now, only eastern Siberia, has indicated the existence of Catastomines, and then only of a single species.

It can also be said of the Cyprinines that they do not occur naturally in the Indian archipelago, as *Carassius auratus* is only a cultured fish there, and *Cyprinus flavus* is that as well and has not spread further than the highlands of the western part of Java. The proper motherland of the Cyprinines is restricted to the temperate and colder areas of Asia and Europe, from where some species have been spread over the most divergent parts of the earth.

The archipelagic Labeoines, according to the present state of science, are 42 or 43 in number. This group is recovered in all continents, were ²⁶ Cyprinoids occur, however its species are so numerous in South and South-western Asia, and in North America, as they are sparse in Europe, South Africa and Eastern Asia, whereas they are totally lacking in North America and North Asia.

The Barbines in the Sunda archipelago are represented by the most numerous species. Those species are 74 in number, and therefore account for the largest half of the total of the archipelagic Cyprinoids. Moreover, the Barbines in general are the richest group in the entire family, as the total number of species, taken over the entire earth and the now living creation, accounts for more than 64% of all the now living species of the entire family. They are relatively the most numerous in South Asia and Europe, the rarest in North Asia and Africa.

The knowledge, gained by my observations, has already shed some light on the geographical distribution of the archipelagic Cyprines

When I started my research, on the map of the Indian Archipelago, Cyprines were only known from a part of western Java and one single spot on both Borneo and Luçon, namely, as indicated above, Luçon and Borneo each with 2, Java with 42 species, and Pinang, if one wants to include this island in the archipelago, with 3 species.

Those proportions nowadays are changed remarkably.

From Java I know 73, from Bali 2, from Sumatra 84, from Nias 1, from Singapore 3, from Banka 10, from Biliton 4, and from Borneo 52 Cyprines; figures that surely by far do not express the real proportions of the species occurring on the islands, but are still remarkable, because they show, on the one hand the earlier not expected wealth of representatives of the order on all larger Sunda Islands, and on the other hand, that especially Sumatra is very rich in Cyprinids, certainly much richer than Java, as it, although less well researched than Java has at present already 11 species more. The figure of Borneo, most probably would also be much higher, if the carps that were sent to me from there, would not have sprung only from the lower parts of its large rivers. Surely a totally different world of Cyprinids is moving in the heart of this largest island of the world, than near its rapids, just like this is already proven for Java and Sumatra.

Only a short while ago there were many reasons to assume that the archipelagic Cyprines form a totally isolated fauna.

Not a single archipelagic Cyprinoid species was known from outside the archipelago, as *Barbus gardonides* Val. from Bengal which according to Mr Valenciennes also ²⁷ occurs on Java, is not found here, – and even if one wished to draw Pinang within the limits of the Archipelago, it still is doubtful whether the species described by Mr Cantor from here as *Leuciscus rasbora*, indeed is the same as *Cyprinus rasbora* of Buchanan.

Only of Panchax, thus a Cyprinodont, one knows that it occurs on the Sunda islands as well as in Bengal.

But also concerning this new light has been shed in the youngest time.

One owes this to the investigations of Count Francis de Castelnau. With great accuracy Mr De Castelnau, during his sojourn in Siam, at Bangkok, has recorded the physiognomy of the fishes he observed there in an album. This album, benevolently sent to me for inspection, with certainty has led to the recognition of a large number of archipelagic fish species amongst which various Cyprinoids. Through this it is proven, that in Siam's rivers also are living *Morulius chrysophekadion*, *Rohita (Rohita) melano-pleura*, *Rohita (Rohita) borneënsis*, *Systemus (Systemus) bulu*, *Systemus (Barbodes) rubripinnis*, *Amblyrhynchichthys truncatus*, *Balantiocheilos melanopterus*, *Rasbora dusonensis* and *Macrochirichthys uranoscopus*. And since the same album has also learned that in various Labyrinth fishes, Rhynchobdelloids and Siluroids, which formerly were only known from the rivers of the Indian archipelago, occur also in freshwaters of Siam, the large relationships between the freshwater fish fauna of Siam, and that of the Sunda Islands is undeniable. That relationship is even in such a way, that, like I have expressed elsewhere, when I would not have been familiar with the origin of the figures of Mr De Castelnau, I would have thought that with regard to the freshwater fishes, they would represent the freshwater fauna of Borneo or Sumatra.

There is no doubt, that a continued research of the freshwater faunas of the aforementioned provinces, which are separated from each other by a rather wide sea, will bring to light many remarkable points with regard to the geographical distribution of the Cyprines, and that many geologists will find occasion for theories on the genetic coherence of those regions, and the origin of the Chinese and Malayan seas lying between them.

Another curious point is the division of various species of Cyprines over the various Sunda Islands. As was already shown for the plant world, for several classes of the ani-

mal kingdom, and in the class of fishes, particularly for the Silurids, that Sumatra and Borneo agree more with each other than one of both with Java; the same can now be proved with regard to the Cyprines. Numerous species are found equally on Borneo and Sumatra, which are lacking on Java, and numerous species are found on Java, which are lacking on Borneo and Sumatra. In as much one ²⁸ knows of the islands of Banka and Biliton, they are in a Cyprinologic respect similarly closer related to Borneo and Sumatra, than to Java.

According to the present state of knowledge the following proportions can be observed.

1°. Species occurring on all three large Sunda Islands (Java, Sumatra, Borneo) are: *Hymenophysa MacClellandi*, *Rohita Hasseltii*, *Rohita vittata*, *Dangila Cuvieri*, *Barbichthys laevis*, *Cyclocheilichthys (Anematischthys) apogon* (also on Banka), *Systemus (Barbodes) lateristriga* (also on Singapore, Banka and Biliton), *Systemus (Barbodes) maculatus* (also on Bali, Nias, Singapore, Banka and Biliton), *Hampala macrolepidota* (also on Pinang), *Chela anomalurus*, *Chela oxygastroides* and *Panchax Buchanani* (also on Pinang).

2°. Java has in common with Sumatra, but not with Borneo; *Cobitis fasciata*, *Acanthopthalmus javanicus*, *Acanthopthalmus fasciatus*, *Homaloptera fasciata*, *Homaloptera ocellata*, *Homaloptera ophiolepis*, *Homaloptera salusur*, *Crossocheilos (Crossocheilos) oblongus*, *Crossocheilos (Crossocheilichthys) cobitis*, *Lobocheilos (Lobocheilos) falcifer*, *Lobocheilos (Lobocheilos) Schwanefeldi*, *Morulius chrysophekadion*, *Rohita microcephalus*, *Labeobarbus douronensis*, *Labeobarbus soro*, *Labeobarbus tambra*, *Labeobarbus tambroides*, *Cyclocheilichthys (Cyclocheilichthys) armatus*, *Systemus (Barbodes) javanicus*, *Systemus (Barbodes) marginatus*, *Luciosoma (Luciosoma) setigerum*, *Rasbora argyrotaenia* and *Rasbora lateristriata*.

3°. Borneo has in common with Java but not with Sumatra: *Acanthopsis dialyzona* and *Systemus (Barbus) erythropterus*.

4°. Borneo has in common with Sumatra but not with Java: *Hymenophysa macracanthus*, *Epalzeorhynchus kallopterus*, *Rohita melanopleura*, *Rohita Schlegeli*, *Rohita triporos*, *Dangila fasciata*, *Dangila ocellata*, *Cyclocheilichthys (Cyclocheilichthys) siaja*, *Cyclocheilichthys (Cyclocheilichthys) microlepis*, *Balantiocheilos melanopterus*, *Systemus (Barbodes) fasciatus* (also on Banka), *Systemus (Barbodes) Schwanefeldi*, *Systemus (Systemus) bulu*, *Hampala ampalong*, *Albulichthys albuloides*, *Amblyrhynchichthys truncatus*, *Rohteichthys microlepis*, *Leptobarbus Hoevenii*, *Luciosoma (Trinematischthys) trinema*, *Thynnichthys polylepis*, *Rasbora dusonensis* and *Macrochirichthys uranoscopus*.

When the higher parts of the river basins will be investigated for Cyprinids, it will also become evident that many species mentioned under 2° also live in clear river water in Borneo, but I do not believe that future investigations will find many species on Java mentioned in this paragraph.

5°. To Java belong: *Lepidocephalus Hasseltii*, *Homaloptera erythrorhina*, *Homaloptera pavonina*, *Homaloptera Valenciennesi*, *Labeo (Diplocheilos) erythropterus*, *Labeo (Diplocheilos) lucas*, *Labeo (Diplocheilos) rohitoideis*, *Labeo? (Diplocheilos) hispidus*, *Lobocheilos (Lobocheilos) lebat*, *Lobocheilos (Gobionichthys) ²⁹ javanicus*, *Lobocheilos (Gobionichthys) microcephalus*, *Lobocheilos?? Hasseltii*, *Dangila Kuhli*, *Dangila lipocheila*, *Cirrhina breviceps Val.*, *Cyclocheilichthys (Cyclocheilichthys) enoplos*, *Cyclocheilichthys (Siaja) Deventeri*, *Cyclocheilichthys (Anematischthys) apo-*

gonides, *Systemus* (*Barbodes*) *bramoides*, *Systemus* (*Barbodes*) *bunter*, *Systemus* (*Barbodes*) *gonionotus*, *Systemus* (*Barbodes*) *hypselonotus*, *Systemus* (*Barbodes*) *koilometopon*, *Systemus* (*Barbodes*) *macrophthalmus*, *Systemus* (*Barbodes*) *obtusirostris*, *Systemus* (*Barbodes*) *platysoma*, *Systemus* (*Capoëta*) *brevis*, *Systemus* (*Capoëta*) *leiacanthus*, *Systemus* (*Systemus*) *lawak*, *Systemus* (*Systemus*) *Waandersi*, *Macrochirichthys*? *macrochirus* and *Aplocheilos javanicus*.

6°. To Sumatra belong: *Cobitis Jaklesi*, *Acanthopsis choirorhynchus*, *Lepidocephalus macrochir*, *Homaloptera gymnogaster*, *Crossocheilos* (*Crossocheilichthys*) *Langei*, *Schismatorhynchus heterorhynchus*, *Diplocheilichthys pleurotaenia*, *Rohita brachynotopterus*, *Rohita eneaporos*, *Rohita Kuhli*, *Dangila sumatrana*, *Cyclocheilichthys* (*Cyclocheilichthys*) *macracanthus*, *Cyclocheilichthys* (*Cyclocheilichthys*) *repasson*, *Systemus* (*Barbodes*) *belinka*, *Systemus* (*Barbodes*) *goniosoma*, *Systemus* (*Barbodes*) *Huguenini*, *Systemus* (*Capoëta*) *oligolepis*, *Systemus* (*Capoëta*) *padangensis*, *Systemus* (*Capoëta*) *sumatranus*, *Thynnichthys thynnoides*, *Rasbora leptosoma*, *Rasbora sumatrana* and *Chela hypophthalmus*.

7°. To Borneo belong: *Cobitichthys barbatuloides*, *Rohita Kappenii*, *Dangila festiva*, *Dangila spilurus*, *Cyclocheilichthys* (*Siaja*) *heteronema*, *Cyclocheilichthys* (*Siaja*) *macrochirus*, *Cyclocheilichthys* (*Anematichthys*) *janthochir*, *Systemus* (*Barbodes*) *amblycephalus*, *Systemus* (*Barbodes*) *tetrazona* and *Rasbora borneënsis*,

8°. To Banka belong: *Rohita oligolepis*, *Rohita Waandersi* and *Rasbora bankanensis*.

9°. Biliton till now does not have species that occur only there, just like Bali, Nias and Singapore, whereas from the remaining Sunda Islands not one species of this order has become known.

10°. To the Philippines belong: *Dangila cyanopareja* and *Dangila philippinia*, the only two Cyprinid species thusfar reported from that island group.

With regard to the distribution of generic types over the Sunda Islands is apparent from the above:

1°. That the three large Sunda Island have in common the genera *Hymenophysa*, *Acanthopsis*, *Rohita*, *Dangila*, *Barbichthys*, *Cyclocheilichthys*, *Systemus*, *Hampala*, *Luciosoma*, *Rasbora*, *Chela*, *Macrochirichthys*? and *Panchax*,

2°. That Java has in common with Sumatra but not with Borneo: *Cobitis*, *Acanthophtalmus*, *Lepidocephalus*, *Homaloptera*, *Crossocheilos*, *Lobocheilos*, *Morulius*, *Labeobarbus*, and the subgenus *Luciosoma*,

3°. That Borneo with Java has not in common a single genus, which not also occurs on Sumatra.

³⁰ 4°. That Borneo, on the contrary, has in common with Sumatra, but not also with Java, the genera *Epalzeorhynchus*, *Balantiocheilos*, *Albulichthys*, *Amblyrhynchichthys*, *Rohteichthys*, *Leptobarbus*, *Thynnichthys* and the subgenus *Trinematichthys*.

5°. That in the archipelago exclusively on Java are found the subgenera *Diplocheilos* and *Gobionichthys* and the genus *Cyprinus*, of which however only *Gobionichthys* belongs to Java.

6°. That to Sumatra belongs the genus *Diplocheilichthys* whereas the genus *Schismatorhynchus* is also represented in South Asia, but in the archipelago is only found on Sumatra.

7°. That the genus *Rasborichthys* is only found on Borneo.

8°. That the species that have become known from Bali, Nias, Biliton, Banka, Singapore and the Philipines all belong to the genera that also occur on other islands.

The abovementioned proportions in the statement following hereafter are represented in tabular form.

When one wants to have an idea of the wealth in species unfolded above, than it is only necessary to compare Java or Sumatra with any other large island, situated close to a continent rich in Cyprines.

With regard to this Great Britain stands in about the same relation to Europe, as Sumatra or Java to Asia.

England and Scotland taken together, in size hardly differing from Java, according to the "List of the specimens of British animals in the Collection of the British Museum" by Mr J.E. Gray, feed only 21 species of Cyprines, i.e. 2 Cobitiformes, 3 Cyprinines, and 16 Barbines, and of those species some were even brought over from the continent.

From Java on the contrary, one knows at present already 73 and from Sumatra 84 Cyprines and those figures certainly too many species do not express the real number occurring on them, whereas it is not to be expected that the figure for Great Britain will be remotely importantly changed by new observations.

If a comparison is made on a somewhat larger scale, e.g. of Java and Sumatra combined, with any large region rich in Cyprines and closely investigated by naturalists, for example Austria, like it was defined at the beginning of this year, with its large river basins of the Danube and the Po river, than it appears that Sumatra alone at present has more Cyprines than Austria as a whole, as in the recent work of Heckel and Mr R. Kner on the Austrian fishes in total 81 Cyprines are mentioned. And if one combines Java and Sumatra, to get ³¹ a surface area that is more comparable to that of Austria, than it appears that one knows at present from both islands already 40 species more, than from the entire Austrian nation.

The whole of Europe possesses, according to our present state of knowledge, just as much Cyprines, as nowadays have been discovered from the Sunda Islands.

The Cyprines are distributed over the Indian Archipelago as follows.

CYPRINORUM ARCHIPELAGICORUM DISTRIBUTIO GEOGRAPHICA.

N O M I N A.	Java.	Bali.	Sumatra.	Nias.	Pinang.	Singapura.	Banka.	Biliton.	Borneo.	Ins. Philipp.	Extra. Archipel.
FAMILIA CYPRINOIDEI.											
<i>Subfamilia Cobitiformes.</i>											
1 Hymenophysa MacClelandi Blkr.	1	"	1	"	"	"	"	"	1	"	"
2 " macracanthus Blkr. . .	"	"	1	"	"	"	"	"	1	"	"
3 Cobitis fasciata Val.	1	"	1	?	"	"	"	"	"	"	"
4 " Jaklesi Blkr.	"	"	1	"	"	"	"	"	"	"	"
5 Cobitichthys barbatuloides Blkr. .	"	"	"	"	"	"	"	"	1	"	"
6 Acanthopsis choirorhynchos Blkr.	"	"	1	"	"	"	"	"	"	"	"
7 " dialyzona V. Hass.	1	"	"	"	"	"	"	"	1	"	"
8 Acanthopthalmus fasciatus V. Hass.	1	"	1	"	"	"	"	"	"	"	"
9 " javanicus V. Hass.	1	"	1	"	"	"	"	"	"	"	"
10 Lepidocephalus Hasseltii Blkr. . .	1	"	"	"	"	"	"	"	"	"	"
11 " macrochir Blkr.	"	"	1	"	"	"	"	"	"	"	"
Tot.	6	"	8	?	"	"	"	"	4	"	"
<i>Subfamilia Homalopteraformes.</i>											
12 Homaloptera fasciata V. Hass. . .	1	"	1	"	"	"	"	"	"	"	"
13 " gymnogaster Blkr.	"	"	1	"	"	"	"	"	"	"	"
14 " javanica V. Hass.	1	"	1	"	"	"	"	"	"	"	"
15 " ocellata V. Hass.	1	"	1	"	"	"	"	"	"	"	"
16 " ophiolepis Blkr.	1	"	1	"	"	"	"	"	"	"	"
17 " salusur Blkr.	1	"	1	"	"	"	"	"	"	"	"
18 " erythrorhina Blkr.	1	"	"	"	"	"	"	"	"	"	"
19 " pavonina Blkr.	1	"	"	"	"	"	"	"	"	"	"
20 " Valenciennesi Blkr.	1	"	"	"	"	"	"	"	"	"	"
Totaal. ; .	8	"	6	"	"	"	"	"	"	"	"
<i>Subfamilia Cypriniformes.</i>											
21 Crossocheilos (Crossocheilos) oblongus V. Hass.	1	"	1	"	"	"	"	"	"	"	"
22 " (") cobitis Blkr.	1	"	1	"	"	"	"	"	"	"	"
23 " (") Langei Blkr.	"	"	1	"	"	"	"	"	"	"	"
24 Epalzeorhynchos kallopterus Blkr.	"	"	1	"	"	"	"	"	1	"	"
25 Schismatorhynchos heterorhynchos Blkr.	"	"	1	"	"	"	"	"	"	"	"
26 Diplocheilichthys pleurotaenia Blkr.	"	"	1	"	"	"	"	"	"	"	"
Transp. . . .	2	"	6	"	"	"	"	"	1	"	"

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N O M I N A.		Java.	Bali.	Sumatra.	Nias.	Pinang.	Singapura.	Banka.	Biliton.	Borneo.	Ins. Philipp.	Extra. Archipel.
	Per transp.	2	"	6	"	"	"	"	"	1	"	"
27	Labeo (Diplocheilos) erythropterus Blkr.	1	"	"	"	"	"	"	"	"	"	"
28	" (") lucas Blkr.	1	"	"	"	"	"	"	"	"	"	"
29	" (") rohitoides Blkr.	1	"	"	"	"	"	"	"	"	"	"
30	" ? (") hispidus Blkr.	1	"	"	"	"	"	"	"	"	"	"
31	Lobocheilos (Lobocheilos) falcifer V. Hass.	1	"	1	"	"	"	"	"	"	"	"
32	" (") lehat Blkr.	1	"	"	"	"	"	"	"	"	"	"
33	" (") Schwanefeldi Blkr.	1	"	1	"	"	"	"	"	"	"	"
34	" (Gobionichthys) javanicus Blkr.	1	"	"	"	"	"	"	"	"	"	"
35	" (") microcephalus Blkr.	1	"	"	"	"	"	"	"	"	"	"
36	" ? (Lobocheilos?) Hasseltii Blkr.	1	"	"	"	"	"	"	"	"	"	"
37	Morulius chrysophekadion Blkr.	1	"	1	"	"	"	"	"	"	"	1
38	Rohita (Rohita) borneensis Blkr.	"	"	"	"	"	"	"	"	1	"	1
39	" (") brachynotopterus Blkr.	"	"	1	"	"	"	"	"	"	"	"
40	" (") enneaporos Blkr.	"	"	1	"	"	"	"	"	"	"	"
41	" (") Hasseltii Val.	1	"	1	"	"	"	"	"	1	"	"
42	" (") kahajanensis Blkr.	"	"	1	"	"	"	"	"	1	"	"
43	" (") Kappeni Blkr.	"	"	"	"	"	"	"	"	1	"	"
44	" (") Kuhli Blkr.	"	"	1	"	"	"	"	"	"	"	"
45	" (") melanopleura Blkr.	"	"	1	"	"	"	"	"	1	"	1
46	" (") microcephalus Blkr.	1	"	1	"	"	"	"	"	"	"	"
47	" (") oligolepis Blkr.	"	"	"	"	"	"	1	"	"	"	"
48	" (") Schlegeli Blkr.	"	"	1	"	"	"	"	"	1	"	1
49	" (") triporos Blkr.	"	"	1	"	"	"	"	"	1	"	"
50	" (") vittata Val.	1	"	1	"	"	"	"	"	1	"	"
51	" (") Waandersi Blkr.	"	"	"	"	"	"	1	"	"	"	"
52	Dangila Cuvieri Val.	1	"	1	"	"	"	"	"	1	"	"
53	" fasciata Blkr.	"	"	1	"	"	"	"	"	1	"	"
54	" festiva Blkr.	"	"	"	"	"	"	"	"	1	"	"
55	" Kuhlii Val.	1	"	"	"	"	"	"	"	"	"	"
56	" ocellata Blkr.	"	"	1	"	"	"	"	"	1	"	"
57	" spilurus Blkr.	"	"	"	"	"	"	"	"	1	"	"
58	" sumatrana Blkr.	"	"	1	"	"	"	"	"	"	"	"
59	" lipocheilos Val.	1	"	"	"	"	"	"	"	"	"	"
60	" cyanopareja Blkr.	"	"	"	"	"	"	"	"	"	1	"
61	" philippina Blkr.	"	"	"	"	"	"	"	"	"	1	"
62	Barbichthys laevis Blkr.	1	"	1	"	"	"	"	"	1	"	"
63	Cirrhina breviceps Val. (gen.??).	1	"	"	"	"	"	"	"	"	"	"
64	Cyprinus flavipinnis V. Hass.	1	"	"	"	"	"	"	"	"	"	1
65	Carassius auratus Nilss.	1	"	"	"	"	"	1	"	"	"	1
66	Labeobarbus douronensis Blkr.	1	"	1	"	"	"	"	"	"	"	"
67	" soro Blkr.	1	"	1	"	"	"	"	"	"	"	"
68	" tambra Blkr.	1	"	1	"	"	"	"	"	"	"	"
69	" tambroides Blkr.	1	"	1	"	"	"	"	"	"	"	"
70	Cyclocheilichthys (Cyclocheilichthys) armatus Blkr.	1	"	1	"	"	"	"	"	"	"	"
	Transp.	28	"	29	"	"	"	3	"	15	2	6

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N O M I N A.		Java.	Bali.	Sumatra.	Nias.	Pinang.	Singapura.	Banka.	Bliton.	Borneo.	Ins. Philipp.	Extra. Archipel.
	Per transp.	28	0	29	0	0	0	3	0	15	2	6
71	<i>Cyclocheilichthys (Cyclocheilichthys) enoplos</i> Blkr.	1	"	"	"	"	"	"	"	"	"	"
72	" (") <i>macracanthus</i> Blkr.	"	"	1	"	"	"	"	"	"	"	"
73	" (") <i>repasson</i> Blkr.	"	"	1	"	"	"	"	"	"	"	"
74	" (Siaja) <i>Deventeri</i> Blkr.	1	"	"	"	"	"	"	"	"	"	"
75	" (") <i>heteronema</i> Blkr.	"	"	"	"	"	"	"	"	1	"	"
76	" (") <i>siaja</i> Blkr.	"	"	1	"	"	"	"	"	1	"	"
77	" (") <i>macropus</i> Blkr.	"	"	"	"	"	"	"	"	1	"	"
78	" (") <i>microlepis</i> Blkr.	"	"	1	"	"	"	"	"	1	"	"
79	" (<i>Anematischthys</i>) <i>apogon</i> Blkr.	1	"	1	"	"	"	1	"	1	"	"
80	" (") <i>apogonides</i> Blkr.	1	"	"	"	"	"	"	"	"	"	"
81	" (") <i>janthochir</i> Blkr.	"	"	"	"	"	"	"	"	1	"	"
82	<i>Balantiocheilos melanopterus</i> Blkr.	"	"	1	"	"	"	"	"	1	"	1
83	<i>Systemus (Barbodes) amblycephalus</i> Blkr.	"	"	"	"	"	"	"	"	1	"	"
84	" (") <i>belinka</i> Blkr.	"	"	1	"	"	"	"	"	"	"	"
85	" (") <i>bramoides</i> Blkr.	1	"	"	"	"	"	"	"	"	"	"
86	" (") <i>bunter</i> Blkr.	1	"	"	"	"	"	"	"	"	"	"
87	" (") <i>erythropterus</i> Blkr.	1	"	"	"	"	"	"	"	1	"	"
88	" (") <i>fasciatus</i> Blkr.	"	"	1	"	"	"	1	"	1	"	"
89	" (") <i>gonionotus</i> Blkr.	1	"	"	"	"	"	"	"	"	"	"
90	" (") <i>goniosoma</i> Blkr.	"	"	1	"	"	"	"	"	"	"	"
91	" (") <i>Huguenini</i> Blkr.	"	"	1	"	"	"	"	"	"	"	"
92	" (") <i>hypselonotus</i> Blkr.	1	"	"	"	"	"	"	"	"	"	"
93	" (") <i>javanicus</i> Blkr.	1	"	1	"	"	"	"	"	"	"	"
94	" (") <i>lateristriga</i> Blkr.	1	"	1	"	"	1	1	1	1	"	"
95	" (") <i>koilometopon</i> Blkr.	1	"	"	"	"	"	"	"	"	"	"
96	" (") <i>macrophthalmus</i> Blkr.	1	"	"	"	"	"	"	"	"	"	"
97	" (") <i>maculatus</i> Blkr.	1	1	1	1	"	1	1	1	1	"	"
98	" (") <i>marginatus</i> Blkr.	1	"	1	"	"	"	"	"	"	"	"
99	" (") <i>obtusirostris</i> Blkr.	1	"	"	"	"	"	"	"	"	"	"
100	" (") <i>platysoma</i> Blkr.	1	"	"	"	"	"	"	"	"	"	"
101	" (") <i>rubripinnis</i> Blkr.	1	"	"	"	"	"	"	"	"	"	1
102	" (") <i>Schwaneveldi</i> Blkr.	"	"	1	"	"	"	"	"	1	"	"
103	" (") <i>tetrazona</i> Blkr.	"	"	"	"	"	"	"	"	1	"	"
104	" (<i>Capoëta</i>) <i>brevis</i> Blkr.	1	"	"	"	"	"	"	"	"	"	"
105	" (") <i>leiacanthus</i> Blkr.	1	"	"	"	"	"	"	"	"	"	"
106	" (") <i>oligolepis</i> Blkr.	"	"	1	"	"	"	"	"	"	"	"
107	" (") <i>padangensis</i> Blkr.	"	"	1	"	"	"	"	"	"	"	"
108	" (") <i>sumatranus</i> Blkr.	"	"	1	"	"	"	"	"	"	"	"
109	" (<i>Systemus</i>) <i>bulu</i> Blkr.	"	"	1	"	"	"	"	"	1	"	1
110	" (") <i>lawak</i> Blkr.	1	"	"	"	"	"	"	"	"	"	"
111	" (") <i>Waandersi</i> Blkr.	1	"	"	"	"	"	"	"	"	"	"
112	<i>Hampala ampaloug</i> Blkr.	"	"	1	"	"	"	"	"	1	"	"
113	" <i>macrolepidota</i> K. v. H.	1	"	1	"	1	"	"	"	1	"	"
114	<i>Albulichthys albuloides</i> Blkr.	"	"	1	"	"	"	"	"	1	"	"
115	<i>Amblyrhynchichthys truncatus</i> Blkr.	"	"	1	"	"	"	"	"	1	"	1
116	<i>Rohteichthys microlepis</i> Blkr.	"	"	1	"	"	"	"	"	1	"	"
117	<i>Leptobarbus Hoevenii</i> Blkr.	"	"	1	"	"	"	"	"	1	"	"
	Transp. :	51	1	54	1	1	2	7	2	36	2	10

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N O M I N A.	Java.	Bali.	Sumatra.	Nias.	Pinang.	Singapura.	Banka.	Biliton.	Borneo.	Ins. Philipp.	Extra. Archipel.
Per transp.	51	1	54	1	1	2	7	2	36	2	10
118 Luciosoma (Luciosoma) setigerum Blkr.	1	"	1	"	"	"	"	"	"	"	"
119 " (") spilopleura Blkr.	"	"	1	"	"	"	"	"	"	"	1
120 " (Trinematichthys) trinema Blkr.	"	"	1	"	"	"	"	"	1	"	"
121 Thynnichthys thynnoides Blkr.	"	"	1	"	"	"	"	"	1	"	"
122 " polylepis Blkr.	"	"	1	"	"	"	"	"	1	"	"
123 Rasbora argyrotaenia Blkr.	1	1	1	"	"	"	"	"	"	"	"
124 " bankanensis Blkr.	"	"	"	"	"	"	1	"	"	"	"
125 " borneënsis Blkr.	"	"	"	"	"	"	"	"	1	"	"
126 " cephalotaenia Blkr.	"	"	"	"	"	"	1	1	1	"	"
127 " dusonensis Blkr.	"	"	1	"	"	"	"	"	1	"	1
128 " Einthoveni Blkr.	"	"	"	"	"	1	1	1	1	"	"
129 " kallochroma Blkr.	"	"	"	"	"	"	1	"	1	"	"
130 " lateristriata Blkr.	1	"	1	"	"	"	"	"	"	"	"
131 " leptosoma Blkr.	"	"	1	"	"	"	"	"	"	"	"
132 " sumatrana Blkr.	"	"	1	"	"	"	"	"	"	"	"
133 " rasbora Blkr.	"	"	"	"	1	"	"	"	"	"	1
134 Rasborichthys Helfrichi Blkr.	"	"	"	"	"	"	"	"	1	"	"
135 Chela anomalura Blkr.	1	"	1	"	"	"	"	"	1	"	"
136 " hypophthalmus Blkr.	"	"	1	"	"	"	"	"	"	"	"
137 " oxygastroides Blkr.	1	"	1	"	"	"	"	"	1	"	"
138 Macrochirichthys uranoscopus Blkr.	"	"	1	"	"	"	"	"	1	"	1
139 " ?? macrochirus Blkr.	1	"	"	"	"	"	"	"	"	"	"
Tot. : :	57	2	68	1	2	3	11	4	47	2	14
Tot. <i>Cobitiiformes</i>	6	"	8	"	"	"	"	"	4	"	"
" <i>Homalopteraeformes</i>	8	"	6	"	"	"	"	"	"	"	"
" <i>Cypriniiformes</i>	57	2	68	1	2	3	10	4	47	2	14
Tot.	71	2	82	1	2	3	10	4	51	2	14
<i>Familia Cyprinodontoides</i>											
140 Aplocheilos javanicus Blkr. . .	1	"	"	"	"	"	"	"	"	"	"
141 Panchax Buchanani Val.	1	"	1	"	1	"	"	"	1	"	1
Tot.	2	0	1	0	1	0	0	0	1	0	1
<i>Ordo Cyprini</i>											
FAMILIA CYPRINOIDEI.	71	2	82	1	2	3	10	4	51	2	14
" CYPRINODONTOIDEI.	2	0	1	0	1	0	0	0	1	0	1
Tot.	73	2	83	1	3	3	10	4	52	2	15

36 To these probably can be added *Barbus balleroides* Val. and *Barbus carassoides* Heck.

A summation, with the means available to me, of all Cyprines of the now living creation, has made me find a figure of 1144 species.

In this figure the archipelagic species are included. These species therefore comprise about 1/8 or more than 0.12 of the total.

If one looks at this proportion in more details regarding the families, subfamilies and groups, one gets the following results.

Of the Cyprinodontoids 97 species are described, among which only 2 archipelagic ones. The proportion therefore = 1: 48.5

The described Cyprinoids are 1047 in number, including 142 archipelagic ones. The proportion thus = 1: 7.37.

The subfamily of the Cypriniformes, including 122 archipelagic species, numbers 959 species. The proportion therefore = 1: 7.87.

Nowadays in science 72 species of Cobitines are mentioned, among which 11 archipelagic ones. From these numbers one gets the proportion = 1: 6.54.

Of the 16 known Homalopteraeformes 9 are archipelagic = 1: 1.77.

These proportions moreover for the groups of Cypriniformes are as follows.

For the Phalacrognathines	= 1: 5.67
" " Cheilognathines	= 1: 9.05
" " Labeonines	= 1: 4.18
" " Chondrostomines	= 0: 64
" " Catostomines	= 0: 54
" " Cyprines	= 0: 33 or taking both imported species
into account	= 1: 16.5
" " Barbines	= 1: 8.15

In these proportions the fossil Cyprinids have been left out.

Although the Cyprines in the archipelago comprise such a remarkably large part of the total, it still is noticeable, not only that the Cyprinodontoids are hardly, and the Chondrostomines, Catostomines and Cyprinines not at all represented, but also that with the exception only of the Cobitiformes, so numerous genera of the remaining Cyprinoids are not found there. One does not recover there any American genus and of the genera occurring in Africa and Europe at most *Labeobarbus*, *Systomus*, *Chela*, *Labeo* and *Crossocheilus*.

37 I have placed below a tabular review of the geographical distribution of all genera of Cyprines that I have accepted, and one will perceive from it, that of the 35 genera of the Labeonines not less than 26, and of the 69 genera of the Barbines not less than 53 are lacking in the archipelago.

As the outermost border land in the South East, the archipelago however has created the most curious and most complex shapes and feeds representatives of the genera *Epalzeorhynchus*, *Diplocheilichthys*, *Lobocheilus*, *Barbichthys*, *Cyclocheilichthys*, *Albulichthys*, *Rotheichthys*, *Leptobarbus*, *Rasborichthys* and *Macrochirichthys*, of which the large continents of the old and the new world till now have not yielded any species.

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CYPRINORUM DISTRIBUTIO GEOGRAPHICA.

FAMILIA I. CYPINROIDEI.

GENERA.	SPECIES.											Tot. gen.			
	Archipelagicae.	Japonicae.	Asiaticae.					Europaeae.	Africanae.	Americanae.					
			As. Merid.	As. Occid.	As. Orient.	As. Septent.	Tot.			Am. Sept.	Antill.		Am. Merid.	Tot.	
SUBFAMILIA 1 COBITIFORMES.															
Hymenophysa McCl.	2	1	3	»	»	»	3	»	»	»	»	»	»	»	6
Acanthopsis V. Hass.	2	1	8	3	1	1	12	3	»	»	»	»	»	»	15
Lepidocephalus Blkr.	2	»	1	»	»	»	1	»	»	»	»	»	»	»	3
Acanthophthalmus V. Hass.	2	»	2	»	»	»	2	»	»	»	»	»	»	»	4
Cobitis Art.	2	»	20	9	1	1	30	2	»	»	»	»	»	»	33
Cobitichthys Blkr.	1	5	»	»	5	»	5	»	»	»	»	»	»	»	11
Tot.	11	7	34	12-	7	2	53	5	»	»	»	»	»	»	72
SUBFAM. 2 HOMALOPTERAIFORMES															
Homaloptera V. Hass.	9	»	4	»	»	»	4	»	»	»	»	»	»	»	13
Psilorhynchus McCl.	»	»	2	»	»	»	2	»	»	»	»	»	»	»	2
Lissorhynchus Blkr.	»	»	1	»	»	»	1	»	»	»	»	»	»	»	1
Tot.	9	»	7	»	»	»	7	»	»	»	»	»	»	»	16
SUBFAMILIA 3 CYPRINIFORMES.															
<i>Cohors A. Phalacrognathini.</i>															
Stirps 1 Labeonini.															
Epalzeorhynchus Blkr.	1	»	»	»	»	»	»	»	»	»	»	»	»	»	1
Discognathus Heck.	»	»	3	3	»	»	6	»	»	»	»	»	»	»	6
Crossocheilus V. Hass.	3	»	5	1	»	»	6	»	2	»	»	»	»	»	11
Discognathichthys Blkr.	»	»	4	1	»	»	5	»	»	»	»	»	»	»	5
Platy cara McCl.	»	»	1	»	»	»	1	»	»	»	»	»	»	»	1
Schismatorhynchus Blkr.	1	»	3	»	»	»	3	»	»	»	»	»	»	»	4
Labeo Cuv.	4	»	9	1	»	»	10	»	8	»	»	»	»	»	22
Tylognathus Heck.	»	»	3	»	»	»	3	»	»	»	»	»	»	»	3
Diplocheilichthys Blkr.	1	»	»	»	»	»	»	»	»	»	»	»	»	»	1
Lobocheilus V. Hass.	7	»	»	»	»	»	»	»	»	»	»	»	»	»	7
Transp.	17	»	28	6	0	0	34	00	10	»	»	»	»	»	61

GENERA.	SPECIES.												Tot. gen.	
	Archipelagicæ.	Japonicæ.	Asiaticæ.					Europææ.	Africanæ.	Americanae.				
			As. Merid.	As. Occid.	As. Orient.	As. Septentr.	Tot.			Am. Sept.	Antill.	Am. Merid.		Tot.
Per transp.	17	0	28	6	0	0	34	0	10	0	0	0	0	61
Rohita Val.	14	"	20	"	"	"	20	"	"	"	"	"	"	32 ⁽¹⁾
Morulus Buch.	1	"	11	"	"	"	11	"	"	"	"	"	"	11
Rohitichthys Blkr.	"	"	"	"	"	"	"	"	1	"	"	"	"	1
Dangila Val.	10	"	1	"	"	"	1	"	"	"	"	"	"	11
Abrostomus Smith.	"	"	"	"	"	"	"	"	2	"	"	"	"	2
Barbichthys Blkr.	1	"	"	"	"	"	"	"	"	"	"	"	"	1
Morara Blkr.	"	"	2	"	"	"	2	"	"	"	"	"	"	2
Semiplotus Blkr.	"	"	1	"	"	"	1	"	"	"	"	"	"	1
Opistocheilos Blkr.	"	"	2	3	"	"	4	"	"	"	"	"	"	4
Cochlognathus B. Gir.	"	"	"	"	"	"	"	"	1	"	"	"	1	1
Pimephales Raf.	"	"	"	"	"	"	"	"	3	"	"	"	3	3
Pseudogobio Blkr.	"	1	"	"	"	"	"	"	"	"	"	"	"	1
Mylocheilus Ag.	"	"	"	"	"	"	"	"	3	"	"	"	3	3
Mylopharodon Ayr.	"	"	"	"	"	"	"	"	2	"	"	"	2	2
Exoglossum Raf.	"	"	"	"	"	"	"	"	2	"	"	"	2	2
Campostoma Ag.	"	"	"	"	"	"	"	"	4	"	"	"	4	4
Siboma Gir.	"	"	"	"	"	"	"	"	2	"	"	"	2	2
Lavinia Gir.	"	"	"	"	"	"	"	"	4	"	"	"	4	4
Dionda Gir.	"	"	"	"	"	"	"	"	10	"	"	"	10	10
Algoma Gir.	"	"	"	"	"	"	"	"	2	"	"	"	2	2
Hyborhynchus Ag.	"	"	"	"	"	"	"	"	5	"	"	"	5	5
Hybognathus Ag.	"	"	"	"	"	"	"	"	7	"	"	"	7	7
Orthodon Gir.	"	"	"	"	"	"	"	"	1	"	"	"	1	1
Cliola Gir.	"	"	"	"	"	"	"	"	3	"	"	"	3	3
Algansea Gir.	"	"	"	"	"	"	"	"	4	"	"	"	4	4
Tot.	43	1	65	9	"	"	73	"	13	53	"	"	53	180
Stirps 2 Chondrostomini.														
Chondrostoma Ag.	"	"	"	2	"	"	2	5	"	"	"	"	"	7
Acheilognathus Blkr.	"	5	"	"	"	"	"	"	"	"	"	"	"	5
Aspidoparia Heck.	"	"	1	"	"	"	1	"	"	"	"	"	"	1
Gymnostomus Heck.	"	"	14	1	"	"	15	"	1	"	"	"	"	16
Mrigala Blkr.	"	"	6	"	"	"	6	"	"	"	"	"	"	6
Dillonia Heck.	"	"	"	"	"	"	"	"	1	"	"	"	"	1
Cyprinion Heck.	"	"	"	6	"	"	6	"	"	"	"	"	"	6
Oreinus McCl.	"	"	3	13	"	"	16	"	"	"	"	"	"	16
Schizopyge Heck.	"	"	4	2	"	"	6	"	"	"	"	"	"	6
Tot.	"	5	28	24	"	"	52	5	2	"	"	"	"	64

(1) Spec. 1 incert. habit.

40

GENERA.	SPECIES.												Tot gen.	
	Archipelagicæ.	Japonicæ.	Asiaticæ.					Europææ.	Africanæ.	Americanae.				
			As. Mer.	As. Occid.	As. Orient.	As. Sept.	Tot.			Am. Sept.	Antill.	Am. Merid.		Tot.
<i>Recapitulatio Stirpium.</i>														
<i>Labeonini.</i>	43	1	65	9	»	»	73	»	13	53	»	»	25	180
<i>Chondrostomini.</i>	»	5	28	24	»	»	52	5	2	»	»	»	»	64
Tot. <i>Phalacrognathini.</i>	43	6	93	33	»	»	125	5	15	53	»	»	»	244
<i>Cohors B. Cheilognathini.</i>														
<i>Stirps 1 Catostomini.</i>														
<i>Acomus</i> Gir.	»	»	»	»	»	1	1	»	»	7	»	»	7	8
<i>Minomus</i> Gir.	»	»	»	»	»	»	»	»	»	3	»	»	3	3
<i>Catostomus</i> Les.	»	»	»	»	»	»	»	»	»	10	»	»	10	10
<i>Ptychostomus</i> Ag.	»	»	»	»	»	»	»	»	»	7	»	»	7	7
<i>Hylomyzon</i> Ag.	»	»	»	»	»	»	»	»	»	1	»	»	1	1
<i>Carpiodes</i> Raf.	»	»	»	»	»	»	»	»	»	5	»	»	5	5
<i>Cycleptus</i> Raf.	»	»	»	»	»	»	»	»	»	2	»	»	2	2
<i>Ichthyobus</i> Raf. : :	»	»	»	»	»	»	»	»	»	4	»	»	4	4
<i>Bubalichthys</i> Ag. : :	»	»	»	»	»	»	»	»	»	6	»	»	6	6
<i>Moxostoma</i> Raf.	»	»	»	»	»	»	»	»	»	8	»	»	8	8
Tot.	»	»	»	»	»	1	1	»	»	53	»	»	53	54
<i>Stirps 2 Cyprinini.</i>														
<i>Cyprinus</i> Art.	1 ⁽¹⁾	2	»	1	4	»	5	8	»	1	»	»	1	13
<i>Carassius</i> Nilss. , ,	1 ⁽²⁾	6	1 ⁽¹⁾	»	9	»	9	7	2	1	»	1	1	20
Tot.	2	8	1	1	13	»	14	15	2	2	»	1	2	33
<i>Stirps 3 Barbini.</i>														
<i>Racoma</i> McCl.	»	»	»	4	»	»	4	»	»	»	»	»	»	4
<i>Schizothorax</i> Heck.	»	»	4	4	»	»	7	»	»	»	»	»	»	7
<i>Balantiocheilos</i> Blkr.	1	»	1	»	»	»	1	»	»	»	»	»	»	1
<i>Amblyrhynchichthys</i> Blkr.	1	»	1	»	»	»	1	»	»	»	»	»	»	1
<i>Albulichthys</i> Blkr.	1	»	»	»	»	»	»	»	»	»	»	»	»	1
<i>Hampala</i> V. Hass. ,	2	»	1	»	»	»	1	»	»	»	»	»	»	2
Transp.	5	0	7	8	0	0	14	0	0	0	0	0	0	16

(1) Introdect.
 (2) Mauritius.

GENERA.	SPECIES.												Tot. gen.	
	Archipelagicae.	Japonicae.	Asiaticae.					Europaeae.	Africanae.	Americanae.				
			As. Merid.	As. Occid.	As. Orient.	As. Septentr.	Tot.			Am. Sept.	Antill.	Am. Merid.		Tot.
Per transp.	5	0	7	8	0	0	14	0	0	0	0	0	0	16
Hypselobarbus Blkr.	"	"	4	"	"	"	4	"	"	"	"	"	"	4
Systemus McCl.	31	"	48	11	"	"	59	"	10	"	"	"	"	98
Cyclocheilichthys Blkr.	12	"	1 ⁽¹⁾	"	"	"	1	"	"	"	"	"	"	12
Barbus Cuv.	"	"	"	7	"	"	7	5	5	"	"	"	"	17
Labeobarbus Rüpp.	4	"	9	4	2	"	14	5	7	"	"	"	"	30
Opsaridium Pet. (gen.??)	"	"	"	"	"	"	"	"	1	"	"	"	"	1
Hemibarbus Blkr.	"	"	1	"	"	"	"	"	"	"	"	"	"	1
Pseudophoxinus Blkr.	"	"	"	1	"	"	1	"	"	"	"	"	"	1
Rohteichthys Blkr.	1	"	"	"	"	"	"	"	"	"	"	"	"	1
Rohtee Syk.	"	"	6	"	3	"	9	"	"	"	"	"	"	9
Acanthobrama Heck.	"	"	"	4	2	"	6	"	"	"	"	"	"	6
Rhodeus Ag.	"	"	"	1	"	"	1	1	"	"	"	"	"	1
Chanodichthys Blkr.	"	"	"	"	3	"	3	"	"	"	"	"	"	3
Pseudoculter Blkr.	"	"	"	"	2	"	2	"	"	"	"	"	"	2
Hemiculter Blkr.	"	"	"	"	1	"	1	"	"	"	"	"	"	1
Aulopyge Heck.	"	"	"	"	"	"	"	1	"	"	"	"	"	1
Meda Gir.	"	"	"	"	"	"	"	"	"	1	"	"	1	1
Chedrus Swns.	"	"	4	"	"	"	4	"	"	"	"	"	"	4
Plargyrus Raf.	"	"	"	"	"	"	"	"	"	7	"	"	7	7
Catla Val.	"	"	1	"	"	"	1	"	"	"	"	"	"	1
Hypophthalmichthys Blkr.	"	"	"	"	6	"	6	"	"	"	"	"	"	6
Thynnichthys Blkr.	2	"	1	"	3	"	4	"	"	"	"	"	"	6
Amblypharyngodon Blkr.	"	"	"	"	3	"	3	"	"	"	"	"	"	3
Devario Heck.	"	"	4	"	"	"	4	"	"	"	"	"	"	4
Luciosoma Blkr.	3	"	1	"	"	"	1	"	"	"	"	"	"	3
Perilampus McCl.	"	"	3	"	"	"	3	"	"	"	"	"	"	3
Esomus Swns.	"	"	3	"	"	"	3	"	"	"	"	"	"	3
Tinca Cuv.	1	"	"	1	"	1	2	"	"	"	"	"	"	2
Argyreus Heck.	"	"	"	"	"	"	"	"	"	11	"	"	11	11
Chrosomus Raf.	"	"	"	"	"	"	"	"	"	1	"	"	1	1
Tiaroga Gir.	"	"	"	"	"	"	"	"	"	1	"	"	1	1
Phoxinus Ag.	"	"	"	"	"	"	"	"	"	"	"	"	"	1
Phoxinellus Heck.	"	"	"	"	"	"	"	1	"	"	"	"	"	1
Cirrhina Cuv.	"	"	1	"	"	"	1	"	"	"	"	"	"	1
Gobio Cuv.	"	"	"	1	1	"	2	4	"	4	"	"	4	10
Sarcocheilichthys Blkr.	"	"	1	"	"	"	"	"	"	"	"	"	"	1
Leptobarbus Blkr.	1	"	"	"	"	"	"	"	"	"	"	"	"	1
Gnathopogon Blkr.	"	"	2	"	"	"	"	"	"	"	"	"	"	2
Pseudorasbora Blkr.	"	"	2	"	"	"	"	"	"	"	"	"	"	2
Rasbora Blkr.	11	"	11	"	4	"	15	"	"	"	"	"	"	24
Rasborichthys Blkr.	1	"	"	"	"	"	"	"	"	"	"	"	"	1
Elopichthys Blkr.	"	"	"	"	2	"	2	"	"	"	"	"	"	2
Aspius Ag.	"	"	"	6	"	"	6	6	"	"	"	"	"	12

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GENERA.	SPECIES.													Tot. gen.
	Archipelagicae.	Japonicae.	Asiaticae.					Europaeae.	Africanac.	Americanae.				
			As. Merid.	As. Occid.	As. Orient.	As. Septent.	Tot.			Am. Sept.	Antill.	Am. Merid.	Tot.	
Per transp.	72	6	107	44	29	1	179	24	23	46	"	"	46	339
Ptychocheilus Ag.	"	"	"	"	"	"	"	"	"	9	"	"	9	9
Opsarius McCl.	"	6	18	1	1	"	20	2	"	"	"	"	28	
Abramis Cuv.	"	"	"	4	"	"	4	16	"	"	"	"	"	20
Luxilus Raf.	"	"	"	"	"	"	"	"	"	10	"	"	10	10
Alburnus Heck.	"	"	"	14	"	"	14	14	2	7	"	"	7	37
Hybopsis Ag.	"	"	"	"	"	"	"	"	"	6	"	"	6	6
Leucosomus Heck.	"	"	"	"	"	"	"	"	"	15	"	"	15	15
Ceratichthys Baird	"	"	"	"	"	"	"	"	"	3	"	"	3	3
Semotilus Raf.	"	"	"	"	"	"	"	"	"	7	"	"	7	7
Leuciscus Klein ⁽²⁾	"	1	1	4	6	1	11	48	3	6	"	"	6	67
Scardinius Bp.	"	"	"	"	"	"	"	13	"	"	"	"	"	13
Alburnops Gir.	"	"	"	"	"	"	"	"	"	4	"	"	4	4
Cyprinella Gir.	"	"	"	"	"	"	"	"	"	31	"	"	31	31
Codoma Gir.	"	"	"	"	"	"	"	"	"	2	"	"	2	2
Smiliogaster Blkr.	"	"	1	"	"	"	1	"	"	"	"	"	"	1
Culter Bas.	"	"	"	"	6	"	6	"	"	"	"	"	"	6
Laubuca Blkr.	"	"	2	"	"	"	2	"	"	"	"	"	"	2
Chela Buch.	3	"	22	"	"	"	22	1	"	"	"	"	"	26
Macrochirichthys Blkr.	2	"	1	"	"	"	1	"	"	"	"	"	"	2
Tot. ; ;	77	13	152	67	42	2	260	116	30	146	"	"	146	628
RECAPITULATIO STIRPIUM.														
Catostomini. ; :	"	"	"	"	"	1	1	"	"	53	"	"	53	54
Cyprinini.	2	8	1	1	13	"	14	15	2	2	"	1	2	33
Barbini.	77	13	152	67	42	2	260	116	30	146	"	"	146	628
Tot. Cheilognathini.	79	21	153	68	55	3	275	131	32	201	"	1	201	715
RECAPITULATIO COHORTUM.														
Phalacrognathini. :	43	6	93	33	"	"	125	5	15	53	"	"	53	244
Cheilognathini. ,	79	21	153	68	55	3	275	131	32	201	"	1	201	715
Tot.	122	27	246	101	55	3	400	136	47	254	"	1	254	959
RECAPITULATIO SUBFAMILIAR.														
Cobitiformes.	11	7	34	12	7	2	53	5	"	"	"	"	"	72
Homalopteraeformes. : :	9	"	7	"	"	"	7	"	"	"	"	"	"	16
Cypriniformes.	122	27	246	101	55	3	400	136	47	254	"	1	254	959
Tot. : :	142	34	287	113	62	5	460	141	47	254	"	1	254	1047

(1) 1 Spec. Maurit. (2) Cum specieb. dubiae affinitatis.

GENERA.	SPECIES,												Tot. gen.	
	Archipelagicae.	Japonicae.	Asiaticae.					Europæae.	Africanæ.	Americanae.				
			As. Mer.	As. Occid.	As. Orient.	As. Sept.	Tot.			Am. Sept.	Antill.	Am. Merid.		Tot.
FAMILIA II CYPRINODONTOIDEI.														
Cohors A. Cyprinodontini.														
Tellia Gerv.	»	»	»	»	»	»	»	»	1	»	»	»	»	1
Cyprinodon Lac.	»	»	»	8	»	»	8	2	4	6	»	2	8	19
Girardinus Poey.	»	»	»	»	»	»	»	»	»	»	1	»	1	1
Heterandria Baird Gir.	»	»	»	»	»	»	»	»	»	4	»	»	4	4
Zygonectes Ag.	»	»	»	»	»	»	»	»	»	8	»	»	8	8
Fundulichthys Blkr.	»	1	»	»	»	»	»	»	»	»	»	»	1	1
Mollienisia Les.	»	»	»	»	»	»	»	»	»	2	»	1	3	3
Pseudoxiphophorus Blkr.	»	»	»	»	»	»	»	»	»	1	»	»	1	1
Xiphophorus Heck.	»	»	»	»	»	»	»	»	»	1	»	»	1	1
Grundulus Val.	»	»	»	»	»	»	»	»	»	»	»	1	1	1
Gambusia Poey.	»	»	»	»	»	»	»	»	»	3	4	»	7	7
Hydrargyra Lac.	»	»	»	»	»	»	»	»	1	7	»	»	7	8
Poecilia Bl. Schn.	»	»	»	»	»	»	»	»	»	1	3	6	9	9
Fundulus Lac.	»	»	»	»	»	»	»	»	»	10	1	1	12	12
Tot.	»	1	»	8	»	»	8	2	6	43	9	11	62	76
Cohors B. Aplocheilini.														
Panchax Val.	1	»	3	»	»	»	3	»	»	»	»	»	»	3
Aplocheilus McCl.	1	1	3	»	»	»	3	»	»	»	»	»	»	5
Tot.	2	1	6	»	»	»	6	»	»	»	»	»	»	8
Cohors C. Orestiasini.														
Orestias Val.	»	»	»	»	»	»	»	»	»	»	»	10	10	10
Cohors D. Anablepini.														
Anableps Art.	»	»	»	»	»	»	»	»	»	»	»	3	3	3
RECAPITULATIO COHORTUM.														
Cyprinodontini.	»	1	»	8	»	»	8	2	6	43	9	11	62	76
Aplocheilini.	2	1	6	»	»	»	6	»	»	»	»	»	»	8
Orestiasini.	»	»	»	»	»	»	»	»	»	»	»	10	10	10
Anablepini.	»	»	»	»	»	»	»	»	»	»	»	3	3	3
Tot.	2	2	6	8	»	»	14	2	6	43	9	24	75	97
RECAPITULATIO FAMILIARUM.														
Cyprinoidei.	142	34	287	113	62	5	460	141	47	254	»	1	254	1047
Cyprinodontoidei.	2	2	6	8	»	»	14	2	6	43	9	24	75	97
Tot.	144	36	293	121	62	5	474	143	53	297	9	25	329	1144

44 FAMILY CYPRINOIDEI. Carp-like Fishes

Cyprini with toothless jaws. Only the lower pharyngeal bones dentate, with the teeth in one to three rows, intermaxillary bones not united. Three rays in the branchiostegal membrane.

Remark. The Cyprinoids differ constantly from the Cyprinodontoids by smooth, toothless jaws, the presence of one to three rows of teeth only on the lower pharyngeal bone, and the presence of only three branchiostegal rays. The presence of scales on the body (Aulopyge) is no more constant than the lacking of scales on the head (Lepidocephalus), and the scales themselves are even not always smooth edged or cycloid (Homaloptera). Also other characters, presented by various authors as being characteristic for Cyprinoids, as indicated above, are not constantly found in all species and therefore also cannot serve for an absolute determination of the family.

Although richer in species than any other family of fishes, the Cyprinoids in no way offer a multitude of important and obvious characters corresponding to that wealth. In this respect, they highly contrast to the Siluroids, which by far do not comprise half as much species.

In the Cyprinoids nature has availed itself of the most simple alphabet to distinguish the notable species from one another and those characters are usually so little obvious, that it could appear a desperate undertaking, when one had the more than thousands known species spread out in front of oneself, to arrange those species in a remotely satisfactory way.

More than a century ago, when one did not even know thirty species, that difficulty did not exist, as it would seem satisfactory to class them in only a few genera. But the numerous discoveries that succeeded each other with rapid strides during the last tens of years, have made ⁴⁵ a further splitting inevitable, and if there are authors nowadays who believe, that at most only a few species can be added to the Artedian genera Cobitis and Cyprinus, a judgement like that can only be explained by a too little penetrating research or a limited knowledge of the species.

The Artedian genera Cobitis and Cyprinus at present have a higher meaning and should be valued as subfamilies.

To these, the Homalopteraeformes can be added as a subfamily.

In as much the arrangements of the Cyprinoids only regard these subfamilies, it does not offer difficulties.

The Cobitiformes are always easy to distinguish from the normal Cypriniformes by their lower jaw barbels and the narrow vertical gill slit, extremely small scales that are sunken in the skin, and the complete absence of pseudobranchiae. And even if it becomes difficult to distinguish them by means of those characters from some Homalopteraeformes, the not being depressed of head and body and the not being flat and broad of the belly decides that they are no Homalopteraeformes.

Similarly, the splitting of the Cobitiformes in genera is still to be done on the basis of solid principles, which will be more apparent in the chapter on his subfamily.

The Homalopteraeformes are easy to recognise by the very flat head and belly, the horizontal, more or less disc shaped pectoral fins that possess several undivided rays

and are implanted on the belly line, the small vertical gill slit and the small inferior central mouth opening.

The problems in the subdivision of the Cypriniformes only begin after one has made some major groups.

Heckel has found an important character in the shape of the jaws and lips and with a small alteration in the definition of the Cypriniformes in Temnochilae and Pachychilae his division can be considered a very good one.

These departments fall almost entirely together with those which I have proposed under the names Phalacrognathines and Cheilognathines.

With these names I wanted to express that in one department the lower jaw, although it sometimes is very thick and not always, like Heckel expresses it "in aciem attenuata" [attenuated into an edge], protrudes free or naked, irrespective of the presence or absence of a lower lip, whereas in the other department the lower jaw is always coated with a lip, which, if it is very much developed as in some species of *Labeobarbus* and in *Balantiocheilos*, always envelops the lower jaw and hangs down before it.

The genera *Labeo* Cuv. and *Chondrostoma* Ag. have provided the types for two large groups of the Phalacrognathines.

Indeed the numerous forms can be placed in two groups, based on the presence or absence of the lower lip. These groups were already distinguished by Heckel ⁴⁶ but not named. One can stamp them after the genera that were first erected in them with the names Labeonines and Chondrostomines.

Each of these groups contains numerous genera, for the grouping of which peculiarities have to be found especially in the dentition and in the structure of the jaws, lips and snout, whereas also in the composition and placing of the fins and squamation good characters can be found, which will be further explained below.

The Cheilognathines, to which the large majority of the Cyprinoids belongs, can be split into three natural groups. I name these after their major types *Catostomini*, *Cyprinini* and *Barbini*.

The *Catostomines* are recognized by their fleshy head, thick lips and especially by the very numerous pharyngeal teeth, from 40 to more than 60, which are implanted in a single row on each lower pharyngeal bone giving the appearance of a comb.

The *Cyprinines*, apart from their remaining natural characters, as a prominent and easily recognizable distinguishing character have a serrated anal fin spine, which is not found in any other group of the family.

The *Barbines* miss those anal fin spine serrations and have as a certain distinction from the *Catostomines*, never more than 12 (4-12) teeth on each lower pharyngeal bone. These teeth are placed in one to three rows.

The largest problem in the delimiting of natural genera and in determining their relationships one finds in the *Barbines*. Because, however sharply the extreme forms of this group seem to be opposed, like the genera *Barbus* and *Macrochirichthys*, the hundreds of intermediate forms offer such numerous and little noticeable transitions, that one, in an attempt to make subgroupings of the genera, one time and again runs up against the not entire validity or constancy of the used characters, and from this it is easy to explain, why various excellent ichthyologists have declared themselves against the erection of so many genera, which have been derived from the *Barbines*.

However, it is mainly the difficulty here to find the right characters and in the formation of genera one must not rely on a single but on a complex of characters. Carefully

consulting nature in this way one will be able to determine most genera with sufficient exactness, and work on a natural grouping of those genera with a better result than was done till now.

In this work I have attempted this grouping just like the sub arrangement of the Phalacrogathines, however, I often have had to restrict myself to make use of the data available in various ichthyological works, and therefore I often was exposed to the errors that can arise from the incompleteness or unjustness of those data.

47 In the mean time, including my Bengalese and Japanese specimens, I was able to investigate after nature 170 species, among which many that belong to the most peculiar genera.

As unfolded above, the Cyprinoids can be divided in three subfamilies, the Cobitiformes, Homalopteraeformes and Cypriniformes, whereas the last one can be split further in two major groups, Phalacrogathines and Cheilognathines, each of which contains two or three well characterized large groups.

One may easily characterize these main divisions as follows.

Family Cyprinoidei

Subfamily I. Cobitiformes. Scales very small more or less immersed in the mucus covering the smooth skin. Six to ten barbels. Gill opening vertical, narrow. Head and body not depressed. Fins spineless, pectoral fins with only one simple ray.

No pseudobranchiae. Pharyngeal teeth conical, in one row.

Subfamily II. Homalopteraeformes. Head and body depressed and flat at the underside. Fins spineless, pectoral and ventral fins disc-like, horizontally inserted in the ventral margin pectoral fins with many simple rays. Pharyngeal teeth conical, in one row. Mouth inferior, small, central.

Subfamily III. Cypriniformes. Never more than 4 barbels, often none at all. Head and body compressed. Gill opening broad. Pectoral fins with only one simple ray. Pharyngeal teeth placed in one to three rows, showing various forms.

Cohors 1. Phalacrogathini. Lower jaw at the margin free and bare, not covered by the lower lip.

Stirps a. Labeonini. Lower part of lower lip constructed in various ways, back-folded behind the tip of the jaw.

Stirps b. Chondrostomini. Lower lip missing.

Cohors 2. Cheilognathini. Tip of the lower jaw covered by lower lip.

Stirps a. Catostomini. Head and lips fleshy. Forty to more than sixty teeth in lower pharyngeal bone on both sides, forming a comb.

Stirps b. Cyprinini. Body oblong. Dorsal fin with many rays and anal fin with few rays, each armed with a serrated spine.

Stirps c. Barbini. Anal fin without a serrated ray. Pharyngeal teeth sparse, placed in one to three rows on both sides, never more than 12.

Below, all these main divisions will be treated in more detail.

48 I have redescribed all archipelagic Cyprinoids of my cabinet.

According as the research of those species, which first successively came to enrich my collection, brought me to new insights concerning the characters that primarily have to receive attention during the description, I got the impression that my descrip-

tions from earlier years needed a complete revision in order to let them serve for a sufficient recognition of genera and species. I have started this revision more readily because many of those diagnoses had been made after a single specimen or only very few specimens, who moreover were not all in a desirable state of preservation or only represented a certain stage of life. Of many of those species I later received larger rows of specimens in an excellent state of preservation, and therefore I was able to improve and add a lot to my earlier descriptions.

Moreover, that revision was necessary, because earlier I followed a less good way for the determination of the relative size of the eyes, the thickness of the body and the scale formulas. The dimension of the eye, if they are not, as in many Cobitiformes, covered with skin of the head, can be determined better when one takes that of the orbit itself than when they are taken, like I myself did earlier, between the free edge of the membrane, which more or less covers the iris. The width of the body is best given when one measures it across the gill covers or the shoulder bones, and not behind the axils, where it sometimes is remarkably thicker, but also dependent of the condition of the weak parts, of fat or roe. Moreover, the number of scales in a longitudinal row as a rule is determined more accurately by counting the scales on which a lateral line tube is present (namely there where a lateral line is present) than by following them like I often did earlier, in a straight line from the gill opening to the middle of the caudal fin base. Also in the description of the dentition I have earlier, partly because I was less skilled, often worked less accurately than I later learned to be necessary for a good evaluation of the dentition.

With regard to the differences between my earlier and my recent descriptions, it has to be noted moreover, that the larger series of specimens that I could dispose of nowadays, naturally have caused changes in the earlier given height- and length proportions of body, head and eyes, because although these proportions are limited between certain borders, and therefore do not stop being of value for the determination of the species, they sometimes differ remarkably between those borders according as the specimens belong to different age groups.

With regard to this it holds as a rule that the head in relation ⁴⁹ to the length of the body and the eyes in relation to the length of the head, become smaller when the size of the animal increases, whereas on the contrary the height of the body in relation to its length, increases, when the animal reaches the adult state.

With regard to the terms used by me, only a few elucidations are necessary. In this work is understand by

Head length	The total length of the head, measured from a perpendicular, which is dropped from the tip of the snout, to the posterior margin of the gill cover.
Head width	The width on the head, measured across the gill covers.
Free eyes	Eyes without a membrane and totally covered with the, over the eye transparent, head skin.
Eye lids	Eyelid membrane, an extension of the head skin inside the edge of the orbit and, after having covered in the shape of a circle a larger or smaller part of the iris, running back to the edge of the orbit.
Rostral barbels	Snout barbels, the same, which by other authors, unjustly, are called "cirri maxillares".

- Supramaxillary barbels ... Upper jaw barbels, the same which by other ichthyologists less justly are stamped with the name "cirri labiales".
- Chewing surface The chewing surface in various shapes that one observes in many pharyngeal jaw teeth.
- Multi rayed fins A fin with more than 15 branched rays.
- Many rayed fins A fin with more than 10 but less than 15 branched rays.
- Poorly rayed fins A fin with less than 10 branched rays.
- Central rictus The mouth slit in the middle of the central surface of the head, removed from the lateral sides of the head.
- Post-labial groove The groove, which one finds in many Cyprinoids on the ventral side of the lower jaw in the skin on the chin, and which sometimes is single and transversely placed, sometimes double, one (sometimes even two) on each side of the chin and placed longitudinally.

50 SUBFAMILY I. COBITIFORMES

Loach-like fishes

Cyprinoidei with an elongate or oblong body, compressed or cylindrical, not depressed, covered by very small, cycloid scales, more or less immersed in the mucus covering the smooth skin. Head completely covered by skin; snout fleshy, mouth small, inferior, surrounded by 6 to 12 barbels; lips fleshy; lower jaw flat, protruding beyond lower lip. Pharyngeal teeth conical, in one row. No pseudobranchiae. Gill opening narrow, vertical. Fins spineless, dorsal and anal fin with few rays or with several rays, never with many rays, pectoral rays with only one simple ray.

Remark. When Artedi erected the genus *Cobitis*, he knew only the three common European species. His diagnosis was restricted to the following words: “Caput et corpus cathetoplatea. Pinnae dorsi et ventrales eadem a rostro distantia sitae. Cirri ad os corpus maculosum. [Head and body pipe-like and compressed. Origin of dorsal and ventral placed at an equal distance from the snout tip. Barbels near the mouth. Body spotted.]

Since 1738, the year in which Artedi’s diagnosis was published, about 70 other species have become known that can be placed in *Cobitis*. However, on several of those species of the characters named by Artedi only that of the barbels can be applied, because there are species with cylindrical bodies, species in which the dorsal fin is placed far behind the ventral fins, and species in which the body does not show the least maculations.

Linnaeus took away from the genus *Cobitis* its original and natural meaning, by placing Cyprinodonts in it from the genera *Anableps* and *Fundulus*.

Cuvier who accepted the genus in the sense of Artedi, gave a redescription of it in 1817, however, this one also by far does not fit on all of its species. Because there are species, like my *Cobitis macracanthus*, in which the head cannot be called small, and the body is not elongate; other ones, like *Cobitis oblonga* Val., in which the dorsal fin is placed far behind the ventrals; and still others, like *Cobitis dario* Buch., in which a part of the swimbladder is situated outside the normal bony vertebral 51 encasing and extends as an ample sack, till far behind the abdominal cavity.

Mr Valenciennes has improved the Cuvierian diagnosis, which was made possible by the ca. 46 species of Cobitiformes, which were known at the time of the publication of the 18th part of the large *Histoire naturelle des Poissons*. Although adopted with the rank of subfamily, the genus *Cobitis* Val. also fits all subsequently discovered species.

When one became familiar with the numerous species of *Cobitis* from outside Europe, one tried to split the large Artedian genus in various genera.

Attempts to do this were made by Kuhl and Van Hasselt, by Misterys Gray, Agassiz and MacClelland and by William Swainson, but the bases on which all these splittings were founded, were partly inadequate, partly insufficiently explained, and thus all known species were incorrectly placed in to a single genus again by Mr Valenciennes.

Lacepède on the basis of *Cobitis fossilis* L., formed a proper genus, which he named *Misgurnus*, but he totally incorrectly credited it with teeth in the jaws.

In 1822 Kuhl and Van Hasselt proposed the genus *Nemacheilus*, to which the old meaning of *Cobitis* was given.

After the death of Kuhl, Van Hasselt still discovered the species on which he based the genera *Acanthopthalmus* and *Acanthopsis*. He was the first one, who separated the species of *Cobitis* with movable suborbital spines from the remaining species of

Cobitis, and he gave the generic name *Acanthophthalmus* to the species with a blunt snout, in which the spine is found under the eye, and the generic name *Acanthopsis* to the species with an acute, elongated snout, in which the spine is placed anterior to the eye.

The genus *Botia* Gray, equally based on the movable suborbital spine, contains as such the genera *Acanthophthalmus* and *Acanthopsis* of van Hasselt, but the species depicted in the Illustrations of Indian Zoology with the name *Botia grandis* is a *Hymenophysa*, of which more will be said later.

Mr Agassiz accepted two genera of Cobitiformes.

In *Cobitis*, he placed the species without check spines, in *Acanthopsis* those with check spines. His genus *Acanthopsis* also has the same meaning as *Botia* Gray.

Ducrotay de Blainville seems to have been the first one who raised the genus *Cobitis* to a group of a higher level. At least in 1816, in the 83rd part of the *Journal de Physique* his "*Cobites*" is placed in a group of his division *Tétrapodes abdominaux*, with the name *Subenchéliosomes*.

Swainson composed with the Cobitiformes a family under the name *Cobitidae*, but he included therein the *Homalopteriformes* and the *Cyprinodontoids*. However, his *Cobitinae*, which he erected as a subfamily of the *Cobitidae*, have the ⁵² same value as *Cobitis* Art. of my Cobitiformes. In the splitting of this subfamily Swainson went further than his predecessors. Indeed in essence he accepted the same genera as Mr Agassiz, when he stamped the genus *Acanthopsis*, with the name *Canthophrys*, however he erected subgenera for both genera. For *Cobitis*, he made the subgenera *Cobitis* and *Acoura*, for *Canthophrys* the subgenera *Canthophrys*, *Diacanthus* and *Somileptis*.

The subgenus *Acoura* would only differ from *Cobitis* by a generally bilobed caudal fin and a scaleless body, and the placed in it *Cobitis savona* Buch. (*Acoura obscura* Swns.), *Cobitis turio* Buch. (*Acoura argentata* Swns.) and *Cobitis corica* Buch. (*Acoura cinerea* Swns.).

The subgenus *Canthophrys* would be characterised by a rounded caudal fin and a scaleless body. Swainson placed in it *Cobitis cucura* Buch., *Cobitis pangania* Buch., *Cobitis balgara* Buch. and *Cobitis guntea* Buch., species Swainson took the liberty to rebaptize with the names *Canthophrys albescens*, *Canthophrys rubiginosus*, *Canthophrys olivaceus* and *Canthophrys vittatus*.

The subgenus *Diacantha* furthermore would be recognisable by its oval, scaleless body, and forked caudal fin. *Cobitis geta* Buch. and *Cobitis dario* Buch., names Swainson changed as well in that of *Diacantha zebra* and *Diacantha flavicauda*, would belong to it.

The subgenus *Somileptes* finally, would be characterised by a lancet shaped, very much compressed, scaled body, large eyes, situated near the tip of the snout, and a rounded caudal fin. Swainson brought under it *Cobitis gongota* Buch. and *Cobitis botia* Buch., or, what is the same, his *Somileptis bispinosa* and *Somileptis unispinis*.

Mr MacClelland, in his *Indian Cyprinidae*, initially accepted only two genera of Cobitiformes. He based those genera on the being bilobed or not bilobed of the caudal fin. Leaving under *Cobitis* the species with a rounded or truncated caudal fin, he placed the species with a bilobed caudal fin in his genus *Scistura*. Later in the same work, he proposed the generic name *Hymenophysa* for three Bengalese species, *Cobitis Dario* Buch., *Cobitis geta* Buch. and *Botia granda* Gr. on account of a free, in the abdominal cavity hanging, swimbladder, which is divided by a diaphragm into lobes.

Prince Charles Lucien Bonaparte did not propose a new generic division of the Cobitiformes, but raised them to the rank of a family, under the name Cobitidae.

In the large fish work the Cobitiformes have neither been accepted in the sense of a family, nor in that of a subfamily, nor even in that of a group. Mr Valenciennes has equally rejected all above-mentioned genera and subgenera.

⁵³ Indeed the generic value of the characters used for the splitting is partly disputable, partly completely unacceptable, whereas still other characters, like that of the swim-bladder are not visible from the outside.

Nevertheless, in connection with other characters, after a renewed investigation of the now already so numerous species they can serve for the determination of generic groups, under which those species, according to my view, indeed will have to be brought.

The Cobitiformes in their organisation do offer so numerous and partly important differences, that when they were found in so many families that have larger species as representatives, one would not hesitate to attach generic value to them.

To those differences I believe can be counted the presence of a forked suborbital spine, which already has led to the erection of the genera *Acanthopsis* V. Hass. and *Acanthophthalmus* V. Hass. (*Botia* Gr., *Acanthopsis* Ag., *Canthophrys* Swns.).

Other peculiarities one finds in the construction of the swimbladder. In a few species, not a trace of a swimbladder is recognisable, whereas in numerous species it consists of a small vessicle of one or two chambers, contained in a bony box formed by a remarkable development of the anteriormost vertebrae. But some other species, like *Cobitis Dario* Buch., *Cobitis macracanthus* Blkr, *Cobitis hymenophysa* Blkr. etc. moreover possess a spacious swimbladder, which lies free in the abdominal cavity and which is connected by a shorter or longer tube to the anterior smaller bladder that is contained in the bony cavity of the vertebral processes. On this peculiarity rests the genus *Hymenophysa* McCl., which indeed deserves to be accepted as a proper genus, as the mention character is connected with other peculiarities in the construction, which I will mention forthwith.

Less fortunate was the idea to determine genera on the shape of the caudal fin (*Schistura* McCl.) and on the being scaled or not of the body (*Acoura*, *Canthophrys*, *Diacantha* Swns.) The caudal fin in its shape indeed offers the most numerous differences, from whole and rounded to little and deeply incised. In many species that incision or emargination is so little, that the fin unless it is totally spread, appears to be truncate or rounded. This character was used by Swainson for his subgenera as well, whereas, moreover he added the character of the scalelessness to it. Till more detailed observations have proven the contrary, I believe, like Mr Valenciennes, that all species of Cobitiformes possess skin scales, although surely in many species they are so small that they will escape superficial observation. Of two species that are in my possession, *Diacantha flavicauda* ⁵⁴ Swns. (*Cobitis Dario* Buch.) and *Canthophrys vittatus* Swns. (*Cobitis guntea* Buch.) I can state with certainty (see *Verhand. Batav. Genootsch. XXV Nalez. ichthyol. van Bengalen* p. 143), that the body is just as completely covered with scales as that of all my remaining species. Swainson in his determination of the being scaled or not of the Bengalese species, seems to have relied completely on the descriptions of Buchanan in his work on the fishes of the Ganges. The subgenera *Acoura*, *Canthophrys* and *Diacantha*, for the reasons developed above, cannot be maintained.

The subgenus *Somileptes* Swns. moreover coincides with *Acanthopsis* and was only separated from it on the basis of a very compressed body, large eyes and a rounded caudal fin.

The species of *Cobitiformes* available to me are only 16 in number, and in my research of the remaining species I am also restricted to their descriptions and illustrations.

The available species however, offer so many different peculiarities in the organization, that I do not hesitate to find cause for their grouping into in a number of genera, and to express my opinion that a more detailed study of the remaining species will result in placing them partly in those genera, partly possibly raising them to other proper genera.

A first particularity in the organization of the *Cobitiformes* that has been overlooked too much by the authors, is the eyes being covered or not with skin of the head. In many species the eyes are free, provided with an eye membrane, so that the head skin extends over the eye as a kind of eyelid and then folds back again forming a kind of conjunctiva.

To this group belong the species that I earlier have described under the names *Cobitis macracanthus*, *Cobitis hymenophysa*, *Cobitis Dario*, *Cobitis fasciata* and *Cobitis Jaklesi*.

In all my remaining species the eyes are totally covered with head skin.

Another particularity in the organization can be found in the placing of the barbels.

In all my species at least 6, in a few 8 or more barbels are present. When there are more than 6, the surplus belong to the lower lip, but the normal 6 constantly belong to the snout or the upper lip. The upper lip – or upper jaw barbels are implanted either only at the corner of the upper jaw, or, when more than one pair is present, also in the middle of each intermaxilla [premaxilla] branch. Thus, in some species there are 4 snout barbels and 2 upper jaw barbels, and in some others only 2 snout barbels and 4 upper jaw barbels.

When these differences coincide with other valuable differences, then it is the basis for erecting proper genera.

55 A third point in the organization of the *Cobitiformes* that deserves special attention, is the place of implantation of the dorsal fin above or entirely behind the pelvic fins. These characters maybe are only of generic value when they are accompanied by others of higher weight.

Very remarkable, at last, is the particularity that in a few *Cobitiformes* not only the body, but also the head is covered with small scales. Thus *Cobitis macrochir* Blkr. and *Cobitis Hasseltii* Val. have scales on the check and the opercle and the first species even on the crown and the subopercle. In all my remaining species the skin of the head is completely bare, which probably will be the case in most other known species, although I suspect, that among the Bengal species there will be some which have this character.

The characters described above, when considered in connection to each other, with those concerning the presence or absence of check spines and the general shape and habitus, have induced me to the acceptance in the subfamily *Cobitiformes* of the genera *Hymenophysis*, *Cobitis*, *Lepidocephalus*, *Acanthopsis*, *Acanthophthalmus* and *Cobitichthys*.

These genera can be easily recognized according to the following scheme.

- I Suborbital spine forked.
- a. Dorsal fin opposite ventral fins.
 † Eyes free. Barbels 6 or 8, nasal barbels 4, maxillary barbels 2, sometimes
 2 lower jaw barbels. Swimbladder for the greater part suspended freely in the ventral cavity.

Hymenophysa McCl.

†† Eyes covered by skin. Barbels 6, nasal barbels 2, maxillary barbels 4.
 Swimbladder completely enclosed in vertebral pyxis.

Acanthopsis V. Hass.

- b. Dorsal fin placed between ventral fins and anal fin. Eyes covered by skin.
 Body very compressed. No swimbladder. Six barbels.
 † Nasal barbels 4, maxillary barbels 2. Head scaled.

Lepidocephalus Blkr.

†† Nasal barbels 2, maxillary barbels 4. Head scaleless.

Acanthophthalmus V. Hass.

- II. No suborbital spine. Dorsal fin opposite ventral fins. Swimbladder completely encased in vertebral box.
- a. Eyes free, Barbels 6, nasal barbels 4, maxillary barbels 2.

Cobitis Art.

- 56 b. Eyes covered by skin. Barbels 10 to 12, nasal-maxillary barbels 6-8, lower jaw barbels 4. Body strongly compressed. Caudal fin above and below the tail ending in a slightly adipose ridge.

Cobitichthys

I consider these genera as natural and I possess of all of these genera 2 to 4 species.

For the rest the existing data are not sufficient to assign the remaining already known species with certainty a place in them. Maybe one will even find species among them, which will have to be raised to proper genera.

The Cobitiformes are restricted to Europe, Asia and the Indian archipelago and possess the largest number of species in southern and south-western Asia.

The genera *Hymenophysa*, *Acanthophthalmus* and *Lepidocephalus* do not seem to spread more westerly than Hindustan, but eastwards *Hymenophysa* extends till Java, Borneo and Japan, the remaining genera till Java.

Acanthopsis and *Cobitis* have the largest distribution. *Acanthopsis* is represented in England as well as in Japan.

Cobitichthys seems to belong exclusively to Eastern Asia, to China, Japan and Borneo.

The most familiar species of the subfamily are, in as much I have been able to ascertain, the following ones.

Cobitiform species known at present

	Habit.
* <i>Hymenophysa dario</i> Blkr. = <i>Cobitis dario</i> Buch. = <i>Diacantha flavicauda</i> Swns. =	
<i>Schistura dario</i> McCl.	Bengal, Assam.
" <i>geto</i> Blkr. = <i>Cobitis geto</i> Buch. = <i>Diacantha zebra</i>	
Swns. = <i>Schistura geta</i> McCl.	Beng. Assam.
" <i>grandis</i> Blkr. = <i>Botia grandis</i> . Gr. = <i>Cobitis grandis</i>	
Val. = <i>Schistura grandis</i> McCl.	Hindustan.
" <i>curta</i> Blkr. = <i>Cobitis curta</i> T. Schl.	Japan.
" <i>MacClellandi</i> Blkr. = <i>Cobitis hymenophysa</i> Blkr.	Java, Sumatra.
" <i>macracanthus</i> Blkr. = <i>Cobitis macracanthus</i> Blkr.	Sumatra, Borneo.
57 <i>Cobitis barbatula</i> L. = <i>Cobitis Furstembergii</i> Fitz.	Eur., S.E. Asia.
" <i>nurga</i> Nordm. = <i>Cobitis merga</i> Krynick.	S. Russia.
" <i>frenata</i> Heck.	Syria.
" <i>panthera</i> Heck.	Syria.
" <i>insignis</i> Heck.	Syria.
" <i>tigris</i> Heck.	Syria.
" <i>leopardus</i> Heck.	Syria.
" <i>malapterus</i> Val.	Syria.
" <i>argyrogramma</i> Heck.	Syria.
" <i>persa</i> Heck.	Persia.
" <i>marmorata</i> Heck.	Cashmir.
" <i>vittata</i> Heck.	Cashmir.
" <i>mooreh</i> Syk.	Deccan.
" <i>Ruppellii</i> Syk.	Deccan.
" <i>arenata</i> Val.	Hindustan.
" <i>scaturigina</i> Buch. = <i>Schistura scaturigina</i> McCl.	Bengal, Assam.
" <i>bilturio</i> Buch. = <i>Cobitis ocellata</i> McCl.	Bengal.
" <i>turio</i> Buch. = <i>Acoura argentata</i> Swns. = <i>Cobitis gibbosa</i> McCl.	Bengal.
" <i>savona</i> Buch. = <i>Acoura obscura</i> Swns. = <i>Schistura savona</i> McCl.	Bengal.
" <i>corica</i> Buch. = <i>Acoura cinerea</i> Swns. = <i>Schistura puntata</i> McCl.	Bengal.
" ? <i>rupecula</i> = <i>Schistura rupecula</i> McCl. = <i>Cobitis rupecula</i> Val.	Bengal.
" ?? <i>boutanensis</i> = <i>Cobitis boutanensis</i> McCl.	Bengal.
" ? <i>zonata</i> = <i>Schistura zonata</i> McCl. = <i>Cobitis zonata</i> Val.	Assam.
" ? <i>chlorosoma</i> = <i>Cobitis chlorosoma</i> McCl.	Assam.
" ? <i>monoceros</i> = <i>Cobitis monoceros</i> McCl.	Assam.
" ?? <i>pavonacea</i> = <i>Cobitis pavonacea</i> McCl.	Assam.
" ?? <i>subfusca</i> = <i>Schistura subfusca</i> McCl. = <i>Cobitis subfusca</i> Val.	Assam.
" ?? <i>phoxocheila</i> = <i>Cobitis phoxocheila</i> McCl.	Assam.
" ?? <i>guttata</i> = <i>Cobitis guttata</i> McCl.	Assam.
" ? <i>micropus</i> = <i>Cobitis micropus</i> Val.	China.
" <i>spiloptera</i> Val.	Cochin-China.
" <i>chrysolaimos</i> K. v. H. = <i>Nemacheilus fasciatus</i> V. 58 Hass. =	
<i>Cobitis fasciata</i> Val. = <i>Cobitis suborbitalis</i> Val. =	
<i>Cobitis Pfeifferi</i> Blkr.	Java, Sumatra.
* <i>Cobitis Jaklesi</i> Blkr.	Sumatra.
<i>Acanthopsis fossilis</i> Ag. = <i>Cobitis fossilis</i> L.	Europe, W. Asia
" <i>taenia</i> Selys = <i>Cobitis taenia</i> L. = <i>Botia taenia</i> Yarr.	Eur., E. As. Japan.
" <i>elongatus</i> Blkr. = <i>Cobitis elongata</i> Heck. Kner.	Europe.
" <i>linea</i> Heck.	Persia.
" ? <i>armatus</i> Blkr. = <i>Cobitis armatus</i> McCl.	Afghanistan.
" ? <i>maya</i> Blkr. = <i>Cobitis maya</i> Sykes.	Deccan.

*	"	guntea Blkr. = Cobitis guntea Buch. = Canthophrys guttatus Swns. . .	Bengal, Assam.
	"	annicolus Blkr. = Cobitis annicola Val.	Bengal.
	"	montanus Blkr. = Schistura montana McCl. = Cobitis montana Val. .	Bengal.
	" ?	cucura Blkr. = Cobitis cucura Buch. = Canthophrys albescens Swns.	Bengal.
	" ?	aculeatus Blkr. = Schistura aculeata McCl. = Cobitis aculeata Val.	Assam.
	" ?	gongota Blkr. = Cobitis gongota Buch. = Somileptes	
	"	bispinosa Swns. = Cobitis oculata McCl.	Bengal.
	" ?	botia Blkr. = Cobitis botia Buch. = Somileptes unispina Swns. =	
	"	Cobitis mucronata McCl.	Bengal.
	"	dialyzona V. Hass. = Cobitis macrorhynchos Blkr.	Java, Borneo.
	"	choirorhynchos Blkr. = Cobitis choirorhynchos Blkr.	Sumatra.
Acanthophtalmus pangia Blkr. = Cobitis pangia Buch. = Canthophrys			
		ruginosus Swns. = Cobitis cinnamomea McCl.	Bengal.
	"	?? thermalis Blkr. = Cobitis thermalis Val.	Ceylon.
	"	fasciatus V. Hass. = Cobitis Kuhlii Val.	Java, Sumatra.
	"	javanicus K. v. H. = Cobitis oblonga K. v. H., Val.	Java.
Lepidocephalus ? balgara Blkr. = Cobitis balgara Buch. =			
		Canthophrys olivaceus Swns. = Schistura bulgara McCl.	Bengal.
	"	Hasseltii Blkr. = Cobitis Hasseltii Val. =	
	"	Cobitis octocirrhus V. Hass.?	Java.
	"	macrochir Blkr. = Cobitis macrochir Blkr.	Java.
Cobitichthys anguillicaudatus Blkr. = Cobitis anguillicaudata Cant.			
	"	pectoralis Blkr. = Cobitis pectoralis McCl.	China.
59	"	Cobitichthys bifurcatus Blkr. = Cobitis bifurcatus McCl.	China.
	"	decemcirrosus Blkr. = Cobitis decemcirrosus Basil.	China.
	" ??	psammismus Blkr. = Cobitis psammismus Richds.	China.
	"	rubripinnis Blkr. = Cobitis rubripinnis T. Schl. (not Blkr. earlier).	Japan.
	"	maculatus Blkr. = Cobitis maculata T. Schl.	Japan.
	"	enalios Blkr. = Cobitis rubripinnis Blkr. earlier (not T. Schl.).	Japan.
	"	dichachrous Blkr.	Japan.
	"	polynema Blkr.	Japan.
	"	barbatuloides Blkr. = Cobitis barbatuloides Blkr.	Borneo.

Fossil species

Cobitis centrochir Ag.	Oeningen.
" cephalotes Ag.	Oeningen.
" longiceps Ag.	Mombach.
"	?
Acanthopsis angustus Ag.	Oeningen

The presence of the Cobitiformes on the Sunda Islands has been shown for the first time by Kuhl and Van Hasselt. – Van Hasselt knew five species from Java, *Cobitis fasciatus*, *Acanthophtalmus javanicus*, *Acanthophtalmus fasciatus*, *Lepidocephalus Hasseltii* and *Acanthopsis dialyzona*, species that I have all recovered.

After Kuhl and Van Hasselt, until my own investigations, not a single species was added to these five, as *Cobitis chrysolaimos* Val. and *Cobitis suborbitalis* Val. in my opinion can be brought back to *Cobitis fasciatus*.

On Java, I found apart from the five mentioned species, of which only four are mentioned in the large *Histoire naturelle des Poissons*, moreover *Lepidocephalus macrochir* and *Hymenophysa MacClellandii*.

Sumatra, from which in earlier days not a single species of Cobitiformes was known, has yielded me of the Javanese species *Hymenophysa MacClellandi*, *Cobitis fasciatus*, *Lepidocephalus macrochir*, *Acanthopthalmus javanicus*, *Acanthopthalmus fasciatus*, and moreover still *Hymenophysa macracanthus*, *Cobitis jaklesi* and *Acanthopsis choirorhynchus*, thus in total eight species.

From Borneo, I received only four species, *Hymenophysa macracanthus*, *Hymenophysa MacClellandi*, *Acanthopsis dialyzona*, and *Cobitichthys barbatuloides*. The last mentioned species seems to be endemic to Borneo.

60 It deserves to be remarked, that of the Islands of Banka, Biliton and Singapore, not a single species belonging to this subfamily has become known.

The archipelagic Cobitiformes prefer clear, fast streaming rivers in mountainous areas. Near river mouths one does find specimens of *Cobitis fasciatus*, *Acanthopsis dialyzona*, *Lepidocephalus Hasseltii* and *Acanthopthalmus fasciatus*, but only rarely, and generally only when the rivers are high and fast streaming. They belong to the high stretches of the rivers, were a number of species like *Cobitis fasciata* and *Lepidocephalus Hasseltii*, at least on Java are often caught by the hundreds.

HYMENOPHYSA McCl., Blkr.
GETJUBAN.

Body oblong, compressed, with small scales. Lower jaw with a thin edge, no tubercle. Head acute. Eyes not covered by skin. Barbels 6 or 8, nasal barbels 4, maxillary barbels 2. Head scaleless. Suborbital spine. Anterior nostrils open. Dorsal fin opposite ventral fins, caudal fin bilobed. Swimbladder in two parts, posterior part freely suspended in abdominal cavity. Pharyngeal teeth conical, in one row.

Remark. I consider the genus *Hymenophysa* as totally natural. The peculiar construction of the swimbladder induced MacClelland to believe that one could base a proper genus on it under the name of *Hymenophysa*, however, he did not put the idea into practice and placed all Cobitiformes in *Cobitis* and *Schistura*, whereas the species of *Hymenophysa* described by him followed immediately after *Schistura*.

Mr Valenciennes did not accept the genus *Hymenophysa* mainly because he was of the opinion that the character found in the swimbladder, was not accompanied by characters in other organs.

In the first place I have to remark here, that the swimbladder in *Hymenophysa*, is not as I myself earlier believed and described, single and that it does not consist only of the spacious, free in the abdominal cavity lying bladder, but that that bladder is only the posterior part of the entire swimbladder, which, by a shorter or longer tube, is united with the anterior part, which, just like in the genera *Cobitis*, *Cobitichthys* and *Acanthopsis* is enclosed in a bony box, formed by the anterior vertebra, and in *Hymenophysa* becomes even relatively considerably larger than in the mentioned genera. I had not noticed this peculiarity, when I described and published the three species of the genus that were contained in my cabinet.

61 There are however other characters than those relating to the shape of the swimbladder, which justify the acceptance of *Hymenophysa* as a proper genus.

In the first place the habitus of the species belonging to genus is a very peculiar one and already sufficient to distinguish them from all other Cobitiformes.

They are all recognisable by a much shorter and thick-set body than one observes in the other Cobitiformes, a habitus that is moreover distinctive by the relatively high back. It is primarily on the basis of the body shape that I place *Cobitis curta* T. Schl. in *Hymenophysa*. This Japanese species also has other external characters of *Hymenophysa*.

In the second place *Hymenophysa* differs from *Cobitis*, *sensu mihi*, by the presence of a usually strongly developed suborbital spine, whereas it cannot be united to any of the remaining genera of Cobitiformes, because of its free, not with skin covered eyes.

Thus one can recognise the genus immediately, by the suborbital spines and the simultaneously free eyes, and that recognition is still made easier by the thickset body shape and the high back, as well as by the forked caudal fin and the more or less acute pig-like snout that all species have in common.

The now known species of *Hymenophysa* can be grouped in those with six and those with eight barbels. All of them however, have four snout barbels of which the basis are set close together, and two upper jaw barbels implanted at the mouth corner.

The lower jaw barbels are sometimes lacking and always very slightly developed. They are not connected to other characters of enough importance to give these groups a higher meaning.

To the eight barbeled species belong *Hymenophysa macracanthus*, *Hymenophysa geto* and *Hymenophysa grandis*, to the six barbled species *Hymenophysa MacClellandi*, *Hymenophysa Dario* and *Hymenophysa curta*.

Both archipelagic species moreover can be differentiated from their related species according to the following scheme.

- I. Barbels 8. Body with 3 transverse, dark, wide bands, an ocular, dorso-ventral and dorso-anal band. D 3/8 or 3/9.

Hymenophysa macracanthus Blkr.

- II. Barbels 6. Body with about 15 transverse, bluish bands. D. 3/10 to 3/13.

Hymenophysa MacClellandi Blkr.

62 *Hymenophysa macracanthus* Blkr,
Grootdoornige Getjoeban [Large Spined Getjuban].
Atl. Cypr. Tab 1.

A *Hymenophysa* with an oblong, compressed body, depth of body contained about 4 times in its length, width about 2 times in its depth. Head acute, convex, contained $3\frac{3}{4}$ to 5 times in length of body; depth of head contained slightly over once to $1\frac{1}{5}$ times in its length, width twice to $1\frac{2}{5}$ times; rostro-dorsal profile convex; eyes not covered by skin, placed in the posterior half of the head, not reaching the rostro-frontal line, eye diameter contained 4 to 6 times in length of head, distance between the eyes $1\frac{3}{4}$ to $2\frac{3}{4}$ times the eye diameter, interorbital line strongly convex; nostrils perforated, placed in the middle of the snout, approximately halfway the tip of the snout and the orbit, a little anterior to the suborbital spine, very close together, the posterior ones larger than the anterior ones; anterior nostrils can be closed by means of a broad valve which is slightly tubular at the base; suborbital spine inserted rather far anterior to the eye, very robust, forked, lower branch more than two times as long as higher branch, ending below the posterior margin of the eye; snout slightly acute, convex, nearly twice as long or more than twice as long as the eye, fleshy, protruding beyond the mouth, upper jaw longer than lower jaw, ending far anterior to the eye; lower jaw thin, spoon-shaped, protruding rather far anterior to the down-folded lower lip, lips broad,



Fig. 1. *Hymenophysa macracanthus* Blkr. [Atl. Ichth. Cypr. Tab. 1, Fig. 2 as *Botia macracanthus*. TL figure 227 mm.]

fleshy, the upper one in front prolonged into two oblong-round membranous lobes, the lower one with a hanging, curved margin; barbels 8, the 4 nasal barbels inserted on the tip of the snout with a common base, the top half articulated, antenna-like, the external barbels longer than the middle ones and the eye, the middle ones to a rather great height united by means of a membrane, the maxillary barbels fleshy at the base and compressed at the top, thin, not or hardly longer than the external nasal barbels, the lower jaw barbels closely together at the base, broad, shorter than the other barbels; 5 pharyngeal teeth placed in a single row on both sides, conical, acute, hardly curved, small. Gill opening nearly vertical; gill cover at the lower posterior side prolonged into an obtuse process; scales very small, visible with the naked eye; lateral line running nearly straight along the middle of the flanks, the anterior part tumid; swimbladder bipartite, the anterior part spherical, enclosed in a bony cavity, united with the posterior part by means of a short, rather wide tube, posterior part oblong, more than twice as large as anterior part, suspended freely in the ventral cavity. Dorsal fin in younger animals starting slightly anterior to, in old animals above the base of the ventral fins and ending anterior to the anal fin, acute or acutely rounded, not emarginate, higher than base length, lower than the body; pectoral fins in younger animals slightly acutely rounded, in old animals acute, not or hardly reaching ventral fins, shorter than the head; ventral fins acute or acutely rounded, shorter than pectoral fins; anal fin acute, not or hardly emarginate, about twice as high as base length, lower than dorsal fin; caudal fin with a deep incision, lobes very acute, contained $3\frac{3}{4}$ to $3\frac{3}{4}$ times in the length of the body. Colour: body beautiful pink or yellow, 3 broad, blackish-dark transverse bands, bordered with saffron-yellow, the ocular first band starting from the crown and surrounding the eye, tapering ventrally and not united with the band on the opposite side, the middle, dorso-ventral band very wide, starting anterior to the dorsal fin, the lower part tapering and united with the band on the opposite side on the belly anterior to the ventral fins, the third band, starting from the dorsal spine and starting on the back of the tail descending to the anal fin and surrounding nearly the whole tail, dorsal and anal fin nearly completely blackish-dark, anteriorly at the base and at the anterior margin and at the tip sometimes rosy-red, pectoral and ventral fins in juveniles bright red, in older fishes pink with a dark wide area in the middle, caudal fin beautiful red, iris golden, tinged with violet and dark.

B. 3. D. $3/8$ or $3/9$. P. $1/13$ to $1/15$. V. $1/8$. A. $3/5$ or $3/6$. C. $8/17/8$ to $10/17/12$, short flanking ones included.

Syn. *Cobitis macracanthus* Blkr, Diagn. Besch. Nieuwe vischs. Sumatra tient. I to IV, Nat. T. Ned. Ind. III p. 603.

Matjan Mal. Sum. *Getjuban* Lampong. Sum.

Hab. Sumatra (Pangabuang, Palembang, Djambi, Lahat, Lematang-Enim, Kwanten), in rivers.
Borneo (Bandjermasin, Kahajan, Pontianak, Sintang), in rivers.
Length of 36 specimens 48''' to 320'''.

63 Remark. I described this species for the first time at the cited place, in the year 1852, after smaller specimens from Sumatra. Since then, I received numerous specimens not only from different places from Sumatra, but also from Borneo, among which were specimens with a length of about one foot. It does not seem to occur on Java.

The Large Spined Getjuban has eight barbels just like *Hymenophysa grandis* and *Hymenophysa geto*, but in the first mentioned species the body is irregularly maculated, and without bars, whereas in the last mentioned species there are 7 or 9 dark transversal bars, so that it can be distinguished from these at a first glance.

Curious in this species is the elongation of the upper lip in two rounded lobes and the antenna like segmentation of the snout barbels. I suspect it is the largest species of all known Cobitiformes.

Hymenophysa MacClellandi Blkr.
MacClelland's Getjuban.
Atl. Cyprin. Tab. II fig. 6.

A *Hymenophysa* with an elongate, compressed body, depth of body contained nearly 5 times to $5\frac{1}{2}$ times in its length, width nearly 2 to $2\frac{1}{2}$ times in its depth. Head swine-like, acute, contained $4\frac{2}{3}$ to nearly 5 times in length of body; depth of head contained $1\frac{1}{2}$ to $1\frac{3}{4}$ times in its length, width $2\frac{1}{2}$ to 3 times; rostro-dorsal profile sloping, nearly straight; eyes not covered, placed in the posterior half of the head, not reaching the rostro-frontal line, eye diameter contained 5 to 7 times in length of head, distance between the eyes slightly more than once to $1\frac{1}{2}$ times their diameter, interorbital line convex; nostrils perforated, placed approximately halfway between the tip of the snout and the orbit, far anterior to the suborbital spine, very closely together, the posterior ones hole shaped; anterior nostrils can be closed by means of a large valve of which the basal half is tubular; suborbital spine inserted not far anterior to the eye, robust, forked, the lower branch about twice as long as the upper branch, ending approximately below the middle of the eye; snout acute, not or hardly convex, swine-like, in juveniles twice as long as the eye, in older animals more than twice as long as the eye, protruding beyond the mouth, fleshy; upper jaw longer than lower jaw, ending far anterior to the eye; hooked at the top, ending far anterior to the eye, lower jaw rather thin, spoon-shaped, protruding beyond the downfolded lip; lips fleshy, simple, not lobed; barbels 6, the 4 nasal barbels inserted on the tip of the snout in a common base, not articulated, the internal barbels inserted above the external barbels and much longer than these and than the eye, only lightly palmate at the base, the 2 maxillary barbels slightly fleshy at the base, not or not much shorter than nasal barbels; pharyngeal teeth in one row on both sides, conical, acute, hardly curved, small. Gill opening nearly vertical, gill opening at the posterior lower side lengthened into a blunt process; scales very small, well visible with the naked eye; lateral line running nearly straight over the middle of the flanks, the anterior part tumid; swimbladder bipartite, the anterior part spherical, encased in a bony cavity, united with the rather wide tubular posterior part, the oblong posterior part more than two times as large suspended freely in the ventral cavity. Dorsal fin starting above or just anterior to the ventral fins and ending a little anterior to the anal fin, slightly acute, not or slightly emarginate, lower than the body, in juveniles length hardly greater, in older animals much greater than depth; pectoral fins slightly acutely or slightly obtusely rounded, ending far anterior to ventral fins, much shorter but less than twice as short as the head; ventral fins slightly acutely or slightly obtusely rounded, shorter than pectoral fins; anal fin acutely or obtusely rounded, not or hardly emarginate, much less than twice as high as base length, slightly or not lower than dorsal fin; caudal fin with a deep incision, lobes acute or acutely rounded, contained $4\frac{1}{3}$ to 5



Fig. 2. *Hymenophysa MacClelandi* Blkr. [Atl. Ichth. Cypr. Tab. 1, fig. 3, as *Botia hymenophysa*. TL figure 184 mm]

times in the length of the body. Colour of upper ⁶⁴ part of the body beautiful rosy-green, lower part pearly; head on both sides with 2 longitudinal bands, the higher one rostro-frontal, the lower rostro-ocular; body in younger animals with 13 to 15 transverse, nearly equally wide and nearly equally distant bluish or on the back violetish bands anteriorly and posteriorly bordered with a deeply blue band or narrow band, not reaching the ventral line, in old animals with hardly or not visible bands but persisting blue narrow bands. Fins pink, dorsal fin with 4 or 5 oblique or nearly horizontal, violetish-blue bands and at the top generally with a black or dark violet spot, caudal fin at the basal half with 3 to 5 transverse blue bands; iris dark, tinged with gold and pink.

B. 3. D. 3/10 to 3/13. P. 2/10 to 2/13. V. 1/7. A. 3/5 or 3/6. C. 10/17/10 to 15/17/15, short flanking ones included.

Syn. *Cobitis hymenophysa* Blkr. Diagn. Beschrijv. Nieuwe vischs. Sumatr. Tient, I-IV, Nat. Tijdschr. N. Ind. III p. 602.

Langli Lampong.

Hab. Java (Ngawi), in rivers.

Sumatra (Pangabuang, Palembang, Lematang-Enim, Lahat), in rivers.

Borneo (Kahajan, Pontianak), in rivers.

Length of 24 specimens 64''' to 187'''.

Remark. I discovered the species described here at the same time as the Large spined Getjuban and described it at the same place after a single specimen from Palembang. Since then I received rather numerous specimens from Sumatra and Borneo and also a few from Java. It differs from its archipelagic relatives by a more slender body, more numerous dorsal fin rays, more numerous, different coloured bands on the body and by the presence of only six barbels. The lastmentioned character is shared with *Hymenophysa curta* and *Hymenophysa Dario*. However, it is easily distinguished from both species, – from *Hymenophysa curta* by its transverse bars and remarkable more numerous dorsal fin rays, – and from *Hymenophysa dario* by its more acute profile, smaller eyes, more numerous dorsal fin rays and more numerous and obliquely placed transverse bars on the body.

I possess only 3 Javanese specimens of this species, which were caught in the area of the Solo river, near Ngáwi. These specimens all have only 13 transverse bars on the body, only 3/10 or 3/11 dorsal fin rays and the violet-purple dorsal fin bands very narrow and placed almost horizontally. Some of my specimens from Sumatra show the

same peculiarities and it would have induced me to describe all of them as a new species, if I had not been in the possession of two specimens, which with the presence of 15 transverse bars on the body and a very oblique position of the dorsal fin bands like I observe in most of my specimens, have only 3/10 to 3/11 dorsal fin rays. As moreover the habitus of all specimens is similar, it can only be explained by a variation due to the climate.

65 ACANTHOPSIS V. Hass.

MUD CREEPER

Body elongate, compressed, with small scales. Lower jaw with a thin edge, no tubercle. Eyes covered. Barbels 6 to 10, nasal barbels 2, maxillary barbels 4. Head compressed, scaleless. Suborbital spine. Anterior nostrils open, not tubular. Dorsal fin opposite ventral fins. Small swimbladder enclosed in bony vertebral cavity. Pharyngeal teeth conical, in one row.

Remark. The generic name *Acanthopsis* was not proposed first by Mr Agassiz, as one generally seems to accept and would be inclined to conclude from the Nomenclator of Mr Agassiz, but dates already from the year 1823 in which year an extract from a letter of Van Hasselt on the fishes of Java, was included in the *Algemene Konst- en Letterbode* and from there in translated form included in the *Bulletin of De Férussac* of 1824.

Van Hasselt based his genus *Acanthopsis* on a peculiar species from Java, which he gave the name *Acanthopsis dialyzona*, and took as generic character the acutely elongated snout and the position of the suborbital spine before and not under the eye. The name *Acanthopsis* later was applied to all species of *Cobitiformes* that possess a suborbital spine, irrespective whether it is placed before or below the eye. In both cases the definition of the genus leaves to be desired. Not all species of *Cobitiformes* with suborbital spines can be placed in one genus, and on the other hand those spines in all species are not placed before the eye, whereas the snout is elongated in only a few species.

Therefore I have drafted a new diagnosis of the genus, but I must note that I have seen only three species with my own eyes, and that consequently with regard to all remaining species I am restricted to what the existing descriptions and figures show. I once possessed an *Acanthopsis* (*Cobitis guntea* Buch.) from Bengal, but this species was lost during the many movings of my cabinet, while in its description, in my *Nieuwe Nalezingen op de ichthyologie van Bengalen*, I have paid no attention to the nature of the eye membrane and the nostrils. For that reason I now can only check both archipelagic species from my cabinet.

In the mean time these species belong to a group of their own in the genus, and are peculiar by their pig-like heads and the suborbital spine being implanted far in front of the eyes. By this already they can be separated from all remaining species.

66 The genus *Acanthopsis* as described above, can easily be distinguished from the remaining genera of *Cobitiformes*. It differs from *Cobitis* and *Cobitichthys* already by its suborbital spine. It cannot be confused with *Cobitis* and *Hymenophysa* because of its covered eyes. It differs from *Lepidocephalus* by its two snout barbels, four upper jaw barbels and scaleless head. And it cannot be confused with *Acanthopthalmus* by the placement of the dorsal fin above the ventral fins.

Both archipelagic species can be characterized as follows.

1. Barbels 8. Head swine-like, acute, more than three times as long as the snout. Suborbital spine inserted far anterior to the eye. Caudal fin emarginate.
 - A. Head contained $4\frac{2}{3}$ times to slightly over 5 times in length of body. Head, back and flanks with round or polymorphous violet-dark spots. A. 2/5 or 2/6.

Acanthopsis choirochynchos Blkr.

- B. Head contained 5 to $5\frac{1}{2}$ times in length of body. No dark spots on head and back. A. 2/6 or 2/7.

Acanthopsis dialyzona. V. Hass.

Acanthopsis choirorhynchos Blkr,
Varkensachtige Modderkruiper [Pig-like Mud creeper].
 Atl. Cypr. Tab. II fig. 5.

An *Acanthopsis* with an elongate, compressed body, depth of body contained $9\frac{1}{2}$ to nearly 11 times in its length, width contained about $1\frac{1}{2}$ times in its depth. Head very acute, swine-like, contained slightly over 5 to $4\frac{2}{3}$ times in length of body; depth of head contained about $2\frac{2}{3}$ times in its length, width about $3\frac{1}{2}$ times; rostro-dorsal profile sloping, straight; eyes completely covered by skin, placed in the posterior third of the head, touching the frontal line, eye diameter contained about $6\frac{1}{3}$ times in length of head, distance between the eyes less than $\frac{1}{2}$ times their diameter, interorbital line not convex; nostrils open, placed approximately halfway between the tip of the snout and the orbit, slightly anterior to the base of the suborbital spine, very close together, the anterior ones slightly tubular, posterior ones foramen-shaped; suborbital spine inserted far anterior to the eye, medium sized, shorter than the eye, ending far anterior to the eye, forked, lower branch less than twice as long as upper branch; snout acute, swine-like, more than three times as long as the eye, conical, slightly compressed, its tip protruding beyond the mouth, fleshy, upper jaw longer than lower jaw, not hooked at the tip, ending far anterior to the eye, lower jaw rather thin, spoon-shaped, protruding beyond the down-folded lip; lips fleshy, simple, not lobed; barbels 8, thin, the 2 nasal barbels inserted on the tip of the snout close to the base, not or not much shorter than the eye, the 4 maxillary barbels equal or nearly equal in length to the eye, the anterior barbels inserted in the central branch of the intermaxillary bone, the posterior ones inserted in the angle of the intermaxillary bone, longer than the anterior barbels, the lower jaw barbels inserted in the front of the lower lip, shorter than the other barbels; pharyngeal teeth about 14 in one row on both sides, conical, acute, hardly curved, small, unequal. Gill opening nearly vertical, gill cover concave at the upper margin, tip rounded, strongly curved at the lower margin, suboperculum protruding beyond gill cover; scales very small, visible with the naked eye; lateral line well visible, nearly 67 straight, running along the middle of the flanks; swimbladder encased in bony vertebral cavity, small, no accessory posterior part freely suspended in the cavity of the belly. Dorsal fin for the second of its four parts opposite the ventral fins and ending a distance of about its total length anterior to the anal fin, slightly higher



Fig. 3. *Acanthopsis choirorhynchos* Blkr. [Atl. Ichth. Cypr. Tab. 1, Fig. 1. TL figure 170 mm.]

than the body, length nearly equal to depth, acute, slightly emarginate; pectoral fins acute, ending far anterior to the ventral fins, much shorter but less than twice as short as the head; ventral fins acute or acutely rounded, shorter than pectoral fins, ending a distance less to more than their length anterior to anal fin; anal fin acute or slightly acutely rounded, not or hardly emarginate, slightly higher than base length, lower than the body; caudal fin oblique, slightly emarginate, lobes acute, lower lobe longer than upper lobe, contained $5\frac{3}{4}$ to $6\frac{3}{4}$ times in the length of the body. Colour of upper part of the body violetish- or rosy-green, silver on the flanks, lower part white, with dark-violet or green-violet spots and rivulets; spots on cheeks small, polymorphous, on snout and forehead on the middle line 4 to 6 transverse, oblong bands, on the middle line of the back 13 to 14 nearly similar oblong, short transverse bands, on the flanks in the lateral line 10 to 12 nearly round, large spots, small spots on lower part of flanks sometimes united into a longitudinal, more or less interrupted, slightly undulating band. Fins orange- or pink-hyaline, rays pink or darkish; caudal fin for the total middle part of the membrane pearly, rays orange, each with 4 to 5 small spots forming transverse bands in the same way, upper part of the base with a small, black, roundish spot.

B. 3. D. 2/10 or 2/11. P. 1/9. V. 1/6. A. 2/5 or 2/6. C. 7/14/5 or 6/14/4, short flanking ones included.

Syn. *Cobitis choirorhynchus* Blkr, Overz. Ichth. Sumatra, Nat. T. Ned. Ind. VII p. 95.

Hab. Sumatra (Region of Palembang where the rivers Lematang and Enim flow together, Lahat).

Length of 7 specimens 101''' to 178'''.

Remark. This species grows remarkably larger than its Javanese congeneric relative of which it moreover primarily differs by its colour markings and relatively larger head. On Sumatra it seems to replace *Acanthopsis dialyzona* V. Hass.

Acanthopsis dialyzona V. Hass.,

Algem. Konst- en Letterb. 1823 II p. 133, Bullet. Férussac 1824 p. 377.

Spitssnuitige Modderkruiper [Acute snouted Mud creeper].

Atl. Cypr. Tab. II fig. 8.

An *Acanthopsis* with an elongate, compressed body, depth of body contained $9\frac{1}{2}$ to $10\frac{1}{2}$ times in its length, width contained about $1\frac{1}{2}$ times in its depth. Head very acute, swine-like, contained 5 to $5\frac{1}{3}$ times in length of body; depth of head contained $2\frac{2}{3}$ to $2\frac{1}{4}$ times in its length, width about 3 times; rostro-dorsal profile sloping, nearly straight or slightly convex; eyes completely covered by skin, placed in the posterior third of the head, touching the frontal line, eye diameter contained 6 to 8 times in length of head, distance between the eyes less than $\frac{1}{2}$ times their diameter, interorbital line not or hardly convex; nostrils perforated, placed approximately halfway between the tip of the snout and the orbit, slightly anterior to the base of the suborbital spine, very small, foramen-shaped; suborbital spine inserted far anterior to the eye, medium sized, shorter than the eye, ending far anterior to the eye, forked, the lower branch less than twice as long as the upper branch; snout acute, swine-like,

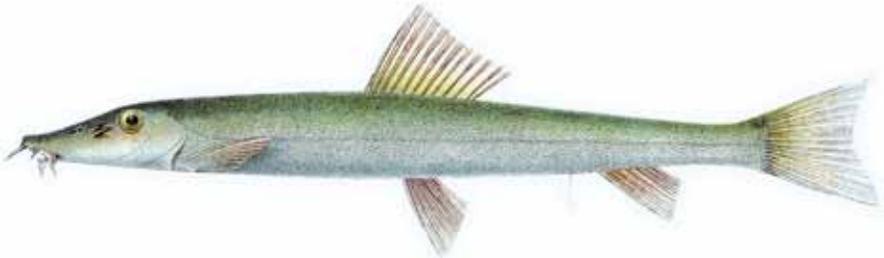


Fig. 4. *Acanthopsis dialyzona* V. Hass. Atl. Ichth. Cypr. Tab. II, Fig. 8. TL figure 107 mm.

more than three times as long as the eye, conical, slightly compressed, its tip protruding beyond the mouth; upper jaw longer than lower jaw, not hooked at the tip, ending far anterior to the eye, lower jaw with fleshy, simple lips, not lobed; barbels 8, thin, the 2 nasal barbels inserted on the tip of the snout, close to the base, shorter than the eye, maxillary barbels 4, the anterior ones inserted in the middle branch of the intermaxillary bone, slightly longer ⁶⁸ than the eye, the posterior ones inserted in the angle of the intermaxillary bone, shorter than the anterior barbels; lower jaw barbels inserted in the anterior part of the lower lip, little conspicuous, shorter than the other barbels; pharyngeal teeth in one row, conical, acute, hardly curved, small. Gill opening nearly vertical, gill cover rounded posteriorly, strongly curved at the lower margin; suboperculum protruding behind the gill cover; scales very small, hardly visible with the naked eye; lateral line nearly straight along the middle of the flanks; swimbladder enclosed in vertebral cavity, small, no accessory posterior part suspended freely in the ventral cavity. Dorsal fin with the second fourth part opposite the ventral fins and ending nearly the distance of its complete length anterior to the anal fin, higher than the body, nearly equally long as high, acute, emarginate; pectoral fins acute, ending far anterior to the ventral fins, much shorter but less than twice as short as the head, ending about their length anterior to the anal fin, higher than the body, length nearly equal to depth, acute, emarginate; anal fin acute or slightly acutely rounded, hardly or not emarginate, slightly higher than base length, lower than the body; caudal fin emarginate, slightly crescent-shaped, lobes acute, lower lobe slightly longer than upper lobe, contained $5\frac{1}{2}$ to 6 times in the length of the body. Colour of upper part of the body olive-hyaline, lower part shiny-pearly, flanks shiny golden-green with irregular diffuse, violetish spots arranged in a longitudinal row or more or less united into a band. Fins pink-hyaline, caudal fin at the upper part of the base with a small, black-violet spot and at the base and in the middle with 3 or 4 softly darkish-violet bands; iris yellow or orange.

B. 3. D. 2/10 or 2/11. P. 1/9. V. 1/6. A. 2/6 or 2/7. C. 8/14/6 to 6/14/4, short flanking ones included.

Syn. *Cobitis macrorynchos* Blkr. Overz. Ichth. Sumatra, Nat. Tijdschr. N. Ind. VII p. 96. Act. Soc. Scient. Ind. Neerl. II 10^e Bijdr. Ichth. Borneo p. 20.

Hab. Java (Batavia), in rivers.

Borneo (Kahajan), in rivers.

Length of 9 specimens 70''' to 113'''.

Remark. The species in question is the same one, for which Van Hasselt proposed the name that is heading this article. I became certain about this not only as I rediscovered this species in Batavia, where it is the only representative of its genus, but also, because I possess a copy of the figure that Van Hasselt had made of it. That copy has a length of 136''', so that the species grows larger than the largest of the specimens in my possession. It is rare in Batavia. I did not yet obtain it from other places on Java.

LEPIDOCEPHALUS Blkr.

SCALE HEAD.

Body elongate, strongly compressed, with small scales. Lower jaw with a thin edge, no tubercle. Head strongly compressed, scaled, snout convex. Eyes covered. Barbels 6 or 8, nasal barbels 4, maxillary barbels 2. Suborbital spine. Anterior nostrils tubular. Dorsal fin placed between ventral fins and anal fin. No visible swimbladder. Pharyngeal teeth conical, in one row.

⁶⁹ Remark. The genus *Lepidocephalus* is easily discernable from the remaining genera of the Cobitiformes by the scales on the suborbital – and opercular area. Its squamation, which in one of the species even extends to over the entire operculum and the crown, in the family of the Cyprinoids, as far as I know, is an independent character and not known of any other genus.

Already for this reason it seems that a generic value ought to be attached to this character. Apart from that *Lepidocephalus* differs from *Cobitis* and *Hymenophysis* by its covered eyes, its dorsal fin placed between the ventral fins and the anal fin, and the absence of a swimbladder; and from *Cobitis* moreover by its suborbital spine. It is more related to the genera *Cobitichthys*, *Acanthopsis* and *Acanthopthalmus*. With these it has the covered eyes in common and moreover with *Acanthopsis* and *Acanthopthalmus* the movable suborbital spine. However, it is sufficiently distinguishable from all of them. *Cobitichthys* lacks the suborbital spine, has 2 snout - and 4 upper jaw barbels, a small swimbladder and the dorsal fin opposite the ventral fins. *Acanthopsis* does have a suborbital spine, but apart from that, it has barbels, a swimbladder and a dorsal fin as in *Cobitichthys*. The most related genus however, is *Acanthopthalmus*, but even this is easy to separate from *Lepidocephalus*, not only as its head is completely scaleless, but also because only 2 snout barbels and on the other hand 4 upper jaw barbels are present.

I know only 2 species from the genus *Lepidocephalus* from personal observation. One of these has been known in science for a long time under the name *Cobitis Hasseltii* Val., whereas the other a few years ago was discovered by myself and was made public under the name *Cobitis macrochir*. I am no stranger to the idea that still other species will be found among the *Cobitiformes* of South Asia that may be placed in *Lepidocephalus*, and although the existing descriptions and figures are not informative enough, I believe I can identify *Cobitis balgara* as a species of this genus although it possesses 8 barbels.

Both species of my collection possess the following characters.

I. Barbels 6.

A. Crown scaled. Dorsal fins placed in between ventral fins and anal fin, ventral fins placed in the posterior half of the body. Body and fins without spots or bands.

70 *Lepidocephalus macrochir* Blkr.

B. Crown scaleless. Fins, dorsal fin nearer to the ventral fins than to the anal fin, ventral fins placed in the anterior half of the body. Body variegated with spots and bands.

Lepidocephalus Hasseltii Blkr.

Lepidocephalus macrochir Blkr.

Large-headed Scale head.

Atl. Cypr. Tab. II fig. 10.

A *Lepidocephalus* with an elongate, compressed body, depth of body contained $6\frac{1}{2}$ to 7 times in its length, width $2\frac{1}{2}$ to 3 times in its depth. Head obtuse, convex, contained 6 to $6\frac{1}{2}$ times in the length of the body; depth of head contained $1\frac{1}{3}$ to $1\frac{1}{4}$ times in its length, width $2\frac{1}{2}$ to 3 times; rostro-dorsal profile convex; eyes completely covered by skin, placed posteriorly in the anterior half of the head, far from the frontal line, eye diameter contained 11 to 14 times in the length of the head, distance between the eyes more than once their diameter, interorbital line convex; nostrils nearer to the eyes than to the tip of the snout, posterior nostrils hole shaped, anterior nostrils tubular; suborbital spine inserted slightly anterior to the eye, robust, longer than the eye, ending behind the eye, forked, lower branch more than twice as long as upper branch; snout obtuse, convex, elevated, fleshy, protruding beyond



Fig. 5. *Lepidocephalus macrochir* Blkr. Atl. Ichth. Cypr. Tab. II, Fig. 6. TL figure 87 mm.

the mouth; upper jaw longer than lower jaw, not hooked at the tip, ending slightly anterior to the eye, lower jaw spoon-formed, protruding beyond the down-folded lip; lips fleshy, simple, not lobed; barbels 6, fleshy, the 4 nasal barbels inserted on the tip of the snout, the external ones slightly longer than the internal ones, slightly more than twice as shorter as the head, maxillary barbels inserted in the angle of the intermaxillary bone, the nasal barbels slightly shorter than the external barbels; vertex and posterior part of cheeks and gill covers scaled, with very small scales, hardly visible with the naked eye. Pharyngeal teeth in one row, conical, acute, hardly curved, small. Gill cover rounded at the posterior side, concave at the lower margin; suboperculum not protruding behind the gill cover; gill opening nearly vertical; scales on the body very small, visible with the naked eye; lateral line nearly straight, running along the middle of the flanks; no swimbladder. Dorsal fin placed in between ventral fins and anal fin, obtuse, convex, about twice as low as the body, about equally high as base length; pectoral fins acute, slightly longer than the head, ending a distance of their complete length or more than their complete length anterior to the ventral fins; ventral fins obtuse, rounded, more than twice as short as pectoral fins, inserted in the posterior half of the body, ending a distance of their complete length or more than their complete length anterior to the anal fin; anal fin obtuse, rounded, not lower than dorsal fin, higher than base length; caudal fin elongate, slightly truncate, rounded at the angles, contained $7\frac{1}{2}$ to $8\frac{1}{2}$ times in the length of the body. Colour of body and fins darkish-orange or dark, no spots or bands on body or fins.

B. 3. D. $1/8$ or $1/9$. P. $1/8$. V. $1/5$ A. $1/5$ or $1/6$. C. $12/14/10$ to $10/14/8$, short flanking ones included.

Syn. *Cobitis macrochir* Blkr, Overz. Ichth. Faun. Sumatr. Nat. T. Ned. Ind. VII p. 97.

Hab. Java (Surakarta), in the river Pepeh.

Sumatra (Palembang), where the rivers Lematang and Enim flow together.

Length of 5 specimens $64''$ to $91''$.

Remark. In the species in question, which I already discovered in the year 1846, but only made public in the year 1854, I observed for the first time, that contrary to [71](#) all other Cyprinoids, the head for the most part is covered with small scales. Similar small scales on the head I found since then also in *Lepidocephalus Hasseltii*, but in this species they are only present on the cheek and the upper parts of the gill covers, whereas in *Lepidocephalus macrochir* they extend to all over the gill cover and over the entire crown of the head.

In general shape this species more resembles the species of *Acanthopthalmus* by the far posterior implantation of the dorsal and ventral fins, whereas the shape of its generic relative approaches more to that of the species of *Acanthopsis*.

Till now only the two abovementioned catch localities of *Lepidocephalus macrochir* have become known to me, so that it seems to be rather rare and restricted to those parts of the area of larger rivers that are more distant from the sea.

Lepidocephalus Hasseltii Blkr.*Van Hasselt's Schubkop* [*Van Hasselt's Scale head*].

Atl. Cypr. Tab. II fig. 2.

A *Lepidocephalus* with an elongate, compressed body, depth of body contained 6 to 7 times in its length, width contained $1\frac{1}{3}$ to $1\frac{1}{2}$ times in its depth. Head slightly obtuse, convex, contained $5\frac{2}{3}$ to 6 times in the length of the body; depth of head contained $1\frac{1}{3}$ to $1\frac{1}{2}$ times in its length, width $2\frac{1}{4}$ to $2\frac{1}{2}$ times; rostrum-dorsal profile convex; cheeks, post-ocular part and upper part of gill cover scaled, scales very small, well visible only with the help of a lens; eyes completely covered, placed posteriorly in the anterior half of the head, very close to the frontal line, eye diameter contained 6 to 7 times in length of head, distance between the eyes about once their diameter, interorbital line convex; nostrils nearer to the eye than to the tip of the snout, posterior nostrils hole-shaped, anterior nostrils tubular; suborbital spine inserted slightly anterior to the eye, rather robust, not or hardly longer than the eye, forked, lower branch less than twice as long as upper branch; snout obtuse, convex, elevated, fleshy, protruding beyond the mouth; upper jaw longer than lower jaw, not hooked at the tip, ending slightly anterior to the eye, lower jaw spoon-shaped, protruding anterior to down-folded lower lip; lips fleshy, simple, lower lip with two lobes; barbels 6, fleshy, the 4 nasal barbels inserted in the periphery of the tip of the snout, external ones slightly longer than internal ones, hardly reaching the eye; upper jaw barbels inserted in the angle of the intermaxillary bone, reaching the eye. Pharyngeal teeth in one row, conical, acute, hardly curved, very small. Gill opening nearly vertical; gill cover rounded at the posterior side, at the lower margin hardly concave; suboperculum hardly or not protruding behind the gill cover; gill opening nearly vertical; scales on the body very small, visible with the naked eye; lateral line nearly straight, running along the middle of the flanks; no swimbladder? Dorsal fin placed in between ventral fins and anal fin, much closer to the ventral fins than to the anal fin, obtuse, rounded, not or hardly higher than the body, higher than base length; pectoral fins slightly acutely rounded, hardly or slightly shorter than the head, ending a distance of about their total length anterior to the ventral fins; ventral fins slightly obtusely or acutely rounded, inserted in the front half of the body, slightly shorter than pectoral fins, ending less than their length anterior to the anal fin; anal fin obtuse, rounded, lower than dorsal fin, higher than base length; caudal fin elongate, slightly convex or hardly emarginate, slightly obtuse at the angles, rounded, contained 5 to $5\frac{1}{2}$ times in the length of the body. Colour of upper part of body green, lower part pearly, middle of flanks with 10 to 12 greenish-dark, slightly rounded spots, set in a single row, traversed by a bluish-violet head-tail band, oculo-maxillary band bluish-⁷² violet, upper part of the body and upper part of the flanks variegated with small, irregular spots and darkish-green points; iris bluish, fins yellowish or pink-hyaline, pectoral, ventral and anal fins dotted more rarely and sparsely, dorsal and caudal fin always and densely on the rays variegated with very small darkish-green spots, caudal fin at the upper part of the base sometimes marked by a deeper green-dark spot.

B. 3. D. $2/7$ or $3/7$. P. $1/7$. V. $1/6$. A. $3/5$ or $3/6$ or $2/6$. C. $10/14/10$ to $8/14/6$, short flanking ones included.

Syn. *Cobitis octocirrhus* v. Hass., Algem. Konst- en Letterbode 1823 II p. 133, Bulletin de Férussac 1824.

Cobitis Hasseltii Val., Poiss. XVIII p. 56, Blkr. Descr. Pisc. Javan. nov. Nat. T. Ned. Ind. XIII p. 365.

Loche de Hasselt, Val. Poiss. XVIII p. 56.



Fig. 6. *Lepidocephalichthys Hasseltii* Blkr. Atl. Ichth. Cypr. Tab. II, Fig. 2. TL figure 42 mm.

Sereni Javan.

Serowot, *Serowot*, *Djeler* Sundan. Mal.

Hab. Java (Batavia, Buitenzorg, Tjilankahan, Perdana, Bandung, Garut, Purworedjo) in rivers.
Length of 55 specimens 32''' to 48'''.

Remark. Since I described this species at the abovementioned place after less well preserved specimens, I came in the possession of about 40 new, partly larger, perfectly preserved specimens. A closer investigation of these, revealed that the lower jaw barbels are not present, as I earlier had described, but that I must have mistaken the lobes of the lower lip for these, which can easily happen with the tender lips of small specimens, when one pulls them a little with a pair of tweezers.

The species is equally remarkable by its squamation of the head as *Lepidocephalus macrochir*, but it has the peculiarity, that the gill cover is only scaled on the upper part and the crown is not scaled. Moreover it differs from *Lepidocephalus macrochir* as in this species body and fins are entirely without band or spot markings, the ventral fins are implanted behind the anterior half of the total body, the dorsal fin starts posterior to the ventral fins, etc.

The size of *Lepidocephalus Hasseltii* remains very small. It does not seem to grow larger than my largest specimens.

Lepidocephalus Hasseltii was first introduced in science by Mr Valenciennes with the name *Cobitis Hasseltii*. It seems that the short description in the large *Histoire naturelle des Poissons* was only taken from a figure by van Hasselt. I am in the possession of a copy of the drawing of this species left by van Hasselt, on which only 6 barbels are indicated, which answers to nature, but apparently also van Hasselt appears to have counted 8 barbels, which is apparent from the name *Cobitis octocirrhus*, which he proposed for this species.

73 ACANTHOPHTHALMUS V. HASS., Blkr,
SEROWOT.

Body elongate, strongly compressed, with small scales. Snout obtuse. Lower jaw with a thin edge, no tubercle. Eyes covered. Barbels 6 or 8, nasal barbels 2, maxillary barbels 4. Head compressed, scaleless. Suborbital spine. Anterior nostrils tubular. Dorsal fin placed between ventral fins and anal fin. No visible swimbladder. Pharyngeal teeth conical, in one row.

Remark. I retain here a genus proposed by Van Hasselt, which he however characterized less sharply, as he comprised therein the species of *Cobitis* in which the suborbital spine is implanted below the eye and the snout is blunt.

According to this diagnosis *Acanthophtalmus* would not be distinguishable from the many species of *Acanthopsis*, for the Javanese species of which Van Hasselt first proposed the name *Acanthopsis*.

In my opinion *Acanthophtalmus* is a very natural genus, when, as is done above, it is delimited more precisely. It belongs to the *Cobitiformes* with covered eyes, and distinguishes itself from the other genera primarily by the presence of only 2 snout barbels and of 4 upper jaw barbels, while at the same time the dorsal fin is placed far posterior to the ventral fins.

It differs from *Cobitichthys* by the abovementioned position of the dorsal fin, and by its suborbital spine. It has this spine in common with *Acanthopsis* and *Lepidocephalus*,

however *Lepidocephalus* has the head scaled and 4 snout barbels and 2 upper jaw barbels, whereas in *Acanthopsis* the dorsal fin is opposed to the anterior to the middle of the body implanted ventral fins, and a small swimbladder is present, which is enclosed in a bony box. In habitus *Acanthopthalmus* otherwise resembles *Lepidocephalus* most.

As far as the existing knowledge extends, the genus *Acanthopthalmus* in the Indian Archipelago is only represented by two species, both of which were already known to Van Hasselt and indicated by him with the names *Acanthopthalmus javanicus* and *Acanthopthalmus fasciatus*. With rather large certainty one can bring Buchanan's *Cobitis pangia* to the same genus, and I also suspect that *Cobitis thermalis* Val. from Ceylon could be placed in it. Both of those species have 8 barbels, so two more than the archipelagic ones.

I recovered both species of Van Hasselt on Java and one of them I also received from Sumatra. They can be characterised by the following scheme.

74 I. Barbels 6

- A. Body with 12 to 15 wide, transverse bands. Barbels three times or more than three times as short as the head.

Acanthopthalmus fasciatus V. Hass.

- B. Body without any bands or spots. Barbels twice as short or slightly more than twice as short as the head.

Acanthopthalmus javanicus. V. Hass.

Acanthopthalmus fasciatus. V. Hass.,
Algem. Konst- en Letterb. 1823 II p. 133, Bullet. Férussac 1824 p. 377.
Gebande Serowot [*Banded Serowot*].
Atl. Cypr. Tab. II, fig. 4.

An *Acanthopthalmus* with an elongate, compressed body, depth of body contained 8 to 10 times in its length, width contained 2 to 3 times in its depth. Head obtuse, convex, contained 8 to 9 times in the length of the body; depth of head contained $1\frac{1}{2}$ to $1\frac{3}{8}$ times in its length, width about 3 times; rostro-dorsal profile convex; eyes completely covered, placed in the anterior half of the head, near the frontal line, eye diameter contained 7 to 10 times in length of head, distance between the eyes more than once their diameter, interorbital line convex; nostrils nearer to the eyes than to the tip of the snout, posterior nostrils hole-shaped, anterior nostrils tubular; suborbital spine inserted slightly anterior to the eye, robust, longer than the eye, ending behind the eye, forked, lower branch more than twice as long as upper branch; snout obtuse, convex, elevated, fleshy, protruding beyond the mouth; upper jaw longer than lower jaw, not hooked at the tip, ending rather far anterior to the eye, lower jaw spoon-shaped, thin, protruding beyond down-folded lower lip; lips fleshy, simple, lower lip bilobed; barbels 6, fleshy, nearly of the same length, three times or more than three times as short as the head, the 2 nasal barbels inserted on the tip of



Fig. 7. *Acanthopthalmus fasciatus*. V. Hass. Atl. Ichth. Cypr. Tab. II, Fig. 4. TL figure 75 mm.

the snout, very close together, maxillary barbels 4, the anterior ones inserted in the middle branch, the posterior ones in the angle of the intermaxillary bone; head completely scaleless. Pharyngeal teeth in one row; gill cover rounded at the posterior side, at the lower margin hardly concave. Suboperculum not protruding behind the gill cover; gill opening nearly vertical, scales on the body very small, hardly visible with the naked eye; lateral line nearly straight, running along the middle of the flanks; no swimbladder. Dorsal fin much closer to anal fin than to ventral fins, ending slightly anterior to the anal fin, obtuse, rounded, much lower than the body, hardly or not higher than base length; pectoral fins rounded, slightly to much shorter than the head, ending a distance of more than three times their length anterior to the ventral fins; ventral fins inserted in the posterior half of the body, rounded, shorter than pectoral fins, ending a distance of about twice their length anterior to the anal fin; anal fin obtuse, rounded, not lower than dorsal fin, hardly higher than base length; caudal fin elongate, truncate or hardly emarginate, at the angles acute or rounded, contained $8\frac{1}{2}$ to 9 times in the length of the body. Colour body beautiful pink with 12 to 15 wide, transverse, dark bands, 3 anterior cephalic bands, the rest dorso-ventral and caudal, all those on the back very wide and closely together, the middle or lower bands tapering or slightly forked, on the lower part of the tail sometimes united with the bands on the opposite side; fins beautiful pink, caudal fin for the basal part mostly dark, iris dark or blue.

75 B. 3. D. 2/6 or 2/7. P. 1/8. V.1/5. A. 1/5 or 1/6 or 2/5 or 2/6. C. 10/14/9 to 6/14/6, short flanking ones included.

Syn. *Cobitis Kuhlii* Val. Poiss. XVIII p. 58; Blkr, Descr. spec. pisc. Javan. nov. Nat. T. Ned. Ind. XIII p. 364.

Loche de Kuhl Val., Poiss. XVIII p. 58.

Serowot Sundan.

Hab. Java (Batavia, Buitenzorg, Penawangan), in rivers.

Sumatra (Lahat), in rivers.

Length of 20 specimens 72''' to 80'''.

Remark. This beautiful species is very easy to recognize because of its broad, closely together placed, oblique, brown bars on the body, which sharply contrast with a beautiful pink background. But this is also the main character by which it differs from the unbanded *Serowot*.

The remaining differences are of little importance and principally concern the greater length of the barbels and the dorsal fin that is placed more closely to the anal fin.

In Batavia it is rare, as they preferably stay in parts of the rivers that are further away.

Acanthopthalmus javanicus V. Hass.,
Algem. Konst- en Letterb. 1823 II p. 133, Bullet. Férussac 1624 p. 377.
Ongebandede Serowot [*Unbanded Serowot*].
Atl. Cypr. Tab. II, fig. 3.

An *Acanthopthalmus* with an elongate, compressed body, depth of body contained 9 to 11 times in its length, width about 2 times in its depth. Head obtuse, convex, contained $7\frac{1}{4}$ to $7\frac{3}{4}$ times in the length of



Fig. 8. *Acanthopthalmus javanicus* V. Hass. Atl. Icht. Cypr. Tab II, Fig. 3. TL figure 78 mm.

the body; depth of head contained $1\frac{3}{4}$ to $1\frac{1}{2}$ times in its length, width $2\frac{1}{4}$ to $2\frac{1}{2}$ times in its length; rostro-dorsal profile convex; eyes completely covered, placed posteriorly in the anterior half of the head, near the frontal line, eye diameter contained about 10 times in the length of the head, distance between the eyes more than once their diameter, interorbital line convex; nostrils nearer to the eyes than to the tip of the snout, posterior nostrils hole shaped, anterior nostrils tubular; suborbital spine inserted slightly anterior to the eye, robust, slightly longer than the eye, ending slightly behind the eye, forked, lower branch more than twice as long as upper branch; snout obtuse, convex, elevated, fleshy, protruding beyond the mouth; upper jaw longer than lower jaw, not hooked at the tip, ending rather far anterior to lower jaw, lower jaw spoon-shaped, thin, protruding anterior to down-folded lower lip; lips fleshy, thin, lower lip with two lobes; barbels 6, fleshy, nearly of the same length, two times or more than two times as short as the head, the 2 nasal barbels inserted on the tip of the snout, very closely together, maxillary barbels 4, the anterior ones inserted in the middle branch, the posterior ones in the angle of the intermaxillary bone; head completely scaleless. Pharyngeal teeth conical, acute, hardly curved; gill cover rounded at the posterior side, at the lower margin hardly concave. Suboperculum not protruding behind the gill cover; gill opening nearly vertical, scales on the body very small, hardly visible with the naked eye; lateral line nearly straight, running along the middle of the flanks; no swimbladder. Dorsal fin much closer to anal fin than to the ventral fins, ending a distance of nearly its total length anterior to the anal fin, obtuse, rounded, slightly to much lower than the body, hardly or not higher than base length; pectoral fins rounded, much shorter but less than twice as short as the head, ending a distance of three times or more than three times their length anterior to ventral fins; ⁷⁶ ventral fins inserted in the posterior half of the body, rounded, not or hardly shorter than pectoral fins, ending a distance of twice or less than twice their length anterior to the anal fin; anal fin obtuse, rounded, not or hardly lower than dorsal fin, generally higher than base length; caudal fin expanded, truncate or hardly emarginate, at the angles acute or rounded, contained $8\frac{3}{4}$ to $10\frac{1}{2}$ times in the length of the body. Colour: body back and flanks dark, belly less strongly coloured; fins orange, pink or darkish; basal half of caudal fin nearly completely dark, iris blue.

B. 3. D. $2/6$ or $2/7$. P. $1/8$ or $1/9$. V. $1/6$. A. $2/5$ or $2/6$. C. $9/14/8$ to $7/14/6$, short flanking ones included.

Syn. *Cobitis oblonga* K. v. H., Val., Poiss. XVIII p. 58, Blkr, Act. Soc. Scient. Ind. Neerl. II Zesde Bijdr. Vischf. Sumatra p. 48.

Loche oblongue Val. Poiss. XVIII p. 58.

Sisi-samping, *Serowot* Sundan.

Hab. Java (Buitenzorg, Tjampea), in rivers.

Sumatra (Lahat), in rivers.

Length of 23 specimens 60''' to 81'''.

Remark. Very closely related to *Acanthopthalmus fasciatus* V. Hass., *Acanthopthalmus javanicus* is easily distinguishable from it by its not banded and not maculated body, longer barbels and moreover its dorsal fin which is ending more anterior to the anal fin. In habitus and colouration it is close to *Lepidocephalus macrochir* Blkr, but a confusion is not possible when one observes the generic characters, whereas moreover in the last mentioned species the body is less slender, the dorsal fin is placed closer to the anal fin, the pectoral fins are acute and longer than the head, etc.

COBITIS Art., Blkr,

LOACH.

Body elongate, fusiform-compressed, with small scales. Lower jaw with a thin edge, no tubercle. Head rounded, scaleless. Eyes not covered. Barbels 6 to 8, nasal barbels 4, maxillary barbels 2. No suborbital spine. Anterior nostrils tubular. Dorsal fin inserted opposite ventral fins, ventral fins inserted anterior to the middle of the body. Swimbladder small, completely enclosed in bony vertebral cavity. Pharyngeal teeth conical, in one row.

Remark. I propose to retain the old generic name *Cobitis* for those Cobitiformes, which have in common with *Cobitis barbatula* L. a free eye membrane and the absence of suborbital spines. Wherever both these characters are found united, they seem to be accompanied by the others mentioned in the diagnosis, and they represent a very natural genus, whose numerous and usually very much resembling species are less easy to distinguish from each other ⁷⁷ just because in habitus and colour pattern they indicate such a large relationship, which makes them belong to a natural genus. When they are characterized as above there is no confusion possible with any other genus.

Except for *Cobitis* only *Hymenophysa* has free eyes, however this genus has strongly developed suborbital spines and a totally different habitus of the body, etc.

Cobitichthys lacks the suborbital spine just like *Cobitis*, however it has the eyes totally covered by the head skin and apart from 6 to 8 barbels on snout and upper jaw, moreover it has 4 on the lower lip.

The genera *Lepidocephalus*, *Acanthopsis* and *Acanthopthalmus* differ from *Cobitis*, both by covered eyes, as by the suborbital spine, apart from still other characters, partly concerning the position of the barbels and of the dorsal and ventral fins, partly regarding the squamation of the head and the presence or absence of the swimbladder.

It is difficult however, to convert the existing descriptions and figures to the defined generic characters, as they in general have hardly been noticed. Two archipelagic species from my cabinet certainly belong to it, as well as all West Asiatic species which have been made known by Heckel and Mr Valenciennes and that have been placed in the genus *Cobitis* in the foregoing review. Less certainty in this matter exists with regard to the there presented *Cobitis* species of Buchanan and Mr MacClelland, and it even would not surprise me that among these some species, when they will become known better, will appear to belong to either *Cobitichthys* or types of genera of their own. I suspect this at least for the 4-barbeled species described by MacClelland, of *Cobitis pavona* McCl., *Cobitis monoceros* McCl., etc. Whether there are otherwise Cobitiformes with only four barbels, in my opinion still has to be confirmed by further research.

Of my archipelagic species, *Cobitis fasciata* was already known to Van Hasselt.

Van Hasselt's genus *Nemacheilus* is no other than *Cobitis*. *Nemacheilus fasciatus* V. Hass. has all generic characters of *Cobitis barbatula* L., so the generic name proposed by Van Hasselt is not acceptable. The second species occurs on Sumatra and was described by myself already a long time ago under the name of its discoverer, Mr P. Jakles. Both species are very closely related.

They can be distinguished from all other known species and from each other according to the following scheme.

- I. Barbels 6. Caudal fin deeply emarginate, bilobed. Dorsal fin with the anterior rays ⁷⁸ placed opposite the ventral fins. Body with slightly dark or deeply green transverse bands. Barbels less than twice as short as the head.
 - A. Head contained 6 to nearly 6½ times in the length of the body, less than twice as long as deep. 13 to 20 transverse bands, often double.

Cobitis Jaklesi Blkr.

- B. Head contained 5½ to 5¾ times in the length of the body, twice as long as deep. 11 or 12 transverse bands.

Cobitis fasciata CV.

Cobitis fasciata Val.,
 Poiss. XVIII p. 18, Blkr, Overz. ichthyol. Fauna v. Sumatra,
 Nat. Tijdschr. Ned. Ind. VII p. 96.
Gebande Meerslang [Banded Loach].
 Atl. Cypr. Tab. II, fig. 7.

A *Cobitis* with an elongate body, anteriorly cylindrical, posteriorly compressed, depth of body contained $7\frac{1}{2}$ to $8\frac{1}{2}$ times in its length. Head slightly obtusely convex, contained nearly 6 to $6\frac{1}{2}$ times in the length of the body; depth of head contained $1\frac{3}{5}$ to $1\frac{4}{5}$ times in its length, width $1\frac{3}{4}$ to nearly 2 times; rostror-dorsal profile convex; eyes not covered, placed approximately halfway the length of the head or largely in the anterior half of the head, very close to the frontal line, eye diameter contained 5 to $5\frac{1}{2}$ times in the length of the head, distance between the eyes more than once their diameter, interorbital line convex; nostrils nearer to the orbit than to the tip of the snout, posterior nostrils open, anterior nostrils slightly tubular; no conspicuous suborbital spine; snout obtuse, convex, less than twice as long as the eye, fleshy tip protruding in front of the mouth; upper jaw longer than lower jaw, not hooked, ending slightly anterior to the eye, lower jaw rather broad, spoon-shaped, protruding in front of the down-folded lower lip; lips fleshy, simple, not lobed; barbels 6, fleshy, the 4 nasal barbels inserted in periphery of the tip of the snout, not united at the base, the external ones longer than the internal ones, surpassing the eye or reaching the posterior margin of the eye; the 2 maxillary barbels inserted in the angle of the premaxillary bone, surpassing the eye. Pharyngeal teeth in one row, small, conical, acute, hardly curved, 5 or 6 on each side; gill opening nearly vertical, ending below the base of the pectoral fins; gill cover rounded at the posterior side, lower margin concave. Suboperculum not or hardly protruding behind the gill cover; scales very small, well visible with the naked eye; lateral line nearly straight, running along the middle of the flanks; swimbladder very small, completely enclosed in bony vertebral cavity, no accessory, free, abdominal part. Dorsal fin with the anterior rays placed opposite the ventral fins, obtuse or slightly acute, not or slightly emarginate, not or not much higher than the body, hardly or not lower than base length, ending a distance of about half its length anterior to the anal fin; pectoral fins rounded, about equal in length to the head, ending a distance of less than their length anterior to the ventral fins; ventral fins inserted in the front half of the body, rounded, slightly shorter than pectoral fins, ending less than their length anterior to the anal fin; anal fin acutely or slightly acutely rounded, not or hardly emarginate, not or hardly lower than the body, higher than base length; caudal fin profoundly emarginate or crescent-shaped-emarginate, lobes acute or slightly obtuse, nearly equal, contained $4\frac{1}{2}$ to 5 times in the length of the body. Colour: upper part of the body pink-green, flanks shiny green, lower part pink-hyaline or pearly-hyaline, back and ⁷⁹ flanks with 13 to 20 wide, transverse, deeply green bands, often double or irregular, sometimes at the underside united into a longitudinal band; pectoral fins pink, other fins greenish-hyaline, dorsal fin often with some green spots on the rays, caudal fin at the base with an oblong, transverse deeply or blackish green spot, iris slightly violet or blue with an golden pupil ring; nasal barbels red, premaxillary barbels greenish.

B. 3. D. $\frac{3}{9}$ or $\frac{3}{10}$. P. $\frac{1}{9}$ to $\frac{1}{11}$. V. $\frac{1}{7}$. A. $\frac{3}{5}$ or $\frac{3}{6}$. C. $\frac{10}{17/8}$ to $\frac{6}{17/6}$, short flanking ones included.

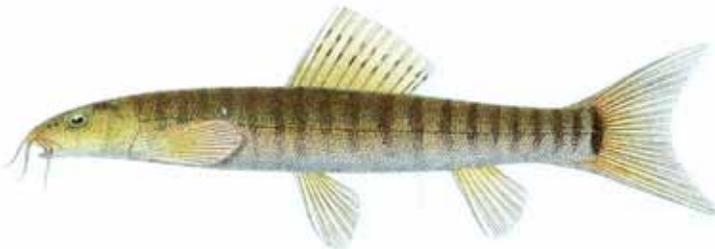


Fig. 9. *Nemacheilus fasciata* Val. Atl. Ichth. Cypr. Tab. II, Fig. 7. TL figure 87 mm.

- Syn. *Naemacheilus* [Noemacheilus] *fasciatus* K. v. Hass., Algem. Konst- en Letterb. 1823 II p. 133, Bull. Férussac 1824 p. 376.
Loche à bandes Val. Poiss. *ibid.* p. 19.
Cobitis suborbitalis Val. Poiss. *ibid.* p. 19.
Loche à sousorbitaires Val. *ib.* p. 19.
Cobitis chrysolaimos K. v. H., Val. *ibid.* p. 20 fig. 521.
Loche aux barbes d'or Val., Poiss. *ibid.* 20.
Cobitis Pfeifferi Blkr, Diagn. Besch. nieuw. vischs. Sumatra, Tient. V to X, Nat. T. Ned. Ind. IV p. 298.
Djeler Mal. Sund.
- Hab. Java (Batavia, Tjampea, Buitenzorg, Garut, Kuningan, Ambarawa, Malang, Ngantang, Lesti), in rivers.
Sumatra (Meninju, Lahat), in rivers and lakes.
Batu or Nias??
- Length of more than 100 specimens 45''' to 85'''.

Remark. Like I have said elsewhere, I believe, that *Cobitis chrysolaimos* K. v. H. is the same species as *Cobitis fasciata* Val., that the figure of *Cobitis chrysolaimos* in the large fishwork really concerns *Cobitis fasciata* CV and in no way answers to the description of *Cobitis chrysolaimos*, in which it is said that "le corps et les nageoires n'offrent aucune taches ni stries" [on body and fins neither spots nor stripes are present], while the figure shows the bars and dorsal fin blots of *Cobitis fasciata* Val. This description was probably taken from a discoloured specimen. In various specimens of my collection, which have been preserved already for a long time, the bar and blotch markings similarly have been lost entirely.

In numerous specimens the suborbital bone is single and below the eye bulges with a blunt process through the skin, whereas in as numerous other specimens the chain of the suborbital bones ventrally entirely encircles the eye. The character found in these bones, for this reason is to be considered of a very subordinate importance.

Cobitis suborbitalis Val. from Java to me appears to differ specifically from *Cobitis fasciatis* no more than *Cobitis chrysolaimos* K. v. H., Val. The chain of suborbital bones in the specimens is once complete and then again intermittent, without showing a specific character. The described blotches of *Cobitis suborbitalis* Val. answer very well to those of many of my specimens, which are in a less well state of preservation. I now also place *Cobitis Pfeifferi*, 180 which I earlier took for a proper species, in *Cobitis fasciata*.

Cobitis fasciata on Java is the most common species of the Cobitiformes and inhabits both the lower as the higher areas of the river drainages. In Batavia it is not rare, but is not caught in sufficient quantities to contribute in any way to the feeding of the people.

Cobitis Jaklesi Blkr,

Diagnost. Beschrijv. Nieuw vischsoort. Sumatra, Tient. 1 to 4,

Nat. Tijdschr. Ned. Ind. III p. 604.

Jakles Meerslang [*Jakles' Loach*].

Atl. Cypr. Tab. II fig. 9.

A *Cobitis* with an elongate body, anteriorly cylindrical, posteriorly compressed, depth of body contained 8 to 8½ times in its length. Head slightly obtuse, convex, completely scaleless, contained 5½ to 5¾ times



Fig. 10. *Nemacheilus jaklesi* Blkr. Atl. Ichth. Tab. II, Fig. 5. TL figure 97 mm.

in the length of the body; depth and width of the head contained about 2 times in its length; rostror-dorsal profile convex; eyes not covered, placed approximately halfway the head, or largely in the anterior half of the head, very close to the frontal line, eye diameter contained $4\frac{3}{4}$ to 5 times in the length of the head, distance between the eyes more than once their diameter, interorbital line slightly convex; nostrils nearer to the orbit than to the tip of the snout, posterior nostrils wide open, anterior nostrils slightly tubular; no conspicuous suborbital spine; snout obtuse, convex, less than twice as long as the eye, tip fleshy, protruding anterior to the mouth; upper jaw longer than lower jaw, not hooked at the tip, ending rather far anterior to the eye, lower jaw rather wide, spoon-shaped, protruding in front of the down-folded lower lip; lips fleshy, simple, not lobed; barbels 6, fleshy, the 4 nasal barbels inserted in the periphery of the tip of the snout, not united at the base, external ones slightly longer than internal ones reaching or surpassing the eye; the 2 maxillary barbels inserted on the angle of the premaxillary bone, surpassing the eye. Pharyngeal teeth in one row, small, conical, acute, hardly curved; gill opening nearly vertical, ending below the base of the pectoral fins; gill cover angular at the posterior side with a rounded angle, lower margin slightly concave. Suboperculum not or hardly protruding behind the gill cover; scales very small, well visible with the naked eye; lateral line nearly straight, running along the middle of the flanks; swimbladder very small, completely enclosed in bony vertebral cavity, no accessory, free, abdominal part. Dorsal fin with the anterior rays placed opposite the ventral fins, slightly acute, not or slightly emarginate, deeper than the body, length about equal to depth, ending a distance of about half its length anterior to the anal fin; pectoral fins rounded, in length about equal to the head, generally ending a distance of less than half their length anterior to the anal fin; anal fin slightly obtuse or slightly acute, convex, or hardly emarginate, not or hardly lower than the body, deeper than base length; caudal fin deeply emarginate or crescent-shaped to emarginate, lobes acute, contained $4\frac{1}{2}$ to $4\frac{3}{4}$ times in the length of the body. Colour: body pink-green or darkish, nebulated with deeper dark-green or with 11 or 12 wide, transverse, darkish bands; fins darkish-hyaline, dorsal and caudal fins on the rays variegated with a darker green; caudal fin at the base with an oblong, transverse green or dark spot; iris violetish-blue.

B. 3. D. 2/10 to 3/12. P. 1/10 or 1/11. V. 1/7. A. 3/5 or 3/6. C. 11/17/9 to 9/17/7, short flanking ones included.

Hab. Sumatra (Pajakombo, Solok, Lahat), in rivers.

Length of 8 specimens 56'' to 91''.

Remark. *Cobitis jaklesi* is very closely related to *Cobitis fasciata* Val. and resembles it in nearly all points. Even the higher [?] brownish-red colour ⁸¹ to which I earlier ascribed the main difference between *Cobitis jaklesi* and *Cobitis fasciata*, after the receipt of better preserved specimens from Solok and Lahat, now rather seems to be attributable to the less well preservation in rice wine. During a detailed comparison of all my specimens of both species I perceive only as constant characters, the differences in the relative height and length of the head, as they are, in the species in question in specimens of a different age, relatively longer and larger than in *Cobitis fasciatus*. The small number of transverse bands also seems to give a specific character.

COBITICHTHYS Blkr,
Nat. T. Ned. Ind. XVI p. 304

Body elongate, compressed, with small scales. Head compressed, scaleless. Snout convex. Eyes covered by head skin. Nasal and maxillary barbels 6 to 9 (8), lower jaw barbels 4. No suborbital spine. Anterior nostrils tubular. Dorsal fin opposite ventral fins. Caudal fin entire, above and under the tail prolonged into an adipose ridge. Pharyngeal teeth in one row, conical. Small swimbladder, completely enclosed in bony vertebral cavity.

Remark. The genus *Cobitichthys* comprises all those species of *Cobitiformes*, which just like the genus *Cobitis* as restricted by me, lack the suborbital spine, but differ from those primarily by covered eyes and numerous barbels. It seems the genus belongs in East Asia and the East Asiatic archipelago, as till now only species of it have become known from China, Japan and Borneo.

Those species are more numerous than was suspected earlier. Mr Schlegel gave the description and figures of the two Japanese species known to him (*Cobitis rubripinnis* Schl. and *Cobitis maculata* Schl.). Mr MacClelland made known two species of *Cobitis* from China under the names *Cobitis pectoralis* (Calc. Journ. Nat. Hist. IV p. 400 tab. 23 fig. 3) and *Cobitis bifurcata* (ibid. fig. 1). Sir J. Richardson in the Zoology of the journey of the Sulphur gave a description and figure of *Cobitis anguillicaudata* of Mr Cantor, which is a *Cobitichthys* as well, whereas in his Report on the Fishes of China, he described another species based on an illustration, under the name *Cobitis psammismus*. *Cobitis decemcirrosus* Basil., from northern China similarly is a *Cobitichthys*, and at last my earlier *Cobitis barbatuloides* from Borneo can be placed in *Cobitichthys*. None of these species has been described in the large *Histoire naturelle des Poissons*, the 19th part of which, dealing with the *Cobitiformes*, as a matter of fact was already published in the year 1840.

82 In my opinion, according to the present state of knowledge, the eleven species of *Cobitichthys* that are present in the list in the heading of this subfamily can be recognized.

The only known archipelagic species can be distinguished by the following characters.

- A. Depth of body contained nearly 7 times in its length. Head contained about $5\frac{1}{2}$ times in the length of the body. Pectoral fins hardly shorter than the head, ventral fins inserted anterior to the middle of the body.

Cobitichthys barbatuloides Blkr.

Cobitichthys barbatuloides Blkr,
Meerslangachtige Cobitichthys [*Loach-like Cobitichthys*],
Atl. Cypr. Tab. II fig. 1.

A *Cobitichthys* with an elongate, compressed body, depth of body contained nearly 7 times in its length, width contained about $1\frac{1}{2}$ times in its depth; Head acute, completely scaleless, contained about $5\frac{1}{2}$ times in the length of the body, depth of head contained $1\frac{2}{3}$ times in its length; eyes covered by skin, eye diameter contained about 5 times in the length of the head, placed halfway the length of the head, very close to the frontal line; snout acute, convex; no conspicuous suborbital spine; 6? nasal-maxillary



Fig. 11. *Misgurnus barbatuloides* Blkr. Atl. Ichth. Cypr. II, Fig. 1. TL figure 44 mm.

barbels; gill opening nearly vertical; scales on the body very small, hardly visible with the naked eye; dorsal fin with the anterior rays placed opposite the ventral fins, ending a distance of its total or more than its total length anterior to the anal fin, obtuse, rounded, slightly lower than the body; pectoral fins acute, hardly shorter than the head, ending far anterior to the ventral fins; ventral fins ending slightly anterior to the middle of the length of the body, shorter than the pectoral fins, ending far anterior to the anal fin; anal fin obtuse, rounded, lower than the body; caudal fin entire, posterior margin slightly convex, contained 5 times in the length of the body; body dark, with deeper dark spots: fins pink-green; rays with dense or sparse dark spots; caudal fin at the upper part of the base with a rather large black spot, surrounded by a reddish ring.

B. 3. D. 2/7 or 2/8. P. 1/6 or 1/7. V. 1/6. A. 2/5 or 2/6. C. 15, short flanking ones included.

Syn. *Cobitis barbatuloides* Blkr. Vijfde Bijdr. ichth, Borneo, Nat. T. Ned. Ind. II p. 435.

Hab. Borneo (Sambas), in rivers.

Length of sole specimen 46''.

Remark. Owing to the poor state of preservation of my single specimen, I could add only few substantial data to my earlier, description of this species cited above. I cannot determine with certainty the number of barbels, but there must be at least six, two of which are implanted at the tip of the snout and four on the upper jaw. It is difficult for me to explain how I in the above mentioned description could have mentioned the presence of a suborbital spine. While dissecting the suborbital skin I must have mistaken the edge of the suborbital bone of my otherwise very small and poorly preserved specimen, for spinous, which a later detailed investigation showed to be wrong. The species deserves to be described more detailed after specimens that are well preserved.

83 SUBFAMILY II HOMALOPTERAEFORMES.

Cyprinoidei with an elongate, depressed body, scaled, belly broad, flat. Head depressed, covered everywhere by glandular skin, lower part broad and flat, scaleless, snout protruding in front of the mouth, mouth small, inferior, transverse, central (at some distance from the sides of the head), lips fleshy, lower jaw flat, protruding in front of the lower lip. Pharyngeal teeth conical, in one row. No pseudobranchia. Gill opening vertical, narrow. Fins spineless, dorsal and anal fin with few rays, pectoral and ventral fins horizontal, nearly disc-shaped, pectoral fins with several simple rays. No swim-bladder.

Remark. The Homalopteraeformes are sharply characterized in the large family of carp-like fishes by the completely horizontal position of the paired fins, by the numerous undivided pectoral fin rays, the flat wide ventral side of head and belly, the small, inferior, transverse mouth opening that does not reach the side of the head, free jaws that are not covered by lips, and a single row of pharyngeal teeth. They are among the

Cyprinoids, what the Glyptosterna are among the Siluroids and what the Platypteraeformes are amongst the Gobioids. Just like these they are built for resisting the current in shallow, fast flowing mountain streams with a stony bottom by clinging or clutching, and it is therefore in the rivers of the mountains where one preferably finds the species of Platyptera, Glyptosternum and Homaloptera. With the Platypteraeformes, the Homalopteraeformes have the habitus and the scale arrangement in common, but the teeth -, gill -, and fin arrangement place the Platypteraeformes far from the [sub] family in question.

The Homalopteraeformes have first become known in science from Bengal. Buchanan, in his work on the fishes of the Ganges, described two species under the names *Cyprinus sucatio* and *Cyprinus balitora*. However, he did not recognize the natural relationship of these species and placed them in his subgenus *Garra*, which he described as comprising the “*Cyprini absque ulla ad aliud genus affiniata, corpore parvo, vix compressiusculo, absque maculis, vittis, notave colorum alia insigni*” [Cyprini not related to any other genus, with a small body, only very slightly compressed, without spots, bands or any other remarkable colour characteristic], *Cyprini*, in which also the species of *Crossocheilos* and *Discognathus* have been placed.

⁸⁴ Mr MacClelland was the first one who placed the Homalopteraeformes of Buchanan in a genus of their own and described and figured them in more detail as *Psilorhynchos sucatio* and *Psilorhynchos variegates*. He rightly placed *Psilorhynchos* next to *Homaloptera*, by which he appeared to have recognized the large relationship between both genera, which cannot be said of Mr Valenciennes who suspects (Poiss. XVI p. 345), that both mentioned Buchananian species belong to the group of *Leuciscus phoxinus* Cuv. or the genus *Phoxinus* Ag.

In the same year (1822) when Buchanan's *Gangetic Fishes* was published, two Java- nese species of Homalopteraeformes were described by Van Hasselt, who proposed the generic name *Homaloptera* for them.

Mr Gray, not familiar with the discovery of Van Hasselt, and finding among the figures that have served for the composition of the “*Illustrations of Indian zoology*” two species which belonged to Van Hasselt's *Homaloptera*, also placed them in a genus of their own, which he named *Balitoria*. Mr. Valenciennes accepted this name because he incorrectly believed that the name *Homaloptera* of Van Hasselt had not been published.

In the year 1833 Mr J. van der Hoeven in his excellent “*Handboek der Dierkunde*” gave a figure of a new species of *Homaloptera*, under the name of *Homaloptera ocellata* V. Hass., from which can be deduced that Van Hasselt also already knew this species. Mr Van der Hoeven very rightly has accepted the generic name proposed by Van Hasselt.

Mr MacClelland published figures of *Balitoria Brucei* and *Balitoria macula* from the *Illustrations of Indian Zoology* again in his *Indian Cyprinidae* accompanied by short descriptions, however, he placed them under a new generic name, so his genus *Platycara* and *Balitora* Gr. have the same meaning as *Homaloptera* V. Hass.

But Mr MacClelland discovered moreover three new species, which he placed in *Platycara*. However, one of these, *Platycara nasuta*, as was already suspected by Mr Valenciennes, represents the type of a proper genus, which however does not belong to the Homalopteraeformes.

Mr Valenciennes later made known some Homalopterae from Java and Cochinchina and my own investigation have also led to the knowledge of some new species.

In my opinion three genera can be distinguished in the Homalopteraeformes, which could be named Homaloptera, Platycara [Psilorhynchus!] and Lissorhynchus.

Homaloptera has six short fleshy barbels and no mental sucking disc.

Psilorhynchus McCl. has the habitus and snout of Homaloptera, but the barbels are lacking (according to testimony of both Buchanan and Mr MacClelland), just like the mental sucking plate.

85 Lissorhynchus, a genus which I base on Platycara lissorhynchus McCl., has a mental sucking disc and, according to the figure of Mr MacClelland, four barbels.

The now known species of Homalopteraeformes are no more than 16 in number. They seem to belong to South Asia and the Sunda archipelago. They occur especially in the mountainous areas of Java, Sumatra and Bengal, and presumably also those of Siam and Cochinchina. Some species sometimes leave the mountainous areas, but surely not voluntarily and only carried away by the current. Of two Javanese species I have found specimens up to the rivers of the capital Batavia.

The now known species of the subfamily are those mentioned below.

The Homalopteraeform species known till now.

Homaloptera ocellata V. Hass., V. d. Hoen. = Homaloptera polylepis Blkr.	Hab.	Java, Sumatra.
" javanica V. Hass. = Homaloptera Zollingeri Blkr.	"	Java, Sumatra.
" fasciata V. Hass. = Homaloptera Wassinki Blkr.	"	Java, Sumatra.
" salusur Blkr.	"	Java, Sumatra.
" ophiolepis Blkr.	"	Java, Sumatra.
" gymnogaster Blkr.	"	Sumatra.
" erythrorhina K. v. H. = Balitora erythrorhina Val.	"	Java.
" Valenciennesi Blkr. = Balitora ocellata Val.	"	Java.
" pavonina Blkr. = Balitora pavonina Val.	"	Java.
" lineolata Blkr. = Balitora lineolata Val.	"	Cochin-China.
" Brucei Blkr. = Ballitora Brucei Gr. = Platycara Brucei McCl.	"	Bengal.
" maculata Blkr. = Balitora maculata Gr. = Platycara maculata Gr.	"	Butan.
" anisurus Blkr. = Platycara anisurus McCl.	"	Mount Kasyah.
Psilorhynchus sucatio McCl. = Stolephorus sukati Buch. =		
Cyprinus sucatio Buch.	"	Bengal.
" balitora Blkr. = Cyprinus balitora Buch. =		
Stolephorus balitora Buch. = Psilorhynchus variegatus McCl. ..	"	Beng., Assam.
Lissorhynchus McClellandi Blkr. = Platycara lissorhynchus McCl.	"	Mount Kasyah.

I do not know the genera Lissorhynchus and Psilorhynchus from nature, and the descriptions and figures of the species belonging to them leave much to be desired.

86 Psilorhynchus must be very closely related to Homaloptera and seems to differ from it only by the absence of barbels, while the more vertical position of the eyes also has a generic value. However, both species with regard to the mouth parts and the dentition still have to be completely investigated, and even with regard to the absence of the barbels, which in the Homalopteraeformes are always very short, a closer investigation still seems to be desirable in every respect. As far as the genus is now known, one could give it the following diagnosis.

PSILORHYNCHUS McCl.,
Indian Cyprinid. Asiat. Research. XIX p. 300.

Body elongate, depressed. Eyes placed nearly vertically. No barbels. Chin without sucking disc. Scales on the body large. Dorsal fin starting anterior to ventral fins and ending far anterior to anal fin.

The genus *Lissorhynchus* also still has entirely the habitus of Homaloptera.

It is already more closely related to the Labeonines of the genus *Discognathus*, because of its sucking disc on the chin and apparently forms a transition of the Homalopteraformes to the genera *Platycaea*, *Discognathus*, *Discognathichthys*, *Crossocheilus* and *Epalzeorhynchus*, which are closely related to each other. According to the known data it can be characterized as follows.

LISSORHYNCHUS Blkr

Head elongate, depressed. Eyes placed nearly horizontally. Barbels 4, nasal and maxillary barbels. Chin with sucking disc. Scales on the body large. Dorsal fin starting above ventral fins and ending far anterior to anal fin.

HOMALOPTERA V. Hasselt,
Algemeene Konst- en Letterbode. 1823 II p. 133 =
BALITORA Gray. – SALUSUR.

Body elongate, depressed. Barbels 6 fleshy, nasal barbels 4, maxillary barbels 2. Eyes placed nearly horizontally. Gape more or less parallelogram-shaped. Jaws free at the margin, thin, the lower one flat without tubular symphysis. Upper lip hanging anterior to lower lip. Lower lip broad, slightly backfolded, entire, united with upper lip. ⁸⁷ One postlabial groove on both sides, short, oblique. Grooves separated by the broad isthmus. Chin without sucking disc. Dorsal starting anterior to or behind ventral fins and ending far anterior to anal fin. No swimbladder. Pharyngeal teeth conical, acute, in one row.

Remark. As was already remarked above, the genus *Homaloptera* was proposed by Van Hasselt and briefly introduced as mainly distinguishing itself amongst the carp like fishes by the entire horizontal position of the pectoral and pelvic fins, a definition that now can be extended to the entire subfamily. The species named by Van Hasselt and by Mistery Gray and MacClelland have already been mentioned above as well.

The 18th part of the large *Histoire naturelle des Poissons*, in which the Homalopterans are dealt with, appeared only in 1846 and thus after the works of the aforementioned zoologists. Mr Valenciennes described therein under the generic name proposed by Mr Gray, apart from *Homaloptera Brucei* and *Homaloptera maculata*, four species, by then still unknown to science, i.e. *Homaloptera erythrorhina* V. Hass., *Balitora ocellata* Val. (which is not the same as *Homaloptera ocellata* V. Hass., V.d. Hoeven), *Balitoria pavonia* Val. and *Balitoria lineolata* Val.

In 1852 I myself described six species of this genus in an article entitled: "Over eenige nieuwe soorten van *Homaloptera* V. Hass. van Java en Sumatra" included in the fourth volume of the *Natuurkundig Tijdschrift voor Nederlandsch Indië*.

For most of these species I since received new and better preserved specimens, after which I have submitted them to a new investigation. From that it appeared that three of

those six species could be reduced to species already described by Van Hasselt. I now consider my *Homaloptera polylepis* not specifically different from Van Hasselt's *Homaloptera ocellata*. My *Homaloptera Zollingeri* with a rather large certainty now can be determined to be the same as Van Hasselt's *Homaloptera javanica*, and my *Homaloptera Waninki* is the same as *Homaloptera fasciata* V. Hass. Although both these species, prior to me, were described by no one, I have thought, in deference to the memory of the excellent Van Hasselt, to put the names accepted by him in place of my names.

The three remaining ones described in the aforementioned contribution, i.e. *Homaloptera ophiolepis*, *Homaloptera salasur* and *Homaloptera gymnogaster*, seem not to have been known to Van Hasselt and they can neither be placed in the species described by Mr Valenciennes.

88 The nine Sundanese species can be separated from the remaining species and from each other as follows.

A. Dorsal fin starting anterior to ventral fins.

a. 45 to 50 scales in a longitudinal row, ridged.

* Pectoral fins not reaching ventral fins. Vent near to the base of the ventral fins.

Belly scaled from vent to base of pectoral fins.

§ Scales not dentate at free margin.

Homaloptera javanica v. Hass.

§ Scales dentate at free margin.

Homaloptera ophiolepis Blkr.

b. 65 scales in a longitudinal row, ridged, dentate at free margin (ridge surpassing free margin).

* Belly scaleless up to the vent. Dark spots on the back surrounded by a lighter ring.

Homaloptera pavonina Blkr.

c. 70 to 80 scales in a longitudinal row.

* Scales toothless. Belly scaleless anterior to ventral fins. Vent placed in the posterior half of the body.

§ Pectoral fins not reaching ventral fins.

† Scales undulate at free margin. Width of head contained $1\frac{1}{4}$ to $1\frac{1}{5}$ times in its length.

Homaloptera ocellata V. Hass., v.d. Hœv.

† Scales not undulate at free margin. Width of head contained $1\frac{2}{5}$ to $1\frac{3}{5}$ times in its length.

Homaloptera salasur Blkr.

§ Pectoral fins reaching ventral fins. Black opercular-caudal band.

Homaloptera Valenciennesi Blkr. = *Balitora ocellata* Val.

* Scales dentate at free margin, 80 in a longitudinal row.

Homaloptera erythrorhina V. Hass.

- B. Dorsal fin starting behind the beginning of ventral fins. Scales not ridged, toothless.
 a. Belly scaleless anterior to ventral fins.
 * Approximately 45 scales in a longitudinal row. Pectoral fins reaching ventral fins.

Homaloptera fasciata V. Hass.

- * Approximately 70 scales in a longitudinal row. Pectoral fins not reaching ventral fins.

Homaloptera gymnogaster Blkr.89 *Homaloptera javanica* V. Hass.,

Algem. Konst- en Letterbode. 1823 II. p. 133,

Javaanse Saloesoer [Javanese *Salusur*].

Atl. Cypr. tab. III. fig. 5.

A *Homaloptera* with an elongate, depressed body, compressed only at the tail, depth of body contained 8 to 8½ times in its length, width about equal to depth. Head depressed, convex, frontal line rounded, slightly crescent-shaped, head contained 6 to 6½ times in the length of the body; width of head contained 1⅓ to slightly over once in its length, depth 1½ to 1⅔ times, crown, snout and cheeks glandular; eyes not covered by skin, placed largely in the posterior half of the head, eye diameter contained 4½ to slightly over 5 times in the length of the head, distance between the eyes less than twice their diameter; nostrils nearer to the eye than to the tip of the snout, the large, oblong posterior nostrils can be closed by means of a valve, anterior nostrils much smaller than posterior nostrils, perforated in the base of the valve of the posterior nostrils; snout convex, width slightly greater than length at the base; barbels nearly equally long, shorter than the eye, thin; lower jaw flat, edge protruding in front of down-folded lower lip; gill cover rounded at the posterior side, lower margin nearly straight or slightly concave.

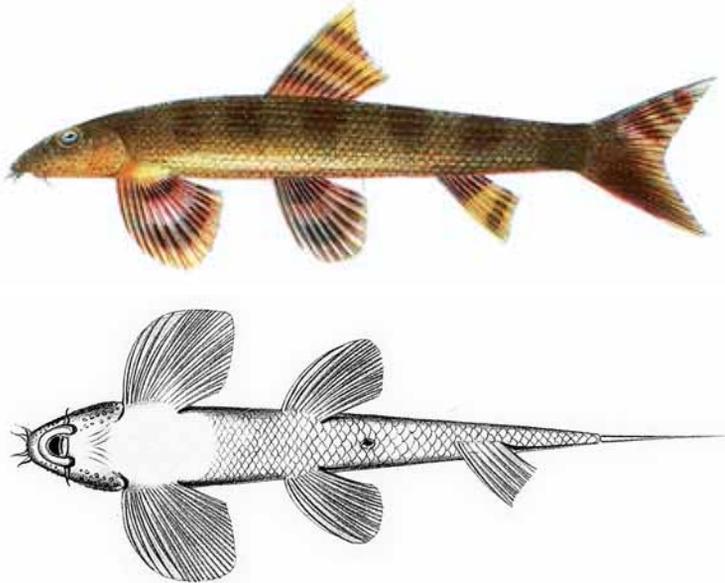


Fig. 12. *Homaloptera javanica* V. Hass. Atl. Ichth. Cypr. Tab III, Fig. 5. TL figure 89 mm.

Pharyngeal teeth in one row, small, conical, acute, slightly curved, about 10. Vent in the anterior half of the body opening much closer to the base of the ventral fins than to the anal fin. Lateral line nearly straight, each scale marked by a simple tube, curved upwards at the base of the caudal fin, anterior part of belly scaled, scaleless only in between ventral fins and hardly scaled behind the base of the ventral fins; scales at the free margin glabrous, not dentate and, except for the ventral and post-anal scales very conspicuously unridged, on the flanks about 45 scales in a longitudinal row, 5 in a transverse row between the 1st dorsal ray and the lateral line, about 15 in a longitudinal row between occiput and dorsal fin, scales on the total belly up to the vent and postaxillary scales conspicuously smaller than scales on the rest of the body; dorsal fin starting slightly anterior to the ventral fins, acute, not emarginate, considerably higher than the body, length less than height; pectoral and ventral fins rounded anteriorly, angular at the tip, pectoral fins slightly longer than ventral fins, not reaching ventral fins, ventral fins not reaching anal fin; anal fin acute or slightly obtuse, not emarginate, not or slightly lower than the body; caudal fin rather deeply emarginate, lobes acute, lower lobe longer than upper lobe; contained $4\frac{3}{4}$ to slightly over 5 times in the length of the body. Colour: upper part of the body orange-olive or dark olive; lower part orange-pink; glands on the head orange; 6 or 7 broad, diffuse dark transverse bands on the body, composed from merging spots, iris violetish-blue, margin of pupil golden; fins orange-pink or red; middle and lower part of caudal fin largely deeply dark or black, upper part with 2 or 3 transverse dark bands; other fins with 2 or 3 longitudinal dorsal and anal bands, pectoral and ventral fins with transverse, dark not always visible bands.

B. 3. D. 2/8 or 2/9. P. 4/9/1 or 4/10/1. V. 2/8. A. 2/5 or 2/6. C. 6/17/5 or 5/17/4, short flanking ones included.

Syn. *Homaloptera Zollingeri* Blkr. Over eenige nieuwe soorten van Homaloptera. Nat. Tijdschr. N. Ind. IV. P. 158.

Salusur Sundan.

Hab. Java (Batavia, Bandung), in rivers.

Sumatra (Lahat), in rivers.

Length of 7 specimens 78''' to 99'''.

Remark. I described this species in the year 1852 after three smaller specimens from Batavia and Bandung, which during the often repeated movings of my ⁹⁰ cabinet have been lost in my various houses.¹ Since then I received some larger specimens from Lahat (in the interior of Palembang), by which I could improve and extend my earlier descriptions.

A more detailed investigation of my specimens and a comparison of these with copies of drawings of the two species observed on Java by Van Hasselt, which he gave the names *Homaloptera javanica* and *Homaloptera fasciata*, certainly brought me to the opinion that my *Homaloptera Zolleringii* can be reduced to *Homaloptera javanica*.

¹ Among the many difficulties that I encountered in the extension and preservation of my collections, those that resulted from numerous movements are not the minor ones. Since I started my collection, I occupied no less than 19 houses in Batavia, Samarang, Soerabaja and Willem I (one of the discomforts of the officer's rank, to whom in the main cities on Java government houses are allotted for occupation). One can imagine to what extend a 19 times move of my cabinet, for which one is forced to have recourse to coelies (native porters), has damaged my collections. Numerous stoppered jars with natural products have gone lost in that way, as the coelies, breaking something accidentally, prefer to let the broken material vanish without a trace, above showing the corpora delicti. Moreover, many species have been lost because of theft by my native servants. Of course they were not interested in those species that they tossed away, but in the stoppered jars for which they always found eager buyers among the Chinese.

The species is easy to recognize by its ca 45 keeled but not serrated scales in a longitudinal series. With regard to the small number of scales it is related to *Homaloptera ophiolepis*, but it differs from it by numerous characters, as in the lastmentioned species the body is remarkably more slender, the scales much stronger keeled and on the hind edge, by the elongation of the keel armed with one to seven teeth, the scales on the belly remarkably smaller, and the body not marked with oblique bars but with smaller round spots, of which some are placed on the middle line of the back, anterior and posterior to the dorsal fin, just like in *Homaloptera ocellata* and still other species.

Homaloptera ophiolepis Blkr,

Over eenige nieuwe soorten van *Homaloptera*, Nat. T. N. Ind. IV p. 160.

Slangenschubbige Saloesoer [*Snake-scaled Salusur*].

Atl. Cypr. Tab. III fig. 3.

A *Homaloptera* with an elongate, depressed body, tail compressed only at the back, depth of body contained $10\frac{1}{4}$ to $11\frac{1}{2}$ times in its length, width slightly greater than depth. Head depressed, convex, frontal line acutely rounded, head contained 6 to 7 times in the length of the body; width of head contained $1\frac{1}{4}$ to $1\frac{1}{2}$ times in its length, depth of head nearly twice to slightly over twice in its length, crown, snout and cheeks glandular; eyes not covered by skin, placed anteriorly in the posterior half of the ⁹¹ head, eye diameter contained $4\frac{1}{2}$ to $5\frac{1}{2}$ times in the length of the head, distance between the eyes less than twice their diameter; nostrils much closer to the eye than to the tip of the snout, the large, oblong posterior nostrils can be closed by means of a valve, anterior nostrils much smaller than posterior nostrils, opening in the base of the valve of posterior nostrils; snout convex, at the base width slightly greater than

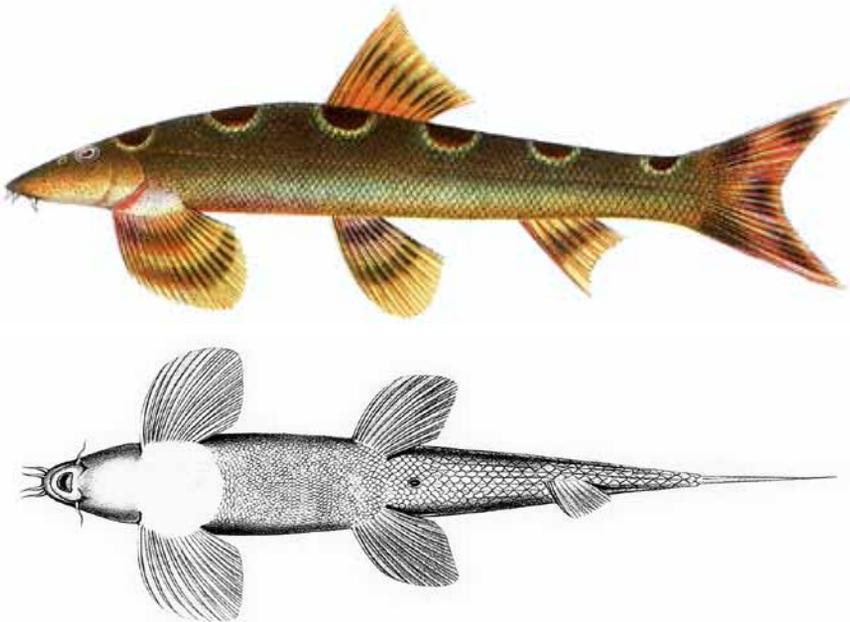


Fig. 13. *Homaloptera ophiolepis* V. Hass. Atl. Ichth. Cypr. Tab III, Fig. 3. TL figure 128 mm.

length; barbels nearly equally long, not or slightly longer than the eye, compressed, broad at the base; lower jaw flat, edge protruding in front of down-folded lower lip; gill cover rounded at the posterior side, lower margin slightly convex. Pharyngeal teeth in one row, small, conical, slightly curved. Vent in the anterior half of the body, opening much closer to the base of the ventral fins than to the anal fin. Lateral line nearly straight, each scale marked by a single tube, curved upwards at the base of the caudal fin; anterior part of belly scaled, scaleless between pectoral fins only; scales on back and flanks very conspicuously uni-ridged, on the nape partly pluri-ridged, ventral scales not ridged, scales on nape and flanks at the free margin dentate with 3 to 7 teeth, ventral scales not dentate, the others conspicuously unidentate; 45 to 48 scales on the flanks in the lateral line, 6 in a transverse row between the 1st dorsal ray and the lateral line, about 15 in a longitudinal row between occiput and dorsal fin, scales on the entire belly up to the vent very small, scales on the anterior part of the back and flanks smaller than caudal and post-anal scales; dorsal fin starting slightly anterior to the insertion of the ventral fins, acute, not or hardly emarginate, much higher than the body, length slightly less than depth; pectoral fins rounded anteriorly and posteriorly, angular at the tip, not reaching ventral fins; ventral fins rounded anteriorly, acute at the tip, hardly shorter than pectoral fins, not reaching anal fin; anal fin acute, not or hardly emarginate, not or slightly higher than the body, considerably higher than base length; caudal fin deeply emarginate, lobes acute, lower lobe longer than upper lobe, contained 4½ to 5 times in the length of the body. Colour: upper part of the body orange-olive, lower part orange-pink; glands on the head orange; middle line of the back with 7 large, round, dark spots, of which 4 behind the dorsal fin; upper part of the flanks with large, dark, generally round spots, unequal in size; fins orange-pink or red, decorated with dark bands, pectoral and ventral fins generally with 3 bands, caudal fin generally with 5 transverse bands, dorsal and anal fin generally with 3 longitudinal bands; caudal bands frequently merging.

B. 3. D. 3/8 or 3/9. P. 5/9 to 4/10 to 4/11/1. V. 2/8. A. 2/5 or 2/6. C. 4/17/4, short flanking ones included.

Syn. *Salusur* Sund.

Hab. Java (Parongkalong, Bandung), in rivers.

Sumatra (Lahat), in rivers.

Length of 7 specimens 83''' to 124'''.

Remark. *Homaloptera ophiolepis* is the most slender *Homaloptera* species known to me. Apart from that it is easily recognisable by its relatively little numerous and large, strongly keeled, and at the free edge ctenoid scales. The scales on the ventral side of the body are divided into two sharply separated groups. Those that are placed anterior to the vent and completely cover the belly till close to the pectoral fins basis are very small, not keeled and not ctenoid. Earlier I had not even noticed these scales, however with a lens they are easily discernable. On the contrary, the scales, which lie between the anal opening near the basis of the pelvic fins, and the anal fin, in size do not yield to the lateral scales between the pectoral fins and the anal fin and are keeled as well.

On Java this species lives in the drainage area of the Tjitaroem. I did not receive it from other rivers on Java. From Sumatra I only got it from the drainage area of the Moesi or river of Palembang.

92 *Homaloptera pavonia* Blkr,

Over eenige soorten van *Homaloptera*, Nat. T. Ned. Ind. IV p. 158,

Pauwoogige Saloesoer [*Peacock-eyed Salusur*].

[Not figured in Atlas.]

A *Homaloptera* with a thinner body, head more acute and thinner, eyes larger, anal fin more square, caudal fin more emarginate and its lower lobe longer than in *Homaloptera Valenciennesi*: pectoral fins short, trapezoid; ventral fins rounded; belly up to the vent scaleless; scales 65 in a longitudinal row, the ridges surpassing the free margin, slightly dentate, dorsal and lateral scales small, slightly thick, imbricated.

cate. Colour: upper part of the body blackish; back anterior to dorsal fin with round, black dots, behind the dorsal fin with 5 large, round, black spots surrounded by a white ring, no longitudinal band on the body, fins with black spots.

D. 10. P. 18. V. 9. A. 6. C. 22.

Syn. *Balitora pavonina* Val., Poiss. XVIII p. 74.

Balitore pavonin Val., *ibid.*

Hab. Java (Buitenzorg), in rivers.

Length 4 French inches.

Remark. *Homaloptera pavonia* seems to be related to *Homaloptera ophiolepis* Blkr, but this last one cannot be united with this, as it has only 45 to 48 scales in a longitudinal row, and the belly from the vent to very closely to the pectoral fin basis is covered with scales be it very small ones.

I do not know this species from nature and give the above mentioned description only translated from that of Mr Valenciennes.

Homaloptera ocellata V. Hass.,

J. van der Hoev., Handb. Dierk. ed. 1^a Tom. II p. 211 tab. 13 fig. 2.

Geogde Saloesoer [*Eyed Salusur*].

Atl. Cypr. Tab. III fig. 4.

A *Homaloptera* with an elongate, depressed body, tail compressed, depth of body contained slightly over 7 to 8½ times in its length, width slightly greater than depth. Head depressed, convex, frontal line slightly acutely rounded or rounded in the form of a crescent, head contained slightly over 6 to 6½ times in the length of the body; width of head contained 1¼ to 1½ times in its length, depth 1⅓ to slightly more than 2 times; crown, snout and cheeks glandular; eyes not covered by skin, placed anteriorly in the

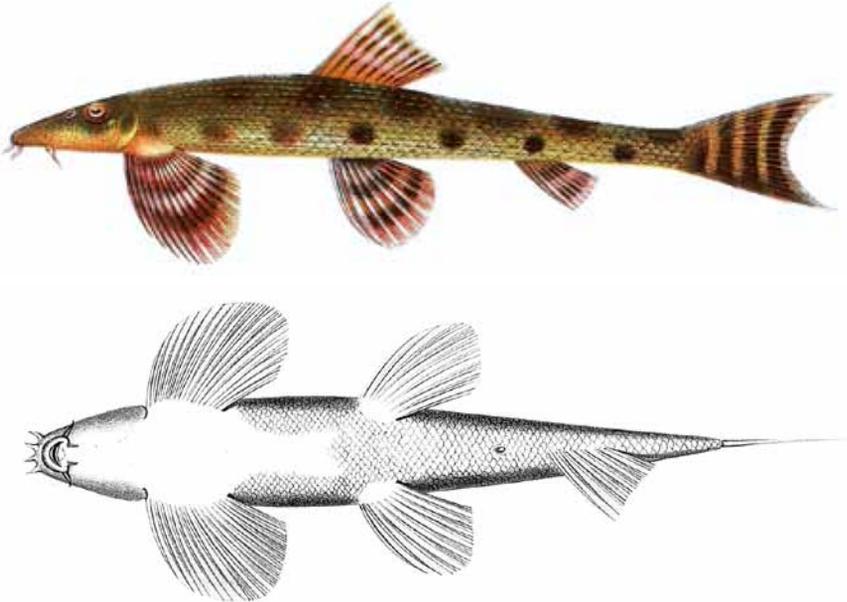


Fig. 14. *Homaloptera ocellata* V. Hass. Atl. Ichth. Cypr. Tab III, Fig. 4. TL figure 123 mm.

posterior half of the head, eye diameter contained $5\frac{2}{3}$ to $6\frac{2}{3}$ times in the length of the head, distance between the eyes about twice their diameter; nostrils much closer to the eye than to the tip of the snout, the large, oblong posterior nostrils can be closed by means of a valve, anterior nostrils much smaller than posterior nostrils, opening in the base of the valve of the posterior nostrils; snout convex, at the base width greater than length; barbels nearly equally long, not longer than the eye, conical-compressed, broad at the base; lower jaw flat, edge protruding anterior to down-folded lower lip; gill cover rounded at the posterior side, lower margin concave. Pharyngeal teeth about 10, in one row, conical, acute, slightly curved, middle teeth longer than teeth at the sides. Vent in the posterior half of the body, perforated, closer to anal fin than to the base of the ventral fins. Lateral line nearly straight, each scale marked by a simple tube; belly scaleless up to a point slightly anterior to ventral fins; scales on body lightly uniridged, at the free margin spineless, undulate; 70 to 75 scales on the flanks in a longitudinal row, 8 or 9 in a transverse row between the 1st dorsal ray and the lateral line, 22 or 23 in a longitudinal row between occiput and dorsal fin, scales in the post-axillary region, on the lower part of the flanks, interventral scales and scales in the gastro-anal ⁹³ region smaller than scales on the rest of the body. Dorsal fin starting slightly anterior to the insertion of the ventral fins, acute, lightly emarginate, higher than the body, length smaller than depth; pectoral fins rounded anteriorly and posteriorly, angular at the tip, not reaching ventral fins; ventral fins rounded anteriorly, angular at the tip, a little shorter than pectoral fins, not reaching anal fin; anal fin acute, emarginate, not or slightly lower than the body, much higher than base length; caudal fin deeply emarginate in the shape of a crescent, lobes acute, lower lobe longer than upper lobe, contained $4\frac{1}{3}$ to $4\frac{1}{2}$ times in the length of the body. Colour: upper part of the body darkish-olive, lower part slightly olive-orange; back and flanks nebulated with dark; 6 or 7 large, round, deeply dark spots, with an orange ring, on the middle line of the back, the posterior 2 on the tail; fins beautiful pink, pectoral and ventral fins generally with 2 transverse bands, dorsal and anal fin generally with one longitudinal, dark-violet band; lower half of caudal fin largely, upper half for a smaller part with 2 violet-dark transverse bands, iris bluish, margin of pupil golden.

B. 3. D. $3/8$. P. $7/8/1$ to $7/10/1$. V. $2/7$. A. $3/5$ or $3/6$. C. $6/17/5$ or $5/17/4$, short flanking ones included.

Syn. *Homaloptera polylepis* Blkr. Over eenige soort. van Homalopt. Nat. Tijdschr. Ned. Ind. IV p. 162.

Salusur Sundan.

Hab. Java (Buitenzorg, Tjipanas, Bandung), in rivers.
Sumatra (Lahat), in rivers.

Length of 26 specimens 76''' to 132'''.

Remark. Since I described this species under the name *Homaloptera polylepis* after two specimens, on which the colours had suffered much, I have come in possession of twenty four partly larger and almost all very well preserved specimens, with few exceptions all caught in the river Tjidani, in the neighbourhood of Buitenzorg. As a result of this I was able to improve my earlier description, especially with regard to the colouration.

It is my present opinion that the species depicted by Mr J. van der Hoeven in the first edition of his *Handboek der Dierkunde*, is the same as my *Homaloptera polylepis*, and although that figure leaves much to be desired, and the species is not described in more detail by Mr Van der Hoeven, I have accepted the name "*ocellata*" as it has the right of priority, whereas Van Hasselt surely wanted to indicate with it the light ringed dots on the back, which in this species in the fresh condition are sharply marked, but slightly disappear after preservation in spirit of wine.

Balitora ocellata Val. is a species different from the one described above, which I do not know. According to Mr Valenciennes the pectoral fin in this species would reach the ventral fins, which is not the case in any of my specimens, young or old. In none of my specimens there is any sign of the black spots on the head or of a black longitudinal body stripe, which is said to be present in *Balitora ocellata* Val. As the species name

“ocellata” is already given to the species depicted by Mr Van der Hoeven, that of *Balitoria ocellata* Val. will have to be changed. I therefore propose to connect to it the name of the famous ichthyologist who first described it.

94 *Balitoria ocellata* V. Hass. in the hills of West Java without any doubt is the most common species, but still it is difficult to get from the native people as it does not form part of their food and even by offering relatively substantial rewards I could not persuade them to collect specimens of the *Salusur*, which is the common Sundanese name for *Homaloptera* species. From Sumatra I received till now only one specimen.

Balitoria maculata Gr. and *Platy cara anisura* McCl. seem to be related to *Homaloptera ocellata*.

Homaloptera salusur Blkr,

Over eenige n. soort. v. Homalopt. Nat. T. Ned. Ind. IV p. 161.

Gladschubbige Saloesoer [*Smooth scaled Salusur*].

Atl. Cypr. Tab. III fig. 2.

A *Homaloptera* with an elongate, slightly depressed body, compressed posteriorly, depth of body contained 8 to 9 times in its length, width not greater than depth. Head depressed, convex, frontal line acutely rounded, head contained $5\frac{2}{3}$ to 6 times in the length of the body, width of head contained $1\frac{3}{5}$ to $1\frac{3}{4}$ times in its length, depth about 2 times; crown, snout and cheeks with little conspicuous glands; eyes not covered by skin, placed anteriorly in the posterior half of the head, eye diameter contained 6 to 7 times in the length of the head, distance between the eyes about twice their diameter; nostrils much closer to the eye than to the tip of the snout, the large, oblong posterior nostrils can be closed by means of a valve, anterior nostrils much smaller than posterior nostrils, opening in the base of the valve of the posterior nostrils; snout convex, at the base width not or hardly greater than length; barbels nearly equally long, not or hardly longer than the eye, compressed at the base, slightly broad; lower jaw flat, edge protruding anterior to down-folded lower lip; gill cover rounded at the posterior side, lower margin concave. Pharyngeal teeth about 10, in one row, conical, acute, slightly curved. Vent in the posterior half of the body, opening closer to anal fin than to the base of the ventral fins. Lateral line nearly straight,

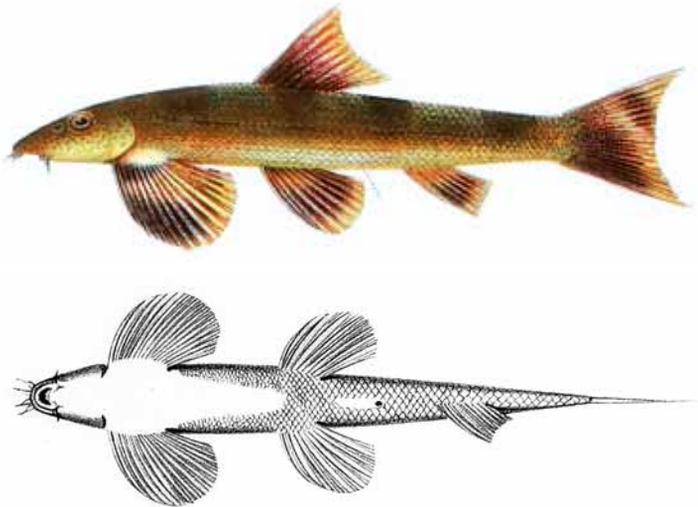


Fig. 15. *Homaloptera salusur* Blkr. Atl. Ichth. Cypr. Tab III, Fig. 2. TL figure 84 mm.

each scale marked by a simple tube; belly up to a point between the ventral fins scaleless; scales on body lightly unridged, at the free margin spineless, entire; on the flanks about 70 scales in the lateral line, about 8 in a transverse row between the 1st dorsal ray and the lateral line, about 22 in a longitudinal row between occiput and dorsal fin, nuchal, post-axillar and gastro-anal scales smaller than scales on the rest of the body; dorsal fin starting a little anterior to the insertion of the ventral fins, acute, lightly emarginate, higher than the body, length slightly smaller than depth; pectoral fins rounded anteriorly and posteriorly, angular at the tip, not reaching ventral fins; ventral fins rounded anteriorly, angular at the tip, slightly shorter than pectoral fins, not reaching anal fin; anal fin acute, emarginate, not or slightly lower than the body, higher than base length; caudal fin deeply emarginate, lobes acute, lower lobe generally longer than upper lobe, contained nearly 5 to 5½ times in the length of the body. Colour: upper part of the body darkish or orange-olive, lower part faintly pink; back with 4 or 5 wide, diffuse, dark bands; iris bluish, pupil with a broad, golden margin, fins pink, dorsal, pectoral and ventral fins for anterior half, caudal fin for the lower lobe nearly completely dark.

B. 3. D. 3/8 or 3/9. P. 5/8/1 or 5/9/1 to 7/10/1. V. 2/7. A. 3/5 or 3/6. C. 6/17/6, short flanking ones included.

Syn. *Salusur* Sundan.

Hab. Java (Batavia, Tjampea, Ngantang), in rivers.

Sumatra (Lahat), in rivers.

Length of 8 specimens 55''' to 90'''.

95 Remark. *Homaloptera salusur* differs only very little from *Homaloptera ocellata* Van Hass. One may however recognize it by its more slender head, which width goes 1⅔ to 1¾ in its length, whereas that width in *Homaloptera ocellata* goes only 1¼ to 1½ times in the length of the head. Moreover the scales in the species in question are entirely smooth edged, whereas the body has only transverse bars, at least in my specimens, and not the sharply drawn and yellow ringed round brown spots on the back of *Homaloptera ocellata*. The difference in the width of the head is very obvious in specimens of both species and also expresses itself in a more slender snout, that seems to be longer, as its width at the base hardly or not exceeds its length.

Homaloptera Valenciennesi Blkr,
Valenciennesche Saloesoer [*Valenciennes' Salusur*].
[Not figured in Atlas.]

A *Homaloptera* with a shorter body, shorter head, more obtuse snout, smaller and more widely spaced eyes, equal, more rounded fins, deeper and more rounded anal fin than in *Homaloptera erythrorina*, pectoral fins elliptical, reaching ventral fins; caudal fin emarginate, scales 70 in a longitudinal row; belly scaleless; lateral line very conspicuous, straight. Colour: body reddish; back behind dorsal fin with 5 round black spots and anterior to dorsal fin with 3 black, cloud-shaped spots, crown with black dots; black operculo-caudal band; fins with black spots or bands; pectoral fins and caudal fin tinged with orange.

D. 9. P. 17. V. 9. A. 6. C. 23.

Syn. *Balitora ocellata* Val., Poiss. XVIII p. 73. Blkr. Over eenige soort. van Homalopt. Nat. T. N.

Ind. IV p. 157.

Balitore ocellé Val., l.c.

Hab. Java (Buitenzorg), in rivers.

Length of described specimen 2 French inches, 8 lines.

Remark. The species described by Mr Valenciennes with the name *Balitora ocellata*, is not the same as the one Van Hasselt indicated with that name. It differs from that

species not only by the longitudinal body stripe, but also because the pectoral fins reach up to the pelvics. As Van der Hoeven already published a figure of *Homaloptera ocellata* V. Hass., I have chosen for the species described here the name of Mr Valenciennes who made her known first and of whose description the one given above is a short translation.

I believe *Balitoria Brucei* is the most closely related species of *Homaloptera Valenciennesi*.

96 *Homaloptera erythrorhina* V. Hass., Blkr,
Over eenig. soort. v. Homalopt. Nat. Tijdschr. Ned. Ind. IV p. 157.
Roodneuzige Salasoer [*Red-nosed Salusur*].
[Not figured in Atlas.]

A *Homaloptera* with an elongate, depressed body, width equal to depth, depth contained 6 times in its length; snout acute, rounded anteriorly; head contained more than 6 times in the length of the body; eye diameter contained 6 times in the length of the head, distance between the eyes 3 times their diameter, nostrils very close to the eye; barbels 6, nasal barbels shorter than maxillary barbels; pharyngeal teeth in one row, about 5; fins elongate, rhomboid-rounded, first ray more robust than the other rays; dorsal fin emarginate, pectoral fins not reaching ventral fins, ventral fins opposite dorsal fin; length of anal fin contained twice in its depth; caudal fin deeply emarginate with acute, equal lobes; scales 80 in a longitudinal row, ridged, the ridges surpassing the free margin, making the scales more or less dentate. Colour: body reddish; membrane of nostrils red, fins with blackish bands or spots resembling bands.

B. 3. D. 10. P. 15. V. 9. A. 6. C. 25.

Syn. *Balitora erythrorhina* Val., Poiss. XVIII p. 70 fig. 524.

Balitore a museau rouge Val., *ibid.*

Hab. Java (Buitenzorg), in rivers.

Length 4 French inches, 8 lines.

Remark. The description given above is compressed and translated from the quoted description of the species by Mr Valenciennes. He adds to it some anatomical peculiarities, which I recovered in all my specimens. The stomach is a large thin membraneous sac, which passes into a little elongated intestinal canal. The liver is very small. The ovaries on the contrary are very large, which is also the case in the species I have in my possession. The swimbladder is lacking in all archipelagic species and probably also in the South Asiatic ones.

All pains I took during my numerous excursions to the Buitenzorg area to obtain this species, have turned out fruitless. It seems to be most closely related to *Homaloptera ocellata* V. Hass. (*Homaloptera polylepis* Blkr), which is the most common species in the neighbourhood of Buitenzorg, but she cannot be identified as that species.

Homaloptera fasciata V. Hass.,
Algem. Konst- en Letterb. 1823 II p. 130.
Gebande Soelasoer [*Banded Salusur*].
Atl. Cypr. Tab. III fig. 3.

A *Homaloptera* with an elongate, depressed body, only the tail compressed, depth of body contained $7\frac{1}{2}$ to 8 times in its length, width greater than depth; head depressed, convex, frontal line slightly acutely rounded or rounded in crescent-shape, contained 5 to $5\frac{1}{2}$ times in the length of the body; width of

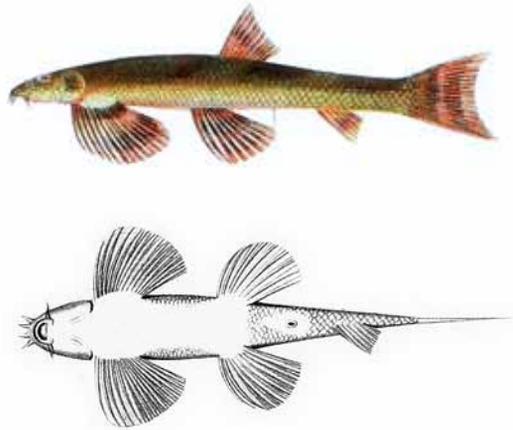


Fig. 16. *Homaloptera fasciata* V. Hass. Atl. Ichth. Cypr. Tab III, Fig. 1. TL figure 60 mm.

head contained slightly over once in its length, depth nearly twice to twice in its length; crown, snout and cheeks with not or hardly visible glands; eyes not covered with skin, placed largely in the posterior half of the head, eye diameter contained $4\frac{2}{3}$ to nearly 6 times in the length of the head, distance between the eyes less than twice their diameter; nostrils much closer to the eye than to the tip of the snout, the large, oblong posterior nostrils can be closed by means of a valve, anterior nostrils much smaller than posterior nostrils, opening in the base of the valve of the posterior nostrils; snout convex, at the base width rather much greater than length; barbels thin, ⁹⁷ fleshy, middle nasal barbels shorter than the other nasal barbels, maxillary barbels slightly longer than other barbels, shorter than the eye; lower jaw flat, edge united with lower lip; gill cover rounded at the posterior side, lower margin nearly straight or slightly convex. Pharyngeal teeth in one row, small, conical, slightly curved, about 8. Vent in the posterior half of the body, opening closer to anal fin than to the base of the ventral fins. Lateral line nearly straight, each scale marked by a simple tube, not curved upwards at the base of the caudal fin; belly scaleless anterior to ventral fins; scales on body not ridged, at the free margin not dentate, entire; about 45 scales on the flanks in a longitudinal row, 5 in a transverse row between the first dorsal ray and the lateral line, 21 or 22 in a longitudinal row between occiput and dorsal fin, scales between the ventral fins and scales on the anterior part of the body conspicuously smaller than caudal scales. Dorsal fin placed completely or nearly completely behind the base of the ventral fins, acute or slightly acute, not or slightly emarginate, not or only slightly higher than the body, length smaller than depth; pectoral and ventral fins obliquely obtusely rounded, pectoral fins larger than ventral fins, reaching the base of the base of the ventral fins; ventral fins not reaching anal fins; anal fin acute, not emarginate, lower than the body, higher than base length; caudal fin emarginate in crescent-shape, lobes acute, lower lobe longer than upper lobe, contained $4\frac{2}{3}$ to $5\frac{2}{3}$ times in the length of the body. Colour: upper part of the body orange-olive, lower part orange-pink or pearly-pink; iris violetish-blue, margin of pupil golden; about 5 or 6 dark, wide, transverse, diffuse bands on the body, closely together; fins orange-pink or red, dorsal and anal fins with 2 or 3 longitudinal bands, pectoral, ventral and caudal fin with 2 or 3 transverse dark, diffuse bands.

B. 3. D. $2/7$ or $2/8$. P. $6/10/1$ or $6/9/1$. V. $2/7$. A. $2/5$. C. $7/17/6$ or $6/17/5$, short flanking ones included.

Syn. *Homaloptera Wassinkii* Blkr, Over eenige nieuwe soort. van Homaloptera, Nat. Tijdschr. Ned. Ind. IV p. 163.

Salusur Sundan.

Habit. Java (Tjampea, Buitenzorg, Kediri), in rivers.

Sumatra (Lahat), in rivers.

Length of 14 specimens 40''' to 57'''.

Remark. In only two Homaloptera species of my collection the dorsal fin is implanted posterior to the ventral fins, i.e. in *Homaloptera fasciata* and *Homaloptera gymnogaster*. Both these species also have in common with each other, that the belly is entirely scaleless between the ventral fins, and that the body scales are not dented. Moreover, both species differ considerably by the size of the scales and the pectoral fins, and *Homaloptera fasciata* is completely well recognizable by the fact that it has only 45 scales in a longitudinal row and that the pectoral fins reach the basis of the pelvic fins.

As it appeared to me from a drawing left by Van Hasselt that he knew this species and that it is the same as that which he indicated as *Homaloptera fasciata* at the above mentioned place, I was of the opinion that, although the species was first described by myself, I ought to restore the species name proposed by Van Hasselt. Earlier I had named her after Mr Dr G. Wassink, now chief of the medical service in the Netherlands Indies, by whose kindness I came in the possession of the first specimens that I saw of the species.

98 In *Platyacara lissorhynchos* McCl. the dorsal fin also seems to start a little posterior to the ventral fins and the figure of this species shows only 36 scales in a longitudinal row. She differs however from *Homaloptera fasciata* by a peculiar sucking apparatus on the ventral surface of the head behind the mouth opening, by which it can even be placed in a genus differing from *Homaloptera*.

Homaloptera gymnogaster Blkr,

Over eenige nieuwe soorten van *Homaloptera*, Nat. T. N. Ind. IV p. 163. –

Kaalbuikige Salasoer [*Bare bellied Salusur*].

Atl. Cypr. Tab. III fig. 6.

A *Homaloptera* with an elongate, depressed body, only the tail compressed, depth of body contained about 8½ times in its length, width greater than depth; head depressed, convex, frontal line slightly obtusely rounded, contained about 6 times in the length of the body; width of the head contained about 1½ times in its length, depth about 2 times; crown, snout and cheeks without visible glands; eyes not covered with skin, placed largely in the posterior half of the head, eye diameter contained 6 to 6½ times in the length of the head, distance between the eyes less than twice their diameter; nostrils much closer to the eye than to the tip of the snout, the large, oblong posterior nostrils can be closed by means of a valve, anterior nostrils much smaller than posterior nostrils, opening in the base of the valve of the posterior nostrils; snout convex, width at the base considerably greater than length; barbels thin, nearly equal in length, slightly shorter than the eye; lower jaw flat, edge united with lower lip; gill cover rounded at the posterior side, lower margin concave. Pharyngeal teeth in one row, small, conical, acute, slightly curved, about 8. Vent in the posterior half of the body, opening very close to anal fin. Lateral line nearly straight, each scale marked by a simple tube, not curved upwards at the base of the caudal fin; belly scaleless in front and behind ventral fins; scales not ridged, at the free margin not dentate, entire; on the flanks about 70 scales in a longitudinal row, 5 or 6 in a transverse row between the 1st dorsal ray and the lateral line, about 28? in a longitudinal row between occiput and dorsal fin, scales on the nape and scales on the anterior part of the flanks conspicuously smaller than caudal scales. Dorsal fin for its total length placed slightly behind the base of the ventral fins, acute, slightly emarginate, higher than the body, length smaller than height; pectoral and ventral fins obliquely obtusely rounded, nearly equal in length, pectoral fins not reaching ventral fins; ventral fins not reaching anal fin; anal fin acute, not or slightly emarginate, not lower than the body, higher than base length; caudal fin emarginate in crescent-shape, lobes acute, lower lobe hardly longer than upper lobe, contained about 5 times in the length of the body. Colour: upper part of the body orange-olive or darkish-olive, lower part orange- or pearly-pink; iris violetish-blue, margin of pupil golden; 5 or 6

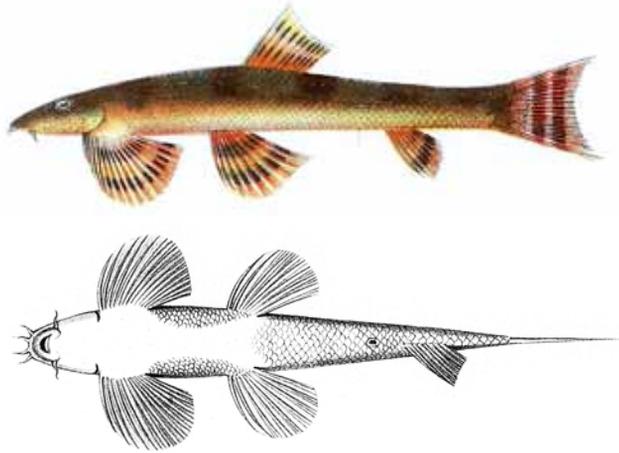


Fig. 17. *Homaloptera gymnogaster* Blkr. Atl. Ichth. Cypr. Tab III, Fig. 6. TL figure 74 mm.

dark, broad, transverse, diffuse bands on the body, close to each other; fins orange-pink or pink, caudal fin with diffuse, transverse dark bands in the middle.

B. 3. D. 2/7 or 2/8. P. 5/9/1 or 5/10/1. V. 2/7. A. 2/6. C. 6/17/6 or 6/17/7, short flanking ones included.

Hab. Sumatra (Meninju), in the lake.

Length of sole specimen 75''.

Remark. Till now I have only received this species from Sumatra in a single specimen originating from Lake Meninju, and donated to me by the famous traveller the late Ida Pfeifer. The species is very easy recognizable by its posterior implantation of the dorsal fin and the numerous scales in a longitudinal row.

99 SUBFAMILY III CYPRINIFORMES CARPS

Cyprinoidei with an oblong or elongate, compressed body, generally scaled, with cycloid scales. Head more or less compressed, scaleless. Barbels: never more than 4, often none. Gape reaching or nearly reaching the sides of the head. Pharyngeal teeth taking various shapes, in one to three-rows. Pseudo-branchia comb-shaped or gland-shaped. Gill opening wide. Pectoral and ventral fins never disc-shaped, pectoral fins with a simple upper ray only. Swimbladder bipartite.

Remark. The Cypriniformes are the carp-like fishes by excellence. What is written by most writers on Cyprinoids, exclusively or almost exclusively concerns this subfamily and therefore the sketches of the development of the knowledge of the Cyprines given in the introduction of this part also mainly concern the Cypriniformes. They do comprise more than nine and a half hundred known species, whereas of both other subfamilies together not even a hundred species are known.

Whereas the Cobitiformes and Homalopteraeformes are restricted to the continent of the eastern hemisphere, one sees the Cypriniformes not only distributed all over

Africa, but they also inhabit almost the whole of North America and this even in very numerous species.

The study of the geographical distribution of the Cyprinoids yields the most important results with regard to the Cypriniformes.

Even to a lesser extent than the freshwater Silurids, the Cyprines, in general, were able to cross the borders set to them by nature. Among them are no species that voluntarily go out of the water or can live long outside water. They are not built for this, and even if many Cobitiformes like Silures, although less easily, can move themselves out of the water in a certain direction, their respiration apparatus is not adapted to contain and hold the amount of water necessary for a somewhat extended moistening of the gills.

100 Nevertheless, the geographic distribution of some species is very large, even of those for which no artificial transposition can be suspected, and consequently one must believe in a simultaneous creation of the species in the drainages in which they are still living now. On the other hand it also holds for the Cypriniformes, that not a single species of the Old world also occurs in the New world, and that in both hemispheres the borders of the various species and genera sometimes are very sharp. Even the genera almost without exception are different in both hemispheres.

Only of *Acomus*, *Leuciscus*, *Alburnus* and *Gobio* one finds species both in the Old as in the New world.

Every large region moreover, not only has its own endemic species, but also genera that do not occur elsewhere. Thus one finds, to mention just a few more specifically from the numerous examples, which one can choose from the forthcoming general outline of the species, *Epalzeorhynchus* only in the Indian archipelago, *Abrostomus* only at Cape of Good Hope, *Cyprion* only in Persia and Syria, *Pseudogobio* only in Japan, *Aulopyge* only in south-eastern Europe, *Elopichthys* only in China, *Esomus* only in Bengal and Hindustan etc.

A thorough revision of the hundreds of species of Cypriniformes and of the genera formed by them is deemed necessary. It is a difficult task, the performance of which may be impossible for some time to come, because the material is spread over various museums in Europe, America and Asia.

I have accomplished that revision for all species that I possess myself, however, as there is not any other ichthyological cabinet in these provinces, I have not been able to extend it further.

In the mean time, the research on these species has led me to study the available literature and by this I have come to the conviction, that, just like the archipelagic Cypriniformes belong to numerous genera that can be characterized with a large certainty, many of the extra-archipelagic genera erected in recent times by various ichthyologists also indeed have to be regarded as natural genera. And thus, even after rejecting of numerous less well defined ones, in my opinion still more than 100 genera of Cypriniformes are to be maintained.

Like already said above, those numerous genera can be placed into two large groups, in that of the Phalacrognathines and that of the Cheilognathines. The genera of the Cheilognathines in numerosity win by far from those of the Phalacrognathines, just as they are more numerous in species.

101 COHORS 1 PHALACROGNATHINI.
BARE JAWED FISHES

Cypriniformes with a lower jaw that is bare at the free margin, not covered by a lower lip, protected by a sheath or by a deciduous bony plate.

After Mr Agassiz in 1837 had given the example to separate the genus *Chondrostoma* from the remaining Cypriniformes on the basis of the peculiar structure of the mouth parts, one also tried to place numerous extra-European Cypriniformes in various genera on the basis of the structure of the mouth parts.

Cuvier in 1817 indeed had already erected the genus *Labeo*, but his characterization concerning the construction of the mouth parts was restricted to the statement that the lips are fleshy and curiously thick, to which diagnosis in 1823 was added that the lips are often crenate.

Both greatest ichthyologists of the newer age without being aware of this, in *Labeo* and *Chondrostoma* had found the types, not, as they supposed, of two genera, but of two groups, rich in species, in which more than 200 species would come to arrange themselves.

Kuhl & Van Hasselt had already noticed some of those genera, during their investigation of the curious Javanese forms of the Phalacrognathines. They already felt the importance of the shape of the mouth parts for the division of the genera, however, their early death has obstructed them, to further develop their view in this matter. Their genera *Crossocheilos*, *Lobocheilos*, *Diplocheilos* and *Labiobarbus* are nothing else than types obtained by analyzing of the basic type of Cuvier's *Labeo*.

Mr MacClelland with the erection of several of his genera also paid attention to the shape of the mouth parts, without however, determining the particularities of that shape in detail. His genera *Cirrhinus* (with *Labeo* as subgenus), *Oreinus*, *Gobio* and *Gonorrhynchus* comprise exclusively Phalacrognathines; *Cirrhinus*, *Gobio* and *Gonorrhynchus* (all with a totally different meaning than in Cuvier) all species of the basic type of *Labeo*, *Oreinus* species of the basic type *Chondrostoma*.

102 A. Smith in *Abrostomus* found a new subtype of *Labeo*.

Dangila and *Rohita*, also derived from the basic type of *Labeo* and erected in the year 1842 by Mr Valenciennes, are part of the genus *Labiobarbus*, as understood by Kuhl & Van Hasselt.

In 1842 Heckel proposed his genera *Cyprinion*, *Scaphiodon*, *Gymnostomus*, *Chondrochylus* and *Chondrorhynchus*, all subtypes of *Chondrostoma*; as well as *Tylognathus* and *Discognathus*, which are subtypes of *Labeo*. In 1847 he added to these the genera *Dillonia*, *Schizopyge* and *Aspidoparia*, which are derived as well from the basic type of *Chondrostoma*, whereas he reduced his genera *Chondrochilus* and *Chondrorhynchus* to the original genus *Chondrostoma*.

In North America too a type was already discovered in 1818, stamped with the name *Exoglossum* by Rafinesque, which is related to the basic type of *Labeo*. The genus *Pimephales* of Rafinesque seems to be related to it as well.

Numerous other North American types, erected in the last decades, with regard to the jaw- and lip-shape also seem to belong to the basic type of *Labeo*, e.g. *Hyborhynchus*, *Hybognathus* and *Campostoma* of Mr Agassiz; *Lavinia*, *Diona*, *Algoma*, *Ortho-*

don, *Alganesea*, *Siboma* and *Cliola* of Mr Girard; *Cochlognathus* of Misters Baird and Girard; and *Mylocheilus* and *Mylopharodon* of Mr Ayres.

All these genera, much as they are related to *Labeo* by the shape of the mouth parts, by their dentition approach more the basic type of *Chondrostoma* and several of them were even presented as *Chondrostomines* by Misters Agassiz and Girard, although the essence of that group is not the same as that which is attached to it in this work.

Heckel in the "Nachtrag zur Charakteristik und Classification der Cyprineen-Gattungen" has very well distinguished the mentioned basic types of *Labeo* and *Chondrostoma*, but he has not named them.

For those who wish to recognize in the genera summed up here only the genera *Labeo* Cuv. and *Chondrostoma* Ag., group A of Heckel's *Temnochilae* would represent *Labeo*, group B of the *Temnochilae* would represent *Chondrostoma*.

I consider these groups as natural groups and name them after their basic types *Labeonines* and *Chondrostomines*.

But moreover I recognize in these groups still other generic types, which had partly remained unknown to other ichthyologists, partly were also overlooked by them. These types are, for the *Labeonines* the genera *Epalzeorhynchus*, *Discognathichthys*, *Diplocheilichthys*, *Schismatorhynchus*, *Rohithichthys*, *Barbichthys*, *Morara*, *Opistochelos*, *Pseudogobio*, *Semiplotus*; – and for the *Chondrostomines* the genera *Mrigala* and *Acheilognathus*.

103 All these genera will be treated in more detail below.

I have to remark here that, although my *Phalacrognathines* answer to Heckel's *Temnochilae*, Heckel's naming just like his diagnosis thereof "maxilla inferiore in aciem cartilagineam attenuata" [lower jaw getting thinner so as to form a cartilaginous edge] are less correct, as the lower jaw in some genera, like *Lobocheilos*, instead of ending in a sharp edge, is extremely thick and bluntly edged.

104 STIRPS I LABEONINI.

LIP CARPS

Cypriniformes with bare jaws, lower lip constructed in various ways, down-folded.

Remark. The *Labeonines* comprise all *Phalacrognathines* in which a lower lip is present, which, although they may have a different shape always have in common that they do not reach the free edge of the lower jaw and is bent away or turned down from the ventral side of the lower jaw.

Department A of the *Temnocheilae* of Heckel only comprises the genera with three rows of pavement-like pharyngeal teeth, and therefore has a more restricted significance than the *Labeonini*, to which here also all North American *Phalacrognathines* are brought, which in their dentition differ from all *Labeonines* of the Old world, except for Japan.

On the basis of the dentition the *Labeonines* can be divided in two groups. All genera of the Old world, with the exception only of *Pseudogobio* of Japan, have "dentes aggregati triseriati" [three rows of aggregated teeth] and two to four barbels, whereas in the American *Labeonines* the pavement-like arrangement of the teeth is constantly lacking and the teeth themselves are placed in only a single or double row (possibly

only with the exception of *Mylopharodon* Ayr. and *Mylocheilus* Ag., which are said to have a *defective* third row).

Of the Labeonines of the Old world I was able to investigate the genera *Epalzeorhynchus*, *Crossocheilos*, *Diplocheilichthys*, *Lobocheilos*, *Schismatorhynchus*, *Morulus*, *Barbichthys* and *Morara* from nature, and have thereafter become convinced of the high value of the shape of the lips and jaws for the generic classification.

A revision of the remaining genera of the Labeonines, from the data that have been published about them, induced me to test their more correct definition and by this I deemed it necessary to separate some species from some of these genera, and to place them in their own generic types. To these belong the genera *Rohithichthys*, *Opistocheilos*, *Semiplotus* and *Pseudogobio*.

105 Whereas the more detailed knowledge of so many species of Labeonines has allowed for the more detailed description of several generic types, that knowledge has also shed light on many species, especially the ones made known by Mr MacClelland from Bengal whose descriptions are too short or whose figures are too insufficient to determine their generic relationships only after these. I have tried to bring these species back to their correct genera, and although the data for many species were insufficient for this, I believe I have given back to many Buchananese and MacClellandese species their true meaning.

Among the Cypriniformes, the Labeonines are closest related to the Homalopteraeformes and Cobitiformes. Judging from the shape of the lower jaw and lips these subfamilies would belong to the Labeonines, if not characters of a higher order would place them in groups of higher value.

The genera, which are most closely related to the aforementioned subfamilies, are *Epalzeorhynchus*, *Crossocheilos*, *Platy cara*, *Discognathus* and *Discognathichthys*.

The species and genera of the Labeonines are much more numerous than those of the Chondrostomines. They account for about 75 percent of all Phalacrognathines.

They are relatively the most numerous on the Sunda Islands, from which already 43 species are known. Continental Asia feeds more than 70 known species and also North America can boast still more than 50 species. In Africa however, they are, according to our present knowledge, much more rare and only 13 in number, whereas they are completely lacking in Europe.

A more detailed definition of the genera of the Labeonines of the Old world is not very difficult with the present knowledge.

Excellent characters can be found in the shape of the posterior undivided dorsal fin ray, in its ossification or lack of ossification, in its being serrated or not.

Other first-rate characters are found in the being notched or not notched of the free edge of the snout; the snout grooves and lateral appendages; the being united or not united of the upper lip with the lower lip and the way they are united; in the shape and direction of the posterior lip groove or grooves; in the shape and the nature of the jaws proper; in the mental sucking disc; in the shape of the lips and their being fringed or not; in the nature of the anal scales etc. In the Labeonine genera of the Old world the barbels and the peculiarities of the dentition are only of secondary importance.

More difficult, anyway according to the present knowledge, seems to be the correct definition of the genera of North American Labeonines. It is also the question, whether they all **106** can be retained, and when I present them all below, it is more

because data to give a final judgement about their value are lacking. Judging from the present data many of those genera are based on characters the generic value of which is very doubtful, however it is possible that other more substantial characters have been overlooked, just like it has happened with many genera of Labeonines from the eastern hemisphere.

From the excellent naturalists, who have made public these genera and are still living in North America, a more detailed investigation of the numerous species discovered by them certainly may be awaited.

The genera of the Labeonines can be surveyed as follows.

- I. Pharyngeal teeth in three rows. Body scaled.
 - a. Dorsal fin spineless.
 1. Snout crenate at free margin. Gape parallelogram-shaped. Barbels 2 to 4. Scales large.
 - aa. Lower lip united with upper lip.
 - * Snout entire, on both sides equipped with a mobile, conical process. Chin without sucking disc.

Epalzeorhynchos Blkr.

- * Snout with a transverse bipartite groove, no lateral processes. Chin with sucking disc.

Discognathus Heck. (partly).

- bb. Lower lip not united with upper lip. Snout entire without processes. Chin without sucking disc.

Crossocheilos V. Hass., Blkr.

2. Snout not crenate at free margin.
 - aa. Chin with sucking disc. Snout entire. Lower lip united with upper lip. Scales large.

Discognatichthys Blkr.

- bb. Lower lip with some kind of lobe, not forming a sucking disc. Scales large.
 - * Snout divided into two parts by deep longitudinal groove.

Platycara McCl.

- * Snout without longitudinal groove. Lower jaw thickened, fleshy-cartilaginous.
 - § Lower lip not united with upper lip. Snout divided into two parts by a transverse groove. Barbels 4.

Schismatorhynchos Blkr.

§' Lower lip united with upper lip, confluent. Barbels 2 to 4.

107 ô Upper lip confluent with anterior margin of lower lip.

- * Snout equipped with a lobe on both sides. Anterior suborbital bone placed rather far anterior to orbit.

Labeo Cuv., Blkr.

- ** Snout not lobed.
- † Snout divided into two parts by a transverse groove.
Lower lip crenulate.

Tylognathus Heck.

- †' Snout entire. Lower lip not crenulate.
Suborbital bone close to the anterior part of the orbit.

Diplocheilichthys Blkr.

- ô Upper lip inserted on the upper surface of lower lip inside the margin.

Lobocheilos V. Hass., Blkr.

- cc. Lower lip simply back-folded, not lobed or disc-shaped. Scales large or medium-sized.
- * Lips fimbriate or crenulate-papillose. Barbels 4 to 2.
- § Upper and lower lips fimbriate. Gape oval when mouth is open.
- ô Two longitudinal postlabial grooves separated by the wide isthmus. Suborbital bone close to the anterior part of the orbit.

Rohita Val.

- ô' One crescent-shaped transverse postlabial groove.
Anterior suborbital bone placed rather far anterior to orbit.

Morulius Buch., Blkr. *Chrysophekadion* Blkr.

- §' Lower lip fimbriate only. Anterior suborbital bone placed rather far anterior to orbit.

Rohitichthys Blkr.

- §'' Upper lip papillose only. Gape nearly parallelogram-shaped when mouth is open. Lower jaw with thin free edge.

Dangila Val.

- *' Lips neither fimbriate nor papillose.
- § Upper lip thick, fleshy. Barbels 4. Scales small.
Mouth parallelogram-shaped.

Abrostomus Smith.

- §' Upper lip very thin, membraneous, hanging anterior to upper lip.
Scales large.
- ô Gape angular. Anterior suborbital bone slightly resembling a horse foot. Barbels 4.

108 *Barbichthys* Blkr.

- * Gape crescent-shaped. Anterior suborbital bone pentagonal. No barbels.

Morara Blkr.

- b. Dorsal fin with a simple, posterior, bony ray.
 - 1. Dorsal spine toothless. Scales large, anal scales not larger than other scales. Dorsal fin with many rays. No barbels.

Semiplotus Blkr.

- 2. Dorsal spine serrated posteriorly. Scales small, anal scales much larger than other scales. Dorsal fin with few rays. Barbels 4.

Opistocheilos Blkr.

- II. Pharyngeal teeth in two rows or in one row.
 - a. Dorsal spine bony. Pharyngeal teeth knife-like 4/4. No barbels. Scales large.
 - 1. Jaws spoon-shaped, acute at the free margin.

Cochlognathus Baird Gir.

- 2. Jaws not spoon-shaped.

Pimephales Raf.

- b. No dorsal spine.
 - 1. Maxillary barbels 2.
 - aa. Pharyngeal teeth thin, acute, in one row, 5/5. Lower lip back-folded, three-lobed. Thoraco-gular region scaleless. Vent close to ventral fins.

Pseudogobio Blkr.

- bb. Pharyngeal teeth molar, permanent, in two rows, 2.5/5.2 or 2.4/4.2. Gape nearly terminal, horizontal.

Mylocheilos Ag.

- 2. No barbels.
 - aa. Pharyngeal teeth molar, permanent, in two rows, 2.5/5.2 or 2.4/4.2. Gape large.

Mylopharidon Ayr.

- bb. Pharyngeal teeth knife-like.
 - * Lower lip bilobed. Teeth in two rows 1.4/4.1.

Exoglossum Raf.

- * Lower lip not lobed.
 - § Pharyngeal teeth in two rows.
 - ô Dorsal fin starting behind ventral fins. Gape curved. Teeth 1.4/4.1, with an elongate, thin chewing surface. Scales medium-sized.

Campostoma Ag.

- 109 ♂' Dorsal fin starting above or anterior to ventral fins. Mouth small, terminal. Teeth 1.4/5.2. without chewing surface. Scales large.

Siboma Gir.

- §' Pharyngeal teeth in one row.
 ♂ Mouth inferior. Scales large or medium-sized.
 † Dorsal fin ending above or hardly anterior to anal fin.
 Gape transverse when mouth is closed. Teeth in one row 5/5.
 Lower jaw truncate at the edge.

Lavinia Gir. = *Acrocheilos* Ag.

- † Dorsal fin ending anterior to anal fin. Teeth 4/4.
 ♂ Teeth not hooked at the tip. Lower jaw rounded at the edge. Dorsal fin starting above ventral fins.

Dionda Gir.

- ♂ Teeth with nearly linear chewing surface. Gape small. Dorsal fin starting anterior to ventral fins. Head slightly truncate. Body elongate?

Algoma Gir.

- ♂' Teeth with linear chewing surface. Gape small, horizontal. Dorsal fin starting above ventral fins. Lower jaw with widely rounded edge. Snout gibbous, truncate. Body oblong.

Hyborynchus Ag.

- ♂'' Mouth terminal. Dorsal fin starting above or anterior to ventral fins. Teeth 4/4 or 5/5.
 † Teeth hardly or not hooked 4/4 with a linear chewing surface. Lower jaw equipped with a tubercle at the symphysis. Scales large. Body elongate, compressed.

Hybognathus Ag.

- †' Teeth lanceolate, nearly straight 5/5. Lower jaw equipped with a tubular symphysis. Scales small. Body nearly fusiform.

Orthodon Gir.

- †'' Teeth predatory, hooked 4/4, without chewing surface. Gape ample. Snout rounded. Scales large. Body elongate, compressed.

Cliola Gir.

- †''' Teeth 4/4 or 5/5. Gape medium-sized, oblique. Snout slightly acute. Scales large or medium-sized. Body oblong, compressed.

Alganssea Gir.

- " ricnorhynchus Blkr. = *Gobio ricnorhynchus*
 McCl. = *Labeo ricnorhynchus* Heck. = *Cyprin*
 ricnorhynque Val. Bengal, Assam.
- " gotyla Blkr. = *Cyprinus gotyla* Gr. = *Gonorhynchus*
 gotyla McCl. = *Barbus gotyla* Val. = *Discognathus*
 cotyla Heck. Bengal.
- " falcatus Blkr. = *Cyprinus* (Bangana) *falcata* Gr. =
Gobio malacostomus McCl. = *Labeo malacostomus*
 Val. = *Isocephalus falcatus* Heck. = *Lobocheilos?*
 falcatus Blkr. India.
- * *Labeo* (*Diplocheilos*) *erythropterus* Blkr. = *Diplocheilos erythropterus*
 V. Hass. = *Labeo erythropterus* Val. Java.
- " (") lucas Blkr. = *Lobocheilos lucas* Blkr. Java.
- " (") rohitoides Blkr. = *Lobocheilos rohitoides* Blkr. .. Java.
- " (") boga Blkr. = *Cyprinus boga* Buch. = *Gobio boga*
 McCl. = *Cyprinus arhiza* Buch. = *Cyprinus*
pangusia Buch. = *Gobio pangusia* McCl. (As.
 Res. XIX tab. 42 f. 1) = *Isocephalus boga* Heck. =
Gymnostomus arhiza Heck. = *Leuciscus*
pangusia Val. = *Leuciscus arhiza* Val. Bengal.
- " (") pangusia Blkr. = *Cyprinus pangusia* Buch. var. =
Gobio pangusia McCl. (As. Res. XIX tab. 42
 fig. 1, b.) Bengal.
- " (") (?) isurus Blkr. = *Gobio isurus* McCl. =
Leuciscus 112 *isurus* Val. Assam.
- Labeo* (*Diplocheilos*?) *dero* McCl. = *Cirrhina dero* Val. =
Isocephalus dero Heck. Bengal.
- " ("?) pausio Blkr. = *Cyprinus pausio* Buch. = *Cirrhinus*
pausio McCl. = *Isocephalus pausio* Heck. Bengal.
- " ("?) breviceps Blkr. = *Cirrhina breviceps* Val. =
Isocephallus breviceps Heck. Java.
- " (Labeo) *niloticus* Val. = *Cyprinus niloticus* Forsk. =
Labeo coubi Rüpp. Nile.
- " (") *Forskalii* Rüpp., or and Val? =
Cyprinus niloticus var. b. Forsk. Nilus.
- " (") *vulgaris* Heck. = *Cyprinus niloticus* Géoffr. =
Chondrostoma dembensis Val. (nec Rüpp.). Nile.
- " (") *horie* Heck. Nile.
- " (") *selti* Val. = *Labeo sellii* Heck. Nile.
- " ? ("?) *rufescens* Heck. = *Cyprinus rufescens* Hass. Palestina.
- " ? ("?) *rostratus* Heck. = *Cyprinus rostratus* Tiles. India.
- " ? ("?) *angra* Blkr. = *Cyprinus angra* Buch. = *Cyprinus* (Bangana)
Hamiltonii Gr. = *Gobio angra* McCl. = *Isocephalus*
Hamiltonii Heck. = *Gobio anera* Val. Bengal.
- "? (") *curmuca* Blkr. = *Cyprinus curmuca* Buch. =
Gobio curmuca McCl. = *Isocephalus curmuca* Heck. Hindustan.
- " (") *dyocheilos* McCl. = *Catostomus?* *dyocheilos* McCl.
Cyprin goréa Val. = *Tylognathus dyochylos* Heck. Assam.
- " *altivelis* Pet. (only known to me by name). Africa (Mossamb).
- " *congoro* Pet. (" " " " " "). " "
- " *cylindricus* Pet. (" " " " " "). " "

- Tylognathus diplostomus Heck. = Varicorhinus diplostomus Heck. =
 Tylognathus Valenciennesii Heck. =
 Labeo diplostomus Val. Cashmir.
 " ?? sandkhol Heck. = Leuciscus sandkhol Syk. Deccan.
 " ?? chitul Heck. = Leuciscus chitul Syk. Deccan.
- * Diplocheilichthys pleurotaenia, Blkr. =
 Lobocheilos pleurotaenia Blkr. Sumatra.
- * Lobocheilos (Lobocheilos) falcifer V. Hass. = Labeo falcifer V. Hass. =
 Labeo falcifer Val. = Tylognathus
 falcifer Heck. Java, Sumatra.
- * " (") lehat Blkr. Java.
- 113 * " (") Schwanefeldii Blkr. Java, Sumatra.
- " ? (" ?) Hasseltii Blkr. = Barbus Hasseltii Blkr. Java.
- * " (Gobionichthys) lipocheilos Blkr. = Chondrostoma
 lipocheilos Val. = Chondrostoma lipocheilos
 Val. = Tylognathus lipocheilos Heck. =
 Gobio javanicus Blkr. = Lobocheilos
 (Gobionichthys) javanicus Blkr. Java.
- * " (") microcephalus Blkr. = Gobio
 microcephalus Blkr. Java.
 " ? (" ?) hispidus Blkr. = Labeo hispidus Val. Java.
- * Rohita (Rohita) melanopleura Blkr. Sumatra, Borneo, Siam.
- * " (") borneënsis Blkr. Borneo, Siam.
- * " (") Kuhli Blkr. Sumatra.
- * " (") Hasseltii Val. = Rohita leiorhynchus Blkr. =
 Rohita Artedii Blkr. Java, Sumatra, Borneo.
- * " (") microcephalus Val. Java.
- * " (") brachynotus Blkr. Sumatra.
- * " (") Schlegelii Blkr. Sumatra, Borneo, Siam.
- * " (") Waandersi Blkr. Banka.
- * " (") Kappenii Blkr. Borneo.
- * " (") kahajanensis Blkr. Borneo.
- * " (") vittata Val. = Rohita erythrura Val. =
 Rohita erythrurus Blkr. Java. Sumatra. Borneo.
- * " (") triporos Blkr. Sumatra. Borneo.
- * " (") enneaporos Blkr. Sumatra.
- * " (") oligolepis Blkr. Banka.
- " (") nandina Val. = Cyprinus nandina Buch. = Labio
 filamentosus Swns. = Cirrhinus nandina McCl. Bengal, Pegu.
- " (") macronotus Blkr. = Cirrhinus macronotus McCl. Bengal, Assam.
- " (") Dussumieri Val. Hindustan.
- " (") Duvaucelii Val. Bengal?
- " (") fimbriata Val. = Cyprinus fimbriatus Bl.? Hindustan.
- " (") gonius Val. = Cyprinus gonius Buch. = Barbus
 gonius Cuv. = Cirrhinus gonius McCl. Bengal.
- " (") rostellatus Val. = Rohita rostellata Heck. Pegu.
- " (") chagunio Val. = Cyprinus chagunio Buch. =
 Rohito chagunio Heck. Bengal.
- " (") lineata Val. Pegu.
- " (") Leschenaulti Val. Hindustan?
- 114 Rohita(Rohita) cursis Val. = Cyprinus cursis Buch. = Cyprinus
 cursa Buch. = Cyprinus curchius Buch. = Labeo
 cursis McCl. = Labeo curchius McCl. = Labeo
 cursa Val. = Rohita kursis Heck. Bengal.

- " (") tincoides Val. ?
- " (") Rouxii Val. Hindustan.
- " (Rohitodes) cephalus Blkr. = Labeo cephalus Val. Pegu.
- " (") Valenciennesi Blkr. = Labeo Dussumieri Val. Bengal.
- " (") Reynaudi Blkr. = Labeo Reynauldi Val. Pegu.
- " (") microlepidota Blkr. = Labeo microlepidotus Val. Pegu.
- " (") bengalensis Blkr. = Labeo fimbriatus Val. Bengal.
- * *Morulius rohita* Blkr. = *Cyprinus rohita* Buch. = *Barbus rohita* Cuv. =
Rohita Buchanani Val. = *Rohita rohita* Heck. =
Cirrhinus rohita McCl. Bengal.
- * " *chalybeatus* Blkr. = *Rohita chalybeata* Val. Bengal, Pegu.
- * " *Belangeri* Blkr. = *Rohita Belangeri* Val. =
Cirrhina micropogon Val. Bengal.
- * " *calbosus* Blkr. = *Cyprinus calbosus* Buch. = *Barbus calbasu*
Cuv. = *Rohita calbasu* Val. = *Rohita kalbosu* Val. Bengal.
- " *velatus* Blkr. = *Labeo velatus* Val. (Règn. an. ed. 3a Poiss.
tab. 93 fig. 3). India?
- " *Reynaudi* Blkr. = *Rohita Reynauldi* Val. =
Rohita Reynoldi Heck. Pegu.
- " *morula* Blkr. = *Cyprinus morula* Buch. = *Barbus morula*
Cuv. = *Cirrhinus morula* McCl. = *Rohita moralius* Val =
Cyprinus morala Gr. Bengal.
- " *pausius* Blkr. = *Cyprinus pausius* Buch. Bengal.
- " *joalius* Blkr. = *Cyprinus joalius* Buch. = *Cirrhinus joalius*
McCl. = *Rohita joalius* Val. Bengal.
- " ? *musiha* Blkr. = *Cyprinus musiha* Buch. =
Rohita muscha Heck. Bengal.
- * " *chrysophekadion* Blkr. = *Chrysophekadion polyporos* Blkr. =
Rohita chrysophekadion Blkr. = *Rohita polyporos* Blkr. =
Rohita koilogeneion Blkr. = *Rohita cyanomelas* Blkr. Java, Sumatra, Siam.
- Rohitichthus senegalensis* Blkr. = *Labeo senegalensis* Val. Senegal.
- * *Dangila leptocheilus* Val. = *Labeobarbus leptocheilus* K. v. H. =
Dangila leptocheila Val. = *Dangila Cuvieri* Val. =
115 *Cyrene Cuvieri* Heck. Java, Sumatra, Borneo.
- Dangila cyanopareja* Blkr. = *Cyrene cyanopareja* Heck. Philippines
- * " *fasciata* Blkr. Sumatra, Borneo.
- * " *Kuhlii* Val. = *Cyrene Kuhlii* Heck. Java.
- * " *festiva* Blkr. = *Cyrene festiva* Heck. Borneo.
- * " *ocellata* Blkr. = *Cyrene ocellata* Heck. =
Dangila microlepis Blkr. Sumatra, Borneo.
- * " *spilurus* Blkr. Borneo.
- * " *sumatrana* Blkr. Sumatra.
- " *lipocheila* Val. = *Cyrene lipocheilus* Heck. Java.
- " *Leschenaultii* Val. = *Cyrene Leschenaultii* Heck. Hindustan.
- " *philippinia* Blkr. = *Cyrene philippinia* Heck. Philipp.
- Abrostomus capensis* Smith. Cape Good Hope.
- " *umbratus* Smith. Cape Good Hope.
- * *Barbichthys laevis* Blkr. = *Barbus nudicephalus* V. Hass. = *Barbus laevis* Val. =
Barbus gobioides Blkr. = *Barbus taeniopterus* Blkr. Java, Sumatra, Borneo.
- * *Morara morar* Blkr. = *Cyprinus morar* Buch. = *Pachystomus morar* Heck. =
Labeo morur Val. = *Leuciscus morar* Blkr. Bengal.
- " ? *margarodes* Blkr. = *Cyprinus jaya* Buch.? = *Leuciscus*
margarodes McCl. = *Pachystomus margarodes* Heck. Bengal.

Semiplotus MacClellandi Blkr. = Cyprinus semiplotus McCl.	Bengala.
Opistocheilus plagiostomus Blkr. = Schizothorax plagiostomus Heck. = Schizopyge plagiostomus Heck. = Oreinus plagiostomus McCl.	Afghanistan, Kashmir.
" sinuatus Blkr. = Schizothorax sinuatus Heck. = Schizopyge sinuatus Heck.	Cashmir.
" ? nobilis Blkr. = Racoma nobilis McCl.	Afghanistan.
" ?? proprius Blkr. = Schizothorax proprius McCl.	Afghanistan.
Cochlognathus ornatus Baird Gir.	N. Amer. (Texas).
Pimephales promelas Raf. Ag.	N. Am. (Ohio, Missuri)
" fasciatus Gir.	N. Am. (Yellowstone riv.)
" maculosus Gir.	N. Am. (Arkansas).
Pseudogobio esocinus Blkr. = Gobio esocinus T. Schl.	Japan.
Mylocheilus caurinus Gr. = Cyprinus (Leuciscus) caurinus. Richds.	N. Am. (Ast., Columb. riv.)
" lateralis Ag. Pick.	N. Am. (Colb. Riv. Puget. S.)
116 Mylocheilus fraterculus Gr.	N. Am. (California).
Mylopharodon conocephalus Gr. = Gila conocephala B. Gir.	N. Am. (California).
" robustus Ayr.	N. Am. (California).
Exoglossum maxillingua Ag. = Cyprinus maxillingua Les. = Exoglossum Lesurianum Raf., Val. = Exoglossum Lesueurianum Heck. = Catostomus maxillingua De Kay.	N. Am. (West. U.S.)
" mirabile Gir.	N. Am. (Arkansas).
Campostoma formulosum Gir.	N. Am. (Texas).
" anomalum Ag. = Rutilus anomalus Raf. = Rutilus melanurus Raf. = ? Chondrostoma pullum Ag. = Exoglossum dubium Kirtl. = Leuciscus prolixus Stor. = Exoglossum spinicephalum Val. = Chondrostoma prolixum Ag. = Campostoma dubium Ag.	N. Am. (Teness, Ohio, Jow, etc)
" nasutum Gr.	N. Am. (Californ.).
" ornatum Gr.	N. Am. (Chihuahua riv.).
Siboma crassicauda Gr. = Lavinia crassicauda B. Gir. (genus or of this location ? [meaning unclear]).	N. Am. (Californ.).
" atraria Gir.	N. Am.
Lavinia alutacea Gir. = Acrocheilus alutaceus Ag. Pick.	N. Am. (Columb. riv. etc.)
" exilicauda B Gir. = Lavinia compressa Ayr.	N. Am. (Californ.).
" gibbosa Ayr.	N. Am. (Californ.).
" harengus Gir.	N. Am. (Californ.).
Dionda episcopa Gr.	N. Am. (Rio Pecos).
" serena Gir.	N. Am. (Texas).
" texensis Gir.	N. Am. (Texas).
" papalis Gir.	N. Am. (Rio Pecos).
" argentosa Gir.	N. Am. (Rio Grande)
" chrysitis Gir.	N. Am. (Rio Pecos).
" melanops Gir.	N. Am. (Coahiula).
" Couchi Gir.	N. Am. (Rio San Juan).
" plumbea Gir.	N. Am. (Canadian riv.)
" spadicea Gir.	N. Am. (Arkansas).
Algoma amara Gir.	N. Am. (Rio Grande)
" fluviatilis Gir.	N. Am. (California).
Hyborhynchus notatus Ag. = Minnilus notatus Raf. = Pimephales elongatus Baird.	N. Am. (Centr. & East. U.S.)
" confertus Gir.	N. Am. (Rio Pecos)
" puniceus Gir.	N. Am. (Canadian riv.).

117	"	perspicuus Gir.	N. Am. (Arkansas).
	"	tenellus Gir.	N. Am. (Choctaw Ag).
	Hybognathus	nitius Gir. = Leuciscus nitidus De Kay.	N. Am. (Lac-Champlain).
	"	argyritis Gir.	N. Am. (Milk river).
	"	Evansi Gir.	N. Am. (Nebraska).
	"	nuchalis Ag.	N. Am. (Illinois, J. Miss.)
	"	placitus Gir.	N. Am. (Arkansas).
	"	regius Gir.	N. Am. (Potomac riv.).
	"	? chrysopterus Blkr. = Leuciscus chrysopterus De Kay. ...	N. Am. (N. York).
	Orthodon	microlepidotus Gir. = Gila microlepidota Ayr.	N. Am. (Californ).
	Cliola	velox Gir.	N. Am. (Texas.)
	"	vigilax Gir. = Leuciscus vigilax B. Gir. =	
		Ceraticthys vigilax B. Gir.	N. Am. (Arkansas).
	"	vivax Gir.	N. Am. (Texas).
	Algansea	tincella Gir. = Leuciscus tincella Val.	N. Am. (Californ.).
	"	bicolor Gir.	N. Am. (Lac. Klamath).
	"	formosa Gir.	N. Am. (Mercede, Mohv. riv.)
	"	obesa Gir.	N. Am. (Humboldt riv.)

EPALZEORHYNCHOS Blkr,

Nalez. Vischfaun. Van Sumatra, Nat. Tijdschr. Ned. Ind. IX (1855) p. 270.

SNUIHOORNKARPER [SNOUT-HORN CARP].

Body elongate, slightly fusiform-compressed, covered with large scales. Jaws bare. Barbels 4, nasal barbels and maxillary barbels. Snout fleshy, entire, protruding far in front of mouth, the skin in front below the upper lip hanging, the lower part crenulate, anteriorly and on both sides with a conical, cartilaginous skin. Upper lip hanging anterior to upper jaw, not papillose or crenulate. Gape parallelogram-shaped with the edges of the jaws truncate anteriorly. Lower jaw equipped with a small tube at the posterior part of the symphysis. Lower lip broad, fleshy, back-folded, entire, united with upper lip. One postlabial sulcus on both sides, directed versus the margin of the mouth, not reaching the free margin of the lip, separated from the postlabial groove of the opposite side by the broad skin of the chin (the isthmus). ¹¹⁸ Dorsal fin starting anterior to ventral fins and ending far anterior to anal fin, posterior simple ray completely cartilaginous. Pectoral fins inserted nearly horizontally. Pharyngeal teeth masticatory, aggregated, 2.4.5/5.4.2, obliquely truncate on the chewing surface.

Remark. The genus *Epalzeorhynchos* among all other Cyprinoids is easily recognizable by the cone-shaped, cartilaginous, movable protuberance, which is situated on both sides anterior on the snout. This protuberance lies in a groove under the anterior part of the anterior suborbital bone and can be moved horizontally almost in an angle of 90° away from the snout, as a result of which the head gets a horned appearance.

The genus indeed is related to the genera *Crossocheilus* Blkr, *Discognathus* Heck. and *Discognathichthys* Blkr, in general habitus, thin jaws, parallelogram-shaped entirely inferior mouth cleft, etc. However, it is easily distinguishable from all of these, besides by the snout protuberances, – from *Discognathus* and *Discognathichthys* by the absence of the mental sucking disc, and from *Crossocheilus* by the single posterior lip groove and the being united of the upper lip with the lower lip.

I described the genus *Epalzeorhynchos* for the first time in the year 1855, however, I have determined its characters more detailed above. The closer investigation of the mouth parts has since taught me that herein as well very firm characters can be found

which differentiate the genus from *Crossocheilos*, characters of a higher value than those present in the barbels.

Till now in *Epalzeorhynchus* only one species can be placed, whose discovery dates from 1850.

Epalzeorhynchus kallopterus Blkr,
Index descript. specier. pisc., Nat. T. Ned. Ind. XIV p. 477. –
Fraaivinnige Snuithoornkarper [Pretty finned Snout-horn Carp].
Atl. Cypr. Tab. IV fig. 5.

An *Epalzeorhynchus* with an elongate, compressed body, depth of body contained $5\frac{1}{2}$ to $6\frac{1}{2}$ times in its length, width $1\frac{1}{2}$ to $1\frac{2}{3}$ times in its depth. Head acute, convex, contained slightly over 5 to nearly $6\frac{1}{2}$ times in length of body with caudal fin, slightly over 4 to 5 times in body without caudal fin, depth of head contained $1\frac{1}{2}$ to $1\frac{3}{4}$ times in its length, width $1\frac{1}{2}$ to $1\frac{1}{3}$ times; eyes superior, eye diameter contained 3 to nearly $3\frac{1}{2}$ times in the length of the head, eye diameter contained about once in the postocular part of the head, distance between the eyes $1\frac{1}{4}$ to $1\frac{1}{2}$ times their diameter, palpebral membrane covering a large part of the eye, opening nearly circular; rostro-dorsal profile convex everywhere, interorbital line ¹¹⁹convex; nostrils closer to the orbit than to the tip of the snout, posterior nostrils open, to be closed with a valve; anterior nostrils with a hardly elevated margin, slightly tubular; snout fleshy, in juveniles not or hardly longer than the eye, in old animals much longer than the eye, convex, conical, protruding far in front of the mouth, set with numerous hardly visible pores, towards the tip on both sides equipped with a conical, thick, rigid process twice or more than twice as short as the eye, pointing backward at the tip, its lower part triangular, flat, sloping backward, its front part porous, the premaxillary membrane hiding the upper lip, slightly curved at the free margin, covered with squarish papillae, in one row, lightly crenulate, densely together, in older animals very conspicuous; anterior suborbital bone irregularly triangular, length slightly greater or not greater than depth, 2nd suborbital bone oblong-quadrangular, length twice or less than twice as great as depth, the anterior part higher than the posterior part, about three times as low as the eye diameter; 3rd suborbital bone much broader than 4th suborbital bone, three times or more than three times as thin as the eye diameter; barbels fleshy, nearly equal in length, slightly shorter than the eye, maxillary barbels thicker towards the tip of the snout, inserted under the base of the rostral lateral process; gape inferior, parallelogram-shaped when the mouth is open, forming a transverse fissure, slightly curved forward, very much shorter than the width of the head when the mouth is open; upper lip thin, hanging anterior to upper jaw, its margin



Fig. 18. *Epalzeorhynchus kallopterus* Blkr. Atl. Ichth. Cypr. Tab. IV, Fig. 5. TL figure 152 mm.

not crenulate or papillose; upper jaw with a slightly curved cartilaginous edge, moderately downward protrusible; lower jaw on the posterior part of the symphysis with a conical, little conspicuous tubercle, anterior to the symphysis broadly cartilaginous, with a truncate or lightly curved edge; lower lip back-folded, entire, united with upper lip, the lower part with one superficial groove on both sides, directed towards the margin of the mouth, not or hardly shorter than the eye, not reaching the free margin of the lip and separated from the groove on the opposite side by the very broad isthmus; width of gill cover contained about $1\frac{1}{2}$ times in its depth, slightly smaller than eye diameter, at the lower margin straight or slightly convex; gill opening ending below posterior margin of the preoperculum. Pharyngeal teeth masticatory, aggregated 2.4.5/5.4.2. obliquely truncate on the chewing surface, elevated at the margins, not lobed, front of teeth in anterior row not sulcate; scapula triangular, acutely rounded; dorsal line of the body convex much higher than slightly convex ventral line; belly flat anterior to ventral fins, behind ventral fins nearly flat, not ridged; scales vertical, slightly larger on the flanks than on the rest of the body, free half and generally also the basal half striped with longitudinal stripes or slightly ray-like stripes, 35 or 36 scales in the lateral line, 15 in transverse row (including the lowest ventral scales) of which $5\frac{1}{2}$ (6) above the lateral line, about 11 in a longitudinal row between occiput and dorsal fin, lowest ventral scales in five longitudinal rows, growing gradually in size posteriorly, those in the medial row hardly larger than those in flanks rows, lateral line nearly straight, sloping downward only anteriorly, not or hardly closer to the base of the ventral fins than to the dorsal line, every scale marked by a simple tube not or hardly reaching the centre of the scale; dorsal fin starting rather far anterior to the ventral fins and ending far anterior to anal fin, scaleless at the base, acute, emarginate, not or slightly higher than base length, pectoral and ventral fins nearly equal in length, acute or slightly acute, contained $5\frac{3}{4}$ to $6\frac{3}{4}$ times in the length of the body, pectoral fins not reaching ventral fins, ventral fin not reaching anal fin; anal fin at the base enclosed in a very low scaled sheath, acute, emarginate, not much lower but about twice as short as the dorsal fin, twice or nearly twice as deep as base length, with the simple third ray thin, cartilaginous; caudal fin scaled at the base, with a deep incision, lobes acute, the upper lobe generally a little longer than the lower lobe, contained $4\frac{1}{3}$ to $4\frac{1}{2}$ times in the length of the body; upper part of the body marked by 3 longitudinal, contiguous bands, the upper band rostro-caudal, dark-violet, surrounding the upper part of the head and back sometimes missing at the head, the middle band golden-red, thin, supraocular-caudal, reaching the upper part of the base of the tail, the lower band rostro-caudal, wider, dark-violet, sometimes missing on the head, nearly completely running above the lateral line, entering the middle of the base of the tail and ending at the posterior margin of the tail, at the underside bordered with a 120 thin orange band; flanks below lateral line pink; belly more faintly pink or pearly; in specimens bands missing on the head, the upper part violet-olive, flanks and underside pink or silver; iris yellow or pink; fins beautiful pink or red, dorsal and anal fins with a very broad, oblique, blackish-violet band; dorsal fin often blackish-violet on top and below; ventral fins with a very large black spot covering nearly the total fin, often diffuse, blackish-violet.

B. 3. D. 4/8 or 4/9. P. 1/14 or 1/15. V. 2/8. A. 3/5 or 3/6. C. 8/17/8 or 7/17/7, short flanking ones included.

Syn. *Barbus kalopterus* Blkr, Bijdr. kenn. ichth. Faun. Borneo., Nat. T. Ned. Ind. I p. 13.

Epalzeorhynchus kalopterus Blkr, Nalez. vischfaun. Sumatra, Nat. T. Ned. ind. IX p. 270.

Hab. Sumatra (Palembang, Lahat), in rivers.

Borneo (Bandjermasin, Kahajan, Pontianak), in rivers.

Length of 13 specimens 63''' to 160'''.

Remark. The first specimen of this species that came into my possession, I received from Bandjermasin, in South East Borneo. Since then I received several larger and better preserved specimens from the same locality, as well as from Kahajan, similarly in South East Borneo, and from Pontianak, in western Borneo from the Kapuas river. Eastern Sumatra provided me with some specimens as well, caught in the area of the Moessi, near Lahat and Palembang. I suspect that the species does not become much larger than my largest specimens.

DISCOGNATHUS Heck.,
Fisch. Syriens p. 37, 182. –
KINSCHIFFKARPER [CHIN DISC CARP].

Body slightly elongate, compressed, covered by large scales. Jaws bare. Barbels 4, nasal and maxillary barbels. Snout fleshy, split by a transverse groove, protruding anterior to the mouth, skin in front below the upper jaw hanging, lower part crenulate. Upper jaw fleshy. Lower jaw with a disc-shaped fold in the chin, calloused in the middle. Dorsal fin starting anterior to ventral fins and ending far anterior to anal fin, posterior simple ray completely cartilaginous. Pectoral fins inserted nearly horizontally. Pharyngeal teeth masticatory, aggregated 2.4.5/5.4.2.

Remark. I apprehend the genus *Discognathus* somewhat different than Heckel and place in it only the species with a transverse grooved snout, a nipple free snout skin edge and four barbels. Restricted in this way, the genus comprises only four species described by Heckel, i.e. his *Discognathus rufus*, *Discognathus obtusus*, *Discognathus crenulatus* and *Discognathus fusiformis*. – The remaining 10 species, placed by Heckel in *Discognathus*, although for a large part with a question mark, can only partly be arranged in it, though they ¹²¹ are mostly still too little known to determine this with certainty. *Gonorhynchus bimaculatus* McCl. and *Gonorhynchus caudatus* McCl. justly seem to belong to it, although the last mentioned is said not to possess cirri, which however needs to be confirmed. Five other species, indicated in more detail below, belong to a separate genus, which I have named *Discognathichthys* because of its close relationship with *Discognathus*.

The remaining species, arranged by Heckel under his genus *Discognathus*, are *Cyprinus cotyla* Gr., *Gobio quadrimaculatus* Rüpp., *Gobio hirticeps* Rüpp. and *Platy cara nasuta* McCl.

Concerning *Cyprinus cotyla*, this is a *Schismatorhynchus*, which genus with *Discognathus* does have in common the transverse split snout, however in the shape of the mouth and chin parts it highly differs from *Discognathus*.

It is difficult to point out to which genus both *Gobio* species of Mr Rüppell belong. A sucking disc on the chin is not mentioned in their description and the snout is not transversely split. *Gobio hirticeps* because of its nipples might even be placed in *Rohita*, but otherwise its description and figure make no conclusion possible about the organization of the mouth parts. Provisionally I consider both species to belong to the genus *Crossocheilos*, which they also resemble most in habitus.

Finally, *Platy cara nasuta* belongs to a genus of its own, easily recognizable by its lengthwise in two parts divided snout.

CROSSOCHEILOS Van Hass.,
Algemeene Konst- en Letterbode 1823 II p. 132; Blkr, Nieuw.
Tientall. Beschrijv. Vischs. v. Sumatra, Nat. Tijdschr. Ned. Ind. V. (1853) p. 525.
DJEDJET.

Body elongate, slightly fusiform-compressed, covered by large scales. Jaws bare. Barbels 4 or 2, nasal and maxillary barbels, or only nasal barbels. Snout fleshy, protruding far in front of the mouth, not lobed at the sides, skin hanging in front below the upper lip, not crenulate or papillose. Mouth parallel-ogram-shaped, the edges of the jaw truncate anteriorly. Lower jaw posterior to the symphysis provided with a tubercle. Lower lip broad, fleshy, drawn back, not united with upper lip. Two postlabial grooves

on both sides directed towards the margin of the mouth, separated by an intermediate, thin, fleshy frenum, which is united with upper lip, internal grooves separated ¹²² by the very broad isthmus, continuing in incision between lip and the jaw.

Dorsal fin starting anterior to ventral fins and ending far anterior to anal fin, posterior simple ray completely cartilaginous. Pectoral fins inserted nearly horizontally. Pharyngeal teeth masticatory, aggregated 2.4.5/5.4.2, on the chewing surface obliquely truncate.

Subgenus *Crossocheilichthys* Blkr. 4 barbels, on snout and upper lip.

Subgenus *Crossocheilos* Blkr. 2 barbels, only on snout.

Remark. Van Hasselt first proposed this genus, however his description of it was so indefinite, one might apply it to very diverse genera with an inferior parallelogram-shaped mouth opening. However, it can be determined with certainty that he erected the genus for a Javanese species, which he named *Crossocheilus oblongus* and which has become known in more detail under that name and under the name *Labeo oblongus* which was given to it by Mr Valenciennes. Van Hasselt indeed neither had a correct idea of its relationship, as he said it was related to *Leuciscus*.

Mr Valenciennes did not accept the genus of Van Hasselt and incorporated it in the genus *Labeo*. In the way the genus *Labeo* was defined by Mr Valenciennes, it comprises a group of very different species, which surely belong to various natural genera.

Heckel described in 1838 a new species of this genus in his *Fische aus Kashmir*, under the name *Barbus diplochilus*, a name he later changed in *Tylognathus diplocheilus* and *Tylognathus barbatulus*. That species apparently belongs to *Crossocheilos*, and indeed to the species of it with snout barbels and upper jaw barbels, the last mentioned lacking in *Crossocheilos oblongus*.

The generic name *Tylognathus* dates from 1842 and therefore long after that of Van Hasselt was proposed, but it can be retained for the species, which Heckel first named *Varicorhinus diplostomus* and later *Tylognathus Valenciennesii* and belongs to a genus different from *Crossocheilos*.

Since then other *Crossocheilos* species with four barbels have become known. Heckel described one from Syria under the name *Tylognathus nanus* and I myself discovered two more, one from Java and Sumatra, which I described earlier under the name *Lobocheilos cobitia*, and the other one from Sumatra, the description of which is made public here for the first time.

The genus *Crossocheilos* is very closely related to *Epalzeorhynchos*. However, it lacks the cone-shaped snout projections and moreover the under lip lobe (or mental lobe) is not entirely free and not confluent with the upper lip as in *Epalzeorhynchos*. On each side one can observe parallel grooves behind the lower jaw, which are separated from each other by a ¹²³ small fleshy bridle, a bridle which is not connected to the lower lip, but with the upper lip.

I place the species of *Crossocheilos* in two subgenera, which I name *Crossocheilos* and *Crossocheilichthys*. In the first of these subgenera can be placed those species that possess only snout barbels and no upper jaw barbels, whereas in those of the last mentioned subgenus both snout barbels and upper jaw barbels are present. Moreover in my species of *Crossocheilos* the upper lip is covered with a row of small nipples, whereas the upper lip in my species of *Crossocheilichthys* are smooth edged.

Of the subgenus *Crossocheilos* with certainty no other than the Javanese species has become known, however, I consider as belonging to it *Cyprinus latius* Buch. and

Cyprinus gohama Buch. from Bengal, whereas *Gonorrhynchus gobioides* McCl. also might be placed in the same subgenus or a subgenus without barbels of the same genus.

Of the subgenus *Crossocheilichthys* on the contrary, we know now the abovementioned 4 species, whereas *Tylognathus porcellus* Heck. from "India", which species is only known to me by name, and *Gobio quadrimaculatus* Rüpp. and *Gobio hirticeps* Rüpp. possibly also can be placed in it.

The species of my collection can be distinguished according to the following scheme.

A. Rostral barbels only. Upper lip crenulate.

Crossocheilos (Crossocheilos) oblongus V. Hass.

B. Rostral and maxillary barbels. Upper lip not crenulate.

† Eye diameter contained 3 to 3½ times in the length of the head. Scales 33 to 35 in a longitudinal row.

§ Depth of head contained 1½ to 1¾ times in its length. Rostral barbels much shorter than eye diameter. Broad silver head-tail band run through by a thin blue band.

Crossocheilos (Crossocheilichthys) cobitis Blkr.

§ Depth of head contained 1½ times in its length. Rostral barbels a little shorter than the eye. Operculo-caudal band broad, dark.

Crossocheilos (Crossocheilichthys) Langei Blkr.

¹²⁴ *Crossocheilos (Crossocheilos) oblongus* V. Hass.,

Algemeene Konst- en Letterbode 1823 II p. 132; Blkr,

Nieuwe Tientall. diagn. beschr. vischs. v. Sumatra, Nat. T. Ned. Ind. V p. 525.

Langwerpige Djetjet [Oblong Djedjet].

Atl. Cypr. Tab. IV fig. 3.

A *Crossocheilos (Crossocheilos)* with an elongate, compressed body, depth of body contained nearly 7 to 5½ times in its length, width contained 1¼ to 1½ times in its depth; head acute, convex, contained 6 to slightly over 7 times in length of body with caudal fin, 4¾ to about 5½ times in length of body without caudal fin, depth and width contained 1½ to 1¾ times in its length; eyes superior, eye diameter contained 3 to 4 times in the length of the head, eye diameter contained once to 1½ times in the postocular part of the head, distance between the eyes 1½ to 2 times their diameter, palpebral membrane covering a large part of the iris, the opening nearly circular; rostro-dorsal profile convex everywhere, interorbital line convex; nostrils closer to the orbit than to the tip of the snout, posterior nostrils open, can be closed by means of a valve; anterior nostrils slightly tubular; snout fleshy, in younger animals not or hardly longer than the eye, in old animals much longer than the eye, convex, conical, protruding far anterior to the mouth, set with numerous little conspicuous pores, not lobed at the sides, its lower part triangular, flat, nearly horizontal, porous, the premaxillary membrane hiding the upper lip, slightly curved at the free margin, covered with square papillae, densely together, in one row, in older animals very conspicuous; anterior suborbital bone triangular, width greater than depth, tip rounded, pointing forward, basal posterior margin nearly vertical, emarginate or angular, 2nd suborbital bone oblong-quadrangular, length twice to much less than twice as great as depth, more than twice to less than twice as low as the eye diameter; 3rd suborbital bone many times broader than 4th suborbital bone, more than twice to less than twice as thin as the eye diameter; barbels fleshy, inserted towards the tip of the snout below the tip of the anterior suborbital bone, shorter than the eye; gape inferior, parallelogram-shaped when the

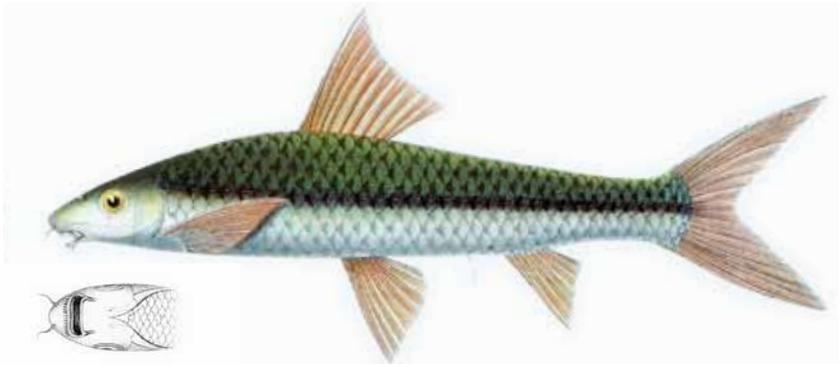


Fig. 19. *Crossocheilus (Crossocheilus) oblongus* V. Hass. Atl. Ichth. Cypr. Tab. IV, Fig. 3. TL figure 152 mm.

mouth is open, forming a transverse fissure, slightly curved forward, very much shorter than the width of the head when the mouth is closed; upper lip thin, hanging anterior to upper jaw, its margin lightly crenulate with conical, slightly acute, short in one row papillae; upper jaw with a slightly curved cartilaginous edge, moderately downward protrusable; lower jaw on the posterior part of the symphysis with a conical, tubercle slightly hooked at the tip, anterior to the symphysis broadly cartilaginous with a truncate or lightly curved edge; lower lip back-folded, entire, not united with upper lip, longitudinal grooves in the lower lip on both sides directed towards the margin of the mouth, separated by a thin, fleshy frenum shorter than the eye diameter, anterior part of frenum merging with upper lip, external groove hardly wider and hardly deeper than internal groove; width of gill cover contained $1\frac{1}{2}$ to $1\frac{1}{3}$ times in its depth, slightly thinner to slightly broader than eye diameter, lower margin nearly straight or slightly convex; gill opening ending below the posterior margin of the preoperculum. Pharyngeal teeth masticatory, aggregated 2.4.5/5.4.2, slightly compressed towards the tip, very obtusely ridged on the masticatory surface, elevated at the margins, more or less lobed at the tip, teeth in anterior row for the front upper half traversed by a wide, longitudinal groove; scapula triangular, acutely rounded; dorsal line of the body convex much higher than slightly convex or nearly straight ventral line; belly flat anterior to ventral fins, behind ventral fins slightly obtusely ridged; scales vertical, slightly larger on anterior part of the flanks than on the rest of the body, free half and generally also the basal half with longitudinal or slightly ray-like stripes, 33 or 34 scales in the lateral line, 12 in a transverse row (including the lowest ventral scales) of which $4\frac{1}{2}$ (5) above the lateral line, 8 or 9 in a longitudinal row between occiput and dorsal fin, lowest ventral scales in three to five longitudinal rows, gradually increasing in size posteriorly, those in the medial row larger than those in flanking rows, lateral line nearly straight, sloping downward only anteriorly, considerably closer to the base of the ventral fins than to the dorsal line, each scale marked by a simple tube reaching or not reaching the centre of the scale. Dorsal fin starting rather far anterior to the ¹²⁵ ventral fins and ending far anterior to anal fin, scaleless at the base, acute, emarginate, slightly to hardly higher than the body and considerably higher than base length, pectoral fins acute or slightly acute, slightly longer than ventral fins, contained slightly over 5 to $6\frac{1}{4}$ times in the length of the body, not reaching the ventral fins, ventral fins acute or slightly acute, not reaching the anal fin; anal fin at the base enclosed in a very low scaled sheath, acute, emarginate, not much lower than but about twice as short as the dorsal fin, about twice as deep as base length, the simple third ray thin, cartilaginous; caudal fin scaled at the base, deeply emarginate, lobes acute, nearly equal, upper lobe generally slightly longer than lower lobe, contained 4 to $4\frac{1}{2}$ times in the length of the body. Colour: upper part of the body olive or bluish-green, lower part silver or pearly; iris yellowish or pink; wide more or less conspicuous violet-dark head-tail band; fins pink-hyaline.

B. 3. D. $4/8$ or $4/9$. P. $1/14$ or $1/15$. V. $2/6$. A. $3/5$ or $3/6$. C. $6/17/6$ or $7/17/7$ short flanking ones included.

Syn. *Labeo oblongus* Val., Poiss. XVI p. 273.

Labéo oblong Val., *ibid.*

Lukas Mal. Bat, *Djedjet* Sundan.

Hab. Java (Batavia, Buitenzorg, Tjampea, Lebak, Tjiandjur, Parongkalong, Surabaya, Ngantang), in rivers.

Sumatra (Palembang, Lahat-Elim, Padang), in rivers.

Length of 19 specimens 62''' to 160'''.

Remark. The Djedjet on Java is not rare in the higher parts of the drainages areas, but is seldom caught in Batavia and then always in juvenile specimens, during high river levels, when the smaller fishes are carried away from their habitats in the higher parts of the rivers.

Crossocheilos (Crossocheilichthys) cobitis Blkr.
Meerslang-achtige Djedjet [Loach-like Djedjet],
 Atl. Cypr. Tab. IV fig. 2.

A *Crossocheilos (Crossocheilichthys)* with an elongate, compressed body, depth of body contained 5 to 6 times in its length, width contained $1\frac{2}{3}$ to $1\frac{1}{2}$ times in its depth; head acute, convex, contained $5\frac{1}{2}$ to about $5\frac{3}{4}$ times in length of body with caudal fin, about $4\frac{1}{4}$ times in length of body without caudal fin, depth contained $1\frac{1}{3}$ to $1\frac{2}{5}$ times in its length, width contained $1\frac{3}{4}$ to $1\frac{2}{5}$ times in its length; eyes superior, eye diameter contained 3 to slightly over 3 times in the length of the head, eye diameter contained about once in the postocular part of the head, distance between the eyes $1\frac{1}{4}$ to $1\frac{1}{3}$ times their diameter, palpebral membrane covering a large part of the iris, the opening nearly circular; rostrum-dorsal profile convex all over, interorbital line convex; nostrils closer to the orbit than to the tip of the snout, posterior nostrils open, can be closed by means of a valve; anterior nostrils with an elevated margin, slightly tubular; snout fleshy, in juveniles not longer than the eye, in older animals slightly longer than the eye, convex, conical, protruding far in front of the mouth, set with numerous little conspicuous pores, not lobed on the sides, its lower part triangular, flat, nearly horizontal, porous, the premaxillary membrane hiding the upper lip, at the free margin slightly curved, covered with conical, short papillae, densely together, in one row, very conspicuous; anterior suborbital bone irregularly triangular, length greater than depth, tip rounded, pointing forward, basal posterior margin nearly vertical, emarginate or angular, 2nd suborbital bone elongate-quadrangular, length more than twice as great as depth, the anterior part much deeper than the posterior part, three to four times as low as the eye diameter; 3rd suborbital bone broader than 4th suborbital bone, many times lower than the eye diameter; nasal barbels longer and thicker than maxillary barbels, 126 much shorter than eye diameter; gape inferior, parallelogram-shaped when the mouth is open, forming a transverse fissure, slightly curved forward, much shorter



Fig. 20. *Crossocheilos (Crossocheilos) cobitis* Blkr. Atl. Ichth. Cypr. Tab. IV, Fig. 2. TL figure 67 mm.

than the width of the head when the mouth is closed; upper lip thin, hanging anterior to upper jaw, entire, not papillose or crenulate; upper jaw with a slightly curved cartilaginous edge, moderately downward protrusible; lower jaw on the posterior part of the symphysis with a conical short tube, anterior to the symphysis broadly cartilaginous with a truncate or lightly curved edge; lower lip broad, back-folded, fleshy, slightly villose, entire, not united with upper lip, on both sides two longitudinal grooves in the lower lip directed towards the margin of the mouth, separated by a thin, fleshy frenum shorter than the eye diameter, anterior part of frenum merging with upper lip, external groove longer than internal groove; width of gill cover contained $1\frac{1}{3}$ to $1\frac{1}{4}$ times in its depth, slightly to hardly narrower than eye diameter, lower margin slightly convex or nearly straight; gill opening ending below gill cover. Pharyngeal teeth masticatory, aggregated 2.4.5/5.4.2, compressed towards the tip, obliquely truncate on the chewing surface, elevated at the margins, not lobed, teeth in anterior row not grooved rostrally; scapula triangular, acutely rounded; dorsal line of the body convex, higher than slightly convex ventral line; belly flat anterior to ventral fins, behind ventral fins nearly flat, not ridged; scales nearly vertical, slightly larger on anterior part of the flanks than on the rest of the body, free half and generally also the basal half with longitudinal stripes, 33 or 34 scales in the lateral line, 12 in a transverse row (without the lowest ventral scales) of which $4\frac{1}{2}$ (5) above the lateral line, 8 or 9 in a longitudinal row between occiput and dorsal fin, lowest ventral scales in three to five longitudinal rows, gradually increasing in size posteriorly, those in the medial row slightly larger than those in flanking rows, lateral line nearly straight, sloping downward only anteriorly, closer to the base of the ventral fins than to the dorsal line, each scale marked by a simple tube generally surpassing the centre of the scale. Dorsal fin starting rather far anterior to ventral fins and ending far anterior to anal fin, scaleless at the base, acute, emarginate, not or slightly higher than the body and considerably higher than base length, pectoral fins acute, slightly longer than acute ventral fins, contained $5\frac{3}{4}$ to slightly over 6 times in the length of the body, not reaching the ventral fins, ventral fins not reaching the anal fin; anal fin at the base enclosed in a very low scaled sheath, acute, emarginate, considerably lower than and about twice as short as the dorsal fin, about twice as deep as base length, the simple third ray thin, completely cartilaginous; caudal fin scaled at the base, with a deep incision, lobes acute, nearly equal, contained about 4 times in the length of the body. Colour: upper part of the body green, lower part pearly; snout and barbels olive or faintly green; iris pink or yellow; wide silver head-tail band, frequently for its total length traversed by a thin, darkish or bluish small band; fins pink or yellowish-hyaline, caudal fin with dark spot on the middle of the base.

B. 3. D. $4/8$ or $4/9$. P. $1/14$ or $1/15$. V. $2/8$. A. $3/5$ or $3/6$. C. $6/17/6$ or $7/17/7$, short flanking ones included.

Syn. *Lobocheilos cobitis* Blkr, Nieuwe Tientall. diagn. beschrijv. nieuwe Vischs. Sumatra, Nat. T. Ned. Ind. V. p. 523.

Lukas Mal. Bat.

Hab. Java (Batavia, Surabaya), in rivers.

Sumatra (Padang), in rivers.

Length of 70 specimens $32'''$ to $67'''$.

Remark. After I had described the species in question correctly as a new species, but incorrectly in the genus *Lobocheilos*, I mentioned it in my *Enumeratio piscium Javanensium* (Nat. T. Ned. Ind. XV p. 427), by I do not know what oversight, as a synonym of *Crossocheilos oblongus*, from which it however differs except for the indicated characters of the barbels and the lip shape, by a less slender body, more convex back, etc.

127 *Crossocheilos (Crossocheilichthys) Langei* Blkr.

Lange's Djedjet.

Atl. Cypr. Tab. IV fig. 1.

A *Crossocheilos (Crossocheilichthys)* with an elongate, compressed body, depth of body contained about 6 times in its length, width contained about $1\frac{1}{2}$ times in its depth; head acute, convex, contained

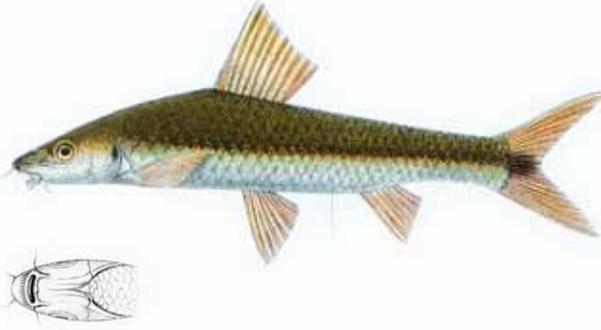


Fig. 21. *Crossocheilos (Crossocheilichthys) Langei* Blkr. Atl. Ichth. Cypr. Tab. IV, Fig. 1. TL figure 75 mm.

$5\frac{3}{5}$ to $5\frac{3}{4}$ times in length of body with caudal fin, about $4\frac{2}{5}$ times in length of body without caudal fin, depth contained about $1\frac{1}{2}$ times in its length, width about $1\frac{1}{3}$ times; eyes superior, eye diameter contained about $3\frac{3}{4}$ times in the length of the head, eye diameter contained slightly over once in the post-ocular part of the head, distance between the eyes about $1\frac{1}{3}$ times their diameter, palpebral membrane covering a large part of the iris, the opening nearly circular; rostro-dorsal profile convex everywhere, interorbital line convex; nostrils closer to the orbit than to the tip of the snout, posterior nostrils open, can be closed by means of a valve; anterior nostrils with an elevated margin, slightly tubular; snout fleshy, slightly longer than the eye, convex, conical, protruding far in front of the mouth, set with numerous little conspicuous pores, not lobed on the sides, its lower part triangular, flat, nearly horizontal, porous, the premaxillary membrane hiding the upper lip, at the free margin slightly curved, covered with short, conical papillae, densely together, in one row, very conspicuous; anterior suborbital bone irregularly triangular, length greater than depth, tip rounded, pointing forward, basal posterior margin nearly vertical, emarginate or angular; 2nd suborbital bone elongate-quadrangular, length twice or more than twice as great as depth, the anterior part much higher than the posterior part, about three times as low as the eye diameter; 3rd suborbital bone broader than 4th suborbital bone, about four times as low as the eye diameter; nasal barbels longer and thicker than maxillary barbels, slightly shorter than eye diameter; gape inferior, parallelogram-shaped when the mouth is open, forming a transverse fissure, slightly curved forward, very much shorter than the width of the head when the mouth is closed; upper lip thin, hanging anterior to upper jaw, margin entire, not papillose or crenulate; upper jaw with a slightly curved cartilaginous edge, lower jaw on the posterior part of the symphysis with a conical, short tube, anterior to the symphysis broadly cartilaginous with a truncate or lightly curved edge; lower lip broad, back-folded, fleshy, slightly villose, entire, not united with upper lip, on both sides two longitudinal grooves in the lower lip directed towards the margin of the mouth, separated by a thin, fleshy frenum much shorter than the eye diameter, anterior part of frenum merging with upper lip, external groove longer than internal groove; width of gill cover contained about $1\frac{1}{2}$ times in its depth, hardly narrower than eye diameter, the lower margin slightly convex or nearly straight; gill opening ending below gill cover. Pharyngeal teeth masticatory, aggregated 2.4.5/5.4.2, compressed towards the tip, obliquely truncate on the chewing surface, elevated at the margins, not lobed, teeth in anterior row not grooved rostrally; scapula triangular, acutely rounded; dorsal line of the body convex, much higher than slightly convex ventral line; belly flat anterior to ventral fins, behind ventral fins nearly flat, not ridged; scales nearly vertical, scales on the anterior part of the flanks slightly larger than on the rest of the body, free half and basal half with longitudinal stripes, 34 or 35 scales in the lateral line, 12 in a transverse row (including the lowest ventral scales) of which $4\frac{1}{2}$ (5) above the lateral line, 10 or 9 in a longitudinal row between occiput and dorsal fin, lowest ventral scales in three to five longitudinal rows, gradually increasing in size posteriorly, those in the medial row slightly larger than those in the flanking rows, lateral line nearly straight, sloping downward only anteriorly, closer to the base of the ventral fins

than to the dorsal line, each scale marked by a simple tube reaching or nearly reaching the centre of the scale. Dorsal fin starting rather far anterior to the ventral fins and ending far anterior to the anal fin, scaleless at the base, acute, emarginate, slightly higher than the body and rather much higher than base length, pectoral and ventral fins acute, nearly equally long, contained about $6\frac{3}{4}$ times in the length of the body, pectoral fins not reaching ventral fins, ventral fins not reaching anal fin; anal fin at the base enclosed in a very low scaled sheath, acute, emarginate, rather much lower than and nearly twice as short as the dorsal fin, about twice as high as base length, the simple ¹²⁸ third ray thin, completely cartilaginous; caudal fin scaled at the base, with a deep incision, lobes acute, upper lobe hardly longer than lower lobe, contained about $4\frac{1}{2}$ times in the length of the body. Colour: upper part of the body olive, lower part silver or pearly; upper part of the snout and nasal barbels olive-violetish; iris yellow or pink, upper part dark; a wide more or less diffuse, dark head-tail band, starting on the gill cover and changing into a large black spot on the base of the caudal fin; a blackish-dark round spot between the vent and the anal fin; fins pink-hyaline.

B. 3. D. 4/8 or 4/9. P. 1/14 or 1/15. V. 2/8. V. 3/5 or 3/6. C. 7/17/7, short flanking ones included.

Hab. Sumatra (Palembang), in rivers.

Length of sole specimen 81''.

Remark. I dedicate this species to my colleague Mr E.A. Lange, acting Health officer and Hospital inspector, to whom I owe its forwarding.

It differs from *Crossocheilichthys cobitis* primarily by a more slender head and body, by its violet snout and snout barbels, the last mentioned of which are also remarkably more developed, and moreover by the broad black head-tail band, which starts already on the gill cover and ends in a large black blotch on the proximal half of the caudal fin.

DISCOGNATHICHTHYS BLK.

SUCKING CHIN CARP.

Body slightly elongate, compressed, covered with large scales. Jaws bare. Barbels 4 or 2, nasal and maxillary barbels, or maxillary barbels only or none at all. Snout fleshy, entire, without transverse groove, protruding in front of the eye. Descending skin rostrally of upper jaw, lower part not crenulate or papillose. Upper jaw fleshy, lower jaw with a disc-shaped fold of the chin, callous in the middle. Dorsal fin starting anterior to ventral fins and ending far anterior to anal fin, posterior undivided ray completely cartilaginous. Pectoral fins inserted nearly horizontally. Pharyngeal teeth masticatory, aggregated 2.4.5/5.4.2.

Remark. The type of this genus is *Discognathus variabilis* Heck. from Syria, which species differs from the other well known *Discognathus* generically by its not transverse grooved snout and not nipped free snout skin edge. There seem to be species with 2 barbels and without barbels, however, except for the one species described by Heckel, the others are only very superficially known. *Gonorhynchus brachypterus* McCl. and *Gonorhynchus lamta* McCl. can be placed in it with certainty, whereas also *Gonorhynchus rupeculus* McCl. and *Gonorhynchus petrophilus* McCl. seem to belong to the same genus.

¹²⁹ PLATYCARA McCl.,

Ind. Cyprinid. In *Asiat. Research.* XIX p. 299, 427 –

FLAT FIN CARP.

Body elongate, slightly fusiform, covered with large scales. Jaws bare. No barbels? Snout fleshy, split by a deep, wide groove, protruding in front of the mouth, skin hanging rostrally below the upper jaw. Lower jaw with a disc-shaped fold of the chin. Dorsal fin starting anterior to ventral fins and ending far anterior to anal fin, posterior simple ray completely cartilaginous. Pectoral fins inserted horizontally. Pharyngeal teeth?

Remark. Mr MacClelland proposed the generic name *Platycara* to replace that of *Balitora* Gr., which name was already superfluous as Van Hasselt already in 1822 adopted that of *Homaloptera* for the same genus. As however Mr MacClelland among his species of *Platycara* describe and figured one species which very certainly does not belong to *Homaloptera* and can be placed in separate genus related to *Discognathus*, I propose to retain the name *Platycara* for this genus. This genus, of course defined entirely different than it was done by MacClelland, has the disc shaped chin sucking disc in common with the genera *Discognathus* and *Discognathichthys*, but distinguishes itself from them by a transverse split snout and probably by more other peculiarities in the arrangement of the mouth parts, which however are not described in more detail and only very indistinctly figured by Mr McClelland. *Platycara nasuta* McCl. till now is the only species that can be placed in this genus.

SCHISMATORHYNCHOS Blkr,

Nalez. Vischfaun. Sumatra, Nat. Tijdschr. Ned. Ind. X p. 269.

DOUBLE SNOUT CARP.

Body oblong or slightly elongate, compressed, covered with large scales. Jaws bare. Barbels 4, upper jaw and nasal barbels. Snout fleshy, upper part split by a transverse incision, protruding in front of the mouth, truncate below the tip, not lobed on the sides, skin hanging rostrally below the upper lip. Upper lip hanging anterior to upper jaw, entire, not papillose or cirrate. Upper jaw with a cartilaginous edge, reminding of a horse shoe, lower jaw tumid, ¹³⁰ cartilaginous-fleshy, anterior margin truncate, posterior part deeply emarginate, from here the posterior part of the jaw two-horned in the oral cavity. Lower lip broad, fleshy, back-folded, entire, not united with upper lip. Two wide postlabial grooves on both sides, directed longitudinally towards the margin of the mouth, intermediate fleshy frenum thin, anteriorly united with upper lip by means of a thin lateral accessory frenum, inner grooves separated by a very broad isthmus ending in the incision between lip and jaw. Dorsal fin starting anterior to ventral fins and ending far anterior to anal fin, posterior simple ray cartilaginous. Pectoral fins inserted horizontally. Pharyngeal teeth masticatory, aggregated 2.4.5/5.4.2, obliquely truncate on the chewing surface, not tuberculate.

Remark. *Schismatorhynchus* is a very natural and very sharply characterized genus, which I proposed first in 1855 based on a species from Sumatra, which I already described in 1853 under the name *Lobocheilos heterorhynchus*. It has in common with *Discognathus* and *Tylognathus* (viz. like I interpret both Heckelian genera) the transversely divided snout, but is easily distinguishable by the totally different shape of the mouth parts.

I only know the mentioned species from nature. However it seems to me that South Asia feeds several other species and that *Cyprinus gotyla* Gray, *Cyprinus* (Bangala) *falcate* Gr. and *Gobio ricnorhynchus* McCl. represent three other species of this genus. However, the mouth parts of these species are so insufficiently described and depicted that a study from nature is absolutely necessary to attain certainty in this matter. Anyway, the species from Sumatra can easily be distinguished from the south Asian ones as follows.

- I Scales 33 or 34 in a longitudinal row, 5½ (6) above lateral line. D. 4/8 or 4/9. Dark head-tail band.

131 *Schismatorhynchos heterorhynchos* Blkr,
 Nalez. Vischfauna v. Sumatra, Nat. Tijdschr. Ned. Ind. IX p. 269.
Sumatraanse Dubbelsnoutkarper [*Sumatran Double snout carp*].
 Atl. Cypr. Tab. IV fig. 4.

A *Schismatorhynchos* with a slightly elongate, compressed body, depth of body contained $5\frac{1}{2}$ to $4\frac{2}{3}$ times in its length, width contained nearly twice to slightly over twice in its depth. Head convex anteriorly, obliquely truncate posteriorly, contained $5\frac{3}{4}$ to $6\frac{1}{2}$ times in length of body with caudal fin, $4\frac{1}{3}$ to nearly 5 times in length of body without caudal fin, depth contained $1\frac{1}{4}$ to $1\frac{1}{2}$ times in its length, width $1\frac{3}{5}$ to $1\frac{3}{4}$ times; eyes superior, eye diameter contained $3\frac{1}{2}$ to $5\frac{1}{2}$ times in length of head, eye diameter contained $1\frac{1}{3}$ to $1\frac{2}{3}$ times in the postocular part of the head, distance between the eyes $1\frac{1}{3}$ to $2\frac{1}{2}$ times their diameter, palpebral membrane covering a large part of the iris, the opening nearly circular; rostror-dorsal profile slightly convex at forehead and crown, very convex at the nape and on the back, interorbital line convex; nostrils much closer to the orbit than to the tip of the snout, posterior nostrils open, can be closed by means of a valve; anterior nostrils slightly tubular; snout very fleshy, much longer to twice as long as eye diameter, nearly rectangular curved, the supra-angular half with numerous, large very conspicuous pores, and a transverse incision making a large deep fossa, porous everywhere, bipartite, upper part again divided in four by 3 superficial, longitudinal incisions, the infra-angular half without visible pores, descending backward, at the frontal part making a flat triangle, tip pointing upward, lower margin slightly crescent-shaped, slightly membraneous, entire, not papillose or cirrate, hanging anterior to upper lip, not lobed at the sides; anterior suborbital bone triangular, length greater than depth, rounded at the tip, pointing forward, basal posterior margin nearly vertical, emarginate, 2nd suborbital bone hexagonal, depth about equal to length, slightly to not lower than eye diameter; 3rd suborbital bone many times broader than 4th suborbital bone, not or hardly lower than eye diameter; barbels fleshy, maxillary barbels more than twice as long as nasal barbels, much longer than the eye; mouth inferior, hidden in the external infralabial groove when the mouth is closed, nasal barbels inserted anteriorly in the groove between the 1st suborbital bone and the rostral flap; gape slightly anterior, in width nearly equal to the width of the mouth, slightly crescent-shaped, but internal entrance to oral cavity narrow and slightly heart-shaped (when the mouth is open); upper lip thin, entire, hardly hanging anterior to upper jaw; upper jaw with a cartilaginous edge, slightly crescent-shaped, strongly downward protrusible; lower jaw on the posterior part of the symphysis deeply emarginate, two-horned, tips of the horns slightly acute, anterior to the symphysis broadly cartilaginous with a cartilaginous-fleshy truncate edge; lower lip back-folded, entire, not united with upper lip, on both sides two longitudinal grooves directed towards the margin of the mouth, separated by a thin, fleshy frenum longer than the eye diameter, anterior part of frenum merging with upper lip by means of the accessory lip, external groove much wider and deeper than internal groove; depth of gill cover about twice as great as width, not or hardly narrower than eye diameter, lower margin slightly convex or slightly concave; gill opening ending below the posterior margin of the preoperculum. Pharyngeal teeth masticatory, aggregated 2.4.5/5.4.2, slightly compressed towards the tip, strongly obliquely truncate on the chewing surface, slightly elevated at the margins, not lobed, teeth in anterior row not grooved rostrally; scapula triangular, slightly acutely rounded; dorsal line of the body convex, much higher than slightly convex ventral line; belly flat anterior to ventral fins, behind ventral fins strongly obtusely ridged; scales nearly vertical, on the flanks not or hardly larger than on the rest of the body (except for the belly), free half and basal half with longitudinal stripes, 33 or 34 scales in the lateral line, 14 in a transverse row (including the lowest ventral scales) of which $5\frac{1}{2}$ (6) above the lateral line, 11 or 12 in a longitudinal row between occiput and dorsal fin, lowest ventral scales in five longitudinal rows, gradually increasing in size posteriorly, those in the medial row not larger than those in flanking rows; lateral line nearly straight, sloping downward only anteriorly, not much closer to the base of the ventral fins than to the dorsal line, each scale 132 marked by a simple tube not reaching or hardly reaching the centre of the scale; dorsal fin starting rather far anterior to ventral fins and ending far anterior to anal fin, at the posterior part of the base enclosed in a very low scaled sheath, acute, strongly emarginate, higher than the body and much higher than base length; pectoral and ventral fins acute, pectoral fins not or only slight-

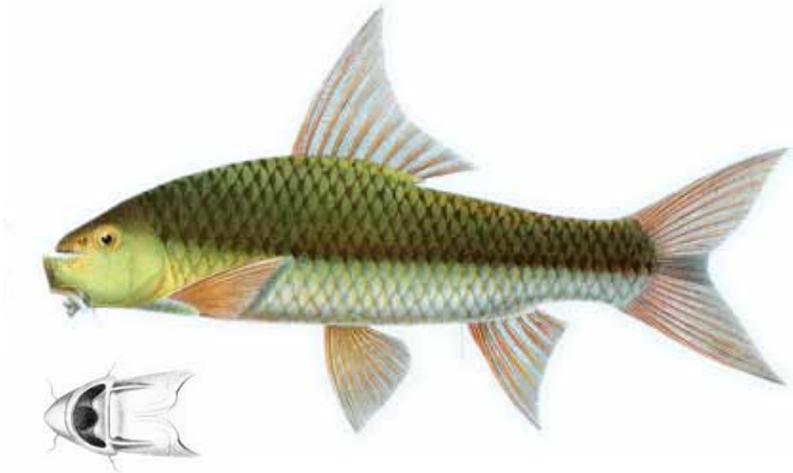


Fig. 22. *Schismatorhynchos heterorhynchos* Blkr. Atl. Ichth. Cypr. Tab IV, Fig. 4. TL figure 189 mm.

ly longer than ventral fins, contained $5\frac{2}{3}$ to slightly over 6 times in the length of the body, not reaching the ventral fins, ventral fins not or hardly reaching the anal fin; anal fin at the base enclosed in a very low scaled sheath, acute, moderately emarginate, much lower than dorsal fin and about twice as short as dorsal fin, more than twice as high as base length, the simple third ray thin, cartilaginous; caudal fin scaled at the base, with a deep incision, lobes acute, the upper lobe longer or not longer than lower lobe, contained about $3\frac{3}{4}$ to about $4\frac{1}{4}$ times in the length of the body. Colour: upper part of the body violetish-olive or deeply olive, lower part more faintly coloured or pearly; iris pink, margin of pupil golden; wide diffuse blackish-violet head-tail band; fins with pink or red rays, membrane pink-hyaline or violetish-hyaline.

B. 3. D. $4/8$ or $4/9$. P. $1/16$. V. $2/8$. A. $3/5$ or $3/6$. C. $6/17/6$ or $7/17/7$, short flanking ones included.

Syn. *Lobocheilos heterorhynchos* Blkr, Nieuwe Tientall. diagn. beschr. nieuwe vischs. Sumatra.

Nat. Tijdschr. Ned. Ind. V. p. 524.

Schismatorhynchos lobocheiloides Blkr, Ind. descr. pisc. Nat. T. Ned. Ind. XIV p. 476.

Hab. Sumatra (Solok, Lahat), in rivers.

Length of 7 specimens $87''$ to $232''$.

Remark. *Cyprinus (Bangala) falcata* Gr. depicted in the Illustrations of Indian Zoology, seems to differ from the species in question by numerous scales both in a longitudinal row as in a transverse row, by two rays more in the dorsal fin, absence of the longitudinal body band, etc.

Judging from the illustration of *Cyprinus gotyla* Gr. from the Illustrations of Indian Zoology this species also seems to differ from *Schismatorhynchos heterorhynchos* by remarkably less scales on a transverse row (only $3\frac{1}{2}$ to 4 above the lateral line), little or no concave fin edges, bluntly rounded pectoral fins, a low, 9- or 10-rayed ($4/9$ or $4/10$) dorsal fin, the absence of a longitudinal body band, etc.

Finally *Gobio ricnorhynchus* McCl., the third South-Asian species of *Schismatorhynchos*, in habitat is much like the species from Sumatra, however according to Mr MacClelland it has 43 scales in a longitudinal row, 11 branched dorsal fin rays and misses the longitudinal body band, etc.

Till now I have received the species in question only from Sumatra.

LABEO Cuv.

Règn. Anim. 1817. I p. 194; Blkr, Descr. pisc. Javan. nov.
in Nat. Tijdschr. Ned. Ind. XIII p. 360 (revised description).

LIP CARP, ARENGAN.

Body oblong, compressed, covered with large scales. Jaws bare. Barbels 4 or 2, nasal and maxillary barbels or ¹³³ maxillary barbels only. Snout fleshy, protruding in front of the mouth, skin hanging anteriorly below the upper jaw and lobed on both sides of the snout. Anterior suborbital bone, placed far anterior to the orbit. Upper lip hanging anterior to upper jaw, entire, not papillose or cirrate, confluent with the free margin of the lower lip. Upper jaw with a cartilaginous edge, reminding of a horse shoe, lower jaw tumid, cartilaginous-fleshy, anterior margin truncate, on the posterior part of the symphysis strongly emarginate, no tubercle. Lower lip broad, fleshy, back-folded, entire or more or less crenulate. Postlabial groove on both sides simple, forming a large, deep fossa, oblique, directed versus the margin of the mouth, not reaching the free margin of the lip, separated from the groove on the opposite side by the rather broad isthmus. Dorsal fin starting anterior to ventral fins and ending far anterior to anal fin with the posterior simple ray completely cartilaginous. Pectoral fins inserted nearly horizontally. Pharyngeal teeth masticatory, aggregated 2.4.5/5.4.2, the chewing surface obliquely truncate.

Subg. *Diplocheilos* Blkr. Barbels 4, nasal and maxillary barbels.

" *Labeo* Cuv. Barbels 2, maxillary barbels only.

Remark. The genus *Labeo*, as it was proposed by Cuvier and based on *C. niloticus* Géoffr. and *C. fimbriatus* Bl., since its erection has been dissolved in numerous genera so that it now must be restricted to those species that according to the present state of knowledge answer to *Labeo niloticus*. I include in it all *Labeonines* with a thick cartilaginous-fleshy lower jaw, a smooth snout edge, which on both sides turns into a fleshy lobe, a oblique-longitudinal posterior lip groove, which is separated from the one on the opposite side by a more or less broad skin of the chin, an upper lip connected with the lower lip, which passes imperceptible (without an intermediate groove) into the skin of the chin.

Defined in this way, the genus *Labeo* still contains rather numerous species, which all belong to North Africa, South Asia and the Sunda Islands, but several species placed in *Labeo* by Heckel and Mr Valenciennes fall outside its borders. Both excellent ichthyologists concerning this have attached too much value to the number of barbels and unconditionally excluded the related species with four barbels, whereas species belonging to other genera, with two barbels irrespective whether they are implanted on the snout or the upper jaw have been included by them in the genus *Labeo*.

¹³⁴ Thus in my opinion *Labeo cephalus* Val. and *Labeo Dussumieri* Val., are species of *Rohita*, in which only upper jaw barbels are present, just like *Labeo Reynauldi* Val., *Labeo microlepidotus* Val. and *Labeo fimbriatus* Val. – Moreover *Labeo oblongus* Val., as was already shown above, is a *Crossocheilos* with only two snout barbels, whereas *Labeo erythropterus* Val. is a real *Labeo*, but also very certainly has 4 barbels and not just 2 upper jaw barbels, as was indicated by Valenciennes. Moreover, in my opinion, *Labeo senegalensis* Val. should be placed in *Tylognathus*, and *Labeo malacostomus* Val. should be placed in a proper genus related to *Rohita*, for which I have proposed to name *Rohitichthys*, just like *Labeo falcifer* and probably also *Labeo hispidus* belong to *Lobocheilos*, – *Labeo diplostomus* Val. to *Tylognathus*, and *Labeo malacostomus* Val. to *Schismatorhynchus*, whereas *Labeo cursa* Val. and *Labeo curchius* Val. seem to belong as well rather to *Rohita* than that they could be placed in *Labeo*.

Heckel has added, although with a question mark, some species to the genus *Labeo*, i.e. *Cyprinus rostratus* Tiles. and *Cyprinus rufescens* Hasselq., the descriptions of which cannot be consulted here in this country so I cannot judge them, and moreover still *Gobio ricnorhynchus* McCl., which species however belongs to my genus *Schismatorhynchus*. *Chondrostoma dembensis* Val. (nec Rüpp.) according to Heckel would be a *Labeo* as well, and not differ from his *Labeo vulgaris*.

Therefore of the 21 species of *Labeo* summed up by Heckel and Mr Valenciennes, only 9 can be placed in that genus as I have defined it.

On the contrary I know several species of this genus, which not only possess upper jaw barbels but also snout barbels. However, these barbels usually are so little developed, that they easily escape attention, which makes me suppose that a further, more detailed observation will also reveal barbels in those species to which till now they have not been credited. I am of the opinion I can propose this, the more so, because none of the species of the genera related to *Labeo*, of which Heckel or Mr Valenciennes mention they possess absolutely no cirri, were examined from nature by these excellent ichthyologists.

Just like has been done in other genera of Cyprinoids, I split the species of *Labeo* in two groups or subgenera according as they possess only upper jaw barbels or both snout barbels and upper jaw barbels. The last I place in the subgenus *Diplocheilos*, the first in the subgenus *Labeo*.

The name *Diplocheilos* I have adopted from Van Hasselt who wanted to use it as a generic name for the species, which since then has become known in science under the name *Labeo erythropterus* and which indeed is a *Labeo* with 4 barbels.

135 All species of my collection belong to the subgenus *Diplocheilos*. One of these species is the same one as I described in my *Nalezingen op de ichthyologie van Bengalen* under the name given to her by Mr McClelland, *Gobio boga*. However, a more detailed investigation has taught me that it is a real *Labeo*. My three remaining species were all caught in the rivers of West Java. I described two of them earlier under the names *Lobocheilos lucas* and *Lobocheilos rohitoides*, whereas the third species is the same as that, which Van Hasselt already stamped with the name *Diplocheilos erythropterus*.

The three archipelagic species can be differentiated from each other and the other known species by the following scheme.

I Nasal and upper jaw barbels (Subgen. *Diplocheilos*)

A. $7\frac{1}{2}$ scales above lateral line, 42 or 43 in a longitudinal row.

- † Barbels twice or more than twice as short as the eye, nearly equal. Width of gill cover contained $2\frac{2}{5}$ to $2\frac{3}{4}$ times in its depth.

Labeo (Diplocheilos) erythropterus Val.

- †† Barbels not much shorter than the eye, anterior barbels longer. Width of gill cover contained $1\frac{3}{4}$ to nearly 2 times in its depth.

Labeo (Diplocheilos) lucas Blkr.

B. $5\frac{1}{2}$ scales above lateral line, about 35 in longitudinal row.

- † Nasal barbels not or hardly shorter than the eye. Width of gill cover contained twice in its depth.

Labeo (Diplocheilos) rohitoides Blkr.

Labeo (Diplocheilos) erythropterus Blkr,
Roodvinnige Arengan [Redfinned Arengan].
 Atl. Cypr. Tab. V.

A *Labeo (Diplocheilos)* with an oblong or slightly elongate, compressed body, depth of body contained nearly 5 to slightly over 4 times in its length, width contained $1\frac{2}{3}$ to 2 times in its depth. Head slightly acute, contained $5\frac{2}{3}$ to 6 times in length of body with caudal fin, slightly over 4 to $4\frac{1}{2}$ times in length of body without caudal fin, depth contained $1\frac{1}{4}$ to $1\frac{1}{3}$ times in its length, width $1\frac{1}{3}$ to $1\frac{1}{2}$ times; eyes superior, eye diameter contained $3\frac{1}{2}$ to 4 times in the length of the head, eye diameter contained once to slightly over once in the postocular part of the head, distance between the eyes $1\frac{3}{5}$ to $2\frac{1}{5}$ times their diameter, palpebral membrane covering the external part of the iris, the opening nearly circular; rostradorsal profile sloping on forehead and crown, slightly convex or nearly straight, very convex on nape and back, interorbital line convex; nostrils much closer to the orbit than to the tip of the snout, posterior nostrils open, can be closed by means of a valve; anterior nostrils with an elevated margin, slightly tubular; snout very fleshy, in younger and old animals much longer than twice as long as eye diameter, truncate anteriorly, ventrally ending in a membranous shield hanging anterior to the mouth, at the front, sides and upper part to a point behind the nostrils covered with numerous, very conspicuous pores, membrane on both sides prolonged into an oblong lobe, entire at the lower margin; anterior suborbital bone placed anterior to the nostrils far anterior to the eye, length greater than depth, lower 136 margin maximally convex, semicircular, upper margins concave, united in a slightly acute, upward pointing corner, 2nd suborbital bone elongate, quadrangular, length twice or more than twice its depth, the anterior part deeper than the posterior part, more than twice, but less than three times as low as the eye diameter; 3rd suborbital bone broader than 4th suborbital bone, more than four times to three times as low as the eye diameter; barbels very thin, little conspicuous, twice or less than twice as short as the eye, maxillary barbels not or hardly longer than nasal barbels, nasal barbels placed anteriorly in the groove between the 1st suborbital bone and the rostral; gape inferior, width nearly equal to width of head, reminding of a horse shoe, when the mouth is closed, but entrance of oral cavity internally narrow and (when mouth is open) oblong-rounded or slightly heart-shaped; upper lip thin, entire, hanging anterior to upper jaw; upper jaw with a cartilaginous edge, slightly reminding of a horse shoe, strongly downward protrusible; lower jaw on the posterior part of the symphysis broadly emarginate, anterior to symphysis broadly cartilaginous-fleshy, flat, with a truncate edge, lower lip back-folded, fleshy, free margin confluent with upper lip, covered with very short papillae in one row, upper surface transversely rugose in a wavy pattern, lower surface smooth; infralabial groove on both sides forming a large, angular, deep fossa, obliquely directed towards the middle line of the chin, but separated from the groove on the opposite site by the isthmus which is considerably thinner than the eye diameter. Width of gill cover contained about $2\frac{3}{5}$ to $2\frac{3}{4}$ times in its depth, considerably to slightly thinner than the eye diameter, the lower margin convex; gill opening ending below the posterior part of the preoperculum. Pharyngeal teeth masticatory, aggregated 2.4.5/5.4.2, slightly compressed towards the top, each with an obliquely truncate chewing surface, slightly elevated in a regular way at the margins, not lobed, anterior teeth not grooved rostrally; scapula triangular, acutely or slightly acutely rounded; dorsal line of the body convex much higher than the slightly convex ventral line; belly flat anterior to ventral fins, behind ventral fins very obtusely ridged; scales nearly vertical, larger on anterior part of the flanks than on the rest of the body, suprascapular scales, however, the largest of all, free half and generally also basal half with longitudinal stripes, slightly ray-like, 42 or 43 scales in the lateral line, 18 in a transverse row (including the lowest ventral scales) of which $7\frac{1}{2}$ (8) above the lateral line, about 16 in a longitudinal row between occiput and dorsal fin, lowest ventral scales in 5 to 7 longitudinal rows, gradually increasing in size posteriorly, those in the medial row not larger than those in flanking rows; lateral line nearly straight, sloping downward only anteriorly, considerably closer to the base of the ventral fins than to the dorsal line, each scale marked by a simple tube which does not reach the centre of the scale. Dorsal fin starting rather far anterior to the ventral fins and ending far anterior to the anal fin, scaleless at the base, acute, emarginate, depth considerably greater than length, depth contained slightly over once to $1\frac{1}{4}$ times in the depth of the body; pectoral and ventral fins acute, nearly equally long, contained $5\frac{3}{4}$ to $5\frac{1}{2}$

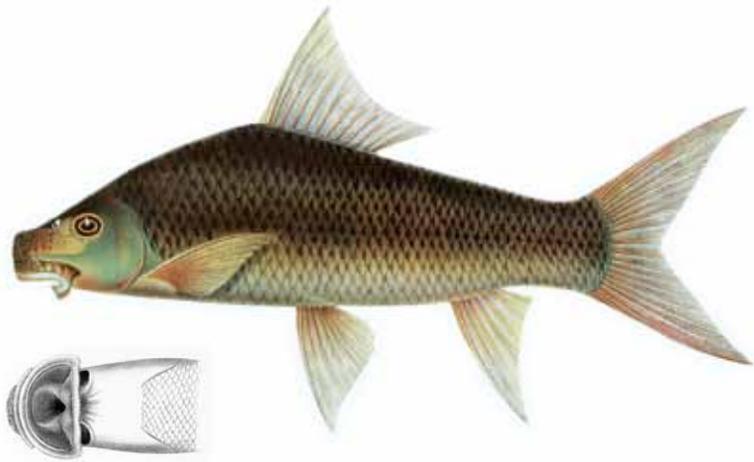


Fig. 23. *Labeo (Diplocheilos) erythropterus* Blkr. Atl. Ichth. Cypr. Tab. V. TL figure 263 mm.

times in the length of the body, pectoral fins not or hardly reaching the ventral fins, ventral fins not reaching the anal fin; anal fin at the base enclosed in a very low scaled sheath, acute, moderately to hardly emarginate, a little lower to a little higher than the dorsal fin, but about twice as short, more than twice to three times as high as base length, the simple third ray thin, cartilaginous; caudal fin scaled at the base, with a deep incision, lobes acute, upper lobe longer than lower lobe, its length contained $3\frac{3}{4}$ to $3\frac{5}{6}$ times in the length of the body. Colour: upper part and flanks of the body violetish-olive, lower part yellowish-olive or pearly; iris yellow, margin of pupil golden, upper part dark; scales on back and flanks, especially in younger fish, each with an oblong or round golden spot; fins with orange- pink rays, membrane bluish-hyaline, more or less with violet-blackish speckles.

B. 3. D. 4/11 or 4/12. P. 1/15. V. 4/8. A. 3/5 or 3/6. C. 7/17/7 or 6/17/6, the short flanking ones included.

Syn. *Diplocheilos erythropterus* V. Hass., Algem. Konst- en letterbode 1823 II p. 133.

Labeo erythropterus Val., Poiss. XVI p. 271; Heck., Fisch. Syr. P. 34, 180; Blkr, Descr. pisc.

Javan. nov. Nat. T. Ned. Ind. XIII p. 360.

Labéon à nageoires rouges Val. Poiss. XVI p. 271.

Arengan Sund.

137 Hab. Java (Lebak, Parongkalong), in rivers.

Length of 2 specimens 150''' and 275'''.

Remark. Although already discovered by Van Hasselt in 1822, the Arengan has only become known in more detail to science in 1842 by Mr Valenciennes, after a stuffed specimen of two feet in the Leiden Museum and a drawing that was prepared under the eyes of Kuhl and Van Hasselt. The description answers rather well to both my two small specimens. However, the snout barbels were not noticed by Mr Valenciennes, whereas also in the fin formula, the shorter and branched rays have not been accounted for. The gold coloured scale marks only are found in juvenile specimens and gradually disappear with age.

Till now I know this species only from West-Java. I received the smallest specimen from Lebak, in the Bantam residency, and it was described in the 13th Volume of the

Natuurkundig Tijdschrift van Nederlands Indië. Since then my collection has been enriched with an excellent preserved specimen with a length of 275 mm, which I obtained in Parangkalong, during a fishing party on the Tjitaroem river. I observed at that occasion several larger specimens of the same species, which however I was unable to keep. The species seems to inhabit only the higher parts of the larger rivers of West-Java.

Labeo (Diplocheilos) lucas Blkr.

Kleinbekkige Arengan [Small-mouthed Arengan].

Atl. Cypr. Tab. VIII fig. 4.

A *Labeo (Diplocheilos)* with a slightly elongate, compressed body, depth of body contained $4\frac{1}{2}$ to 5 times in its length, width contained 2 to $1\frac{1}{4}$ times in its depth. Head slightly acute, contained $4\frac{3}{4}$ to 5 times in length of body with caudal fin, $3\frac{3}{4}$ to 4 times in length of body without caudal fin, depth contained $1\frac{1}{4}$ to $1\frac{1}{3}$ times in its length, width $1\frac{3}{4}$ to $1\frac{1}{2}$ times; eyes superior, eye diameter contained 3 to $3\frac{1}{2}$ times in the length of the head, eye diameter contained once to slightly over once in the postocular part of the head, distance between the eyes $1\frac{1}{3}$ to $1\frac{2}{3}$ times their diameter, palpebral membrane covering external part of the iris, the opening nearly circular; rostro-dorsal profile sloping on forehead and crown, nearly straight or slightly convex, very convex on nape and back, interorbital line convex; nostrils much closer to the orbit than to the tip of the snout, posterior nostrils open, can be closed by means of a valve; anterior nostrils with an elevated margin, slightly tubular; snout very fleshy, in younger animals not longer than eye diameter, in older animals not much longer than eye diameter, convex, rounded nor truncate anteriorly, at the underside ending in a membranous fold hanging anterior to the mouth, at the front, on top and on the sides covered with numerous, conspicuous pores, this flap on both sides prolonged into an oblong, rounded lobe, lower margin entire; anterior suborbital bone completely or nearly completely anterior to nostrils, placed rather far anterior to the eye, length greater than depth, lower margin maximally convex, semicircular, upper margins concave, united in a slightly acute, upward pointing corner; 2nd suborbital bone elongate-quadrangular, length three times or more than three times as great as depth, the anterior part deeper than the posterior part, three times to more than three times as low as the eye diameter; 3rd suborbital bone slightly broader than 4th suborbital bone, many times lower than the eye diameter; barbels thin, maxillary barbels longer than nasal barbels, not much shorter than eye diameter, placed anteriorly in the groove between the 1st suborbital bone and the rostral membrane; 138 gape inferior, width very much shorter than width of head, closed mouth reminding of a horse shoe. Entrance to oral cavity narrow internally and oblong and rounded or slightly heart-shaped (when the mouth is open); upper lip fleshy, entire, hanging anterior to upper jaw; upper jaw with a cartilaginous edge, slightly reminding of a horse shoe, strongly downward protrusible; lower jaw on the posterior part of the symphysis broadly emarginated, anterior to symphysis broadly cartilaginous-fleshy, flat, with a truncate edge; lower lip back-folded, fleshy, free margin confluent with upper lip, covered with very short papillae, upper surface transversely rugose in a wavy pattern, lower surface smooth; infralabial groove on both sides forming a large, angular, deep fossa, obliquely directed versus the middle line of the chin, but separated from the groove on the opposite site by an isthmus which is twice as thin as the eye diameter; width of gill cover contained about $1\frac{3}{4}$ to nearly 2 times in its depth, slightly narrower than eye diameter, lower margin nearly straight or slightly convex; gill opening ending below the gill cover. Pharyngeal teeth masticatory, aggregated 2.4.5/5.4.2, compressed towards the tip, masticatory surface obliquely truncate, margin slightly elevated, hardly or not lobed, anterior teeth not grooved rostrally; scapula triangular, slightly acutely rounded; dorsal line of the body convex much higher than convex ventral line; belly flat anterior to ventral fins, behind ventral fins very obtusely ridged; scales nearly vertical, larger on anterior part of the flanks than on the rest of the body, suprascapular scales not larger than surrounding scales; free half and generally also basal half with longitudinal, but little conspicuous stripes, 41 or 42 scales in the lateral line, 18 in a vertical row (including the lowest ventral scales) of which $7\frac{1}{2}$ (8) above the lateral line, about 16 in a longitudinal row between occiput and dorsal fin, lowest ventral scales in 5 to 7 longitudinal rows, gradually increasing in size posteriorly, those in the medial row not larger than those in flanking rows; lateral line nearly



Fig. 24. *Labeo (Diplocheilos) lucas* Blkr. Atl. Ichth. Cypr. Tab VIII, Fig 4. TL figure 83 mm.

straight, sloping downward only anteriorly, not much closer to the base of the ventral fins than to the dorsal line, each scale marked by a simple tube reaching or nearly reaching the centre of the scale. Dorsal fin starting rather far anterior to the ventral fins and ending far anterior to the anal fin, scaleless at the base, acute, emarginate, height not much greater than length, not much lower to not lower than body; pectoral and ventral fins acute, nearly equal in length, contained $6\frac{1}{3}$ to $6\frac{1}{2}$ times in the length of the body, pectoral fins not reaching the ventral fins, ventral fins not reaching the anal fin; anal fin at the base enclosed in a very low scaled sheath, acute, slightly lower, but about twice as short as the dorsal fin, about twice as high as base length, the simple third ray thin, cartilaginous; caudal fin scaled at the base, with a deep incision, lobes acute, nearly equal in length, contained nearly 4 to slightly over 4 times in the length of the body. Colour: upper part of the body faintly green, lower part silver; iris yellow or silver, tail with a large round diffuse blackish spot in the lateral line near the base of the caudal fin; fins pink or pink-hyaline.

D. 3. D. 4/10 to 4/12. P. 1/14 to 1/15. V. 2/8. A. 3/5 or 3/6. C. 7/17/7 or 8/17/8, short flanking ones included.

Syn. *Lobocheilos lucas* Blkr, Descr. spec. pisc. Javan. nov. diagn., Nat. T. Ned. Ind. XIII p. 362.
Lucas, Wadon-gunung Mal. Batav.

Hab. Java (Batavia), in rivers.

Length of 23 specimens 58''' to 93'''.

Remark. A further and more detailed investigation of my well preserved specimens of this species, has induced me to placing them again the subgenus *Diplocheilos*, of which it possesses all characters. The formulas of the scales and the fin rays even completely answer to those of *Labeo (Diplocheilos) erythropterus*, although it certainly is a different species, which can be distinguished from the last mentioned one by its different coloration, relatively much broader gill cover, bulging snout, thinner gape, longer barbels, shorter pectoral and ventral fins, etc.

139 *Labeo (Diplocheilos) rohitoides* Blkr.
Rohita-achtige Arengan [Rohita-like Arengan]
Atl. Cyprin. Tab. VIII fig. 3.

A *Labeo (Diplocheilos)* with an elongate, compressed body, depth of body contained about 5 times in its length, width contained about 2 times in its depth. Head slightly acute, contained about $5\frac{1}{2}$ times in length of body with caudal fin, about 4 times in length of body without caudal fin, depth contained

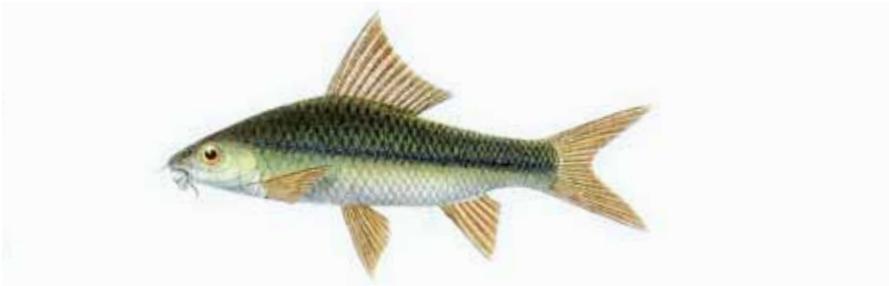


Fig. 25. *Labeo (Diplocheilos) rohitooides* Blkr. Atl. Ichth. Cypr. Tab VIII, Fig. 3. TL figure 62 mm.

about $1\frac{1}{4}$ times in its length, width about $1\frac{1}{2}$ times; eyes superior, eye diameter contained slightly over 3 times in the length of the head, eye diameter contained slightly over once in the postocular part of the head, distance between the eyes nearly $1\frac{1}{2}$ times their diameter, palpebral membrane covering external margin of the iris, the opening nearly circular; rostro-dorsal profile sloping on forehead and crown, slightly convex, convex on nape and back, interorbital line convex; nostrils much closer to the orbit than to the tip of the snout, posterior nostrils open, can be closed by means of a valve; anterior nostrils with an elevated margin, slightly tubular; snout very fleshy, not longer than eye diameter, convex, rounded nor truncate anteriorly, ventrally ending in a membranous flap hanging anterior to the mouth, rostrally, dorsally and laterally covered with numerous, little conspicuous pores, flap entire at lower margin; anterior suborbital bone nearly completely anterior to nostrils, placed not far anterior to the eye, length greater than depth, lower margin maximally convex, semicircular, upper margin nearly straight; 2nd suborbital bone elongate-quadrangular, length more than twice as great as depth, the anterior part not much deeper than the posterior part, many times as low as the eye diameter; 3rd suborbital bone hardly broader than 4th suborbital bone, many times lower; barbels rather fleshy, maxillary barbels much longer than nasal barbels, not or hardly shorter than eye diameter, nasal barbels placed below the tip of the anterior suborbital bone; gape inferior, width very much shorter than width of head, reminding of a horse shoe when the mouth is closed, entrance to oral cavity narrow internally and oblong, rounded or slightly heart-shaped when the mouth is open; upper lip fleshy, entire, hanging anterior to upper jaw; upper jaw with a cartilaginous edge, slightly reminding of a horse shoe, strongly downward protrusible, lower jaw on the posterior part of the symphysis broadly emarginate posteriorly, anterior to the symphysis broadly cartilaginous-fleshy, flat, with a truncate edge; lower lip back-folded, fleshy, free margin confluent with upper lip; infralabial groove on both sides forming a large, angular, deep fossa, obliquely directed towards the medial line of the chin, but separated from the groove on the opposite site by the isthmus which is about twice as thin as the eye diameter; width of gill cover contained twice in its depth, hardly narrower than eye diameter, lower margin slightly convex; gill opening ending below the posterior margin of the preoperculum. Pharyngeal teeth masticatory, aggregated 2.4.5/5.4.2, compressed towards the tip, obliquely truncate on the chewing surface, slightly elevated at the margin, hardly or not lobed, anterior teeth not grooved rostrally; scapula triangular, slightly obtusely rounded; dorsal line of the body convex, higher than slightly convex ventral line; belly flat anterior to ventral fins; scales nearly vertical, larger on anterior part of the flanks than on the rest of the body, free half and generally also the basal half with longitudinal but little conspicuous stripes, about 35 scales in the lateral line, about 13 in a vertical row (including the lowest ventral scales) of which $5\frac{1}{2}$ (6) above the lateral line; lateral line nearly straight, sloping downward only anteriorly, not much closer to the base of the ventral fins than to the dorsal line, every scale marked by a simple tube reaching or nearly reaching the centre of the scale. Dorsal fin starting rather far anterior to the ventral fins and ending far anterior to the anal fin, scaleless at the base, acute, emarginate, not or hardly higher than the body, only slightly higher than base length; pectoral and ventral fins acute, nearly equal in length, contained about $6\frac{1}{2}$ times in the length of the body, pectoral fins not reaching ventral fins, ventral fins not reaching anal

fin; anal fin at the base enclosed in a very low scaled sheath, acute, emarginate, slightly lower but more than twice as short as the dorsal fin, more than twice as high as base length, the simple third ray thin, cartilaginous; caudal fin scaled at the base, with a deep incision, lobes acute, upper lobe slightly longer than lower lobe, contained $3\frac{3}{4}$ to 4 times in the length of the body. Colour: upper part of the body green, lower part silver, diffuse, darkish-violet head-tail band; fins pink-hyaline or pink.

140 B. 3. D. 4/11 or 4/12. P. 1/14 or 1/15. V. 2/8. A. 3/5 or 3/6. C. 6/17/6 or 7/17/7, short flanking ones included.

Syn. *Lobocheilos rohitoides* Blkr, Descr. specier. pisc. javan. nov., Nat. T. Ned. Ind. XIII p. 363.
Lukas Mal. Bat.

Hab. Java (Batavia), in rivers.

Length of sole specimen 68'''.

Remark. According to my definition of the genus *Labeo* the species in question belongs to this genus and not to *Lobocheilos*, under which I described it earlier. It can easily be distinguished from *Labeo* (*Diplocheilos*) *erythropterus* and *Labeo* (*Diplocheilos*) *lucas* by the formula of its scales, as it has a few scales less both on a longitudinal and on a transverse row, and 2 rows of scales less between the lateral line and the back line. Moreover it also has the barbels, especially the upper jaw barbels, remarkably longer and it is also recognizable by its longitudinal body band.

My single specimen is not in a very good state of preservation, especially with regard to the belly and the belly scales.

Cirrhhina breviceps Val.,

Poiss. XVI p. 224

a *Labeo* (*Diplocheilos*) species or a *Diplocheilichthys*?

The description according to Valenciennes:

[Translated from French]

"The height goes four times in the total length, which is seven times the head length. The eye is large, it measures a third of the head length. The two maxillary barbels are shorter than the snout; the mouth is short; the dorsal fin is high anteriorly and its margin with a scythe shape; the anal fin has the first rays much longer; the dorsal lobe of the caudal is also elongated and acutely tapering; the pectoral fin is small; but the pelvic fin large. D. 13. A. 7. C. 19. P. 13. V. 9. The scales are rather large and strong; I counted at least 40 rows in a longitudinal series; there is a long scale in the axil of the ventral fin. The colour is greenish on the back and silver on the belly. The stuffed specimen that I have described is 7 inches and three lines long; it occurs in the rivers of Bantam."

Syn. *Labeobarbus breviceps* K v. H. of Val.

Remark. I very much doubt the existence of representatives of the genus *Cirrhhina* in the Indian archipelago, and also that the species described by Mr Valenciennes would belong to this genus. Species of *Mrigala* which Mr Valenciennes mentions as *Cirrhhines*, are also unknown to me from the Sunda Islands. Therefore I suspect that *Cirrhhina breviceps* Val. will have to be placed in the subgenus *Diplocheilos* of *Labeo* or in the genus *Diplocheilichthys*, and that the in these genera often very small and deep lying upper jaw barbels (lip barbels Val.) have escaped attention in the described *dry* specimen. 141 Anyway I do not possess that species, as I cannot find the combination of its described characters among any of my species. A more detailed and more extensive description of the species than the one made by Mr Valenciennes, would be very desirable.

TYLOGNATHUS Heck.,
Fish. Syr. p. 37, 181. –
CALLOUS JAW CARP.

Body slightly elongate, compressed, covered with large scales. Jaws bare. Barbels 2, maxillary barbels. Snout fleshy, split by a transverse groove, protruding anterior to the mouth, descending skin hanging anterior to upper lip. Upper lip entire, not papillose or cirrate, confluent with lower lip. Upper jaw with a crescent-shaped edge. Lower jaw very thick, cartilaginous-fleshy. Lower lip not lobed, thin, slightly back-folded, crenulate. Simple postlabial groove on both sides directed towards the margin of the mouth, separated from the groove on the opposite side by the very broad isthmus. Dorsal fin starting anterior to ventral fins and ending far anterior to anal fin, posterior simple ray cartilaginous. Pharyngeal teeth masticatory, aggregated 2.4.5/5/4.3, the chewing surface obliquely truncate.

Remark. The genus *Tylognathus*, as it is characterized here, is not the same as it was described by Heckel. That description moreover is insufficient and would comprise other very different genera of Labeonines as well. As delimited above, it is based on the species that was first described and depicted by Heckel under the name *Varicorhinus diplostomus* and later mentioned under the names *Tylognathus diplostomus* and *Tylognathus Valenciennesii*. This species is one of the few that Heckel knew from nature and placed in *Tylognathus*. The others belong to other genera.

Heckel placed no less than twelve species in his genus *Tylognathus*.

His *Tylognathus barbulator* however, is a *Crossocheilus*, just like his *Tylognathus nanus* and maybe also his *Tylognathus porcellus*. However, I cannot judge the last named species, since I cannot consult "Hügel's Reise" in which it seems to be described.

Heckel's *Tylognathus lamta* (*Cyprinus lamta* Buch.) is a *Discognathichthys*, and ¹⁴² his *Tylognathus falcifer* and *Tylognathus lipocheilus* are species of *Lobocheilus*, whereas his *Tylognathus diocheilus* to me rather seems to be a *Labeo*.

Moreover Heckel's *Tylognathus Duvaucellii* (*Chondrostoma Duvaucellii* Val.) judging from the description of Mr Valenciennes is on no account a *Tylognathus* but rather a *Gymnostomus*?, to which genus also seems to belong *Tylognathus semilarvatus* Heck., at least if it, as I suspect, is the same species as *Chondrostoma semivelatum* Val.

The two remaining species were placed by Heckel, under escort of a question mark, in his genus *Tylognathus*. They are *Leuciscus sandkhol* Syk. and *Leuciscus chitul* Syk., species for which the superficial description of Heckel does not suffice to place them in a certain genus, and which one therefore, also under the escort of a question mark, better temporarily can place in *Tylognathus* than in any other genus. From what Mr Sykes says about it, it seems possible to conclude that they in any case belong to the Labeonines.

DIPLOCHEILICHTHYS Blkr.
DOUBLE LIP CARP

Body oblong-elongate, compressed, covered with large scales. Jaws bare. Barbels 4, nasal barbels, inserted on the tip of the snout, and maxillary barbels. Snout fleshy, entire, protruding anterior to the mouth, descending skin hanging anterior to the upper lip, not lobed at the sides. Upper lip hanging anterior to upper jaw, entire, not papillose or cirrate, confluent with free margin of lower lip. Upper jaw with a cartilaginous edge, slightly reminding of a horse shoe, inferior jaw tumid, cartilaginous-fleshy, anterior margin truncate, at the posterior part of symphysis not emarginate or tuberculate. Lower lip

broad, fleshy, back-folded, crenulate, not lobed. Postlabial groove on both sides simple, forming a large, deep fossa, straight, directed towards the margin of the mouth, not reaching the free margin of the lip, separated from the groove on the opposite side by a very broad isthmus. Dorsal fin starting anterior to ventral fins and ending far anterior to anal fin, the posterior simple ray completely cartilaginous. Pectoral fins inserted nearly horizontally. Pharyngeal teeth masticatory, aggregated 2.4.5/5.4.2, chewing surface obliquely truncate, tuberculate at the margins.

Remark. The genus *Diplocheilichthys* in relationship stands between *Labeo* and 143 *Rohita*. From *Rohita* it differs by its smooth edged nippleless or fringeless lips and from *Labeo* by the absence of lateral snout skin lobes. In all species of *Labeo* (*Diplocheilos*) known to me from nature, the anterior suborbital spine lies more anterior to the eye, removed from the orbit, whereas it has more or less the shape of a half round disc with the convex side directed ventrally. Moreover the snout barbels in *Diplocheilos* are implanted high on the snout, at the anterior ventral margin of the suborbital bone.

In *Diplocheilichthys* on the contrary the anterior suborbital bone is shaped as in *Rohita*, that is, obliquely elongate quadrangular or pentagonal and lies against the orbital edge, whereas the snout barbels are implanted closer to the snout edge and more anteriorly. The relationship therefore is larger with *Labeo* than with *Rohita*.

I know till now only one species of this genus, the same one that I have described in 1853 under the name of *Lobocheilos pleurotaenia*.

Diplocheilichthys pleurotaenia Blkr.

Gebande Dubbellipkarper [*Banded double lip carp*].

Atl. Cypr. Tab. IX fig. 1.

A *Diplocheilichthys* with a slightly elongate, compressed body, depth of body contained nearly 5 to slightly over 5 times in its length, width contained $1\frac{3}{4}$ to 2 times in its depth; head slightly acute, contained nearly 5 to 6 times in length of body with caudal fin, $3\frac{3}{5}$ to $4\frac{1}{4}$ times in length of body without caudal fin, depth contained $1\frac{1}{4}$ to $1\frac{1}{3}$ times in its length, width $1\frac{3}{4}$ to $1\frac{1}{2}$ times; eyes superior, eye diameter contained nearly 3 to $3\frac{3}{4}$ times in the length of the head, eye diameter contained once to slightly over once in the postocular part of the head, distance between the eyes $1\frac{1}{4}$ to $1\frac{1}{3}$ times their diameter, palpebral membrane covering the external margin of the iris, the opening nearly circular; rostro-dorsal profile sloping, slightly convex, strongly convex on nape and back, interorbital line convex; nostrils much closer to the orbit than to the tip of the snout, posterior nostrils open, can be closed by means of a valve; anterior nostrils with an elevated margin, slightly tubular; snout very fleshy, in juveniles not longer than eye diameter, in old animals much longer than eye diameter, convex, slightly truncate anteriorly, ventrally ending in a membraneous flap hanging in front upper lip, at the front covered with numerous, conspicuous pores, this flap not lobed at the sides, lower margin entire; anterior suborbital bone obliquely irregularly triangular, length hardly or not greater than depth, top slightly acute, pointing forward, anterior margin nearly straight, posterior margin obliquely ascending backward, strongly curved, upper part contiguous with the orbit; 2nd suborbital bone elongate-quadrangular, length more than twice as long as depth, the anterior part much higher than the posterior part, four times to about three times as low as the eye diameter; 3rd suborbital bone broader than 4th suborbital bone, more than five times to more than four times as low as the eye diameter; barbels thin, at the base membraneous, maxillary barbels much longer than nasal barbels, nasal barbels inserted on the tip of the snout, maxillary barbels slightly to not shorter than the eye; gape inferior, width considerably shorter than width of head, slightly curved forward in the middle when the mouth is closed, at the sides curved strongly backward, entrance to oral cavity internally wide; upper lip fleshy, entire, hanging anterior to upper jaw; upper jaw with a cartilaginous edge, slightly reminding of a horse shoe, strongly downward protrusible; lower jaw on the posterior part of the symphysis not emarginate or tuberculate, anterior to



Fig. 26. *Diplocheilichthys pleurotaenia* Blkr. Atl. Ichth. Cypr. Tab. IX, Fig. 1. TL figure 202 mm.

symphysis broadly cartilaginous-fleshy, flat, with a truncate edge; lower lip back-folded, fleshy, free margin confluent with upper lip, covered with very short papillae in one row, ¹⁴⁴ anterior part not broader than posterior part; infralabial groove on both sides simple, on both sides directed longitudinally, shorter than the eye, forming a deep fossa shorter than the eye diameter on both sides, separated from the groove on the opposite site by the isthmus which is not much to not smaller than the eye diameter; depth of gill cover twice to more than twice as great as width, narrower than eye diameter, lower margin nearly straight or slightly convex; gill opening ending below the posterior margin of the preoperculum. Pharyngeal teeth masticatory, aggregated 2.4.5/5.4.2, slightly compressed towards the top, the chewing surface obliquely truncate, margins elevated, more or less one-lobed or bilobed, teeth in anterior row not grooved rostrally; scapula triangular, acutely rounded; dorsal line of the body convex much higher than slightly convex ventral line; belly flat anterior to ventral fins, rounded behind ventral fins, not or very obtusely ridged; scales nearly vertical, larger on anterior part of the flanks than on the rest of the body, free half and basal half with longitudinal stripes, slightly ray-like, 34 scales in the lateral line, 13 in a transverse row (including the lowest ventral scales) of which $5\frac{1}{2}$ (6) above the lateral line, 11 or 12 in a longitudinal row between occiput and dorsal fin; lowest ventral scales in three to five longitudinal rows, gradually increasing in size posteriorly, scales in the medial row slightly larger than those in flanking rows; lateral line nearly straight, sloping downward only anteriorly, considerably closer to the base of the ventral fins than to the dorsal line, each scale marked by a simple tube not or hardly reaching the centre of the scale. Dorsal fin starting rather far anterior to ventral fins and ending far anterior to anal fin, scaleless at the base, acute, emarginate, not or hardly higher than the body; pectoral and ventral fins acute, nearly equal in length, contained slightly over 6 to $5\frac{1}{2}$ times in the length of the body, pectoral fins not or hardly reaching ventral fins, ventral fins not or hardly reaching anal fin; anal fin at the base enclosed in a very low scaled sheath, acute, slightly to strongly emarginate, considerably to not lower, but more than twice as short as the dorsal fin, twice to three times as high as base length, the simple posterior ray thin, completely cartilaginous; caudal fin scaled at the base, with a deep incision, lobes acute, upper lobe slightly to not longer than lower lobe, contained $3\frac{1}{2}$ to $3\frac{3}{4}$ times in the length of the body. Colour: upper part of the body slightly olive-green, lower part silver, iris yellowish or pink, diffuse, dark-violet head-tail band, in older animals conspicuous; in juveniles band not conspicuous, but tail with a roundish violet-dark spot in the lateral line, close to the caudal base; scales on the back and flanks in older animals each with an oblong transverse, violetish spot; fins with pink rays, membrane pink or violetish-hyaline.

B. 3. D. 4/10 or 4/11. P. 1/14 or 1/15. V. 2/8. A. 3/5 or 3/6. C. 7/17/7 or 6/17/6, short flanking ones included.

Syn. *Lobocheilos pleurotaenia* Blkr, Nalez. vischf. Sumatra, Nat. T. Ned. Ind. IX p. 267.
 Hab. Sumatra (Lahat), in rivers.
 Length of 3 specimens 64''' to 216'''.

Remark. In external appearance this species looks rather similar to *Labeo* (*Diplocheilos*) *cobitis* Blkr. and *Lobocheilos* (*Lobocheilos*) *Schwanefeldi* Blkr, however, the shape of its mouth and snout parts indicates it should be placed in a separate genus. Till now, the species is only known from eastern Sumatra.

LOBOCHEILOS V. Hass.,
 Algem. Konst- en Letterbode 1823 II p.133; Blkr,
 Nat. Tijdschr. Ned. Ind. V p. 520.
 LEHAT.

Body oblong or slightly elongate, compressed, covered with large scales. Jaws bare. Barbels 4 or 2, nasal and maxillary 145 barbels, or maxillary barbels only. Snout fleshy, entire, protruding anterior to the mouth, below the tip truncate, descending skin hanging anterior to upper lip. Upper lip hanging anterior to upper jaw, entire, not papillose nor cirrate, on both sides descending between the lower jaw and the lower lip and affixed to the posterior part of the upper surface of the lower lip. Upper jaw with a cartilaginous, crescent-shaped edge. Lower jaw tumid, cartilaginous-fleshy, anterior margin truncate, not emarginate or tuberculate on the posterior part of the symphysis. Lower lip broad, fleshy, backfolded, entire, lobed on both sides. Postlabial groove simple on both sides, longitudinally directed towards the margin of the mouth, forked at the front, external branch ending in groove of upper jaw, internal branch ending on the internal insertion of the upper lip, separated from the groove on the opposite side by the very broad isthmus. Dorsal fin starting anterior to ventral fins and ending far anterior to anal fin, posterior simple ray cartilaginous. Pectoral fins inserted nearly horizontally. Pharyngeal teeth masticatory, aggregated 2.4.5/5.4.2, the chewing surface obliquely truncate.

Subg. *Lobocheilos* Blkr. Barbels 4, nasal and maxillary barbels.
 " *Gobionichthys* Blkr. Barbels 2, maxillary barbels only.

Remark. When Van Hasselt on Java, observed the most common species of this genus and noticed the differences between the mouth parts of this species and those of *Crossocheilos oblongus* and *Diplocheilos erythropterus*, the idea justly occurred to him to bring her to a genus of her own, which he proposed to name *Lobocheilos*, a name totally fitting on account of the lateral lobe-shaped extension of the lower lip.

When I earlier gave the above mentioned diagnosis of *Lobocheilos*, I knew the genus less well than at present, and I have discovered since, that in the remark placed under that diagnosis, the meaning that van Hasselt gave to this genus was not correctly interpreted by me. A misunderstanding that only became clear to me since I was able to consult besides the Bulletin of De Férussac, the Algemene Konst- en Letterbode of the year 1823, in which an abstract was included from a letter of Van Hasselt dealing with the Javanese Cyprinids.

In the mean time the genus *Lobocheilos* has not been defined in more detail, as he only states: "that it differs too much by a totally aberrant shape of the mouth, 146 to unite it with another genus"; and one would even be totally uncertain which genus was meant by Van Hasselt, if he had not stated after those words "in our drawing it bears the name *falcifer*". This drawing since then appears to refer to *Labeo falcifer* Val.

Mr Valenciennes indeed has placed *Lobocheilos falcifer* V. Hass. in his genus *Labeo*, just like some other species, which totally differ from *Labeo*. With regard to *Lobocheilos falcifer* Mr Valenciennes was induced to do so, because he observed only two upper jaw barbels and not the nasal barbels. However it surprises me that Mr Valenciennes a few years later, in the 17th Volume of the large fishwork, introduced another species closely related to *Lobocheilos* as a *Chondrostoma*. This species, which from the figure of Mr Valenciennes is very well recognisable as a *Lobocheilos*, now appears to me not to differ from the species that I in my *Enumeratio piscium* have referred to as *Lobocheilos (Gobionichthys) javanicus* and which in earlier years, when I knew only juvenile specimens of it, incorrectly was described by me as a *Gobio*. Just like in *Lobocheilos falcifer* the nasal barbels were not noticed by Mr Valenciennes, in his *Chondrostoma lipocheilos* the upper jaw barbels also escaped his attention.

Heckel who did not know the Javanese species of the genus from nature, following Mr Valenciennes, at first introduced *Lobocheilos falcifer* under *Labeo*, but later under *Tylognathus*, to which he also believed *Chondrostoma lipocheilos* belonged. However, they belong to *Tylochromis* no more than to *Labeo*, irrespective if one bases the genus *Tylochromis*, like I propose, on *Varicorhinus diplostomus* Heck. (*Tylognathus Valenciennesi* Heck.) or on *Tylognathus barbulator* Heck., which is a *Crossocheilos*.

The genus *Lobocheilos* is very easy to recognise by the shape of the mouth parts. The lower lip on both sides forms a rounded lobe, the edge of which however is not united with the upper lip. The upper lip however, is continued downwards ascending between the lower jaw and lower lip, to insert, not at the edge of that lip, but at its surface more backwards. Next to this character comes the thick cartilaginous-fleshy lower jaw, the broad upper surface of which is neither emarginate nor knobbed, the single only rostrally bipartite posterior lip groove, the entire lips, the entire and not lobed snout skin, etc.

Java and Sumatra feed various species of *Lobocheilos*. With certainty I know 5 species, which are in my possession, but I suspect that *Labeo hispidus* Val. and *Barbus Hasseltii* Blkr. (described after a drawing) can also be placed in the same genus.

Of the extra-archipelagic species of Cyprinoids, which have come to my knowledge, none could be placed in *Lobocheilos*.

147 Of the 5 species from my collection, three, because of the presence of snout barbels, belong to the subgenus *Lobocheilos* and the two others to the subgenus *Gobionichthys*. – If *Labeo hispidus* similarly is a *Lobocheilos* and only possesses upper jaw barbels, it can be placed in *Gobionichthys*, whereas my former *Barbus Hasseltii*, if it should not have to be placed in a different genus, which cannot be decided with certainty, represents a fourth species of *Lobocheilos*.

The aforementioned species, at least those from my own collection, have a large similarity with each other, both in habitus as in the peculiarities of scales and shape of the fins. However they can be separated sufficiently according to the following scheme.

- I. 4 Barbels, nasal and maxillary barbels (Subg. *Lobocheilos*).
 - A. 33 to 35 scales in the lateral line. D 4/8 or 4/9. Snout very prominent.
 - + 5½ or 6 scales above the lateral line.
 - Depth of body contained 6 to 5 times in its length. Depth of head contained 1½ to 1 3/7 times in its length. Head-tail band yellowish.

Lobocheilos (Lobocheilos) Schwanefeldi Blkr.

- Ô' Depth of body contained slightly over 5 to $4\frac{1}{3}$ times in its length. Depth of head contained $1\frac{1}{4}$ to hardly more than once in its length. No cephalo-caudal band.

Lobocheilos (Lobocheilos) falcifer Van Hass.

- † $4\frac{1}{2}$ or 5 scales above the lateral line.
 Ô Depth of body contained slightly over 5 to $4\frac{1}{3}$ times in its length. Depth of head contained $1\frac{1}{3}$ to $1\frac{1}{4}$ times in its length. No head-tail band.

Lobocheilos (Lobocheilos) lehat Blkr.

- B. About 40 scales in the lateral line. D $\frac{4}{9}$ or $\frac{4}{10}$? Snout hardly prominent.
 † $4\frac{1}{2}$ or 5 scales above the lateral line.

Lobocheilos ? (Lobocheilos?) Hasseltii Blkr.

II. 2 Barbels, maxillary barbels only (Subg. *Gobionichthys*)

- A. 34 to 36 scales in the lateral line, $5\frac{1}{2}$ to 6 above the lateral line. P $\frac{1}{14}$ or $\frac{1}{15}$.
 † Depth of body contained $5\frac{1}{2}$ to 5 times in its length. Snout very prominent. Width of gill cover contained twice to slightly over twice in its depth.

Lobocheilos (Gobionichthys) lipocheilos Blkr.

- † Depth of body contained $4\frac{3}{4}$ times in its depth. Snout hardly prominent. Width of gill cover contained $1\frac{2}{3}$ times in its depth.

Lobocheilos (Gobionichthys) microcephalus Blkr.

- 148 B. P. 17 D. 11 (according to Valenciennes). Scales?
 † Depth of body contained 5 times in its length. Head contained 5 times in the length of the body.

Lobocheilos (Gobionichthys) hispidus Blkr.

Lobocheilos (lobocheilos) falcifer Van Hass.,

Algem. Konst- en Letterbode 1823 II p. 133; Blkr, Nieuw Tientall. Diagnost. Beschrijv.

Nieuwe vischs. v. Sumatra, Nat. T. Ned. Ind. V. p. 522.

Zeisvinnige Lehat [*Scythe finned Lehat*]

Atl. Cypr. Tab. VI.

A *Lobocheilos (Lobocheilos)* with a slightly elongate, compressed body, depth of body contained slightly over 5 times to $4\frac{1}{3}$ times in its length, width contained 2 to $2\frac{1}{4}$ times in its depth. Head convex, anterior part slightly truncate, contained 6 to 7 times in length of body with caudal fin, $\frac{4}{3}$ to $\frac{5}{3}$ times in length of body without caudal fin, depth contained $1\frac{1}{4}$ times to hardly more than once in its length, width contained $1\frac{1}{3}$ to $1\frac{2}{3}$ times in its length; eyes superior, eye diameter contained 3 to $4\frac{1}{2}$ times in the length of the head, eye diameter contained once to $1\frac{2}{3}$ times in the postocular part of the head, distance between the eyes $1\frac{1}{3}$ to nearly $2\frac{1}{2}$ times their diameter, palpebral membrane covering a large part of the iris, the opening nearly circular; rostro-dorsal profile sloping on forehead and crown, nearly straight or slightly convex, very convex on nape and back, interorbital line convex; nostrils much closer to the orbit than to the tip of the snout, posterior nostrils open, can be closed by means of a valve; anterior nostrils with an elevated margin, slightly tubular; snout very fleshy, in juveniles not longer than the eye, in old

animals much longer than the eye, convex, truncate or slightly truncate anteriorly, not lobed at the sides, but traversed by a slightly oblique, superficial to rather deep groove, frequently united with the groove on the opposite side, covered with numerous conspicuous pores above and under the groove, below the tip with a triangular, more or less backward descending surface and there forming a crescent-shaped smooth membrane hiding the upper lip, membrane on free margin entire, not papillose or cirrate, not lobed at the sides; anterior suborbital bone oblong, slightly triangular or slightly quadrangular, length greater than depth, rounded at the tip or more or less truncate, pointing forward, posterior margin nearly vertical or more or less emarginate or curved; 2nd suborbital bone elongate or oblong-quadrangular, length more than three times to two times as long as depth, the anterior part not much deeper than the posterior part, four times to two times as low as the eye diameter; 3rd suborbital bone broader than 4th suborbital bone, more than three times to two times as low as the eye diameter; barbels thin, membranous at the base, maxillary barbels longer than nasal barbels, generally slightly shorter than the eye, nasal barbels inserted anteriorly in the rostral groove anterior to the first suborbital bone; gape slightly inferior, width considerably shorter than the width of the head, the middle part slightly curved forward when the mouth is closed, at the sides curved strongly backward; open mouth crescent-shaped; entrance to oral cavity internally wide; upper lip fleshy, entire, hanging anterior to upper jaw, descending to a point below the lower jaw and affixed to upper surface of the lip rather far behind its anterior margin; upper jaw with a cartilaginous slightly crescent-shaped edge, strongly downward protrusible, lower jaw at the symphysis not emarginate or tuberculate, anterior to symphysis broadly cartilaginous-fleshy, very thick, tumid, with a truncate edge; lower lip fleshy, broad, back-folded, anterior margin slightly villose, anterior part broader than posterior part; on both sides prolonged into a rounded lobe; infralabial groove directed versus the margin of the mouth, shorter than the eye, separated from the groove on the opposite site by the very wide isthmus, forked anteriorly, internal branch running between the lower lip and the upper surface of the lower lip, external branch ending in the groove in the upper jaw; width of gill cover contained $1\frac{1}{3}$ to $2\frac{1}{4}$ times in its depth, slightly thinner to slightly broader than the eye, lower margin nearly straight or slightly convex; gill opening ending below the posterior margin of the preoperculum. Pharyngeal teeth masticatory, ¹⁴⁹ aggregated 2.4.5/5.4.2, slightly compressed towards the tip, masticatory surface obliquely truncate, not or hardly elevated or lobed at the margins, teeth in anterior row not grooved rostrally; scapula triangular, acute or slightly acutely rounded;

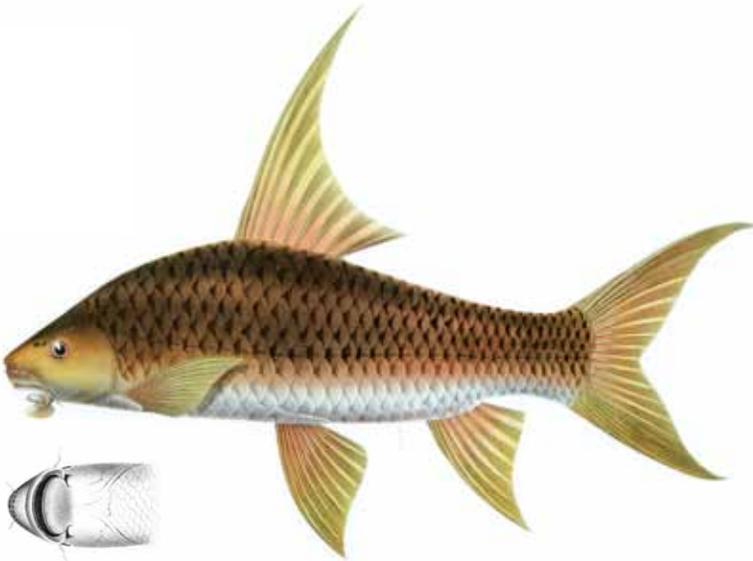


Fig. 27. *Lobocheilus (lobocheilus) falcifer* Blkr. Atl. Ichth. Cypr. Tab. VI. TL figure 315 mm.

dorsal line of the body convex, much higher than the convex ventral line; belly behind ventral fins slightly flat not ridged; scales nearly vertical, larger on the middle and anterior part of the flanks than on the rest of the body, free half and generally also the basal half with longitudinal stripes or slightly ray-like stripes, 34 or 35 scales in the lateral line, 13 in a transverse row (including the lowest ventral scales) of which $5\frac{1}{2}$ (6) above the lateral line, 11 or 12 in a longitudinal row between occiput and dorsal fin; lowest ventral scales in three to five longitudinal rows, gradually increasing in size posteriorly, scales in medial row hardly larger than those in flanking rows; lateral line nearly straight, sloping downward only anteriorly, much closer to the base of the ventral fins than to the dorsal line, each scale marked by a simple tube not or hardly reaching the centre of the scale; dorsal fin starting rather far anterior to ventral fins and ending far anterior to anal fin, scaleless at the base, acute, strongly emarginate, hardly to much higher than the body, width much less than twice to three times as great as length, simple ray posteriorly and forked first ray in old animals much prolonged; pectoral and ventral fins acute, nearly equal in length, contained 6 to nearly 5 times in the length of the body, pectoral fins reaching or not reaching the ventral fins, ventral fins reaching or not reaching the anal fin; anal fin at the base enclosed in a very low scaled sheath, acute, moderately to strongly emarginate, much lower than dorsal fin to nearly twice as low, twice to three times as high as base length, the simple third ray thin, completely cartilaginous; caudal fin scaled at the base, with a deep incision, lobes acute, upper lobe generally longer than lower lobe, contained 4 to $3\frac{1}{2}$ times in the length of the body. Colour: upper part of the body in younger animals olive, lower part pearly or silver, upper part in old animals violetish-olive, lower part grey or olive-pearly; juveniles frequently with a trace of a darkish longitudinal band on the posterior part of the body in the lateral line; iris golden-olive or golden-dark with a golden margin of the pupil, fins with pink rays, membrane pink-hyaline or pink-violetish or slightly olive-violet.

B. 3. D. 4/8 or 4/9. P. 1/14 or 1/15. V. 2/8. A. 3/5 or 3/6. C. 6/17/6 or 7/17/7, short flanking ones included.

Syn. *Labeo falcifer* Val. Poiss. XVI p. 274.

Labéon falcifer Val., *ibid.*

Lehat, Millang, Mal. Bat. Sund., *Udjah* Sund.

Hab. Java (Batavia, Rankasbetong, Lebak, Tjampea, Buitenzorg, Sadjira, Sading, Tjiandjur, Parongkalong, Kuningan, Ngantang), in rivers.
Sumatra (Meninju), in lakes.

Length of 27 specimens 95''' to 335'''.

Remark. At the place indicated above *Lobocheilos falcifer* is only named but not described by Van Hasselt. However a figure of the species left by Van Hasselt, has given me certainty that my specimens belong to the same species.

Mr Valenciennes described the species for the first time, however as a *Labeo*. His description in many aspects leaves to be desired. All my specimens possess 4 barbels and not just two upper jaw barbels, like Mr Valenciennes states for his *Labeo falcifer*. The snout barbels however, are very thin and in dry and small specimens surely hard to observe.

Lobocheilos falcifer in the higher parts of the area of the large rivers of West Java occurs in sufficient quantities, to be arranged among the food-stuff 150 of the indigent people. Hundreds of specimens of one to more than two foot long I have seen being caught during a fishing party near Parangkalong in the Tjitaroem [river]. Similarly in the western part of the residence of Buitenzorg I have seen the *Lehat* placed in market in large quantities.

In Batavia, this species is rare, and is only caught in the period when the rivers reached their highest level when the young individuals are drained by the strong currents from the highlands.

Lobocheilos (lobocheilos) Schwanefeldi Blkr,

Nieuw tientall. Diagn. beschrijv. nieuwe vischs. Sumatra, Nat. T. Ned. Ind. V. p.523. –
Schwanefeld's Lehat.

Atl. Cypr. Tab. IX. fig. 3.

A *Lobocheilos* (*Lobocheilos*) with an elongate, compressed body, depth of body contained nearly 6 to 5 times in its length, width contained 2 to $1\frac{3}{4}$ times in its depth. Head convex, the anterior part slightly truncate, contained slightly over 6 times in length of body with caudal fin, nearly $4\frac{1}{2}$ to nearly 5 times in length of body without caudal fin, depth contained $1\frac{1}{5}$ to $1\frac{3}{7}$ times in its length, width nearly $1\frac{2}{3}$ to $1\frac{1}{2}$ times; eyes superior, eye diameter contained slightly over 3 to $3\frac{3}{5}$ times in the length of the head, eye diameter contained slightly more than once to $1\frac{1}{4}$ times in the postocular part of the head, distance between the eyes $1\frac{1}{4}$ to $1\frac{1}{4}$ times the diameter, palpebral membrane covering a rather large part of the iris, the opening nearly circular; rostro-dorsal profile sloping on forehead and crown, nearly straight or slightly convex, very convex on nape and back, interorbital line convex; nostrils much closer to the orbit than to the tip of the snout, posterior nostrils open, can be closed by means of a valve; anterior nostrils with an elevated margin, slightly tubular; snout very fleshy, in juveniles not longer than the eye, in old animals much longer than the eye, convex, truncate or slightly truncate anteriorly, not lobed at the sides, but traversed by a slightly oblique, superficial to rather deep groove, sometimes united with the groove on the opposite side, covered with numerous conspicuous pores above and under the groove, below the tip with a triangular, more or less backward descending surface and there forming a crescent-shaped smooth membrane hiding the upper lip, membrane at the free margin entire, not papillose or cirrate, not lobed at the sides; anterior suborbital bone oblong, slightly triangular or slightly quadrangular, length greater than depth, generally more or less truncate at the tip, pointing forward, posterior margin nearly vertical or more or less emarginate or curved; 2nd suborbital bone elongate-quadrangular, length more than twice as large as depth, the anterior part much deeper to slightly deeper than the posterior part, more than twice to three times as low as the eye diameter; 3rd suborbital bone broader than 4th suborbital bone, more than four times to three times as low as the eye diameter; barbels thin, membranous, at the base, maxillary barbels much longer than nasal barbels, much to slightly shorter than the eye, nasal barbels inserted anteriorly in the rostral groove anterior to the tip or below the tip of the anterior suborbital bone; gape slightly inferior, width considerably shorter than the width of the head, closed mouth curved slightly forward in the middle, at the sides strongly curved backward, open mouth crescent-shaped; entrance to oral cavity wide internally; upper lip fleshy, entire, hanging anterior to upper jaw, descending below the lower jaw and affixed to the upper surface of the lower lip rather far behind its anterior margin; upper jaw with a cartilaginous crescent-shaped edge, strongly downward protrusible; lower jaw not emarginate or tuberculate at the symphysis, anterior to symphysis broadly cartilaginous-fleshy, very thick, tumid, with a truncate edge; lower lip fleshy, broad, backfolded, anterior margin slightly villose, anterior part broader than posterior part; on both sides prolonged into a rounded lobe, infralabial groove directed versus the margin of the mouth, not much shorter than the eye diameter, separated from the groove on the opposite site by the very wide isthmus, forked anteriorly, internal branch running between the lower lip and ¹⁵¹ the upper surface of the lower lip, external branch ending in the groove of the upper jaw; width of gill cover contained about twice in its depth, slightly thinner than the eye diameter, lower margin slightly convex or nearly straight; gill opening ending below the posterior margin of the preoperculum. Pharyngeal teeth masticatory, aggregated 2.4.5/5.4.2, slightly compressed towards the tip, masticatory surface obliquely truncate, margins slightly elevated not lobed, teeth in anterior row not grooved rostrally; scapula triangular, acutely rounded; dorsal line of the body convex much deeper than convex ventral; belly flat anterior to ventral fins, behind ventral fins rounded, not ridged; scales nearly vertical, scales on the middle and anterior part of the flanks larger than on the rest of the body, basal half with longitudinal stripes, slightly ray-like, 34 scales in the lateral line, 13 in a transverse row (including the lowest ventral scales) of which $5\frac{1}{2}$ (6) above the lateral line, 11 or 12 in a longitudinal row between occiput and dorsal fin; lowest ventral scales in three to five longitudinal rows, gradually increasing in size posteriorly, scales in medial row not or hardly larger than those in flanking rows; lateral line nearly straight, sloping downward only

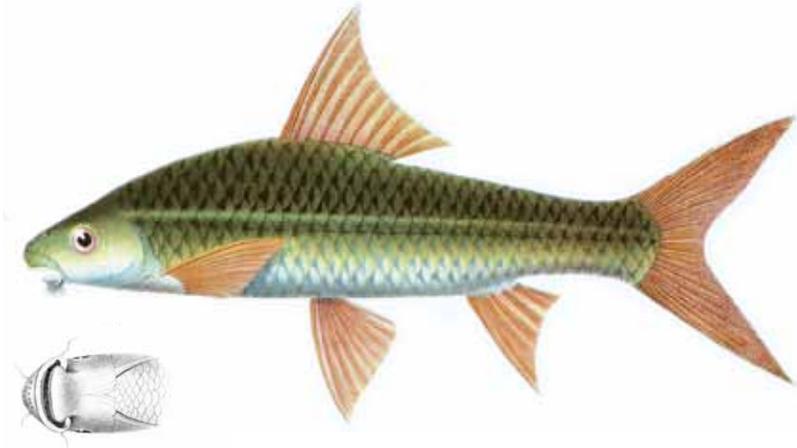


Fig. 28. *Lobocheilus (lobocheilus) Schwanefeldi* Blkr. Atl. Ichth. Cypr. Tab. IX, Fig. 3. TL figure 203 mm.

anteriorly, considerably closer to the base of the ventral fins than to the dorsal line, each scale marked by a simple tube not or hardly reaching the centre of the scale. Dorsal fin starting rather far anterior to the ventral fins and ending far anterior to the anal fin, scaleless at the base, acute, strongly emarginate, not to hardly higher than the body, much less than twice as high as base length, no prolonged rays; pectoral and ventral fins nearly equal in length, ray and split first ray in older fishes very prolonged; pectoral and ventral fins nearly equal in length, contained $5\frac{1}{2}$ to $6\frac{1}{2}$ times in the length of the body, pectoral not or hardly reaching ventral fins, ventral fins reaching or not reaching the anal fin; anal fin at the base enclosed in a very low scaled sheath, acute, moderately to strongly emarginate, considerably lower than dorsal fin and twice to nearly twice as short, twice to not much more than twice as high as base length, the simple posterior ray thin, completely cartilaginous; caudal fin scaled at the base, with a deep incision, lobes acute, upper lobe generally longer than lower lobe, contained $3\frac{2}{3}$ to nearly 4 times in the length of the body. Colour: upper part of the body olive, lower part silver or pearly; iris pink or yellow, margin of pupil golden; tail with the trace of violetish-dark, diffuse longitudinal band in the lateral line; on top a diffuse, yellowish longitudinal band on the anterior part of the body above the lateral line, not always visible; fins with pink rays, membrane pinkish-hyaline or violetish-hyaline.

B. 3. D. $4/8$ or $4/9$. P. $1/14$ or $1/15$. V. $2/8$. A. $3/5$ or $3/6$. C. $6/17/6$ or $7/17/7$, short flanking ones included.

Syn. *Lahat*, Millang Sund.

Hab. Java (Lebak, Parongkalong), in rivers.

Sumatra (Solot, Lahat), in rivers.

Length of 15 specimens 82''' to 212'''.

Remark. *Lobocheilus Schwanefeldi* is so closely related to *Lobocheilus falcifer*, that I, even after a detailed study of both species, hesitated to leave it under its own species name. All my specimens probably belong to the juvenile stage, and as the fins, especially the first dorsal fin rays and the anal fin rays in *Lobocheilus falcifer* only in an advanced age develop remarkably, and give these fins a more or less crescent like shape, one may expect, that the older specimens obtain the different height proportions as well. When comparing the species, I have restricted myself to specimens of equal length. What is most obvious then and is mainly responsible for the specific difference, is, that in *Lobocheilus falcifer* the body is less slender and the head more blunt and remarkably

higher than in *Lobocheilos Schwanefeldi*. Possibly another ¹⁵² specific character lies in the vaguely yellow longitudinal band above the lateral line at the anterior part of the body, which in most of my specimens is still rather well visible notwithstanding the prolonged preservation in spirit of wine.

Lobocheilos (Lobocheilos) lehat Blkr. –
Soendasche Lehat [Sundanese Lehat]
 Atl. Cypr. Tab. VIII fig. 8.

A *Lobocheilos (Lobocheilos)* with a slightly elongate, compressed body, depth of body contained slightly over 5 to $4\frac{1}{2}$ times in its length, width contained nearly twice in its depth. Head convex, slightly truncate anteriorly, contained nearly 6 to 6 times in length of body with caudal fin, slightly over 4 to $4\frac{1}{2}$ times in length of body without caudal fin, depth contained $1\frac{1}{3}$ to $1\frac{1}{4}$ times in its length, width $1\frac{3}{5}$ to $1\frac{1}{2}$ times; eyes superior, eye diameter contained slightly over 3 to $3\frac{1}{3}$ times in the length of the head, eye diameter contained slightly more than once to $1\frac{1}{4}$ times in the postocular part of the head, distance between the eyes $1\frac{1}{3}$ to $1\frac{1}{2}$ times the diameter, palpebral membrane covering a rather large part of the iris, the opening nearly circular; rostro-dorsal profile sloping at the forehead and convex or slightly convex on the crown, convex on nape and back, interorbital line convex; nostrils much closer to the orbit than to the tip of the snout, posterior nostrils open, can be closed by means of a valve; anterior nostrils with an elevated margin, slightly tubular; snout very fleshy, not to not much longer than the eye, convex, truncate or slightly truncate anteriorly, not lobed at the sides, but traversed by a slightly oblique, superficial to rather deep groove, not united with the groove on the opposite side, the upper and lower part covered with numerous conspicuous pores, below the tip with a triangular, more or less backwards descending surface and there forming a crescent-shaped smooth membrane covering the upper lip, membrane on the free margin papillose nor cirrate, not lobed at the sides; anterior suborbital bone irregularly triangular, length greater than depth, at the tip rounded or more or less truncate, pointing forward, posterior margin nearly vertical, more or less emarginate or curved; 2nd suborbital bone elongate or oblong-quadrangular, length less than twice to twice as great as depth, the anterior part much deeper than the posterior part, hardly more than twice as low as the eye diameter; 3rd suborbital bone broader than 4th suborbital bone, more than twice to about three times as low as the eye diameter; barbels thin, membraneous at the base, maxillary barbels much longer than nasal barbels, considerably shorter than the eye, nasal barbels inserted anteriorly in the rostral groove below the tip of the anterior suborbital bone; gape slightly inferior, width considerably shorter than width of head, closed mouth curved slightly forward in the middle, at the sides strongly curved backwards, open mouth crescent-shaped; entrance of oral cavity internally wide; upper lip fleshy, entire, hanging anterior to upper jaw, descending below the lower jaw and affixed to the upper surface of the lower lip rather far behind its anterior margin; upper jaw with a cartilaginous slightly crescent-shaped edge, strongly downward protrusible, lower jaw which is not emarginate or tuberculate at the symphysis, symphysis broadly cartilaginous-fleshy, very thick, tumid, truncate anteriorly; lower lip fleshy, broad, back-folded, not lobed at the sides, but obtusely rounded, anterior part broader than posterior part, anterior margin slightly villose or lightly papillose; infralabial groove directed versus the margin of the mouth, not much shorter than the eye, separated from the groove on the opposite site by the very broad isthmus, forked anteriorly, ending between the lower lip and the upper surface of the lower lip, separated from the upper jaw groove by a small frenum; width of gill cover contained about twice in its depth, thinner than the eye diameter, lower margin nearly straight or slightly concave; gill opening ending below the posterior margin of the preoperculum. Pharyngeal teeth masticatory, aggregated 2.4.5/5.4.2, slightly compressed towards the tip, masticatory surface obliquely truncate with not or hardly elevated margins, not lobed, teeth in anterior row not grooved rostrally; scapula triangular, acutely rounded; dorsal line of the body convex, much higher than convex ventral line; belly flat anterior to ventral fins, rounded, not ridged behind ventral fins; scales nearly vertical, ¹⁵³ larger on the middle and anterior part of the flanks than on the rest of the body,



Fig. 29. *Lobocheilus (lobocheilus) lehat* Blkr. Atl. Ichth. Cypr. Tab. VIII, Fig. 8. TL figure 118 mm.

free half and basal half with longitudinal or slightly ray-like stripes, 33 or 34 scales in the lateral line, 12 in a transverse row (including the lowest ventral scales) of which $4\frac{1}{2}$ (5) above the lateral line, 9 in a longitudinal row between occiput and dorsal fin; lowest ventral scales in three to five rows, gradually increasing in size posteriorly, scales in medial row not or hardly larger than those in flanking rows; lateral line nearly straight, sloping downward only anteriorly, considerably closer to the base of the ventral fins than to the dorsal line, each scale marked by a simple tube reaching or nearly reaching the centre of the scale; dorsal fin starting rather far anterior to the ventral fins and ending far anterior to the anal fin, scaleless at the base, acute, emarginate, not to hardly lower than the body, depth less than twice as great as base length; pectoral and ventral fins acute, nearly equal in length, contained $5\frac{3}{5}$ to slightly over 6 times in the length of the body, pectoral not reaching ventral fins, ventral fins not or hardly reaching anal fin; anal fin at the base enclosed in a very low scaled sheath, acute, emarginate, rather much to much less than twice as low as dorsal fin and nearly twice as short, more than twice as high as base length, the simple posterior ray thin, completely cartilaginous; caudal fin scaled at the base, with a deep incision, lobes acute, upper lobe longer than lower lobe, contained $3\frac{1}{2}$ to 4 times in the length of the body. Colour: upper part of the body olive, lower part silver; scales on back and flanks each with a transverse violet band at the base; iris yellow or pink; fins with pink rays, membrane pinkish-hyaline.

B. 3. D. $4/8$ or $4/9$. P. $1/15$. V. $2/8$. A. $3/5$ or $3/6$. C. $6/17/6$ or $7/17/7$, short flanking ones included.

Syn. *Lobocheilos lehat* Blkr, Enumer. specier. pisc. javan. Nat. T. Ned. Ind. XV p. 428 (no Syn.)

Lehat, Millang Sundan.

Hab. Java (Parongkalong), in rivers.

Length of 2 specimens $105''$ and $124''$.

I suspect, that my specimens are of a young age. This species primarily differs from *Lobocheilos falcifer* by having one longitudinal row of scales less above the lateral line, an undivided lower lip groove, which is separated from the upper lip groove by a bridle, a snout that is more rounded at the convex underside and less flattened and angular, etc. In habitus equal sized specimens of both species show a very large similarity. However, a closer examination clearly shows the less numerous scale rows and the therefore larger scales above the lateral line.

Lobocheilos? (Lobocheilos?) Hasseltii Blkr.
 Atl. Cypr. Tab. VIII fig. 1.
 [Not figured in Atlas Ichthyologique]

A *Lobocheilos?* with an oblong, compressed body, depth of body contained about $3\frac{3}{4}$ times in its length; Head slightly acute, contained about 5 times in length of body with caudal fin, nearly 4 times in length of body without caudal fin, depth of head contained about $1\frac{1}{4}$ times in its length; eye diameter contained about $3\frac{1}{2}$ times in the length of the head, eye diameter contained $1\frac{1}{3}$ times in the postocular part of the head; snout convex, longer than the eye, not protruding anterior to the mouth; rostro-dorsal profile slightly concave above the eyes, convex on the nape; upper jaw ending anterior to the eye; maxillary barbels longer than nasal barbels, not or hardly shorter than the eye; lips fleshy; back elevated, hardly more convex than the belly; about 40 scales in the lateral line, about 10 in a transverse row (without the lowest ventral scales) of which $4\frac{1}{2}$ (5) above the lateral line; 11 or 12 in a longitudinal row between occiput and dorsal fin; dorsal fin starting slightly anterior to the base of the ventral fins, acute, emarginate, depth contained about $1\frac{2}{3}$ times in the depth of the body, not or hardly higher than base length, the simple posterior ray very thin, glabrous, shorter than the head; pectoral and ventral fins 154 acute, nearly equal in length, contained $6\frac{1}{2}$ to 7 times in the length of the body, pectoral fins not reaching ventral fins, ventral fins not reaching anal fin; anal fin acute, emarginate, hardly or not lower than dorsal fin, more than twice as high as base length, the simple third ray thin, cartilaginous; tail scaled only at base, with a deep incision, lobes acute, contained about $4\frac{1}{2}$ times the length of the body. Colours?

D. 3/9 or 4/9. P. 1/15. V. 1/8 or 2/8. A. 2/5 or 3/5. C. 5/17/5 or 6/17/6, the short flanking ones included.

Syn. *Barbus Hasseltii* Blkr, Descr. specier. Pisc. Javan. nov., Nat. Tijdschr. Ned. Ind. XIII p. 355.

Hab. Java (Sading-wetan), in rivers.

Length of described figure 120''.

Remark. I erected this species after a sketch drawing, left by Kuhl and Van Hasselt, as I have not succeeded to obtain specimens of it. I used to place it earlier in the genus *Barbus*, but nowadays I am not a stranger to the idea that it would rather fit in the genus *Lobocheilos*. The figure however, does not seem to possess the accurateness that one usually finds in the illustrations left by Van Hasselt.

Lobocheilos (Gobionichthys) lipocheilos Blkr.
Tweedradige Lehat [Two barbeled Lehat]
 Atl. Cypr. Tab. VII.

A *Lobocheilos (Gobionichthys)* with a slightly elongate, compressed body, depth of body contained $5\frac{1}{3}$ to 5 times in its length, width contained twice to nearly twice in its depth. Head slightly convex, rounded, not truncate anteriorly, contained slightly over 5 to $7\frac{1}{4}$ times in length of body with caudal fin, 4 to $5\frac{1}{3}$ times in length of body without caudal fin, depth contained about $1\frac{1}{4}$ times in its length, width $1\frac{2}{3}$ to $1\frac{1}{2}$ times; eyes superior, eye diameter contained slightly 3 times to slightly over 4 times in the length of the head, eye diameter contained slightly over once to $1\frac{1}{3}$ times in the postocular part of the head, distance between the eyes slightly over once to $2\frac{1}{4}$ times their diameter, palpebral membrane covering a large part of the iris, the opening nearly circular; rostro-dorsal profile sloping on forehead and crown, nearly straight or slightly convex, very convex on nape and back, interorbital line convex; nostrils much closer to the orbit than to the tip of the snout, posterior nostrils open, can be closed by means of a valve; anterior nostrils with an elevated margin, slightly tubular; snout very fleshy, in juveniles much shorter than the eye, in old animals much longer, convex, conical, slightly acute, not truncate, not lobed at the sides, but traversed by a slightly oblique groove, not reaching the tip of the snout, at the tip and above and below the groove covered with numerous conspicuous pores, below the tip with a short, nearly triangular, more or less backward descending surface and there forming a crescent-shaped smooth membrane hiding the upper lip, membrane at the free mar-

gin entire, not papillose or cirrate, not lobed at the sides; anterior suborbital bone oblong, slightly triangular or slightly quadrangular, length much greater than depth, at the tip rounded or more or less truncate, pointing forward, posterior margin obliquely backwards ascending, convex or angular; 2nd suborbital bone elongate-quadrangular, length more than twice as great as depth, the anterior part considerably deeper than the posterior part, more than twice to nearly four times as low as the eye diameter; 3rd suborbital bone broader than 4th suborbital bone, three times to six times as low as the eye diameter; no nasal barbels, maxillary barbels thin, membraneous at the base, a lot to slightly shorter than the eye; gape slightly inferior, width considerably shorter than the width of the head, closed mouth curved slightly forward in the middle, at the sides strongly curved backwards, open mouth crescent-shaped; entrance to oral cavity internally wide; upper lip fleshy, entire, hanging anterior to upper jaw, descending to a point below the lower jaw and affixed to the upper surface of the lower lip rather far behind its anterior margin; upper jaw with a slightly crescent-shaped cartilaginous edge, strongly downward protrusable, lower jaw not emarginate¹⁵⁵ or tuberculate at the symphysis, anterior to symphysis broadly cartilaginous-fleshy, very thick, tumid, with a truncate edge; lower lip fleshy, broad, back-folded, anterior margin slightly villose, anterior part broader than posterior part, on both sides lengthened into a rounded lobe; infralabial groove directed versus the margin of the mouth, shorter than the eye, separated from the groove on the opposite site by the very wide isthmus, forked anteriorly, internal branch running between the upper lip and the upper surface of the lower lip, external branch ending in the groove of the upper jaw; width of gill cover contained twice to slightly over twice in its depth, not or hardly smaller than the eye diameter, lower margin nearly straight or slightly concave; gill opening ending below the posterior margin of the preoperculum. Pharyngeal teeth masticatory, aggregated 2.4.5/5.4.2, slightly compressed towards the tip, the chewing surface obliquely truncate, margins not or slightly elevated, not lobed, teeth in anterior row not grooved rostrally; scapula triangular, acutely rounded; dorsal line of the body convex, much higher than convex ventral line; belly flat anterior to ventral fins, slightly flat, not ridged behind ventral fins; scales nearly vertical, larger on the middle and anterior part of the flanks than on the rest of the body, free half and basal half with longitudinal stripes or slightly ray-like stripes, 35 or 36 scales in the lateral line, 13 in a transverse row (including the lowest ventral scales) of which 5½ (6) above the lateral line, 12 or 13 in a longitudinal row between occiput and dorsal fin; lowest ventral scales in three to five longitudinal rows, gradually increasing in size posteriorly, scales in the medial row hardly larger than those in flanking rows; lateral line nearly straight, sloping downward only anteriorly, considerably closer to the base of the ventral fins than to the dorsal line, each scale marked by a simple



Fig. 30. *Lobocheilus (Gobionichthys) lipocheilus* Blkr. Atl. Ichth. Cypr. Tab. VII, Fig. 2. TL figure 253 mm.

tube not reaching the centre of the scale. Dorsal fin starting anterior to ventral fins and ending far anterior to anal fin, scaleless at the base, acute, strongly emarginate, lower to hardly higher than the body, depth much less than twice as great as length; pectoral and ventral fins acute, nearly equal in length, contained $6\frac{1}{2}$ to 6 times in the length of the body, pectoral fins not reaching ventral fins, ventral fins not reaching anal fin; anal fin at the base enclosed in a very low scaled sheath, acute, moderately to strongly emarginate, much lower than dorsal fin and twice to nearly twice as short, twice to more than twice as broad as base length, the simple third ray thin, completely cartilaginous; caudal fin scaled at the base, with a deep incision, lobes acute, lower lobe longer, contained 4 to $3\frac{1}{2}$ times in the length of the body. Colour: upper part of the body olive, lower part silver or pearly; iris yellow or pink; fins with pink rays, membrane pink or violetish-hyaline.

B. 3. D. 4/8 or 4/9. P. 1/14 or 1/15. V. 2/8. A. 3/5 or 3/6. C. 6/17/6 or 7/17/7, the short flanking ones included.

Syn. *Chondrostoma lipocheilos* Val., Poiss. XVII p. 298 tab. 513.

Chondrostome à lèvres épaisses Val., ibidem.

Tylognathus lipocheilos Heck., Fisch. Syr. P. 181, 188.

Gobio javanicus Blkr, Descr. spec. pisc. javan. nov., Nat. T. Ned. Ind. XII p. 358.

Lobocheilos (Gobionichthys) javanicus Blkr, Enum. Piscium. Arch. Ind. P. 145.

Wadong gunung Mal. Bat., *Lehat*, Millang Sund.

Hab. Java (Batavia), in rivers.

Length of more than 200 specimens 41''' to 265'''.

Remark. I now believe to have found in the species in question the species that was described and depicted by Mr Valenciennes under the name *Chondrostomus lipocheilos*. It was already noted by Heckel in his *Fische Syriens* that this species could not be a *Chondrostomus*. Indeed, *Lobocheilos (Gobionichthys) lipocheilos* has a totally similar lip shape as *Lobocheilos falcifer* and *Lobocheilos Schwanefeldi*, however, the most detailed investigations only shows upper jaw [maxillary] barbels to be present and no snout barbels. Already because of this it can be distinguished from 156 both aforementioned species, but it differs moreover from both these species by its rounded and not truncated snout.

For the rest it is more closely related to *Lobocheilos Schwanefeldi* than to *Lobocheilos falcifer*, which has a relatively higher body, head and dorsal fin, but it can be differentiated from *Lobocheilos Schwanefeldi*, apart from the abovementioned characters, by the absence of a longitudinal band marking, a higher head, a more or less concave ventral opercular edge, etc.

I described this species earlier as a species of *Gobio*, after very juvenile specimens, of which the largest was not longer than 72 mm [TL]. Since then having given more attention to the large diversity in and the diagnostic value of the shape of the mouth parts, I have come to notice that that shape completely agrees with that of the related species of *Lobocheilos*, while a detailed comparison with larger specimens I received since then leave no doubt at all concerning this.

I will note here that in the description of Mr Valenciennes it is mentioned that the species has only 20 scales in a longitudinal row. This must be a writing or printing error, as the figure shows about 37 scales in a longitudinal row, which agrees with nature. In contrast the figure depicts the dentition of the species very incorrectly, whereas it is characterised correctly in the description. The shape of the mouth parts in the figure is presented totally insufficiently.

Lobocheilos (Gobionichthys) microcephalus Blkr,
Kleinkoppige Lahat [Small headed Lahat].
 Atl. Cypr. Tab. VIII fig. 2.

A *Lobocheilos (Gobionichthys)* with a slightly elongate, compressed body, depth of body contained $4\frac{3}{4}$ times in its length, width contained twice in its depth. Head slightly convex, rounded, not truncate anteriorly, contained $5\frac{3}{4}$ times in length of body with caudal fin, about $4\frac{2}{3}$ times in length of body without caudal fin, depth contained about $1\frac{1}{4}$ times in its length, width about $1\frac{2}{3}$ times; eyes superior, eye diameter contained slightly over 3 times in the length of the head, eye diameter contained slightly over once in the postocular part of the head, distance between the eyes about $1\frac{1}{3}$ times their diameter, palpebral membrane covering the external margin of the iris, the opening nearly circular; rostro-dorsal profile sloping on forehead and crown, slightly convex, very convex on nape and back, interorbital line convex; nostrils much closer to the orbit than to the tip of the snout, posterior nostrils open, can be closed by means a valve; anterior nostrils with an elevated margin, slightly tubular; snout very fleshy, hardly shorter than the eye, convex, not truncate, not lobed at the sides, but on both sides traversed by an oblique, little conspicuous short groove, snout covered with numerous conspicuous pores anteriorly, no triangular surface below the tip, short membrane covering the upper lip entire at the free margin, not papillose or cirrate, not lobed at the sides; anterior suborbital bone oblong-triangular or slightly quadrangular, length slightly greater than depth, at the tip rounded, pointing forward, posterior margin nearly vertical, slightly curved; 2nd suborbital bone elongate-quadrangular, length more than twice as great as depth, the anterior part slightly deeper than the posterior part, more than three times as low as the eye diameter; 3rd suborbital bone slightly broader than 4th suborbital bone, many times lower than the eye diameter; no nasal barbels, maxillary barbels thin, less than twice as short ¹⁵⁷ as the eye diameter; gape slightly inferior, width very much shorter than width of head, closed mouth curved slightly forward in the middle, at the sides strongly curved backward, open mouth crescent-shaped; entrance to oral cavity internally wide; upper lip fleshy, entire, hanging anterior to upper jaw, descending to a point below the lower jaw and affixed to the upper surface of the lower lip rather far behind its free margin; upper jaw with a slightly crescent-shaped cartilaginous edge, strongly downward protrusable, lower jaw at the symphysis not emarginate or tuberculate, anterior to the symphysis broadly cartilaginous-fleshy, very thick, with a truncate edge, broad; lower lip fleshy, back-folded, anterior margin slightly villose, anterior part broader than posterior part, on both sides lengthened into an obtusely rounded lobe; infralabial groove directed towards the margin of the mouth, shorter than the eye, separated from the groove on the opposite site by the very wide isthmus, forked anteriorly, internal branch running between the upper lip and the upper surface of the lower lip, external branch ending in the groove of the upper jaw; width of gill cover contained $1\frac{2}{3}$ times in its depth, not thinner than the eye diameter, lower margin nearly straight or slightly convex; gill opening ending below the posterior margin of the preoperculum. Pharyngeal teeth masticatory, aggregated 2.4.5/5.4.2, slightly compressed towards the tip, the chewing surface obliquely truncate, margins not or slightly elevated, not lobed, teeth in anterior row not grooved rostrally; scapula triangular, acutely rounded; dorsal line of the body convex, much higher than convex ventral line; belly flat anterior to ventral fins, slightly flat, not ridged behind ventral fins; scales nearly vertical, larger on the anterior part of the flanks than on the rest of the body, free half and basal half with longitudinal stripes, slightly ray-like, 34 or 35 scales in the lateral line, 13 in a transverse row (including the lowest ventral scales) of which $5\frac{1}{2}$ (6) above the lateral line, 12 in a longitudinal row between occiput and dorsal fin; lateral line nearly straight, sloping downward only anteriorly, not much closer to the base of the ventral fins than to the dorsal line, each scale marked by a simple tube reaching or surpassing the centre of the scale. Dorsal fin starting anterior to ventral fins and ending far anterior to anal fin, scaleless at the base, acute, hardly emarginate, hardly lower than the body, depth very much less than twice as great as length; pectoral and ventral fins acute, nearly equal in length, contained about $6\frac{1}{2}$ times in the length of the body, pectoral fins not reaching ventral fins, ventral fins not reaching anal fin; anal fin at the base enclosed in a very low scaled sheath, acute, hardly emarginate, considerably lower than but about twice as short as dorsal fin, about twice as high as base length, the simple third ray thin, cartilaginous; caudal fin scaled at the base, with a deep incision, lobes acute,



Fig. 31. *Lobocheilus (Gobionichthys) microcephalus* Blkr. Atl. Ichth. Cypr. Tab. VIII, Fig. 2. TL figure 68 mm.

nearly equal in length, contained about $4\frac{1}{4}$ times in the length of the body. Colour: upper part of the body green, lower part silver; iris yellow or pink; fins pink or pinkish-hyaline.

B. 3. D. $4/8$ or $4/9$. P. $1/14$. V. $2/8$. A. $3/5$ or $3/6$. C. $6/17/6$ or $7/17/7$., short flanking ones included.

Syn. *Gobio microcephalus* Blkr, Desc. spec. pisc. Javan. nov. Nat. T. Ned. Ind. XIII p. 357.

Wadon gunung Mal. Bat.

Hab. Java (Batavia), in rivers.

Length of sole specimen 71'''.

Remark. The species in question is no more a *Gobio* than *Lobocheilus javanicus* and belongs to the same genus as this one. Likewise it possesses only the upper jaw barbels and no snout barbels. However it differs by a smaller head and deeper body (in specimens of equal size of both species), by a snout surface which is not bend back to the mouth opening, a relatively broader opercle, etc.

My specimen most probably belongs to a very juvenile age group, making it necessary for a better knowledge of the species that larger specimens are also investigated.

158 *Lobocheilus? (Gobionichthys) hispidus* Blkr.

Description according to Valenciennes

[Translated from French]

A *Labeo* quite similar to the preceding ones (*Labeo erythropterus* K v. H., *Labeo fimbriatus* Val.) that has two very short barbels at the mouth corner. The body depth is one fifth of the total length; the head length equals that depth. The obtuse snout is bristled with pointed tubercles; the caudal is much forked; the dorsal is high and pointed; its first ray is fairly rigid and detached; the anal narrow; the ventrals are long. D. 11. A. 6. C. 19. P. 17. V. 9. On a drawing made in Java, I see that the back is blue, and that a band of that colour is running on the middle of the tail and disappears at the level of the chest. The flanks are silvery with a pink tinge, which changes to yellowish on the belly; the fins are yellow. The specimen, one foot long, originates from Buitenzorg. The young naturalists to whom we owe it, were of the opinion to distinguish it as a genus, and named it *Lobocheilus*."

Syn. *Lobocheilus* sp. Van Hass., following Val.

Labeo hispidus Val. Poiss. XVI p. 272; Blkr, Enummerat. Pisc. Arch. Indic.

Labeon hérissé Val op. cit.

Remark. The here copied description of Mr Valenciennes absolutely does not allow to decide whether the species is a *Labeo* or not. I place it under *Lobocheilus*, primarily

because Van Hasselt himself placed it in this genus. When it indeed has only upper jaw barbels and no snout barbels, it would follow that it also belongs to the subgenus *Gobionichthys*.

Concerning the acute snout knobs, these are not characteristic. I have observed these in very many Labeonines with visible skin pores. They simply are a calcareous secretion of those pores and therefore very deciduous. They stand in the same relation to the skin pores as the horny jaw sheaths, which in general loosely cover the jaw in Phalacrognathines and are usually so deciduous that a light push or pull is enough to remove them from the jaw.

ROHITA Val.,
Poiss. XVI p. 184, Heck. Fish. Syr. P. 35 Nachtr. p. 180. –
ROHITA.

Body oblong, compressed, covered with large or medium-sized scales. Jaws bare, not tumid. Barbels 4 or 2, nasal and maxillary barbels, or maxillary barbels only. Snout fleshy, entire, slightly or hardly protruding anterior to the mouth, not lobed at the sides, free margin not papillose or fimbriate. Anterior suborbital bone close to the orbit. Upper lip hanging anterior to upper jaw, fimbriate, confluent with lower lip. Gape ¹⁵⁹ more or less oval when mouth is open. Upper jaw with a thin crescent-shaped edge. Lower jaw with a thin truncate or rounded edge, symphysis without tubercle. Lower lip back-folded, not papillose or fimbriate, not lobed. Postlabial groove simple on both sides, directed longitudinally towards the margin of the mouth, separated from the groove on the opposite site by the broad isthmus. Dorsal fin starting anterior to ventral fins and ending anterior to or above anal fin, posterior simple ray cartilaginous. Pharyngeal teeth masticatory, aggregated 2.4.5/5.4.2, obliquely truncate at the masticatory surface.

Subg. *Rohita* Blkr, Barbels 4, nasal and maxillary barbels.

" *Rohitodes* Blkr, Barbels 2, maxillary barbels only.

Remark. The genus *Rohita* comprises all real Labeonines with a lobed snout edge, the anterior suborbital bone resting against the orbit, the lower jaw not thickened and not knobbed at the symphysis, fringed and confluent lips, and a single united posterior lip groove. Defined in this way it is sufficiently distinguishable on the one hand from the related genera *Labeo*, *Rohitichthys*, *Diplocheilichthys* and *Morulius*, and on the other hand from the equally related genera *Abrostomus*, *Dangila* and *Barbichthys*.

Mr Valenciennes, when erecting the genus *Rohita*, restricted it to the species with 4 barbels, while he placed many species in which only upper jaw barbels and no snout barbels are present in the genus *Labeo*, like his *Labeo cephalus*, *Labeo Dussumieri*, *Labeo Reynauldi*, *Labeo microlepidotus* and *Labeo fimbriatus*.

Heckel did not restrict the genus *Rohita* to the species with 4 barbels, but also included species with 2 barbels and even species without barbels. Heckel did not design the genus after nature and therefore it can be explained that both definitions which he gave for *Rohita* are in many ways insufficient and even inaccurate.

Thus is mentioned in his first diagnosis "Dentes aggregati [aggregated teeth] 3.3.6/6.3.3", which is incorrect – moreover "os inferum" [mouth inferior], which again is incorrect for a number of species, – and at last "maxilla superior carnea, margine fimbriata, sub rostor crasso poroso occulta" [upper jaw fleshy, fringed, hidden under the thick, porous snout] which is a completely erroneous representation, because it is

not the thin cartilaginous upper jaw that is fringed, but indeed the upper lip that is free suspended anterior to it, while moreover in several species the snout has no visible pores. This last incorrect representation is repeated in his later diagnosis in the year 1847.

160 The genus *Rohita* is rich in species, however they all belong to South-Asia and the Indian Archipelago. Mr Valenciennes gave the name of one of the Bengalese species (*Cyprinus rohita* Buch.) to the genus, however, his type species is his *Rohita nandina*, or Buchanan's *Cyprinus nandina*, which indeed is a real *Rohita*, while *Cyprinus rohita* Buch. belongs to the genus *Morulius*, because of its far anterior to the eye lying anterior suborbital bone.

Therefore it would have been more proper to give the name *Nandina* to all those species which are real *Rohites* and to preserve the name *Rohita* for *Cyprinus rohita* Buch. and the species related to it. In order to prevent confusion in the meaning, I have retained the name *Rohita* for the species to which Mr Valenciennes preferably applied it.

Several South-Asiatic species placed by Mr Valenciennes in *Rohita*, after the splitting of the genus can no longer be placed in it, but must be included in the genus *Morulius*. I cannot indicate for all species to which of both genera they belong, as the existing descriptions and figures are not sufficient with regard to the generic characters. However, the four Bengalese species of my collection (*Rohita Bachanani* Val., *Rohita Belangeri* Val., *Rohita calbosu* Val. and *Rohita chalybeata* Val.) can be placed in *Morulius*, but they are not the only ones, as I will indicate in more detail in my treatment of *Morulius*. For the rest, for reasons mentioned above, in the list of the Labeonines several other species have been placed in *Rohita*, for which a more detailed investigation maybe will show to be species of *Morulius*.

The species of the Indian archipelago till now placed in *Rohita* with only one exception indeed belong to it. Only my former *Rohita chrysophekalion* should be included in *Morulius*.

These species, after subtraction of the last named, are still 14 in number all belonging to the subgenus *Rohita* because of their 4 barbels. For a large part they can easily be distinguished from the other known species, however some species are so much related to each other, that a detailed study is necessary to determine the specific differences with certainty. I am of the opinion to have succeeded in this in the following scheme.

1. Barbels 4, nasal and maxillary barbels (Subgen. *Rohita*).
 - A. 45 to 53 scales in the lateral line. Barbels well developed, not shorter than the eye. D. 4/17 to 4/19.
 - † 10 or 11 scales above the lateral line. Eyes slightly posterior. P. 1/16 or 1/17. Large, oblong, transverse, black postaxillary spot. Anterior part of the snout without any visible pores.

Rohita (Rohita) melanopleura Blkr.

- 161** † 8 scales above the lateral line. Eyes superior. P. 1/14. A round, black spot on the tail. Anterior part of the snout with 5 conspicuous pores, arranged in a transverse row.

Rohita (Rohita) borneënsis Blkr.

- B. 32 to 37 scales in the lateral line. Barbels well developed.
- + Anterior part of the snout without conspicuous pores.
 - Ô 7 (6½) scales above the lateral line. Anterior suborbital bone irregularly quadrangular.
 - Eyes superior.
 - Ø Dark head-tail band. D. 4/12 or 4/13. P. 1/14. 35 or 36 scales in the lateral line. Tail contained about 4½ times in the length of body between posterior dorsal ray and base of caudal fin.

Rohita (Rohita) Waandersi Blkr.

- Ø' No head-tail band, but a large black spot enclosing the tail. D. 4/15 or 4/16. 32 to 34 scales in the lateral line. Tail contained about 7½ times in length of the body between posterior dorsal ray and base of caudal fin.

Rohita (Rohita) Kappenii Blkr.

- ' Eyes posterior
 - Ø' Flanks without stripes or bands. D. 4/13 to 4/15. 34 to 36 scales in the lateral line. Tail contained about 5¼ times in length of body between posterior dorsal ray and base of caudal fin.

Rohita (Rohita) Schlegeli Blkr.

- Ô 6 (5½) scales above the lateral line. Eyes superior.
 - Posterior part of the flanks with several dark longitudinal bands, anterior part with golden or shiny-green bands. D. 4/14 to 4/18. 34 to 37 scales in the lateral line. Anterior suborbital bone irregularly quadrangular.

Rohita (Rohita) Hasseltii Val.

- ' Flanks with a single black head-tail band. 34 or 35 scales in the lateral line. P. 1/14. Anterior suborbital bone crescent-shaped.
 - Ø D. 4/12 or 4/13. Depth of head contained 1½ times in its length. 14 scales in a transverse row.

Rohita (Rohita) microcephalus Val.

- Ø' D. 4/10 or 4/11. Depth of head contained 1½ times in its length. 13 scales in a transverse row.

Rohita (Rohita) brachynotopterus Blkr.

- 162 Ô" Scales 5 (4½) above the lateral line.
- Tail with a round black spot. D. 4/14 or 4/15. 33 scales in the lateral line.

Rohita (Rohita) Kuhli Blkr.

- + Anterior part of the snout with conspicuous pores. Eyes superior. 6 (5½) scales above the lateral line.
 - Ô Anterior part of the snout with 2 distant pores. D. 4/15 or 4/16. 35 scales in the lateral line. Suprascapular region with a blue spot.

Rohita (Rohita) kahajanensis Blkr.

- Ô' Anterior part of the snout with 3 conspicuous pores, the one in the middle larger than those on the sides. 32 to 34 scales in the lateral line. D. 4/10 to 4/14.
 O Anterior part of dorsal fin without black spot. 14 scales in a transverse row. Width of gill cover contained twice to slightly over twice in its depth.

Rohita (Rohita) vittata Val.

- O' Anterior part of dorsal fin with a large black spot. 13 scales in a transverse row. Width of gill cover contained 1½ to 1¾ times in its depth.

Rohita (Rohita) triporos Blkr.

- O'' Snout with 8 pores arranged in a circle and in addition one central pore larger than the other pores.
 O Blackish head-tail band. D. 4/12 or 4/13. Width of gill cover contained 2½ times in its depth.

Rohita (Rohita) enneaporos Blkr.

- B. 28 to 30 scales in the lateral line. Barbels well developed. Eyes superior.
 † Anterior part of the snout with numerous conspicuous pores, no larger central pores.
 Ô 5 (4½) scales above the lateral line. D. 4/12 or 4/13. Tail with a black spot.

Rohita (Rohita) oligolepis Blkr.

Concerning the Subgenus *Rohita*, I include in it some species from South Asia, which possess the characters of *Rohita* Val., but no snout barbels, reason why only Mr Valenciennes seems to have placed them in the genus *Labeo*. However, with regard to these species I have to note, that it is possible, that they belong to *Morulius*, which cannot be determined till the shape and the position of the suborbital bones of these species has been investigated. In the description of these species of Mr Valenciennes nothing about this has been reported and the only figure that I know of these species (*Labeo cephalus* Val. tab. 187), and which moreover with regard to the mouth parts is very incorrect, is not illuminating in this respect.

163 *Rohita (Rohita) melanopleura* Blkr,
 zesde Bijdr. Ichth. Fauna Borneo, Nat. T. Ned. Ind. III p. 430. –
Zwartvlekkige Rohita [Black spotted *Rohita*].
 Atl. Cypr. Tab. XIII.

A *Rohita (Rohita)* with an oblong, compressed body, depth of body contained 3⅔ to 3¾ times in its length, width contained 2¼ to 2⅓ times in its depth. Head slightly acute, not convex, the lower anterior part obliquely truncate, when the mouth is closed, contained 4⅓ to 5⅓ times in length of body with caudal fin, slightly over 3 to nearly 4 times in length of body without caudal fin, depth of head contained slightly over once in its length, width contained about 1½ times in its length; eyes slightly superior, eye diameter contained 5 to slightly over 4 times in the length of the head, eye diameter contained slightly over once to 1½ times in the postocular part of the head, distance between the eyes 1⅓ times to slightly over twice their diameter, palpebral membrane covering the external margin of the iris only, the opening nearly circular; rostro-dorsal profile sloping on the head, convex or nearly straight, strongly convex on nape and back, interorbital line convex; nostrils closer to the orbit than to the tip of the snout, posterior nostrils open, can be closed by means of a valve; anterior nostrils tubular; small pores on both sides between the nostrils and

the superior angle of the gill cover, in one longitudinal row, conspicuous; snout convex, flat, not or hardly protruding anterior to the mouth, in juveniles shorter than the eye, in old animals much longer than the eye, smooth everywhere, no larger or smaller visible pores; anterior suborbital bone oblong-quadrangular, length about twice as great as depth, rounded at the angles; other suborbital bones very low, many times as thin as the eye diameter; suborbital pores small, conspicuous, placed in one longitudinal row; barbels fleshy, nasal barbels not longer to much longer than the eye, generally shorter than the upper jaw barbels; upper jaw with a cartilaginous edge, reminding of an horse shoe, not emarginated at the symphysis, strongly downward protrusible; upper lip very fleshy, entire, hanging anterior to upper jaw, free margin covered with numerous, many-rowed, short, cirriform papillae; lower jaw flat, slightly spoon-shaped; lower lip very fleshy, back-folded, free margin covered with numerous, many-rowed, short, cirriform papillae, grooves at lower and front side separated by the wide isthmus; chin obliquely truncate because of strongly ascending lower jaw; width of gill cover contained about twice in its depth, lower margin nearly straight; gill opening vertical, ending below the suboperculum. Pharyngeal teeth masticatory, aggregated 2.4.5/5.4.2 or 3.3.5/5.3.3, partly elevated on the chewing surface; teeth in anterior row traversed by longitudinal top groove rostrally; scapula short, obtusely rounded; dorsal line of the body convex, much higher than convex ventral line; belly flat anterior to ventral fins, very obtusely ridged behind ventral fins; scales nearly vertical, larger on the middle of the flanks than on the rest of the body; free half and basal half with longitudinal stripes, slightly ray-like, 45 to 53 scales in the lateral line, 20 or 21 in a transverse row (without the lowest ventral scales) of which 10 or 11 above the lateral line, 17 to 21 in a longitudinal row between occiput and dorsal fin; lowest ventral scales in 5 longitudinal rows, gradually increasing in size posteriorly, those in the medial row not smaller than those in flanking rows; lateral line nearly straight, sloping downward only anteriorly, not or only slightly closer to the base of the ventral fins than to the dorsal line, each scale marked by a simple tube not or hardly reaching the centre of the scale; dorsal fin starting anterior to ventral fins and ending above anal fin, scaleless at the base, acute, emarginate, length greater than depth; pectoral and ventral fins acute, nearly equal in length, contained slightly over 5 to slightly over 6 times in the length of the body, pectoral fins not or hardly reaching ventral fins, ventral fins not to hardly reaching anal fin; anal fin at the base enclosed in a low scaled sheath, acute, slightly or not emarginate, slightly lower than dorsal fin but more than twice to more than three times as short, the simple third ray thin, cartilaginous; caudal fin scaled at the base, with a deep incision, lobes acute, upper lobe generally longer than lower lobe, contained $3\frac{2}{3}$ to 4 times in the length of the body.

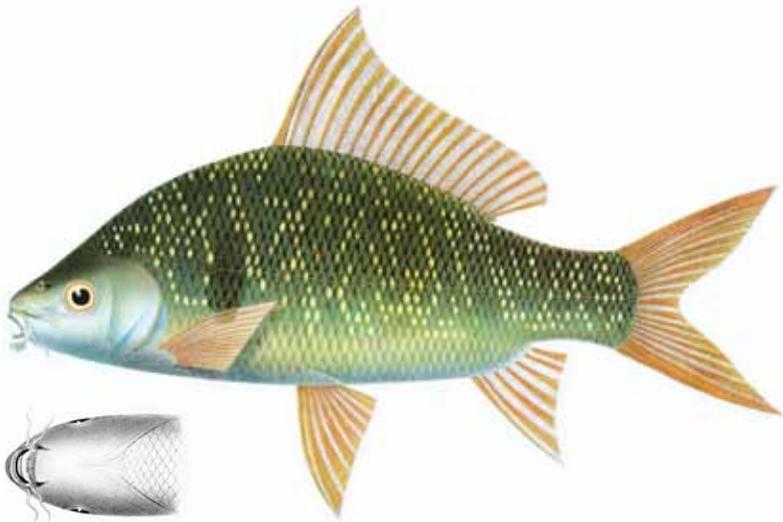


Fig. 32. *Rohita (Rohita) melanopleura* Blkr. Atl. Ichth. Cypr. Tab. XIII. TL figure 314 mm.

Colour: upper part of the body olive, fainter at the flanks, lower part silver, back and flanks 164 frequently variegated with fainter spots; iris yellow or pink; barbels flesh or slightly olive-dark; postscapular region with an oblong, transverse, large black spot; scales on black and flanks each with a deeper colour on the base then on the free margin; fins pink or violetish, frequently with dense dark speckles.

B. 3. D. 4/17 or 4/18 or 4/19. P. 1/16 or 1/17. V. 2/8. A. 3/5 or 3/6. C. 5/17/5 or 6/17/6, the short flanking ones included.

Hab. Sumatra (Palembang), in rivers.

Borneo (Bandjermasin, Kahajan, Pontianak), in rivers.

Length of 18 specimens 75''' to 320'''.

Remark. I discovered this species in the year 1852 and described it then after three specimens from Sumatra and Borneo. Since then my cabinet has been enriched with numerous specimens of the same islands. From a sketchbook of Siamese fishes given to me for inspection, made by Count Francis De Castelnau, I perceive, that the species is also found in Siam where it occurs in the river Meinam, near the capital Bangkok. *Rohita melanopleura* is easy recognizable by the formula of its scales and fin rays, by the posterior to the mouth slit placed eyes, its long barbels, smooth snout and black spot behind the axils. The number of scales in a longitudinal row shows more variation than the remaining species of *Rohita* known to me. However, in none of my 18 investigated specimens the number is lower than 45 or more than 53, whereas the number of longitudinal scale rows above the lateral line only varies between 10 and 11.

In the younger specimens the colour of the body is more uniform than in the older ones, in which the flanks are irregularly marked with light yellowish spots.

Rohita (Rohita) borneënsis Blkr,

Act. Soc. Scient. Ind. Néerl. I, Tiende Bijdrage ichthyol. fauna van Borneo p. 17. –

Borneosche Rohita [*Borean Rohita*].

Atl. Cypr. Tab. VIII fig. 5.

A *Rohita (Rohita)* with an oblong, compressed body, depth of body contained nearly 4 times in its length, width contained about 2 times in its depth. Head slightly acute, the lower anterior part obliquely truncate, when the mouth is closed, contained nearly 5 times in length of body with caudal fin, about $3\frac{3}{4}$ times in length of body without caudal fin, depth of head contained about $1\frac{1}{4}$ times in its length, width contained about $1\frac{3}{4}$ times in its length; eyes superior, eye diameter contained about 3 times in the length of the head, eye diameter contained slightly over once in the postocular part of the head, distance between the eyes about $1\frac{1}{3}$ times their diameter, palpebral membrane covering the external margin of the iris only, the opening nearly circular; rostro-dorsal profile sloping on forehead and crown, nearly straight, very convex on nape and back; interorbital line slightly convex; nostrils closer to the orbit than to the tip of the snout, posterior nostrils open, can be closed by means of a valve; anterior nostrils slightly tubular, small pores on both sides between the nostrils and the superior angle of the gill cover, in one longitudinal row, conspicuous; snout fleshy, slightly flat, convex, hardly protruding in front of the mouth, slightly shorter than the eye, on the tip 5 conspicuous pores in a transverse, curved row, pore in the middle conspicuously larger than the others, 2 external pores much smaller than the others; several small, little conspicuous suborbital pores in one longitudinal row; anterior suborbital bone oblong-quadrangular, rounded at the angles, length less than twice as great as depth; other suborbital bones very low, many times as narrow as eye diameter; barbels 165 fleshy, tapering, maxillary barbels not much longer than nasal barbels, hardly or not longer than the eye; upper jaw with a cartilaginous edge, slightly reminding of an horse shoe; at the symphysis lightly emarginate, strongly downward protrusible; upper lip very fleshy, hanging anterior to upper jaw, free margin covered with numerous, many-rowed, short, conical, slightly obtuse papillae; lower jaw flat, slightly spoon-shaped; lower lip very fleshy, back-folded, free margin with numerous,



Fig. 33. *Rohita (Rohita) borneënsis* Blkr. Atl. Ichth. Cypr. Tab. VIII, Fig 5. TL figure 76 mm.

many-rowed, short, conical papillae, papillae in outer row acute, slightly thread-like; grooves at lower and front side separated by the wide isthmus; chin obliquely truncate because of the strongly ascending lower jaw; width of gill cover contained about $1\frac{1}{2}$ times in its depth, lower margin nearly straight or slightly convex; gill opening ending below the anterior part of the gill cover. Pharyngeal teeth masticatory, aggregated 2.4.5/5.4.2, each with the chewing surface obliquely truncate or obliquely convex, margins elevated, particularly in anterior row unequally bilobed, rostral part of teeth in anterior row deeply grooved for the top half; scapula triangular, slightly acutely rounded; dorsal line of the body convex, higher than convex ventral line; belly flat anterior to ventral fins, very obtusely ridged behind ventral fins; scales nearly vertical, hardly larger on the middle of the flanks than on the rest of the body, free half and basal half with hardly visible longitudinal stripes or without stripes, about 46 in a longitudinal row, 17 or 18 in a transverse series, of which 8 above the lateral line, 14 to 15 in a longitudinal row between occiput and dorsal fin; lowest ventral scales in 3 longitudinal rows, those in the medial row not larger than those in flanking rows; lateral line nearly straight, sloping downward only anteriorly, hardly or not closer to the base of the ventral fins than to the dorsal line, each scale marked by a simple tube reaching or surpassing the centre of the scale. Dorsal fin starting anterior to the ventral fins and ending above the beginning of the anal fin, scaleless at the base, acute, emarginate, length very much greater than depth, length contained about $3\frac{1}{2}$ times in the length of the body, depth contained $1\frac{3}{5}$ times to $1\frac{1}{2}$ times in the depth of the body; pectoral and ventral fins acute, nearly equal in length, contained about 6 times in the length of the body, pectoral fins not reaching ventral fins, ventral fins not reaching anal fin; anal fin at the base enclosed in a very low scaled sheath, acute, not emarginate, not much lower than dorsal fin, but more than three times as short, the simple third ray thin, cartilaginous; caudal fin scaled at the base, with a deep incision, lobes slightly acute, upper lobe slightly longer than lower lobe, contained slightly over 5 times in the length of the body. Colour: upper part of the body bluish-green, lower part silver; iris yellowish or pink, back and flanks with a longitudinal darkish-violet band on each row of scales; tail with a roundish, bluish-violet band in the lateral line close to the base of the caudal fin; fins pink, particularly dorsal and anal fin with dark speckles.

B. 3. D. 4/17 or 4/18. P. 1/14. V. 2/8. A. 3/5 or 3/6. C. 6/17/6 or 7/17/7, short flanking ones included.

Hab. Borneo (Pontianak), in the river.

Length of sole specimen 80''.

Remark. A more detailed investigation of this species has made me perceive that it belongs to the group of the genus with large visible snout pores, pores that I had not noticed in my earlier description although based on the same specimen. Already therefore it differs from *Rohita melanopleura* Blkr, to which it is related because of the number of scales in a longitudinal row and by the number of fin rays, – moreover it can be distinguished by several other characters from *Rohita melanopleura*, e.g. by the presence of only 8 longitudinal scale rows above the lateral line, the completely superior

eyes, the absence of a black spot behind the axils, and the presence, on the contrary, of a round black spot in the lateral line at the caudal fin base, shorter barbels, etc.

166 Earlier this species was only known to me from Pontianak, from where I received my single specimen, however the above mentioned sketch book of the Count de Castelnau teaches me that it also lives in Siam, near Bangkok.

Rohita (Rohita) Waandersi Blkr,
Nieuwe Bijdr. ichth. kenn. V. Banka, Nat T. Ned. Ind. P. 733. –
Waandersche Rohita [Waanders' *Rohita*].
Atl. Cypr. Tab. IX fig. 2.

A *Rohita (Rohita)* with an oblong, compressed body, depth of body contained about 4 times in its length, width contained slightly over 2 times in its depth. Head slightly obtuse, slightly convex, the lower anterior part slightly obliquely truncate, when the mouth is closed, contained about $5\frac{3}{4}$ times in length of body with caudal fin, about $4\frac{2}{5}$ times in length of body without caudal fin, depth of head contained about $4\frac{1}{5}$ times in its length, width about $1\frac{2}{5}$ times; eyes superior, eye diameter contained about $3\frac{3}{4}$ times in the length of the head, eye diameter contained $1\frac{1}{3}$ to $1\frac{2}{5}$ times in the postocular part of the head, distance between the eyes nearly twice their diameter, palpebral membrane covering the external margin of the iris only, the opening nearly circular; rostro-dorsal profile sloping on the head, nearly straight or slightly convex, convex on nape and back; interorbital line convex; nostrils closer to the orbit than to the tip of the snout, posterior nostrils open, can be closed by means of a valve; anterior nostrils slightly tubular, small pores between the nostrils and the superior angle of the gill cover, placed in one longitudinal row, little conspicuous; snout fleshy, nearly flat, convex, longer than the eye, hardly protruding in front of the mouth, no larger or smaller visible pores; anterior suborbital bone oblong-irregularly quadrangular, the posterior part higher than the anterior part; length less than twice as great as depth; other suborbital bones low, four times to many times as narrow as eye diameter, no visible suborbital pores; barbels fleshy, tapering, maxillary barbels much longer than nasal barbels, not or hardly longer than the eye diameter; upper jaw with a cartilaginous edge, slightly reminding of a horse shoe; at the symphysis lightly emarginate, strongly downward protrusible; upper lip very fleshy, hanging anterior to upper jaw, internal margin with obliquely transverse grooves, free margin with many-rowed, short, conical, obtuse papillae; lower jaw flat, anterior margin truncate; lower lip very fleshy, back-folded, internal margin with obliquely transverse grooves, free margin with many-rowed, conical, obtuse, short papillae; grooves at lower front side separated by the wide isthmus; chin slightly obliquely truncate because of the ascending lower jaw; width of gill cover contained nearly twice in its depth, not narrower than eye diameter, lower margin nearly straight; gill opening ending below the posterior part of the gill cover. Pharyngeal teeth masticatory, aggregated 2.4.5/5.4.2, each with little visible, slightly elevated margins on the obliquely truncate chewing surface, teeth in anterior row not grooved rostrally; scapula triangular, acutely rounded; dorsal line of the body convex, higher than convex ventral line; belly flat anterior to ventral fins, slightly obtusely ridged behind ventral fins; scales nearly vertical, larger on the middle of the flanks than on the rest of the body, free half and generally also basal half with longitudinal stripes, slightly ray-like, 35 or 36 scales in the lateral line, 15 in a transverse row, of which $6\frac{1}{2}$ (7) above the lateral line, about 12 in a longitudinal row between occiput and dorsal fin; lowest ventral scales in three longitudinal rows, those in the middle grow gradually increasing in size posteriorly, larger than scales in flanking rows; lateral line nearly straight, sloping downward only anteriorly, hardly closer to the base of the ventral fins than to the dorsal line, each scale marked by a simple tube reaching or nearly reaching the centre of the scale; dorsal fin starting anterior to ventral fins and ending rather far anterior to anal fin, scaleless at the base, acute, hardly emarginate, length not much greater than depth, length contained about $4\frac{3}{4}$ times in the length of the body, depth contained about $1\frac{2}{5}$ times in the depth of the body; pectoral fins acute, nearly equal in length, contained nearly $6\frac{1}{2}$ times in the length of the body, not reaching ventral fins; ventral fins acute, contained about **167** 7 times in the length of the body, not reaching the anal fin; anal fin at the base enclosed in a very low scaled sheath, acute, not emarginate,

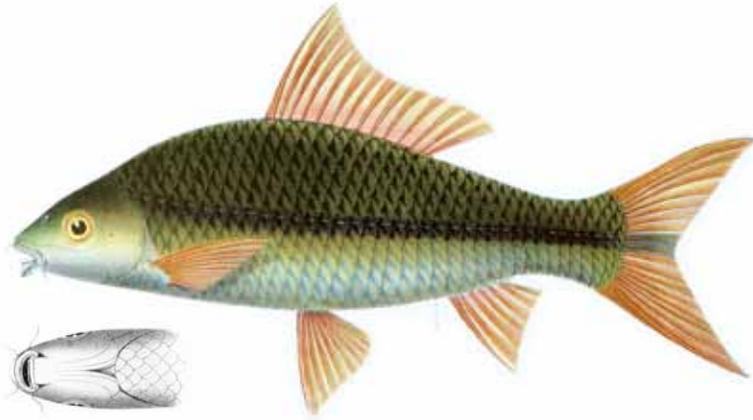


Fig. 34. *Rohita (Rohita) Waandersi* Blkr. Atl. Ichth. Cypr. Tab. IX, Fig 2. TL figure 193 mm.

considerably lower than the dorsal fin and about 3 times as short, the simple third ray thin, cartilaginous; caudal fin scaled at the base, with a deep incision, lobes acute, contained about $4\frac{1}{2}$ times in the length of the body. Colour: upper part of the body green, lower part silver; iris yellow or pink, darkish-violet head-tail band thinner on the anterior part of the body than on the tail, maximally conspicuous, the posterior part lengthened as far as the tips of the middle rays of the caudal fin; fins beautiful pink or red.

B. 3. D. $4/12$ or $4/13$. P. $1/14$. V. $2/8$. A. $3/5$ or $3/6$. C. $5/17/5$ or $6/17/6$, the short flanking ones included.

Hab. Banka (Toboali), in the river.

Length of sole specimen 198'''.

Remark. *Rohita waandersi*, so named in honour of Mr H.L. Van Bloemen Waanders, to whom we owe its acquaintance, belongs to the species with a longitudinal brown or blackish body band, to which also belong *Rohita vittata* Val, *Rohita enneapora* Blkr, *Rohita microcephalus* Val. and *Rohita brachynotopterus* Blkr, all of them species from the Sunda Islands. It cannot be confused with any of them. From *Rohita enneapora* and *Rohita vittata* it can be distinguished already by the fact that its snout is entirely smooth and has no visible pores. However, from all four mentioned species it distinguishes itself by having one longitudinal scale row more above the lateral line, those rows numbering $7 (6\frac{1}{2})$, whereas in all other species only $6 (5\frac{1}{2})$ are found. As far as the species of my collection are concerned *Rohita waandersi* has this character only in common with *Rohita Kappeni* Blkr, a species which for the rest misses the longitudinal band, however on the contrary is remarkable by a very large black spot which comprises the entire caudal fin in vertical direction.

For the rest *Rohita Waandersi* is most closely related to *Rohita microcephalus* Val., both in habitus as in fin shape. Apart from the difference between them in the formula of the scales, I perceive still another in the shape of the anteriormost suborbital bone, which in *Rohita waandersi* is irregular rectangular, whereas in *Rohita microcephalus* it has a crescent-like shape. Moreover in *Rohita microcephalus* the opercle is relatively narrow, the pharyngeal teeth are not lobed and those of the anterior row are not grooved, etc.

Till now the species is only known from Banka.

Rohita (Rohita) Kappeni Blkr,
Act. Soc. Scient. Ind. Neerl. II Tiende Bijdr. Ichthyol. Fauna van Borneo p. 19 –
Van Kappensche Rohita [*Van Kappen's Rohita*].
Atl. Cypr. Tab. XII fig. 1.

A *Rohita (Rohita)* with an oblong, compressed body, depth of body contained about $3\frac{1}{2}$ times in its length, width contained about $2\frac{1}{2}$ times in its depth. Head slightly acute, the lower anterior part slightly obliquely truncate, when the mouth is closed, contained nearly 6 times in length of body with caudal fin, about $4\frac{1}{4}$ times in length of body without caudal fin, depth of head contained hardly more than once in its length, width about $1\frac{1}{2}$ to $1\frac{3}{5}$ times; eyes slightly superior, eye diameter contained about 3 times in the length of the head, eye diameter contained once in the postocular part of the head, distance between the eyes about $1\frac{1}{2}$ times their diameter, palpebral ¹⁶⁸ membrane covering the external margin of the iris only, the opening nearly circular; rostro-dorsal profile sloping on head and crown, nearly straight, very convex on nape and back; interorbital line convex; nostrils closer to the orbit than to the tip of the snout, posterior nostrils open, can be closed by means of a valve; anterior nostrils slightly tubular; small pores on both sides between the nostrils and the superior angle of the gill cover, placed in one longitudinal row, little conspicuous; snout fleshy, slightly flat, convex, hardly protruding in front of the mouth, not or hardly shorter than the eye, smooth everywhere, no smaller or larger visible pores; anterior suborbital bone oblong-quadrangular, rounded at the angles, length less than twice as great as depth; other suborbital bones low, many times as narrow as the eye diameter, no visible suborbital pores; barbels fleshy, maxillary barbels much longer than nasal barbels, maxillary barbels slightly shorter than the eye diameter; upper jaw with a cartilaginous edge, slightly reminding of a horse shoe, not emarginate at the symphysis, strongly downward protrusible; upper lip very fleshy, hanging anterior to jaw, free margin covered with numerous many-rowed, conical, acute, short papillae; lower jaw flat, slightly spoon-shaped; lower lip very fleshy, back-folded, free margin with numerous many-rowed, conical, acute, short papillae; grooves at the lower and front side separated by the wide isthmus; chin lightly obliquely truncate because of ascending lower jaw; width of gill cover contained about twice in its depth, lower margin slightly concave; gill opening ending below the anterior part of the gill cover. Pharyngeal teeth masticatory, aggregated 2.4.5/5.4.2, each with an obliquely truncate or obliquely convex chewing surface, margins elevated, particularly teeth in anterior row unequally bilobed, teeth in the anterior row with a broad groove rostrally side of the top half; scapula triangular, acutely rounded; dorsal line of the body convex, much higher than convex ventral line; belly flat anterior to ventral fins, very obtusely ridged behind ventral fins; scales nearly vertical, larger on the middle of the flanks than on the rest of the body, free half with longitudinal, slightly ray-like stripes, basal half with some longitudinal stripes, 32 to 34 scales in the lateral line, $14\frac{1}{2}$ (15) in a transverse series, of which $6\frac{1}{2}$ (7) above the lateral line, 10 or 11 in a longitudinal row between occiput/crown and dorsal fin; lowest ventral scales in three longitudinal rows, those in the medial row not or hardly larger than scales in flanking rows; lateral line nearly straight, sloping downward only anteriorly, not much closer to the base of the ventral fins than to the dorsal line, each scale marked by a simple tube reaching or surpassing the centre of the scale. Dorsal fin starting anterior to the ventral fins and ending above the beginning of the anal fin, scaleless at the base, acute, emarginate, length much greater than depth, length contained about $3\frac{3}{5}$ times in the length of the body, depth contained about $1\frac{1}{2}$ times in the depth of the body; pectoral and ventral fins acute, nearly equal in length, contained nearly 6 times in the length of the body, pectoral fins not reaching ventral fins, ventral fins not reaching anal fin; anal fin at the base enclosed in a very low scaled sheath, acute, not or hardly emarginate, not much lower than dorsal fin but about 3 times as short, the simple third ray thin, cartilaginous; caudal fin scaled at the base, with a deep incision, lobes acute, upper lobe slightly longer than lower lobes, contained about $3\frac{3}{5}$ times in the length of the body. Colour: upper part of the body green, lower part silver; iris yellow or pink, each scale on back and flanks with a violetish, transverse stripe or crescent-shaped band at the base; many scales on the anterior part of the flanks with a shiny green droplet; tail without longitudinal bands but with a large black spot enclosed



Fig. 35. *Rohita (Rohita) Kappeni* Blkr. Atl. Ichth. Cypr. Tab. XII, Fig 1. TL figure 117 mm.

ing nearly the whole tail close to the base of the caudal fin and with a wide orange border; dorsal and anal fin pink, more or less with dark speckles; small darkish-violet spot on the roots of each of the rays of the dorsal fin, ventral, pectoral and caudal fin yellowish, orange or pink.

B. 3. D. 4/15 or 4/16. P. 1/13. V. 2/8. A. 3/5 or 3/6. C. 6/17/6 or 7/17/7, short flanking ones included.

Hab. Borneo (Pontianak), in the river.

Length of sole specimen 120'''.

Remark. The *Rohita* in question in relationship stands between *Rohita Hasseltii* Val. and *Rohita Schlegeli* Blkr. It differs from *Rohita Hasseltii* by having one row of scales ¹⁶⁹ more above the lateral line, shorter barbels, a higher, more thick-set body (mainly caused by a shorter tail, which, measured from the last dorsal fin ray till the basis of the caudal fin, goes $7 \frac{3}{5}$ times in the length of the body, whereas the tail in specimens of *Rohita Hasseltii* and *Rohita Schlegeli*, measured in the same way, go only about $5 \frac{1}{4}$ times in the length of the body.), a higher and more acute dorsal fin, the absence of longitudinal tail bands and the larger black spot which almost totally encompasses the tail.

From *Rohita Schlegeli* on the contrary it differs except by a shorter tail, by a less acute profile, smaller head, one row of scales less under the lateral line, higher in the head (almost superior) placed eyes, dorsal fin ending above the anal fin, larger black tail spot, etc.

The differences between the three species in question are all very well visible when one compares specimens of the same size, however some of them are less apparent when the specimens differ considerably in size, as the body shape and the length and depth of the head and dorsal fin within certain confines, vary with the age of the specimens.

Rohita (Rohita) Schlegeli Blkr,
 Vijfde Bijdr. Ichth. Borneo, Nat. T. Ned. Ind. II p. 423,
 Negende Bijdr. Ichth. Borneo, Nat. T. Ned. Ind. IX p. 426. –
Schlegel's Rohita.
 Atl. Cypr. Tab. XV fig. 3.

A *Rohita (Rohita)* with an oblong, compressed body, depth of body contained 4 to $3\frac{1}{2}$ times in its length, width contained 2 to $2\frac{1}{2}$ times in its depth. Head acute, the lower anterior part moderately obliquely truncate, when the mouth is closed, contained $4\frac{2}{5}$ to nearly 6 times in length of body with caudal fin, $3\frac{1}{2}$ to $4\frac{1}{5}$ times in length of body without caudal fin, depth of head contained $1\frac{1}{4}$ times to slightly over once in its length, width contained $1\frac{3}{4}$ to $1\frac{1}{5}$ times in its length; eyes posterior, eye diameter contained $2\frac{2}{5}$ to $3\frac{1}{4}$ times in the length of the head, eye diameter contained once to $1\frac{1}{5}$ times in the postocular part of the head, distance between the eyes once to slightly more than twice their diameter, palpebral membrane covering the external margin of the iris only, the opening nearly circular; rostro-dorsal profile in younger animals slightly concave on forehead and crown, in old animals nearly straight, strongly convex on nape and back; interorbital line convex; nostrils closer to the orbit than to the tip of the snout, posterior nostrils open, can be closed by means of a valve; anterior nostrils slightly tubular, small pores between the nostrils and the superior angle of the gill cover, placed in one longitudinal row, little conspicuous; snout fleshy, flat, convex, hardly protruding in front of the mouth, in juveniles shorter than the eye, in old animals not shorter than the eye, smooth everywhere, without larger or smaller visible pores; anterior suborbital bone oblong, irregularly quadrangular, generally rounded at the angles; length less than twice as great as depth; other suborbital bones low, many times as narrow as eye diameter, no visible suborbital pores; barbels fleshy, maxillary barbels much longer than nasal barbels, considerably shorter than the eye diameter; upper jaw with a cartilaginous, slightly reminding of a horse shoe; not emarginate at the symphysis, strongly downward protrusible; upper lip very fleshy, hanging anterior to jaw, free margin covered with numerous many-rowed, conical, acute, short papillae; lower jaw flat, slightly spoon-shaped; lower lip very fleshy, backfolded, free margin with numerous many-rowed, conical, acute, short papillae; grooves 170 at lower anterior side separated by the wide isthmus; chin obliquely truncate because of ascending lower jaw; width of gill cover contained $1\frac{2}{3}$ to 2 times in its depth, lower margin nearly straight; gill opening ending below the anterior part of the gill cover. Pharyngeal teeth masticatory, aggregated 2.4.5/5.4.2, each tooth in the posterior rows obliquely truncate at the chewing surface, teeth in the anterior row with an irregular chewing surface, with an elevated margin, bilobed, top half with a broad groove rostrally; scapula obtuse, rounded; dorsal line of the body convex, much higher than convex ventral line; belly flat anterior to ventral fins, very obtusely ridged behind ventral fins; scales nearly vertical, larger on the middle of the flanks than on the rest of the body, free half with longitudinal, slightly ray-like stripes, basal half with hardly any longitudinal strips or none at all, 34 to 36 scales in the lateral line, $15\frac{1}{2}$ (16) in a transverse row, of which $6\frac{1}{2}$ (7) above the lateral line, 11 or 12 in a longitudinal row between occiput and dorsal fin; lowest ventral scales in 3 longitudinal rows, scales in the medial row not larger than those in flanking rows; lateral line nearly straight, sloping downward only anteriorly, not much closer to the base of the ventral fins than to the dorsal line, each scale marked by a simple tube reaching or not reaching the centre of the scale. Dorsal fin starting anterior to the ventral fins and ending above the beginning of the anal fin, scaleless at the base, acute, emarginate, length not much greater than depth, length contained $4\frac{3}{4}$ to slightly over 4 times in the length of the body, depth contained $1\frac{1}{5}$ to $1\frac{2}{5}$ times in the depth of the body; pectoral fins acute or slightly acute, not or hardly reaching the ventral fins, contained 6 to $6\frac{1}{2}$ times in the length of the body, ventral fins acute, not or hardly reaching the anal fin, contained $5\frac{3}{4}$ to $5\frac{1}{5}$ times in the length of the body; anal fin at the base enclosed in a very low scaled sheath, acute, slightly to not emarginate, not to considerably lower than dorsal fin but more than twice to 3 times as short, the simple third ray thin, cartilaginous; caudal fin scaled at the base, with a deep incision, lobes acute, contained $3\frac{3}{4}$ to more than 4 times in the length of the body, upper lobe slightly longer than lower lobe. Colour: upper part of the body golden-green or olive, lower part silver; iris yellow or pink, every scale on the back and the



Fig. 36. *Rohita (Rohita) Schlegeli* Blkr. Atl. Ichth. Cypr. Tab. XV, Fig 3. TL figure 193 mm.

flanks with a transverse, violetish band at the base; fins pink or red, more or less with dark speckles, anterior part of dorsal fin often with a very large diffuse blackish-violet spot.

B. 3. D. 4/13 to 4/15. P. 1/14 to 1/16. V. 2/8. A. 3/5 or 3/6. C. 6/17/6 or 7/17/7, short flanking ones included.

Syn. *Aralim* or *Aralim* Palemb.

Hab. Sumatra (Meninju, Palembang, Lahat), in rivers and lakes.

Borneo (Bandjermasin, Prabukarta, Pontianak), in rivers.

Length of 12 specimens 71''' to 258'''.

Remark. Closely related to *Rohita Hasseltii* Val., the species in question differs steadily from it by a few rows of scales more on a transverse row in general, and by one longitudinal scale row more above the lateral line. It is moreover recognizable by lower placed eyes, a more acute profile, a higher and shorter dorsal fin, etc. The entirely behind and not (as in *Rohita Hasseltii*) higher than the mouth slit placed eyes, give the head a physiognomy of its own, by which the species is distinguishable from *Rohita Hasseltii* in one glance. Just like *Rohita Waandersi* and *Rohita Kappenii* it has 7 (6½) longitudinal scale rows above the lateral line, however it differs from both of them by its posteriorly placed eyes, the absence of a longitudinal body band or tail spot, and moreover it has the tail longer than *Rohita Kappenii* but shorter than *Rohita Waandersi*.

From the above several times mentioned sketch book of Count de Castelnau I perceive that *Rohita Schlegeli* also lives in Siam.

171 *Rohia (Rohita) Hasseltii* Val.,

Poiss XVI p. 209; Blkr, Zevende Bijdr. Ichthyol. Borneo, Nat. T. Ned. Ind. V p. 450. –
Van Hasselt's Rohita.
 Atl. Cypr. Tab. XIV.

A Rohita (Rohita) with an oblong, compressed body, depth of body contained 4 to $3\frac{3}{5}$ times in its length, width contained 3 to 2 times in its depth. Head slightly acute, the lower anterior part slightly obliquely truncate, when the mouth is closed, contained 5 to 7 times in length of body with caudal fin, $3\frac{3}{4}$ to slightly over 5 times in length of body without caudal fin, depth of head contained $1\frac{1}{4}$ times to once in its length, width $1\frac{3}{5}$ to $1\frac{1}{5}$ times; eyes slightly superior, eye diameter contained nearly 3 to 4 times in the length of the head, eye diameter contained once to $1\frac{2}{3}$ times in the postocular part of the head, distance between the eyes $1\frac{1}{4}$ to $2\frac{2}{3}$ times their diameter, palpebral membrane covering the external margin of the iris only, the opening nearly circular; rostro-dorsal profile nearly straight or slightly concave on forehead and crown, very convex on nape and back; interorbital line convex; nostrils closer to the orbit than to the tip of the snout, posterior nostrils open, can be closed by means of a valve; anterior nostrils slightly tubular, small pores on both sides between the nostrils and the superior angle of the gill cover, placed in one longitudinal row, conspicuous; snout fleshy, flat, convex, hardly protruding in front of the mouth, in juveniles shorter than the eye, in old animals longer than the eye, smooth everywhere, without larger or smaller visible pores; anterior suborbital bone oblong, irregularly quadrangular; length less than twice as great as depth; other suborbital bones low, many times to three times as narrow as eye diameter, no visible suborbital pores; barbels fleshy, maxillary barbels much longer than nasal barbels, not to slightly longer than the eye; upper jaw with a cartilaginous edge, slightly reminding of a horse shoe; not emarginate at the symphysis, strongly downward protrusible; upper lip very fleshy, hanging anterior to jaw, free margin covered with numerous many-rowed, conical, acute, short papillae; lower jaw flat, slightly spoon-shaped; lower lip very fleshy, back-folded, free margin with numerous many-rowed, conical, acute, short papillae; grooves at lower anterior side separated by the wide isthmus; chin obliquely truncate because of ascending lower jaw; width of gill cover contained $1\frac{1}{2}$ to 2 times in its depth, lower margin nearly straight or slightly convex; gill opening ending below the anterior part of the gill cover. Pharyngeal teeth masticatory, aggregated 2.4.5/5.4.2, each with an obliquely truncate chewing surface, teeth in anterior row with an elevated margin, lobed and with a broad groove at the front of the top half; scapula triangular, slightly obtusely rounded; dorsal line of the body convex, higher than convex ventral line; belly flat anterior to ventral fins, rounded or very obtusely ridged behind ventral fins; scales nearly vertical, larger on the middle of the flanks than on the rest of the body, free and basal half with longitudinal stripes, slightly ray-like, 34 to 37 scales in the lateral line, $13\frac{1}{2}$ (14) in a transverse row (without the lowest ventral scales) of which $5\frac{1}{2}$ (6) above the lateral line, 11 or 12 in a longitudinal row between occiput and dorsal fin; lowest ventral scales in three longitudinal rows, gradually increasing in size posteriorly, scales in the medial row hardly larger than those in flanking rows; lateral line nearly straight, sloping downward only anteriorly, not much closer to the base of the ventral fins than to the dorsal line, each scale marked by a simple tube reaching or not reaching the centre of the scale. Dorsal fin starting anterior to the ventral fins and ending slightly anterior to or above the beginning of the anal fin, scaleless at the base, acute, emarginate, length not much greater than to more than twice as great as depth, length contained $4\frac{3}{5}$ to $3\frac{3}{4}$ times in the length of the body, depth contained $1\frac{1}{4}$ to 2 times in the depth of the body; pectoral and ventral fins acute to slightly obtusely rounded, nearly equally long, contained $5\frac{3}{4}$ to 7 times in the length of the body, pectoral fins not reaching ventral fins, ventral fins not reaching anal fin; anal fin at the base enclosed in a very low scaled sheath, acute, slightly convex to hardly emarginate, slightly to not lower than dorsal fin but much more than twice to nearly 4 times as short, the simple third ray thin, cartilaginous; caudal fin scaled at the base, with a deep incision, lobes acute, upper lobe generally longer than lower lobe, contained $3\frac{2}{3}$ to $4\frac{2}{5}$ times in the length of the body. Colour: upper part of the body faintly green, olive or blackish-green, lower part faintly green or silver-172 pearly; iris yellowish or faintly pink, suprascapular spot generally violet-green or blackish; anterior part of the flanks with a droplet or a crescent-shaped golden, or red or shiny green spot on each scale, posterior part in younger animals nearly always, in old animals more



Fig. 37. *Rohita (Rohita) Hasseltii* Blkr. Atl. Ichth. Cypr. Tab. XIV, Fig. 1. TL figure 270 mm.

rarely with several longitudinal darkish bands, generally composed of spots (one on each scale); tail in younger animals with a large blackish spot in the lateral line close to the base of the caudal fin; fins greenish-hyaline or pink or violet-black.

B. 3. D. 4/14 to 4/18. P. 1/13 to 1/15. V. 2/8. A. 3/5 or 3/6. C. 6/17/6 or 7/17/7, short flanking ones included.

Syn. *Rohita de Hasselt* Val., Poiss. XVI p. 209.

Rohita leiorhynchos Blkr. Verh. Bat. Gen. XXIII Ichth. M. O. Java p. 19.

Rohita Artedii Blkr, Vijfde Bijdr. ichth. Borneo, Nat. T. Ned. Ind. I p. 434.

Millem Mal. Batav. *Lehat*, *Mangut*, *Regis*, *Nillem* Sundan.

Palon Lampong., *Palouw* Benkul.

Hab. Java (Batavia, Perdana, Krawang, Tjikao, Tjampea, Kuningan, Lelles, Ngawi, Surabaya, Gempol), in rivers.

Sumatra (Telokbetong, Pangabuang, Palembang, Padang, Solok, Meninju), in rivers and lakes.

Borneo (Pengaron, Bandjermasin, Pontianak, Bankajang, Sambas), in rivers.

Length of 78 specimens 60''' to 320'''.

Remark. The numerous specimens of this species in my possession, offer rather remarkable differences regarding the relative depth of the body, the depth and length of the fins (especially of the dorsal fin), and the colouration of body and fins. In many specimens the spots on the anterior part of the flanks are brilliantly red, in many others shining green, however, both the red and the green spots disappear completely during the preservation in spirit of wine.

The species is very common in Batavia. It belongs, just like *Systemus (Barbodes) bramoides* Blkr, *Systemus (Barbodes) rubripinnis* Blkr, *Rasbora argyrotaenia* Blkr. and *Hampala macrolepidota* V. Hass. to the Batavian Cyprinoids that are caught daily with dip-nets in the Tjiliwong. However, because of the surplus of more palatable sea fish, none of the Cyprinoids in Batavia are consumed by Europeans, and usually the catch is only made by the natives for their own use. Once in a while, larger quantities of this species are placed on the market in Batavia by fishermen from the Krawang country, where now and then large schools are caught in the mouth of the Tjitarum river.

A comparison of the specimens which I earlier described under the names *Rohita leiorhynchos* and *Rohita Artedii*, with numerous specimens of the same size of *Rohita Hasseltii*, has given me the conviction that no specific value can be attached the differences earlier indicated by me, so that both these species, being only nominal, should be removed from the registers.

Rohita Hasseltii is easily and at a first glance recognizable, when they still possess their natural coloration. However, also without this it can be recognized by the smooth snout, 34 to 37 scales in the lateral line, 6 (5½) longitudinal scale rows above the lateral line, an irregular square shaped anterior ¹⁷³suborbital bone, well developed barbels, 14 to 18 branched dorsal fin rays (D. 4/14 to 4/18) and superior eyes.

Rohita (Rohita) microcephalus Val., Poiss XVI p. 210?; –
Kleinkoppige Rohita [*Small headed Rohita*].
Atl. Cypr. Tab. XI fig. 1.

A *Rohita (Rohita)* with an oblong, compressed body, depth of body contained 4½ to slightly over 4 times in its length, width contained about twice in its depth. Head slightly obtusely convex, the lower part not or hardly obliquely truncate when the mouth is closed, contained 5⅓ to nearly 6 times in length of body with caudal fin, 4⅓ to 4½ times in length of body without caudal fin, depth of head contained 1½ to 1⅔ times in its length, width contained about 1½ times in its length; eyes superior, eye diameter contained slightly over 3 to about 3¼ times in the length of the head, eye diameter contained once in the postocular part of the head, distance between the eyes 1⅓ to about 1⅔ times their diameter, palpebral membrane covering the external margin of the iris only, the opening nearly circular; rostro-dorsal profile nearly straight on all of the head, convex on nape and back; interorbital line convex; nostrils much closer to the orbit than to the tip of the snout, posterior nostrils open, can be closed by means of a valve; anterior nostrils slightly tubular, pores between the nostrils and the superior angle of the gill cover small, conspicuous, placed in one longitudinal row; snout fleshy, strongly convex, obtuse, slightly protruding anterior to the mouth, longer than the eye, smooth everywhere, without larger or smaller visible pores; anterior suborbital bone slightly crescent-shaped, with the convexity pointing backward, length not much greater than depth; other suborbital bones low, three to four times as narrow as eye diameter, no visible suborbital pores; barbels fleshy, maxillary barbels much longer than nasal barbels, hardly shorter than the eye diameter; upper jaw with a cartilaginous edge, slightly reminding of a horse shoe; at the symphysis lightly emarginate, strongly downward protrusible; upper lip very fleshy, hanging anterior to jaw, internal margin with transverse internal grooves, free margin covered with many-rowed, conical, short, obtuse papillae; lower jaw flat, slightly spoon-shaped, anterior margin slightly truncate; lower lip very fleshy, back-folded, internal margin with transverse grooves all over, free margin with many-rowed, conical, acute papillae, grooves at lower front side separated by the wide isthmus; chin hardly obliquely truncate because of ascending lower jaw; width of gill cover contained slightly over 2 times in its depth, considerably thinner than the eye diameter, lower margin slightly concave; gill opening ending below the posterior margin of the preoperculum. Pharyngeal teeth masticatory, aggregated 2.4.5/5.4.2, each with an obliquely truncate or obliquely convex chewing surface, margins elevated, teeth particularly in anterior row unequally bilobed; teeth in the anterior row rostrally side of the top half run through with a broad longitudinal groove; scapula triangular, acutely rounded; dorsal line of the body convex, higher than convex ventral line; belly flat anterior to ventral fins, rounded, not ridged behind ventral fins; scales nearly vertical, larger on the middle of the flanks than on the rest of the body, free and basal half with longitudinal, slightly ray-like stripes, 34 scales in the lateral line, 13½ (14) in a transverse row, of which 5½ (6) above the lateral line, 10 or 11 in a longitudinal row between occiput and dorsal fin; lowest ventral scales in three longitudinal rows, scales in the medial row not larger than scales in flanking rows; lateral line nearly straight, sloping downward only anteriorly, not much closer to the base of the



Fig. 38. *Rohita (Rohita) microcephalus* Blkr. Atl. Ichth. Cypr. Tab. XI, Fig. 1. TL figure 132 mm.

ventral fins than to the dorsal line, marked on every scale by a simple tube not reaching or hardly reaching the centre of the scale; dorsal fin starting anterior to the ventral fins and ending anterior to the anal fin, scaleless at the base, acute, emarginate, length slightly greater than depth, length contained about $4\frac{1}{2}$ times in the length of the body, depth contained about $1\frac{1}{2}$ in the depth of the body; pectoral fins slightly acutely rounded, contained 6 to about $6\frac{2}{5}$ times in the length of the body, not reaching ventral fins; ventral fins slightly acutely or slightly obtusely rounded, contained $6\frac{1}{2}$ to nearly 7 times in the length of the body, not reaching anal fin; anal fin at the base enclosed in a very low scaled sheath, acute, not or hardly emarginate, not much lower than dorsal fin but about 3 times as short, the simple third ray thin, cartilaginous; caudal fin scaled at the base, with a deep incision, lobes acute, upper lobe hardly longer than lower lobe, ¹⁷⁴ contained $4\frac{1}{4}$ to about $4\frac{3}{5}$ times in the length of the body. Colour: upper part of the body green, lower part silver; iris golden or yellow, blackish-violet eye-tail band posteriorly broader and more conspicuous than anteriorly, ending at the base of the caudal fin; fins pink, dorsal fin with a small darkish spot at the base of each ray.

B. 3. D. 4/12 or 4/13. P. 1/14. V. 2/8. A. 3/5 or 3/6. C. 6/17/6 or 7/17/7, short flanking ones on the sides included.

Syn. *Rohita Waandersii* Blkr, Enum. Spec. pisc. Javan. Nat. T. Ned. ind. XVI p. 427 (not Nat. T. Ned. Ind. III p. 733).

Hab. Java (Tjikao), in rivers.
Sumatra (Lahat), in rivers.

Length of 4 specimens 84''' to 140'''.

Remark. It seems probable to me that the species in question is the same as the one that was described from dried specimens in the large *Histoire naturelle des Poissons* under the name *Rohita microcephalus*.

The blunt smooth snout, the small opercle, the high, short dorsal fin and the formula of the scales agree almost entirely with what is said concerning this of *Rohita microcephalus*, whereas the differences that the referred description offers with my specimen, cannot be considered to be more than individual variation or can be ascribed to the being less well preserved of the dry specimens observed by Mr Valenciennes. The description of Mr Valenciennes for that matter runs as follows

Rohita microcephalus, *Rohite à petite tête* Val.,
Poiss. XVI p. 210

[Translated from French]

“I believe I still have to place following the proceeding (*Rohita Hasseltii* Val.) this fish, which it resembles in habitus, but the head of which is much smaller, the dorsal fin much higher and scythe-shaped and also shorter. The body depth is one fourth of the body length. The head goes $1\frac{2}{3}$ times in the body depth, the forehead is short, large and rounded, the snout seems obtuse, but without large and distinct pores, it seems rather smooth. The upper lip is extended over the lower lip, which is straight, thin and bevelled. There are four short barbels on the upper lip, of which two are placed on the corner of the mouth. The eye has an average size, the anteriormost suborbital bone is triangular and covers the whole tip of the snout. The preorbital is large, it descends until the bottom of the cheek; the opercle is small. The dorsal fin originates at one third of the total length, and is shaped like a scythe. The first ray is larger than the fin, and three times as long as the last ray. The ventral fins are large and pointed. The anal fin is high and slightly scythe-shaped. The caudal is forked, with the dorsal lobe longer than the ventral one. D. 13. A. 7. C. 19. P. 13, V. 9. – The scales are of an average size, and striped: there are 33 in a longitudinal row, and 10 in a transverse row. The lateral line is straight on the middle of the 175 body. The colour seems to be olive-green, with brown spots on the basis of each scale. The fins are whitish without any spots. Hab. Bantam, in rivers. – Length of the described specimen 7 Parisian inches.”

I note here, that the large single dorsal fin ray, and ventral fin ray in my specimen, by a bending that carries the signs of a retarded development, so that it does not express the normal height of the dorsal fin nor the normal length of the ventral fins, and that the species in a normal state in this regard will answer more to the description of Mr Valenciennes.

Earlier I took my specimen, after a superficial investigation for a half-grown specimen of *Rohita Waandersi* Blkr. and mentioned it also erroneously under this name in my *Enumeratio specierum piscum Javanensium*, included in the 15th Volume of the *Natuurkundig Tijdschrift van Nederlandsch Indië*. – *Rohita Waandersi* however definitely is a different species, with less high and less posterior on the head placed eyes, a less convex snout, a broader opercle, a sharper delineated dark body band that extends till the posterior margin of the caudal fin, other details in the shape of the pharyngeal bones, one or two scales more in the lateral line, one longitudinal scale row more above the lateral line, etc.

Rohita brachynotopterus is equally related to the species in question, but is more easily distinguishable from it by its much less convex snout and lower placed eyes, one row of scales less under the lateral line, two rays less in the dorsal fin, etc.

Rohita (Rohita) brachynotopterus Blkr,
Nalez. op de vischfauna van Sumatra, Nat. T. Ned. Ind. IX p. 266. –
Kortvinnige Rohita [*Short-finned Rohita*]
Atl. Cypr. Tab. VIII fig. 6.

A *Rohita (Rohita)* with an oblong, compressed body, depth of body contained about $4\frac{3}{4}$ times in its length, width contained about 2 times in its depth. Head slightly acutely, slightly convex, the lower anterior part lightly obliquely truncate, when the mouth is closed, contained about $5\frac{1}{2}$ times in length of body with caudal fin, slightly over 4 times in length of body without caudal fin, depth of head contained about $1\frac{1}{3}$ times in its length, width about $1\frac{1}{2}$ times; eyes slightly superior, eye diameter contained about 3 times in the length of the head, eye diameter contained about once in the postocular part

of the head, distance between the eyes about $1\frac{1}{2}$ times the eye diameter, palpebral membrane covering the external margin of the iris only, the opening nearly circular; rostro-dorsal profile slightly convex on the head, convex on nape and back; interorbital line convex; nostrils closer to the orbit than to the tip of the snout, posterior nostrils open, can be closed by means of a valve; anterior nostrils slightly tubular, no visible pores between the nostrils and the superior angle of the gill cover; snout fleshy, convex, hardly protruding in front of the mouth, not shorter than the eye, smooth everywhere, without larger or smaller visible pores; anterior suborbital bone slightly crescent-shaped, with the convexity pointing backward; other suborbital bones low, three times to more than three times as narrow as the eye diameter, no visible suborbital pores; barbels fleshy, nasal barbels much shorter than the eye, maxillary barbels slightly longer than the eye; upper jaw with a cartilaginous edge, reminding of a horse shoe, at the symphysis ¹⁷⁶lightly emarginate, strongly downward protrusible; upper lip very fleshy, hanging anterior to jaw, internal margin with transverse grooves, free margin with short, conical many-rowed papillae; lower jaw flat, slightly spoon-shaped; lower lip very fleshy, back-folded, free margin with many-rowed, short, conical papillae, grooves at lower front side separated by the broad isthmus; chin obliquely truncate because of ascending lower jaw, slightly concave; width of gill cover contained about twice in its depth, hardly narrower than the eye diameter, lower margin slightly concave; gill opening ending below the posterior margin of the preoperculum. Pharyngeal teeth masticatory, aggregated 2.4.5/5.4.2, each with a thin chewing surface with irregular, elevated margins, teeth in anterior row compressed for the top half, at the front side traversed by a very conspicuous longitudinal sulcus; scapula triangular, slightly acutely rounded; dorsal line of the body convex, much higher than convex ventral line; belly flat anterior to ventral fins, obtusely ridged behind ventral fins; scales nearly vertical, larger on the middle of the flanks than on the rest of the body, free and basal half with longitudinal, slightly ray-like stripes, 34 or 35 scales in the lateral line, $12\frac{1}{2}$ (13) in a transverse row, of which $5\frac{1}{2}$ (6) above the lateral line, about 12 in a longitudinal row between occiput and dorsal fin; lowest ventral scales in three longitudinal rows, scales in the medial row hardly larger than those in flanking rows; lateral line nearly straight, slightly closer to the base of the ventral fins than to the dorsal line, each scale marked by a simple tube not reaching or surpassing the centre of the scale. Dorsal fin starting anterior to the ventral fins and ending anterior to the anal fin, scaleless at the base, acute, emarginate, length only slightly greater than depth, length contained about $4\frac{1}{2}$ times in the length of the body, depth contained slightly over once in the depth of the body; pectoral and ventral fins acute, nearly equal in length, contained slightly over 6 times to $6\frac{1}{3}$ times in the length of the body, pectoral fins not reaching ventral fins; ventral fins not reaching anal fin; anal fin at the base enclosed in a very low scaled sheath, acute, not or hardly emarginate, slightly lower than dorsal fin but about 3 times as short, the simple third ray thin, cartilaginous; caudal fin scaled at the base, with a deep incision, lobes acute, upper lobe longer than lower lobe, contained about $4\frac{2}{3}$ times in the length of the body. Colour: upper part of the body green, lower part silver; iris yellow or pink, diffuse dark-violet snout-eye-tail band; fins



Fig. 39. *Rohita (Rohita) brachynotopterus* Blkr. Atl. Ichth. Cypr. Tab. VIII, Fig. 6. TL figure 86 mm.

beautiful pink or red, dorsal and anal membrane with dark speckles, dorsal fin at the base with a small, round blackish-dark spot anterior to each ray.

B. 3. D. 4/10 or 4/11. P. 1/14. V. 2/8. A. 3/5 or 3/6. C. 7/17/7, short flanking ones included.

Hab. Sumatra (Lahat), in the river.

Length of sole specimen 90''.

Remark. The Rohita in question can be recognized by its small number of dorsal fin rays, its smooth snout, its slender body, its formula of the scale rows and peculiarities in the shape of the pharyngeal jaws.

Concerning its short dorsal fin it is related to Rohita chagunio Val., which according to Mr Valenciennes however has only 12 dorsal fin rays (read 4/9 or 4/10). This Rohita moreover has two more pectoral fin rays, the outline of the belly almost straight, and a band-like series of black spots on the back, whereas the eye-tail band is lacking.

With regard to the archipelagic species, Rohita brachynotus in relationship stands between Rohita Waandersi Blkr. and Rohita microcephalus Val., however it has two dorsal fin rays less than both these species, a scale row formula differing from both species, and other peculiarities in the dentition, whereas it can be separated from each of both species separately by other characters.

177 Amongst my juvenile specimens of Rohita vittata Val. there are some in which the for this species common three large snout pores are lacking and the dorsal fin has the same number of rays as Rohita brachynotus. Both species still can be separated from each other as in Rohita vittata the head and the body are remarkably deeper and one longitudinal scale row more is present, not above but below the lateral line.

Rohita (Rohita) Kuhli Blkr. –

Kuhl's Rohita

Atl. Cypr. Tab. XII fig. 3.

A Rohita (Rohita) with an oblong, compressed body, depth of body contained about $3\frac{3}{4}$ times in its length, width contained about $2\frac{1}{4}$ times in its depth. Head slightly acute, the lower anterior part moderately obliquely truncate when the mouth is closed, contained about 6 times in length of body with caudal fin, about $4\frac{1}{2}$ times in length of body without caudal fin, depth of head contained hardly more than once in its length, width contained about $1\frac{1}{2}$ times in its length; eyes superior, eye diameter contained slightly over 3 times in the length of the head, eye diameter contained slightly over once in the postocular part of the head, distance between the eyes about $1\frac{1}{2}$ times the eye diameter, palpebral membrane covering the external margin of the iris only, the opening nearly circular; rostro-dorsal profile sloping downward in a nearly straight line on forehead and crown, strongly convex on nape and back; interorbital line convex; nostrils closer to the orbit than to the tip of the snout, posterior nostrils open, can be closed by means of a valve; anterior nostrils slightly tubular, small conspicuous pores on both sides between the nostrils and the superior angle of the gill cover in one longitudinal row; snout fleshy, nearly flat, convex, hardly protruding in front of the mouth, not shorter than the eye, smooth everywhere, without larger or smaller visible pores; anterior suborbital bone oblong, irregularly quadrangular, length less than twice as great as depth, more or less rounded at the angles; other suborbital bones low, many times to four times as narrow as the eye diameter, no visible suborbital pores; barbels fleshy, maxillary barbels much longer than nasal barbels, hardly longer than the eye; upper jaw with a cartilaginous edge, reminding slightly of a horse shoe; at the symphysis lightly emarginate, strongly downward protrusible; upper lip very fleshy, hanging anterior to jaw, free margin with numerous, conical, short, slightly obtuse, many-rowed papillae; lower jaw flat, slightly spoon-shaped; lower lip very fleshy, back-folded, free margin with numerous many-rowed, conical, short, acute papillae, grooves at lower



Fig. 40. *Rohita (Rohita) Kuhli* Blkr. Atl. Ichth. Cypr. Tab. XII, Fig. 3. TL figure 152 mm.

front side separated by the broad isthmus; chin obliquely truncate because of ascending lower jaw; width of gill cover contained about twice in its depth, lower margin nearly straight; gill opening ending below the posterior margin of the preoperculum. Pharyngeal teeth masticatory, aggregated 2.4.5/5.4.2, each with an obliquely truncate or obliquely convex chewing surface, margins elevated, teeth particularly in anterior row unequally one- to two-lobed, teeth in anterior row at the front side of the top half with broad grooves; scapula triangular, obtusely rounded; dorsal line of the body convex, much higher than convex ventral line; belly flat anterior to ventral fins, very obtusely ridged behind ventral fins; scales nearly vertical, conspicuously larger on the middle of the flanks than on the rest of the body, free and basal half with longitudinal, slightly ray-like stripes, 33 scales in the lateral line, $11\frac{1}{2}$ (12) in a transverse row of which $4\frac{1}{2}$ (5) above the lateral line, 10 or 11 in a longitudinal row between the occiput and dorsal fin; lowest ventral scales in three longitudinal rows, scales in the medial row not larger than those in flanking rows; lateral line nearly straight, sloping downwards only anteriorly; not much closer to the base of the ventral fins than to the dorsal line, each scale marked by a simple tube not or hardly reaching the centre of the scale. Dorsal fin starting anterior to the ventral fins and ending hardly anterior to or above the beginning of the anal fin, scaleless at the base, acute, emarginate, length much greater than depth, length contained nearly 4 times in the length of the body, depth contained about $1\frac{1}{3}$ times in the depth of the body; pectoral and ventral fins acute or acutely rounded, nearly equal in length, contained 178 slightly over 6 times in the length of the body, pectoral fins not reaching ventral fins, ventral fins not reaching anal fin; anal fin at the base enclosed in a very low scaled sheath, acute, not or hardly emarginate, not much lower than dorsal fin but about three times as short, the simple third ray thin, cartilaginous; caudal fin scaled at the base, with a deep incision, lobes acute, upper lobe longer than lower lobe, contained about $3\frac{1}{2}$ times in the length of the body. Colour: upper part of the body olive, lower part silver; iris yellowish or pink; scales on the back and flanks each at the base olive-violetish; tail without longitudinal bands but with a large black diffuse roundish spot in the lateral line near the base of the caudal fin; fins pink, with more or less dark speckles.

B. 3. D. 4/14 or 4/15. P. 1/14. V. 2/8. A. 3/5 or 3/6. C. 6/17/6 or 7/17/7, short ones included.

Hab. Sumatra (Palembang), in the river.

Length of sole specimen 160'''.

Remark. I dedicate this species to the commemoration of H. Kuhl, for whom only time to live was lacking to be ranked amongst the foremost zoologists of the present

time. The species is closely related to *Rohita Hasseltii*, which gave me the idea to name it after Kuhl, as a name that is only seldom pronounced without that of Van Hasselt. This large relationship earlier made me fail to notice its characters, the reason why I preserved it for a long time with my specimens of *Rohita Hasseltii*.

However it surely is a proper species. Comparing it with similar sized specimens of *Rohita Hasseltii*, one already perceives that it has a deeper body and head, and that the dorsal fin is shorter, but higher and more acute, however the real characters lie in the squamation. The scales are relatively larger and placed in only 12 transverse rows, of which $4\frac{1}{2}$ to 5 above the lateral line, whereas *Rohita Hasseltii* has 14 transverse rows of which $5\frac{1}{2}$ to 6 above the lateral line. My specimens of *Rohita Hasseltii* moreover generally have 36 or 37 scales in the lateral line and exceptionally only 34, which however is still one scale more than *Rohita Kuhl*.

Apart from *Rohita Kuhl* I possess still another *Rohita* with only 5 ($4\frac{1}{2}$) scale rows above the lateral line, i. e. *Rohita oligolepis* Blkr. However this species differs from it in several ways, by a with visible pores covered snout, only 28-30 scales in the lateral line, one to two rays less in the dorsal fin, etc.

Rohita (Rohita) vittata Val.,

Poiss XVI p. 203: Blkr, Zevende Bijdr. Ichth. Borneo, Nat. T. Ned. Ind. V p. 451. –

Gebande Rohita [*Banded Rohita*].

Atl. Cypr. Tab. XII fig. 2.

A *Rohita (Rohita)* with an oblong, compressed body, depth of body contained $4\frac{3}{4}$ to 4 times in its length, width contained 2 to $2\frac{1}{4}$ times in its depth. Head slightly acute or slightly obtuse, the lower anterior part slightly obliquely truncate when the mouth is closed, head contained $5\frac{1}{3}$ to 7 times in length of body with caudal fin, 4 to $5\frac{1}{2}$ times in length of body without caudal fin, depth of head contained $1\frac{1}{4}$ to $1\frac{1}{8}$ times in its length, width $1\frac{1}{3}$ to $1\frac{2}{3}$ times; eyes superior, eye diameter contained 3 to 4 times in the length of the head, eye diameter contained once to $1\frac{1}{5}$ times in the postocular part of the head, distance between the eyes $1\frac{1}{4}$ to 2 times the eye diameter, ¹⁷⁹ palpebral membrane covering the external margin of the iris only, the opening nearly circular; rostro-dorsal profile sloping on forehead and crown, slightly convex, convex on nape and back; interorbital line convex; nostrils closer to the orbit than to the tip of the snout, posterior nostrils open, can be closed by means of a valve; anterior nostrils slightly tubular, small pores on both sides between the nostrils and the superior angle of the gill cover, in one longitudinal row, little conspicuous; snout fleshy, slightly flat, strongly convex, slightly protruding in front of the mouth, in younger animals not longer than the eye, in old animals much longer than the eye, at the tip in older fishes always, in younger fishes generally with 3 large, distant pores placed in a transverse row, central pore generally much larger than those on the sides, no smaller surrounding visible pores; anterior suborbital bone irregularly oblong-quadrangular, more or less rounded at the angles, length less than twice as great as depth; other suborbital bones low, many times to less than 3 times as narrow as the eye diameter, suborbital pores in one longitudinal row slightly or not visible; barbels fleshy, maxillary barbels much longer than nasal barbels, not or hardly longer than the eye diameter; upper jaw with a cartilaginous edge, slightly reminding of a horse shoe; at the symphysis lightly emarginate, strongly downward protrusible; upper lip very fleshy, hanging anterior to jaw, internal margin transversely rugose, free margin with many-rowed conical, short, acute papillae; lower jaw flat, anterior margin truncate; lower lip very fleshy, back-folded, internal margin obliquely transversely rugose, free margin with many-rowed, conical, short, acute papillae, grooves at lower front side separated by the wide isthmus; chin slightly obliquely truncate because of ascending lower jaw; maximal width of gill cover contained 2 to slightly over 2 times in its depth, width of the upper part contained 2 to $2\frac{2}{3}$ times in its depth, slightly narrower to not narrower than the eye diameter; lower margin nearly straight or slightly convex; gill opening ending below the posterior margin of the preoperculum. Pharyngeal teeth masticatory,

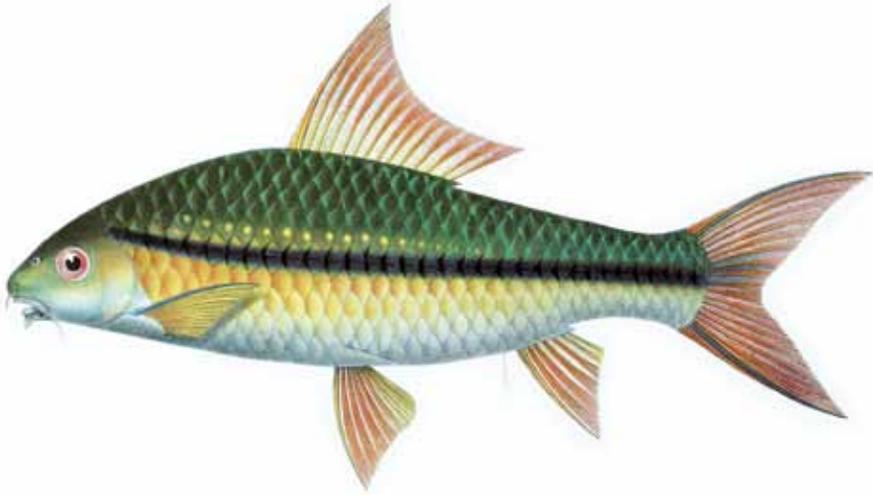


Fig. 41. *Rohita (Rohita) vittata* Blkr. Atl. Ichth. Cypr. Tab. XII, Fig. 2. TL figure 225 mm.

aggregated 2.4.5/5.4.2, each with an obliquely truncate chewing surface, margins elevated, teeth particularly in anterior row unequally lobed, teeth in anterior row at the front side of the top half traversed by a broad longitudinal groove; scapula triangular, slightly acutely rounded; dorsal line of the body convex, higher than convex ventral line; belly flat anterior to ventral fins, behind ventral fins rounded, not ridged; scales nearly vertical, larger on the middle of the flanks than on the rest of the body, free and basal half with longitudinal, slightly ray-like stripes, 33 or 34 scales in the lateral line, 14 (13½) in a transverse row, of which 6 (5½) above the lateral line, 11 or 12 in a longitudinal row between the occiput and dorsal fin; lowest ventral scales in 3 longitudinal rows, gradually increasing in size posteriorly, scales in medial row not larger than those at the sides; lateral line nearly straight, sloping downward only anteriorly, not much closer to the base of the ventral fins than to the dorsal line, each scale marked by a simple tube reaching or not reaching the centre of the scale. Dorsal fin starting anterior to the ventral fins and ending anterior to the anal fin, scaleless at the base, acute, emarginate, length slightly less than slightly more than depth; length contained 4⅔ to 5⅓ times in the length of the body, depth contained slightly over once to 1¼ times in the depth of the body; pectoral and ventral fins acute, nearly equal in length, contained nearly 6 to nearly 7 times in the length of the body, pectoral fins not reaching ventral fins; ventral fins not or hardly reaching anal fin; anal fin at the base with a hardly present very low scaled sheath, acute, slightly emarginate, considerably lower than dorsal fin, but more than twice (less than three times) as short, the simple third ray thin, cartilaginous; caudal fin broadly scaled at the base, deeply emarginate, lobes acute, upper lobe longer than lower lobe, contained 3⅓ to 4¼ times in the length of the body. Colour: upper part of the body green or olive, lower part silver; iris yellowish or pink, violet or darkish head-tail band, more or less broad, often not or little conspicuous, scales on the body each with a violetish spot at the base, spots in young animals sometimes resembling longitudinal bands, many of the scales on the back and flanks adorned with a small transverse shiny-green band; fins pink-hyaline or pink.

B. 3. D. 4/10 to 4/14. P. 1/13 to 1/16. V. 2/8. A. 3/5 or 3/6. C. 6/17/6, the short flanking ones included.

180 Syn. *Labeobarbus vittatus* K. v. H. ap. Val., Poiss. XVI p. 203.

Rohita à bandes Val., Poiss. XVI p. 203 (young)

Rohita erythrura Val., Poiss. XVI p. 204 (old)

Rohita à queue rouge Val., *ibidem* XVI p. 204.

Rohita erythrurus Blkr. Zevende Bijdr. ichth. Borneo, Nat. T. Ned. Ind. V p. 452.

Millem Mal. Bat., *Nillem* Sund.

Kasehreh Lamp.

Hab. Java (Batavia, Lebak, Buitenzorg, Tjikao, Parongkalong, Surabaya, Gempol), in rivers.
Sumatra (Pangabuang, Padang, Solok, Meninju, Lahat), in rivers and lakes.
Borneo (Bandjermasin, Pengaron, Pontianak), in rivers.
Length of 23 specimens 105''' to 245'''.

Remark. It now seems more than probable to me that *Rohita vittata* Val. and *Rohita erythrura* Val. are only different age groups of one and the same species. The differences mentioned in the cited descriptions as specific, must be considered to have no higher value than an individual one and can partly even be the result of the less well preserved state of the described or depicted specimens.

Rohita enneaporos Blkr. is a closely related species, which however cannot be united with *Rohita vittata* because of its 9 large snout pores, very narrow and high opercle, its lower head (in specimens of an equal size), etc. Not less closely related is *Rohita triporos* Blkr, which however can be recognized by a very large black spot anteriorly on the dorsal fin, a scale row less under the lateral line, etc.

Rohita vittata Val. is not rare in Batavia, however it is caught there especially during high water in the river, when they seems to descent more from the higher parts of the river.

Rohita (Rohita) kahajanensis Blkr,

Act. Soc. Scient. Ind. Neerl. II, Tiende Bijdr. Ichth. Fauna van Borneo p. 18. –
Kahajan's Rohita.

Atl. Cypr Tab. XV fig. 5. [Tab.VII, fig. 1]

A *Rohita (Rohita)* with an oblong, compressed body, depth of body contained 4 to slightly over 4 times in its length, width contained about 2 times in its depth. Head slightly acute, the lower anterior part slightly obliquely truncate, when the mouth is closed, head contained $5\frac{1}{2}$ to $5\frac{3}{4}$ times in length of body with caudal fin, 4 to $4\frac{1}{2}$ times in length of body without caudal fin, depth of head contained $1\frac{1}{3}$ to $1\frac{1}{2}$ times in its length, width contained $1\frac{3}{4}$ to $1\frac{1}{2}$ times in its length; eyes slightly superior, eye diameter contained slightly over 3 times in the length of the head, eye diameter contained slightly over once in the postocular part of the head, distance between the eyes $1\frac{1}{3}$ to $1\frac{1}{2}$ times their diameter, palpebral membrane covering the external margin of the iris only, the opening nearly circular; rostro-dorsal profile sloping, slightly convex on forehead and crown, convex on nape and back; interorbital line convex; nostrils closer to the orbit than to the tip of the snout, posterior nostrils open, can be closed by means of a valve; anterior nostrils slightly tubular, small pores on both sides between the nostrils and the superior angle of the gill cover, in one longitudinal row, little conspicuous; snout fleshy, nearly flat, convex, hardly protruding anterior to the mouth, not shorter than the eye, at the tip with 2 large distant pores placed in a transverse line, not surrounded by any visible 181 smaller pores; anterior suborbital bone oblong irregularly quadrangular, rounded at the angles, length less than twice as great as depth; other suborbital bones low, many times as narrow as eye diameter, no visible suborbital pores; barbels fleshy, tapering; maxillary barbels much longer than nasal barbels, hardly longer than the eye diameter; upper jaw with a cartilaginous edge, slightly reminding of a horse shoe, at the symphysis lightly emarginate, strongly downward protrusible; upper lip very fleshy, hanging anterior to jaw, free margin with numerous many-rowed conical, obtuse, short papillae; lower jaw flat, slightly spoon-shaped; lower lip very fleshy, back-folded, free margin with numerous many-rowed, conical, obtuse, short papillae, grooves at lower front side separated by the broad isthmus; chin slightly obliquely truncate because of ascending lower jaw; width of gill cover contained nearly twice in its depth, lower margin nearly straight; gill opening ending below the posterior margin of the preoperculum. Pharyngeal teeth masticatory, aggregated 2.4.5/5.4.2, each with an obliquely truncate or obliquely convex chewing surface, margins elevated, teeth particularly in



Fig. 42. *Rohita (Rohita) kahajanensis* Blkr. Atl. Ichth. Cypr. Tab. VIII, Fig. 1. TL figure 78 mm.

anterior row unequally bilobed, teeth in anterior row at the front side of the top half traversed by a broad longitudinal groove; scapula triangular, acutely rounded; dorsal line of the body convex, higher than convex ventral line; belly flat anterior to ventral fins, behind ventral fins rounded, obtusely ridged; scales nearly vertical, slightly larger on the middle of the flanks than on the rest of the body, free and generally also basal half with longitudinal, slightly ray-like stripes, 35 or 36 scales in the lateral line, 13 in a transverse row, of which $5\frac{1}{2}$ (6) above the lateral line, 10 or 11 in a longitudinal row between occiput and dorsal fin; lowest ventral scales in three longitudinal rows; lateral line nearly straight, sloping downward only anteriorly, hardly closer to the base of the ventral fins than to the dorsal line, each scale marked by a simple tube reaching or surpassing the centre of the scale. Dorsal fin starting anterior to the ventral fins and ending slightly anterior to the anal fin, scaleless at the base, acute, emarginate, length much greater than depth; length contained slightly over 4 times in the length of the body, depth contained about $1\frac{1}{3}$ times in the depth of the body; pectoral and ventral fins acute, nearly equal in length, contained about 7 times in the length of the body, pectoral fins not reaching ventral fins; ventral fins not reaching anal fin; anal fin at the base enclosed in a very low scaled sheath, acute, not emarginate, slightly lower but more than 3 times as short as dorsal fin, simple third ray thin, cartilaginous; caudal fin scaled at the base, with a deep incision, lobes acute, upper lobe longer than lower lobe, contained slightly over 4 times in the length of the body. Colour: upper part of the body green, lower part silver; iris yellow or pink, shiny-blue spot in suprascapular region; tail in older animals with a large black spot near the base of the caudal fin; diffuse darkish head-tail band; fins pink, dorsal, anal and caudal fin more or less with dark speckles.

B. 3. D. 4/15 or 4/16. P. 1/14. V. 2/8. A. 3/5 or 3/6. C. 7/17/7, short ones included.

Hab. Borneo (Kahajan), in rivers.

Sumatra (Lahat), in rivers.

Length of 5 specimens 76''' to 106'''.

Remark. The principal character of this species is found in the two large separate snout pores, without surrounding or in between lying smaller or larger pores, making these pores sharply delimited from the otherwise smooth snout.

In the number, the size and the position of the pores in *Rohita* characters can be found, which, because of their steadiness appear to me indeed of specific value. In many species these pores are totally lacking, as in 8 of the 9 species described above. In the species in question the pores are only present to the number of two. Other species, like *Rohita vittata* Val. and *Rohita triporos* Blkr, have three of these pores, which are placed [182](#) in a transverse row on the anterior part of the snout and of which the middle one is remarkably larger than the lateral ones. About *Rohita borneensis* I have already

said that there are five pores in a transverse row placed anterior on the snout. In *Rohita enneaporos* this number is elevated to nine, eight of which are placed in a circle, while the ninth, which is much larger than the other ones, is found in the middle of the circle. In still other species those pores are much more numerous, but they then cease to yield specific characters as their number as a rule increases with age, just like in several species of *Labeo*, *Morulus*, etc.

Rohita kahajanensis, apart from its snout pores, is also recognizable by its 35 or 36 scales in the lateral line, 6 (5½) scale rows above the lateral line, 15 or 16 branched dorsal fin rays and a glistening blue shoulder spot.

Rohita (Rohita) triporos Blkr,

Diagn. Besch. Nieuwe vischs. v. Sumatra Tient. I-V, Nat. T. Ned. Ind. III p. 598. –

Drieporige Rohita [Tri-pored *Rohita*].

Atl. Cypr. Tab. XI fig. 3.

A *Rohita (Rohita)* with an oblong, compressed body, depth of body contained 4 to 4¼ times in its length, width contained slightly over 2 to 2¼ times in its depth. Head slightly acute, the lower anterior part slightly obliquely truncate, when mouth is closed, head contained 5⅔ to 6⅓ times in length of body with caudal fin, 4½ to 4⅔ times in length of body without caudal fin, depth of head contained 1½ to about 1⅙ times in its length, width about 1⅓ times; eyes superior, eye diameter contained 3⅓ to 3¼ times in the length of the head, eye diameter contained slightly more than once to 1¼ times in the postocular part of the head, distance between the eyes 1½ to 1⅓ times their diameter, palpebral membrane covering the external margin of the iris, the opening nearly circular; rostro-dorsal profile sloping, nearly straight on forehead and crown, strongly convex on nape and back; interorbital line convex; nostrils closer to the orbit than to the tip of the snout, posterior nostrils open, can be closed by means of a valve; anterior nostrils slightly tubular, small pores on both sides between the nostrils and the superior angle of the gill cover, in one longitudinal row, little conspicuous; snout fleshy, slightly flat, convex, slightly protruding anterior to the mouth, longer than the eye, at the tip with 3 large distant pores placed in a transverse row, central pore larger than those on the sides, not surrounded by any visible smaller pores; anterior suborbital bone oblong-quadrangular, rounded at the angles, length less than twice as great as depth; other suborbital bones low, 3 to 4 times as narrow as the eye diameter, no visible suborbital pores; barbels fleshy, somewhat thin; maxillary barbels much longer than nasal barbels, not or only slightly longer than the eye diameter; upper jaw with a cartilaginous edge, slightly reminding of a horse shoe, at symphysis lightly emarginate, strongly downward protrusible; upper lip very fleshy, hanging anterior to jaw, free margin with numerous many-rowed conical, slightly acute, short papillae; lower jaw flat, anterior margin truncate; lower lip very fleshy, back-folded, free margin with numerous many-rowed, conical, slightly acute, short papillae, grooves at lower front side separated by the wide isthmus; chin slightly obliquely truncate because of ascending lower jaw; width of gill cover contained 1½ to 1¾ times in its depth, hardly to not thinner than the eye diameter, lower margin nearly straight; gill opening ending below the posterior margin of the preoperculum. Pharyngeal teeth masticatory, aggregated 2.4.5/5.4.2, each with an obliquely truncate chewing surface, margins elevated, teeth particularly in anterior row unequal, slightly lobed, teeth in anterior row at the front side of the top half traversed by a broad, superficial longitudinal groove; scapula triangular, slightly acutely rounded; 183 dorsal line of the body convex, much higher than convex ventral line; belly flat anterior to ventral fins, rounded or very obtusely ridged behind ventral fins; scales nearly vertical, larger on the middle of the flanks than on the rest of the body, free half and generally also basal half with longitudinal stripes, slightly ray-like, 32 to 34 scales in the lateral line, 12½ (13) in a transverse row, of which 6 (5½) above the lateral line, about 10 in a longitudinal row between occiput and dorsal fin; lowest ventral scales in three longitudinal rows, gradually increasing in size posteriorly, larger than those in flanking rows; lateral line nearly straight, sloping downward



Fig. 43. *Rohita (Rohita) triporus* Blkr. Atl. Ichth. Cypr. Tab. XI, Fig. 3. TL figure 149 mm.

only anteriorly, slightly or not much closer to the base of the ventral fins than to the dorsal line, each scale marked by a simple tube reaching or not reaching the centre of the scale. Dorsal fin starting anterior to the ventral fins and ending anterior to the anal fin, scaleless at the base, acute, emarginate, length slightly greater to considerably greater than depth, length contained $4\frac{1}{2}$ to $4\frac{5}{6}$ times in the length of the body, slightly lower to slightly higher than the body; pectoral fins acute, contained $6\frac{1}{2}$ to 6 times in the length of the body, not reaching the ventral fins; ventral fins acute, contained 6 to 5 times in the length of the body, not to nearly reaching the anal fins; anal fin at the base enclosed in a very low scaled sheath, acute, slightly to hardly emarginate, much lower than the dorsal fin and about 3 times as short, the simple third ray thin, cartilaginous; caudal fin scaled at the base, with a deep incision, lobes acute, upper lobe longer than lower lobe, contained 4 to $3\frac{1}{2}$ times in the length of the body. Colour: upper part of the body green, lower part silver; iris yellowish or pink, scales on back and flanks each with an oblong transverse dark-violetish spot at the base; diffuse darkish head-tail band (only visible in a younger specimen); fins pink or yellowish, dorsal fin (only in a larger specimen) at the lower front side with a large blackish-violet spot and the membrane between each of the rays with a diffuse spot composed of dark speckles.

B. 3. D. $4/11$ to $4/13$. P. $1/14$. V. $2/8$. A. $3/5$ or $3/6$. C. $6/17/6$ or $7/16/7$, short flanking ones included.

Hab. Sumatra (Palembang), in rivers.

Borneo (Pontianak), in rivers.

Length of 2 specimens $130'''$ and $154'''$.

Remark. *Rohita triporus* is very closely related to *Rohita vittata* Val. However, it differs specifically from it by a longitudinal scale row less under the lateral line, a deeper body, a higher, more acute and more concave dorsal fin, longer ventral fins, a deeper head, a shorter and also less convex snout, a shorter tail, a broader opercle, a large blackish dorsal fin spot, etc.

These differences however, are partly only apparent when specimens of a similar size are compared.

Thus I find in specimens of both species of 154 mm length.

	<i>Rohita triporos</i>	<i>Rohita vittata</i>
Depth of the body in its length	4½ times	4⅔ times
Depth of the head in its length	1⅛ "	1⅕ "
Width of the opercle in its height	1½ "	2 "
Depth of the dorsal fin in the depth of the body	less than 1	more than 1
Length of the tail from the last dorsal fin ray to the caudal fin base in the length of the entire body	4¾ - 4⅘ "	4 "
Ventral fin in the length of the body	5 "	6⅓ "

184 I see the head-tail band in *Rohita triporos* only in my smaller specimen and then only slightly expressed. In *Rohita vittata* however this band is often similarly lost as a result of long preservation in spirit of wine.

Rohita (Rohita) enneaporos Blkr,

Diagn. Beschrijv. Nieuwe vischs. v. Sumatra Tient. I-IV, Nat. T. Ned. Ind. III p. 596. –

Negen-porige Rohita [*Nine-pored Rohita*].

Atl. Cypr. Tab. XI fig. 2.

A *Rohita (Rohita)* with an oblong, compressed body, depth of body contained nearly 4¼ times in its length, width contained about 2 times in its depth. Head slightly obtuse, the lower anterior part slightly obliquely truncate, when the mouth is closed, head contained about 6½ times in length of body with caudal fin, about 5 times in length of body without caudal fin, depth of head contained 1¼ times in its length, width about 1½ times; eyes superior, eye diameter contained 3⅔ to 3¾ times in the length of the head, eye diameter contained about 1¼ times in the postocular part of the head, distance between the eyes about twice their diameter, palpebral membrane covering the external margin of the iris only, the opening nearly circular; rostro-dorsal profile sloping, nearly straight on forehead and crown, convex on nape and back; interorbital line convex; nostrils closer to the orbit than to the tip of the snout, posterior nostrils open, can be closed by means of a valve; anterior nostrils slightly tubular, small pores on both sides between the nostrils and the superior angle of the gill cover, in one longitudinal row, little conspicuous; snout fleshy, nearly flat, strongly convex, slightly protruding anterior to the mouth, much longer than the eye, at the tip with large very conspicuous pores, central pore larger than the other conspicuous 8 pores surrounding it in a circle, some extra pores outside the circle, smaller than the others, hardly or not visible with the naked eye; anterior suborbital bone irregularly quadrangular, length about twice as great as depth, more or less rounded at the angles; other suborbital bones low, 3 to 4 times as narrow as the eye diameter; no visible suborbital pores; barbels fleshy, maxillary barbels longer than nasal barbels, not or slightly longer than the eye diameter; upper jaw with a cartilaginous edge, slightly reminding of a horse shoe; at the symphysis lightly emarginate, strongly downward protrusible; upper lip very fleshy, hanging anterior to jaw, internal margin transversely rugose, free margin with many-rowed conical, obtuse, short papillae; lower jaw flat, anterior margin truncate; lower lip very fleshy, back-folded, internal margin obliquely transversely rugose, free margin with many-rowed conical, short, acute papillae, grooves at lower front side separated by the wide isthmus; chin slightly obliquely truncate because of ascending lower jaw; maximum width of gill cover contained 2⅔ times in its depth, width of upper part contained 3 times in its depth, much narrower than the eye diameter, lower margin slightly convex; gill opening ending below the posterior margin of the preoperculum. Pharyngeal teeth masticatory, aggregated 2.4.5/5.4.2, each with an obliquely truncate chewing surface, margins elevated, teeth particularly in anterior row unequally lobed, at the front side of the top half with a superficial longitudinal groove; scapula triangular, slightly acutely rounded. Dorsal line of the body convex, higher than convex ventral line; belly flat anterior to ventral fins, rounded, not ridged behind ventral fins; scales nearly vertical, larger on the middle of the flanks than on the rest of the body, free half and generally also the basal half with longitudinal

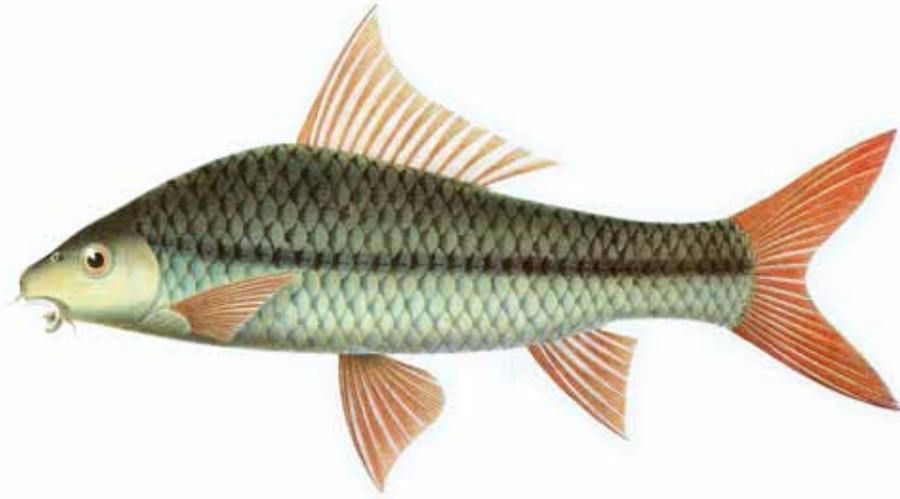


Fig. 44. *Rohita (Rohita) enneaporus* Blkr. Atl. Ichth. Cypr. Tab. XI, Fig. 2. TL figure 246 mm.

stripes, slightly ray-like, 33 to 34 scales in the lateral line, $13\frac{1}{2}$ (14) in a transverse row, of which $5\frac{1}{2}$ (6) above the lateral line, 11 or 12 in a longitudinal row between occiput and dorsal fin; lowest ventral scales in 3 longitudinal rows; lateral line nearly straight, sloping only anteriorly, hardly closer to the base of the ventral fins than to the dorsal line, each scale marked by a simple tube not or hardly reaching the centre of the scale. Dorsal fin starting anterior to the ventral fins and ending anterior to the anal fin, scaleless at the base, acute, emarginate, length slightly greater than depth; length contained nearly 5 times in the length of the body, depth contained slightly more than once in the depth of the body; **185** pectoral and ventral fins acute, pectoral fins contained nearly 7 times in the length of the body, not reaching the ventral fins; ventral fins contained slightly more than 6 times in the length of the body, not reaching the anal fins; anal fin at the base enclosed in a very low scaled sheath, acute, emarginate, not much lower than dorsal fin, but more than twice (less than three times) as short as dorsal fin, the simple third ray thin, cartilaginous; caudal fin scaled at the base, with a deep incision, lobes acute, upper lobe longer than lower lobe, contained about 4 times in the length of the body. Colour: upper part of the body olive-green, lower part silver; iris yellowish or pink; diffuse darkish-violet head-tail band; fins pink or red.

B. 3. D. 4/12 or 4/13. P. 1/15. V. 2/8. A. 3/5 or 3/6. C. 6/17/6, short flanking ones included.

Hab. Sumatra (Padang), in the river.

Length of sole specimen 246'''.

Remark. A new comparison of the above described specimen with my numerous specimens of *Rohita vittata* Val. at first made me doubt whether if it really could be placed in a species that is different from that one, so large is the similarity in most of the peculiarities of habitus and organization. In the mean time I see in none of my specimens of *Rohita vittata* Val. of the same size more than three snout pores placed on a transverse line, whereas it also has the head constantly relatively deeper and the opercle relatively broader and less high. Therefore I have left my specimen under the earlier given specific name, where it shall remain to be placed unless new series of specimens will show that no specific value can be attached to the described differences.

Rohita (Rohita) oligolepis Blkr,
 Nalez. ichth. Faun. van Banka, Nat. Tijdschr. Ned. Ind. V p. 191. –
Grootschubbige Rohita [*Large-scaled Rohita*].
 Atl. Cypr. Tab. VIII fig. 7.

A *Rohita (Rohita)* with an oblong, compressed body, depth of body contained about 4 times in its length, width contained slightly over 2 times in its depth. Head slightly acute, the lower anterior part moderately obliquely truncate when the mouth is closed, head contained about $5\frac{1}{2}$ times in length of body with caudal fin, $4\frac{1}{3}$ to $4\frac{1}{3}$ (sic) times in length of body without caudal fin, depth of head contained $1\frac{1}{3}$ to $1\frac{1}{4}$ times in its length; eyes slightly superior, eye diameter contained slightly over 3 times in the length of the head, eye diameter contained slightly more than once in the postocular part of the head, distance between the eyes about $1\frac{1}{2}$ times the eye diameter, palpebral membrane covering the external margin of the iris only, the opening nearly circular; rostro-dorsal profile sloping, nearly straight on forehead and crown, strongly convex on nape and back; interorbital line convex; nostrils closer to the orbit than to the tip of the snout, posterior nostrils open, anterior nostrils slightly tubular; small pores on both sides between the nostrils and the superior angle of the gill cover, in one longitudinal row, conspicuous; snout convex, fleshy, hardly protruding anterior to the mouth, hardly or not longer than the eye, upper part smooth, at the front with many, nearly equal, well visible pores, no larger central pores; anterior suborbital bone obliquely quadrangular, depth greater than length, posterior part much higher than anterior part; other suborbital bones very low, three to much more than three times as thin as the eye diameter; barbels fleshy, nasal barbels hardly shorter than the eye, maxillary barbels considerably longer than the eye; upper jaw with a cartilaginous edge, slightly reminding of a horse shoe; at the symphysis hardly emarginate, strongly downward protrusible; upper lip very fleshy, hanging anterior to jaw, with numerous transverse folds, 186 free margin with many-rowed very short, conical papillae; lower jaw flat, slightly spoon-shaped, lower lip very fleshy, back-folded, with numerous obliquely transverse folds, free margin with many-rowed very short, conical papillae, grooves at lower side separated by the wide isthmus; chin obliquely truncate because of strongly ascending lower jaw; width of gill cover contained about $1\frac{3}{5}$ times in its depth, lower margin nearly straight; gill opening ending below the posterior margin of the preoperculum. Pharyngeal teeth masticatory, 2.3.5/5.3.2 or 2.4.5/5.4.2, each with an obliquely truncate chewing surface, more or less lobed at the elevated margin; scapula triangular, obtusely rounded; dorsal line of the body convex, much higher than convex ventral line; belly flat anterior to ventral fins, strongly obtusely ridged behind ventral fins; scales nearly vertical, larger on the middle of the flanks than on the rest of the body, free half and part of the basal half with longitudinal, slightly ray-like stripes, 28 to 30 scales in the lateral line, about 11 in a transverse row, of which $4\frac{1}{2}$ (5) above the lateral line, about 11 in a longitudinal row between occiput and dorsal fin; lowest ventral scales in three longitudinal rows; lateral line nearly straight, not closer to the base of the ventral fins than to the dorsal line, each scale marked by a simple tube reaching or nearly reaching the centre of the scale. Dorsal fin starting anterior to the ventral fins and ending anterior to the anal fin, scaleless at the base, acute, not or hardly emarginate, length greater than depth; length contained $4\frac{1}{2}$ to $4\frac{2}{3}$ times in the length of the body, depth contained $1\frac{1}{3}$ to $1\frac{1}{4}$ times in the depth of the body; pectoral fins acute, contained slightly over 6 times in the length of the body; ventral fins acute, contained nearly 7 times in the length of the body, pectoral fins not reaching the ventral fins, ventral fins not reaching the anal fin; anal fin acute, not or slightly emarginate, slightly lower than dorsal fin, but about three times as short, simple third ray thin, cartilaginous; caudal fin scaled at the base, with a deep incision, lobes acute, upper lobe slightly longer than lower lobe, contained about 4 times in the length of the body. Colour: upper part of the body pink-green, lower part pink-pearly; iris yellow or pink; many scales on the flanks with a dark transverse, crescent-shaped band; tail with a round, blackish spot in the lateral line bordering on the base of the caudal fin; fins pink, uneven, more or less with dark speckles.

B. 3. D. $4/12$ or $4/13$. P. $1/13$. V. $2/8$. A. $3/5$ or $3/6$. C. $7/17/7$, short flanking ones included.

Hab. Banka (Marawang), in the river.

Length of 2 specimens 100'' and 103''.



Fig. 45. *Rohita (Rohita) oligolepis* Blkr. Atl. Ichth. Cypr. Tab. VIII, Fig. 7. TL figure 94 mm.

Remark. *Rohita oligolepis* is recognizable, apart from the low number of its scales and dorsal fin rays, by its acute head, by well visible numerous pores on the tip of the snout without larger central pores, by rather long barbels, a large round tail spot, etc.

For as far as the observations go, this *Rohita* is endemic to Banka, just like *Rohita Waandersi*.

MORULIUS Buch. Blkr.
= earlier CHRYSOPHEKADION Blkr. –
MILLEM.

Body oblong, compressed, covered with large or medium-sized scales. Jaws bare, not tumid. Barbels 4, nasal and upper jaw barbels. Snout fleshy, entire, protruding anterior to the mouth, lobed or not lobed at the sides, free margin not papillose or with a fringed margin. Anterior suborbital bone oblong, placed rather far anterior to the orbit. Upper lip hanging anterior to upper jaw, fimbriate, confluent with lower lip. Gape more or less oval when the mouth is open. Upper jaw with a thin crescent-shaped edge. Lower jaw with a thin truncate or rounded edge, symphysis without tubercle. Lower lip back-folded, papillose or fimbriate, not lobed. One transverse postlabial sulcus, half-moon-shaped, nearly parallel with the margin of the lower lip. Dorsal fin starting anterior to ventral fins and ending anterior to or above anal fin, posterior simple ray cartilaginous. Pharyngeal teeth masticatory aggregated 2.4.5/5.4.2, masticatory surface obliquely truncate, not tuberculate.

Remark. I separate the genus *Morulius* from *Rohita*, on the one hand because of the single transverse posterior lip groove, and on the other hand because of the far anterior placed anteriormost suborbital bone, which, more elongate in shape, just like in the genus *Labeo* has been shifted far anterior to the orbit by the second suborbital bone.

The genus generally in relationship stands between *Rohita*, *Rohitichthys* and *Labeo*, but can be separated from all of them by the single posterior lip groove, which runs crescent shaped parallel to the free lower lip edge, whereas in the remaining mentioned genera the middle of the chin skin is without groove and the groove that is situated on both sides of this skin runs longitudinally.

To this genus I now bring 5 species of my collection, four of which are from Bengal and only one from the Sunda Islands, i.e. *Rohita calbosu* Val., *Rohita belangeri* Val., *Rohita Buchananii* Val. and *Rohita chalybeata* Val. from Bengal and *Rohita chrysophekadion* Blkr. from the Indian archipelago. – Moreover, I believe that in it can also be placed some other Bengal species which I do not know from nature, like *Rohita moralius* Val., *Rohita jaolius* Val., *Rohita Reynauldii* Val., *Rohita musiha* Heck. and *Labeo velatus* Val.

These species, partly very closely related to each other, partly also differ considerably from each other with regard to coloration, profile, shapes of the opercle and the fins, squamation, etc. so that for several of them the diagnostic differences are easy to determine, whereas for other species that is difficult to describe. Thus among my Bengal species *Morulius chalybeatus* is easy recognizable by its ca 70 scales in the lateral line and 14 to 15 longitudinal scale rows above the lateral line, and *Morulius rohita* (*Cyprinus rohita* Buch.) by its 40 scales in the lateral line, 7 (6½) longitudinal scale rows above the lateral line, extraordinarily developed opercle the width of which goes only 1½ times in its length, smooth snout without visible pores and extremely small barbel. On the ¹⁸⁸ contrary *Morulius Belangeri* and *Morulius calbosu* in habitus of the head, body and fins, and in coloration are very closely related to the Sundanese species. This one however can be recognized as follows.

1. Snout strongly protruding in front of the mouth, covered with numerous conspicuous pores. Barbels well developed.
 - A. 41 to 43 scales in the lateral line, 9 (8½) above the lateral line. Width of gill cover contained nearly twice to slightly more than twice in its depth. Dorsal fin at the base contained 4 to 4½ times in the length of the body, rays 4/15 or 4/16 to 4/18 or 4/19.

Morulius chrysophekadion Blkr.

Morulius chrysophekadion Blkr, –
Veelklierige Morulius or *Millem* [*Many-glanded Morulius* or *Millem*].
 Atl. Cypr. Tab. X.

A *Morulius* with an oblong, compressed body, depth of body contained 4⅓ to 3⅔ times in its length, width contained 1⅓ to 2⅓ times in its depth. Head slightly acute, the lower anterior part very obliquely truncate when the mouth is closed, head contained 4⅔ to 6½ times in length of body with caudal fin, to nearly 3⅔ times in length of body without caudal fin, depth of head contained 1⅓ to 1 1/9 times in its length, width 1½ to 1⅓ times in its length; eyes superior, eye diameter contained 2¾ to 4 times in the length of the head, eye diameter contained once to 1⅓ times in the postocular part of the head, distance between the eyes 1⅓ to 2⅓ times the eye diameter, palpebral membrane largely covering the external margin of the iris, the opening nearly circular; rostro-dorsal profile sloping on forehead and crown, nearly straight or slightly concave, very convex on nape and back; interorbital line convex; nostrils much closer to the orbit than to the tip of the snout, posterior nostrils open, can be closed by means of a valve; anterior nostrils slightly tubular; small pores on both sides between the nostrils and the superior angle of the gill cover, in one longitudinal row, not always visible; snout very fleshy, nearly flat, strongly convex, clearly protruding in front of the mouth, in younger fishes shorter than the eye, in older animals and adults longer than the eye, the anterior part in younger animals and adults with very many conspicuous pores, extending to a point in between and behind the nostrils, no central pores which are conspicuously larger than the others; anterior suborbital bone placed rather far anterior to the eye and completely or nearly completely anterior to the nostrils, irregularly oblong-oval, length less than twice

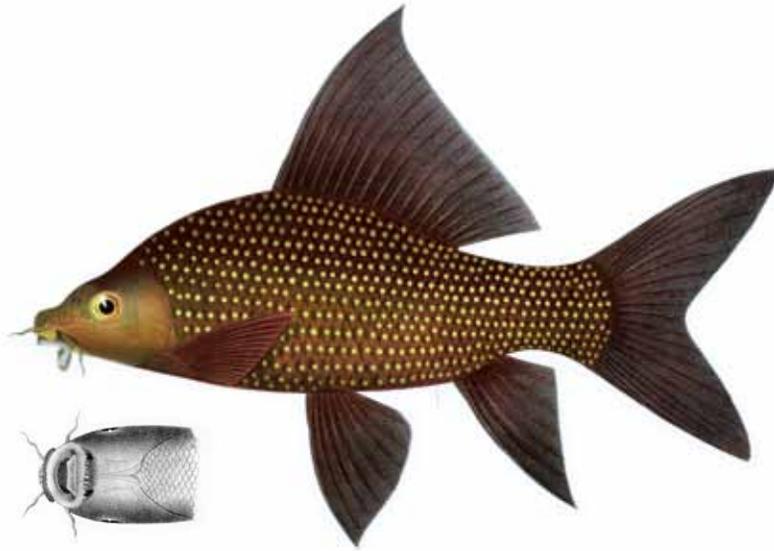


Fig. 46. *Morulius chrysophekadion* Blkr. Atl. Ichth. Cypr. Tab. X. TL figure 283 mm.

as great as depth, lower margin strongly convex; other suborbital bones very low, many times as thin as the eye diameter, second suborbital bone very elongate, prolonged anterior to the eye, suborbital pores in one longitudinal row, slightly or not conspicuous; barbels fleshy, rostral barbels slightly shorter to slightly longer than upper jaw barbels; shorter to slightly longer than the eye diameter; upper jaw with a cartilaginous edge, reminding slightly of a horse shoe; at the symphysis lightly to not emarginate, strongly downward protrusible; upper lip slightly fleshy, hanging anterior to jaw, rugose, free margin with many-rowed conical, obtuse, very short papillae; lower jaw flat, anterior margin truncate; lower lip strongly back-folded, fleshy, not rugose, free margin with many-rowed conical, acute, cirriform papillae, grooves at lower side united behind the lip from where a postlabial, deep, transverse, crescent-shaped incision; chin strongly obliquely truncate because of ascending lower jaw; width of gill cover contained nearly twice to slightly more than twice in its depth, posterior part rounded in crescent shape, lower margin convex or slightly convex; gill membrane extending rather broadly behind gill cover, rounded in crescent shape; gill opening ending below the posterior margin of the preoperculum or below the anterior part of the gill cover. ¹⁸⁹ Pharyngeal teeth masticatory, aggregated 2.4.5/5.4.2, each with an obliquely truncate chewing surface margins elevated, not lobed, teeth in anterior row not grooved rostrally; scapula triangular, slightly acutely or obtusely rounded; dorsal line of the body convex, much higher than convex ventral line; belly flat anterior to ventral fins, very obtusely ridged behind ventral fins; scales on the upper part of the body nearly vertical, on the flanks below the lateral line oblique (superior angle of free upper margin placed anterior to lower angle of free margin), suprascapular scales largest, scales on the anterior part of the flanks larger than those on the rest of the body, except for those in the suprascapular region, free half and basal half with longitudinal, slightly ray-like stripes, 41 to 43 scales in the lateral line, 19 or 20 in a transverse row, of which $8\frac{1}{2}$ (9) above the lateral line, 20 to 23 in a longitudinal row between occiput and dorsal fin, the lowest scales on the flanks in five longitudinal rows, gradually increasing in size posteriorly, scales in the medial row not larger than those in flanking rows; lateral line nearly straight, sloping downward only anteriorly; not much closer to the base of the ventral fins than to the dorsal line, each scale marked by a simple tube hardly or not reaching the centre of the scale. Dorsal fin starting anterior to the ventral fins and ending anterior to the anal fin, at the base enclosed in a low scaled sheath, acute, not to strongly emarginate, length hardly greater to considerably

smaller than depth; length contained $4\frac{3}{4}$ to 4 times in the length of the body, not or hardly higher to much higher than the body; the simple posterior ray frequently more or less prolonged; pectoral fins contained 5 to $5\frac{3}{5}$ times in the length of the body, not or hardly reaching ventral fins; ventral fins acute, contained $4\frac{1}{4}$ to slightly over 5 times in the length of the body, reaching anal fin; anal fin at the base enclosed in a very low scaled sheath, not to strongly emarginate, slightly to much lower than dorsal fin, but more than 2 to 3 times as short, the simple third ray thin, cartilaginous; caudal fin scaled at the base, with a deep incision, lobes acute, upper lobe longer than lower lobe, contained $3\frac{3}{5}$ to 4 times in the length of the body. Colour: upper part of the body dark-violet, violetish-olive or violet-blackish; barbels violet or blackish; iris pink or golden; each scale on the body generally beautifully marked with a golden or orange droplet; fins violetish-pink, or violet or violet-black.

B. 3. D. $4/15$ or $4/16$ to $4/18$ or $4/19$. P. $1/15$ to $1/17$. V. $2/8$. A. $3/5$ or $3/6$. C. $5/17/5$ or $6/17/6$, short flanking ones included.

- Syn. *Rohita chrysophekadion* Blkr, Verh. Bat. Gen. XXIII Bijdr. ichth. Midd. Oost-Java p. 20.
Rohita polyporos Blkr, Nieuw. Tient. diagn. beschr. Vischs. v. Sumatra, Nat. T. N. Ind. V p. 520.
Rohita koilogeneion Blkr. Descript. spec. pisc. javan. nov. Nat. T. Ned. Ind. XIII p. 359.
Rohita cyanomelas Blkr, Diagn. beschr. nieuwe. vischs. Sumatra, Tient. I-IV, Nat. T. Ned. Ind. III p. 597.
Si-hitam, *Situm* Palemb.

Millem (Mal. Bat.), *Arengan* Sund.

- Hab. Java (Batavia, Bekassi, Krawang, Tjampea, Parongkalong, Tjikao, Surabaya, Gempol), in rivers.

Sumatra (Morah-kompeh, Palembang), in rivers.

Length of more than 40 specimens 75'' to 600''.

Remark. The archipelagic species of *Morulius* is recognizable by its numerous snout pores and the formula of its scales and fin rays. It offers very numerous individual and climatological differences, both with regard to the development of the snout pores and barbels as in the fins, especially of the dorsal fin, ventral fins and anal fin, whereas also the colour pattern shows many nuances and ranges ¹⁹⁰ from uniformly black-blue (specimens from Palembang) to darker olive with a round golden or orange coloured spot on each scale.

Earlier when I possessed only very few specimens of these varieties, I attached a higher value to the observed differences, than they since then appear to deserve, and a repeated detailed study of all my specimens has led me to reduce the four species, which I earlier believed I should erect, to a single one.

On Java *Morulius chrysophekadion* is not rare. Especially in the large rivers it sometimes is abundant and there it reaches a size, amply exceeding that of my largest specimens. I have witnessed the catch of hundreds of large specimens in the Tjitaroem [river] near Parongkalong, during an organized fishing party and also at the mouth of the Tjitaroem it is sometimes caught by the hundreds and from there placed on the market in Batavia.

It is very closely related to *Morulius Belangeri* from Bengal, which belongs to the same group and has the same scale formula. However, I find in *Morulius Belangeri* of which I possess two specimens, for the formula of the dorsal fin only $4/13$ or $4/14$ and $4/14$ or $4/15$, which formula I find in none of my very numerous Sumatran or Javanese specimens. These specimens moreover comparing with similar sized specimens of *Morulius chrysophekadion*, it appears that in *Morulius Belangeri* the body is remarkably deeper, the dorsal fin remarkably shorter (5 times and more in the length of the

body, whereas in my specimens of *Morulius chrysophekadion* go only $4\frac{2}{5}$ to 4 times in the length of the body), etc.

Morulius calbosu from Bengal is also very closely related to *Morulius chrysophekadion* and even comes closer to it with regard to the formula of the dorsal fin rays (4/14 to 4/16) and slenderness of its body. As I also possess this species, I was able to compare my specimens thereof with similar sized specimens of *Morulius chrysophekadion* and I found that also in *Morulius calbosu* the dorsal fin, notwithstanding its almost equal or equal fin ray formula, is remarkably shorter (more than 5 times in the length of the body) than in *Morulius chrysophekadion*, whereas moreover it has the profile of the back remarkably less convex and the belly profile more convex, and I can count only $7\frac{1}{2}$ (8) scales in a transverse row above the lateral line.

Judging from a sketch drawing of Mr Castelnau, the species in question also occurs in Siam.

191 ROHITICHTHYS Blkr.

Body oblong-elongate, compressed, covered with large scales. Jaws bare. Barbels 2, maxillary barbels. Snout fleshy, entire, skin descending anterior to upper lip hanging, snout not lobed at the sides. Upper lip hanging anterior to upper jaw, entire, not papillose or fimbriate. Lower lip fimbriate. Dorsal fin starting anterior to ventral fins and ending long before anal fin, the posterior simple ray completely cartilaginous. Anterior suborbital bone at a distance from the eye.

Remark. This genus needs to be described in more detail after nature. I base it on the description and figure of *Labeo senegalensis* Val., as they are given by Mr Valenciennes.

Concerning the relationship *Rohitichthys* stands between *Labeo* and *Rohita*. It misses the snout lobes of *Labeo* and has the fringed lower lip of *Rohita*. Because of the far forward extending second suborbital bone, the anteriormost suborbital bone is far removed from the eye, just as in *Labeo*, however the snout bulges slightly before the mouth opening.

The habitus however, judging from the figure of Mr Valenciennes, is neither that of a *Labeo*, nor that of a *Rohita*. It represents the only species which till now can be placed in *Rohitichthys*.

DANGILA Val.,

Poiss. XVI p. 174. = CYRENE Heck., Fisch. Syr. p. 34, 182. –

LAMBA.

Body oblong or elongate, compressed, covered with large or medium-sized scales. Jaws bare, not tumid. Barbels 4, nasal barbels and maxillary barbels. Snout fleshy, entire, slightly protruding in front of the mouth, at free margin hanging anterior to upper lip, entire, not crenulate or papillose, not lobed at the sides. Upper lip hanging anterior to upper jaw, papillose, confluent with lower lip. Gape slightly parallelogram-shaped. Jaws thin at the edge, lower jaw equipped with a small tube on the posterior part of the symphysis. Lower lip entire, fleshy, not cirrate or lobed. On both sides a simple postlabial groove, directed longitudinally towards the margin of the mouth, separated ¹⁹² from the groove on the opposite side by the broad isthmus. Dorsal fin elongate, starting anterior to ventral fins and ending above or anterior to anal fin, the posterior simple ray cartilaginous. Pectoral fins inserted nearly horizontally. Pharyngeal teeth masticatory, aggregated 2.4.5/5.4.2, with an obliquely truncate or more or less twisted chewing surface.

Remark. Mr Valenciennes erected this genus in the 16th Volume of the large *Histoire naturelle des Poissons*, published in the year 1842, whereas Heckel erected the same genus, under the name *Cyrene*, similarly in the year 1842 in his *Abbildungen und Beschreibungen der Fische Syriens*, which work however was only published in 1843 in Stuttgart. Heckel also already knew the name given by Mr Valenciennes to the *Cyrene*, which he included in his *Fische Syriens* between two inverted commas behind the by himself proposed name of *Cyrene*.

Therefore the name proposed by Mr Valenciennes must be preserved.

The diagnosis of Mr Valenciennes fits well on all species of *Dangila*, but is not indicative for its natural relationship as a genus belonging to the *Labeonines*.

Heckel gave two different diagnosis of it, which indicate that relationship better, however they lead to misunderstanding by the statement that the *upper jaw* is provided with a row of tooth-like nipples. However these nipples are not implanted in the upper jaw but in the *upper lip*. This distinction has to be made for the *Acheilognathes* as here the upper lip hangs free before the upper jaw and does not cloth or envelop the entire upper jaw as in the *Cheilognathes*.

At present 11 species of *Dangila* are known. Mr Valenciennes described four of them, i.e. *Dangila Cuvieri* Val. (which is the same as *Dangila leptocheila* Val.), *Dangila Kuhli* Val. and *Dangila lipocheila* Val. from Java, and *Dangila Leschenaultii* Val. from Hindustan. Heckel added to these the descriptions of four other species, those of *Cyrene festiva* Heck. and *Cyrene ocellata* Heck. from Borneo and of *Cyrene cyanopareja* and *Cyrene philippina* Heck. from the Philippines.

Of the species of Mr Valenciennes and Heckel I have recovered *Dangila leptocheila*, *Dangila Kuhli*, *Dangila festiva* and *Dangila ocellata*, but moreover I have discovered still three other species from Sumatra and Borneo, which I have described under the names *Dangila fasciata*, *Dangila sumatrana* and *Dangila spilurus*.

With the exception only of *Dangila Leschenaultii* Val. all these species belong to the Indian archipelago. They can be distinguished from each other by the following scheme.

- 193 I. Dorsal fin ending above or hardly anterior to anal fin.
- A. More than 60 scales in the lateral line, 14 or 15 above lateral line.
 - a. D 4/27 or 4/28. On both sides 2 round black spots, the anterior spot in the post-axillary region below the lateral line, the posterior caudal one in the lateral line.

Dangila ocellata Blkr.

- B. 50 or 51 scales in the lateral line, 10 above lateral line.
 - a. D. 4/27 to 4/30. Body with longitudinal dark-violet bands.

Dangila fasciata Blkr.

- C. 30 to 40 scales in the lateral line.
 - a. D 4/23 to 4/26.
 - † 39 to 40 scales in the lateral line.
 - Ô 8 scales above lateral line. Head contained 5½ times in the length of the body.

Dangila Kuhli Val.

- Ô' 7 scales above lateral line. Head contained 6 to $7\frac{1}{2}$ times in the length of the body.

Dangila leptocheilus Val.

- † 37 or 38 scales in the lateral line, 6 above lateral line.
 Ô A dark head-tail band.

Dangila sumatrana Blkr.

- Ô No head-tail band.

Dangila phillipinia Blkr.

- † 33 scales in the lateral line, 8 above lateral line.
 Ô Caudal fin with a violet-black longitudinal band on both lobes.

Dangila festiva Blkr.

- b. D 4/17 or 4/18. 5 scales above lateral line.
 † 35 scales in the lateral line. Gill cover adorned with a blue spot.

Dangila cyanopareja Blkr.

- † 36 scales in the lateral line. Gill cover without blue spot.

Dangila lipocheilus Val.

- II Dorsal fin ending far anterior to anal fin, rays 4/10 or 4/11 only.
 A. 28 scales in the lateral line, 5 above lateral line.
 a. Tail with round black spot.

Dangila spilurus Blkr.

¹⁹⁴ *Dangila ocellata* Blkr,

Index descript. specier. Pisc. Bleeker., Nat. T. Ned. Ind. XIV p. 475.

Geogde Lamba [*Eyed Lamba*].

Atl. Cypr. Tab. XVI fig. 3.

A *Dangila* with an oblong, compressed body, depth of body contained 4 to $4\frac{1}{4}$ times in its length, width contained $1\frac{3}{4}$ to slightly over 2 times in its depth. Head acute, contained 6 to $6\frac{1}{2}$ times in length of body with caudal fin, $4\frac{3}{5}$ to $4\frac{4}{5}$ times in length of body without caudal fin, depth of head contained $1\frac{2}{5}$ to $1\frac{1}{4}$ times in its length, width $1\frac{3}{5}$ to $1\frac{1}{2}$ times; eyes superior, eye diameter contained $2\frac{2}{3}$ to 3 times in the length of the head, eye diameter contained slightly more than once to once in the postocular part of the head, distance between the eyes slightly more than once to $1\frac{1}{4}$ times their diameter, palpebral membrane covering the external margin of the iris, broader anteriorly than posteriorly, the opening nearly circular; rostrum-dorsal profile sloping on forehead and crown, nearly straight, convex on nape and back; interorbital line slightly convex; nostrils closer to the orbit than to the tip of the snout, posterior nostrils open, can be closed by means of a valve; anterior nostrils slightly tubular, no visible small pores on both sides between the nostrils and the superior angle of the gill cover; snout fleshy, slightly flat, convex, slightly protruding in front of the mouth, in younger animals and in old animals considerably shorter than the eye, the anterior part covered with many, large, conspicuous pores; [anterior] suborbital bone

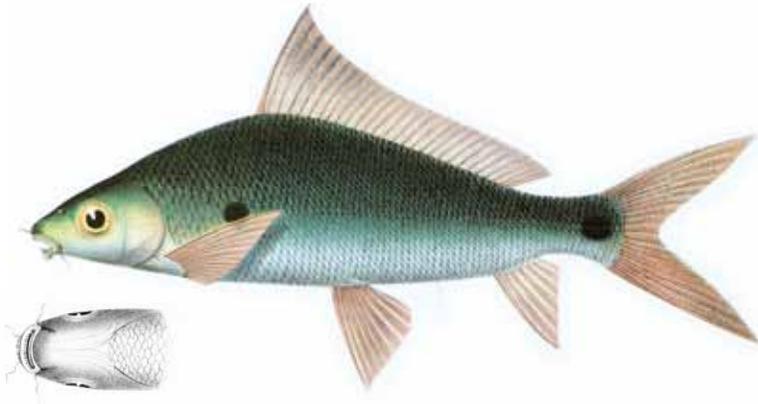


Fig. 47. *Dangila ocellata* Blkr. Atl. Ichth. Cypr. Tab. XVI, Fig. 3. TL figure 185 mm.

irregularly triangular, depth not or hardly greater than length, lower margin nearly horizontal, slightly convex, anterior and posterior margin more or less concave, united into an acute angle, upward pointing and ending between nostrils and the eye; 2nd suborbital bone elongate-quadrangular, anteriorly much higher than posteriorly, length twice to more than twice as great as depth; about 4 times as low as eye diameter; barbels thin, maxillary barbels longer than nasal barbels; slightly to not shorter than eye diameter; gape slightly parallelogram-shaped; jaws with a cartilaginous edge, anterior margin strongly obtuse, slightly truncate; upper jaw moderately downward protrusible, with a conical, tubercle at the posterior part of symphysis slightly hooked at the tip; lips slightly fleshy, upper lip hanging anterior to upper jaw, free margin covered with one-row of conical, short, very conspicuous papillae, lower lip slightly back-folded, free margin entire, lower part with short grooves, separated anteriorly by the very broad isthmus; chin obliquely truncate because of ascending lower jaw; width of gill cover contained $1\frac{1}{3}$ to 2 times in its depth, much narrower to slightly narrower than eye diameter, lower margin convex; gill opening ending below the posterior margin of the preoperculum. Pharyngeal teeth masticatory, 2.4.5/5.4.2, each compressed at the top, the chewing surface obliquely truncate, twisted, margins slightly elevated; scapula triangular, acutely rounded; dorsal line of the body convex, much higher than convex ventral line; belly flat anterior to ventral fins, slightly flat not ridged behind ventral fins; scales oblique (upper angle of the free margin placed anterior to the lower angle of the free margin), scales on the middle of the flanks larger than on the rest of the body, but the suprascapular scales the largest of all; no longitudinal stripes on the basal half of the scales, free half without stripes or with little conspicuous stripes, 65 to 67 scales in the lateral line, about 32 in a transverse row, of which $13\frac{1}{2}$ (14) or $14\frac{1}{2}$ (15) above the lateral line, 22 to 24 in a longitudinal row between occiput and dorsal fin; lowest ventral scales in 7 to 9 longitudinal rows, scales in medial row not larger than those in flanking rows; lateral line nearly straight, sloping downward only anteriorly; not much closer to the base of the ventral fins than to the dorsal line, each scale marked by a simple tube not or hardly reaching the centre of the scale; dorsal fin starting far anterior to the ventral fins and ending above the middle of the base of the anal fin, scaleless at the base, acute, strongly emarginate, length nearly twice to slightly more than twice as great as depth; length contained 3 to $2\frac{2}{3}$ times in the length of the body, depth contained slightly more than once to $1\frac{1}{3}$ times in the depth of the body; pectoral fins acute, contained $5\frac{1}{2}$ to slightly over 6 times in the length of the body, not reaching the ventral fins; ventral fins acute, contained $6\frac{1}{3}$ to slightly over 7 times in the length of the body, not reaching the anal fin; anal fin at the base enclosed in a very low scaled sheath; not or slightly emarginate, acute, generally considerably lower than dorsal fin, but 5 to more than 5 times as short, the ¹⁹⁵ simple third ray thin, cartilaginous; caudal fin scaled at the base, with a deep incision, lobes acute, upper lobe generally longer than lower lobe, contained $3\frac{3}{5}$ to $4\frac{1}{3}$ times in

the length of the body. Colour: upper part of the body blue-green, lower part silver; iris yellow or pink; on each flank two blackish-violet spots, surrounded by a yellowish colour, anterior spot below the lateral line slightly anterior to the dorsal fin, the posterior one on the tail close to the base of the caudal fin; fins pinkish-hyaline or pink or yellowish, dorsal and caudal fin more or less with dark speckles.

B. 3. D. 4/27 or 4/28. P. 1/14 to 1/18. V. 2/8. A. 3/5 or 3/6. C. 6/17/6 or 7/17/7, short flanking ones included.

Syn. *Cyrene ocellata* Heck., Abb. Besch. Fisch. Syriens p. 35.

Dangila microlepis Blkr, Diagn. beschr. nieuwe vischs. v. Sumatra, Tiental. 1-IV in Nat. T. Ned. Ind. III p. 595.

Luma Lamp. *Lamba* Palemb.

Hab. Sumatra (Pangabuang, Palembang, Lahat, Lematang-Enim), in rivers.

Borneo (Kahajan, Pontianak), in rivers.

Length of 9 specimens 144''' to 221'''.

Remark. The *Lamba* was first made known to science in 1843 by J. Heckel, in his *Fische Syriens* and briefly described from a specimen of 6 inches.

I recovered it in the year 1852 in a specimen of 185 mm length from Palembang and described it at the time, unfamiliar as I then was with Heckel's discovery, under the name of *Dangila microlepis*, which name must fall into disuse because of Heckel's earlier name, although it is not less characteristic. Since that time I have come into possession of more specimens of different sizes, which have enabled me to improve and complete the already existing descriptions.

The *Lamba* is a beautiful and extremely sharply characterized species of *Dangila*. Its numerous scales, both on a longitudinal as on the transverse rows, make its recognition very easy, whereas also the round black spots, one in the posterior axil area just below the lateral line and one on the tail on the lateral line near the caudal fin base, at a first glance are very characteristic for it.

Dangila fasciata Blkr,

Diagn. Beschrijv. Nieuwe vischs. Sumatra, Tient. V-X,

Nat. Tijdschr. Ned. Ind. IV p. 297. –

Gebande Lamba [*Banded Lamba*].

Atl. Cypr. Tab. XVI fig. 2.

A *Dangila* with a compressed body, depth of body contained $4\frac{1}{4}$ to $4\frac{1}{2}$ times in its length, width contained $2\frac{1}{3}$ to $2\frac{1}{2}$ times in its depth. Head acute, contained $6\frac{1}{2}$ to nearly 7 times in length of body with caudal fin, 5 to $5\frac{1}{4}$ times in length of body without caudal fin, depth of head contained $1\frac{1}{4}$ to $1\frac{1}{2}$ times in its length, width $1\frac{3}{4}$ to $1\frac{1}{2}$ times in its length; eyes superior, eye diameter contained 3 to slightly over 3 times in the length of the head, eye diameter contained slightly more than once in the postocular part of the head, distance between the eyes $1\frac{1}{4}$ to $1\frac{1}{2}$ times the eye diameter, palpebral membrane covering the external margin of the iris, broader anteriorly than posteriorly, opening nearly circular; rostro-dorsal profile sloping, nearly straight on forehead and crown, strongly convex on nape and back; interorbital line convex; nostrils closer to the orbit than 196 to the tip of the snout, posterior nostrils open, can be closed by means of a valve; anterior nostrils slightly tubular, little conspicuous small pores on both sides between the nostrils and the upper angle of the gill cover in one longitudinal row; snout fleshy, nearly flat, convex, slightly protruding anterior to the mouth, not or only slightly longer than eye diameter; at the front covered with many large pores in many transverse rows; anterior suborbital bone irregularly triangular, lower margin obliquely convex, anterior lateral margin concave, posterior lateral margin convex or angular, united into an upwards pointing acute angle close to the nostrils; 2nd suborbital bone elongate-quadrangular, higher anteriorly than posteriorly,

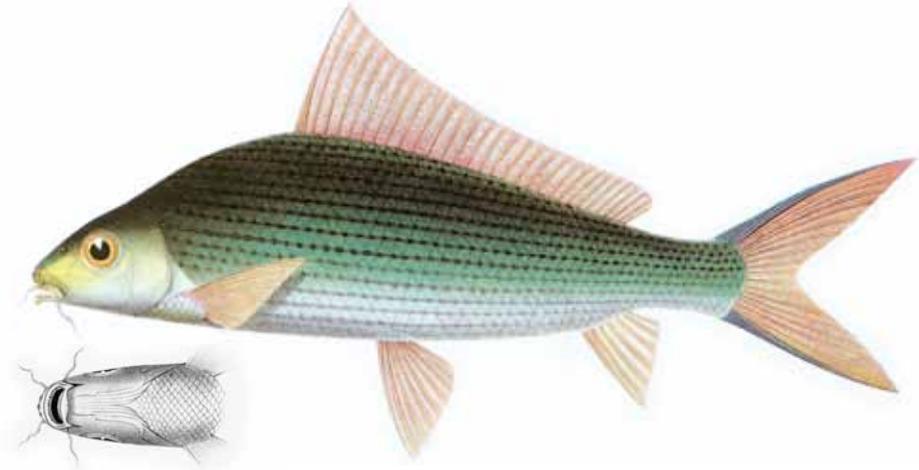


Fig. 48. *Dangila fasciata* Blkr. Atl. Ichth. Cypr. Tab. XVI, Fig. 2. TL figure 221 mm.

length about twice as great as depth, about 3 times as low as eye diameter; third suborbital bone broader than fourth suborbital bone; about 4 times as narrow as eye diameter; no visible suborbital pores; barbels thin, maxillary barbels longer than nasal barbels; considerably longer than eye diameter; gape slightly parallelogram-shaped; jaws with a cartilaginous edge, anterior margin strongly obtuse, slightly truncate; upper jaw moderately downward protrusible, lower jaw at the symphysis with a conical, very conspicuous, tubercle, slightly hooked at the tip; upper lip slightly fleshy, hanging anterior to upper jaw, free margin covered with conical, short, slightly obtuse, very conspicuous papillae, lower lip very fleshy, slightly back-folded, entire, at the underside with short grooves, at the anterior side separated by the very broad skin of the chin; chin not truncate because there is no ascending lower jaw; width of gill cover contained 2 to nearly 2 times in its depth, narrower than eye diameter, lower margin slightly convex; gill opening ending below the posterior part of the preoperculum. Pharyngeal teeth masticatory, aggregated 2.4.5/5.4.2, each with an obliquely truncate, twisted chewing surface, margins elevated, irregular, teeth in anterior row on the anterior side of the top half traversed by a wide, short, longitudinal groove; scapula triangular, acutely rounded; dorsal line convex, much higher than convex ventral line; belly flat anterior to ventral fins, slightly flat, not ridged behind ventral fins; scales oblique (upper angle of the free margin placed anterior to the lower angle of the free margin), scales on the middle of the flanks slightly larger than those on the rest of the body, suprascapular scales the largest of all; scales with a longitudinal stripes on the free half, basal half hardly or not striped, 50 to 51 scales in the lateral line, 21 in a transverse row (lowest ventral scales included), of which $9\frac{1}{2}$ (10) above the lateral line, 13 or 14 in a longitudinal row between occiput and dorsal fin; lowest scales on flanks in 5 longitudinal rows, scales in middle row hardly larger than those in side rows; lateral line nearly straight, sloping downward only anteriorly, slightly closer to the base of the ventral fins than to the dorsal line, each scale marked by a simple tube reaching or nearly reaching the centre of the scale. Dorsal fin starting rather far anterior to the ventral fins and ending above the middle of the base of the anal fin, scaleless at the base, acute, emarginate, length more than 2 times as great as depth, length contained $2\frac{3}{4}$ to $2\frac{1}{2}$ times in the length of the body, depth contained about $1\frac{1}{2}$ times in the depth of the body; pectoral and ventral fins acute, nearly equal in length, contained about $6\frac{1}{2}$ times in the length of the body; pectoral fins not reaching ventral fins, ventral fins not reaching anal fin; anal fin at the base enclosed in a low scaled sheath, acute, not or hardly emarginate, much lower than dorsal fin and nearly 6 times as short, the simple undivided third ray thin, cartilaginous; caudal fin scaled at the base, with a deep incision, lobes acute, upper lobe longer than lower lobe, contained about 4 times in the length of the body. Colour: upper part of the body green, lower

part silver; iris yellow or pink; scales on back and flanks each with a slightly square dark-violet spot at the base, spots nearly forming longitudinal stripes, spots on the scales bordering the lateral line forming a head-tail band; fins pink, caudal fin red, violet at the upper and lower margins.

B. 3. D. 4/26 or 4/27 to 4/29 or 4/30. P. 1/18 or 1/19. V. 2/8. A. 3/5 or 3/6. C. 6/17/6 or 7/17/7, short flanking ones included.

Hab. Sumatra (Pangabuang), in the river.

Borneo (Pontianak), in the river.

Length of two specimens 232''' and 236'''.

197 Remark *Dangila fasciata* is very easy recognizable by the formula of its scales and dorsal fin rays, which differs remarkably from that of the remaining known species.

The habitus of this species reminds somewhat of that of *Barbichthys laevis*, a genus which in several ways is related to *Dangila*. I discovered it in 1853, in a collection from the interior of the Lampong districts sent to me by the late Captain Juch. But since then I also received a single specimen from Western Borneo.

Dangila Kuhli Val.,

Poiss. XVI p. 175. –

Kuhl's Lamba.

Atl. Cypr. Tab. XVI fig. 1.

A *Dangila* with an oblong, compressed body, depth of body contained about $4\frac{2}{5}$ times in its length, width contained about 2 times in its depth. Head acute, contained about $5\frac{1}{2}$ times in length of body with caudal fin, hardly more than 4 times in length of body without caudal fin, depth of head contained about $1\frac{1}{4}$ times in its length, width nearly $1\frac{3}{5}$ times; eyes superior, eye diameter contained about $2\frac{1}{2}$ times in the length of the head, eye diameter contained hardly more than once in the postocular part of the head, distance between the eyes hardly more than once their diameter, palpebral membrane covering the external margin of the iris, broader anteriorly than posteriorly, opening nearly circular; rostro-dorsal profile sloping on forehead and crown, nearly straight, convex on nape and back; interorbital line slightly convex; nostrils closer to the orbit than to the tip of the snout, posterior nostrils open, can be closed by means of a valve; anterior nostrils slightly tubular; small pores on both sides between the nostrils and the upper angle of the gill cover in one longitudinal row, little conspicuous; snout fleshy, nearly flat, convex, slightly protruding anterior to the mouth, shorter than eye diameter, the anterior part covered with many large pores in 3 or more transverse rows, most of them on a horny small round plate of which the centre is prolonged into an acute, conical process; anterior suborbital bone irregularly triangular, depth hardly or not greater than length, lower margin obliquely convex, anterior margin concave, posterior margin undulate or angular, at the top united into an upwards pointing acute angle close to the nostrils; 2nd suborbital bone elongate-quadrangular, higher anteriorly than posteriorly, length more than twice as great as depth, about 3 times as low as eye diameter; 3rd suborbital bone much broader than 4th suborbital bone, about 3 times as narrow as eye diameter; no visible suborbital pores; barbels thin, upper jaw barbels considerably longer than nasal barbels, much longer than eye diameter; gape slightly parallelogram-shaped; jaws with a cartilaginous edge, anterior margin strongly obtuse, slightly truncate; upper jaw moderately downward protrusible, lower jaw at the posterior part of the symphysis with a conical, little conspicuous tubercle; upper lip slightly fleshy, hanging anterior to upper jaw, free margin covered with conical, short, obtuse, very conspicuous papillae in one row; lower lip very fleshy, slightly back-folded, entire, at the underside with short grooves, at the front side separated by the very broad isthmus; chin lightly obliquely truncate because of ascending lower jaw; width of gill cover contained about 2 times in its depth, considerably narrower than eye diameter, lower margin nearly straight; gill opening ending below the posterior part of the preoperculum. Pharyngeal teeth masticatory, aggregated 2.4.5/5.4.2,

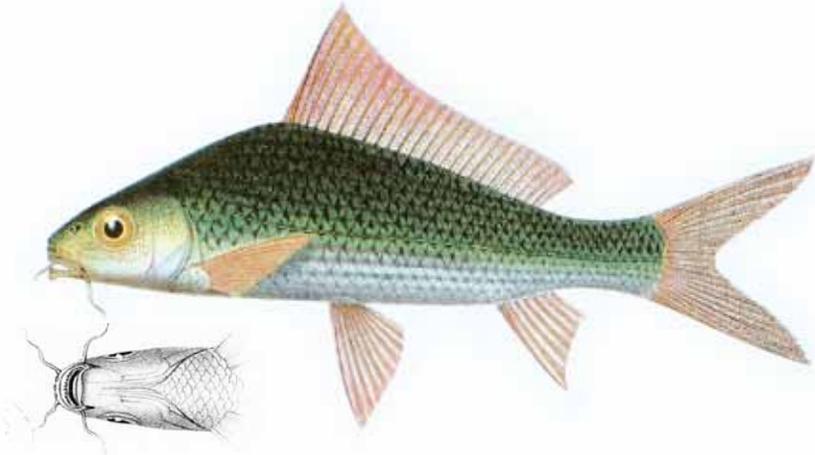


Fig. 49. *Dangila Kuhli* Blkr. Atl. Ichth. Cypr. Tab. XVI, Fig. 1. TL figure 107 mm.

each with an obliquely truncate masticatory surface, more or less twisted, margins elevated, strongly irregular, 3 teeth in anterior row on the front of the top half with a broad, short, longitudinal groove; scapula triangular, slightly obtusely or slightly acutely rounded; dorsal line convex, much higher than convex ventral line; belly flat anterior to ventral fins, rounded behind ventral fins, not ridged; scales oblique (the superior angle of free margin placed anterior to the lower angle of the free margin), scales on the middle of the flanks ¹⁹⁸ slightly larger than on the rest of the body, but suprascapular scales the largest of all; scales with conspicuous longitudinal stripes on the free half, no stripes on basal half, 39 scales in the lateral line, 16 in a transverse row (lowest ventral scales included), of which $7\frac{1}{2}$ (8) above the lateral line (below the dorsal fin), about 11 in a longitudinal row between occiput and dorsal fin; lowest ventral scales in 3 to 5 longitudinal rows, scales in middle row not or hardly larger than those in side rows; lateral line nearly straight, sloping downward only anteriorly; considerably closer to the base of the ventral fins than to the dorsal line, each scale marked by a simple tube reaching or nearly reaching the centre of the scale. Dorsal fin starting rather far anterior to the ventral fins and ending above the middle of the base of the anal fin, scaleless at the base, acute, emarginate, length slightly less than twice the depth; length contained about 3 times in the length of the body, depth contained about $1\frac{1}{2}$ times in the depth of the body; pectoral and ventral fins acute, nearly equal in length, contained slightly over 6 times in the length of the body; pectoral fins not reaching ventral fins, ventral fins not reaching anal fin; anal fin at the base enclosed in a low scaled sheath, acute, not or slightly emarginate, considerably lower than dorsal fin and about 5 times as short, the simple third ray thin, cartilaginous; caudal fin broadly scaled at the base, with a deep incision, lobes acute, upper lobe longer than lower lobe, contained about $3\frac{3}{5}$ times in the length of body. Colour: upper part of the body bluish-green, lower part silver; iris yellow or pink; tail with a round, diffuse violet-blue spot in the lateral line near the base of the caudal fin; fins yellowish-hyaline or pink-hyaline, dorsal and caudal more or less with dark speckles.

B. 3. D. 4/25 or 4/26. P. 1/16. V. 2/8. A. 3/5 or 3/6. C. 7/17/7, short flanking ones included.

Syn. *Dangila de Kuhl* Val., Poiss. XVI, p. 175.

Cyrene Kuhlii Heck., Fisch. Syr. P. 35, Nachtr. P. 183.

Wadon gunung, Millem Mal. Bat.

Hab. Java (Batavia), in the river.

Length of sole specimen 113''.

Remark. I believe to have recovered in the abovementioned specimen, the species described by Mr Valenciennes under the name *Dangila Kuhli*. This species indeed differs from *Dangila leptocheilus* by a larger head and eyes and strongly developed upper lip nipples, just as was indicated by Mr Valenciennes, however Mr Valenciennes mentions only 36 scales in a longitudinal row and gives the dorsal fin formula as 3/24. However these differences are only of individual value or, at least as far as the scales are concerned, depend on the method of counting or of the less well or better preservation of the scales. The indicated differences can only be observed well in equally sized specimens. However I noticed another peculiarity that makes the recognition easier, which is the fact that *Dangila Kuhli* has one longitudinal scale row more above the lateral line than *Dangila leptocheilus*.

Dangila leptocheilus Val.,
Poiss. XVI p. 173, *Cuvier's Lamba*
Atl. Cypr. Tab. XVII.

A *Dangila* with an oblong to slightly elongate, compressed body, depth of body contained nearly 5 to $4\frac{1}{3}$ times in its length, width contained 2 to $2\frac{1}{2}$ times in its depth. Head slightly acute or slightly obtuse, contained 6 to $7\frac{1}{2}$ times in length of body with caudal fin, $4\frac{1}{2}$ to $5\frac{1}{2}$ times in length of body without caudal fin, depth of head contained $1\frac{1}{3}$ to $1\frac{1}{2}$ times ¹⁹⁹ in its length, width $1\frac{1}{3}$ to $1\frac{1}{2}$ times; eyes superior, eye diameter contained $2\frac{2}{3}$ to $3\frac{1}{4}$ times in the length of the head, eye diameter contained once to $1\frac{1}{3}$ times in the postocular part of the head, distance between the eyes slightly more than once to $1\frac{4}{7}$ times their diameter, palpebral membrane covering the external margin of the iris only, broader anteriorly than posteriorly, opening nearly circular; rostro-dorsal profile sloping, nearly straight or slightly convex on forehead and crown, strongly convex on nape and back; interorbital line slightly convex or convex; nostrils closer to the orbit than to the tip of the snout, posterior nostrils open, can be closed by means of a valve; anterior nostrils with elevated margins, slightly tubular, small pores on both sides between the nostrils and the upper angle of the gill cover in one longitudinal row, little conspicuous or not visible; snout fleshy, nearly flat, convex, slightly protruding anterior to the mouth, shorter than eye diameter, the anterior part with several to rather numerous little conspicuous to very conspicuous pores in 2 or more transverse rows; anterior suborbital bone irregularly triangular or pentagonal, depth not or slightly greater than length, lower margin obliquely convex, lateral margins more or less angular, united into a acute, upwards pointing angle, close to the nostrils; 2nd suborbital bone elongate-quadrangular, higher anteriorly than posteriorly, length twice or more than twice as great as depth, more than 3 times as low as eye diameter; 3rd suborbital bone wider than 4th suborbital bone; more than 3 times as narrow as eye diameter; no visible suborbital pores; barbels thin, upper jaw barbels much longer than nasal barbels; slightly to much longer than eye diameter; gape slightly parallelogram-shaped, when mouth is open; jaws with a cartilaginous edge, anterior margin strongly obtuse, slightly truncate; upper jaw moderately downward protrusible, lower jaw at the posterior part of the symphysis with a conical tubercle, slightly hooked at the tip; lips slightly fleshy, hanging anterior to upper jaw, free margin covered with conical, short, obtuse, conspicuous papillae in one row, lower lip slightly back-folded, entire, at the underside with short grooves, at the front side kept far apart by the broad isthmus; chin lightly obliquely truncate because of ascending lower jaw; width of gill cover contained $1\frac{1}{2}$ to 2 times in its depth, more narrow than eye diameter, lower margin slightly concave, nearly straight or slightly convex; gill opening ending below the posterior margin of the preoperculum. Pharyngeal teeth masticatory, aggregated 2.4.5/5.4.2, each with an obliquely truncate chewing surface, more or less twisted, margins elevated, irregular, teeth in anterior row at the front of the top half traversed by a wide, longitudinal groove; scapula triangular, slightly acutely rounded; dorsal line convex, much higher than convex or slightly convex ventral line; belly flat anterior to ventral fins, rounded or very obtusely ridged behind ventral fins; scales oblique (the upper angle of the free margin

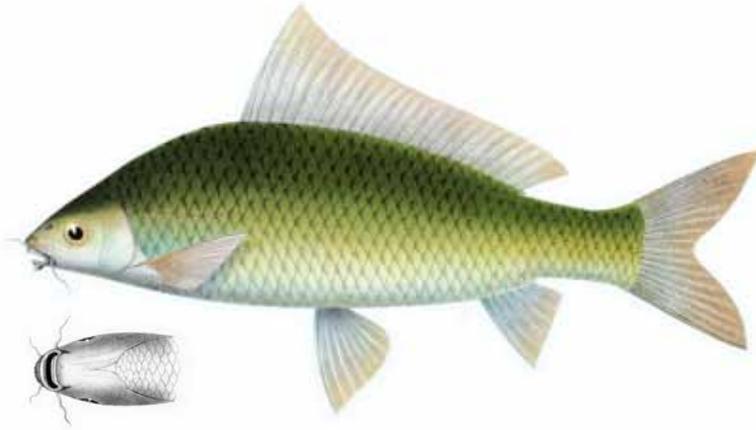


Fig. 50. *Dangila leptocheilus* Blkr. Atl. Ichth. Cypr. Tab. XVII. TL figure 258 mm.

anterior to the lower angle of the free margin), scales on the middle of the flanks slightly larger than on the rest of the body, but suprascapular scales the largest of all; longitudinal stripes on free half of scales conspicuous, often no stripes on basal half, more rarely visible stripes, 39 or 40 scales in the lateral line, 16 in a transverse row (lowest ventral scales included), of which $6\frac{1}{2}$ (7) above the lateral line (below the dorsal fin), 11 or 12 in a longitudinal row between occiput and dorsal fin; lowest scales on flanks in 5 longitudinal rows, scales in middle row not larger than those in side rows; lateral line nearly straight, sloping downward only anteriorly; not much closer to the base of the ventral fins than to the dorsal line, each scale marked by a simple tube reaching or not reaching the centre of the scale; dorsal fin starting far anterior to the ventral fins and ending approximately above the middle of the base of the anal fin, scaleless at the base, acute, emarginate, length less than 2 to more than 2 times as great as depth; length contained 3 to $2\frac{3}{4}$ times in the length of the body, depth contained slightly over once to $1\frac{1}{2}$ times in the length of the body; pectoral fins acute, nearly equal in length [to ventral fins], contained 6 to $6\frac{1}{2}$ times in the length of the body; pectoral fins not reaching ventral fins, ventral fins not reaching anal fin; anal fin at the base enclosed in a low scaled sheath, acute, not or slightly emarginate, considerably lower and 4 to 5 times as short as dorsal fin, simple third ray thin, cartilaginous; caudal fin scaled at the base, with a deep incision, lobes acute, upper lobe generally slightly longer than lower lobe, contained nearly 4 to $4\frac{1}{2}$ times in the length of the body. Centre of the scale the upper part of the body faintly green or olive-green, lower part silver; iris yellow; fins yellowish- or pink-hyaline, of uneven colour, more or less speckled with dark. ²⁰⁰

B. 3. D. $\frac{4}{22}$ or $\frac{4}{23}$ to $\frac{4}{25}$ or $\frac{4}{26}$. P. $\frac{1}{15}$ or $\frac{1}{16}$. V. $\frac{2}{8}$. A. $\frac{3}{5}$ or $\frac{3}{6}$. C. $\frac{7}{17/7}$ or $\frac{6}{16/6}$, short flanking ones included.

Syn. *Labeobarbus leptocheilus* K. V. Hass., Val.

Dangila Cuvieri Val., Poiss. XVI p. 174 fig. 470; Blkr, Verg. Bat. Gen, XXIII Ichth. M.O.

Java p. 19.

Dangila de Cuvier Val. Poiss. XVI p. 174 fig. 740.

Dangila leptocheila Val., ib. P. 178.

Dangile à lèvres cachées Val., ib. P. 178.

Cyrene leptocheila Heck., Fisch. Syr. P. 35.

Wadon gunung, Millem Mal. Bat. Nilem, Tiworo Sund. Wader Jav.

Hab. Java (Batavia, Perdana, Lebak, Tjampea, Buitenzorg, Tjikao, Ngawi, Surabaya), in rivers.

Sumatra (Palembang), in rivers.

Borneo (Pontianak), in rivers.

Length of 37 specimens 84''' to 275'''.

Remark. The description of *Dangila leptocheilus* by Mr Valenciennes answers rather well to my specimens, but is little characteristic. The upper lip would not be nipped, which however is not likely. The differences in the scale formulas can be explained when one accepts that the count has not been done properly or that the observed specimens did not allow a proper count. In a few of my specimens there are also traces of a tail spot. I am of the opinion that *Dangila leptocheilus* Val. is the same as *Dangila Cuvieri* Val. and represents the medium age, whereas the specimen described by Mr Valenciennes as *Dangila Cuvieri* relates to the juvenile age, in which the head is relatively larger in proportion to the length of the body.

On Java this species is relatively common, especially in the higher parts of the large rivers. It offers a large variation regarding the relative height of the body. As a rule the males are remarkably more slender than the females.

The referred figure of Mr Valenciennes is a good representation of the habitus, but is not correct with regard to the formula of the scales. Also the upper lip nipples cannot be perceived.

Dangila sumatrana Blkr,

Diagn. Beschrijv. Nieuwe vischs. Sumatra, Tiental I-IV, Nat. T. Ned. Ind. III p. 596. –

Sumatrasche Lamba [*Sumatran Lamba*].

Atl. Cypr. Tab. XV. fig. 4.

A *Dangila* with an elongate, compressed body, depth of body contained $5\frac{1}{4}$ to $5\frac{1}{2}$ times in its length, width contained slightly more than twice in its depth. Head acute, contained about $6\frac{1}{2}$ times in length of body with caudal fin, hardly over 5 times in length of body without caudal fin, depth of head contained about $1\frac{1}{3}$ to $1\frac{2}{5}$ times in its length, width contained about $1\frac{2}{3}$ times ²⁰¹ in its length; eyes superior, eye diameter contained about 3 times in the length of the head, eye diameter contained once in the postocular part of the head, distance between the eyes slightly more than once the eye diameter, palpebral membrane covering the external margin of the iris, broader anteriorly than posteriorly, opening nearly circular; rostro-dorsal profile sloping on forehead and crown, nearly straight, convex on nape and back; interorbital line convex; nostrils closer to the orbit than to the tip of the snout, posterior nostrils open, can be closed by means of a valve; anterior nostrils slightly tubular, no visible small pores on both sides between the nostrils and the upper angle of the gill cover; snout fleshy, nearly flat, convex, slightly protruding anterior to the mouth, not or hardly shorter than eye diameter; at the front covered with numerous very conspicuous pores in several transverse rows; anterior suborbital bone irregularly triangular, depth hardly or not greater than length, lower margin obliquely convex, anterior lateral margin convex, posterior lateral margin convex or angular, united into an acute, upwards pointing angle, close to the nostrils; second suborbital bone elongate-quadrangular, length about twice as great as depth, higher anteriorly than posteriorly, about 3 times as low as eye diameter; 3rd suborbital bone broader than 4th suborbital bone; about 3 times as narrow as eye diameter; no conspicuous suborbital pores; barbels thin, upper jaw barbels much longer than nasal barbels, slightly longer than eye diameter; gape slightly parallelogram-shaped; jaws with a cartilaginous edge, at the anterior margin very obtuse, slightly truncate; upper jaw moderately downward protrusible, lower jaw at the posterior part of the symphysis with a conical tubercle, slightly hooked at the tip; lips slightly fleshy, hanging anterior to upper jaw, free margin covered with conical, short, obtuse, papillae in one row, lower lip slightly back-folded, entire, at underside with short grooves separated at the front by the very broad isthmus; chin hardly obliquely truncate because of hardly ascending lower jaw; width of gill cover contained about 2 times in its depth, considerably more narrow than eye diameter, lower margin slightly convex; gill opening ending below the posterior part of the preoperculum. Pharyngeal teeth masticatory, aggregated 2.4.5/5.4.2, each with an obliquely truncate, more or



Fig. 51. *Dangila sumatrana* Blkr. Atl. Ichth. Cypr. Tab. XV, Fig. 2. TL figure 179 mm.

less twisted chewing surface, margins elevated, irregular, teeth in anterior row in the front part of the top half traversed by a broad longitudinal groove; scapula triangular, acutely rounded; dorsal line convex, much higher than convex ventral line; belly flat anterior to ventral fins; scales oblique on the posterior part of the body, scales on the middle of the flanks slightly larger than on the rest of the body, hardly any or no visible longitudinal stripes on the basal half, conspicuous longitudinal stripes on the free half, 37 or 38 scales in the lateral line, 14 or 15? in a transverse row (lowest ventral scales included), of which $5\frac{1}{2}$ (6) above the lateral line (below the dorsal fin), 11 or 12 in a longitudinal row between occiput and dorsal fin; lateral line nearly straight, sloping downward only anteriorly, slightly closer to the base of the ventral fins than to the dorsal line, each scale marked by a simple tube reaching the centre of the scale; dorsal fin starting far anterior to the ventral fins and ending above the anterior part of the base of the anal fin, scaleless at the base, acute, emarginate, length less than twice as great as depth, length contained $3\frac{1}{2}$ to $3\frac{3}{5}$ times in the length of the body, depth contained once or more than once in the depth of the body; pectoral and ventral fins acute, nearly equal in length, contained about 7 times in the length of the body, pectoral fins not reaching ventral fins, ventral fins not reaching anal fin; anal fin at the base enclosed in a low scaled sheath, acute, not or hardly emarginate, much lower than dorsal fin and less than 5 times as short, the simple third ray thin, cartilaginous; caudal fin scaled at the base, with a deep incision, lobes acute, upper lobe generally slightly longer than lower lobe, contained about 4? times in the length of the body. Colour: upper part of the body green, lower part silver; iris yellow or pink; violet-dark, slightly diffuse head-tail band over its total length traversed by the lateral line; fins pink-hyaline or pink.

B. 3. D. 4/23 or 4/24. P. 1/15. V. 2/8. A/ 3/5 or 3/6. C. 6/17/6 or 7/17/7, short flanking ones included.

Hab. Sumatra (Solok, Lahat), in the river.

Length of sole specimen 185'''.

Remark. *Dangila sumatrana* must be very closely related to *Dangila philippina*.²⁰² Judging from the short description of this species by Heckel it differs only from it by a longer dorsal fin and a longitudinal body band.

My single specimen of this species is in a little satisfying state of preservation. A further detailed investigation has made me recognize the earlier not perceived upper lip nipples, whereas also the implantation grooves of the largely lost scales made it possible rather to decipher sufficiently the formula of the scales. The species is also related to *Dangila leptocheilos* Valenciennes. Comparing specimens of this species of equal size as my specimen of *Dangila sumatra* with the last mentioned one, the differences in

habitus of the body and head become very apparent, as in *Dangila leptocheilos* the back is remarkably higher and more arched, the head remarkably more blunt and relatively higher and the dorsal fin longer. The principal difference to me seems to be the presence of one scale row more above the lateral line in *Dangila leptocheilos*.

Dangila philippina Blkr. –
Philippijnse Lamba [*Philippine Lamba*].

Description following Heckel [Translated from German]

“Body elongated, especially in the back region strongly compressed; Head small, obtuse, $\frac{2}{13}$ of the total length, or $\frac{2}{3}$ of the largest body depth. Eyes $\frac{1}{3}$ of the head length, dorsal fin basis very long, equaling $1\frac{1}{2}$ times the largest body depth. The middle of the anal fin base lies under the end of the dorsal fin base. Scales large, almost everywhere of the same size; 37 scales in the lateral line, 6 scale rows above and 5 under the lateral line. D. $\frac{3}{23}$. A. $\frac{3}{5}$.”

Syn. *Cyrene philippina* Heck., Fisch. Syr. p. 5.

Cyrene philippina Heck. Fisch. Syr. Nachtr. p. 133.

Hab. Philippine Isl.

Length of the described specimen 6 inches.

Remark. Judging from the short description by Heckel, this species would only differ from *Dangila sumatrana* by a shorter dorsal fin and the absence of a brown longitudinal body band. A further investigation and a comparison of specimens of both species after nature are necessary to determine possible further existing differences. In the light of the large distance of the Philippine islands from Sumatra it is not likely that both species can be reduced to one.

Dangila festiva Blkr,
Act. Soc. scient. Ind. Neerl. Tiende bijdr. ichth. fauna v. Borneo. p. 16. –
Borneosche Lamba [*Bornean Lamba*].
Atl. Cypr. Tab. XV fig. 6.

A *Dangila* with an oblong, compressed body, depth of body contained $4\frac{3}{4}$ to $4\frac{1}{2}$ times in its length, width contained about twice in its depth. Head acute, contained about $5\frac{1}{5}$ times in length of body with caudal fin, 4 to $4\frac{1}{3}$ times ²⁰³ in length of body without caudal fin, depth of head contained $1\frac{1}{3}$ to $1\frac{1}{4}$ times in its length, width about $1\frac{1}{4}$ times; eyes superior, eye diameter contained about $2\frac{1}{2}$ times in the length of the head, eye diameter contained nearly once to once in the post ocular part of the head, distance between the eyes about once their diameter, palpebral membrane covering the external margin of the iris only, opening nearly circular; rostro-dorsal profile sloping, nearly straight on forehead and crown, convex on nape and back; interorbital line slightly convex; nostrils closer to the orbit than to the tip of the snout, posterior nostrils open, can be closed by means of a valve; anterior nostrils slightly tubular, small pores on both sides between the nostrils and the upper angle of the gill cover in one row, little conspicuous to not visible; snout fleshy, slightly flat, convex, slightly protruding anterior to the mouth, shorter than eye diameter, the anterior part covered with several large, very conspicuous pores in two transverse rows; anterior suborbital bone irregularly triangular, depth hardly to not greater than length, lower margin oblique, slightly convex, anterior margin concave and posterior margin undulate or angular, united into a acute, upwards pointing angle, which ends between the nostrils and the eye; 2nd suborbital bone elongate-quadrangular, much deeper anteriorly than posteriorly, length more than twice as great as depth, more than 4 times as low as eye diameter; 3rd and 4th suborbital bones more than 4 times as narrow as eye diameter; no visible suborbital pores;

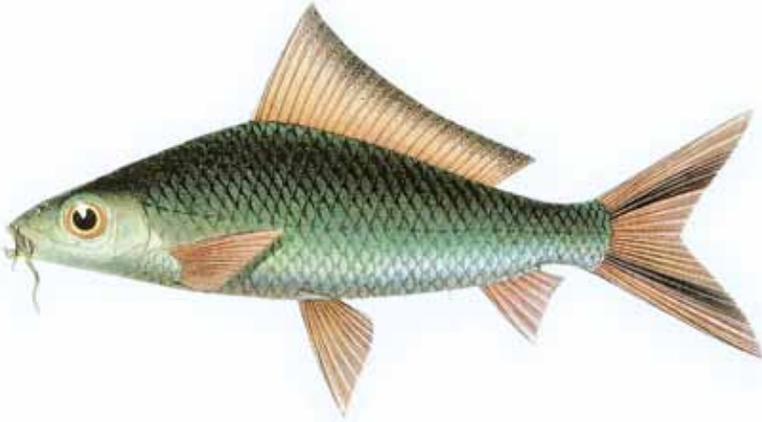


Fig. 52. *Dangila festiva* Blkr. Atl. Ichth. Cypr. Tab. XV. Fig. 4. TL figure 93 mm.

barbels thin, upper jaw barbels longer than nasal barbels; hardly to considerably longer than eye diameter; gape slightly parallelogram-shaped; jaws with a cartilaginous edge, anterior margin strongly obtuse, slightly truncate; upper jaw moderately downward protrusible, lower jaw at the posterior part of the symphysis with a conical tubercle, slightly hooked at the tip; lips slightly fleshy, upper lip hanging anterior to upper jaw, free margin entire, covered with one row of conical, short, obtuse papillae, lower lip slightly back-folded, free margin entire, short grooves at the underside far apart at the front because of the broad isthmus; chin lightly obliquely truncate because of ascending lower jaw; width of gill cover contained about $1\frac{1}{2}$ times in its depth, much narrower than the eye diameter, lower margin nearly straight or slightly concave; gill opening ending below the posterior part of the preoperculum. Pharyngeal teeth masticatory, aggregated 2.4.5/5.4.2, each with an obliquely truncate chewing surface, margins slightly elevated, teeth in anterior row on the chewing surface more or less twisted, at the front of the top half traversed by a broad, longitudinal groove; scapula triangular, slightly acutely rounded; dorsal line convex, higher than convex ventral line; belly flat anterior to ventral fins, behind ventral fins rounded, not ridged; scales nearly vertical, the free margin very convex, scales on the middle of the flanks slightly larger than on the rest of the body, no visible longitudinal stripes on the basal half, hardly visible stripes or no stripes on the free half; 33 or 34 scales in the lateral line, 16 in a transverse row (lowest ventral scales included), of which $7\frac{1}{2}$ (8) above the lateral line (under dorsal fin), 11 in a longitudinal row between the occiput and dorsal fin, lowest ventral scales in 3 longitudinal rows; lateral line nearly straight, sloping downward only anteriorly, not much closer to the base of the ventral fins than to the dorsal line, each scale marked by a simple tube reaching or nearly reaching the centre of the scale; dorsal fin starting far anterior to the ventral fins and ending above the middle of the base of the anal fin, scaleless at the base, acute, emarginate, length nearly twice to twice as great as depth, length contained slightly over 3 times in the length of the body, depth contained $1\frac{1}{4}$ times to hardly more than once in the depth of the body; pectoral and ventral fins acute, nearly equal in length, contained about $6\frac{1}{4}$ times in the length of the body, pectoral fins not reaching ventral fins, ventral fins not reaching anal fin; anal fin at the base enclosed in a low scaled sheath, not or hardly emarginate, acute, much lower than the dorsal fin and about 5 times as short, the simple third ray thin, cartilaginous; caudal fin scaled at the base, with a deep incision, lobes acute, contained nearly 4 times in the length of the body. Colour: upper part of the body bluish-green, lower part silver; iris pink or yellow; scales on back and flanks each with a transverse, crescent-shaped dark or violet band, fins pink, dorsal and caudal fin of a deeper colour than the other fins, dorsal fin at the top with a broad blackish-violet border, caudal fin in the middle of both lobes with a broad, longitudinal violet-black band.

B. 3. D. 4/25 or 4/26. P. 1/18. V. 2/8. A. 3/5 or 3/6. C. 7/17/7, short flanking ones included.

Syn. *Cyrene festiva* Heck., Abbild. Beschreib. Fisch. Syriens p. 35, Nachtr. P. 183.

204 Hab. Borneo (Kahajan), in rivers.

Length of 5 specimens 82'' to 98''.

Remark. The first knowledge of this species is also due to Heckel just like that of *Dangila ocellata*. It is brief, but sufficiently recognizable described in his *Fische Syriens* and easy to recognize by its longitudinal blackish bands on the caudal fin lobes, which one does not find in any of the remaining species of *Dangila*. Indeed it stands in relationship between *Dangila sumatrana* Blkr. and *Dangila lipocheilus* Val. and distinguishes itself, apart from the caudal fin bands, moreover from *Dangila sumatrana* by 4 or 5 scales [less] in the lateral line and by 2 scales more above the lateral line, and from *Dangila lipocheilus* by a few scales less in the lateral line and three scale rows more above the lateral line.

Dangila cynopareja Blkr. –
Heckel's Lamba.

Description following Heckel
[translated from German]

"Habitus like *Cyprinus Idus* L. Head slightly less than $\frac{1}{5}$ of the total length, or $\frac{2}{3}$ of the largest body depth. Eyes small, $\frac{1}{4}$ of the head length. The length of the dorsal fin base is equal to the body depth, the length of the first ray is equal to the head length. The origin of the anal fin lies behind the end of the dorsal fin base. Large scales, especially at the origin of the lateral line, which contains 35 scales and has 5 scale rows above, and 4 scale rows below it. A blue spot on the gill cover, against the upper corner of the gill slit. D. 3/17 A. 3/5".

Syn. *Cyrena cyanopareja* Heck., Fisch. Syr. p. 53, Nachtr. p.183.

Hab. Philippine islands.

Length of the described specimen 5 inches.

Remark. The differences between *Dangila cyanopareja* and *Dangila lipocheilus* Val. seem to be very small, at least as far as the proportions of the body and the formulas of the scales and fin rays are concerned. Still the species in question would have a blue spot on the opercle of which there is no question in the description of *Dangila lipocheilus* Val. and which I also not find indicated in a figure of the species which is in my possession. Both species equally deserve to be compared further with each other like *Dangila philippina* and *Dangila sumatrana*.

Dangila lipocheilus Val.,
Dangile à lèvres minces Poiss. XVI p. 176. –
Van Hasselt's Lamba.

As I have seen no specimen the description is taken from Valenciennes:

[Translated from French]

"These cyprinids have the anteriormost suborbital bone very much larger than the ordinary Barbines, as it is extended till the end of the snout: this gives them a peculiar look. The back outline is straight but elevated, the back is rounded; the belly is compressed, the outline 205 curved. The body depth goes less than four times in the length and the body width goes $2\frac{2}{3}$ times its depth.

The head is small, the frontcompressed, large; the snout obtuse: the small eye is placed posteriorly and

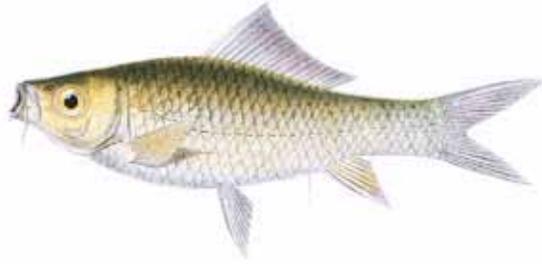


Fig. 53. *Dangila lipocheilus* Val. (Cop. v. Hass.) Atl. Ichth. Cypr. Tab. VII, Fig. 1. TL figure 68 mm.

superiorly; the suborbital is large; the posterior part is very small; the tree others are striped; the preopercle is small; the opercle is large, smooth and without stripes; the lips are fleshy, thin; there is a small knob at the symphysis, which enters a withdrawn angle in the upper jaw, as in mullets and in other Cyprinoids. There are four short barbels, one at each commissure, the other near the end of the snout. The dorsal starts at one third of the body and is slightly extended, and the first ray is small as in bleaks. The shoulder bone is rounded, small, pectoral fin pointed, ventral fin normal, anal fin high, but somewhat long, rostrally somewhat pointed, caudal fin deeply forked.

A. $2/8$ (read $2/18$). P. 16. V. 8. A. 6. C. 20.

Lateral line straight, on the middle of the body, the scales are small, thin, without stripes, 86 in a longitudinal series, 14 in a transverse series; a large pointed scale covers the axil of the ventral fins.

The colour of the back is lead gray, belly and flanks are greenish with golden reflection, near the tail turning to silvery white. Dorsal fin whitish, with a large elongated black blotch dorsally. Pectorals, pelvics and anal pale yellowish; caudal fin gray with a black margin. On the drawing sent from Java by Misters Kuhl and Van Hasselt, the back is green, the belly bluish; there is yellow on the opercle and on the flanks; the dorsal and caudal fin are bluish; The specimen deposited in Leiden has a length of 8 inches."

Syn. *Labeobarbus lipocheilus* K. v. H. Mss according to Val.

Cyrene lipocheila Heck., Fisch. Syr. p. 35, Nachtr. p. 183.

Hab. Java (Batavia, Tjilakahan), in rivers.

Remark. Of this species I do not possess a single specimen, notwithstanding it would occur at Batavia, at least according to a figure left by Kuhl and van Hasselt and marked *Labeobarbus lipocheilus*. According to this figure, which is taken from a specimen of 70 mm length, the formula of the dorsal fin would be $2/18$, which answers well to the formula of Mr Valenciennes, where the formula = $2/8$ apparently has to be read as $2/18$.

The species then would primarily be recognizable by the low number of its dorsal fin rays, whereas the dorsal fin itself, judging from the figure, is remarkable by its shortness, as its length goes 4 times in the length of its body and is considerably less than two times its height. The figure shows 5 or $5\frac{1}{2}$ scale rows above the lateral line, which number however needs to be further confirmed as the figure indicates 32 scales in a longitudinal row, whereas Mr Valenciennes mentions 36 scales in the lateral line. In the mentioned figure is indicated as well that the species is also found twice as large as on the illustration, on the south coast of Java, near Tjilankalan, in almost stagnant waters.

[N.B. In the Atlas Ichthyologique des Indes Orientales Néerlandaises, Vol. III, Bleeker (1963: 48) restricts the name *Dangila lipocheilus* Val. to the specimen figured by Van Hasselt as *Labeobarbus lipocheilus*. In Vol. II of the Atlas (Bleeker, 1862: PL VII, Fig. I) a figure is given which is a copy of the original, drawn by Bleeker's artist L. Speigler. This figure is reproduced above.]

206 *Dangila spilurus* Blkr,
 Nieuwe Bijdr. ichthyol. Borneo, Nat. T. Ned. Ind. I p. 272. –
Staatvlekkige Lamba [Tail-spot Lamba].
 Atl. Cypr. Tab. XV fig. 1.

A *Dangila* with an elongate, compressed body, depth of body contained about 5 times in its length, width contained about twice in its depth. Head acute, contained more than 5 times in length of body with caudal fin, about $4\frac{1}{4}$ times in length of body without caudal fin, depth of head contained about $1\frac{1}{2}$ times in its length, width contained about $1\frac{1}{2}$ times in its length; eyes slightly superior, eye diameter contained slightly over 3 times in the length of the head, eye diameter contained slightly more than once in the postocular part of the head, distance between the eyes about $1\frac{1}{2}$ times their diameter, palpebral membrane covering the external margin of the iris, opening nearly circular; rostro-dorsal profile forehead and crown slightly convex, convex on nape and back; interorbital line slightly convex; nostrils closer to the orbit than to the tip of the snout, posterior nostrils open, can be closed by means of a valve; anterior nostrils with an elevated margin, slightly tubular; small pores on both sides between the nostrils and the upper angle of the gill cover, in one longitudinal row, little conspicuous; snout fleshy, nearly flat, convex, slightly protruding anterior to the mouth, hardly or not shorter than eye diameter; at the front covered with several little conspicuous pores; anterior suborbital bone quadrangular, length hardly or not greater than depth, lower margin nearly straight; 2nd suborbital bone elongate-quadrangular, length more than twice as great as depth, not much higher anteriorly than posteriorly, length more than 2 times as great as depth, anteriorly not much higher than posteriorly, more than 3 times as low as eye diameter; 3rd suborbital bone hardly broader than 4th suborbital bone, many times as low as eye diameter; no visible suborbital pores; upper jaw barbels considerably longer than nasal barbels and than eye diameter; gape slightly parallelogram-shaped; jaws with a cartilaginous edge, anterior margin very obtuse, slightly truncate; upper jaw moderately downward protrusible, lower jaw at the posterior part of the symphysis with a conical, little conspicuous tubercle; upper lip fleshy, hanging anterior to upper jaw, free margin covered with one row of conical, short, obtuse, conspicuous papillae; lower lip very fleshy, back-folded, entire, the grooves at the underside kept far apart at the front because of the broad isthmus; chin lightly obliquely truncate because of ascending lower jaw; width of gill cover contained about $1\frac{1}{2}$ times in its depth, not narrower than eye diameter, lower margin slightly convex; gill opening ending below the posterior margin of the preoperculum. Pharyngeal teeth masticatory, aggregated 2.4.5/5.4.2, with a slightly truncate chewing surface, slightly lobed; scapula triangular, slightly obtusely rounded; dorsal line convex, higher than convex ventral line; scales oblique (the superior angle of the free margin placed anterior to the lower angle of the free margin), scales on the middle of the flanks slightly larger than on the rest of the body, about 28 scales in the lateral line, about 12 in a transverse row (lowest ventral scales in-



Fig. 54. *Dangila spilurus* Blkr. Atl. Ichth. Cypr. Tab. XV, Fig. 1. TL figure 79 mm.

cluded), of which $4\frac{1}{2}$ (5) above the lateral line, 9 or 10 in a longitudinal row between occiput and dorsal fin; lateral line nearly straight, sloping downward only anteriorly; dorsal fin starting rather far anterior to the ventral fins and ending rather far anterior to the anal fin, base length contained about $5\frac{2}{3}$ times in the length of the body, acute, emarginate, slightly lower than the body, not or hardly higher than base length; pectoral and ventral fins acute, nearly equal in length?, contained about 7? times in the length of the body; anal fin acute, emarginate, considerably lower than dorsal fin and less than 3 times as short, nearly twice as high as base length, the simple third ray thin, cartilaginous; caudal fin scaled at the base, with a deep incision, lobes acute (partly missing). Colour: upper part of the body pink-green, lower part silver; tail with a blackish round spot in the lateral line close to the base of the caudal fin; fins pink.

B. 3. D. $4/10$ or $4/11$. P. $1/12?$ $V.2/7$ or $2/8$. A. $3/5$ or $3/6$. C. $6/17/6$, short flanking ones included.

Hab. Borneo (Bandjermasin), in the river.

Length of the sole, badly preserved, specimen 75'''.

Remark. I have had to take the above given description from the same damaged specimen from which I described the species for the first time in 1850, as I did not 207 succeed in obtaining new specimens.

The species is easily recognizable in its genus by its small number of scales and a short dorsal fin. Because of its short dorsal fin it approaches more than any other species the genus *Barbichthys*, however in habitus of the head it deviates rather much from it because of the slight development of the suborbital bones.

ABROSTOMUS Smith,
Illustrat. Zoöl. South Africa, Pisc. Tab. and pag. 12 –
WEAK-MOUTH CARP.

Body elongate, compressed, covered with medium-sized scales. Jaws bare. Barbels 4, upper lip (or nasal?) barbels and maxillary barbels. Snout fleshy, entire, hardly protruding anterior to mouth, not lobed at the flanks. Upper lip thick, fleshy, entire, not papillose or fringed, united with lower lip. Gape small, parallelogram-shaped. Lower lip entire, not lobed or fringed. Postlabial groove simple on both sides, longitudinally directed towards the margin of the mouth. Dorsal fin starting anterior to ventral fins and ending far anterior to anal fin, posterior simple ray cartilaginous. Pectoral fins inserted nearly horizontally.

Remark. The genus *Abrostomus* rightly is considered a proper genus by Mr Andrew Smith. Heckel also accepted it as such, but did not place it under his *Temnochilae*, to which it however, according to the figure of Mr Smith in his *Illustrations of the Zoology of South Africa* (Pisces tab. 12 fig. a) apparently belongs. In relationship the genus stands partly between *Labeo* and *Rohithichthys*, and partly between *Labeo* and *Crossocheilos*. Among the *Labeonines* it is primarily characterized by its round connected smooth edged lips and its parallelogram-shaped mouth opening, while the recognition is still made easier by the little bulging, neither grooved, nor lobed snout and relatively small scales (more than 70 to more than 100 in a longitudinal row, at least according to the figures). When the illustrations of *Abrostomus umbratus* and *Abrostomus capensis* are correct with regard to the cirri, the genus would have the peculiarity that the upper pair of barbels is not implanted as usual, on the snout, but on the upper lip itself. In his description Mr Smith however speaks repeatedly of snout barbels and therefore the illustrations may be incorrect with regard to this char-

acter. However it deserves to be noted, that in the four remaining Cyprinoids from the Cape depicted in the mentioned work, ²⁰⁸ the snout barbels are presented properly as taking their rise from the snout. Regarding the dentition one finds no clarification from Mr Smith. The two mentioned species from the Cape are the only ones that till now have become known of this genus. It seems that the genus is restricted to South Africa.

BARBICHTHYS Blkr. –
SANTRAN.

Body slightly elongate, compressed, covered with large scales. Jaws bare, not tumid. Barbels 4, nasal and upper jaw barbels. Snout not fleshy, entire, protruding anterior to the mouth, not lobed at the sides, free margin not papillose or fringed. Supermaxillary bones completely covering the intermaxillary bones, intermaxillary and inframaxillary bones united with the bones on the opposite side in an obtuse angle, edges thin. Lower jaw tubercle at the symphysis. Gape angular. Lips thin, entire, not papillose or with a fringed margin, upper lip hanging anterior to upper jaw, confluent with lower lip, lower lip back-folded, not lobed, inserted hardly behind edge of the jaw. Postlabial groove simple, parallel to the lower margin of the jaw, united with the groove on the opposite side. Suborbital bones bare, the anterior bone slightly resembling a horse shoe, the others strongly elevated, largely covering the cheeks. Dorsal fin starting anterior to the ventral fins and ending far anterior to the anal fin, scaleless at the base, the posterior simple ray cartilaginous. Pharyngeal teeth masticatory, aggregated 2.4.5/5.4.2, inserted in fragile bones.

Remark. I base this genus on a species, which Van Hasselt already indicated with the name *Barbus nudicephalus*, Mr Valenciennes described in the large *Histoire naturelle des Poissons* under the name *Barbus laevis*, and which I myself have described, after the various states in which I observed it, under the names *Barbus brachynemus*, *Barbus gobioides* and *Barbus taeniopterus*.

However, that species does not belong to *Barbus*, but to a totally different genus, which, because of its naked jaws and free lips can be placed in the Labeonines. The thin upper lip is hanging completely free before the upper jaw, however the lower lip is implanted very close to the anterior edge of the lower jaw, so that it without more detailed research seems to envelop the lower jaw as in *Barbus*.

With the structure of the mouth parts, which is that of the Labeonines, the ²⁰⁹ habitus of the entire body is also in agreement, and the pharyngeal bone teeth are build after the type of the Labeonines of the Old World.

Barbichthys is closely related to *Dangila* and principally distinguishes itself from it by a snout that is not fleshy, an upper lip without nipples, very much developed high suborbital bones, of which the anteriormost is more or less horse shoe shaped, an angular gape, a hardly from the lower jaw separated lower lip and a short dorsal fin.

Till now only a single species is known. Under the numerous still insufficiently elucidated Cyprinoids from South America I see not one, which can be placed in the genus *Barbichthys*, and the specimens sent to me from the large Sunda Islands and earlier considered by me as belonging to two species, since then by comparing a large series of specimens appeared to be only a single species, which is the same as *Barbus laevis*.

Barbichthys laevis Blkr. –
Gewone Santran [Common Santran].
 Atl. Cypr. Tab. XVIII.

A *Barbichthys* with a slightly elongate, compressed body, depth of body contained $4\frac{1}{3}$ to $5\frac{1}{4}$ times in its length, width contained $1\frac{2}{3}$ to 2 times in its depth. Head slightly obtuse, convex, contained $4\frac{1}{3}$ to $6\frac{1}{2}$ times in length of body with caudal fin, $3\frac{2}{3}$ to 5 times in length of body without caudal fin, depth of head contained $1\frac{2}{5}$ to $1\frac{1}{5}$ times in its length, width contained nearly 2 to $1\frac{3}{5}$ times in its length; eye diameter contained 3 to $4\frac{1}{2}$ times in the length of the head, eye diameter contained $1\frac{1}{4}$ to $1\frac{3}{4}$ times in the postocular part of the head, distance between the eyes $1\frac{1}{4}$ to nearly $2\frac{1}{2}$ times the eye diameter, palpebral membrane rather broadly covering the external margin of the iris, opening nearly circular; snout obtuse, convex, fleshy at the tip, protruding anterior to the mouth, in juveniles not or hardly longer than the eye, in adult fishes much longer than the eye, nostrils closer to the orbit than to the tip of the snout; rostro-dorsal profile convex on head and nape, between occiput and nape in old animals generally slightly concave; interorbital line convex; anterior suborbital bone in shape slightly reminding of a horse foot, the nearly horizontal hoof forward pointing only at the tip, the middle traversed by a longitudinal, generally branched crest; 2nd suborbital bone pentagonal, in younger animals length not or hardly greater than depth, lower than the eye, in old animals depth frequently greater than length, not lower than the eye, at lower margin nearly horizontal, the anterior and posterior lower margins nearly vertical, the slightly concave upper margins united into an acute, upward pointing angle, bordering on the first suborbital bone; 3rd suborbital bone very broad and convex, at the posterior margin close to the posterior margin of the preoperculum; upper jaw moderately vertically downward protrusible, ending far anterior to the eye; gape transverse with an obtuse angle, the anterior (superior) margin three-fold, formed by the intermaxillary bone and the intermaxillary and rostral parts of the lip, intermaxillary margin acute, symphysis with a slight incision; intermaxillary lip thin, membranous, rather broad, hanging from the anterior margin of the intermaxillary bone; rostral lip with a thin margin hanging from the tip of the snout and the anterior surface of the supramaxillary bone; gape posteriorly (at the underside) with a double margin, anterior margin formed by the edge of the inframaxillary bone, posterior margin formed by the lower lip; lower lip or skin fold of the chin rather broad, membranous, hanging from total margin of the anterior inframaxillary bone, entire, its free margin nearly parallel to the gape; lower jaw at the symphysis with a tube-shaped, conical, very conspicuous tubercle, slightly

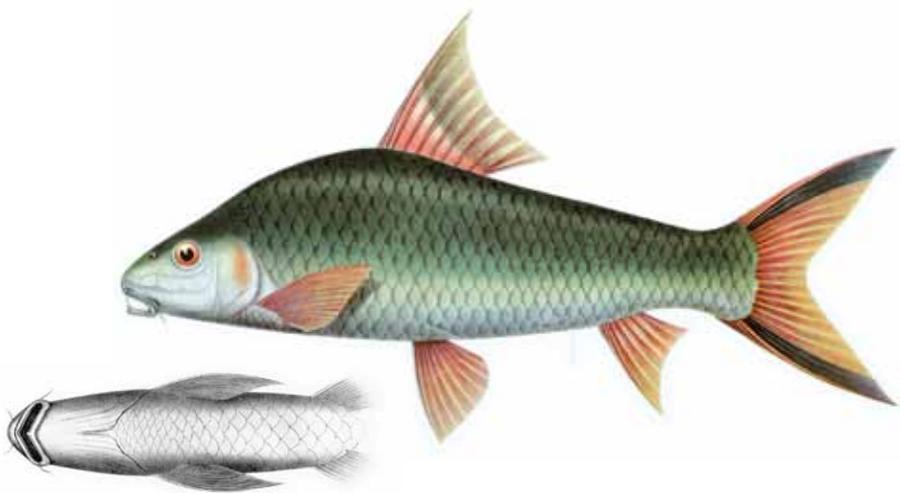


Fig. 55. *Barbichthys laevis* Blkr. Atl. Ichth. Cypr. Tab. XVIII. TL figure 323 mm.

hooked at the tip, at the underside on both branches about 4 pores placed in a longitudinal row, not always visible; barbels thin, nearly equal in length, twice or less than twice as short as the eye, anterior barbels with their insertion far removed from the first suborbital bone, close to the tip of the snout; width of gill cover contained nearly twice to twice in its depth, lower margin slightly convex or nearly straight; gill ²¹⁰ opening ending below the posterior angle of the preoperculum. Pharyngeal teeth masticatory, aggregated 2.4.5/5.4.2., inserted in thin, fragile bones; scapula triangular, obtusely rounded; belly flat anterior to ventral fins, angular at the flanks, rounded, not ridged behind ventral fins; back rather elevated, angular, much higher than the belly; scales for the lower half and generally also for the basal half with fan-like stripes, 36 to 39 scales in the lateral line, 13 in a transverse row (excluding the lowest ventral scales) of which $6\frac{1}{2}$ above the lateral line, 11 or 12 in a longitudinal row between occiput and dorsal fin; lowest ventral scales in 5 longitudinal rows, scales in middle row gradually increasing in size towards the back, not larger than those in the side rows; lateral line nearly straight, slightly curved only anteriorly, not reaching the rostro-caudal line, each scale marked by a simple tube generally not reaching the centre of the scale; dorsal fin starting anterior to the ventral fins, acute, emarginate, not or only slightly lower than the body, a lot higher but less than twice as high as base length; the simple ray thin, smooth, largely cartilaginous, flexible on the posterior side, not or not much longer than the head; pectoral and ventral fins acute, nearly equal in length or pectoral fins slightly longer than ventral fins, contained 6 times to $6\frac{1}{3}$ times in the length of the body, pectoral fins reaching or nearly reaching ventral fins in younger animals, in old animals not reaching ventral fins; ventral fins not reaching anal fin; anal fin acute, not or slightly emarginate, much lower but much less than twice as low as dorsal fin, about twice as high as base length, the simple third ray thin, bony only at the base; caudal fin scaled only at the base, with a deep incision, lobes acute, contained $3\frac{1}{3}$ to 4 times in the length of the body. Colour: upper part of the body bluish-green; iris yellow tinged with pink; gill cover with a diffuse fiery red spot, not visible in conserved specimens, fins yellow or pink, at the base frequently beautiful red, caudal fin on both lobes with a longitudinal, intramarginal blackish-violet stripe; dorsal fin in younger animals with an oblique, broad blackish band, descending from the top of the fin towards the posterior part of the base of the fin and above the base anteriorly with a large black trigonal blackish spot.

B. 3. D. 4/8 or 4/9. P. 1/14 to 1/16. V. 2/8. A. 3/5 or 3/6. C. 7/17/7 or 6/17/6, short flanking ones included.

Syn. *Barbus nudicephalus* K. v. H., according to an unpublished drawing.

Barbus laevis Val., Poiss. XVI p. 145; Blkr, Zevende bijdr. ichth. Borneo, Nat. Tijdschr. Ned. Ind. P. 447.

Barbus lisse Val., Poiss. XVI p. 145.

Barbus brachynemus Blkr, Verh. Bat. Gen. XXIII Ichth. Midd. Oost-Java p. 18.

Barbus gobioides Blkr, Diagn. beschr. vischs. Sumatra Tient. I-IV, Nat. T. Ned. Ind. III p. 592.

Barbus taeniopterus Blkr, Ind. descr. pisc. Nat. Tijdschr. Ned. Ind. XIV p. 475.

Battu-ulu Lampong, *Wadon gunong* Mal. Bat., *Santran* Sundan., *Wader* Javan.

Hab. Java (Batavia, Tangerang, Bankasbetong, Lebak, Buitenzorg, Parongkalong, Surabaya, Gempol), in rivers.

Sumatra (Province of Lampong, Pangabuang, Palembang, Lahat), in rivers.

Borneo (Pengaron), in rivers.

Length of 48 specimens 68''' to 340'''.

Remark. Complete series of specimens of the species in question from Java, Sumatra and Borneo, have made me recognize that my earlier *Barbus taeniopterus* (*Barbus gobioides* Blkr nec Val.) can be reduced to it, just like I have already indicated earlier that my *Barbus brachynemus* similarly represents *Barbus laevis*.

The species was already known to Van Hasselt, as appears from a ²¹¹ drawing left by him, which bears the name of *Barbus nudicephalus* and of which I possess a copy. That drawing however, although it makes the species recognizable, apparently was made after a discoloured specimen and moreover possesses various faults.

We owe the first description of this species to Mr Valenciennes, however the description of the shapes is too incomplete and that of the colouration taken from the aforementioned figure, to defective, to recognize the species from. When I thus described the species for the first time, I was of the opinion to have a proper species before me, notwithstanding that the specimens after which my description of *Barbus brachynemus* was taken, left to be desired with regard to the colouration. The first well preserved specimen of *Barbichthys laevis* that I observed, I received in 1852 from Palembang and was 105 mm long. The dark violet caudal fin bands and red oblique longitudinal band on the dorsal fin, which indeed disappear in older specimens, made me treat it as a proper species, which I named *Barbus gobioides*, a name, which I since discovered had already been given to another species and which for that reason was changed to *Barbus taeniopterus*.

The Santran is not rare on Java, however, on eastern Java it seems to be more common than on the western part of the island. With regard to Sumatra and Borneo, I received it only from the southern parts of these islands. Elsewhere I have already placed in notice the fact that the fish fauna of south eastern Sumatra and south eastern Borneo has more in common with that of Java than that of the remaining areas of both these islands.

MORARA Blkr.

Body elongate, compressed, covered with large scales. Jaws bare, thin at the cartilaginous edge. No barbels. Snout not fleshy, entire, obtuse, convex, protruding anterior to the mouth, not lobed at the sides, free margin not papillose or fringed. Supramaxillary bones completely covering intermaxillary bones. Lower jaw without tubercle at the symphysis. Gape crescent-shaped when the mouth is closed. Lips thin, entire, not papillose or fringed, upper lip hanging anterior to upper jaw, confluent with lower lip, lower lip inserted slightly behind the edge of the jaw. Suborbital bones bare, anterior suborbital bone pentagonal, pointing upward at the tip, other suborbital bones very broad, largely covering the cheeks. Dorsal fin starting above the base of the ventral fins and ending far anterior to anal fin, ²¹² scaleless at the base, posterior simple ray cartilaginous. Anal fin longer than dorsal fin. Pharyngeal teeth masticatory, aggregated, in three rows?, the chewing surface obliquely truncate, flat.

Remark. The genus *Morara* in relationship seems to me to be standing between *Barbichthys* and *Mrigala*, but to possess most resemblance with *Barbichthys*, of which it primarily differs by the very thin acute flat lower jaw without a knob on the symphysis, a very thin lower jaw, pentangular anteriormost suborbital bone, a crescent shape gape, the presence of barbels, a dorsal fin that does not begin anterior to the ventral fins, a longer anal fin, etc.

I base this genus on *Cyprinus morar* Buch., of which I possess a juvenile specimen, which is in a not very good state of preservation.

I cannot determine the number of teeth, however they surely belong to the *dentes aggregati* with obliquely truncated flat masticatory planes.

Judging from what Mr MacClelland says about his *Leuciscus margarodes*, this species can also be placed in *Morara*.

SEMILOTUS Blkr.

Body oblong, compressed, covered with large scales. Lower jaw attenuate into a cartilaginous edge. No barbels. Head and snout entire, very fleshy. Intermaxillary bones affixed to maxillary bones and

maxillary bones affixed to nasal bones and suborbital bones, resulting in an immobile upper jaw. Lips not papillose or fringed, lower lip hardly back-folded. Gape inferior. Dorsal fin starting anterior to ventral fins and ending above anal fin, posterior simple ray bony, not serrated. Teeth?

Remark. I erect this genus based on the species, described and depicted by Mr MacClelland under the name *Cyprinus semiplotus*. Mr Valenciennes has included this species among the species of *Cyprinus*, however Heckel rightly separated it from it and placed it in his *Temnochilae*, where he placed it in his genus *Cyprinion*. It surely is related to *Cyprinion*, but it differs from it not only by the absence of barbels, but also by its very fleshy head and snout, its firmly connected premaxillary-, upper jaw-, nasal- and suborbital bones, the unserrated dorsal fin spine, and the extraordinary length of the dorsal fin itself, which has about 26 branched rays ²¹³ and, judging from the figure, not only begins far anterior to the ventral fins, but even ends only above the middle of the anal fin.

The species is remarkable by its 9, in a transverse row placed, snout pores. Indeed it is still insufficiently known with regard to the structure of the lips, while the dentition has not been mentioned at all.

OPISTOCHEILOS Blkr.

Body elongate or slightly elongate, compressed, covered with small scales. Jaws bare, thin at the cartilaginous edge. Barbels 4, nasal and upper jaw barbels. Snout fleshy, entire, not lobed, protruding anterior to the mouth. Lips entire, not papillose or fringed, superior lip confluent with the free margin of the lower lip, lower lip back-folded. Dorsal fin ending anterior to or above ventral fins and ending far anterior to anal fin, posterior simple ray bony, serrated. Anal fin with a longitudinal fold at the base, covering the vent, provided with large scales. Pharyngeal teeth 2.3.5/5.3.2.

Remark. When Heckel, in a series of Cyprinoids received from Kashmir, observed the peculiar character of a longitudinal with large scales covered pleat, which covers the vent, he was of the opinion that all species which possessed this character should be placed in a proper genus, which he named *Schizothorax*. He made these species known in more detail in his "Fische aus Cashmir" which was published in 1833 in Vienna. However, already at that time Heckel divided the species known to him on the basis of the shape of their mouth parts in three groups, which he described as follows.

- A. Lips at the margin attenuated into an edge, lower lip covered with a shiny cartilaginous membrane and its margin back-folded, entire; lower lip horizontal.
- B. Lips at the margin attenuated into an edge, soft; back-folded margin of lower lip interrupted in the middle.
- C. Lips thickened, shortened.

Heckel correctly realized later that his original genus *Schizothorax* was a complex genus, and in 1847, in his "Nachtrage zur Charakteristik und Classification der Cyprineen Gattungen" he separated those species of *Schizothorax*, in which the lower jaw ends in a thin cartilaginous rim. These species he placed in a proper genus of his *Temnochilae*, which he named *Schizopyge* and in which he included all species, which can be placed in his above mentioned groups A and B, i. e. *Schizopyge plagiostomus* Heck, ²¹⁴ *Schizopyge sinuatus* Heck., *Schizopyge curvifrons* Heck., *Schizopyge longipinnis* Heck., *Schizopyge niger* Heck. and *Schizopyge nasus* Heck.

I go a step further than Heckel and consider his A and B as separate genera, which by the shape of the lips differ enough from each other to elevate them to separate genera.

Opistocheilos thus is formed at the cost of Schizopyge Heck. and contains only Heckel's Schizopyge plagiostomus and Schizopyge sinuatus, while the other species can remain in Schizopyge.

Department C of Heckel answers also to Schizothorax, as he later conceived it. His department B has the same meaning as Schizopyge, as I accept this genus and will describe it further below, whereas his department A is synonymous with the genus Opistocheilos, as it is defined above.

Apart from both mentioned species, till now I do not know any other species that can be placed in Opistocheilus, unless maybe, at least judging from the illustration, *Racoma nobilis* McCl., and also *Schizothorax proprius* McCl. The genus *Opistocheilus* still belongs to the real Labeonines with pharyngeal teeth in three rows, but it is the only known one in which the posteriormost undivided dorsal fin ray is bony and at the same time serrated and where an anal sheath with large scales is found.

COCHLOGNATHUS Baird Gir.,

Notic. of a new genus of Cyprinidae in Proceed.
Acad. Nat. scienc. Philad. VII 1854 p. 150; Girard,
Cyprin. Fish Unit. States ibid. VIII 1856 p. 181.

Body elongate, compressed, covered with large scales. Jaws bare, spoon-shaped, acute at the edge. No barbels. Snout entire, obtuse. Gape small, terminal. Dorsal fin starting above ventral fins and ending far anterior to the anal fin, simple ray bony? (structure of *Pimephales* Gir.). Pharyngeal teeth knife-like, hooked 4/4.

Remark. This genus primarily seems to be characterized by the spoon-shaped appearance of the jaws. I see only a single species of it mentioned, *Cochlognathus ornatus* Baird Gir. Mr Girard also mentions that the dorsal fin has the same shape as that of *Pimephales*, which may mean that the last undivided dorsal fin ray is similarly bony.

215 PIMEPHALES Raf.

Ichth. Ohiens.; Ag., Ichth. Pacif. Slope N. Amer. P. 35 in Amer Journ.
Science arts 2^d Ser. XIX; Gir., Cyprin. Fish. Unit. Stat. In Proceed.
Acad. nat. scienc. Philad. VIII p. 180.

Body oblong, slightly fusiform, covered with large scales. Jaws equal, bare, cartilaginous, hard. No barbels. Head short, conical. Snout obtuse, entire. Gape curved, terminal. Dorsal fin starting above or hardly anterior to ventral fins, posterior simple ray bony. Pharyngeal teeth knife-like, slightly hooked 4/4, with a thin chewing surface.

Remark. The genus *Pimephales* among the Labeonines of the New world is the counterpart of *Opistocheilos* Blkr, by its spine-like developed posteriormost dorsal fin ray, which however is not serrated like that of *Opistocheilos*. Concerning the special relation of the lips I find no elucidation neither with Mr Agassiz, nor by Mr Girard. Apart from the species discovered by Raffinesque (*Pimephales promelas* Raf.) Mr Girard brings two other species to *Pimephales*, i.e. *Pimephales maculosus* Gir. and *Pimephales fasciatus* Gir.

PSEUDOGOPIO Blkr.

Body elongate, slightly fusiform-compressed, covered with large scales. Jaws bare. Barbels 2, upper jaw barbels. Snout entire, acute, prolonged, not protruding anterior to the mouth, at the underside not crenulated or lobed. Anterior suborbital bone placed far anterior to the eye. Upper lip hanging anterior to upper jaw, crenulate. Lower lip back-folded, trilobed. Mouth inferior, gape crescent-shaped or reminding of the shape of a horse shoe, when the mouth is closed. Lower jaw not tumid. Lateral line slightly curved. Vent opening far anterior to anal fin, close to the base of the ventral fins. Thoraco-gular region scaleless. Dorsal fin starting rather far anterior to base of ventral fins and ending hardly behind base of ventral fins, posterior simple ray completely cartilaginous. Pectoral fins inserted nearly horizontally. Pharyngeal teeth thin, acute, 5/5.

Remark. I base the genus *Pseudogobio* on a species, depicted and extensively ²¹⁶ described in the Fauna Japonica under the name *Gobio esocinus*. Mr Schlegel noticing the numerous peculiarities that this species offers, nevertheless placed it under the genus *Gobio*. Indeed in habitus it looks much like a *Gobio*, but important characters indicate a place for it far removed from *Gobio*. As the organization of the mouthparts is described by Mr Schlegel, there remains no doubt that the species belongs to the Phalacrognathines. However, in this large series of Cyprinoids it will still remain difficult to point out a right place for it. Therein it apparently belongs to the Labeonines, but it cannot be placed in any of the now already numerous erected genera. The position of the vent near the basis of the pectoral fins and the being scaleless of gular and pectoral area are characters by which it distinguishes itself from all other known genera of Labeonines. By its single rowed pharyngeal teeth it distinguishes itself moreover from all genera of Labeonines of the Old world and unites itself to the American genera *Hyborhynchus* Ag., *Hybognathus* etc. and by its upper jaw teeth [?] to the American genus *Mylocheilus* Ag., of which it differs however, apart from its dentition, by several other specialities in its organization.

I hold this genus for one of the most natural ones and named it after its apparent relationship with *Gobio*. – *Pseudogobio esocinus* till now is the only known representative.

MYLOCHEILUS Ag.,

Ichth. Faun. Pacif. Slope N. Amer. P. 44,
in Americ. Journ. scienc. arts 2^d Ser. Vol. XIX.

Body elongate, compressed, covered with medium-sized scales. Jaws bare. Barbels 2, upper jaw barbels. Snout rounded, entire. Gape nearly terminal, horizontal. Dorsal fin short, starting anterior to? ventral fins, posterior simple ray cartilaginous. Pharyngeal teeth molar, not ring-shaped or grooved, permanent teeth 2.5/5.2 or with a row of deciduous teeth 3.2.5/5.2.3.

Remark. From what Mr Agassiz says about the horny sheaths of upper- and lower jaw it appears that *Mylocheilus* belongs to the Phalacrognathines. Mr Girard has further elucidated the dentition, but he says quite in contradiction to Mr Agassiz, that the ventral fins are implanted anterior to the rostral edge of the dorsal fin. Sir Richardson mentions concerning his *Cyprinus* (*Leuciscus*) *caurinus*, which belongs to *Mylocheilus*, that the ventral fins are implanted below the fifth dorsal fin ray, ²¹⁷ which confirms the

definition of Mr Agassiz. For the rest I find with none of these three authors any information about the construction of the lips.

Apart from the mentioned species, two other have been placed in *Mylocheilus*, i.e. *Mylocheilus lateralis* Ag. and *Mylocheilus fraterculus* Gir.

EXOGLOSSUM Raf.;

Ichthyol. Pac. Slope N. Amer. p. 30

in Am. Journ. scienc. arts 2^d Ser. Vol. XIX; Girard, Cyprin. Fish. Unit. Stat.

in Proc. Acad. nat. scienc. Phil. VIII 1856 p. 191.

Body elongate, cylindrical to slightly compressed, covered with medium-sized scales. Jaws bare. No barbels. Snout obtuse, convex, entire, not protruding anterior to the mouth. Upper lip entire, not papillose or fringed, confluent with lower lip. Gape slightly inferior. Lower lip on both sides broad, as if forming a lobe. Lower jaw protruding from between the lobes of the lower lip, which is missing at the symphysis, jaw itself therefore more or less trilobed. Dorsal fin starting above or hardly behind ventral fins and ending anterior to anal fin, posterior simple ray cartilaginous. Pharyngeal teeth knife-like, compressed, curved, hooked 1.4/4.1.

Remark. In the genus *Exoglossum*, as it is restricted by Misters Agassiz and Girard and described above, till now only two species can be placed, i.e. *Exoglossum maxilligua* Hald. Ag., the typical species already known to Raffinesque, and *Exoglossum mirabile*, which was briefly described by Girard in the above mentioned paper. *Exoglossum* is one of the few genera of Labeonines of North America, of which the construction of the mouth parts is sufficiently described.

CAMPOSTOMA Ag.,

Ichthyol. Pac. Slope N. Amer. p. 33 in Am. Journ. scienc. arts 2^d Ser. XIX;

Girard, Cyprin. Fish. Un. Stat. in Proc. Acad. nat. scienc.

Philad. VIII 1856 p. 176.

Body elongate, fusiform-compressed, covered with medium-sized scales. Jaws bare. No barbels. Snout obtuse, entire, protruding anterior to the mouth. Lips strongly developed. Gape low, curved. Ventral fins inserted anterior to dorsal fin. Dorsal fin with the posterior simple ray cartilaginous. Pharyngeal teeth knife-like, hooked, 1.4/4.1, with a thin chewing surface.

218 Remark. The genus *Campostoma* Ag. seems to differ from *Exoglossum* principally by the lip construction, although I do not see those of *Campostomus* described in detail. Mr Girard mentions 4 species of this genus, i.e. *Campostoma anomalum* Ag., *Campostoma ornatum* Gir., *Campostoma formosulum* Gir. and *Campostoma ornatum* Gir.

MYLPOPHARODON Ag.,

Gir., Res. Cyprin. Un. Stat.

in Proceed. Acad. nat. scienc. Philad. VIII 1856 p. 169.

Body elongate. Head slightly conical. No barbels. Gape large. Ventral fins inserted anterior to dorsal fin, dorsal fin with the posterior simple ray cartilaginous. Pharyngeal teeth molar, slightly compressed at the crown, not gyrate or grooved, permanent teeth 2.4/4.2 or 2.5/5.2, or with a deciduous row 2.2.5/5.2.2 or 3.2.4/4.2.3.

Remark. This genus thus far has been defined little sufficiently. Concerning the construction of the jaws and lips I see nothing mentioned. As however the dentition shows a great resemblance to that of *Mylocheilus* and the species occur in western North-America, like those of *Mylocheilus*, one may suspect that this genus also belongs to the Labeonines. *Mylopharodon conocephalus* Gir. and *Mylopharodon robustus* are the only species, which I see mentioned as belonging to this genus.

SIBOMA Gir.,

Cyprin. Un. Stat. in Proceed. Acad. nat. scienc. Philad. VIII 1856 p. 208.

Body oblong, compressed, covered with large scales. Snout entire, cuneiform-rounded. Jaws equal. Gape small, terminal, horizontal. No barbels. Dorsal fin starting above or anterior to ventral fins, posterior simple ray cartilaginous. Pharyngeal teeth predatory, hooked, 1.4/5.2 without chewing surface.

Remark. Of the diagnosis of this genus of Mr Girard the same can be said as that of *Cliola* (p. 221). It is based on *Lavinia crassicauda* Baird. Gir. The second known species of *Siboma* is *Siboma atraria* Gir.

²¹⁹ LAVINIA Gir.,

Descr. new Fish. in Proc. Ac. nat scienc. Ph. 1854, Cypr. Fish. Unit.

St. ib. VIII 1856 p. 184 = *ACROCHEILUS* Ag.,

Ichth. Pac. slope N. Am. p. 26 in Am Journ. scienc. arts 2^d Ser. XIX.

Body oblong, compressed, covered with medium-sized scales. Jaws bare. No barbels. Snout entire, protruding above the mouth. Gape transverse when mouth is closed. Lower lip flat, with a truncate edge; upper jaw with a rounded edge. Upper lip fleshy, united with the edge of the lower jaw. Dorsal fin starting above ventral fins and ending above or anterior to the beginning of anal fin, posterior simple ray cartilaginous. Pharyngeal teeth knife-like, hooked 5/5.

Remark. Mr Girard erected the genus *Lavinia* in 1854, but described it little sufficiently with the following words: "Mouth shaped as in *Gila* and *Pogonichthys*, but proportionally smaller than either and unprovided with barbel. Body covered with large scales as in *Pogonichthys*". Originally he placed three species in it, of which however *Lavinia crassicauda* Baird Gir. later was placed in *Siboma*, and *Lavinia conformis* Baird Gir. in *Tigoma*.

What is known about the more essential characters of this genus, we owe to Mr Agassiz, whom at the referred place further described it under the name *Acrocheilus*, after *Acrocheilus alutaceus* Ag. Pick. – In his later publication on the Cyprinoids of North America Mr Girard similarly gave a further description of the genus and he placed in the same one, apart from *Acrocheilus alutaceus* Ag. Pick, *Lavinia exilicauda* Baird Gir. a new species named *Lavinia harengus*.

DIONDA Gir.,

Cypr. Fish. Un. St., Proc. Ac. nat. sc. Phil. VIII 1856 p. 176.

Body elongate, compressed, covered with medium-sized or large scales. No barbels. Snout entire, prominent. Jaws bare, lower jaw flat, thin, with a rounded edge. Dorsal fin starting in front or above pectoral fins, posterior simple ray cartilaginous. Pharyngeal teeth knife-like, not hooked 4/4.

Remark. According to Mr Girard his genus *Dionda* is very closely related to the genera *Hyborhynchus* and *Campostoma*. He described no less than 9 species of it, all of them new to science, i.e. *Dionda episcopa*, *Dionda serena*, *Dionda texensis*, *Dionda papalis*, *Dionda argentosa*, *Dionda chrysitis*, ²²⁰ *Dionda melanops*, *Dionda Couchi*, *Dionda plumbea* and *Dionda spadicea*.

ALGOMA Gir.,

Cyprin. Fish. Unit. States, Proceed. Acad. nat. scienc. Philad. VIII 1856 p. 180.

Body elongate?, covered with large scales. No barbels. Head slightly truncate. Jaws bare, lower jaw shorter than upper jaw. Gape small, inferior. Dorsal fin starting anterior to ventral fins, posterior simple ray cartilaginous. Pharyngeal teeth knife-like 4/4, chewing surface nearly linear.

Remark. According to Mr Girard this genus seems to be related to *Hyborhynchus* and *Pimephales*, from which it can be distinguished principally by the large scales and also by the absence of dorsal fin spines. Only 2 species of it I see briefly described, *Algoma amara* and *Algoma fluviatilis*.

HYBORHYNCHUS Ag.,

Ichth. Pacif. slope N. Americ. p. 37 in Amer. Journ. scienc. arts 2^d Ser. XIX;
Gir., Cyprin. Fish. Unit. Stat. Proc. Acad. nat. scienc. Philad. VIII 1856 p. 184.

Body oblong, covered with large scales. Jaws bare, lower jaw at the edge broadly rounded. No barbels. Snout entire, gibbous, truncate. Gape inferior, small, horizontal. Dorsal fin starting above ventral fins, posterior simple ray cartilaginous. Pharyngeal teeth knife-like, slightly hooked, 4/4 with a thin, linear chewing surface.

Remark. Mr Agassiz considers the genus *Hyborhynchus* as closely related to *Pimephales*. He based it on *Minnilus notatus* Raf. Mr Girard placed yet four other species under the same genus i.e. *Hyborhynchus perspicuous* Gir., *Hyborhynchus tenellus* Gir., *Hyborhynchus puniceus* Gir. and *Hyborhynchus confertus* Gir.

HYBOGNATHUS Ag.,

Ichth. Pacif. slope N. Amer. p. 37 in Amer. Journ. scienc. arts 2^d Ser. XIX;
Gir., Cyprin. Fish. Unit. Stat. Proc. Acad. nat. scienc. Philad. VIII 1856 p. 181.

Body elongate, compressed, covered with large scales. Jaws bare, lower jaw at the symphysis provided with a tubercle. No barbels. Snout ²²¹ entire, not protruding anterior to the mouth. Gape nearly terminal, horizontal. Dorsal fin starting anterior to or above ventral fins and ending anterior to anal fin, posterior simple ray cartilaginous, longer than following rays. Pharyngeal teeth knife-like, not or hardly hooked, 4/4/ with a thin, linear chewing surface.

Remark. Mr Agassiz based the genus *Hybognathus* on his *Hybognathus nuchalis*. Mr Girard places *Leuciscus nitidus* De Kay in the same genus and moreover still 4 other species i.e. *Hybognathus argyritis* Gir., *Hybognathus Evansi* Gir., *Hybognathus placitus* Gir. and *Hybognathus regius* Gir.

ORTHODON Gir.,

Cyprin. Fish. Unit. State., Proceed. Acad. natur. Scienc. Philad. VIII 1856 p. 182.

Body slightly fusiform, covered with small scales. Jaws bare, equal. No barbels. Snout entire, not protruding anterior to the mouth. Lower jaw at the symphysis provided with a tubercle. Gape terminal, oblique, medium-sized. Dorsal fin starting above ventral fins, posterior simple ray cartilaginous. Pharyngeal teeth knife-like, lanceolate, nearly straight 5/5.

Remark. This genus seems to be closely related to *Hybognathus*. As single species Mr Girard places in it *Gila microlepidota* Ayr., the description of which, included in the first volume of the Proceedings of the California Academy natural sciences (1866), I cannot consult as I do not possess it.

CLIOLA Gir.,

Cyprin. Fish. Unit. States, Proceed. Acad. nat. scienc. Philad. VIII 1856 p. 192.

Body elongate, compressed, covered with large scales. No barbels. Snout entire, rounded. Jaws equal. Gape ample, terminal. Dorsal fin starting above ventral fins, posterior simple ray cartilaginous. Pharyngeal teeth predatory, hooked 4/4 without chewing surface.

Remark. The description of this genus, like many others by Mr Girard, does not allow one to determine whether it is indeed can be placed in the Labeonines. I suspect such on the indication of Mr Girard, that it has ²²² the habitus of *Dionda*. I see three species placed in it: *Leuciscus vigilax* Baird Gir., *Cliola velox* and *Cliola vivax* Gir.

ALGANSEA Gir.,

Cyprin. Fish. Unit. States. Proc. Acad. natur. scienc. Philad. VIII 1856 p. 182.

Body oblong, compressed, covered with medium-sized or large scales. No barbels. Head slightly conical. Snout entire, more or less acute. Jaws bare, equal. Gape medium-sized, oblique. Dorsal fin beginning anterior to or above ventral fins and ending anterior to anal fin, posterior simple ray cartilaginous. Pharyngeal teeth knife-like 4/4 or 5/5.

Remark. Mr Girard bases his genus on *Leuciscus tintella* Val., which in habitus would greatly resemble a tench. He made known three other species under the names *Algansea bicolor*, *Algansea obesa* and *Algansea formosa*.

²²³ STIRPS 2. CHONDROSTOMINI.

CARTILAGE LIP CARPS.

Carp-like fishes with cartilaginous jaws, lower lip missing.

Remark. The second large series of the Phalacrognathines is easily recognizable by its bare chin, from which the lower lip is lacking.

This series is of equal significance as the series B of the *Temnochilae* in Heckel's above mentioned "Nachtrag". I name them Chondrostomines after the genus, which was the first to be erected in this series and soon afterwards received civil rights.

The Chondrostomines, as they are conceived here, exclusively belong to the eastern hemisphere, but even in this hemisphere they have a much more restricted distribution than the Labeonines. Indeed a number of *Chondrostoma* species live in southern Europe, in which continent no Labeonines are found, however, on the contrary they are lacking, except for a few species from Egypt and Abyssinia, in the whole of Africa like in the Indian archipelago.

The genera and species of the Chondrostomatines are also less numerous than those of the Labeonines. Only 9 of the genera of the Phalacrognathines belong to the Chondrostomines and these genera together comprise only slightly more than 60 species.

Two of those genera I could examine after nature, *Mrigala* from Bengal and *Acheilognathus* from Japan. They are also the only new generic types, which can be added to the ones already known.

Heckel contributed most to the further knowledge of the Chondrostomines. After Mr Agassiz had made known the genus *Chondrostoma* in the year 1837, Mr MacClelland with his genus *Oreinus* added a new type belonging to the same large series, without defining the relationship with *Chondrostoma*. Heckel, also recognizing this genus, named it *Scaphiodon*, but moreover he also proposed already in 1842 the genera *Cyprinion*, *Gymnostomus*, *Chondrochilus* and *Chondrorhynchus*. He dropped both last mentioned genera in 1847, however he erected on the contrary *Dillonia*, *Schizopyge* and *Aspidoparia* as new genera, deriving *Schizopyge* however from his earlier genus *Schizothorax* and also comprising therein some species, which can be placed in the Labeonines and which by me are separated from *Schizopyge* under the generic name *Opistocheilus*.

The Chondrostomines, although they do not possess the lower lip which is so important for the diagnosis of the genera of the Labeonines, offer still a series of characters that facilitate its grouping in genera.

One finds these characters again in the dentition, in the being cartilaginous or bony and serrated or not serrated of the posterior unbranched dorsal fin ray, the length of the dorsal fin, the proportion of the anal fin scales, the shape of the suborbital bones etc.

The genera with these characters can be separated as follow:

224 I. Pharyngeal teeth in one row, knife-like 5/5 to 6/6 or 7/6. No dorsal fin.

A. Snout entire, protruding anterior to the mouth. No barbels. Dorsal fin ending far anterior to anal fin.

Chondrostoma Ag.

B. Snout with fovea, not protruding anterior to mouth. Two barbels, upper jaw barbels. Dorsal fin ending above anal fin.

Acheilognathus Blkr.

II. Pharyngeal teeth in three rows.

A. Dorsal fin without spine.

a. Dorsal fin placed between ventral fins and anal fin, with few rays. No barbels. Suborbital bones covering cheeks. Teeth aggregated 2.4.4/4.4.2. Lateral line strongly sloping.

Aspidoparia Heck.

- b. Dorsal fin starting above or anterior to ventral fins. Lateral line nearly straight.
 - † Barbels 2, upper jaws barbels or none. Snout entire at free margin. Teeth shovel-shaped 2.3.4/4.3.2.

Gymnostomus Heck.

- † Barbels 2, nasal barbels. Snout on free margin crenulate. Teeth aggregated 2.3.5/5.3.2.

Mrigala Blkr.

- B. Dorsal spine bony.
 - a. Dorsal spine toothless. Anal scales normal. Dorsal fin with few rays. Teeth spoon-shaped, 2.3.4/4.3.2. No barbels.

Dillonia Heck.

- b. Dorsal fin serrated.
 - † Anal scales normal, not larger than other scales.
 - Ô Dorsal fin with many rays. Two barbels, upper jaw barbels. Scales large. Teeth spoon-shaped 2.3.4/4.3.2.

Cyprinion Heck.

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- Ô Dorsal fin with few rays. Four barbels, nasal barbels and upper jaw barbels or 2, upper jaw barbels. Scales small or medium-sized. Teeth shovel-shaped 2.3.4/4.3.2.

Oreinos McCl. = *Scaphiodon* Heck.

- †† Anal scales much larger than other scales.
 - Ô Dorsal fin with few rays. Four barbels, nasal and upper jaw barbels. Scales small. Teeth aggregated 2.3.5/5.3.2.

Schizopyge Heck.

Chondrosomini species known up till now.

	Habit.
Chondrostoma nasus Ag. = Nasus male and female Marsigl. = Cyprinus nasus L. Bl. =	
Leuciscus nasus Cuv.	Europa.
" Genei Bp. = Chondrostoma rysela Ag. Heck. =	
Chondrostoma jaculum De Fil.	Europa.
" soëtta Bp. = Chondrostoma seva Val. = Chondrostomanasus De Fil. =	
Chondrochylus nasicus Heck. = Chondrorhynchus soëtta Heck.	Europa.
" Knerii Heck.	Europa.
" phoxinus Heck.	Europa.
" regius Heck. = Chondrochilus regius Heck.	Syria.
" ? labeo Heck. = Cyprinus labeo Pall. = Chondrostoma labeo Val.	Dauria.
Acheilognathus melanogaster Blkr.	Japan.
" lanceolatus Blkr. = Capoëta lanceolata T. Schl. =	
Devario lanceolata Heck.	Japan.

- " intermedius Blkr. = *Capoëta intermedia* T. Schl. =
Devario intermedia Heck. Japan.
 " limbatus Blkr. = *Capoëta limbata* T. Schl. = *Devario limbata* Heck. Japan.
 " rhombeus Blkr. = *Capoëta rhombea* T. Schl. = *Devario rhombea* Heck. ... Japan.
Aspidoparia sardina Heck. Assam.
Gymnostomus (*Gymnostomus*) *syriacus* Heck. = *Chondrostoma syriacum* Val. Syria.
 " (*Acra*) *anisurus* Blkr. = *Gobio anisurus* McCl. =
Gymnostomus anisurus Heck. Bngala.
 226 *Gymnostoma* (*Acra*) *bicolor* Blkr. = *Gobio bicolor* McCl. =
Gymnostomus bicolor Heck. Bengal.
 " (") *acra* Blkr. = *Cypr. acra* Buch. = *Cypr. cura* Buch. =
Gobio lissorhynchus McCl. = *Gymnostomus lissorhynchus* Heck. =
Leuciscus acra Val. Bengal.
 " (") *limnophilus* Blkr. = *Cyprinus bangon* Buch. = *Gobio limnophilus*
 McCl. = *Gymnostomus limnophilus* Heck. Bengal.
 " (") *gangeticus* Blkr. = *Chondrostoma gangeticum* Val. =
Gymnostomus gangeticus Heck. Bengal.
 " (") *fulungee* Blkr. = *Chondrostoma fulungee* Syk. =
Gymnostomus fulungee Heck. Deccan.
 " (") *boggut* Blkr. = *Chondrostoma boggut* Syk. =
Gymnostomus boggut Heck. Deccan.
 " (") *kawrus* Blkr. = *Chondrostoma kawrus* Syk. =
Gymnostomus kawrus Heck. Deccan.
 " (") *wattana* Blkr. = *Chondrostoma wattanah* Syk. =
Gymnostomus wattanah Heck. Deccan.
 " (") *mullyah* Blkr. = *Chondrostoma mullyah* Syk. =
Gymnostomus mullya Heck. Deccan.
 " (") *dembensis* Blkr. = *Chondrostoma dembensis* Rüpp. (not Val.) =
Gymnostomus dembensis Heck. Egypt.
 " (") *Duvaucelii* Blkr. = *Chondrostoma Duvaucelii* Val. =
Tylognathus Duvaucelii Heck. Hindustan.
 " (") *semivelatus* Blkr. = *Chondrostoma semivelatum* Val. =
Tylognathus semilarvatus Heck. Hindustan.
 " (") *bobree* Blkr. = *Varicorhinus bobree* Syk. = *Gibelion bobree* Heck. ... Deccan.
 " (") *potail* Blkr. = *Cyprinus potail* Syk. = *Gibelion potail* Heck. Deccan.
Mrigala Buchanani Blkr. = *Cyprinus mrigala* Buch. = *Gobio mrigala* McCl. =
Cirrhina mrigala Val. = *Isocephalus mrigala* Heck. Bengal.
 " *bengalensis* = *Cirrhina bengalensis* Blkr. Bengal.
 " *cirrrosa* Blkr. = *Cyprinus cirrhosus* Bl. = *Cirrhina Blochii* Val. =
Isocephalus cirrhosus Heck. Hindustan.
 " *rubripinnis* Blkr. = *Cirrhina rubripinnis* Val. = *Isocephalus rubripinnis* Heck. ... Bengal.
 " *reba* Blkr. = *Cyprinus reba* Buch. = *Gobio reba* McCl. = *Isocephalus reba* Heck. Bengal.
 227 " ? *plumbea* Blkr. = *Cirrhina plumbea* Val. = *Isocephalus plumbeus* Heck. Pegu.
Dillonia abyssinica Heck. = *Chondrostoma Dillonii* Val. = *Dillonia Dilonii* Heck. Abyssinia.
Cyprinion aculeatus Heck. = *Chondrostoma aculeatum* Val. Persia.
 " *cypris* Heck. Syria.
 " *kais* Heck. Syria.
 " *macrostomus* Heck. Syria.
 " *neglectus* Heck. Syria.
 " *tenuiradius* Heck. Syria.
Oreinus (*Orein.*) *maculatus* McCl. = *Scaphiodon maculatus* Heck. Bengal.
 " (") *tinca* Blkr. = *Scaphiodon tinca* Heck. Natolia.

"	(Scaphiodon) amir Blkr. = Scaphiodon amir Heck.	Persia.
"	(") macrolepis Blkr. = Scaphiodon macrolepis Heck.	Persia.
"	(") niger Blkr. = Scaphiodon niger Heck.	Persia.
"	(") Saadii Blkr. = Scaphiodon Saadii Heck.	Persia.
"	(") peregrinorum Blkr. = Scaphiodon peregrinorum Heck.	Syria.
"	(") fratercula Blkr. = Scaphiodon fratercula Heck.	Syria.
"	(") socialis Blkr. = Scaphiodon socialis Heck.	Syria.
"	(") trutta Blkr. = Scaphiodon trutta Heck.	Syria.
"	(") umbla Blkr. = Scaphiodon umbla Heck.	Syria.
"	(") fundulus Blkr. = Cyprinus capoëta Gùldenst. = Capoëta fundulus Val. = Scaphiodon capoëta Heck.	Syr. M. Casp.
"	(") Burnesianus Blkr. = Cirrhinus Burnesiana. McCl.	Cabul.
"	(") guttatus Blkr. = Oreinus guttatus McCl. = Scaphiodon guttatus Heck.	Butan.
"	(") progastus Blkr. = Oreinus progastus McCl. = Scaphiodon progastus Heck.	Assam.
"	(") Richardsonii Blkr. = Cyprinus Richardsonii Gr. = Scaphiodon Richardsonii Heck.	Bengal. ?
Schizopyge	curvifrons Heck. = Schizothorax curvifrons Heck.	Cashmir.
"	longipinnis Heck. = Schizothorax longipinnis Heck.	Cashmir.
"	niger Heck. = Schizothorax niger Heck.	Cashmir.
"	nasus Heck. = Schizothorax nasus Heck.	Cashmir.
"	? chrysochlora Blkr. = Racoma chrysochlora McCl.	Cabul riv.
"	?? Griffithii Blkr. = Oreinus Griffithii McCl.	Afghanistan.

228 CHONDROSTOMA Ag.,

Mém. Sociét. scienc. natur. Neuchatel I. 1837;

Heck., Fisch. Syr. Nachr. p. 186; Heck. Kner, Fisch. Oestreich. Monarch. p. 217. =

CHONDROSTOMUS, CHONDROCHILUS, CHONDRORHYNCHUS Heck., Fisch. Syr. p. 40, 41.

Body elongate, cylindrical-compressed, covered with large or medium-sized scales. Lower jaw attenuated into a thin truncate cartilaginous edge. No barbels. Snout fleshy, entire, protruding anterior to the mouth. Mouth bare. Gape inferior, transverse. Dorsal fin starting above ventral fins and ending anterior to anal fin, posterior simple ray cartilaginous. Pharyngeal teeth knife-like 5/5, 6/6 or 7/6.

Remark. After the genus *Chondrostoma* had been erected by Mr Agassiz in 1837, Heckel (in 1842) believed it had to be split in three genera, which he based on the pharyngeal teeth formula. However, a few years later Heckel also accepted the genus *Chondrostoma* in the way that Mr Agassiz had defined it.

The genus seems to be proper to Europe and West-Asia. Heckel did bring up a species from America, *Leuciscus nasutus* Ayr. as a *Chondrostoma*, but only in company of a question mark, and since Mistern Agassiz and Girard have made known so many related North American forms as generically differing from *Chondrostoma*, it is not to be suspected, that the aforementioned species of Mr Ayres indeed belongs to *Chondrostoma*. As I do not have to my disposal the journal in which that species is described and depicted, I cannot determine whether on the basis of the description and the illustration it can be placed in one of the genera of *Phalacrognathines* proposed by Mistern Agassiz and Girard. Neither was I in the position to consult the description of *Cyprinus labeo* Pall., which occurs in north eastern Asia and similarly in the company

of a question mark, placed by Heckel in *Chondrostoma*. All remaining known species of *Chondrostoma* belong to Europe and West Asia.

ACHEILOGNATHUS Blkr.

Body oblong, compressed, covered with large scales. Jaws bare, thin at the cartilaginous edge. Barbels 2, upper jaw barbels. Snout with a fovea, entire, obtuse, convex, not protruding anterior to the mouth. Supramaxillary bones largely covering intermaxillary bones. Lower jaw ²²⁹ flat, with a small tubercle at the posterior part of the symphysis. Gape crescent-shaped, when the mouth is closed. Upper lip very thin, on both sides united with the skin of the chin. No real lower lip. Suborbital bones bare, anterior suborbital bone pentagonal with an upward pointing tip, the others narrow. Dorsal fin starting above ventral fins and ending above the beginning of the anal fin, scaleless at the base, posterior simple ray rigid, toothless. Anal fin not longer than dorsal fin. Pharyngeal teeth compressed, hooked, in one row 5/5, with a thin, nearly linear chewing surface.

Remark. The Japanese rivers are rich in endemic types of Cyprinoids.

In the Fauna Japonica all real Cyprinoids known from Japan have been placed in 5 genera, in *Cyprinus*, *Carassius*, *Gobio*, *Capoëta* and *Leuciscus*.

With the exception of the species placed in the two first named genera, which however are Cyprinines, those which are placed there in *Gobio*, *Capoëta* and *Leuciscus*, belong to different types, which according to the present state of knowledge can be placed in different genera. Thus *Gobio esocinus* T. Schl. is a *Pseudogobio*, *Gobio barbatus* T. Schl. a *Hemibarbus*, *Leuciscus variegatus* T. Schl. a *Sarcocheilichthys*, *Leuciscus parvus* T. Schl. and *Leuciscus pusillus* T. Schl. species of *Pseudorasbora*. *Capoëta elongata* T. Schl. and *Capoëta gracilis* T. Schl. probably belong to the subgenus *Bengala* of my genus *Rasbora*, whereas *Leuciscus macropus*, *Leuciscus minor*, *Leuciscus Temminckii* and *Leuciscus Sieboldii* of the Fauna Japonica to me seem to belong to the genus *Opsarius*, as it is restricted by me, or at least to a genus related to it. The remaining Cyprinoids mentioned in the Fauna Japonica, *Capoëta lanceolata*, *Capoëta intermedia*, *Capoëta limbata* and *Capoëta rhombea*, do not belong, as already indicated by Mr Schlegel himself, to the genus *Capoëta* Val., which is otherwise an artificial composition of species, but not a natural genus, but according to me rather could be placed in the genus *Dario*, until I, as a result of the receipt of a few specimens of *Acheilognathus melanogaster* from Jedo, will have recognized those species as belonging to the genus in question.

ASPIDOPARIA Heck., Fish. Syriens Nachtr. p. 186.

Body elongate, compressed, covered with large scales. Jaws bare, thin at the cartilaginous edge. No barbels. Snout entire, prolonged. Suborbital bones covering the cheeks. Gape slightly inferior, semi-circular, small. Lower lip missing towards symphysis. No ²³⁰ anal sheath with larger scales. Dorsal fin starting behind ventral fins and ending anterior to anal fin, posterior simple ray cartilaginous. Anal fin longer. Ventral fins with 7 divided rays. Lateral line strongly sloping. Pharyngeal teeth aggregated 2.4.4/4.4.2.

Remark. Heckel erected this genus in 1847 after a specimen, which in habitus has much of *Engraulis*. Among the Chondrostomines the genus is remarkable because of the

high suborbital bones, which are covering the check, the position of the dorsal fin between the ventral fin and the anal fin, the strongly bended lateral line and the pavement shaped pharyngeal teeth.

GYMNOSTOMUS Heck.,
Fisch. Syriens p. 40, Nachtr. p. 185.

Body oblong or elongate, compressed, covered with medium-sized or large scales. Jaws bare, with a cartilaginous edge. Barbels 2, upper jaw barbels or none. Snout entire, more or less protruding anterior to the mouth. Lower lip missing near the symphysis. Anal sheath without larger scales. Dorsal fin starting above or anterior to ventral fins and ending anterior to anal fin, posterior simple ray cartilaginous. Pharyngeal teeth shovel-shaped 2.3.4/4.3.2.

Subg. *Gymnostomus* Heck. - Barbels 2, upper jaw barbels.

“ *Acra* Blkr. - No barbels.

Remark. The genus *Gymnostomus* was first proposed by Heckel in 1842, however in 1847 he gave a new definition of it, which answers to the above mentioned. Following that definition the genus would distinguish itself from the other *Chondrostomines* by their construction of its three rows of pharyngeal teeth, its cartilaginous posterior-most unbranched dorsal fin ray and the implantation of the dorsal fin above or anterior to the ventral fins.

It does not appear that Heckel knew from nature any of the rather numerous species that were placed by him in his genus *Gymnostomus*, as even the characters derived from the dentition are only taken from one single species and indeed from the description and figure of *Chondrostomus syriacum* Val. in the large *Histoire naturelle des Poissons*.

I myself neither know from nature any of the species which were placed in *Gymnostomus* by Heckel, and with regard to the insufficiency of the existing descriptions of those species only that of *Chondrostoma syriacum* excepted, little specific can be determined with regard to the essential relationships of those species. However, it ²³¹ seems to me that they, when they will be better known, will turn out to belong to different genera.

If *Chondrostoma syriacum* Val. is thus placed in the subgenus *Gymnostomus*, one could provisionally gather together the remaining Heckelian species of *Gymnostomus*, which all are said not to possess barbels, under the subgeneric name *Acra*, which is derived from one of the Buchananian names. One could also add to it *Chondrostoma Duvauccelli* Val. and *Chondrostoma semivelatum* Val., which are placed by Heckel in his composed genus *Tylognathus*, as well as a few species with a longer dorsal fin, arranged by Heckel in his unacceptable genus *Gibelion*, i.e. *Varicorhinus bobree* Syk. and *Cyprinus potail* Syk.

MRIGALA Blkr.

Body oblong or elongate, compressed, covered with large or medium-sized scales. Jaws bare, thin at the cartilaginous edge, lower jaw at the symphysis provided with a tubercle. Snout entire, more or less protruding anterior to the mouth, crenulated at the free margin. Barbels 2, nasal barbels. Lips

missing (both upper and lower lip). No anal sheath with larger scales. Dorsal fin starting anterior to ventral fins and ending anterior to anal fin, posterior simple ray cartilaginous. Suborbital bones not covering the cheeks. Pharyngeal teeth masticatory, aggregated 2.3.5/5.3.2.

Remark. In my *Nalezingen op de ichthyologische fauna van Bengalen en Hindustan* I described a species under the name *Cirrhina bengalensis*, which later, after detailed examination of the mouth parts appeared to me to belong to the *Chondrostomines*, and therein to a proper genus, which can easily be distinguished from the other department by the presence of two snout barbels, with the simultaneous absence of upper jaw barbels, by the process on the symphysis of the lower jaw, by its cartilaginous unbranched posteriormost dorsal fin ray, which is implanted above or anterior to the ventral fins, and by the formulas of its pavement-like pharyngeal teeth.

I have named this genus *Mrigala*, after the specific name of *Cyprinus mrigala* Buch., which appears to me to belong to it as well, whereas I find it equally probable, that *Cirrhina rubripinnis* Val. and *Cyprinus cirrhosa* Bl. can be placed in it.

The genus *Cirrhina*, according to the opinion of Mr Valenciennes, differs from *Mrigala* by the construction of the mouth parts and belongs to the department of the ²³² *Cheilognathines* as Mr Valenciennes says of it that it has “les lèvres et la bouche simples” [the plain lips and mouth] of the genus *Barbus*.

DILLONIA Heck.,
Fisch. Syriens p. 183.

Body oblong, compressed, covered with large scales. Jaws bare, thin at the cartilaginous edge. No barbels. Snout entire, obtuse. No lower lip near the symphysis. Gape curved. Dorsal fin starting anterior to or above ventral fins and ending far anterior to anal fin, posterior simple ray thick, bony, smooth. Anal region without fold with larger scales. Pharyngeal teeth spoon-shaped 2.3.4/4.3.2.

Remark. Heckel erected this genus after *Chondrostoma Dillonii* Val. from Abyssinia, which till now is the only known species of this genus. It can easily be distinguished from the related genera by its large scales, normal anal scales, unserrated dorsal fin spine and spoon shaped pharyngeal teeth.

CYPRINION Heck.,
Fisch. Syriens p. 25, Nachtr. p. 183.

Body oblong or elongate, compressed, covered with large scales. Lower jaw attenuated into a thin, cartilaginous edge. Barbels 2, upper jaw barbels. Snout entire, protruding anterior to the mouth. Mouth bare. Gape inferior, transverse. Dorsal fin starting anterior to or above ventral fins and ending anterior to anal fin, posterior simple ray bony, serrated. Pharyngeal teeth spoon-shaped 2.3.4/4.3.2. Two rows of larger scales on the tapering anterior part of the back.

Remark. Under his *Temnochiles* with a bare mouth and armed with a dorsal spine Heckel has placed 4 genera, i.e. *Cyprinion*, *Dillonia*, *Schizopyge* and *Scaphiodon*. Among these *Cyprinion* would be recognizable by its two upper jaw barbels, its long dorsal fin with a serrated spine and *squamae distichae* [a double row of scales] on the

neck. It seems to be a very natural genus. Apart from 5 species of Persia and Syria, which he knew from nature, Heckel placed in it *Chondrostoma aculeatum* Val. and *Cyprinus semiplotus* McCl. – *Chondrostoma aculeatum* indeed seems to be a Cyprinion, although it belongs to an aberrant type with a very slender body and a short dorsal fin (D. 10). On the contrary *Cyprinus semiplotus* McCl. does not answer to the generic diagnosis of Heckel and can neither be placed in *Dillonia* or *Schizopyge* or *Scaphiodon*. Above this species is already placed in a proper genus with the name *Semiplotus*.

233 OREINUS McCl.,

Res. Asiat. Soc. XIX p. 273. –

MOUNTAIN BARBEL = SCAPHIODON Heck.,

Fisch. Syr. p. 30, Nachtr. p. 184.

Body oblong or elongate, compressed, covered with small or medium-sized scales. Lower jaw attenuate into a cartilaginous edge. Barbels 4 or 2, nasal and upper jaw barbels or only upper jaw barbels. Snout entire, more or less fleshy. Gape inferior, transverse or more or less curved. Dorsal fin starting above or anterior to ventral fins and ending anterior to anal fin, posterior simple ray bony, serrated. Pharyngeal teeth shovel-shaped 2.3.4/4.3.2.

Subg. *Oreinus*. Barbels 4, nasal and upper jaw barbels.

.. *Scaphiodon*. Barbels 2, only upper jaw barbels.

Remark. Mr J. MacClelland erected this genus with the following characters: "Head fleshy, mouth directed downwards, lower jaw shorter than the upper, snout muscular and projecting, furnished with cirri, dorsal proceeded by a serrated spinous ray, scales small." In his diagnosis of *Oreinus*, in his article "Afghan collection of Fishes" included in the 2nd part (1842) of the Calcutta Journal of Natural History, he further adds to this diagnosis: "The upper lip soft and continuous, with a reflected mammilated fold which passes across the lower jaw behind a hard and cartilaginous lower lip." The genus therefore is completely the same as the one Heckel erected in 1842 under the name *Scaphiodon* and Heckel has in fact placed all species that MacClelland placed in his genus *Oreinus* in his genus *Scaphiodon*.

The name *Oreinus* therefore needs to be retained for those species and their related ones, because if one wished to change the generic names with the modifications, so often made necessary by the extension of the knowledge of their diagnosis, than most genera soon would be subject to a series of name changes, which would only lead to confusion.

Mr Valenciennes accepted the genus *Oreinus* only conditionally, because he did not know the species placed in it from nature, but he believed those species actually belonged to his genus *Barbus*.

Heckel made the genus known more accurately in 1842, however he then placed two more species in it, *Capoëta macrolepidota* Val. and *Capoëta amphibia* Val., which not only do not belong to *Oreinus*, but even not to the *Phalacrognathines*, as *Capoëta macrolepidota* is a *Hampala* and *Capoëta amphibia* a *Systemus*. These species moreover have been left out in the list of species of *Scaphiodon*, **234** found in Heckel's *Nachtrag zur Classification der Cyprineen-Gattungen*.

We now know species with 4 and species with only 2 barbels. For the first ones I propose to keep as subgeneric name that of *Oreinus*, and to place under the by Heckel

proposed generic name *Scaphiodon* only the species in which only the upper jaw barbels are present.

I have to note here that *Gobio damasces* Val., which is summed up by Heckel, although with doubt, amongst his species of *Scaphiodon*, cannot well be placed as it lacks the serrated dorsal spine. As long as one does not know the mouth parts of this species in more detail, it would be best to leave the species in the genus *Gobio*. Mr MacClelland in his "Afghan collection of Fishes" has introduced two species of *Oreinus*, of which one, *Oreinus plagiostomus*, is the same as *Opistocheilus plagiostomus* Blkr, while the other one, *Oreinus Griffithii*, is either a *Schizopyge* or an *Opistocheilus*.

SCHYZOPYGE Heck.,
Fisch. Syriens Nachtr. p. 183.

Body elongate or slightly elongate, compressed, covered with small scales. Jaws bare, thin at the cartilaginous edge. Barbels 4, nasal and upper jaw barbels. Snout entire, not lobed, more or less protruding anterior to mouth. No lower lip towards symphysis. Dorsal fin starting anterior to or above ventral fins and ending far anterior to anal fin, posterior simple ray bony, serrated. Anal fin with a longitudinal fold, provided with large scales at the base, covering the vent. Pharyngeal teeth aggregated 2.3.5/5.3.2.

Remark. The genus *Schizopyge*, as defined above, has the same meaning as department B of the species of *Schizothorax* as it was erected by Mr Heckel in his *Fische aus Kashmir*. His *Schizopyge plagiostomus* and *Schizopyge sinuatis* fall outside it and belong, as was already indicated earlier, to my genus *Opistocheilus*. Till now only 4 species can be placed with certainty in *Schizopyge*, all of which inhabit the highland of Kashmir, i.e. *Schizopyge curvifrons* Heck., *Schizopyge longipinnis* Heck., *Schizopyge niger* Heck. and *Schizopyge nasus* Heck. However, probably *Racoma chrysochlora* McCl. also belongs to the same genus, that is judging from the figure which Mr MacClelland has given of this species; whereas possibly *Oreinus Griffithii* also may be counted as a *Schizopyge*. The teeth of *Schizopyge curvifrons* figured by Heckel, are specifically "aggregati" [aggregated] and not "cochleariformes" [spoon-shaped].

235 COHORS II CHEILOGNAHINI.

COVERED JAWS.

Cypriniformes with jaws covered by lips, no sheath or horny plate.

Remark. In the great majority of the Cypriniformes the mucous membrane of the mouth merges imperceptibly in the lips, so that the jaws are draped with the lips, which never possess the horny envelope, which in the Phalacrognathines protect the lipless ends of the jaws.

Therefore one can stamp this large cohort with the name given them here, which expresses the character of the cohort better than *Pachychilae*, the name employed by Heckel, which is incorrect for a large, if not the largest part of the species.

The Cheilognathines comprise three sharply delimited groups the basic types of which can be found in the genera *Catostomus* Les., *Cyprinus* Cuv. and *Barbus* Cuv. Therefore the groups are referred to as *Catostomines*, *Cyprinines* and *Barbines*.

The Catostomines are externally recognizable by thick fleshy lips and inferior mouth with the simultaneous absence of barbels or fin spines. If one is still uncertain with these characters, than the peculiar pharyngeal jaws with its numerous teeth, which have the appearance of a curved comb, decide the real place in the system.

The Cyprinines are sharply characterized by their serrated anal fin spine. Fleshy round lips, a relatively deep body, large scales and a multi rayed dorsal fin with a serrated spine are characters which are not less constantly present than the serrated anal fin spine, but are also found in many Barbines.

The Barbines lack the serrated anal spine of the Cyprinines and although one can find all external characters of the Catostomines among them, they are never found combined in one species. Moreover, a certain recognition character is found in the dentition, where one does not find in any Barbine species more than 12 teeth in a lower pharyngeal bone and never more than 5 or 6 teeth in a single row.

The Cheilognathines have a wider geographic distribution than the other Cyprinoids. They are found everywhere at the borders of the Cyprinoids themselves, both in Japan and in the Indian archipelago, as in the south point of Africa, high ²³⁶ in the north of Asia, Europe and Africa, yes even in Mexico.

The distribution however is not so large for the groups.

If the Catostomines are not restricted in absolute sense to North- America, one finds only one of its more than fifty known species in the not far from America removed part of North Asia.

The Cyprinines are real extra-tropical fishes of the eastern hemisphere and only enter the warm zone in the indeed outside the tropics originating drainage areas of South China.

On the contrary the Barbines everywhere occur together with Catostomines and Cyprinines and reach through the tropics, to the southern temperate climates.

The number of Cheilognathines known at present amounts to more than 700 species. More than 600 of those species, and thus more than half of all known Cyprines, belong to the Barbines, whereas the number of Catostomines amounts to little more than 50 and that of the Cyprinines a little over 30.

It is also especially the Barbines that is rich in generic types. Those of the Cyprinines are only two in number, *Cyprinus* and *Carassius*, whereas some [ichthyologists] also comprise *Carpio*. The Catostomines, which during their discovery by Lesueur were all combined in the genus *Catostomus*, soon afterwards were divided in several types. Rafinesque recognized the types *Moxostoma*, *Carpiodes*, *Cycleptus* and *Ichthyobus*; Mr Agassiz *Bubalichthys*, *Ptychostomus*, and *Hylomyzon*: and Mr Girard *Acomus* and *Minomes*. However, in the Barbines more than 60 generic types can be adopted, all of which have been derived from the genera *Barbus*, *Gobio*, *Tinca*, *Cirrhina*, *Abramis* and *Leuciscus* of Cuvier's Règne animal.

Numerous ichthyologists have contributed to the erection of those types, even when one leaves out of consideration those genera that are not acceptable or correspond in meaning with other ones.

Hamilton Buchanan introduced the genus *Chela*.

To Rafinesque one owes the assignment of *Luxilus*, *Plargyrus*, *Semotilus* and *Chrosomus*.

Van Hasselt pointed to the significance of *Hampala*.

Mr Rüppell indicated the generic value of *Labeobarbus*.

Mr Agassiz noted, the genera *Rhodeus*, *Phoxinus*, *Aspius*, *Ptychoceilus* and *Hypobopsis*.

We owe to Mr MacClelland the assignment of *Systemus*, *Racoma*, *Opsarius* and *Perilampus*, just like that of *Rohtee* to Colonell Sykes.

Swainson discovered the generic value of *Chedrus* and *Esomus*.

Heckel pointed at still other generic types in *Aulopyge*, *Schizothorax*, *Acanthobrama*, *Leucosomus*, *Argyreus*, *Phoxinellus*, *Amblypharhyngodon*, (*Mola* Heck.).

237 The Prince of Canino discovered the generic value of *Scardinus*.

Mr Valenciennes gave a generic significance to *Catla*.

The genera *Ceraticthys*, *Gila*, *Meda*, *Alburnops*, *Cyprinella*, *Codoma* and *Tiaroga* are assignments, the first of Mr Baird, the second of Misters Baird and Girard and the remaining ones of Mr Girard himself.

Mr Basilevski added to these *Culter* and *Chanodichthys* (*Leptocephalus* Bas.).

My own investigations at last have led me to the adoption of still another series of generic types of *Barbines*, which I have named *Cyclocheilichthys*, *Balantiocheilus*, *Hypselobarbus*, *Albulichthys*, *Amblyrhynchichthys*, *Hemibarbus*, *Pseudoculter*, *Hemiculter*, *Elopichthys*, *Leptobarbus*, *Sarcochelichthys*, *Pseudophoxinus*, *Thynnichthys*, *Hypophthalmichthys*, *Gnathopogon*, *Rasbora*, *Pseudorasbora*, *Rasborichthys*, *Luciosoma*, *Laubuca*, *Macrochirichthys* and *Similogaster*.

STRIPS 1. CATOSTOMINI. – COMBTOOTH CARPS.

Cypriniformes with covered jaws and an oblong or elongate, compressed or slightly fusiform body, jaws enclosed in broad fleshy lips, mouth inferior, dorsal fin starting anterior to ventral fins, without spine, scales on the body small to large, pharyngeal teeth on both sides 36 to 130, in one row, placed in a comb-shaped row, no barbels.

Remark. The Catostomines are sharply characterized in the large family of the Cyprinoids by their numerous in a single row as a comb inserted pharyngeal teeth.

Lesueur united the species known to him, in 1817, under the generic name *Catostomus*.

Rafinesque shortly after Lesueur's article on *Catostomus*, came to the conviction, that North America feeds several genera of Catostomines and laid the basis for the knowledge of the genera *Ichthyobus*, *Carpiodes*, *Cycleptus* and *Moxostoma*, but he described them insufficiently, so that it was difficult to re-establish them after the species observed by him.

Cuvier accepted the genus *Catostomus* of Lesueur and described it briefly as possessing the same fringed or notched lips as *Labeo*, but a short dorsal fin like that of *Leuciscus* and implanted above the pelvic fins; a diagnosis completely insufficient for the present state of knowledge of the Cyprinoids.

Heckel defined the genus further and based it principally on the numerous single-rowed pharyngeal teeth, which he calls "pectiniformes". He even proposed 238 to raise the Cyprinoids with such a dentition to a tribe and to place them in the three genera *Catostomus* Les., *Rhytidostomus* Heck. and *Exoglossum* Raf. However, Heckel did not possess enough material, it is apparent from his list of species that he could only

examine *Catostomus teres* Les. and *Cyprinus catostomus* Forst. after nature.

His genus *Rhytidostomus* had already been recognized by Rafinesque and named *Cycleptus*. Of the two species that Heckel sums up of *Rhytidostomus*, *Catostomus elongatus* Rafinesque is a *Cycleptus* and *Cyprinus catostomus* Forst. a real *Catostomus*. The genus *Exoglossum* indeed by no means belongs to the *Catostomines*, but to the *Chondrostomines*, however in that genus species that differ very much from each other are placed, as *Exoglossum macropteron* Raf. can indeed be placed in the *Catostomines* and indeed in the genus *Hylomyzon*.

Mr Valenciennes describing the *Catostomines* in the 17th part of the *Histoire naturelle des Poissons*, placed them, just like Heckel, in three genera, in *Catosomus*, *Sclerognathus* and *Exoglossum*. – *Catostomus* retained in it approximately the same meaning as in Lesueur, but the species placed by Mr Valenciennes in *Catostomus*, can be placed in later divisions of this genus, partly in *Catostomus*, partly in the genera *Moxostoma*, *Acomus*, *Ptychostomus*, *Hylomyzon* and *Cycleptus*. The genus *Sclerognathus* Val. comprises the two genera of Rafinesque, *Carpiodon* and *Ichthyobus*, and the genus *Exoglossum* Val. not only comprises *Exoglossum* but also the genera *Hylomyzon* Ag. and *Campostoma* Ag.

Since 1854 Mr Agassiz has further elucidated the *Catostomines* and found occasion to resurrect and define in more detail the earlier erected genera of Rafinesque, and moreover propose still other genera. In his publication “Synopsis of the Ichthyological Fauna of the Pacific slope of North America”, he gave further definitions of the genera *Carpiodes*, *Ichthyobus*, *Cycleptus* and *Moxostoma* of Rafinesque, as well as definitions of the genera *Bubalichthys*, *Ptychochromus* and *Hylomyzon*, which he believed should be separated from the other genera of the *Catosomini*.

In 1856 Mr Girard added to all these genera still the genera *Minomus* and *Acomus*.

I do not know the *Catostomines* from nature and the illustrations and descriptions of the known species do not allow to determine properly to what extent the rather numerous genera, which one fancied to erect in this department, can be considered as natural. And although it seems to me, that one may have gone too far with the splitting of these genera, and has used characters of which the generic value is open to reasonable doubt, I have limited myself here, as I in this case could not decide from nature, to giving a review of these genera and their characters, ²³⁹ as I have been able to compile them from the known data.

One of those genera, *Moxostoma* Raf. is very recognizable and very curious by the absence of a visible lateral line.

Four other genera, *Carpiodes* Raf., *Ichthyobus* Raf., *Bubalichthys* Raf. and *Cycleptus* Raf. have in common a long dorsal fin, which, just like in all *Catostomines*, begins before the ventral fins, but extends till above the anal fin. These genera can only be told apart by characters of lesser weight. *Bubalichthys* Ag. would mainly only be distinguishable from the other three as its dorsal fin anteriorly is not or a little higher than in the middle or posteriorly, as well as by strong trilateral pharyngeal teeth and the blunt, convex chewing pads of the pharyngeal teeth. In *Carpiodes* the pharyngeal teeth are exceptionally thin and the lips transversely ruffled. I suspect that scale sheath along the dorsal fin base, as depicted by DeKay for *Carpiodes cyprinus*, in this genus has a generic significance. *Cycleptus* and *Ichthyobus* seem to be extremely related. However, *Ichthyobus* would have thin lips and single knob pharyngeal teeth; *Cycleptus* on the

contrary pharyngeal teeth without knobs and with thick lips, of which the lower lip bilobed. The remaining genera are easily recognizable by the much shorter, far posterior to the anal fin ending dorsal. To these belong *Catostomus sensu stricto*, *Acomus* Gir., *Minomus* Gir., *Hylomyzon* Ag. and *Ptychostomus* Ag. It seems to me that the characters for genera ought to be more sharply defined, than has been done, to accept them as natural genera. That they are so indeed, can be concluded from their difference in habitus, like for instance *Hylomyzon nigricans* Ag., *Ptychostomus macrolepidotus* Ag., *Catostomus teres* Les. and *Acomus aurora* Gir.

At present one knows more than 50 species of Catostomines, which, except for only of *Catostomus Tilesii* Val. from north-eastern Asia, all belong to North America. I even believe a further research is necessary to see if *Catostomus Tilesii* really belongs to this group, as the real criterion for the determination are the numerous comb-like placed pharyngeal teeth, about which I see nothing mentioned. If that species indeed belongs to the Catostomines, it will have to take a place in the genus *Acomus* Gir.

The genera of the Catostomines can be reviewed as follows.

I. Lateral line conspicuous.

A. Dorsal fin ending far anterior to anal fin. Lower lip bilobed. Body elongate.

a. Pharyngeal teeth tuberculate. Lips papillose. Body elongate, protruding far anterior to the mouth. Scales smaller anteriorly than posteriorly.

1. Scales small or medium-sized, caudal scales much larger than supra-axillary scales. Pharyngeal bones thin, not directed inward, teeth with two tubercles.

240 *Acomus* Gir.

2. Scales medium-sized or large, caudal scales slightly larger than supra-axillary scales.

- † Pharyngeal bones thin, directed strongly inward, teeth with two tubercles.

Minomus Gir.

- † Pharyngeal bones robust, slightly compressed, teeth with one tubercle.

Catostomus Les.

b. Pharyngeal teeth not tuberculate. Snout hardly protruding in front of mouth.

1. Scales on body equal anteriorly and posteriorly. Lips less fleshy, transversely grooved. Pharyngeal bones robust, broad.

Ptychostomus Ag.

2. Scales on body larger anteriorly than posteriorly. Lips broadly fleshy, papillose. Pharyngeal bones slightly broad.

Hylomyzon Ag.

B. Dorsal fin with many rays, ending above anal fin.

a. Dorsal fin strongly elevated anteriorly, low in the middle and posteriorly. Lips papillose.

1. Pharyngeal bones thin, strongly compressed, teeth with one tubercle. Lower lip bilobed.

Carpiodes Raf.

2. Pharyngeal bones rather robust, triangular or nearly triangular, teeth with an obliquely emarginate chewing surface. Lower lip emarginate in the middle.

Cycleptus Raf.

3. Pharyngeal bones rather robust, triangular or nearly triangular, teeth with one tubercle. Lower lip papillose.

Ichthyobus Raf.

- b. Dorsal fin hardly higher anteriorly than posteriorly and in the middle. Lips granulated.
 1. Pharyngeal bones robust, triangular, teeth with convex chewing surface, only at the angle provided with a short process.

Bubalichthys Ag.

II. Lateral line not visible

- A. Dorsal fin slightly elongate, ending anterior to anal fin. Lower lip bilobed.

Moxostoma Raf.

241 *Catostomine species known at present.*

Acomus latipinnis Gir. = Catostomus latipinnis B. Gir.	N. Am. (Rio Gila).
" aurora Gir. = Catostomus aurora Ag. (acc. to Ag. this species and the following.)	N. Am. (Lake Super.)
" Forsterianus Gir. = Catostomus Forsterianus Richds., Heck. (not Ag.)	N. Am. (Canada).
" Guzmaniensis Gir.	N. Am. (Chihuahua).
" generosus Gir.	N. Am. (Lake Utah)
" griseus Gir.	N. Am. (Platte river).
" lactarius Gir.	N. Am. (Milk river).
" ? Tilesii Blkr. = Cyprinus rostratus Tiles. = Catostomus Tilesii Val.	N. E Asia (Siberia).
Minomus insignis Gir. = Catostomus insignis B. Gir. = Ptychostomus? insignis Ag.	N. Am. (Rio Gila).
" plebejus Gir. = Catostomus plebejus B. Gir.	N. Am. (Rio Gila).
" Clarkii Gir. = Catostomus Clarkii B. Gir.	N. Am. (Rio Gila).
Catostomus hudsonius Les. = Cyprinus catostomus Forst. = Rhytidostomus catostomus Heck.	N. Am. (Sin. Hudson, Cumb.).
" Forsterianus Ag. (not Richds.)	N. Am. (Lake super.)
" teres Les. = Cyprinus teres Mitch. = Catostomus communis Les. = Catostomus gracilis Kirtl.	N. Am. (U.S.A or.).
" bostoniensis Les. = Catostomus pallidus De Kay? = Catostomus florealis Baird.	N. Am. (U.S.A. or.).
" occidentalis Ayr.	N. Am. (Californ.).
" macrocheilus Gir.	N. Am. (Astoria).
" Sucklii Gir.	N. Am. (Milk river).
" Bernardini Gir.	N. Am. (Mexico).
" labiatus Ayr.	N. Am. (W. USA, L. Klam.).
" longirostrum Les.	N. Am. (Vermont).

- Ptychostomus congestus Gir. = Moxostoma? congestum Ag. =
 Catostomus congestus B. Gir. N. Am. (Texas, Salado r.).
 " aureolus Ag. = Catostomus aureolus Les. =
 Catostomus Sueurii Richds.? Heck. N. Am. (L. Sup., Erie, Can.).
 " albidus Gir. N. Am. (Californ.).
 " Duquesnii Ag. = Catostomus Duquesnii Les. =
 Catostomus erythrurus Raf. N. Am. (L. Canad. Huntsv. etc.).
 " Haydelli Gir. N. Am. (Missuri).
 " macrolepidotus Ag. = Catostomus macrolepidotus Les. ²⁴² =
 Catostomus carpio Val.? = Catost. oneida De Kay. N. Am. (N.Y, Ont., Oneid. Can.)
 " melanops Ag. = Catostomus melanops Raf. = Catostomus
 fasciatus Les. = Catostomus melanotus Val. N. Am. (W. & S. USA)
- Hylomyzon nigricans Ag. = Catostomus nigricans Les. = Catostomus
 maculosus Les. = Catostomus fasciolaris Raf. = Catostomus
 flexuosus Raf. = Catostomus megastomus Raf. = Catostomus
 xanthopus Raf. = Exoglossum macropteryum Raf. =
 Hypentelium macropteryum Raf. = Catostomus planiceps
 Val. N. Am (E. & S. USA)
- Carpiodes cyprinus Ag. = Catostomus cyprinus Les. = Carpiodes vaeca Ag. =
 Labeo cyprinus De Kay. = Sclerognathus cyprinus Val. N. Am. (S. USA)
 " Thompsoni Ag. = Catostomus cyprinus Zad. Thomps. N. Am. (L. Champlain)
 " velifer Raf., Ag. = Catostomus cyprinus Kirtl. =
 Carpiodes carpio Raf. = Carpiodes setosus Raf. =
 Catostomus (Moxostoma) anisopterus Raf. N. Am. (Ohio).
 " bison Ag. N. Am. (Mississip., Osage r.)
 " damalis Gir. N. Am. (Missuri).
- Cycleptus elongatus Ag. = Catostomus elongatus Les. = Decactylus Raf. =
 Rhytidostomus elongatus Heck. N. Am. (Ohio, Cincinnati).
 " nigrescens Raf. N. Am. (S. Louis).
- Ichthyobus bubalus Raf., Ag. = Sclerognathus cyprinella Val. N. Am. (N. Orleans).
 " Rauchii Ag. N. Am. (Iowa).
 " Stolleyi Ag. N. Am. (Missuri).
 " tumidus Gir. = Carpiodes tumidus B. Gir. =
 Ictyobus tumidus Gir. N. Am. (Texas).
- Bubalichthys bubalus Ag. = Catost. bubalus Kirtl. (not Raf.) N. Am. (Ohio).
 " bonasus Ag. N. Am. (Osage r.).
 " niger Ag. = Catostomus niger Raf. N. Am. (Ohio).
 " vitulus Ag. = Carpiodes vitulus Ag. N. Am. (Wabash).
 " taurus Ag. = Carpiodes taurus Ag. N. Am. (Mobile r.).
 " urus Ag. = Carpiodes urus Ag. N. Am. (Tennessee r.).
- Moxostoma oblongum Ag. = Cyprinus oblongus Mitch. =
 Catostomus vittatus Les. = Labeo esopus De Kay =
 Labeo gibbosus De Kay = Labeo oblongus De Kay =
 Labeo elegans De Kay = Catostomus tuberculatus Les. =
 Catostomus gibbosus Les. = Moxostoma tuberculatum
 v. gibbosum Ag. N. Am. (E. USA)
- Moxostoma sucetta Ag. = Cyprin. sucetta Lac. = Catost. sucetta Les. =
 Catost. suceti Val. = Moxost. suceti Ag. N. Am. (Charlest., Georgia etc.).
- ²⁴³ Moxostoma allisurus Ag. = Catost. (Moxostoma) anisurus Raf. N. Am. (L. Erie, Illin., Miss. etc.)
 " tenue Ag. N. Am. (Alabama).
 " claviformis Gir. N. Am. (Canadian r.).
 " Kennerlii Gir. N. Am. (Texas).

- " Victoriae Gir. N. Am. (Texas).
 " Campbells Gir. N. Am. (Texas).

ACOMUS Gir.,

Research. Cyprin. Fish. Unit. States in Proceed Acad. nature scienc.
 Philadelph. Vol. VIII p. 173.

Body elongate, fusiform-compressed, covered with small or medium-sized scales, much smaller anteriorly on the body than posteriorly. Jaws enclosed in papillose lips. Lower lip bilobed. Length of head greater than depth. Snout entire, protruding far anterior to the mouth. Dorsal fin starting anterior to ventral fins and ending far anterior to anal fin, length greater than depth. Pharyngeal bones not elongate. Pharyngeal teeth numerous, compressed, with two tubercles, placed in a comb-shaped row.

Remark. Mr Girard placed in his genus, apart from *Catostomus Forsterianus* Richds. (nec Ag.) and *Catostomus aurora* Ag., 5 more species discovered by him. *Cyprinus rostratus* Tiles. from North Eastern Asia can be placed in *Acomus*, when this species indeed belongs to the *Catostomines*.

MINOMUS Gir.,

Research. Cyprin. Fish. Unit. States in Proceed Acad. nature scienc.
 Philadelph. Vol. VIII p. 173

Body elongate, fusiform-compressed, covered with large or medium-sized scales, slightly smaller anteriorly on the body than posteriorly. Jaws enclosed in papillose lips. Lower lip bilobed. Length of head greater than depth. Snout entire, protruding anterior to the mouth. Dorsal fin starting anterior to ventral fins and ending anterior to anal fin, depth greater than length or length equal to depth. Pharyngeal bones not laterally elongate, but strongly inwards directed. Pharyngeal teeth numerous, compressed, bicuspidate, placed in a comb-shaped row.

244 Remark. In this genus Mr Girard placed three species, which he made known in 1954 with Mr Baird under the names *Catostomus clarkii*, *Catostomus insignis* and *Catostomus plebejus*. I very much doubt whether *Minomus* has rightly been separated from *Catostomus*, which indeed can also be said about *Acomus* Gir.

CATOSTOMUS Les.,

Journ Acad. Phil. I; Ag. Ichth. Pacif. slope N. Amer. p. 22. in
 Amer Journ. sc. Arts. 2^d Ser. Vol. XIX

Body elongate fusiform-compressed, covered with large or medium-sized scales, smaller anteriorly on the body than posteriorly. Jaws enclosed in fleshy, papillose lips. Lower lip bilobed. Snout entire, obtuse, protruding anterior to the mouth. Lower jaw broad, short. Dorsal fin starting anterior to ventral fins and ending far anterior to anal fin. Pharyngeal bones robust, slightly compressed. Pharyngeal teeth numerous medium-sized, increasing in size towards the symphysis of the pharyngeal bones, compressed, chewing surface obtuse, at the angle with a short process, placed in a comb-shaped row.

Remark. After the splitting of the Lesueurian genus *Catostomus* already numerous species, which originally were contained in it, had been removed. However, rather nu-

merous species were left, which belonged to *Catostomus* in its present restricted meaning. To those species can be brought *Cyprinus catostomus* Forst., *Catostomus teres* Les., *Catostomus bostonensis*, *Catostomus longirostrum* Les. and some other species discovered by recent American ichthyologists.

PTYCOSTOMUS Ag.,

Ichth. Pacif. slope North. Amer. p. 18 in
Amer. Journ. science and arts, 2^d Series Vol. XIX.

Body oblong or elongate, compressed, covered with large scales, equal anteriorly and posteriorly. Jaws enclosed in thin transversely grooved lips. Lower lip bilobed. Snout entire, hardly protruding anterior to the mouth. Dorsal fin starting anterior to ventral fins and ending far anterior to anal fin. Pharyngeal bones robust, broad. Pharyngeal teeth numerous, medium-sized, increasing in size towards the symphysis of the pharyngeal bones, compressed, chewing surface flat, at the angle with a short shortened process, placed in a comb-shaped row.

245 Remark. The genus *Ptychostomus* seems to distinguish itself from *Hylomyzon* mainly by transversely ruffled and not nipped lips. It is richer in species than *Hylomyzon*, as already seven species of it have been admitted to science.

HYLOMYZON Ag.,

Ichth. Pacif. slope North Amer. p. 20 in
Amer. Journ. science and arts, 2^d Series Vol. XIX.

Body elongate, fusiform-compressed, covered with large scales, larger anteriorly on the body than posteriorly. Jaws enclosed in broad, fleshy, papillose lips. Lower lip bilobed. Head flat on top. Snout entire, hardly protruding anterior to the mouth. Dorsal fin starting anterior to ventral fins and ending far anterior to anal fin, depth about equal to length. Pharyngeal bones slightly broad. Pharyngeal teeth numerous, medium-sized, increasing in size towards the symphysis of the pharyngeal bones, compressed, chewing surface thin, not tubular, placed in a comb-shaped row.

Remark. The only species of *Hylomyzon* known till now is *Hylomyzon nigricans* Ag., which has been described by various ichthyologists under various specific and generic names (*Catostomus*, *Exoglossum*, *Hypentelium*).

CARPIODES Raf.,

Ichth. Ohiens.; Ag., Ichth. Faun. Pacif. slope North. Amer. p. 4 in
Amer. Journ. science and arts, 2^d Series Vol. XIX = *SCLEROGNATHUS* Val: partly.

Body oblong, compressed, covered with large scales. Jaws enclosed in thin, transversely grooved lips. Lower lip bilobed. Length of head about equal to depth. Snout entire, convex. Dorsal fin elongate, strongly elevated anteriorly, starting anterior to ventral fins and ending above anal fin. Pharyngeal bones compressed, very thin. Pharyngeal teeth numerous, small, compressed, with one tubercle at the top, placed in a comb-shaped row.

Remark. *Carpiodes* is recognizable by its long, anteriorly very high dorsal fin, its bilobed lower lip and very thin compressed pharyngeal bones. *Catostomus cyprinus* Les. is the oldest known species of this genus, which however by **246** Mr Valenciennes was placed in his genus *Sclerognathus* and by De Kay in the genus *Labeo*. Moreover

four other species are known, among others *Carpiodes velifer* Raf. after which Rafinesque erected the genus.

CYCLEPTUS Raf.,

Prodr. of 70 n. gen.; Ag. Ichth. Faun. Pacif. slope North. Amer. p. 12 in
Amer. Journ. science and arts, 2^d Series Vol. XIX =
RHYTIDOSTOMUS Heck. ex parte.

Body elongate, cylindrical, covered with large scales. Jaws enclosed in papillose lips. Lower lip emarginate in the middle. Dorsal fin elongate, much higher anteriorly than posteriorly, starting far anterior to ventral fins and ending above anal fin. Pharyngeal bones robust, nearly triangular. Pharyngeal teeth numerous, medium-sized, increasing in size towards the symphysis of the pharyngeal bones, chewing surface more or less oblique or emarginate, placed in a comb-shaped row.

Remark. Of *Cycleptus* I see only two species mentioned, the type species of Rafinesque, *Cycleptus nigrescens*, and *Cycleptus elongates* Ag., which however has to be proven to differ specifically from *Cycleptus nigrescens* Raf.

ICHTHYOBUS Raf.,

Ichth. Ohiens.; Ag. Ichth. Faun. Pacif. slope North. Amer. p. 10 in
Amer. Journ. science and arts, 2^d Series Vol. XIX.

Body oblong, compressed, covered with large scales. Jaws enclosed in thin lips. Snout entire, not protruding anterior to the mouth. Lower lip broad. Dorsal fin elongate, much higher anteriorly than posteriorly, starting above or anterior to ventral fins and ending above anal fin. Pharyngeal bones slightly compressed, nearly triangular. Pharyngeal teeth numerous, small, increasing in size towards the symphysis of the pharyngeal bones, compressed, on the chewing surface provided with a short process, placed in a comb-shaped row.

Remark. The most well known species of *Ichthyobus* is *Sclerognathus cyprinella* Val., which species however was already indicated by Rafinesque under the name of *Ichthyobus* ²⁴⁷ *bubalus*. The knowledge of yet three other species one owes to Misters Agassiz and Baird and Girard.

BUBALICHTHYS Ag.

Ichth. Faun. Pacif. slope North America p. 7 in
Amer. Journ. scienc. and arts, 2^d Series Vol. XIX.

Body oblong, compressed, covered with large scales. Jaws enclosed in thin, granulated lips. Dorsal fin elongate, slightly higher anteriorly than posteriorly, starting anterior to ventral fins and ending above anal fin. Pharyngeal bones robust, triangular. Pharyngeal teeth numerous, medium-sized, increasing in size towards the symphysis of the pharyngeal bones, compressed, chewing surface convex, obtuse, only at the angle provided with a short process, placed in a comb-shaped row.

Remark. This genus has the long dorsal fin of *Carpiodes*, *Cycleptus* and *Ichthyobus*, but the fin is anteriorly hardly higher than more posteriorly, which makes the genus easy to recognize. Mr Agassiz mentions 6 species of *Bubalichthys*. – *Catostomus niger* Raf. and *Catostomus bubalus* Kirtl. (nec. Raf.) belong to these.

MOXOSTOMA Raf.,
 Ichth. Ohiens.; Ag. Ichth Pac. slope North Amer. p. 14 in
 Amer. Journ. Science and arts, 2^d series Vol. XIX.

Body oblong or elongate, compressed, covered with large scales. Jaws enclosed in thin, fleshy, transversely grooved lips. Lower lip bilobed. Lateral line without any external pores or openings. Dorsal fin starting anterior to ventral fins and ending anterior to anal fin. Pharyngeal bones slightly compressed, nearly triangular. Pharyngeal teeth numerous, medium-sized, increasing in size towards the symphysis of the pharyngeal bones, compressed, curved, slightly hooked, placed in a comb-shaped row.

Remark. The genus *Moxostoma* is recognizable by the absence of a visible lateral line. Till now only 8 species are known. One of them, *Moxostoma sucetta* Ag. was already known to Lacépède and a few others to Lessueur and Rafinesque, but the remaining ones have only been described in recent years.

246 STIRPS 2. CYPRINI. –
 REAL CARPS.

Cypriniformes with covered jaws and an oblong, compressed body, jaws enclosed in fleshy round lips; mouth anterior; dorsal fin elongate and anal fin with few rays, provided with a bony, serrated ray; large scales on the body; few pharyngeal teeth, in one to three rows.

Remark. The Cyprinines form a sharply delimited group by its serrated anal fin spine, a character that is only found in this tribe in the large family of the Cyprinoids. The recognition moreover is even made easier by the long dorsal fin, which extends till above the anal fin and which is armed with a serrated spine. The structure of the lips places them in the Cheilognathines. They seem to be for the Old world what the Catosomines are for the New world.

The Cyprinines comprise the genus *Cyprinus* as it is conceived by Cuvier and Mr Valenciennes.

Nilsson separated from them the species without barbels, which he placed in a proper genus with the name *Carassius*.

Fitzinger placed the same species in his genus *Cyprinopsis*, which has the same meaning as *Carassius*.

Heckel went even further and separated his *Cyprinus Kollarii* from the genus *Cyprinus*, on the basis of some peculiarities in the dentition. He named this genus *Carpio*. *Carpio* then would only differ from *Cyprinus* by the beaker-like shape of the pharyngeal teeth. As it possesses all other characters of *Cyprinus* till even the four barbels.

Heckel sometimes went too far in attaching generic value to peculiarities of the dentition. He thought so himself, as appears e.g. from the withdrawing of his genera *Chondrochilus* and *Chondrorhynchus*, which he separated from *Chondrostoma* on the basis of minor differences in numbers of pharyngeal teeth, but later brought back to *Chondrostoma*. It seems to me that generic value can be attached to differences in the details of the dentition only when these differences have been translated to characters that are externally visible. As this is not the case in *Carpio* Heck., this genus does not seem acceptable.

I therefore only accept two genera of Cyprinines, which can be distinguished externally from each other by the absence or presence of the barbels and which moreover possess a rather different dentition.

The Cyprinines are restricted to the Old world. Their real homeland there is ²⁴⁹ the temperate zone of the northern hemisphere. From there they extend in East Asia till the tropics, but except for the south of China, thus far they are not known from South-Asia. The Javanese species has been introduced there, just like *Cyprinus carpio* L. from Europe has been transported to America. *Carassius auratus*, with its numerous varieties and monstrosities has not only been transplanted to Europe, but also to the Indian archipelago, Africa and America. Very curious is the occurrence of 2 species of *Carassius* on the island of Mauritius, but it would not surprise me, if it would be found, that the carps of Mauritius have been taken there from Japan or China.

Both genera of the Cyprinines are easily recognizable, as follows.

- I. Barbels 4, nasal and upper jaw barbels. Pharyngeal teeth molar or calyx-shaped 1.1.3/3.1.1. or 1.4/4.1.

Cyprinus Art.

- II. No barbels. Pharyngeal teeth lancet-like 4/4.

Carassius Nilss.

Species of Cyprinines known at present.

- Cyprinus carpio* L. = *Cyprinus nobilis* Schon. = *Cyprinus rex cyprinorum*
Bl. = *Cyprinus carpio macrolepidotus* Ag. Eur., As. min.
(N. Am. introduced).
- " *acuminatus* Heck. Kner (nec Richds.) = *Cyprinus angulatus*
Heck. = *Cyprinus thermalis* Heck. Europa.
- " *hungaricus* Heck. = *Cyprinus primus* Marsigl. =
Cyprinus carpio var. *lacustris* Fitz. Europa.
- " *regina* Bp. = *carpio?* *regina* Heck. Europa.
- " *elatus* Bp. Europa.
- " *Nordmanni* Val. Europa.
- " *striatus* Holandre = *Carpio striatus* Heck. Europa.
- " *Kollarii* Heck. = *Carpio Kollarii* Heck. Europa.
- " *chinensis* Basil. China.
- " *obesus* Basil. China
- " ? *fossicola* Gr. Richds. China.
- " *flavipinna* V. Hass. = *Cyprinus floripenna* V. Hass. (typogr. error) =
Cyprinus nigro-auratus Lac.? = *Cyprinus rubro-fuscus* Lac.? =
Cyprinus viridi-violaceus Lac.? ²⁵⁰ = *Cyprinus flavipinnis* Val. =
Cyprinus vittatus Val. = *Cyprinus atro-virens* Richds.? = *Cyprinus*
flammans Richds.? = *Cyprinus hybiscoides* Richds.? = *Cyprinus*
acuminatus Richds.? = *Cyprinus sculponeatus* Richds. = *Cyprinus*
conirostris T. Schl. = *Cyprinus haematopterus* T. Schl. Chin, Jap. (Jav. introd.).
- **Cyprinus melanotus* T. Schl. Japan.
- Carassius vulgaris* Nilss. = *Cyprinus carassius* L. = *Cyprinopsis carassius* Fitz. =
Carassius Linnaei Bp. Europa.

"	<i>gibelio</i> Nilss. = <i>Cyprinus gibelio</i> Gmel.	Europa.
"	<i>moles</i> Ag.	Europa.
"	<i>oblongus</i> Heck. Kner.	Europa.
"	<i>humilis</i> Heck. = <i>Cyprinus humilis</i> Heck.	Europa.
"	? <i>incobia</i> Heck. = <i>Carassius incobia</i> Bp.	Europa.
"	<i>bucephalus</i> Heck. = <i>Cyprinus bucephalus</i> Heck.	Europa.
"	<i>lineatus</i> Heck. = <i>Cyprinus lineatus</i> Val.	China.
"	<i>Langsdorfii</i> Heck. = <i>Cyprinus Langsdorfii</i> Val.	China.
"	<i>Bürgeri</i> T. Schl. = <i>Cyprinus</i> (<i>Carassius</i>) <i>Bürgeri</i> T. Schl. = <i>Carassius coeruleus</i> Bas.	China, Japan.
"	<i>auratus</i> Nilss. = <i>Cyprinus auratus</i> Bl. = <i>Cyprinus Telescopus</i> Lac. = <i>Cyprinus macrophthalmus</i> Bl. = <i>Cyprinus quadrilobus</i> Lac. = <i>Cyprinus nukta</i> Syk. = <i>Cyprinus quadrilobatus</i> Bas.	Chin., Jap., Phil. (Java & Eur. intr.).
"	<i>pekinensis</i> Bas.	China.
"	<i>discolor</i> Bas.	China.
"	<i>abbreviatus</i> Blkr. = <i>Cyprinus abbreviatus</i> Richds.	China.
"	<i>gibelioides</i> Blkr. = <i>Cyprinus gibelioides</i> Cant. = <i>Cyprinus</i> <i>nigrescens</i> Cant. (<i>Carassius Langsdorfii</i> Val.? sec. Richds.) ...	China.
"	<i>carassiioides</i> Blkr. = <i>Cyprinus carassiioides</i> Gr.	China.
"	<i>Cuvieri</i> T. Schl. = <i>Cyprinus</i> (<i>Carassius</i>) <i>Cuvieri</i> T. Schl.	Japan.
"	<i>grandoculis</i> T. Schl.	Japan.
"	<i>thoracatus</i> Heck. = <i>Cyprinus thoracatus</i> Val.	Maurit., Japan.?
"	<i>mauritanus</i> Blkr. = <i>Cyprinus mauritanus</i> Benn.	Mauritius.

251 CYPRINUS Art.:

L., Syst. Nat. ed. 6^a (1748), Nilss. Skand. Fisk. =
 CARPIO Heck., Fish. Syr. p. 24 –
 CARP.

Body oblong, compressed, covered with large scales. Jaws enclosed in fleshy, terete, simple lips. Barbels 4, nasal and upper jaw barbels. Gape terminal, in shape reminding of a horse shoe, when the mouth is closed. Simple postlabial groove on both sides, longitudinal, not united with the groove on the opposite side. Gill cover rugose. Dorsal fin elongate, starting above or anterior to ventral fins and ending above anal fin, scaleless at the base, posterior simple ray bony, serrated. Anal fin with few rays, posterior simple ray bony, serrated. Pharyngeal bones slightly compressed, slightly triangular. Pharyngeal teeth molar or stone-shaped, in one to three rows, chewing surface grooved.

Remark. The genus *Cyprinus*, as described above, comprises the genera *Cyprinus* Heck. and *Carpio* Heck., which in my opinion are only a single genus. Indeed *Carpio* Heck. would differ from *Cyprinus* in nothing but the shape of the pharyngeal teeth, the chewing pad of which is slightly concave, much as those teeth are built after the type of those of *Cyprinus* and similarly have grooves on the chewing surface.

One now knows the above mentioned species of *Cyprinus*, of which most inhabit Europe, while the remaining ones are all known from China and Japan. In my collection only a single archipelagic species is present, which till now in the Indian archipelago has only been found in the western part of Java and has been brought there from China. This species by the following characters can be distinguished from all other known species of the genus.

- I. Depth of body contained $3\frac{1}{2}$ to $4\frac{1}{4}$ times in its length. Head acute, contained $3\frac{3}{4}$ to $4\frac{1}{2}$ times in the length of the body, depth contained $1\frac{1}{3}$ to $1\frac{1}{4}$ times in its length. Eyes contained 3 to $4\frac{1}{3}$ times in the length of the head. D 4/16 to 4/18. Teeth, globular smooth one excepted, obliquely truncate, chewing surface generally with three ridges 1.1.3/3.1.1 or 1.3/3.1

Cyprinus flavipinna K. v. H.

²⁵² *Cyprinus flavipinna* K. v. H.;

Val., Poiss. XVI p. 52 tab 547;

Blkr, Descr. spec. Jav. Nov. Nat. Tijdschr. Ned. Ind. XIII p. 345,

Geelvinnige Karper [Yellow finned Carp].

Atl. Cypr. tab. XIX.

A *Cyprinus* with an oblong, compressed body, depth of body contained $3\frac{1}{2}$ to $4\frac{1}{4}$ times in its length, width contained $1\frac{2}{3}$ to 2 times in its depth. Head slightly acute, conical, contained $3\frac{3}{4}$ to $4\frac{1}{2}$ times in length of body with caudal fin, $3\frac{1}{6}$ to $3\frac{2}{3}$ times in length of body without caudal fin, depth of head contained $1\frac{1}{3}$ to $1\frac{1}{4}$ times in its length, width contained $1\frac{3}{4}$ to $1\frac{2}{3}$ times in its length; eye diameter contained 3 to $4\frac{1}{3}$ times in the length of the head, eye diameter contained $1\frac{1}{2}$ to 2 times in the postocular part of the head, distance between the eyes once to nearly twice their diameter, palpebral membrane covering the external margin of the iris only, opening nearly circular; snout slightly acute or obtusely convex, not protruding anterior to the mouth, in younger animals shorter than the eye, in old animals longer than the eye; nostrils much closer to the orbit than to the tip of the snout; rostro-dorsal profile generally sloping between snout and nape, nearly straight, convex on the nape; anterior suborbital bone obliquely quadrangular, length nearly twice to twice as great as width, posterior margin strongly convex, anterior margin nearly straight or slightly concave, lower half traversed by a longitudinal, posteriorly ascending crest; 2nd suborbital bone obliquely quadrangular, anteriorly much higher than posteriorly, length about twice as great as depth, about 3 times as low as first suborbital bone; upper jaw longer than lower jaw, strongly downward protrusible, ending anterior to the eye, contained $3\frac{2}{3}$ to 4 times in the length of the head; gape slightly oblique; nasal barbels much shorter to more than twice as short as upper jaw barbels, sometimes missing; upper jaw barbels shorter to slightly longer than the eye; lips fleshy, terete, with transverse stripes on the oral surface; postlabial groove separated from the groove on the opposite side

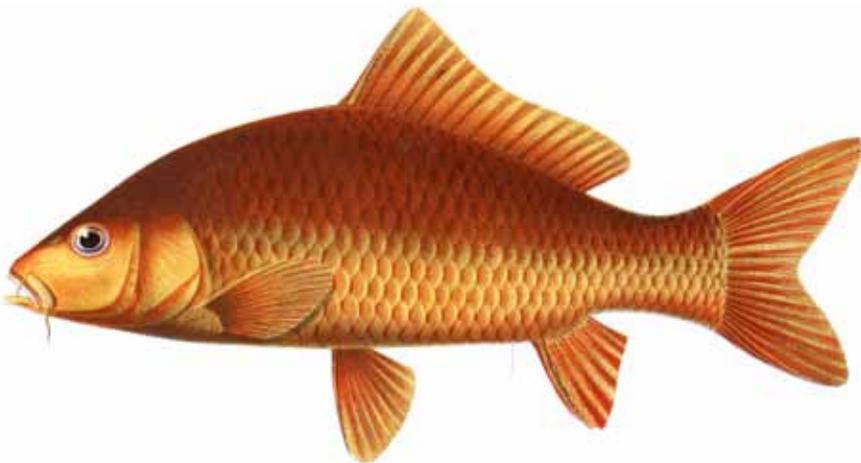


Fig. 56. *Carpio flavipinna* K. v. H. Atl. Ichth. Cypr. Tab. VII, Fig 3. TL figure 238 mm.

by the rather broad isthmus; lower jaw with a conical, obtuse, short tubercle at the symphysis, at the underside on both branches with several pores in a longitudinal row; suborbital bones and preopercular border with conspicuous pores in a simple curved row; gill cover rugose ray-like, width contained $1\frac{3}{5}$ to 2 times in its depth, lower margin nearly straight or slightly concave; gill opening ending under the posterior margin of the preoperculum. Pharyngeal teeth molar 1.1.3/3.1.1 or 1.3/3.1, internal tooth in posterior row globular, very obtuse, not grooved, other teeth obliquely truncate, the chewing surface generally with three ridges; scapula triangular, very obtusely rounded; belly flat anterior to ventral fins, angular at the sides, behind the ventral fins obtusely ridged; back elevated, rounded or slightly angular, much higher than the belly; scales for the free half and the basal half with longitudinal stripes slightly ray-like, 35 to 37 scales in the lateral line, 14 or 13 in a transverse row (without the lowest ventral scales), of which 6 ($5\frac{1}{2}$) above the lateral line, 12 or 14 in a longitudinal row between occiput and dorsal fin; lowest ventral scales in five longitudinal rows, scales middle row hardly increasing in size posteriorly, not larger than those in side rows; lateral line nearly straight, sloping downward only anteriorly, not reaching the rostrum-caudal line, each scale marked by a simple tube reaching or nearly reaching the centre of the scale; dorsal fin starting above or slightly anterior to the ventral fins, scaleless at the base, contained $2\frac{3}{5}$ to nearly 3 times in the length of the body without caudal fin, acute or slightly obtuse, emarginate, depth contained $1\frac{1}{3}$ to more than 2 times in the depth of the body, length in juveniles nearly twice, in older animals twice to more than twice as great as depth, spine rather robust, armed with conspicuous teeth posteriorly with its flexible part shorter than the head without the snout; pectoral and ventral fins slightly acutely or slightly obtusely rounded; pectoral fins slightly longer than ventral fins, contained nearly 6 to $6\frac{2}{3}$ times in the length of the body, reaching or not reaching the ventral fins, ventral fins not reaching the anal fin; anal fin lightly scaled at the base, not or slightly emarginate, slightly lower or not lower than dorsal fin, depth twice to considerably less than twice as great as base length, posterior ray opposite posterior dorsal ray or inserted slightly behind it, spine rather robust, armed with conspicuous teeth posteriorly; caudal fin scaled at the base, with a deep incision, lobes acute or slightly acutely rounded, contained 4 to $4\frac{3}{4}$ ²⁵³ times in the length of the body. Colour: body beautiful golden, or gold-green or deeply green or black on the back and gold or silver on the flanks; flanks sometimes with diffuse, longitudinal bands of a deeper colour; iris golden or pink or yellow; fins gold-red or gold-yellow or faintly pink, sometimes nebulated with violet or black.

B. 3. D. 4/16 to 4/18. P. 1/13 to 1/16. V. 2/8. A. 3/5 or 3/6. C. 6/17/6 to 8/17/8, short flanking ones included.

Syn. *Cyprinus floripenna* (printing error) V. Hass., Algern. Konst- en Letterb. 1823 II p. 132, Bull. de De Féruss. 1824 Zoöl. P. 375.

Cyprinus rubro-fuscus Lac., Poiss. V. p. 531, Val., Poiss. XVI p. 54? Richds., Rep. Fish. Chin. Jap. in Rep. 15th Meet. Brit. Assoc. p. 288?

Cyprin rouge-brun Lac., Poiss. V p. 531 tab. 16 fig. 1?

Cyprinus nigro-auratus Lac., Poiss. V. p. 547; Val., Poiss. XVI p. 53, Richds., l.c. p. 290?

Cyprin mordoré Lac., Poiss. V p. 547 tab. fig. 2?

Cyprinus viridi-violaceus Lac., Poiss. V p. 448; Val., Poiss. XVI p. 55, Richds., l.c. p. 288?

Cyprin verd-violet Lac., Poiss. V p. 548 tab. 16 fig. 3?

Carpe rouge-brun Val., Poiss. XVI p. 54?

Carpe mordorée Val., Poiss. XVI p. 53?

Carpe vert-violet Val., Poiss. XVI p. 55?

Cyprinus atro-virens Richds., Rep. Ichth. Chin. Jap. in Rep. 15th Meet. Brit. Assoc. p. 287?

Cyprinus flammans Richds., ibid. p. 288.

Cyprinus hibiscoides Richds., ibid. p. 289?

Cyprinus acuminatus Richds., ibid. p. 289?

Cyprinus sculponeatus Richds., ibid. p. 290?

Carpe aux nageoires jaunes Val., Poiss. XVI p. 457.

Cyprinus vittatus Val., Poiss. ibid.

Carpes aux bandes vertes Val., Poiss. ibid.

Cyprinus haematopterus T. Schl., Faun. Jap. Poiss. p. 189 tab. 96.

Cyprinus conirostris T. Schl., Faun. Jap. Poiss. p. 191 tab. 97 fig. 2.

Hih-li, Hak-li, Tang-li, Tong-li, Ho-li, Fo-li, Luh-li, Luk-li, Foo-yung-li, Foo-gang-li, Fu-yung-li, Shang-hae-la, Shang-hai, Sheung-hoi-lap, Hae-li, Hoi-li, Kik-li Chinese.

Tambra and *Tambra mas* Mal. and Sund.

Hab. Java (Batavia, Buitenzorg, Tjampea, Tugu, Tjiseroa, Tjipanas, Tjilandur, Lelles, Bandung, Tjibulus, Pandjellu), in rivers, lakes and ponds.

Japan (Jedo), in rivers.

Length of 35 specimens 70''' to 248'''.

Remark. *Cyprinus flavipinna* V. Hass. is closely related to the common European carp (*Cyprinus carpio* L.) and differs from it primarily by a more slender body, larger head and larger eyes and a less convex profile. Many specimens even have the beautiful gold shining green colour of the common European carp.

Cyprinus melanotus of Japan is more slender of head and body than *Cyprinus flavipinna*, has the pectoral fin more developed and offers still various other differences in shape of the suborbital bones and the nature of the chewing pads of the pharyngeal teeth.

Cyprinus vittatus Val. is the same species as *Cyprinus flavipinna*. I possess various ²⁵⁴specimens, which because of the longitudinal bands on the body would belong to *Cyprinus vittatus* Val., however they differ in nothing essential from *Cyprinus flavipinna*. The band marking in a few specimens appears already during life, in others only after preservation in spirit of wine.

The colouration in various specimens offers so numerous variegations, that after a superficial examination one would easily believe to find specific differences therein. Instead of the number of dorsal fin ray of 27 (a printing error), which is given in the large fish work, it should be read as 17.

In western Java the green variety is named *Tambra*, the golden variety on the contrary is named *Tambra mas*. The species belongs to the most tasteful freshwater fishes of Java and for that reason in the hills it is often kept in ponds. All my specimens belong to the juvenile and medium age, as the species can attain a length of more than 400 mm.

Van Hasselt already noted that *Cyprinus flavipinnis* was brought from China to Java. It is moreover remarkable that it is the only real species of carp, which till now was observed free in nature in the Indian archipelago, and that its distribution is restricted to Java and indeed only to the western part of that island. When the assertion of Van Hasselt is correct, which I believe is true based on information on Java, it now seems very probably to me that it is the same species as that which Lacépède has depicted as three different species under the names *Cyprinus rubro-fuscus*, *Cyprinus nigro-auratus* and *Cyprinus viridi-violatus*, and which under the same names has been placed in the large *Histoire naturelle*. The habitus of these species, as they are represented in the figures of Lacépède, answers well to those of my younger specimens, although the details of the execution leave much to be desired.

Cyprinus corirostris [conirostris] T. Schl. and *Cyprinus haematopterus* T. Schl. of Japan I take even more definitively for the same species as *Cyprinus flavipinnus*; especially after I was able to compare a number of specimens from Jedo with my Javanese ones.

If it could be determined with certainty that the threefold erected species of Lacépède was indeed the same as the species in question, the one described here should get one of the names of Lacépède for which that of nigro-auratus would be preferred.

From figures of Reeves, Mr Richardson, apart from the three nominal species of Lacépède, has erected some other species of *Cyprinus* from China under the names *Cyprinus atro-virens*, *Cyprinus flammans*, *Cyprinus hibiscoides*, *Cyprinus acuminatus* and *Cyprinus sculponeatus*, which I suspect all represent the same species as that of Lacépède. The peculiarities after which they have been erected, are derived from the figures and these lack, as can be gathered from the ²⁵⁵ descriptions of Mr Richardson, the necessary accurateness with regard to the numbers of scales, etc.

Thus when my opinion with regard to this would appear to be correct, the 8 species of Richardson might be reduced to a single one, in which also could be placed both Javanese species of Mr Valenciennes and *Cyprinus haematopterus* T. Schl. and *Cyprinus conirostris* T. Schl. from Japan, so that of these twelve species only a single one should take place in science.

CARASSIUS Nilss.,
Heck. Fisch. Syr p. 24. –
KARAUSCH.

Body oblong, compressed, covered with large scales. Jaws enclosed in fleshy, terete, simple lips. No barbels. Gape terminal, in form reminding of a horse shoe when the mouth is closed. Postlabial groove simple on both sides, longitudinal, not united with the groove of the opposite side. Gill cover rugose. Dorsal fin elongate, starting above ventral fins and ending above anal fin, scaleless at the base, posterior simple ray bony, serrated. Pharyngeal teeth lancet-like 4/4.

Remark. Nowadays about 20 species are known of *Carassius*, most of which belong to the fauna of China and Japan, and the remaining ones to that of Europe.

Carassius thoracatus Heck. from Mauritius seems to be a Japanese species, at least it also occurs in Japan, and just like *Carassius auratus* can produce monstrosities with double fins. *Cyprinus mauritanus* Benn. (Proceed Comm. Zool. Soc. I p. 167) maybe is no other species than *Cyprinus thoracatus* Val., which however cannot be determined from the very short description by Bennett. On the whole it seems to me, that various Chinese and Japanese species must be further investigated and compared. It will then maybe become apparent that some species are only nominal and nothing else than varieties or monstrosities. Thus for instance *Cyprinus nukta* Syk. from Dekka is also only a monstrosity of *Carassius auratus*.

Carassius auratus Nilss.:
Heck., Fisch Syr. p. 24 –
Gold fish.

- Syn. *Cyprinus auratus* L. Gm., Syst. Nat. ed. 13^a p. 1418 et auct.
Cyprinus telescopus Lac., Pal.
Cyprinus macrphthalmus Bl., Ausl. Fisch. Tab. 410.
Cyprinus quadrilotus Lac. Poiss. V. tab. 18 fig. 3.
Cyprinus nukta Syk., Fish. Dukhun in Trans, Zool. Soc. II p. 355 (monstr.).
²⁵⁶ *Cyprinus quadrilobatus* Basil., Mem. Soc. imper. Natur. Mosc. X 1855, Ichth. Chin. bor. p. 230 tab 5 fig. 5.

Remark. Of *Carassius auratus* I possessed numerous specimens, all belonging to various monstrosities of the species, as they are kept in ponds on Java and in Japan for pleasure. All those specimens, preserved in a large stoppered jar, have got lost during the last transfer of my cabinet, either stolen by the porters, or thrown away after the breaking of the jar during transport. The principal monstrosities, observed by me, I had already noted on p. 48 of my "Nalezingen op de Ichthyologie van Japan", included in the 25th Volume of the *Verhandelingen van het Bataviaasch Genootschap van kunsten en wetenschappen*. They were, apart from deviations in the shape and length of the head, body and fins, found in the being absent or double of one or more fins. These monstrosities in a few words can be characterized as follows.

- Monstrosity 1 Monopterus, diuropterus, diproktopterus, phaionotus.
 " 2 Monopterus, diuropterus, monoproktopterus, aureus.
 " 3 Anopterus diuropterus, diproktopterus, aureus.
 " 4 Anopterus, diuropterus, phaisoma.

All these monstrosities I have recovered in a number of goldfishes from a pond of the kings of Surakarta. Earlier I have noted the following with regard to a number of specimens belonging to these monstrosities.

1. *Carassius auratus, macronopterus, diuropterus, diproktopterus, phaionotus.*

Syn. *Cyprinus auratus* var. Basil., Ichth. Chin. boreal. tab. 5 fig. 2.
Tambras mas Mal. Jav.

A *Carassius* with an oblong, compressed body, depth contained 3 to 3½ times in its length; head obtuse, rounded, contained 5 to 6 times in the length of the body; eye diameter contained 3½ times in the length of the head; dorsal line strongly convex; scales on flanks 24 or 25 in a longitudinal row; fins strongly elevated and elongate, dorsal, pectoral and ventral fins simple, anal and caudal fin double, caudal fin trilobed with acute lobes, in the middle contained only twice in the length of the total body. Colour: upper part of the body blackish-dark, flanks and underside yellowish-golden, fins dark.

D. 4/19. P. 1/16. V. 2/6 or 2/7. A. 3/6 + 3/6. C. 17 + 17 and short flanking ones.

Hab. Surakarta, in ponds of princes.

Length of 2 specimens 115''' and 170'''.

2. *Carassius auratus, macronopterus, diuropterus, monoproktopterus, oblongus, aureus.*

Syn. *Cyprinus macrophthalmus* Bl., Ausl. Fisch. Tab. 410.

Cyprin gros-yeux Lac., Poiss. V tab. 18 fig. 2.

Cyprin quatre-lobes Lac., Poiss. V tab. 18 fig. 3. 257

Quen-Yu ou Lettré's, Mors-doré and *Élégand*, 23 *Jujube* and *Baté* 9, *Maltache* and *Croix blanche* 29- Collection of Savigny.

Kin-Yu, Maricot, 7, *Ardoisé* and *Rubicon* 4, *Nigrisant* and *Aurore* 16, *Mauche* and *Marbré* 2, *Noiroux* 6, *Brunet* and *Cinabré* 8, *Superbe* 3, *Souci* and *Capucine* 1, *Charbonnier* and *Bleuet* 5, Collection of Savigny.

Original and *Bande-Gueule* 21, *Mauri-jaune*, *Ensanglanté* and *Tout-chair* 20, Collection of Savigny.

Long-Tjing-Yu or the *Eyes of the dragon*, species of the *Ya-Tan-Yu* or cane eggs; *Rouillé*, *Cérisse* and *Léopard* 22, *Masqué* and *Cap-mine* 10, *Quinte-bande* and *Norimembre* 14, *Rubismouche* and *Nuageux* 12, *Telescope* 11, *Turquoise* and *Agathe* 26. Collection of Savigny.

Ya-Tan-Yu or cane eggs, *Ferrigineux*, *Tettard* and *Frangirouge* 15. Collection of Savigny.

Kin-Teon-Yu, or *Cabrioleurs*, *Verdret* and *Sombricolore* 17. Collection of Savigny.

Tambras mas Mal.

A Carassius with an oblong, compressed body, depth contained $3\frac{1}{2}$ to 4 times in its length; head obtuse, rounded, contained about 4 times in the length of the body; eye diameter contained $3\frac{1}{2}$ times in the length of the head; dorsal line convex in a regular way; scales on flanks 23 to 25 in a longitudinal row; dorsal, pectoral, ventral fins and anal fin simple, caudal fin doubly trilobed, acute lobes contained about $3\frac{1}{2}$ times in the length of the body. Colour on the whole body golden, fins yellowish-golden.

D. 4/16 or 4/17. P. 1/14 or 1/15. V. 2/8. A. 3/6. C. 16 + 16, and short ones.

Hab. Surakarta, in ponds of princes.

Length of 2 specimens 75''' and 103'''.

3. *Carassius auratus, anotopterus diuropterus, diproktopterus, aureus.*

Syn. *Tambra mas* Mal.

A Carassius with an oblong, compressed body, depth contained about 3 times in its length; head obtuse, contained about $5\frac{1}{2}$ times in the length of the body; eye diameter contained $3\frac{1}{2}$ times in the length of the head; dorsal line strongly angular anteriorly; belly much more convex than gibbous back; scales on flanks about 25 in a longitudinal row; fins: no dorsal fin, pectoral and ventral fins simple, elongate, anal and caudal fin double, caudal fin tetralobed, acute middle lobes contained only twice in the length of the total body. Colour: the whole body golden, fins yellowish-golden.

D. 0. P. 1/17. V. 2/6. A. 3/7 + 3/6. C. 19 + 19, and short flanking ones.

Hab. Surakarta, in ponds of princes.

Length of 2 specimens 110''' and 210'''.

4. *Carassius auratus, anotopterus, diuropterus, diproktopterus, phaionotus.*

Syn. *Cyprinus auratus* var. Bl. Tab. 94 fig. 2

Tambra mas Mal.

A Carassius with an oblong, compressed body, depth contained about $4\frac{1}{2}$ times in its length; head obtuse, contained nearly 6 times in the length of the total body; eye diameter contained $3\frac{3}{4}$ times in the length of the head; nasal valve prolonged into a lobe; dorsal line irregularly rounded; back strongly ridged, more convex than belly; scales on flanks about 20 in a longitudinal row; fins: no dorsal fin, pectoral and ventral fins simple, ²⁵⁸ maximally elongate, considerably surpassing the tail, anal and caudal fin double, anal rays very long, caudal fin with four lobes, acute lobes making up more than half the length of the total body. Colour: body and fins dark, only gill covers and belly fins golden or silver.

D. 0. P. 1/16 or 1/17. V. 2/7. A. 3/9 + 3/6. C. 15 + 15, and short flanking ones.

Hab. Surakarta, in ponds of princes.

Length of sole specimen 185'''.

Since the specimens from which the above mentioned notes were taken, got lost, I came again in the possession of some monstrosities, all from Japan, and largely originating from aquaria of an eminent Japanese from Jedo.

After these monstrosities I have taken the following notes

5. *Carassius auratus, macronotopterus, diuropterus, diproktopterus, aureus.*

Syn. *Cyprinus auratus* var. Basilevski, Ichtyogr. Chin. tab 5 fig. 3, 5.

A Carassius with an oblong, compressed body, depth contained 3 to $3\frac{1}{4}$ times in its length; head obtuse, contained $4\frac{3}{5}$ to 5 times in the length of the total body; eye diameter contained 3 to $3\frac{1}{2}$ times in the length of the head; nostrils not tubular, but large posterior nostrils can be closed by means of a valve;

dorsal line rounded in a rather regular way; back ridged, not or only slightly higher than tumid belly; scales on flanks 26 or 27 in the lateral line; fins very elongate and elevated, dorsal fin about equally long and high, simple; pectoral fins hardly shorter to no shorter than the head; ventral fins longer than the head; anal fin double, caudal fin double, with four lobes, lobes very acute, middle lobes not or hardly shorter than the trunk plus the head; (contained about twice in the length of the total body. Colour: body and fins red-golden; fins for the free half sometimes beautiful pink.

D. 4/15 or 4/16. P. 1/16 or 1/17. V. 2/8. A. 3/7 + 3/7. C. short flanking ones + 1/17 + 17/1 and short flanking ones.

Hab. Japan, in ponds of the city of Edo.

Length of 2 specimens 123''' and 126'''.

Carassius auratus, macronotopterus, diuropterus, monoproktopterus, aureus.

A specimen belonging to monstrosity n° 2, but differing in various peculiarities from my earlier specimens, i. e. by a more slender body, a more angular back- and body outline and larger caudal fin lobes. The specimen originates from Nagasaki and is 85 mm long.

6. *Carassius auratus, micronotopterus, diuropterus, monoproktopterus, aureus.*

Syn. Val., Poiss. XVI p. 86.

Cyprinus auratus var. Basil., Ichth. Chin. bor. tab. 5 fig. 1.

A *Carassius* with an oblong, compressed body, depth contained about 2½ times in its length; head obtuse, slightly convex, contained nearly 4 times in the length of the body; eye diameter contained about 3½ times in the length of the head; nostrils not tubular, but posterior nostrils can be closed by means of a large valve; dorsal line strongly angular; ventral line convex in a regular way; back hardly higher than belly; about 25 scales in the lateral line; dorsal fin 259 short, not longer than gill cover, depth much greater than length, more than twice as low as the body; pectoral and ventral fins acute, shorter than the head; anal fin simple, acute, rounded posteriorly; caudal fin double, with four lobes, lobes acute, nearly equal, contained about 3¾ times in the length of the total body. Colour: body red-golden; fins beautiful red; dorsal and caudal fin with a black margin.

D. 4/5 or 4/6. P. 1/15. V. 2/7. A. 3/5 or 3/6. C. 1/17/1 and short flanking ones + 1/13/1 plus short flanking ones.

Hab. Japan (Edo), in ponds.

Length of sole specimen 90'''.

Carassius auratus, anotopterus, diuropterus, diproktopterus, phaoinotus.

Two specimens from Jedo. Belonging to monstrosity n° 4, but with much shorter fins and body the depth of which goes only about 2½ times in its length. The head only goes 3½ to 4 times in the length of the body, the caudal fin 2⅔ to 3 times. There are 27 to 21 scales in the lateral line. The ventral and pectoral fins are shorter than the head; the nasal valve has developed to a long fleshy lobe. The specimens have a length of 53 and 95 mm.

7. *Carassius auratus, anotopterus, diuropterus, diproktopterus, sarcocephalus, aureus.*

A *Carassius* with an oblong, compressed body, depth contained about 2¾ times in its length; head very obtuse, maximally convex, depth greater than length, completely covered with villous-fleshy skin, contained slightly over 4 times in the length of the body; eye diameter contained about 4 times in the length

of the head; nasal valve developed into a fleshy multipartite lobe; dorsal line rounded, slightly higher than rounded ventral line; back very thick, not ridged; about 25 scales in the lateral line hardly visible; no dorsal fin, pectoral and ventral fins acute, slightly shorter than the head; anal fin semi-duplicate, duplicate, gobioid anteriorly, simple posteriorly; caudal fin double, with four lobes, lobes acute, longer on the sides than in the middle, contained slightly over 3 times in the length of the body. Colour: body beautiful golden-red; fins red; upper jaw black.

D. 0. P. 1/14 or 1/15. V. 2/7 or 2/8. A. 2/3 above, 2/3 below + 3. C. short flanking ones + 1/13/15/1 + short flanking ones.

Hab. Japan (Edo), in ponds.
Length of sole specimen 139'''.

8. *Carassius auratus, anotopterus, diuropterus, monoproktopterus, aureus.*

Syn. *Cyprinus auratus* var. Bl., tab. 94 fig. 1.

A *Carassius* with an oblong, compressed body, depth contained about $2\frac{3}{4}$ times in its length, head very obtuse, angular, depth greater than length, contained nearly 4 times in the length of the body; eye diameter contained 3 times in the length of the head; crown slightly villose; nasal valve thickened, but not prolonged into a lobe; dorsal line curved in a regular way, not or hardly more convex than rounded ventral line; back thick, not ridged; 26 scales in the lateral line; no dorsal fin, pectoral and ventral fins acute, shorter than the head; anal fin simple, acute; caudal fin double, trilobed, lobes acute, nearly equal in length, contained about 3 times in the length of the body. Colour: body golden-red; fins red.

260 D. 0. P. 1/16. V. 2/6. A. 3/5 or 3/6. C. short flanking ones + 1/33/1 + short flanking ones.

Hab. Japan (Edo), in ponds.
Length of sole specimen 101'''.

9. *Carassius auratus, macronotopterus, monuropterus, monoproktopterus, rhombeus, aureus.*

Syn. *Cyprinus auratus* var. Bl., Ichthyogr. Chin. boreal. Tab. 5 fig. 4.

A *Carassius* with an oblong, compressed body, rhomboid, depth contained $2\frac{2}{3}$ to $2\frac{3}{4}$ times in its length; head angular, acute, depressed, contained $3\frac{1}{2}$ to 4 times in the length of the body, depth about equal to length; eye diameter contained slightly over 3 times to $3\frac{1}{2}$ times in the length of the head; nasal valve moderately evolved; dorsal line with an obtuse angle; ventral line rounded; back ridged, hardly higher than belly; 25 to 29 scales in the lateral line; dorsal fin elongate, length greater than depth, pectoral and ventral fins acute, shorter than the head; anal fin simple, acute, depth greater than length; caudal fin simple, bilobed, lobes acute, contained about $2\frac{1}{2}$ to $2\frac{2}{3}$ times in the length of the body. Colour: upper part of the body golden-red, lower part silver; fins beautiful red.

D. 4/15 to 4/19. P. 1/13 to 1/15. V. 2/7 to 2/8. A. 3/6 or 3/7. C. 1/17/1, and short flanking ones.

Hab. Japan (Edo), in ponds.
Length of 2 specimens 66''' and 68'''.

Remark. In one of these specimens the snout is very acute and the snout-forehead line very concave. In this specimen the dorsal fin has a large black spot between the 2nd and the 7th ray. In the other specimen this spot is lacking, and neither is the forehead line concave.

The following known monstrosities are not in my collection.

10. *Anotopterus, monuroproktopterus.*

Syn. *Cyprinus auratus*. var. Bl. tab. 94 fig. 3.

11. *Macronotopterus, monuropterus, monoproktopterus, elongatus* (slightly different from the normal form)

Syn. *Nin-Eubk-Yu* or *Nymphes, Ambre-jaune* and *Tricolor* 13, *Queue-mine* and *Hirondelle* 27, *Fade* and *Minier* 28, Collections of Savigny.

Kin-Yu, Orangé 19, *Vermillion* 25. Collections of Savigny.

12. *Dinotopterus* (Val., Poiss. XVI p. 82).

13. *Micronotopterus, diuropterus diproktopterus* (Val., Poiss. XVI p. 86, 87).

261 STIRPS 3. – BARBINI. –
BARBELS.

Cypriniform fishes with covered jaws, body oblong or elongate, compressed or slightly fusiform, anal ray simple, at the posterior side smooth, without teeth, pharyngeal teeth sparse, in one to three rows, never more than 12 on either side.

Remark. In the Barbines I place all Cheilognathines, which do not belong to the Catostomines and Cyprinines.

Above I already have pointed at the difficulties to arrange the more than 600 now known species of Barbines according to their natural relationships and to define the genera with the necessary sharpness.

Heckel's attempt of a natural classification of the Cyprinoids, so little met the demands of a natural system, that he himself rejected it a few years later by the erection of his Temnochilae the genera of which in his earlier classification, in which the Cyprinoid genera accepted by him are mentioned with No. 1 to No. 54, occur on the numbers 5, 13, 18 to 23 and 27 to 30, surrounded by Cyprinines, Barbines and Catostomines. And even when one removes the Cyprinines and Catostomines from that list, as well as the genus *Glossodon*, which belongs to a different order, the Barbines in no way follow each other in a natural way. The sequence in which the Barbines in that case would occur, would be as follows.

1 Gibelion Heck.	13 Abramis Cuv.	25 Scardinius Bp.
2 Devario Heck.	14 Blicca Heck.	26 Idus Heck.
3 Rhodeus Ag.	15 Bliccopsis Heck.	27 Leucos Heck.
4 Systemus McCl.	16 Acanthobrama Heck.	28 Pachystomus Heck.
5 Barbus Cuv.	17 Osteobrama Heck.	29 Leuciscus Rond.
6 Labeobarbus Rupp.	18 Ballerus Heck.	30 Phoxinellus Heck.
7 Luciobarbus Heck.	19 Chela Buch.	31 Phoxinus Rond.
8 Schizothorax Heck.	20 Esomus Swains.	32 Argyreus Heck.
9 Aulopyge Heck.	21 Pelecus Ag.	33 Squalinus Bp.
10 Gobio Cuv.	22 Perilampus McCl.	34 Leucosomus Heck.
11 Tinca Rond.	23 Alburnus Rond.	35 Opsarius McCl.
12 Isocephalus Heck.	24 Aspius Ag.	

Many of these genera since then have become better known, whereas others have been found untenable. Numerous other generic forms discovered since then, have thrown a new light on the relationships of 262 older ones, and because of that, this part of the knowledge of the Cyprines nowadays has got a totally different complexion.

Much can be said against the value of many of those new genera.

It is especially in the Barbines, that one has gone too far in creating new genera on the basis of insignificant changes in the dentition. Heckel in this was still overpassed by Agassiz and Girard.

Certainly the dentition also has its value for the systematic classification of the Barbines, but not in such a way that a small difference in the rows and shape of the teeth can be considered sufficient to multiply the genera while neglecting the remaining natural relationships, and it certainly will become apparent that many genera which are drawn up that way are untenable.

However, apart from the dentition, the Barbines offer various characters by which one is able to group them better than has been done till now.

One finds an excellent character in the shape of the anterior part of the body. In most Barbines the belly is flat anterior to the pelvic fins, offering a more or less broad surface on which one can observe 3 to more longitudinal scale rows. In rather numerous other species the belly is knife-like compressed, forming only a sharp keel instead of a flat undersurface, and the pelvic fins in these species are not implanted on the lower edge of the body, but on the flanks above the ventral keel. One can name both these groups Amblygastris and Oxygastris.

The Oxygastris comprise the 5 genera *Smiliogaster* Blkr, *Culter* Basil., *Laubuca* Blkr, *Chela* Buch. and *Macrochirichthys* Blkr, which could further be sharply characterized by the presence or absence of a serrated or unserrated dorsal spine, the placement of the dorsal fin above or in front of the anal fin, the structure of the jaws, the squamation, the shape of the lateral line and the ventral outline etc.

When searching for constant characters to split the Amblygastris in subgroups one encounters numerous difficulties.

Those characters cannot be found in the dentition, unless one would like to sever all natural relationships entirely.

Thus for instance one finds three rows of teeth in *Barbus*, *Rohtee*, *Catla*, *Luciosoma*, *Opsarius*, *Rasborichthys*, etc.; two rows of teeth in *Meda*, *Aspius*, *Gobio*, *Argyreus*, *Phoxinus*, etc.; one rowed teeth in *Tinca*, *Aulopyge*, *Acanthobrama*, *Rhodeus*, *Esomus*, etc., genera of which the natural classification is entirely different.

In the barbels one finds these characters still less and considered on its own these are even not sufficient in the determination of the genera, as in various natural genera, like *Cyclocheilichthys*, *Hypselobarbus*, *Systemus*, *Luciosoma*, 263 four, two, or no barbels are encountered in species of the same genus.

The same difficulties arise, when one tries the classification on other characters, e.g. the length of the dorsal or anal fin, the squamation, the position and size of the mouth opening, the size of the gill opening, the shape of the snout, the shape of the lateral line, etc.

Other characters which might be used with profit, like the peculiarities of jaw and lip structures, the shape of the anterior suborbital bones, the scaly dorsal fin sheath, etc., are by far not known of all genera, and therefore when one tries to apply these

characters one soon encounters difficulties which cannot be lifted.

It appeared to me that the nature of the posterior undivided dorsal fin ray will be most useful for a general division of the Amblygastri.

I have split them on that basis in Acanthophori, and Anacanthophori. The presence or absence of a dorsal spine agrees most, although not totally, with the other natural relationships, and has the practical benefit of an easy recognition. However, here also transitions are found, although, as far as is known to me, only in the genera *Labeobarbus* and *Systemus*, where the dorsal spine in some species is so little developed, that its bony nature can be doubted.

To the genera that possess a dorsal spine belong *Racoma* McCl., *Schizothorax* Heck., *Balantiocheilos* Blkr., *Amblyrhynchichthys* Blkr., *Albulichthys* Blkr., *Hampala* V. Hass., *Hypselobarbus* Blkr., *Systemus* McCl., *Cyclocheilichthys* Blkr., *Barbus* Cuv., *Labeobarbus* Rüpp., *Hemibarbus* Blkr., *Pseudophoxinus* Blkr., *Rohteichthys* Blkr., *Rohtee* Syk., *Acanthobrama* Heck., *Rhodeus* Ag., *Chanodichthys* Blkr., *Pseudoculter* Blkr., *Hemiculter* Blkr., *Aulopyge* Heck. and *Meda* Gir., both last ones are very peculiar because of their scaleless body.

I have arranged those genera further by the being scaled or not of the body, the shape of the anal scales, of the lips, gill opening, snout, gape, interorbital bones, dorsal fin and anal fin, the being serrated or not of the dorsal fin spine, the existing or not of eye membrane, the arrangement and special shapes of the teeth etc.

The genera of the Anacanthonoti are remarkably more numerous than those of the Acanthophori.

Two of those genera are remarkable because of the presence of hexagonal cells or wart-like elevations on the jaws proper with at the same time scaleless chest areas. These genera are *Cherus* Swains. and *Plargyrus* Raf.

Another row of genera is remarkable by flat, more or less ²⁶⁴ spoon shaped lower jaws. Moreover, they are also related by general habitus, flat snout, more or less posterior eyes and their dentition. To these belong *Catla* Val., *Thynnichthys* Blkr., *Hypophthalmichthys* Blkr. and *Amblypharyngodon* Blkr. (*Mola* Heck.).

A third row of genera of the Anacanthonoti is recognizable by a slender body with a low back and a dorsal fin that is placed above the anal fin. *Luciosoma* Blkr., *Perilampus* McCl. and *Esomus* Sws. belong to these. The genus *Devario* Heck., is also related to this series and is intermediate between it and the series of *Catla*.

A fourth natural series can be composed from a number of genera which have in common with each other a delicate scaled body, with a fleshy snout and a short dorsal fin that is placed before the anal fin, and an equally short anal fin. They all have also only one or two rows of teeth. In this series I place *Tinca* Cuv., *Argyreus* Heck., *Chrosomus* Raf., *Tiaroga* Gir., *Phoxinus* Ag. and *Phoxinellus* Heck., the last genus again is very remarkable by the absence of scales except only on the lateral line.

To this series naturally some genera with large scales link up like *Sarcocheilichthys* Blkr., *Gobio* Cuv. and *Cirrhina* Cuv.

In still another series head and snout are depressed, the body is slender, the back low and the dorsal fin short and placed before the anal fin. My genera *Leptobarbus*, *Gnathopogon*, *Pseudorasbora* and *Rasborichthys* can be reckoned among them.

The remaining genera of the Anacanthonoti still can be placed in two other less sharply separated groups.

Those of the first group have in common with each other a wide gape which extends till below the eyes, a more or less multi-rayed anal fin, a much curved lateral line and an acute snout with a terminal mouth opening. I am of the opinion that I have to place herein *Elopichthys* Blkr, *Opsarius* McCl. and the extremely closely related genera *Aspius* Ag., *Gila* Baird Gir. and *Ptychocheilus* Ag.

In the genera of the second group the gape is less large, sometimes even small, and the snout more convex and fleshy. They are in greater or lesser measure related to *Aspius* and a sharp demarcation line cannot be drawn.

It is especially in both these last groups, that a sharp definition of the genera is difficult and just like *Gila* and *Ptychocheilus* need to be more closely compared to *Aspius*, it is necessary, that the borders of the genera *Abramis* Cuv., *Luxilus* Raf., *Alburnus* Heck., *Hybopsis* Ag., *Leucosomus* Heck., *Ceratichthys* Baird, *Semotilus* Raf., *Leuciscus* Klein, *Scardinius* Bp., *Alburnops* Gir., *Cyprinella* Gir. and *Cocoma* Gir., hereafter still referred to as genera are more sharply defined than has been done till now, in order to be able to definitively regard them as natural genera, and this notwithstanding the fact that various other ones of the recently erected genera have already been reduced to the ones mentioned above.

265 Below I have tried to give a diagnostic review of all the genera of Barbines accepted in this work.

With regard to the geographic distribution of the genera of Barbines, the present state of science allows the following conclusions.

Proper to North America are *Meda*, *Luxilus*, *Leucosomus*, *Alburnops*, *Cyprinella*, *Plargyrus*, *Semotilus*, *Ptychocheilus*, *Gila*, *Hybopsis*, *Ceratichthys*, *Tiaroga*, *Argyreus* and *Chrosomus*.

Common to both hemispheres are only *Leuciscus*, *Alburnus* and *Gobio*, so that all other genera are proper to the Old world.

Of those genera exclusive for Europe are: *Aulopyge*, *Scardinius*, *Phoxinus* and *Phoxinellus*.

From Africa no genus is known, which not at the same time occurs in Europe or Asia, unless maybe the genus *Opsardinius* Peters that is completely unknown to me.

Europe, Africa and Asia have in common: *Barbus*, *Labeobarbus* and *Alburnus*.

Europe has in common with Asia only: *Rhodeus*, *Abramis*, *Aspius*, *Tinca* and *Chela*.

Asia has in common with Africa, but not with Europe: *Systemus* and *Opsarius*.

All remaining genera are proper to Asia, but many occur only on the Asiatic islands, in Japan and the Indian archipelago.

The Asian continent has in common with the Japanese islands only the genus *Opsarius*, and with the Sunda Islands: *Labeobarbus*, *Systemus*, *Balantiocheilus*, *Amblyrhynchichthys*, *Hampala*, *Thynnichthys*, *Rasbora*, *Luciosoma*, *Chela* and *Macrochirichthys*.

Proper to the Japanese islands are: *Hemibarbus*, *Sarcocheilichthys*, *Pseudorasbora* and *Gnathopogon*.

At last to the Sunda Islands are proper: *Cyclochelichthys*, *Albulichthys*, *Rotheichthys*, *Leptobarbus* and *Rasborichthys*.

The genera of the Barbines can be reviewed as follows:

1. *Amblygastris*. Belly not sharp anterior to fins.
 1. *Acanthophori*. Dorsal fin armed with a spine.
 a. Body scaled.

Ô Anal scales larger than the other, small scales. Dorsal spine dentate. Nasal and upper jaw barbels present.
 O Lower lip lobed.

Racoma McCl.

O' Lower lip not lobed. Teeth spoon-shaped 2.3.5/5.3.2.

Schizothorax Heck.

266 Ô' Anal scales not larger than other scales

Ó Gill opening vertical, rather narrow, ending below gill cover. Dorsal spine serrated. No barbels. Lower lip hanging from the total margin of the jaw, forming a sac which is open only at the back. Teeth hooked/spoon-shaped 2.3.5/5.3.2. Scales large. Back angular.

Balantiocheilos Blkr.

Ó' Gill opening broad, ending below the preoperculum, or under the eye.

- † Eyes largely covered by palpebral membrane. Dorsal spine serrated. No barbels. Scales large. Back angular. Lower jaw with a hooked tubercle at the symphysis.
 O Snout truncate. Supermaxillary bones reaching the tip of the snout, and there hiding the back-folded intermaxillary bones. Anterior suborbital bone shoe-shaped. Caudal fin scaled only at the base. Teeth aggregated wedge-shaped 2.3.4/4.3.2.

Amblyrhynchichthys Blkr.

O' Snout convex, not truncate. Supermaxillary bones not reaching the tip of the snout. Anterior suborbital bone pentagonal. Caudal fin scaled for total basal half. Teeth incisors, lancet-like 2.3.4/4.3.2.

Albulichthys Blkr.

†' Eyes not covered

- O Anal fin with few rays.
 aa Gape large, oblique. Upper jaw and gill opening ending below the eye. Barbels 2, upper jaw barbels. Dorsal spine dentate. Scales large. Teeth spoon-shaped 1.3.5/5.3.1.

Hampala V. Hass.

bb Gape small or medium-sized, ending anterior to the eye.

- † Snout and cheeks covered with tubercles or warts. Snout conical. Dorsal spine thin, toothless. Barbels 4, or 2 or none.

Hypselobarbus Blkr.

(subgenus *Hypselobarbus*, *Gonoprokopterus* and *Tambra* Blkr.)

†' Snout and cheeks without tubercles or warts.

o Scales large or medium-sized.

- * Anterior suborbital bone pentagonal, pointing upward with the sharp tip. Postlabial groove parallel to the margin of the mouth on both sides, separated from the groove on the opposite side by the isthmus. Mouth anterior or slightly anterior. Scales ²⁶⁷ large. Barbels 4, or 2, or none. Dorsal spine dentate or toothless. Teeth not aggregated, in three rows, 8 to 10.

Systemus McCl. (subg. *Barbodes*, *Capoëta* and *Systemus* Blkr.)

- *' Anterior suborbital bone triangular, pointing forward with the sharp tip, or elongate. Single postlabial groove parallel to the margin of the mouth.
- X Dorsal spine dentate. Snout conical. Teeth spoon-shaped or slightly spoon-shaped, 7 to 10, in three rows.
 - I Dorsal fin with a scaled sheath at the base. Back elevated, angular. Cheeks with numerous parallel transverse stripes. V. 2/9.

Cyclocheilichthys Blkr. (subg. *Cyclocheilichthys*, *Siaja* and *Anematchthys* Blkr.)

I' Dorsal fin not scaled at the base. Back low. Barbels 4.

Barbus Cuv.

- X' Dorsal spine without teeth. Scales large. V. 2/8.
 - I Barbels 4. Teeth spoon-shaped or slightly spoon-shaped, 7 to 10 in three rows.

Labeobarbus Rüpp.

I' Barbels 2, upper jaw barbels only. Teeth pointed, in one row 4/4.

Hemibarbus Blkr.

- Λ' Scales small. No barbels.
 - * Dorsal spine without teeth. Dorsal fin scaleless at the base. Teeth with a rod-like neck 5/4.

Pseudophoxinus Blkr.

- *' Dorsal spine dentate. Gill opening ending below the eye. Dorsal fin scaled. Teeth hooked-spoon-shaped 2.3.5/5.3.2.

Rohteichthys Blkr.

- O' Anal fin elongate or slightly elongate, with several to many rays. No barbels. Mouth anterior or slightly anterior.
 - aa Dorsal spine dentate. Scales small. Teeth spoon-shaped 2.3.5/5.3.2.

Rohtee Syk. = *Osteobrama* Heck.

- + Body oblong. Snout convex. Teeth 5/5.
- ²⁶⁸ Λ Lateral line ending at the base of the caudal fin. Scales small or medium-sized. Teeth with a rod-like neck.

Acanthobrama Heck.

- Λ' Lateral line only visible on the anterior part of the body. Scales large.
Teeth knife-like.

Rhodeus Ag.

- + Body slightly elongate. Snout very acute. Scales medium-sized.
Lateral line slightly curved.
Λ Lower jaw not prominent. Back angular. Snout prolonged.

Chanodichthys Blkr.

- Λ' Lower jaw prominent. Back low. Snout short.

Pseudoculter Blkr.

- +'' Body elongate. Snout short. Scales medium-sized or small. Lateral line strongly curved.

Hemiculter Blkr.

b. Body scaleless.

- Ô Dorsal spine dentate. Gape small. Nostrils simple on both sides. Barbels 4.
Teeth lancet-like 4/4.

Aulopyge Heck.

- Ô Dorsal spine without teeth. Gape ending below the eye. No barbels.
Teeth prehensile 1.4/4.1.

Meda Gir.*Anacanthonoti* No dorsal spine. Body scaled.

- a Jaws tumid, porous-verrucose or lacunose. Thoraco-gular region scaleless. Scales large.
No barbels.
Ô Humeral bones strongly developed, bare. Dorsal fin starting behind ventral fins.
Teeth hooked with a rod-like neck 4.5/5.4.

Chedrus Swns. = partly *Pachystomus* Heck.

- Ô Humeral bones normal. Dorsal fin starting above ventral fins. Teeth compressed,
prehensile 2.4/4.2.

269 *Plargyrus* Raf. = *Hypsolepis* Baird

b Jaws covered with smooth skin.

- Ô Lower jaw depressed, spoon-shaped. No barbels. Snout depressed. Mouth anterior.
Teeth aggregated or molar, in three rows.
Ô Dorsal fin with many rays, anal fin with few rays.
Scales large. Single postlabial groove. Lower lip hanging from the total margin of
the jaw. Teeth aggregated 2.4.5/5.4.2.

Catla Val. = partly *Gibelion* Heck.

- Ô¹ Dorsal fin with few rays. Scales small. Eyes posterior or inferior.
 † Anal fin with many rays, longer than dorsal fin. Gill cover ray-like rugose.

Hypophthalmichthys Blkr.

- †' Anal fin with few rays, shorter than dorsal fin. Gill cover not rugose.
 O Dorsal fin starting above or anterior to ventral fins. Teeth aggregated, the chewing surface oblique truncate, flat 2.4.5/5.4.2.

Thynnichthys Blkr.

- O' Dorsal fin starting behind ventral fins. Teeth molar, the chewing surface oblong-rounded and transversely rugose 1.2.3/3.2.1.

Amblypharyngodon Blkr. = *Mola* Heck.

- Ô² Dorsal fin and anal fin elongate, with many rays, dorsal fin largely opposite anal fin. No barbels.
 Ó Scales large. Body oblong, elevated. Lateral line strongly curved downward, close to convex ventral line.

Devario Heck.

- Ô³ Dorsal fin completely or partly opposite anal fin. Back low. Scales large. Eyes placed behind or inside the tip of the snout.
 Ó Gape broad, oblique, ending below the eye. Dorsal and anal fin with few rays, short, pectoral fins elongate. Four barbels, fleshy barbels or no barbels. Teeth slightly spoon-shaped or predatory 2.4.4/4.4.2 or 2.4.5/5.4.2.

Luciosoma Blkr. (subg. *Luciosoma* and *Trinematichthys* Blkr.)

- Ó' Gape small, ending anterior to the eye. Four barbels, upper jaw barbels, rigid, setaceous.
 † Lateral line strongly curved, close to the convex ventral line. Dorsal and anal fins with several to many rays, pectoral fins not elongate.

270 *Perilampus* McCl.

- †' No lateral line. Nasal barbels close to upper jaw barbels. Dorsal and anal fin with few rays, short, pectoral fins elongate. Teeth acute, hardly curved 5/5.

Esomus Swns. = *Nuria* Val.

- Ô⁴ Scales small. Snout fleshy. Dorsal and anal fins with few rays, dorsal fin placed completely anterior to anal fin.
 Ó Barbels 2, upper jaw barbels.
 † Mouth terminal. Body oblong, compressed with an elevated, angular back. Teeth clavate 4/5.

Tinca Rond. Cuv.

- † Mouth inferior. Body elongate, fusiform with a low back. Predatory teeth, in one or two rows 1.4/4.2 or 2.4/4.2, or 4/4.

Argyreus Heck. = *Rhinichthys* Ag. = *Agosia* Gir.

Ó No barbels. Body elongate, fusiform.

- † Body scaled all over. Lateral line hardly curved. Mouth terminal.
 O Teeth lightly hooked, with a thin chewing surface 5/5. Scales membranous.

Chrosomus Raf.

O' Predatory teeth without chewing surface 1.3/3.1. Isthmus very wide.

Tiaroga Gir.

O'' Predatory teeth 2.4/4.2. or 2.5/4.2. Snout obtuse, convex. Mouth terminal.

Phoxinus Rond. Ag.

- † Body scaled only on the anterior part of the lateral line, with scales in one row.
 O Teeth with a rod-like neck 5/4. Snout obtuse, convex. Mouth terminal.

Phoxinellus Heck.

- Ô⁵ Scales large. Snout fleshy. Dorsal and anal fins short, dorsal fin starting anterior to ventral fins and ending far anterior to anal fin. Gape small.
 O Barbels 2, nasal barbels only. Snout not prolonged.

Cirrhina Cuv.

Ó Barbels 2, upper jaw barbels only. Snout prolonged.
 Predatory teeth. 2.5/5.2. or 2.4/4.1 or 3.5/5.2.

271 *Gobio* Cuv.

O'' No barbels. Snout very fleshy, elevated. Lateral line nearly straight. Dorsal fin starting anterior to ventral fins.

Sarcocheilichthys Blkr.

- Ô⁶ Snout acute, depressed. Body elongate with a low back. Dorsal fin with few rays, placed anterior to anal fin.
 Ó Dorsal fin starting above or hardly anterior to ventral fins. Scales large. Anal fin with few rays.
 † Barbels 4, nasal and upper jaw barbels. Lips thin. Gape medium-sized, oblique. Lower jaw without tubercle at the symphysis. Lateral line curved. Teeth spoon-shaped, pluricrenulate on chewing surface 2.3.5/5.3.2.

Leptobarbus Blkr.

†' Barbels 2, upper jaw barbels only. Gape medium-sized, oblique. Lateral line nearly straight. Teeth?

Gnathopogon Blkr.

†'' No barbels. Lips very fleshy. Mouth superior, with a very short, vertical gape. Lateral line nearly straight. Teeth hooked-compressed 5/5.

Pseudorasbora Blkr.

Ó' Dorsal fin starting behind ventral fins. No barbels. Mouth anterior, with a medium-sized gape. Teeth in two or three rows.

† Anal fin with few rays. Scales large. Upper jaw at the symphysis with an incision taking in the inframaxillary symphyseal tubercle. Eyes not covered by skin. Lateral line close to the ventral line. Teeth slightly spoon-shaped, hooked.

Rasbora Blkr.

†' Anal fin with many rays, much longer than dorsal fin. Scales medium-sized. Upper jaw without incision at the symphysis. Eyes largely covered by a palpebral membrane. Lateral line hardly curved. Teeth knife-like.

Rasborigichthys Blkr.

Ô' Gape large, oblique, ending below the eye. Anal fin with several rays. Lateral line strongly curved. Snout acute. Mouth anterior.

Ó Nasal bones strongly developed. Lower jaw at the symphysis with a tubercle which is hooked at the tip. Swimbladder trilobed. Body elongate. Scales small or medium-sized. No barbels. Snout prolonged.

272 *Elopichthys* Blkr.

Ó'' Nasal bones normal.

† Pharyngeal teeth in two rows, predatory. No barbels. Dorsal fin starting behind ventral fins.

Ó Upper jaw emarginate at the symphysis, lower jaw prominent, with a tubercle at the symphysis entering the intermaxillary incision. Body elongate. Tail thin. Scales large or medium-sized. Teeth cylindrical.

Aspius Ag.

Ó' Scales small or medium-sized, unequal. Body elongate with a thin tail. Teeth compressed, lower jaw hooked?

Gila Baird Gir. = *Tigoma* Gir. = *Cheonda* Gir.

Ó'' Scales medium-sized, unequal. Lips fleshy. Body oblong or elongate. Tail robust. Teeth without chewing surface. Isthmus medium-sized.

Ptychocheilos Ag. = *Clinostomus* Gir.

- † Pharyngeal teeth predatory, in three rows 2.3.5/5.3.2 or 2.3.4/4.3.2. Belly convex, not lower than back. Barbels 4, or 2, or none. Scales large or medium-sized. Lateral line strongly curved.

Opsarius McCl. (subg. *Shacra*, *Bendilisis*, *Opsarius* Blkr).

- Ô⁸ Snout convex, not depressed. Scales large or medium-sized. Dorsal fin short.
 Ó Anal fin with many rays, elongate, much longer than dorsal fin; dorsal fin starting behind ventral fins. Scales large. No barbels. Body strongly elevated. Teeth in one or two rows.
 O Lateral line slightly curved. Belly behind ventral fins with a scaleless ridge.

Abramis Cuv. = *Blicca* Heck. = *Ballerus* Heck. = *Bliccopsis* Heck.

- O' Lateral line strongly curved.

Luxilus Raf. = *Stilbe* De Kay = *Richardsonius* Gir.

- Ó' Anal fin with many rays, longer than dorsal fin. Body slightly elongate, back not elevated. Upper jaw at the symphysis taking in tubercle of lower jaw in incision. Gape strongly oblique. Dorsal fin starting behind ventral fins. Belly ridged behind ventral fins. Lateral line strongly curved.

273 *Alburnus* Rond., Heck, = *Alburnelles* Gir. = *Leucaspius* Heck., Kner.

- Ó'' Anal fin not elongate, shorter to hardly longer than dorsal fin.
 † Snout strongly convex, slightly truncate, protruding anterior to the mouth. Dorsal fin starting above ventral fins. Scales large. Two barbels, upper jaw barbels or none. Lateral line nearly straight.

Hybopsis Ag. (Subg. *Hybopsis* Ag., *Hudsonius* Gir.)

- † Snout not truncate, not protruding anterior to mouth. Dorsal fin ending anterior to or above begin of anal fin.
 O Two barbels, upper jaw barbels. Scales large. Body elongate or slightly elongate.
 aa Gape rather large. Lateral line curved. Teeth in two rows.

Leucosomus Heck. = *Cheilonemus* Baird = *Pogonichthys* Gir. = *Nocomis* Gir.

- bb Gape medium-sized. Lateral line nearly straight. Teeth in one row.

Ceraticthys Baird.

- O' No barbels. Scales large or medium-sized. Teeth in one or two rows. Body oblong or elongate.
 aa Gape rather large. Dorsal fin starting behind ventral fins. Eyes superior. Cheeks elevated. Lateral line slightly curved.

Semotilus Raf. (gen. *Leucosomus* Heck. strongly related)

- bb Gape medium-sized or small. Body oblong or elongate.
 † Dorsal fin starting above or hardly behind ventral fins. Lateral line slightly to strongly curved. Scales large or medium-sized.

Leuciscus Rond., Klein = *Leucos* Heck. = *Squalius* Bp. = *Telestes* Bp. = *Telestes* Bp.

†' Body oblong. Scales large. Lateral line moderately curved. Dorsal fin starting behind ventral fins.

Scardinius Bp. = *Idus* Heck.

†'' Scales large, deciduous. Snout thickened, protruding anterior to mouth. Dorsal fins starting above ventral fins. Lateral line nearly straight.

Alburnops Gir.

†''' Scales high, short. Gape short. Lateral line moderately curved. Dorsal fin starting above or hardly behind ventral fins.

274 *Cyprinella* Gir.

†'''' Scales medium-sized. Jaws equal. Lateral line slightly curved. Dorsal fin starting a little behind ventral fins. Isthmus rather wide. Teeth 4/4.

Codoma Gir.

II *Oxygastri*. Belly sharp anterior to ventral fins. Body scaled. Fins: anal fin elongate, dorsal fin short. No barbels.

1. Dorsal fin armed with a spine. Pectoral fins medium-sized.

a. Dorsal spine serrated. Body oblong, with angular back and snout. Scales small. Lateral line nearly straight. Teeth compressed, with an oblique, truncate, plurituberculate chewing surface 2.2.4/4.2.2.

Smiliogaster Blkr.

b. Dorsal spine toothless. Body elongate with a low back. Dorsal fin placed between ventral and anal fins. Scales medium-sized or small. Lateral line strongly curved. Swimbladder three-lobed.

Culter Basil.

2. Dorsal fin without spine, completely or partly opposite anal fin. Pectoral fins elongate. Gape strongly oblique.

a. Outline of throat and belly convex in a regular manner. Lateral line strongly curved.

Ô Body oblong. Gape short. Upper jaw not emarginate at symphysis, lower jaw without tubercle at the symphysis. Scales large, nearly equal, scales on nape withdrawn to far behind the eye. Teeth predatory. 2.4.5/5.4.2.

Laubuca Blkr.

Ô' Body oblong or elongate. Scales large or small, unequal, scales on nape starting above the eye. Upper jaw with an incision at the symphysis, taking in the tubercle of the lower jaw. Predatory teeth, in two or three rows 2.4.5/5.4.2. or 2.5/5.2 or 4.4/4.4.

Chela Buch = *Pelecus* Ag.

- b. Outline of throat and belly behind axilla strongly emarginate.
Lateral line slightly curved.
Ô Body elongate. Scales small. Gape large, nearly vertical. Teeth predatory,
slightly spoon-shaped 4.4/4.4. Pectoral fins elongate.

Macrochirichthys Blkr.**275** *Barbini species known up till now.*

- Racoma labiata McCl. Afghanistan.
" brevis McCl. Afghanistan.
" Edeniana Blkr. = Schizothorax Edeniana McCl. Afghanistan.
" Ritchieana Blkr. = Schizothorax Ritchieana McCl. Afghanistan.
Schizothorax esocinus Heck. Afghan., Cashmir.
" micropogon Heck. Cashmir.
" planifrons Heck. Cashmir.
" Hügelii Heck. Cashmir.
" intermedius McCl. Afghanistan.
" ? barbatus Blkr. = Schizothorax barbatus McCl. Afghanistan.
" ? gobioides Blkr. = Racoma gobioides McCl. Afghan. (Bamean riv.).
* Balantiocheilos melanopterus Blkr. = Barbus melanopterus Blkr. =
Systemus melanopterus Blkr. Sumatra, Borneo, Siam.
* Amblyrhynchichthys truncatus Blkr. = Barbus truncatus Blkr. =
Systemus truncatus Blkr. Sumatra, Borneo, Siam.
* Albulichthys albuloides Blkr. = Systemus albuloides Blkr. Sumatra, Borneo, Siam.
* Hampala ampalong Blkr. = Capoeta ampalong Blkr. Borneo, Sumatra.
* " macrolepidota V. Hass. = Capoeta macrolepidota Val. =
Scaphiodon macrolepidotus Heck. =
Systemus macrolepidotus Heck. Jav., Sum., Born., Pin., Ten.
Hypselobarbus (Hypselobarbus) mussullah Blkr. =
Barbus mussullah Syk. Deccan.
" (" nancar Blkr. = Cyprinus nancar Buch. =
Gibelion nancar Heck. Bengal.
" (Gonoproktopterus) kolus Blkr. = Barbus kolus Syk. =
Systemus kolus Heck. =
Capoëta kolus Blkr. Deccan.
" (Tambra) abramioides Heck. =
Leuciscus abramioides Blkr. Deccan.
Systemus ? (Barbodes) surkis Blkr. = Barbus surkis Rüpp. Nile.
" ? (" perince Blkr. = Barbus perince Rüpp. Nile.
" ? (" intermedius Blkr. = Barb. intermedius Rüpp. Nile.
" ? (" bynni Blkr. = Cyprinus bynni Forsk. =
Cyprinus lepidotus Geoffr. =
Barbus bynni Val. Nile.
" ? (" gobionides Blkr. = Barbus gobionides Val.
(or Barbus pallidus Smith ??) =
Barbus gobioides Heck. Cape of Good Hope.
276 Systemus (Barbodes) pallidus Blkr. = Barbus
(Pseudobarbus pallidus Smith. Cape of Good Hope.
" (" Burchelli Blkr. = Barbus (Pseudobarbus)
Burchelli Smith. Cape of Good Hope.
" (" callensis Blkr. = Barbus callensis Val. Algeria.

- " (") setivimensis Blkr. = *Barbus setivimensis* Val. =
Barbus leptopogon Ag.? Algeria.
- " (") labecula Blkr. = *Barbus labecula* Val. Palestine.
- " (") lacerta Blkr. = *Barbus lacerta* Heck. Syria.
- " (") perniciosus Blkr. = *Barbus perniciosus* Heck. Syria.
- " (") pectoralis Blkr. = *Barbus pectoralis* Heck. Syria.
- " (") chalybatus Blkr. = *Cyprinus calybatus* Pall. =
Barbus chlybatus Heck. Caspian Sea.
- " (") arabicus Blkr. = *Cyprinus arabicus* Ehr. =
Barbus arabicus Val. Arabia.
- " (") kersin Blkr. = *Barbus kersin* Heck. Syria.
- " (") rajanorum Blkr. = *Barbus rajanorum* Heck. Syria.
- " (") Duvaucelii Blkr. = *Barbus Duvaucelii* Val. Bengal.
- " (") capito Blkr. = *Cyprinus capito* Pall. =
Barbus capito Val. Georgia.
- " (") clavatus Blkr. = *Barbus clavatus* McCl. =
Cyprinus chagunio Buch. sec. McCl. (1845) or
rather a *Cyclocheilichthys* species? Bengal.
- " (") spilopholus Blkr. = *Barbus spilopholus* McCl. =
Cyprinus chagunio Buch. sec. McCl. (1839);
a *Cyclocheilichthys*? or a proper genus? Bengal.
- " (") deliciosus Blkr. = *Barbus deliciosus* McCl. Assam.
- " (") kadoon Blkr. = Russ. No. 260. Hindustan.
- " (") gibbosus Blkr. = *Barbus gibbosus* Val. Hindustan.
- " (") subnasutus Blkr. = *Barbus subnasutus* Val. Hindustan.
- " (") kakus Blkr. = Kakoo or Karoo Russ. No. 205 =
Barbus kakus Val. Hindustan.
- " (") chrysopoma Blkr. = *Barbus chrysopoma* Val. Hindustan.
- " (") roseipinnis Blkr. = *Barbus roseipinnis* Val. Hindustan.
- " (") Polydori Blkr. = *Barbus Polydori* Val. Hindustan.
- " (") sarana Blkr. = *Barbus sarana* Val. Hindustan.
- " (") kunnamo Blkr. = Kunnamo Russ. No. 204 =
Cyprinus sarana Buch. = *Barbus sarana* Val.
in part = *Barbus kunnamvo* Heck. Hindustan.
- 277 " (") immaculatus Blkr. = *Systemus immaculatus*
McCl. = *Barbus immaculatus* Heck. =
Cyprinus MacClellandi Val. =
Barbus MacClellandi Val. Assam.
- " (") gardonides Blkr. = *Barbus gardonides* Val. Bengal.
- " (") sada Blkr. = *Cyprinus sada* Buch. =
Gonorrhynchus fimbriatus McCl. =
Barbus sada Val. = Rohita? fimbriata Heck. ... Bengal.
- " (") rododactylus Blkr. =
Barbus rododactylus McCl. Assam.
- " (") micropogon Blkr. = *Barbus micropogon* Val. . Hindust. (Mysore).
- " (") deauratus Blkr. = *Barbus deauratus* Val. Cochinchina.
- " (") carassioides Blkr. = *Barbus carassioides* Heck.
(description unknown to me). Borneo.
- " (") balleroides Blkr. = *Barbus balleroides* Val. Sunda Archip. ?
- " (") Schwanefeldi Blkr. =
Barbus Schwanefeldii Blkr. Sumatra, Borneo.
- " (") belinka Blkr. Sumatra.

- " (") amblycephalus Blkr. =
Barbus amblycephalus Blkr. Borneo.
- " (") erythropterus Blkr. =
Barbus erythropterus Blkr. Java, Borneo.
- " (") bramoides Blkr. = Barbus bramoides Val. =
Barbus bramoides Val. = Barbus wadon Blkr. Java.
- " (") javanicus Blkr. = Barbus javanicus Blkr. Java, Sumatra.
- " (") koilometopon Blkr. =
Barbus koilometopon Blkr. Java.
- " (") gonionotus Blkr. = Barbus gonionotus Blkr. Java.
- " (") Huguenini Blkr. = Barbus Huguenini Blkr. Sumatra.
- " (") hypselonotus Blkr. = Barbus hypselonotus
V. Hass. = Barbus hypocoenatus Bull. Féruss.
1824 (Typographical error) Java.
- " (") macrophthalmus Blkr. =
Barb. macrophthalm. Blkr. Java.
- " (") platysoma Blkr. = Barbus platysoma Blkr. Java.
- " (") rubripinna Blkr. = Barbus rubripinna V. Hass.
= Barbus rubripinnis Val. = Barbus orphoides
Val. = Barbus gardonides Val. (specimen from
Java) = Barbus sarananella Blkr. Java, Siam.
- " (") bunter Blkr. = Barbus bunter Blkr. Java.
- " (") tetrazona Blkr. = Barbus tetrazona Blkr. Borneo.
- " (") lateristriga Blkr. = Barbus lateristriga Val. Jav., Sum., Bom., Bank., Bil.
- " (") fasciatus Blkr. = Barbus fasciatus Blkr. Sumatra, Banka, Borneo.
- " (") obtusirostris Blkr. =
Barbusobtusirostris V. Hass. Java.
- " (") maculatus Blkr. = Barbus maculatus V. Hass. =
Barbus binotatus Kuhl. = Barbus oresigenes
Blkr. 278 = Barbus blitonensis Blkr. = Barbus
kusanensis Blkr. = Barbus polyspilos Blkr. Jav., Bali, Sum., Bilit., Bank.,
Bint., Nias, Borneo.
- * " (") goniosoma Blkr. Sumatra.
- " (") marginatus Blkr. = Barbus marginatus Val. Java, Sumatra.
- " (Capoëta) beso Blkr. = Varicorhinus beso Rüpp. = Systemus
beso Heck. = Labeo varicorhinus Val. Nile.
- " (") luteus Blkr. = Systemus luteus Heck. Syria.
- " (") albus Blkr. = Systemus albus Heck. Syria.
- " (") amphibijs Blkr. = Capoëta amphibia Val. =
Scaphiodon amphibia Heck. Hindustan.
- " (") chola Blkr. = Cyprinus chola Buch. = Systemus
chola McCl. = Capoëta chola Blkr. Bengal.
- " (") chrysosomus Blkr. =
Systemus chrysosomus McCl. Bengal.
- " (") padangensis Blkr. =
Capoëta padangensis Blkr. Sumatra.
- " (") sumatranus Blkr. = Capoëta tetrazona Blkr. Sumatra.
- " (") brevis Blkr. = Capoëta brevis Blkr. Java.
- " (") leiacanthus Blkr. = Capoëta javanica Blkr. Java.
- " (") oligolepis Blkr. = Capoëta oligolepis Blkr. Sumatra.
- " (Systemus) chrysopterus McCl. Bengal.
- " (") guganio Blkr. = Cyprinus guganio Buch. Bengal.
- " (") tictis Blkr. = Cyprinus tictis Buch. Bengal.

- " (") puntio Blkr. = *Cyprinus puntio* Buch. Bengal.
- " (") Duvaucelii Blkr. = *Leuciscus Duvaucelii* Val.,
Poiss. fig. 491 p. 71 (not pag. 58 which species
is quite different.) Bengal.
- " (") terio Val. = *Cyprinus terio* Buch. =
Cyprinus teripungti Buch. =
Systemus gibbosus McCl. Bengal.
- " (") sophore McCl. = *Cyprinus sophore* Buch. =
Barbus sophore Val. Bengal.
- " (") phutunio Val. = *Cyprinus phutunio* Buch. =
Cyprinus phutunipungto Buch. =
Systemus leptosomus McCl. Bengal.
- " (") siamensis Casteln. Mss. Siam.
- " (") gelius McCl. = *Cyprinus gelius* Buch. =
Cyprinus canius Buch. = *Cyprinus ranipungti*
Buch. = *Systemus canius* McCl. Bengal.
- " (") ticto McCl. = *Cyprinus ticto* Buch. = *Cyprinus*
bimaculatus Buch. Ap. McCl. = Rohtee ticto
Syk. = *Systemus bimaculatus* McCl. Bengal, Deccan
- 279 * *Systemus* (*Systemus*) *cosuatis* Blkr. = *Cyprinus cosuatis* Buch. =
Cyprinus coswati Buch. = *Systemus malacopterus*
McCl. = *Leuciscus cosuatis* Val. Bengal.
- " (") *conchonius* Val. = *Cyprinus conchonius*
Buch. Belgal.
- " (") *pyrrhopterus* McCl. Assam.
- " (") *titius* Val. = *Cyprinus titius* Buch. =
Systemus tetrapagus McCl. Assam.
- " (") *stigma* Blkr. = *Leuciscus stigma* Val. Mysore.
- " (") *sulphureus* Blkr. = *Leuciscus sulphureus* Val. Mysore.
- " (") *filamentosus* Blkr. =
Leuciscus filamentosus Val. Hindustan.
- " (") *tripunctatus* Blkr. =
Systemus tripunctatus Jerdon. Hindustan.
- " (") *pangut* Heck. = Rohtee pangut Syk. Deccan.
- " (") *mahecola* Blkr. = *Leuciscus mahecola* Val. East Hindustan.
- " (") *presbyter* Blkr. = *Leuciscus presbyter* Val. East Hindustan.
- " (") *thermalis* Blkr. = *Leuciscus thermalis* Val. Ceylon.
- " (") *binotatus* Blkr. = *Leuciscus binotatus* Blyth. .. Ceylon.
- * " (") *Waandersi* Blkr. Java.
- * " (") *bulu* Blkr. Sumatra, Borneo, Siam.
- * " (") *lawak* Blkr. Java.
- * *Cyclocheilichthys* (*Cyclocheilichthys*) *armatus* Blkr. = *Barbus armatus* Val. =
Barbus Valenciennesi Blkr. Java, Sumatra, Siam?
- * " (") *enoplos* Blkr. =
Barbus enoplos Blkr. Java.
- * " (") *macracanthus* Blkr. = *Barbus*
macracanthus Blkr. Sumatra.
- * " (") *repasson* Blkr. =
Barbus repasson Blkr. Sumatra.
- * " (Siaja) *Deventeri* Blkr. = *Capoëta Deventeri* Blkr. ... Java.
- * " (") *heteronema* Blkr. =
Barbus heteronema Blkr. Borneo.
- * " (") *macropus* Blkr. Borneo.

- * " (") microlepis Blkr. =
Capoëta microlepis Blkr. Sumatra, Borneo.
- * " (") siaja Blkr. = Capoëta siaja Blkr. =
Capoëta enoplos Blkr. Sumatra, Borneo.
- * (Anematicthys) apogon Blkr. = Barbus apogon
Kuhl. = Systemus apogon Val. ... Jav., Sum., Borneo, Banka.
- * " (") apoganides Blkr. =
Systemus apogonides Blkr. Java.
- * " (") janthochir Blkr. =
Systemus janthochir Blkr. Borneo.
- Labeobarbus caninus Blkr. = Barbus caninus Val. Europa.
- " Petenyi Blkr. = Barbus Petenyi Heck. = Pleudobarbus
Leonhardi Bielz.
- " Canalii Blkr. = Barbus Canalii Val. Europe.
- " fucini Blkr. = Barbus fucini Gosta. Europe.
- 280** Labeobarbus peleponesius Blkr. = Barbus peleponesius Val. =
- " Barbus peleponensis Heck. Europe (Greece).
- " canis Blkr. = Barbus canis Val. =
Luciobarbus canis Heck. Palestina.
- " longiceps Blkr. = Barbus longiceps Val. =
Luciobarbus longiceps Heck. Palestina.
- " Kotschyi Blkr. = Barbus Kotschyi Heck. Syria.
- " grypus Blkr. = Barbus grypus Heck. Syria.
- " nedgia Rüpp. Nile.
- " affinis Blkr. = Barbus affinis Rüpp. =
Luciobarbus affinis Heck. Nile.
- " elongatus Blkr. = Barbus elongatus Rüpp. =
Luciobarbus elongatus Heck. Nile.
- " gorguari Blkr. = Barbus gorguari Rüpp. =
Luciobarbus gorguari Heck. Nile.
- " capensis Blkr. = Barb. (Cheilobarbus) capensis Smith. Cape of Good hope.
- " marequensis Blkr. = Barbus (Cheilobarbus)
marequensis Smith. Cape of Good hope.
- " macrolepis Heck. Cashmir.
- " khudree Blkr. = Barbus khudree Syk. Decean.
- " chelynoides Blkr. = Barbus chelynoides McCl. =
Barbus cheilynoides McCl. Bengal.
- " macrocephalus Blkr. = Barbus macrocephalus McCl. . Assam.
- " hexagonolepis Blkr. = Barbus hexagonolepis McCl. Assam.
- " mosal Blkr. = Cyprinus mosal Buch. = Barbus mosal
Val. = Barbus megalepis McCl. Bengal.
- " tor Blkr. = Cyprinus tor Buch. = Tor Hamiltonii Gr. =
Barbus hexastichus McCl. = Barbus tor Val. Bengal.
- " progeneias Val. = Cyprinus tor Buch. Coll. sec. McCl. =
Barbus progeneius McCl. Bengal.
- " putitora Blkr. = Cyprinus putitora Buch. =
Barbus putitora McCl. Bengal, China.
- " spinulosus Blkr. = Barbus spinulosus McCl. China?
- " douronensis Blkr. = Barbus douronensis Val. =
Barbus douronensis Heck. Java, Sumatra.
- " soro Blkr. = Barbus soro Val. Java, Sumatra.
- " tambroides Blkr. Java, Sumatra.
- " zambezensis Pet. (only the name known to me). Africa (Mossamb.)

- Barbus vulgaris* Flem. = *Cyprinus barbus* L. = *Cyprinus barba* ²⁸¹
 Hartm. = *Barbus communis* Cuv. = *Barbus fluviatilis* Ag. Europe.
- Barbus* *Mayori* Val. Europe.
- " *plebejus* Bp. = *Barbus tiberinus* Bp. Europe.
- " *eques* Bp. = *Cyprinus barbus* ? Nardo. Europe.
- " *leptopogon* Bp. Europe.
- " *scincus* Heck. Syria.
- " ? *longus* Heck. (description unknown to me) Syria.
- " *barbulus* Heck. Syria, Persia.
- " *mystaceus* Blkr. = *Cyprinus mursa* Gldenst.? =
Luciobarbus nuptaceus Heck. Syria, Casp. sea.
- " *schejch* Blkr. = *Luciobarbus schejch* Heck. =
Luciobarbus schech Heck. Syria.
- " *esocinus* Blkr. = *Luciobarbus esocinus* Heck. Syria.
- " *xanthopterus* Blkr. = *Luciobarbus xanthopterus* Heck. Syria.
- " *paludinosus* Pet. (only the name known to me) Africa (Mossamb.).
- " *gibbosus* Pet. (only the name known to me) Africa (Mossamb.).
- " *inermis* Pet. (only the name known to me) Africa (Mossamb.).
- " *trimaculatus* Pet. (only the name known to me) Africa (Mossamb.).
- " *radiatus* Pet. (only the name known to me) Africa (Mossamb.).
- Opsaridium zambezeense* Pet. (only the name known to me, place?) Africa (Mossamb.).
- Hemibarbus barbus* Blkr. = *Gobio barbus* T. Schl. Japan.
- Pseudophoxinus zeregi* Blkr. = *Phoxinellus zeregi* Heck. Syria.
- Rohteichthys microlepis* Blkr. = *Barbus microlepis* Blkr. =
Systemus microlepis Blkr. = *Rohtee microlepis* Blkr. Sumatra, Borneo.
- Rohtee Ogilbii* Syk. = *Osteobrama Ogilbii* Heck. Deccan.
- " *Vigorsii* Syk. = *Osteobrama Vigorsii* Heck. Deccan.
- " *Alfredianus* Blkr. = *Leuciscus Alfredianus* Val. = *Leuciscus*
Duvaucelii Val. (Poiss. XVII p. 58 not pag. 71 fig. 491). Deccan.
- " *cotis* Blkr. = *Cyprinus cotis* Buch. = *Cyprinus cotio* Buch. =
Abramis gangeticus Swns. = *Osteobrama cotis* Heck. =
Leuciscus cotio Val. Bengal.
- " *chrysops* Blkr. = *Leuciscus chrysops* Val. Bengal.
- " *Blythi* Blkr. = *Systemus microlepis* Blyth (not Blkr). Bengal?
- " *bramuia* Blkr. = *Abramis bramuia* Val. China.
- " *terminalis* Blkr. = *Abramis terminalis* Richds. China.
- " *rhomboidalis* Blkr. = *Abramis rhomboidalis* Richds. =
Leuciscus rhomboidalis Val. China.
- ²⁸² *Acanthobrama centisquama* Heck. = *Trachibrama centisquama* Heck. Syria.
- " *marmid* Heck. = *Trachibrama marmid* Heck. Syria.
- " *cupida* Heck. = *Trachibrama cupida* Heck. Syria.
- " *arrhada* Heck. = *Trachibrama arrhada* Heck. Syria.
- " *pekinensis* Blkr. = *Abramis pekinensis* Bas. China.
- " *mantschurica* Blkr. = *Abramis mantschuricus* Bas. ... Mongol., Mantschuria.
- Rhodeus amarus* Ag. = *Alburnus Ausonii* Marsigl. =
Cyprinus amarus L. = *Leuciscus amarus* Cuv. Europe, Asia minor.
- Chanodichthys mongolicus* Blkr. = *Leptocephalus mongolicus* Bas. Mongolia, Mantshur.
- " ? *argenteus* Blkr. = *Leuciscus argenteus* Bas. China.
- " ? *aethiops* Blkr. = *Leuciscus aethiops* Bas. China.
- Pseudoculter pekinensis* Blkr. = *Culter pekinensis* Bas. China.
- " *exiguus* Blkr. = *Culter exiguus* Bas. China.
- Hemiculter leucisculus* Blkr. = *Culter leucisculus* Bas. China.

- Aulopyge Hügeli Heck. Europe (Rosnia, Dalmat.)
 Meda fulgida Gir. N. Am. (Rio San Pedro).
 Chedrus chedra Blkr. = Cyprinus chedra Buch. = Chedrus Grayi Swms. =
 Pachystom. chedra Heck. = Leuciscus chedra McCl. Bengal.
 " tila Blkr. = Cyprinus tila Buch. = Pachystomus tila Heck. =
 Leuciscus tila Val. Bengal.
 " apiatus Blkr. = Cyprinus apiatus Val. = Leuciscus apiatus McCl. =
 Pachystomus apiatus Heck. Bengal.
 " brachiatus Blkr. = Leuciscus brachiatus McCl. = Leuciscus
 brachiatus McCl. = Pachystomus brachiatus Heck. Bengal.
 Plargyrus cornutus Gill. = Cyprinus cornutus Mitch. = Cyprinus
 rubripinnis Mus. Par. = Leuciscus cornutus De Kay =
 Hypsolepis cornutus Baird = Argyreus rubripinnis Heck. N. Am. (New. Britt, Ind. Lake,
 etc.)
 " typicus Gill. = Rutilus plargyreus Raf. =
 Leuciscus plargyrus Kirtl. N. Am. (Ohio).
 " gibbosus Gir. = Leuciscus gibbosus Stor. =
 Hypsolepis gibbosus Ag. N. Am. (Alabama etc)
 " frontalis Gill. = Leuciscus frontalis Ag. =
 Hypsolepis frontalis Ag. N. Am (L. Superior)
 " gracilis Gir. = Leuciscus gracilis Ag. N. Am. L. Huron)
 " Bowmani Gill. N. Am. (Nebraska)
 " argentatus Gill. N. Am. (James riv.)
 Catla Buchanani Val. = Cyprinus catla Buch. = Gibelion ²⁸³ catla Heck. Bengal.
 Hypophthalmichthys molitrix Blkr. = Leuciscus molitrix Val. =
 Leuciscus hypophthalmus Gray, Richds. China.
 " mantschuricus Blkr. =
 Cephalus mantschuricus Bas. Mongol., Mantschur.
 " nobilis Blkr. = Leuciscus nobilis Gray. China.
 " ? idella. = Leuciscus idella Val.? =
 Aspius? vel Idus? idella Richds. China.
 " ? piceus Blkr. = Leuciscus piceus Richds. China.
 " ? aeneus Blkr. = Leuciscus aeneus Val. China.
 * Thynnichthys thynnoides Blkr. = Leuciscus thynnoides Blkr. Sumatra.
 " polylepis Blkr. Sumatra, Borneo.
 " harengula Blkr. = Leuciscus harengula Val. Pegu.
 " ? jesella Blkr. = Leuciscus jesella Val. China.
 " ? rosetta Blkr. = Leuciscus rosetta Val. China.
 " ? xanthurus Blkr. = Leuciscus xanthurus Richds. =
 Aspius? xanthurus Richds. China.
 * Amblypharyngodon mala Blkr. = Cyprinus mola Buch. = Leuciscus
 mala McCl. = Opsarius mola Heck. = Mola mala
 Heck. = Leuciscus pellucidus McCl. Bengal.
 " microlepis Blkr. = Leuciscus microlepis Blkr. Bengal.
 " melettina Blkr. = Leuciscus melettina Val. East Hindustan.
 Devario Buchanani Blkr. = Cyprinus devario Buch. = Cyprinus devarid
 Buch. = Devario devario Heck. Bengal.
 " cyanotaenia Blkr. =
 McCl., Ind. Cypr. As. Res. XIX tab. 56 fig. 9. Bengal.
 " MacClellandi Blkr. =
 McCl., Ind. Cypr. As. Res. XIX tab. 56. fig. 8. Bengal.
 " ostreographus Blkr. = Perilampus ostreographus McCl. =
 Devario ostreographus Heck. Assam.

- * *Luciosoma* (*Luciosoma*) *setigerum* Blkr. = *Barbus setigerus* Val. =
 Barbus podonemus Blkr. Java, Sumatra.
- * " (") *spilopleura* Blkr. Sumatra, Siam.
- * " (*Trinematichthys*) *trinema* Blkr. = *Leuciscus trinema* Blkr. Sumatra, Borneo.
- Perilampus* *rerio* Blkr. = *Cyprinus rerio* Buch. = *Perilampus striatus* McCl. =
 Nuria rerio Val. = *Esomus striatus* Heck. Bengal.
- " *dangila* Blkr. = *Cyprinus dangila* Buch. = *Perilampus*
 reticulatus McCl. = *Esomus reticulatus* McCl. Bengal.
- " ? *lineolatus* Blkr. = *Leuciscus lineolatus* Blyth. Darjeling.
- 284 *Esomus danrica* Heck. = *Cyprinus danrica* Buch. = *Cyprinus Danrua*
 Buch. = *Cyprinus sutiha* Buch. = *Cyprinus jogia* Buch. =
 Esomus vittatus Swns. = *Esomus danrua* Heck. = *Perilampus*
 recurvirostris McCl. = *Perilampus macropterus* McCl. =
 Perilampus macrourus McCl. = *Nuria danrica* Val. =
 Cyprin danrica, *Cyprin jogia* and *Cyprin sutiha* Val. Bengal.
- " *thermoicos* Heck. = *Nuria thermoicos* Val. Ceylon.
- " *thermophilus* Heck. = *Perilampus thermophilus* McCl. =
 Nuria thermophylos Val. Bengal.
- Tinca vulgaris* Cuv. = *Cyprinus tinca* L. = *Tinca chrysitis* Ag. =
 Tinca italica Bp. Europe. Asia minor.
- " ? *perennurus* Heck. = *Cyprinus perennurus* Pall. =
 Leuciscus perennurus Val. Siberia.
- Argyreus atronasmus* Heck. = *Cyprinus atronasmus* Mitch. = *Leuciscus*
 atronasmus Stor. = *Rhinichthys atronasmus* Ag. N. Am. (N. Y. Massach.)
- " *marmoratus* Gill. = *Rhinichthys marmoratus* Ag. N. Am. (L. Superior.)
- " *nasutus* Gir. = *Leuciscus nasutus* Ayr. = *Rhinichthys nasutus*
 Ag. = *Chondrostoma? nasutum* Heck. N. Am. (Massach. Conn.)
- " *obtusus* Gir. = *Rhinichthys obtusus* Ag. N. Am. (Huntsville).
- " *meleagris* Gill. = *Rhinichthys meleagris* Ag. N. Am. (Iowa).
- " *dulcis* Gill. N. Am. (Nebraska).
- " *nubilus* Gir. N. Am. (Puget-sound).
- " *osculus* Gill. N. Am. (San Pedro riv.).
- " *notabilis* Gill. N. Am. (St. Cruz, Sonora).
- " *chrysogaster* Blkr. = *Agosia chrysogaster* Gill. N. Am. (St. Cruz).
- " *metallicus* Blkr. = *Agosia metallica* Gir. N. Am. (San Pedro riv.).
- Chrosomus erythrogaster* Raf. = *Luxilus erythrogaster* Kirtl. =
 Leuciscus erythrogaster Stor. = *Rutilus? ruber* Raf. N. Am. (Ohio, Tennessee, Osag.).
- Tiaroga cobitis* Gill. N. Am. (San Pedro riv.).
- Phoxinus Belonii* Aldv. = *Cobitis fluviatilis* Marsigl. = *Cyprinus phoxinus*
 L. = *Cyprinus aphyra* Meid. = *Leuciscus phoxinus* Cuv. =
 Phoxinus laevis Ag. = *Phoxinus Marsilii* Heck. =
 Cyprinus Lumaireul Bonell. = *Phoxinus Lumaireul* Heck. Europe.
- Phoxinellus alepidotus* Heck. = *Leuciscus alepidotus* Heck. Europe.
- Cirrhhina Dussumieri* Val. = *Isocephalus Dussumieri* Heck. Hindost. (Mysore).
- Gobio fluviatilis* Ag. = *Gobius fluviatilis* Marsigl. = *Cyprinus gobio* L. =
 Gobio vulgaris Cuv. = *Gobio* 285 *lutescens* De Filippi. Europe.
- Gobio uranoscopus* Ag. Europe.
- " *venatus* Bp. = *Cyprinus benacensis* Pollini? Europe.
- " *obtusirostris* Val. Europe.
- " *damascinus* Val. = *Scaphiodon? damascinus* Heck. =
 a *Gobio?* Blkr. Syria.
- " *rivularis* Bas. China.

- " cataractae Val. N. Am.
 " gelidus Gir. N. Am.
 " aestivalis Gir. N. Am.
 " vernalis Gir. N. Am.
 Sarcocheilichthys variegatus Blkr. = Leuciscus variegatus T. Schl. Japan.
 * Leptobarbus Hoevenii Blkr. = Barbus Hoevenii Blkr. Sumatra, Borneo.
 * Gnathopogon elongatus Blkr. = Capoëta elongata T. Schl. =
 Devario elongata Heck. Japan.
 " gracilis Blkr. = Capoëta gracilis T. Schl. =
 Devario gracilis Heck. Japan.
 Pseudorasbora parva Blkr. = Leuciscus parvus T. Schl. Japan.
 * " pusilla Blkr. = Leuciscus pusillus T. Schl. Japan.
 * Rasbora argyrotaenia Blkr. = Leuciscus argyrotaenia Blkr. =
 Leucisc. cyanotaenia Blkr. = Leucisc. Schwenkii Blkr. Java, Bali, Sumatra.
 * " lateristriata Blkr. = Leuciscus lateristriatus V. Hass. Java, Sumatra.
 * " dusonensis Blkr. = Leuciscus dusonensis Blkr. Sumatra, Borneo, Siam.
 * " kallochroma Blkr. = Leuciscus kallochroma Blkr. Borneo, Banka.
 * " sumatrana Blkr. = Leuciscus sumatranus Blkr. Sumatra.
 * " borneënsis Blkr. Borneo.
 * " Einthoveni Blkr. = Leuciscus Eithovenii Blkr. Born., Bilit., Banka.
 * " bankanensis Blkr. = Leuciscus bankanensis Blkr. Banka.
 * " leptosoma Blkr. = Leuciscus leptosoma Blkr. Sumatra.
 * " cephalotaenia Blkr. = Leciscus cephalotaenia Blkr. Born., Bilit., Banka, Sing.
 * " Buchananii Blkr. = Cyprinus rasbora Buch. =
 Leuciscus rasbora McCl. = Opsarius rasbora Heck. =
 Cyprin rasbora Val. = Leuciscus rasbora Cant.? Bengal, Pinang?
 " daniconia Blkr. = Cyprinus daniconius Buch. =
 Leuciscus daniconius McCl. = Opsarius daniconius Heck. Bengal.
 " haematopterus Cast. Icon. Siam.
 " anjana Blkr. = Cyprinus anjana Buch. = Leuciscus lateralis
 McCl. = Opsarius anjana Heck. Bengal.
 286 " ?? bata Blkr. = Cyprinus bata Buch. Bengal.
 " ? dandia Blkr. = Leuciscus dandia Val. Ceylon.
 " ? elingulata Blkr. = Perilampus elingulatus McCl. =
 Leuciscus elingulatus McCl. = Squalius elingulatus Heck. Bengal.
 " ? teretiuscula Blkr. = Leuciscus teretiusculus Bas. China.
 " tschiliensis Blkr. = Leuciscus tschiliensis Bas. China.
 " curricula Blkr. = Leuciscus curriculum Richds. China.
 " ? vandella Blkr. = Leuciscus vandella Richds. China.
 " ?? cura Blkr. = Cyprinus cura Buch. Bengal.
 " ? piscatoria Blkr. = Opsarius piscatorius McCl. Bengal.
 " elanga Blkr. = Cyprinus elanga Buch. = Bengal elanga Gr. =
 Leuciscus dystomus McCl. = Cirrhina? elanga Val. =
 Seardinus distomus Heck. Bengal.
 Rasborichthys Helfrichii Blkr. = Leuciscus Helfrichii Blkr. Borneo.
 Elopichthys dauricus Blkr. = Nasus dauricus Bas. Mongol., Mantschur.
 " bambusa Blkr. = Leuciscus bambusa Richds. =
 Chela? or Pelecus? Richds. China.
 Aspilus rapax Ag. = Cyprinus aspilus L. = Cyprinus rapax Pall. =
 Cyprinus taeniatus Eichw. Var. Leuciscus aspilus Cuv. Europe.
 " owsianka Czernay. Europe.
 " Turskyi Blkr. = Squalius Turskyi Heck. =
 Leuciscus (Microlepis) Turskyi. Bp. Europe.

- " *microlepis* Blkr. = *Squalius microlepis* Heck. =
Leuciscus (Microlepis) microlepis Bp. Europe.
 " *tenellus* Blkr. = *Squalius tenellus* Heck. =
Leuciscus (Microlepis) tenenus Bp. Europe.
 " *albus* Blkr. = *Squalius albus* Bp. Europe.
 " *leptocephalus* Heck. = *Cyprinus leptocephalus* Pall. Asia.
 " *chalcoides* Heck. = *Cyprinus chalcoides* Güldenst. Asia.
 " *tarichi* Heck. = *Cyprinus tarichi* Güldenst. Asia.
 " *vorax* Heck. Syria.
 " *berag* Blkr. = *Squalius berag* Heck. = *Squalius berak* Heck. Syria.
 " *lepidus* Blkr. = *Squalius lepidus* Heck. Syria.
Gila robusta Baird Gill. N. Am. (Zuni riv.).
 " *elegans* Baird Gill. N. Am. (Zuni riv.).
 " *conocephala* Baird Gill. N. Am. (San Joaquina riv.).
 287 " *gracilis* Baird Gir. N. Am. (Zuni riv.).
 " *Emorii* Baird Gir. N. Am. (Gila riv.).
 " *Grahami* Baird Gir. N. Am. (Gila riv.).
 " *pulchella* Baird Gir. = *Tigoma pulchella* Gir. N. Am. (Texas).
 " *conformis* Blkr. = *Lavinia conformis* Baird Gir. =
Tigoma conformis Gir. N. Am. (California).
 " *gibbosa* Baird Gir. = *Tigoma gibbosa* Gir. N. Am. (Santa Cruz riv.).
 " *bicolor* Blkr. = *Tigoma bicolor* Gir. N. Am. (L. Flamath).
 " *purpurea* Blkr. = *Tigoma purpurea* Gir. N. Am. (Huagui riv.).
 " *intermedia* Blkr. = *Tigoma intermedia* Gir. N. Am. (Rio San Pedro).
 " *obesa* Blkr. = *Tigoma obesa* Gir. N. Am. (Salt-lake.valley)
 " *Humboldtii* Blkr. = *Tigoma Humboldtii* Gill. N. Am. (Humboldt riv.).
 " *lineata* Blkr. = *Tigoma lineata* Gill. N. Am. (Humboldt riv.).
 " *Girardi* Blkr. = *Tigoma gracilis* Gill. N. Am. (Humboldt riv.).
 " *nigrescens* Blkr. = *Tigoma nigrescens* Gill. N. Am. (Boca grande, Jonas r.).
 " *pulchra* Blkr. = *Tigoma pulchra* Gill. N. Am. (Chihchuari riv.).
 " *crassa* Blkr. = *Tigoma crassa* Gir. N. Am. (California.).
 " *Cooperi* Blkr. = *Cheonda Cooperi* Gir. N. Am. (Columbia riv.).
 " *coerulea* Blkr. = *Cheonda coerulea* Gr. N. Am. (Lost riv.).
Ptychocheilus grandis Gir. = *Gila grandis* Ayr. =
Ptychocheilus major Ag. N. Am. (Californ.).
 " *oregonensis* Gir. = *Cyprinus (Leuciscus) oregonensis*
 Richds. = *Ptychocheilus gracilis* Ag. Pick = *Leuciscus*
oregonensis Val. N. Am. (Oregon, Col. riv. etc.)
 " *rapax* Gir. N. Am. (Californ.).
 " *vorax* Gill. N. Am.
 " *lueius* Gir. N. Am. (Colorado riv.).
 " *elongatus* Blkr. = *Luxilus elongatus* Kirtl. = *Leuciscus*
elongatus De Kay = *burnoides elongatus* Les. = *Leuciscus*
productus Stor. = *Clinostomus elongatus* Gill. N. Am. (Ohio, Wabash).
 " *funduloides* Blkr. = *Clinostomus funduloides* Gill. N. Am. (Washington).
 " *affinis* Blkr. = *Clinostomus affinis* Gill. N. Am. (James river).
 " *carolinus* Blkr. = *Clinostomus carolinus* Gill. N. Am. (Salem N. C.)
Opsarius (Shacra) Blkr. = *Cyprinus shacra* Buch. = *Opsarins cirratus*
 McCl. = *Pachystomus schagra* Heck. = *Barbus*
schagra Val. = *Chedri* sp? Assam.
 " (") *cocsa* Blkr. = *Cyprinus cocsa* Buch. = *Leuciscus cocsa*
 McCl. = *Pachystomus cocsa* Heck. Bengal.

- 288 " (") chapalio Buch. = *Cyprinus chapalio* Buch. =
Esomus chapalio Heck. Bengal.
- " (Opsarius) goha Heck. = *Cyprinus goha* Buch. = *Cyprinus*
(*Leuciscus*) *goha* Blkr. = *Opsarius gracilis* McCl. =
Leuciscus goha Val. Bengal, Assam.
- " (") tileo Blkr. = *Cyprinus tileo* Buch. = *Opsarius maculatus* McCl. =
Opsarius maculosus McCl. = *Leuciscus tileo* Val. ... Bengal.
- " (") bola Blkr. = *Cyprinus bola* Buch. = *Opsarius*
megastomus McCl. = *Leuciscus bola* Val. Bengal.
- " (") barila Blkr. = *Cyprinus barila* Buch. = *Cyprinus*
chedrio Buch. = *Opsarius anisocheilus* McCl. =
Leuciscus barila Val. = *Leuciscus chedrio* Val. Bengal.
- " (") barna Blkr. = *Cyprinus barna* Buch. = *Cyprinus*
balibhola Buch. = *Opsarius fasciatus* McCl. =
Leuciscus barna Val. Bengal.
- " (") vagra Blkr. = *Cyprinus vagra* Buch. = *Cyprinus loya* Buch. =
Opsarius isocheilus McCl. = *Leuciscus vagra* Val. Bengal.
- " (") brachialis McCl. (or a variety of *Opsarius tileo*?) Bengal.
- " (") acanthopterus McCl. = *Opsarius latipinnatus* McCl. =
Opsarius? *acanthopterus* Heck. Assam.
- " (") aequipinnatus Blkr. = *Perilampus aequipinnatus* McCl. =
Chela aequipinnata Heck. Bengal.
- " (") gatensis Blkr. = *Leuciscus gaten sis* Val. Hindustan.
- " (") hoalius Blkr. = *Cyprinus hoalius* Buch. Bengal.
- " (") solio Blkr. = *Cyprinus solio* Buch. Bengal.
- " (") borelio Blkr. = *Cyprinus borelio* Buch. Bengal.
- " (") salmoides Blkr. = *Leuciscus salmoides* Blyth. Bengal.
- " (") homospilotus Blkr. = *Leuciscus homospilotus*
Richds. *Aspius?* or *Alburnus?* Richds. China.
- " (") uncirostris Blkr. = *Leuciscus uncirostris* T. Schl. Japan.
- " (") platypus Blkr. = *Leuciscus platypus* T. Schl. Japan.
- " (") macropus Blkr. = *Leuciscus macropus* T. Schl. Japan.
- " (") minor Blkr. = *Leuciscus minor* T. Schl. Japan.
- " (") Temminckii Blkr. = *Leuciscus Temminckii* T.Schl. .. Japan.
- " (") Sieboldii Blkr. = *Leuciscus Sieboldii* T. Schl. Japan.
- " (") nesogallicus Blkr. = *Leuciscus nesogallicus* Val. Mauritius.
- 289 " (") thebensis Blkr. = *Leuciscus thebensis* De Joann. =
Leuciscus nilotieus De Joann. =
Opsarius thebensis Heck. Nile.
- " (Bendilisis) *bendilisis* Blkr. = *Cyprinus bendilisis* Buch. =
Opsarius bendilisis Heck. = *Gobio bendilisis* Val. ... Hind. (Mysore).
- " (") bicirrhatus Blkr. = *Opsarius bicirrhatus* McCl. =
Leuciscus bicirrhatus Blkr. Afghanistan.
- Abramis brama* Cuv. = *Brama Marsigl.* = *Cyprinus brama* L. =
Cyprinus farenus L. Europe.
- " *blicca* Cuv. = *Cyprinus ballerus* Meid. (nec L.) = *Cyprinus*
blicca Gm. = *Blicca argyroleuca* Heck. = *Blicca blicca* Heck. Europe.
- " *vimba* Cuv. = *Capito anodromus* Marsigl. = *Cyprinus vimba* L. =
Cyprinus carinatus Pall. Europe.
- " *ballerus* Cuv. = *Cyprinus ballerus* L. = *Ballerus ballerus* Heck. Europe.
- " *Buggenhagii* Cuv. = *Cyprinus Buggenhagii* Bl. =
Bliccopsis Buggenhagii Heck. Europe.

- " vetula Heck. Europe.
 " sapa Heck. = *Cyprinus sapa* Pall. = *Brama secunda* foem.
 Marsigl. = *Abramis Schreibersii* Heck. Europe.
 " melanops Heck. Europe.
 " Leuckartii Heck. Europe.
 " laskyr Nordm. = *Cyprinus laskyr* Gldenst. =
Cyprinus gastera or *lasgyrr* Pall. = *Blicca laskyr* Heck. Europe.
 " microlepidotus Ag. Europe
 " micropteryx Ag. Europe.
 " argyreus Ag. = *Cyprinus Baggenhagii* Bl. var.? Val. Europe.
 " erythropterus Ag. Europe.
 " elongatus Ag. Europe. (Crimea.)
 " tenellus Val. = *Leuciscus tenellus* Val. Europe. (Crimea.)
 " Frivaldskyi Heck. Natolia.
 " chrysoprasias Heck. = *Cyprinus chrysoprasius* Gm. Pall. Asia.
 " gibbosus Heck. = *Cyprinus gibbosus* Gm. Pall. Asia.
 " persa. Heck. = *Cyprinus persa* Gm. Pall. Persia.
Luxilus *americanus* Gir. = *Cyprinus americanus* Lac. = *Cyprinus*
chrysoleucus Mitch. = *Leuciscus chrysoleucus* Stor. = *Leuciscus*
Boscii Val. = *Leucosomus chrysoleucus* Heck. = *Stilbe*
chrysoleucus De Kay = *Leucosomus* ²⁹⁰ *americanus* Gir. N. Am. (Massach.).
 " *compressus* Gir. = *Rutilus compressus* Raf. =
Leuciscus compressus Kirtl. N. Am. (Ohio).
 " *obesus* Gir. = *Leuciscus obesus* Stor. = *Stilbe obesus* Ag. N. Am. (Alabama).
 " *occidentalis* Gir. = *Leucosomus occidentalis* B. Gir. N. Am. (Posa, Four creek).
 " *leptosomus* Gir. N. Am. (Texas).
 " *seco* Gir. N. Am. (Texas).
 " *lucidus* Gir. N. Am. (Canadian Riv.).
 " *versicolor* Blkr. = *Cyprinus eolus* Cossem = *Abramis versicolor*
De Kay = *Stilbe versicolor* Ag. N. Am. (New York).
 " *balteatus* Blkr. = *Abramis balteatus* Richds. =
Squalius balteatus Heck. = *Leuciscus balteatus* Val. =
Richardsonius balteatus Gir. N. Am. (Columbia riv.).
 " *lateralis* Blkr. = *Richardsonius lateralis* Gir. N. Am. (Puget-sound).
Alburnus ? *parvulus* Blkr = *Leuciscus parvulus* Val. Europe (Crimea).
 " *bipunctatus* Heck. = *Phoxinus primus* Mars. = *Cyprinus*
bipunctatus L. = *Leuciscus bipunctatus* Cuv. = *Leuciscus*
Baldneri Val. = *Aspius bipunctat.* Ag. Europe.
 " *coeruleus* Heck. Syria.
 " *lucidus* Heck. = *Phoxinus secundus* Marsigl. = *Cyprinus*
alburnus L. = *Leuciscus alburnus* Cuv. = *Aspius ochrodon*
Fitz. = *Aspius alburnus* Ag. = *Aspius alburnoides* Selys. Europe
 " *breviceps* Heck. Kner. Europe.
 " *alborella* Heck. = *Aspius alborella* De Filipp. Europe.
 " *scoranza* Heck. Europe.
 " *fracchia* Heck. Kner. Europe.
 " *scoranzoides* Heck. Kner. Europe.
 " *mento* Heck. = *Aspius mento* Ag. = *Aspius Heckelii* Fitz. Europe.
 " *obtusus* Heck. Europe.
 " *acutus* Heck. Europa.
 " *cordilla* Blkr. = *Cyprinus cordilla* Savi =
Leuciscus cordilla Val. Europe.
 " *delineatus* Blkr. = *Squalius delineatus* Heck. Europe.

"	abruptus Blkr. = <i>Leucaspilus abruptus</i> Heck. Kner.	Europe.
"	niloticus Heck. = <i>Leuciscus niloticus</i> De Joann. = Pelecus niloticus Heck.; a Chela?	Nile.
"	bibie Blkr. = <i>Leuciscus bibie</i> De Joann. = Pelecus bibie Heck; a Chela?	Nile.
291	" sellal Heck.	Syria.
"	microlepis Heck.	Syria.
"	hebes Heck.	Syria.
"	mossulensis Heck.	Syria.
"	capito Heck.	Syria.
"	pallidus Heck.	Syria.
"	iblis Heck.	Persia.
"	schejtan Heck.	Persia.
"	caudimacula Heck.	Persia.
"	megacephalus Heck.	Persia.
"	maxillaris Heck. = <i>Leuciscus maxillaris</i> Val. = Alburnus iblis Heck. ??	Persia.
"	albuloides Heck. = <i>Leuciscus albuloides</i> Val.	Persia.
"	clupeoides Heck. = <i>Leuciscus clupeoides</i> Val.	Persia.
"	? rubellus Blkr. = <i>Alburnus rubellus</i> Ag.	N. Am. (L. Superior).
"	lepidulus Gir.	N. Am. (Black-warrior r.).
"	dilectus Gir. = <i>Alburnellus dilectus</i> Gir.	N. Am. (Arkansas).
"	umbratilis Gir. = <i>Alburnellus umbratilis</i> Gir.	N. Am. (Arkansas).
"	amabilis Gir. = <i>Alburnellus umbratilis</i> Gir.	N. Am. (Rio Nueces).
"	socius Gir. = <i>Alburnellus socius</i> Gir.	N. Am. (Texas).
"	megalops Gir. = <i>Alburnellus megalops</i> Gir.	N. Am. (Texas).
Hybopsis	(<i>Hybopsis</i>) gracilis Ag.	N. Am. (Huntsville).
"	(") dorsalis Ag.	N. Am. (Burlington, Iowa).
"	(") Storerianus Gir. = <i>Rutilus Storerianus</i> Kirtl. = <i>Leuciscus Storerianus</i> Kirtl.	N. Am (Ohio, Russellville).
"	(") Winchellii Gir.	N. Am. (Alabama).
"	(Hudsonius) hudsonius Blkr. = <i>Clupea hudsonia</i> Clint. <i>Leuciscus hudsonius</i> De Kay. = <i>Stolephorus</i> <i>hudsonianus</i> Cozzens. = <i>Catostomus hudsonius</i> Ag. = <i>Hudsonius hudsonia</i> Gir. = <i>Hudsonius</i> <i>fluviatilis</i> Gir.	N. Am. (Huron, Mich., Huds. riv.).
"	(") amarus Blkr. = <i>Hudsonius amarus</i> Gir.	N. Am.
Leucosomus	<i>plumbeus</i> Gir. = <i>Gobio plumbeus</i> Ag.	N. Am. (L. Sup., Huron).
"	pulchellus Gir. = <i>Leucisc. pulchellus</i> Stor. = <i>Leucisc. argenteus</i> Stor. = <i>Leucosomus chrysoleucus</i> Heck. = <i>Leucisc. Storeri</i> Val. = <i>Cheilonemus pulchellus</i> Gir.	N. Am. (New Britt.).
"	dissimilis Gir.	N. Am. (Milk river).
"	pallidus Gir.	N. Am. (Arkansas).
"	inerassatus Gir.	N. Am. (Choctaw-ag.).
"	laevigatus Heck. = <i>Cyprinus laevigatus</i> Mus. Paris. sec. Heck.	N. Am. (New-York).
292	" inaequilobus Blkr. = <i>Pogonichthys inaequilobus</i> B. G.	N. Am. (S. Joaq. riv.).
"	symmetricus Blkr. = <i>Pogonichthys symmetricus</i> B. G.	N. Am. (S. Joaq. riv.).
"	argyreiosus Blkr. = <i>Pogonichthys argyreiosus</i> Gir.	N. Am. (Californ.).
"	communis Blkr. = <i>Pogonichthys communis</i> Gir.	N. Am. (Nebraska).
"	nebracensis Blkr. = <i>Nocomis nebracensis</i> Gir.	N. Am. (Nebraska);
"	bellicus Blkr. = <i>Nocomis bellicus</i> Gir.	N. Am. (Bl.-warrior riv.).

- " ? gracilis Blkr. = *Leuciscus gracilis* Richds. =
Leucosomus gracilis Heck. N. Am. (Saskatch. riv.).
 " ? vittatus Blkr. = *Leuciscus vittatus* De Kay. N. Am. (New-York).
 " ? corporalis Blkr. = *Cyprinus corporalis* Mitch. =
Leuciscus? corporalis De Kay. N. Am. (New-York).
Ceratichthys biguttatus Baird. = *Semotilus biguttatus* Kirtl. =
Leuciscus biguttatus De Kay. N. Am. (Mahon. r., Ohio).
 " *amblops* Gir. = *Rutilus amblops* Raf. N. Am. (Ohio).
 " *leptocephalus* Gir. N. Am. (Salem).
Semotilus atromaculatus Gir. = *Cyprinus atromaculatus* Mitch. =
Leuciscus atromaculatus De Kay. = *Leucisc. iris* Val. N. Am. (N. Y., Carolina).
 " *speciosus* Gir. N. Am. (Nebraska).
 " *dorsalis* Raf. N. Am. (Ohio).
 " *cephalus* Raf. = *Leuciscus cephalus* Kirtl. N. Am. (Ohio).
 " *macrocephalus* Gir. N. Am. (Nebraska).
 " ? *vandoisulus* Blkr. = *Leuciscus vandoisulus* Val. N. Am.
 " ? *rotengulus* Blkr. = *Leuciscus rotengulus* Val. N. Am.
Leuciscus vulgaris Cuv. = *Vandoise* Belon. = *Cyprinus leuciscus* L. =
Cyprinus jaculus Jur. = *Leuciscus argenteus* Ag. =
Leuciscus saltator Bp. = *Squalius leuciscus* Heck. Kner. Europe.
 " *rostratus* Ag. = *Squalius rostratus* Heck. Europe.
 " *cavedanus* Bp. = *Squalius cavedanus* Bp. =
Squalius tiberinus Bp.? = *Squalius Pareti* Bp.? Europe.
 " *chalybaeus* Blkr. = *Squalius chalybaeus* Heck. Kner. Europe.
 " *rodens* Ag. = *Squalus rodens* Heck. Europe.
 " *dobula* Ag. = *Capito fluviatilis* Gesn. =
Capito Ausonii s. *Cephalus* Mars. = *Dobula Schoneveldii*
 Wil. = *Cyprinus cephalus* L. ex parte = *Cyprinus dobula* L.
 (nec syn.) = *Cyprin. orfus* Pall. = *Cyprin. idus* Bl. tab 36. =
Leuciscus frigidus Val. = *Gardonus cephalus* Bp. =
Squalius dobula Heck. Kner. Europe.
 " *argentatus* Fitz. = *Mugil* s. *Cephalus fluviatilis minor* Gesn. =
Capito fluviatilis s. *Squalius minor* ²⁹³ Marsigl. = *Cyprinus*
dobula Bl., tab. 5. = *Cyprinus Leuciscus* Bl., tab. 97. = *Leuciscus*
vulgaris Heck. = *Squalius lepusculus* Heck. Kner. Europe.
 " *lancastriensis* Shaw. = *Leuciscus majalis* Ag. =
Squalius majalis Heck. Europe.
 " *dolabratus* Holandre = *Squalius? dolabratus* Heck. =
Scardinius? dolabratus Heck. Europe.
 " *illyricus* Blkr. = *Squalius illyricus* Heck. Europe.
 " *svallize* Blkr. = *Squalius svallize* Heck. Europe.
 " *albus* Blkr. = *Squalius albus* Bp. Europe.
 " *ukliwa* Blkr. = *Squalius ukliwa* Heck. Europe.
 " *trasimenicus* Blkr. = *Squalius trasimenicus* Bp. Europe.
 " *rubilio* Bp. = *Squalius rubilio* Rp. = *Leucos rubilio* Bp. Europe.
 " *Fucini* Blkr. = *Squalius Fucini* Rp. Europe.
 " *elatus* Blkr. = *Squalius elatus* Bp. = *Leucisc. elatus* Val. Europe.
 " *ochrodon* Val. = *Aspius ochrodon* Ag. Europe.
 " *peleponensis* Val. Europe.
 " *stymphalicus* Val. Europe.
 " *albiensis* Val. Europe.
 " *burdigalensis* Val. Europe.
 " *sardella* Val. = *Leuciscus dobula* Costa. Europe.

"	comes Costa.	Europe.
"	albidus Costa.	Europe.
"	brutius Costa.	Europe.
"	vulturinus Costa. = Leuciscus vulturius Val.	Europe.
"	fasciatus Val. = Aspius fasciatus Nordm.	Europe.
"	orientalis Blkr. = Squalius orientalis Heck. = Squalius cephalopsis Heck.	Syria.
"	spurius Blkr. = Squalius spurius Heck.	Syria.
"	rutilus L. = Rubellus Marsigl. = Cyprinus rutilus L. = Rothauge Bl. = Leuciscus lividus Heck. = Gardonus rutilus Bp.	Europe.
"	Pausingeri Heck. = Gardonus Pausingeri Bp.	Europe.
"	pigus De Filipp. = Cyprinus rutilus Scopoli. = Gardonus pigus Bp.	Europe.
"	virgo Heck. Kner. = Nörfling, Erfle Gesn. = Vröwfish Will. = Orfus Germanorum Marsigl. = Cyprinus idus Fitz. = Cyprinus orfus Reis. = Chevaîne du Lech Val.	Europe.
294	" Meidingeri Heck. Kner. = Cyprinus grislagine Meid. (nec L.) = Leuciscus grislagine Ag. Val. (colors only)	Europe, Asia minor.
"	Frisii Nordm. = Gardonus Frisii Bp.	Europe.
"	cephalus Heck. = Cyprinus cephalus L. = Cyprinus jeses Jur.	Europe.
"	prasinus Ag.	Europe.
"	roseus Bp. = Gardonus? roseus Bp.	Europe.
"	Genei Bp.	Europe.
"	Heckelii Nordm.	Europe (Crimea).
"	adpersus Blkr. = Leucos adpersus Heck.	Europe.
"	rutiloides Selys. = Leucos? rutiloides Heck.	Europe.
"	Selysii Heck. = Leucos Selysii Heck. 293	Europe.
"	aula Val. = Squalius aula Bp. = Leucos (Cenisophius) pauperum Bp. = Leuciscus pauperum De Fil. = Leuciscus scardinius De Fil. = Squalius aula Heck. = Leucos aula Bp. = Leucos (Cenisophius) scardinius Bp.	Europe.
"	rubella Bp. = Leucos rubellus & Leucos Henlei Bp.? = Squalius rubella Heck. = Leucos rubella Heck. = Leucos cisalpinus Heck.	Europe.
"	basack Blkr. = Leucos basack Heck.	Europe.
"	chrysopterus De Kay.	N. Am.
"	vittatus De Kay.	N. Am.
"	Agassizii Val. = Ryserle, Ryssling Gesn. = Gryslagine Will., tab. Q 1 fig. 1. = Leuciscus aphyia Ag. = Chondrostoma rysela Ag.?? = Squalius aphyia Heck. = Telestes aphyia Bp. = Telestes rysela Heck. = Leuciscus (Telestes) muticellus Günth. (nec Bp.) = Telestes Agassizii Heck. Kner.	Europe.
"	Savignyi Val. = Telestes Savignyi Bp. = Leuciscus muticellus De Fil. according to Bp.	Europe.
"	muticellus Bp. = Telestes muticellus Bp. = Squalius muticellus Heck.	Europe.

Relationships with Barbines not yet fully determined

Leuciscus croceus Stor., Hentz, Ag.	N. Am. (Alabama etc.).
" elongatus Les. Val. = Alburnoides elongatus Les.	N. Am. (Wabash).
295 " pulchelloides Ayr.	N. Am. (Connecticut).

"	dissimilis Kirtl., De Kay.	N. Am. (Lac. Erie).
"	Gire Val.	Nile.
"	bisarre Val.	Nile.
"	cir Val.	Nile.
"	lacustris Val. = <i>Cyprinus lacustris</i> Pall.	Siberia.
"	coreënsis Val., Richds.	Korea, Japan.
"	fintella Val., Richds.	China.
"	chevanella Val., Richds.	China.
"	molitorella Val., Richds.	China.
"	cupreus Val., Richds.	China.
"	plenus Richds. = <i>Cyprinus plenus</i> Brouss.	China.
"	zeylonicus Benn. (<i>Rasbora</i> affinis)	Ceylon.
Scardinius erythrophthalmus Bp. = <i>Cyprinus erythrophthalmus</i> L. =		
<i>Leuciscus erythrophthalmus</i> Val. = <i>Scardinius</i>		
	<i>hesperidicus</i> Heck.	Europe.
"	<i>dergle</i> Heck. Kner.	Europe.
"	<i>scardafa</i> Bp. = <i>Leuciscus scardafa</i> Bp.	Europe.
"	<i>plotizza</i> Heck. Kner = <i>Scardinius platizza</i> Bp.	Europe.
"	<i>macrophthalmus</i> Heck. Kner.	Europe.
"	<i>Hegeri</i> Bp. = <i>Hegerius typus</i> Bp.	Europe.
"	<i>marocchius</i> Blkr. = <i>Leuciscus marocchius</i> Costa.	Europe.
"	<i>scarpetta</i> Blkr. = <i>Leuciscus scarpetta</i> Val.	Europa.
"	<i>affinis</i> Blkr. = <i>Leuciscus affinis</i> Val.	Europa.
"	<i>idus</i> Blkr. = <i>Capito fluviatilis</i> which Jesen and Jenting call Genus [?]. = <i>Capito fluviatilis coeruleus</i> Marsigl. = <i>Cyprinus</i> <i>idus</i> L. = <i>Cyprinus jeses</i> L. Bl. = <i>Cyprinus idbarus</i> Meid. = <i>Leuciscus jeses</i> Bp.? = <i>Idus melanotus</i> Heck. Kner.	Europe.
"	<i>orfus</i> Blkr. = <i>Capito fluviatilis subruber</i> , named Orfum by the Germans = <i>Cyprinus orfus</i> Bl., L. Bl. = <i>Leuciscus orrus</i> Val. = <i>Idus orfus</i> Heck.	Europe.
"	<i>miniatus</i> Blkr. = <i>Idus miniatus</i> Heck.	Europa.
"	<i>neglectus</i> Blkr. = <i>Leuciscus neglectus</i> Selys. = <i>Idus neglectus</i> Heck.	Europe.
<i>Alburnops blennius</i> Gir.		
	"	N. Am. (Arkansas).
	"	N. Am. (Arkansas).
296	"	N. Am. (Arkansas).
	"	N. A. (N. Jers., N. Harm.)
<i>Cyprinella bubalina</i> Gir. = <i>Leuciscus bubalinus</i> Baird Gill.		
	"	N. Am. (Arkansas).
"	<i>umbrosa</i> Gir.	N. Am. (Canadian r.).
"	<i>Gunnisoni</i> Gir.	N. Am. (Utah).
"	<i>Reckwithi</i> Gir.	N. Am. (Arkansas).
"	<i>Whipplei</i> Gir.	N. Am. (Arkansas).
"	<i>suavis</i> Gir.	N. Am. (Texas).
"	<i>lepida</i> Gir.	N. Am. (Texas).
"	<i>notata</i> Gir.	N. Am. (Texas).
"	<i>macrostoma</i> Gir.	N. Am. (Texas).
"	<i>venusta</i> Gir.	N. Am. (Texas).
"	<i>texana</i> Gir.	N. Am. (Texas).
"	<i>luxiloides</i> Gir.	N. Am. (Texas).
"	<i>lugubris</i> Gir.	N. Am.
"	<i>ludibunda</i> Gir.	N. Am.

"	lutrensis Blkr. = <i>Leuciscus lutrensis</i> Baird Gir. = Moniana lutrensis Gir.	N. Am. (Arkans., Red. r.).
"	leonina Blkr. = <i>Moniana deliciosa</i> Gir.	N. Am. (Texas, Leon-riv.)
"	deliciosa Blkr. = <i>Moniana deliciosa</i> Gir.	N. Am. (Leon-riv.).
"	proserpina Blkr. = <i>Moniana proserpina</i> Gir.	N. Am. (Texas).
"	aurata Blkr. = <i>Moniana aurata</i> Gir.	N. Am. (N. Mexico).
"	complanata Blkr. = <i>Moniana complanata</i> Gir.	N. Am. (Texas).
"	laetabilis Blkr. = <i>Moniana laetabilis</i> Gir.	N. Am. (R. Gr. del Norte).
"	pulchella Blkr. = <i>Moniana pulchella</i> Gir.	N. Am. (Arkansas).
"	frigida Blkr. = <i>Moniana frigida</i> Gir.	N. Am. (Texas).
"	Couchi Blkr. = <i>Moniana Couchi</i> Gir.	N. Am. (Mexico).
"	rutila Blkr. = <i>Moniana rutila</i> Gir.	N. Am. (Mexico).
"	nitida Blkr. = <i>Moniana nitida</i> Gir.	N. Am. (Mexico).
"	formosa Blkr. = <i>Moniana formosa</i> Gir.	N. Am. (Mexico).
"	gracilis Blkr. = <i>Moniana gracilis</i> Gir.	N. Am. (Mexico).
"	gibbosa Blkr. = <i>Moniana gibbosa</i> Gir.	N. Am. (Texas).
"	tristis Blkr. = <i>Moniana tristis</i> Gir.	N. Am. (Texas).
"	? gardoneus Blkr = <i>Leuciscus gardoneus</i> Val.	N. Am.
Codoma ornata Gir.		N. Am. (Chihuahua.).
" vittata Gir.		N. Am. (Mexico).
Smiliogaster Belangeri Blkr. = <i>Leuciscus Belangeri</i> Val.		Bengal.
Culter alburnus Bas.		China.
" erythropterus Bas.		China.
297 * " mongolicus Bas.		Mongolia.
" recurviceps Blkr. = <i>Leuciscus recurviceps</i> Richds = <i>Aspius recurviceps</i> Richds.		China.
" machaeroides Blkr. = <i>Leuciscus machaeroides</i> Richds.		China.
" acutus Blkr. = <i>Cyprinus acutus</i> Brouss. Mss. = <i>Leuciscus acutirostris</i> Gr. = <i>Leuciscus acutus</i> Richds.		China.
* <i>Laubuca guttata</i> Blkr. = <i>Cyprinus laubuca</i> Buch. = <i>Perilampus guttatus</i> McCl. = <i>Chela guttata</i> Heck. = <i>Leuciscus laubuka</i> Val.		Bengal.
" dancena Blkr. = <i>Cyprinus dancena</i> Buch.		Bengal.
* <i>Chela anomalura</i> Blkr. = <i>Clupea anomalura</i> V. Hass. = <i>Oxygaster</i> <i>anomalura</i> V. Hass. = <i>Cyprinus oxygaster</i> Cuv. = <i>Leuciscus oxygaster</i> Val.		Java, Sumatra, Borneo.
" hypophthalmus Blkr.		Sumatra.
" oxygastroides Blkr. = <i>Leuciscus oxygastroides</i> Blkr.		Java, Sumatra, Borneo.
" bacaila Blkr. = <i>Cyprinus bacaila</i> Buch. = <i>Salmophasia oblonga</i> Swms. = <i>Pelecus bacaila</i> Heck. = <i>Opsarius bacaila</i> McCl.		Bengal.
" gora Blkr. = <i>Cyprinus gora</i> Buch. = <i>Oyprinus cora</i> Gr. = <i>Opsarius pholicephalus</i> McCl. = <i>Pelecus pholicephalus</i> Heck = <i>Salmophasia elongata</i> Swms.		Bengal.
" perseus Heck. = <i>Perilampus perseus</i> McCl.		Bengal ?, Assam.
" phulo Blkr. = <i>Cyprinus phulo</i> Buch. = <i>Opsarius albulus</i> McCl. = <i>Pelecus albulus</i> Heck. = <i>Oyprinus phulchela</i> Buch. Coll.		Bengal.
" leucera Blkr. = <i>Opsarius leucerus</i> McCl. = <i>Pelecus leucerus</i> Heck.		Bengal.
" cachus Blkr. = <i>Cyprinus cachus</i> Buch. = <i>Cyprinus kachki</i> Buch. Coll. = <i>Perilampus cachus</i> McCl.		Bengal.
" atpar Blkr. = <i>Cyprinus atpar</i> Buch. = <i>Cyprinus loyukula</i> Buch. Coll. = <i>Perilampus psilopteromus</i> McCl.		Bengal.
" macrolepis Blkr. = McCl., Ind. Cypr. Asiat. Res. XIX tab. 56 fig. 10 nameless.		Bengal.

"	cultella Blkr. = <i>Leuciscus cultellus</i> Val.	Hindustan.
"	Dussumierii Blkr. = <i>Cyprinus clupeioides</i> Bl.? = <i>Leuciscus</i> Dussumieri Val. = <i>Leuciscus clupeioides</i> Heck.?	Hindust. (Mysore).
"	novacula Blkr. = <i>Leuciscus novala</i> Val. = <i>Pelecus novacula</i> Heck.	Hindustan.
"	acinaces Blkr. = <i>Leuciscus acinaces</i> Val.	Hindust. (Mysore).
298	" balookee Syk.	Deccan.
"	Oweni Syk.	Deccan.
"	jorah Syk.	Deccan.
"	teekanee Syk.	Deccan.
"	alkootee Syk.	Deccan.
"	alburna Heck.	India.
"	scalpella Blkr. = <i>Leuciscus scalpellus</i> Val.	Ceylon.
"	sardinella Blkr. = <i>Leuciscus sardinella</i> Val.	Pegu.
"	melanochir Casteln. Mss.	Siam.
"	siamensis Casteln. Mss.	Siam.
"	cultrata Cuv. = <i>Cyprinus cultratus</i> L = <i>Cyprinus clupeioides</i> Bl., tab. 408 = <i>Pelegus cultratus</i> Ag. = <i>Leuciscus cultratus</i> Val.	Europe.
Macrochirichthys	uranoscopus Blkr. = <i>Leucisc. uranoscopus</i> Blkr.	Sumatra, Borneo, Siam.
"	macrochir Blkr. = <i>Clupea macrochira</i> K. v. H. = <i>Leuciscus macrochirus</i> Val.	Java.

Fossilized Cypriniformes (all from the Molasse period)

Cyprinus	priscus H. De Meyer.	Ulm.
"	sp ?	?
Thaumaturus	sp.?	?
Gobio	analis Ag.	Oeningen.
Tinca	furcata Ag.	Oeningen.
"	leptosoma Ag.	Oeningen.
"	micropygoptera Ag. = <i>Tinca microptera</i> Jaeg.	Oeningen.
Leuciscus	oeningensis. Ag.	Oeningen.
"	latiusculus Ag.	Oeningen.
"	pusillus Ag.	Oeningen.
"	heterurus Ag.	Oeningen.
"	leptus Ag.	Habichtswald.
"	macrurus Ag.	Bonn.
"	papyraceus Bronn.	Lignites tert.
"	Hartmanni Ag.	Steinheim.
"	gracilis Ag.	Steinheim.
"	brevis Ag.	?
"	acrogaster Reuss.	Bohemia.
"	medius Reuss.	Bohemia.
"	Stephani H. De Meyer.	Bohemia.
299	" Colei H. De Meyer.	Bohemia.
"	cephalon Zenk.	Lignites.
"	sp. ?	?
Aspius	gracilis Ag.	Oeningen.
"	Brogniarli Ag.	Puy de Dome.
"	furcatus H. De Meyer.	Bohemia.
"	elongatus H. De Meyer.	Bohemia.
Scardinius	homospondylus Heck.	Steinmark.
Rhodeus	elongatus Ag.	Oeningen.
"	latior Ag.	Oeningen.

RACOMA McCl.,
Afghan Collect. of Fish., Calcutt. Journal Nat. Hist. II 1842 p. 576, Blkr.

Body elongate, compressed, covered with small scales. Jaws enclosed in broad, fleshy lips. Barbels 4, nasal barbels and upper jaw barbels. Snout prolonged. Eyes not covered by palpebral membrane. Mouth slightly anterior or inferior. Lower lip lobed. Anal sheath covered with large scales. Dorsal fin starting above ventral fins and ending far anterior to anal fin, posterior simple ray bony and serrated. Anal fin with few rays, shorter than dorsal fin, acute. Caudal fin scaled only at the base. Pharyngeal teeth ??

Remark. Although I take the genus *Racoma* in a different meaning as Mr McClelland, it seems to me that it can be retained within the borders described above. It then is most closely related to *Schizothorax*, and differs mainly from it by the extraordinary development of thick, fleshy lobed lower lip. In this genus can be placed some Afghan species described briefly by Mr McClelland, i.e. *Ramoma labiatus* McCl., *Racoma brevis* McCl., *Schizothorax Edeniana* McCl. and *Schizothorax Ritchieana* McCl. – *Racoma labiatus* McCl. is the type species of this genus and remarkable, not only by its extremely fleshy lips, but also by its at the tips tripartite barbels, which reminds one of the multipartite barbels of *Cyclocheilichthys* (*Siaja*) *heteronema* Blkr.

300 SCHIZOTHORAX Heck.,

Fisch. Cashmir p. 11; Val., Poiss. XVI p. 160;
Heck., Fisch. Syr. p. 30; Nachtr. p. 183; Blkr.

Body elongate, compressed, covered with small scales. Jaws enclosed in terete, simple lips. Barbels 4, nasal barbels and upper jaw barbels. Snout acute, prolonged. Eyes not covered by palpebral membrane. Mouth slightly anterior or inferior, gape crescent-shaped or in shape reminding of a horse shoe when the mouth is closed. Lower jaw shorter than upper jaw. Postlabial groove on both sides parallel to the free margin of the jaw, not united with the groove on the opposite side. Anal sheath covered with large scales. Dorsal fin starting above ventral fins and ending far anterior to anal fin, posterior simple ray bony and serrated. Anal fin with few rays, shorter than dorsal fin, acute, not emarginate. Caudal fin scaled only at the base. Pharyngeal teeth spoon-shaped 2.3.5/5.3.2.

Remark. As I have already indicated above, I restrict the old genus *Schizothorax* of Heckel after I have separated from it the genus *Schizopyge* following in its footsteps, and, the genus *Opistocheilos* on the basis of the structure of the mouth parts, to the species, which according to their lip structure belong to the *Cheilognathines*, i. e. *Schizothorax esocinus* Heck., *Schizothorax micropogon* Heck., *Schizothorax planifrons* Heck. and *Schizothorax Hügelli* Heck. *Schizothorax intermedius* McCl. can also be placed in it and maybe *Schizothorax barbatus* McCl. and *Racoma gobioides* as well.

BALANTIOCHEILUS Blkr. –
POUCH LIP CARP.

Body elongate, strongly compressed, covered with large scales, back angular. Jaws enclosed in terete, fleshy lips, upper jaw strongly downward protrusible. No barbels. Snout acute. Anterior suborbital bone oblong-square. Mouth slightly inferior, gape ending anterior to the eye, in shape reminding of a horse shoe when the mouth is closed. Lower lip hanging from the total margin of the jaw, broad, form-

ing a pouch which is open only posteriorly. Single postlabial groove parallel to the free margin of the jaw, reminding of the shape of the gape. Anal sheath without larger scales. Dorsal fin starting above or hardly behind ventral fins ³⁰¹ and ending far anterior to anal fin, at the base included in a scaled sheath, posterior simple ray bony and serrated. Anal fin shorter than dorsal fin, emarginate. Gill opening rather narrow, vertical, ending below the middle of the gill cover. Interbranchial isthmus wide. Pharyngeal teeth hooked-spoon-shaped 2.3.5/5.3.2.

The genus *Balantiocheilus* in relationship stands between the genera *Cyclocheilichthys* and *Systemus*. However, it differs from both, firstly: by the peculiar structure of the lower lip, which turns down from the entirely free edge of the lower jaw and is very broad thereby forming a pouch, which is only open posteriorly; – secondly, by the gill opening which is relatively very narrow, and only forms a vertical slit, which ends medially under the opercles. Otherwise it differs also especially from *Cyclocheilichthys* by the irregular square shape of the anterior interorbital, and from *Systemus* by the single horse shoe shaped posterior lip groove.

I possess only one species of this genus and for the rest see nowhere any species described or depicted, which similarly could be placed in it.

Balantiocheilus melanopterus Blkr. –
Zwartvinnige zaklipkarper [*Black finned Pouch lip carp.*]
Atl. Cypr. Tab XLIV.

A *Balantiocheilus* with an oblong, compressed body, depth of body contained $4\frac{1}{3}$ to $3\frac{1}{3}$ times in its length, width 3 to $2\frac{1}{2}$ times in its depth. Head acute, contained $4\frac{3}{4}$ to slightly over 5 times in length of body with caudal fin, $3\frac{1}{2}$ to $3\frac{1}{3}$ times in length of body without caudal fin; depth of head contained $1\frac{1}{2}$ to $1\frac{1}{4}$ times in its length, width 2 to $1\frac{1}{2}$ times; eye diameter contained 3 to slightly over 4 times in the length of the head, distance between the eyes $1\frac{1}{3}$ to 2 times the eye diameter, palpebral membrane covering the external margin of the iris only, opening circular; snout acute, lightly convex anteriorly, in younger animals slightly shorter than the eye, in adults longer than the eye, hardly sticking out in front of the mouth; nostrils rather close to the orbit; rostro-dorsal profile on top of the head sloping, nearly straight, convex on the nape; interorbital line convex; anterior suborbital bone oblong-square, lower part much wider than upper part; lower angle slightly obtusely rounded, anterior angle acute, forward facing; 2nd suborbital bone about twice as low as 1st suborbital bone; upper jaw longer than lower jaw, strongly vertically downward protrusible, ending anterior to the eye, contained $3\frac{1}{3}$ to $3\frac{1}{2}$ times in the length of the head; gape slightly oblique, lower jaw slightly ascending, obtuse, not hooked or tubular at the symphysis; lips broad, fleshy, upper lip traversed by numerous transverse grooves, in adults very broad, anteriorly protrusible in an acute lobe; lower lip very broad, back-sheathed from the total margin of the lower jaw and united broadly with the upper lip, forming a pouch which is open only posteriorly; underside of lower jaw without any visible pores; height of gill cover contained $1\frac{1}{4}$ to $1\frac{1}{2}$ times in its length, lower margin nearly straight; gill opening vertical, narrow, ending below the middle of the gill cover. Pharyngeal teeth hooked-spoon-shaped 2.3.5/5.3.2; scapula triangular, acute, in old animals rounded; back elevated, angular, much higher than the belly; belly flat anterior to ventral fins, angular at the flanks, rounded behind the ventral fins, not ridged; tail depth contained 2 to $1\frac{1}{4}$ times in the length of the head; free and basal part of with longitudinal stripes, 35 scales in the lateral line, 11 in a transverse row (without ³⁰² the lowest ventral scales) of which 6 ($5\frac{1}{2}$) above the lateral line, 11 in a longitudinal row between occiput and dorsal fin, on the lower belly in three longitudinal rows, scales in medial row larger than those in flanking rows; lateral line nearly straight, sloping downward only anteriorly, reaching the rostro-caudal line, each scale marked by a short, simple tube, not reaching the centre of the scale; dorsal fin starting above the middle of the base of the ventral fins, acute, emarginate, in juveniles not lower than the body, in old animals not much lower than the body, depth about twice base length, spine thick, posteriorly

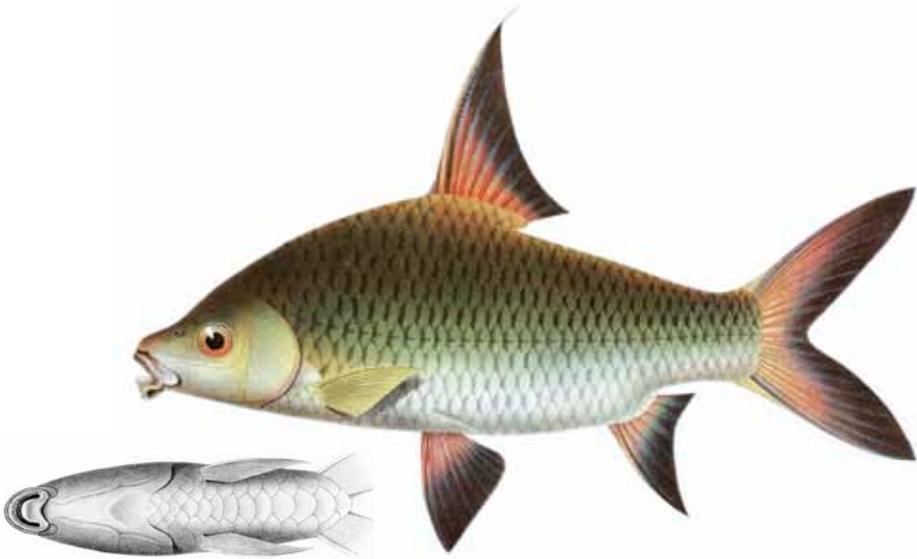


Fig. 57. *Balantiocheilos melanopterus* Blkr. Atl. Ichth. Cypr. Tab. XXXIX. TL figure 313 mm.

armed with large teeth, with a flexible part longer than the head; pectoral and ventral fins acute, ventral fins slightly shorter than dorsal fins, contained $6\frac{1}{4}$ to 7 times in the length of the body, in juveniles reaching the ventral fins, in old animals not reaching the ventral fins; anal fin acute, emarginate, much lower than dorsal fin, less than twice as high as base length, simple third ray bony only for the basal half; caudal fin scaled only at the base, with a deep incision, lobes acute, contained $3\frac{1}{2}$ to slightly over 4 times in the length of the body. Colour: upper part of the body faintly green, lower part silver, iris yellow; fins pink or yellowish-pink, ventral fins black for the top half. Dorsal, anal and caudal fin with a broad black margin, dorsal fin for the lower front half and caudal fin for basal half with external rays, generally violet.

B. 3. D. $4/8$ or $4/9$. P. $1/15$. V. $2/9$. A. $3/5$ or $3/6$. C. $6/17/6$ or $7/17/7$, short flanking ones included.

Syn. *Barbus melanopterus* Blkr, Bijdr. ichth. Borneo, Nat. T. Ned. Ind. I. p. 11.

Systemus melanopterus Blkr, Zesde bijdr. ichth. Born. Nat. T. Ned. Ind. III p. 429. Zevende bijdr. ichth. Borneo, Nat. T. Ned. Ind. V p. 449.

Batang buro Palemb.

Hab. Borneo (Bandjermasin, Kahajan, Pengaron, Pontianak, Sintang), in rivers.
Sumatra (Palembang), in rivers.

Length of 19 specimens $80''$ to $322''$.

Remark. The beautiful species described here, the only one till now known from this genus, not only lives in the large streams of Sumatra and Borneo, as I see it also very well recognizable depicted in the already various times cited sketchbook of Siamese fishes of Count Fr. de Castelnau, making it clear that it is also found near Bangkok, the capital of Siam.

I discovered it already in the year 1950 and described it first as a *Barbus* and later as a *Systemus*, but place it now, on the above mentioned grounds, in a genus of its own. The very broad black free halves of the fins (except for the pectoral fins) are very sharply delimited and make the species easily recognizable at a first glance.

AMBLYRHYNCHICHTHYS Blkr. –
BLUNT SNOUT CARP.

Body oblong, strongly compressed, covered with large scales, with an elongate back. Jaws enclosed in simple lips, upper lip strongly downward protrusible. No barbels. Snout very obtuse, truncate. Supramaxillary bones reaching the tip of the snout and there hiding the intermaxillary bones. Anterior suborbital bone shoe-shaped, with the tip of the shoe facing backward. Eyes largely covered by palpebral membrane. Mouth anterior, ³⁰³ with a small gape, in shape reminding of a horse shoe when the mouth is closed. Lower lip with a hooked tubercle at the symphysis. Postlabial groove on both sides parallel with the free margin of the jaw, not united with the groove on the opposite side. Gill opening medium-sized, ending below the angle of the preoperculum. No anal sheath covered with larger scales. Dorsal fin starting above ventral fins and ending anterior to anal fin, at the base included in a scaled sheath, posterior simple ray bony, serrated. Anal fin shorter than dorsal fin, emarginate. Caudal fin scaled at the base only. Pharyngeal teeth wedge-shaped, aggregated 2.3.4/4.3.2.

Remark. The genus *Amblyrhynchichthys* is undeniable related to *Systemus* and *Albulichthys*, but it possesses various peculiarities in its morphology that characterize it as proper genus. It is very peculiar that the pharyngeal teeth are pavement-like arranged here and have entirely flat, obliquely truncated chewing area, a shape which generally is only found in *Labeobarbus*. But apart from the dentition the genus is remarkable by the shape of the anterior half of the head, by the shoe-shape of the anterior suborbital bone, the tip of which is pointing backwards; and by the extension of the maxillae up till the rostral surface of the snout, which thereby, while entirely covering the intermaxillary bones [premaxillae] anteriorly, are placed between these and the nasal bones. This organization determines the very high and almost vertically truncated shape of the snout, by which the till now only known species of this genus, at the first glance, can be distinguished from all other Cyprinoids. The shape of the trunk and fins for the rest is that of *Systemus* and *Cyclocheilichthys*, whereas the broad eyelid membrane, which is largely covering the eye, is also found in the genus *Albulichthys*. To the generic characters of *Amblyrhynchichthys* can also be brought the short flat lower jaw, which is provided with a strongly developed bony projection at its symphysis, the thin lips and a double posterior lip groove. Maybe generic value can also be attached to the large bony third undivided dorsal fin ray, which represents a second dorsal fin ray that in length surpasses the length of the eye. Till now I know of this genus only the species that I described already in the year 1850 under the name *Barbus truncatus*.

Amblyrhynchichthys truncatus Blkr. –
Geknotte Stompsnuit karper [Truncated Blunt Snout Carp].
Atl. Cypr. Tab. XLV.

An *Amblyrhynchichthys* with an oblong, compressed body, depth of body contained $4\frac{1}{2}$ to 4 times in its length, width contained 2 to $2\frac{1}{2}$ times in its depth. Head obtuse, truncate, contained $4\frac{1}{2}$ to $5\frac{3}{4}$ times in length of body with caudal fin, 4 to $4\frac{1}{2}$ ³⁰⁴ times in length of body without caudal fin; depth of head contained $1\frac{1}{2}$ to $1\frac{3}{4}$ times in its length, width slightly over 2 to $1\frac{3}{4}$ times in its length; eyes surrounded by broad adipose skin, eye diameter contained $2\frac{2}{3}$ to $2\frac{1}{2}$ times in the length of the head, distance between the eyes $\frac{3}{4}$ to $\frac{5}{6}$ times the eye diameter, palpebral membrane nearly completely covering the iris anteriorly, posteriorly and at the underside, at the upper side covering only the external margin, opening nearly circular or oblong-squarish; snout very obtuse, nearly vertically truncate, elevated, in juve-



Fig. 58. *Amblyrhynchichthys truncatus* Blkr. Atl. Ichth. Cypr. Tab. XXVIII, Fig. 2. TL figure 254 mm.

niles and adults about twice as short as the eye, sticking out in front of the mouth; nostrils closer to the tip of the snout than to the orbit, more forward than sideways facing; rostro-dorsal profile rectangular on the head, rounded at the angle, on the nape sloping, nearly straight; interorbital line convex; anterior suborbital bone shoe-shaped, tip of the shoe facing backward, the shaft of the shoe close to the nostrils; 2nd suborbital bone more than twice as low as 1st suborbital bone; upper jaw longer than lower jaw, strongly vertically downward protrusible, ending below the anterior part of the pupil, contained 4 times to slightly over 4 times in the length of the head; intermaxillary bone nearly completely hidden below the supramaxillary bone, ascending branch vertical; gape nearly horizontal, lower jaw short, margin thin, at the symphysis with a conical, very conspicuous tubercle, slightly hooked at the tip; lips fine, thin, very short; underside of lower jaw without any visible pores; width of gill cover contained 1 $\frac{3}{4}$ to 1 $\frac{1}{2}$ times in its depth, lower margin concave or slightly concave; gill opening vertical, ending below the posterior margin of the preoperculum. Pharyngeal teeth aggregated 2.3.4/4.3.2, each with a flat, smooth, wedge-shaped chewing surface, margins not elevated or tuberculate; scapula triangular, slightly obtuse, acutely rounded at the tip; back elevated, angular, much higher than the belly; belly flat anterior to ventral fins, angular at the flanks, behind ventral fins rounded, not ridged; tail height contained 1 $\frac{1}{2}$ to 2 times in the length of the head; scales for the free part and the basal part with longitudinal stripes, 36 or 37 scales in the lateral line, 11 in a transverse row (without the lowest ventral scales) of which 6 (5 $\frac{1}{2}$) above the lateral line, 11 or 12 in a longitudinal row between occiput and dorsal fin, on the lower belly in three longitudinal rows, scales in medial row larger than those in flanking rows; lateral line nearly straight, sloping downward only anteriorly, not reaching the rostro-caudal line, each scale marked by a short, simple tube, generally not reaching the centre of the scale; dorsal fin starting above the base of the ventral fins, acute, emarginate, not lower or slightly lower than the body, about twice as high as base length, spine thick, posteriorly armed with large teeth, with a flexible part much longer than the head, simple third ray bony, spine-shaped, longer than the eye; pectoral and ventral fins acute, nearly equal in length, contained slightly over 6 to 7 times in the length of the body, pectoral fins not reaching ventral fins, anal fin acute, emarginate, twice as low or more than twice as low as dorsal fin, less than twice as high as base length, simple third ray medium-sized, bony only for the basal half; caudal fin scaled only at the base, with a deep incision, lobes acute, contained 4 to 4 $\frac{3}{4}$ times in the length of the body. Colour: upper part of the body faintly green, lower part silver; iris yellow; fins faintly pink or yellowish, dorsal and caudal fin with a margin of dense dark speckles.

B. 3. D. 4/8 or 4/9. P. 2/16. V. 2/9. A. 3/5 or 3/6. C. 7/17/7 or 8/17/8, short flanking ones included.

Syn. *Barbus truncatus* Blkr, Bijdr. ichth. Born. Nat. T. Ned. Ind. I p. 13.

Systemus truncatus Blkr, Bijdr. ichth. Borneo, Nat. T. Ned. Ind. II p. 60.

Teban galang, *Bettet* Palemb.

Hab. Borneo (Bandjermasin, Pontianak), in rivers.

Sumatra (Palembang), in rivers.

Length of 11 specimens 50''' to 260'''.

Remark. I received my first specimens of this species from the Barito near Bandjermasin, but since then I also obtained larger specimens, caught in the Kapoeas near Pontianak and in the Moessi near Palembang. The species therefore inhabits the larger rivers of Borneo and Sumatra. However, it is not restricted to the Indian archipelago, [305](#) as I saw it also depicted in the sketchbook of Mr De Castelnau, from which it is apparent that it also occurs in Siam near the capital Bankok. The figure of Mr De Castelnau has a length of ca 330 millimetres, so that this species seems to become still remarkably larger than my largest specimens.

ALBULICHTHYS Blkr. –

ALBULA CARP.

Body slightly elongate, strongly compressed, covered with large scales, back angular. Jaws enclosed in terete, simple lips, upper jaw strongly downward protrusible. No barbels. Snout convex. Upper jaw bones not reaching the tip of the snout. Anterior suborbital bone pentagonal, the acute tip looking upwards. Eyes largely covered by palpebral membrane. Mouth nearly anterior, with a medium-sized gape, in shape reminding of a horse shoe when the mouth is closed. Lower jaw with a hooked tubercle at the symphysis. Postlabial groove on both sides parallel with the free margin of the jaw, not united with the groove on the opposite side. Gill opening medium-sized, ending below the angle of the preoperculum. Anal sheath not covered by larger scales. Dorsal fin starting above or slightly anterior to ventral fins and ending far anterior to anal fin, at the base enclosed in a scaled sheath, simple ray bony, serrated on the posterior side. Anal fin shorter than dorsal fin, emarginate. Caudal fin for the basal half completely scaled. Pharyngeal teeth incisive, scalpriform 2.3.4/4.3.2, on the chewing surface longitudinally rugose.

Remark. A further study of the species, which I described in the year 1855 under the name of *Systemus albuloides*, in connection with my new ideas concerning the classification of the Cyprinoids, has taught me that that species equally deserves to be raised to a proper genus as my earlier *Systemus truncatus*. The habitus of that species, especially of the head, much resembles that of an *Albulus*. It has the pentagonal with the upwards directed tip of the anterior suborbital bone of *Systemus*, but together with that the broad, even the pupil somewhat covering, eyelid membrane of *Amblyrhynchichthys*. The third undivided dorsal fin ray is much developed and bony, as it is in *Amblyrhynchichthys*. Remarkable is moreover the densely squamation of the entire or almost the entire basal half of the caudal fin, which I do not recognize in any cyprinoid. These characters, added to the peculiar wedge- or chisel shape of the pharyngeal teeth, which [306](#) are longitudinally ribbed on their chewing surface, give, in my opinion, every right to see in this species a proper genus, which I, because of its resemblance in habitus to *Albula*, have named *Albulichthys*.

Albulichthys albuloides Blkr. –
Typische Albulakarper [Typical *Albula* Carp].
 Atl. Cypr. Tab. XLVI Fig. 2.

An *Albulichthys* with an oblong or elongate, compressed body, depth of body contained $4\frac{1}{2}$ to slightly over 5 times in its length, width contained $1\frac{3}{4}$ to 2 times in its depth. Head acute, contained nearly 5 to $5\frac{1}{4}$ times in length of body with caudal fin, $3\frac{3}{4}$ to 4 times in length of body without caudal fin; depth of head contained about $1\frac{2}{3}$ times in its length, width $1\frac{3}{4}$ to $1\frac{2}{3}$ times; eye diameter contained 3 to $3\frac{1}{2}$ times in the length of the head, distance between the eyes slightly more than once their diameter, palpebral membrane covering the total iris anteriorly and posteriorly, opening oblong-oval, vertical; snout convex, shorter than the eye, sticking out in front of the mouth; nostrils very close to the orbit; rostro-dorsal profile convex on all of the head; interorbital line convex or slightly convex; anterior suborbital bone pentagonal, the acute tip pointing upward, depth greater than length, longitudinal ridge in the middle, ascending backward; 2nd suborbital bone three times to more than three times as low as 1st suborbital bone; upper jaw slightly longer than lower jaw, strongly vertically downward protrusible, contained 3 to slightly over 3 times in the length of the head, ending below the anterior part of the eye; lower jaw at the symphysis with a conical tubercle, slightly hooked at the tip; lips slender, terete; width of gill cover contained $1\frac{2}{3}$ to $1\frac{3}{4}$ times in its depth, lower margin nearly straight; gill opening ending below the posterior margin of the preoperculum. Pharyngeal teeth scalpriform (incisive) 2.3.4/4.3.2, each with an oblique, flat, longitudinally rugose chewing surface, free margin forming an acute, rounded edge; scapula triangular, obtuse; back angular, much higher than the belly; belly flat anterior to ventral fins, angular at the flanks, behind ventral fins rounded, not ridged; scales with longitudinal stripes on the free part, 38 or 39 scales in the lateral line, 11 in a transverse row (without the lowest ventral scales) of which $5\frac{1}{2}$ or 6 above the lateral line, 11 or 12 in a longitudinal row between occiput and dorsal fin, on the lower belly in three longitudinal rows, scales in medial row larger than those in flanking rows; lateral line straight, sloping downward only anteriorly, not descending below the rostro-caudal line, each scale marked by a short, simple tube, generally not surpassing the centre of the scale; dorsal fin starting above or hardly anterior to the ventral fins, acute, emarginate, slightly lower than the body, higher than base length, spine thick, posteriorly serrated with very conspicuous teeth, with a flexible part slightly shorter than the head; pectoral and ventral



Fig. 59. *Albulichthys albuloides* Blkr. Atl. Ichth. Cypr. Tab. XXXIII, Fig. 2. TL figure 253 mm.

fins acute, nearly equal in length, contained 7 to 7½ times in the length of the body, pectoral fins not reaching ventral fins, anal fin acute, emarginate, much lower than dorsal fin, less than twice as high as base length; caudal fin densely scaled on the total basal half, with a deep incision, lobes acute, contained 4½ to 5 times in the length of the body. Colour: upper part of the body faintly green, lower part silver, iris yellow; fins yellowish-pink or red; upper part of dorsal fin and posterior part of caudal fin with violetish-dark margins; iris yellow.

B. 3. D. 4/8 or 4/9. P. 1/16 to 1/18. V. 2/9. A. 3/5 or 3/6. C. 7/17/7 or 6/17/6, short flanking ones included.

Syn. *Systoma albuloides* Blkr, Negende bijdr. ichth. Borneo, Nat. T. Ned. Ind. IX p. 425.

Hab. Sumatra (Palembang), in rivers.

Borneo (Kahajan, Pontianak), in rivers.

Length of 5 specimens 132''' to 255'''.

Remark. The teeth, with exception of the two anterior ones of the outer row, have wedge shaped or incisor-like, at the corners rounded, crowns, which show some longitudinal ridges on the chewing surface, which are not extended to the upper edges of the teeth. The symphyseal knob of the lower jaw is rather strongly developed. Because of the observation of excellent preserved specimens, I can at present positively declare that the species does not possess barbels, which I earlier had slight doubts about. – Till now I know it only from the large rivers of Borneo and Sumatra.

HAMPALA Van Hass.,

Algemeene Konst- en Letterbode 1823 II p. 132. –

HAMPAL.

Body oblong-elongate, compressed, covered with large scales, back angular. Jaws enclosed in terete, simple lips, upper lip slightly protrusible. Barbels 2, upper jaw barbels. Snout acute, not convex. Supramaxillary bones not reaching the tip of the snout. Anterior suborbital bone pentagonal, the acute tip pointing upward. Eyes not covered by palpebral membrane. Mouth anterior, with a large, oblique gape. Lower jaw not shorter than upper jaw with a slightly elevated symphysis. Postlabial groove on both sides parallel with the free margin of the jaw, not united with the groove on the opposite side. Gill opening broad, protracted to a point below the eye. Anal sheath not covered by larger scales. Dorsal fin starting above the base of ventral fins and ending far anterior to anal fin, at the base enclosed in a scaled sheath, posterior simple ray bony, serrated. Anal fin shorter than dorsal fin, emarginate. Caudal fin scaled only at the base. Pharyngeal teeth spoon-shaped 1.3.5/5.3.1.

Remark. Van Hasselt, probably struck by the peculiar habitus of the fish, on Java so common and known under the name Ampalong, Hampel, Hampalong and Soetjo, placed it in a proper genus, which he after the Sundanese name gave the name Hampala. However, he did not characterize it further than by saying that it "most resembles *Leuciscus* Cuv., but distinguishes itself by two filaments, on each mouth corner" (that means one, on each mouth corner). Mr Valenciennes placed Van Hasselt's *Hampala macrolepidota* in his genus *Capoëta*, a less lucky invention, as the three species of *Capoëta* described by Mr Valenciennes, belong in just as much genera, i.e. in *Scaphiodon*, *Systemus* and *Hampala*.

Heckel, in his "Fische Syriens", originally placed *Hampala macrolepidota* in his genus *Scaphiodon*, but recognized his error in the end of the same work, by placing it in his genus *Systemus*.

Hampala indeed is closely related to *Systomus*. Fin shape and squamation are the same, but the shapes of the snout and jaws and even of the dentition offer differences, which justify a separation of *Systomus*.

I count among these the acute snout, the relatively large gape and its oblique position, the little protrusible upper jaw and the length of the lower jaw which is as long as the upper jaw making the gape completely terminal. Because of these peculiarities of the shape a profile is formed that is very different from that of *Systomus* and related genera and Van Hasselt was right to point at the relationship of *Hampala* with *Leuciscus* Cuv., as many species related to *Leuciscus* present a comparable mouth shape.

Till now I only know two species of the genus, both of which inhabit the Indian archipelago. In habitus, fin structure and squamation they have very much in common and can primarily be distinguished from each other as follows

- I. 28 scales in the lateral line. A large, oblong, vertical, black spot between dorsal and ventral fins. Upper and lower part of caudal fin with a broad black-violet margin.

Hampala macrolepidota V. Hass.

- II. 31 scales in the lateral line. Middle of the flanks with 2 round black spots, the anterior one between the dorsal and ventral fins, posterior one hardly behind the anal fin. Upper and lower part of caudal fin without black-violet margin.

Hampala ampalong Blkr.

Hampala macrolepidota K. v. H.,
 Algem. Konst- en letterbode 1823 II p. 132. –
Grootshubbige Hampal [*Large-scaled Hampal*].
 Atl. Cypr. Tab. XLIII.

A *Hampala* with an oblong or elongate, compressed body, depth of body contained 4 to 5½ times in its length, width contained 1¾ to 2 times in its depth. Head acute, contained 4 to 4¾ times in length of body with caudal fin, ¾ to 3¾ times in length of body without caudal fin; depth of head contained 1½ to 1¾ times in its length, width 1½ to 2½ times; eye diameter contained 3 to 5 times in the length of the head, distance between the eyes ¾ to 1¼ times their diameter, palpebral membrane covering the external margin of the iris only, opening nearly circular; snout acute, not or slightly convex, with the upper jaw in younger animals shorter than the eye, in old animals longer than the eye, not sticking out in front of the mouth; nostrils much closer to the orbit than to the tip of the snout; rostro-dorsal profile sloping downward on the head, nearly straight or slightly concave, convex on the nape; interorbital line nearly straight or slightly convex; anterior suborbital bone irregularly pentagonal, lower part 309 broader than upper part, lower margin nearly horizontal, rounded anteriorly and posteriorly, other margins more or less concave, superior angle acute, close to the nostrils, pointing upward, complete upper half of the bone traversed by a strongly curved crest, ending in branches at the underside; 2nd suborbital bone oblong, obliquely quadrangular, about twice as low as 1st suborbital bone; jaws equal or nearly equal, upper jaw slightly forward protrusible, in juveniles ending hardly anterior to the eye or below the anterior margin of the eye, in old animals ending below the middle of the eye or below the anterior half of the eye, contained 3 to 2½ times in the length of the head; gape rather oblique; barbels slightly longer or shorter than the eye; lower jaw at the symphysis with a conical, obtuse, short tubercle, on the underside on each branch some little conspicuous pores in one longitudinal row; lips medium-sized, terete, not rugose; width of gill cover contained 1½ to 1¾ times in its depth, lower margin nearly straight or slightly concave; gill opening broad, ending below the posterior suborbital bone. Pharyngeal teeth slightly

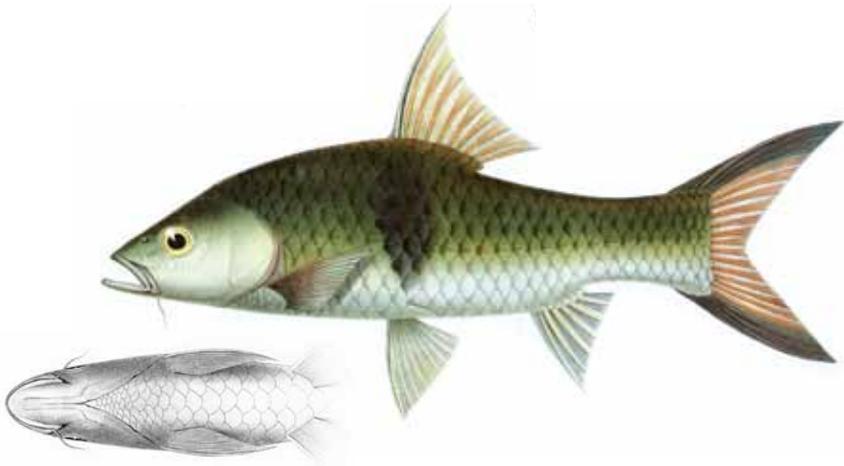


Fig. 60. *Hampala macrolepidota* K. v. H. Atl. Ichth. Cypr. Tab. XXXVIII, Fig. 2. TL figure 292 mm.

hooked to spoon-shaped 1.3.5/5.3.1; scapula triangular, obtuse, with a rounded angle; back rather elevated, angular, much higher than the belly; belly flat anterior to ventral fins, lightly angular on the flanks, behind ventral fins rounded, not ridged; depth of tail contained slightly over 2 times to $1\frac{1}{2}$ times in the length of the head; scales striped ray-like from a reticulate or simple common centre, often granulated, 28 scales in the lateral line, 9 in a transverse row (without the lowest ventral scales) of which 5 ($4\frac{1}{2}$) above the lateral line, 10 in a longitudinal row between occiput and dorsal fin, on lower belly in three longitudinal rows, scales in medial row gradually increasing in size posteriorly, posterior ones in those rows larger than those in flanking rows; lateral line moderately curved, descending below the rostro-caudal line, each scale marked by a simple tube, generally reaching the centre of the scale; dorsal fin starting above the base of the ventral fins, acute, emarginate, slightly to much lower than the body, much higher but less than twice as high as base length, spine thin, posteriorly serrated or rough with little conspicuous or hardly visible teeth, with the flexible part much shorter than the head; pectoral and ventral fins acute, pectoral fins slightly longer than ventral fins, contained $6\frac{1}{2}$ to $7\frac{1}{2}$ times in the length of the body, not reaching ventral fins, ventral fins not reaching anal fin; anal fin acute, emarginate, much lower than dorsal fin, but less than twice as low, much higher than to about twice as high as base length, simple third ray thin, bony only at the base; caudal fin scaled only at the base, with a deep incision, lobes acute, contained 4 to $4\frac{3}{4}$ times in the length of the body. Colour: upper part of the body green, lower part silver, iris yellow; snout and forehead often deeply olive; scales on back, flanks and tail generally each at the base with a transverse, crescent-shaped, violetish or blackish band; a transverse elongate black spot or band between dorsal and ventral fin, frequently diffuse, more rarely missing; dorsal and caudal fin beautiful pink, front part of dorsal fin and upper and lower part of caudal fin with a deeply violet margin; other fins white-hyaline.

B. 3. D. $4/8$ or $4/9$. P. $1/15$ or $1/16$. V. $2/8$. A. $3/5$ or $3/6$. C. $6/17/6$ to $8/17/8$, short flanking ones included.

Syn. *Capoëta macrolepidota* Valenciennes, Poiss. XVI p. 214 tab. 477; Cant., Catal. Mal. Fish. P. 267;

Blkr, Verh. Bat. Gen. XXIII Ichthyol. Midden-Oost-Java p. 21.

Capoëte bordé Valenciennes, Poiss. XVI p. 214 tab. 477.

Scaphiodon macrolepidotus Heckel, Fisch. Syriens, p. 31.

Systemus macrolepidotus Heckel, Fisch. Syriens, Nachtr. p. 184.

Ampalong Mal. Batav. *Hampal*, *Hambal*, *Hampalong* Sund.

Wader, *Sutjo* Javan.

Sabaju Lampong., *Kabarouw* Benkul.

Hab. Java (Batavia, Tjibilong, Tjampea, Buitenzorg, Pondokgedeh, Seogol, Parongkalong, Pandjullu, Ngawi, Surabaya, Grati, Lesti), in rivers and lakes.
 Borneo (Bandjermasin, Sambas), in rivers.
 Sumatra (Pangabuang, Palembang, Lahat, Padang, Meninju), in rivers and lakes.
 Length of 40 specimens 45''' to 340'''.

310 Remark. This species was discovered on Java by Kuhl and Van Hasselt. I received it also from Borneo and Sumatra; and Mr Cantor mentions it from Pinang and Tenasserim. My specimens from East Java and the Lampongs differ from the remaining ones by a more slender body and more acute and relatively longer head. On Java the species is rather common. In Batavia it is one of the most frequent occurring species. It also lives in the mountain streams till more than 2000 feet above sea level, and reaches a length that surpasses that of my largest specimens.

Hampala ampalong Blkr. –
Tweevlekkige Hampal [Two spotted Hampal].
 Atl. Cypr. Tab. XLVI fig. 1.

A *Hampala* with an oblong compressed, body, depth of body contained $4\frac{1}{3}$ to $4\frac{3}{4}$ times in its length, width contained nearly 2 to $1\frac{3}{4}$ times in its depth. Head acute, contained nearly 4 to $4\frac{1}{2}$ times in length of body with caudal fin, 3 to $3\frac{1}{4}$ times in length of body without caudal fin; depth of head contained about $1\frac{1}{2}$ times in its length, width contained $2\frac{1}{4}$ to nearly 2 times in its length; eye diameter contained slightly over 4 to $4\frac{1}{2}$ times in the length of the head, distance between the eyes slightly more than once their diameter, palpebral membrane covering the external margin of the iris only, opening nearly circular; snout acute, not convex, with the upper jaw longer than the eye, not sticking out in front of the mouth; nostrils much closer to the orbit than to the tip of the snout; rostro-dorsal profile sloping on the head, nearly straight or nearly concave, convex on the nape; interorbital line nearly straight; anterior suborbital bone triangular, length greater than depth, rounded at the underside, front and back, the acute tip pointing upward, close to the nostrils, middle with a longitudinal ridge which is ramose anteriorly; 2nd suborbital bone oblong-squarish, twice to nearly twice as low as 1st suborbital bone; jaws equal, upper jaw slightly forward protrusible, ending below the anterior half of the eye, contained $2\frac{1}{2}$ to $2\frac{2}{3}$ times in the length of the head; gape strongly oblique, barbels thin, slightly or not longer than the eye; lower jaw at the symphysis with a conical, obtuse, short tubercle, on the underside on each branch some little conspicuous pores in one longitudinal row; lips medium-sized, terete, not rugose; width of gill cover contained $1\frac{1}{2}$ to $1\frac{3}{5}$ times in its depth, lower margin nearly straight; gill opening broad, ending below the posterior suborbital bone. Pharyngeal teeth slightly hooked to spoon-shaped 1.3.5/5.3.1; scapula triangular, obtuse, rounded; back moderately elevated, angular, much higher than the belly; belly flat anterior to ventral fins, lightly angular at the flanks, behind ventral fins rounded, not ridged; depth of tail contained about $2\frac{1}{3}$ times in the length of the head; scales with ray-like stripes from a common centre, 31 scales in the lateral line, 9 in a transverse row (without the lowest ventral scales) of which 5 ($4\frac{1}{2}$) above the lateral line, 10 in a longitudinal row between occiput and dorsal fin, on the lower belly in three longitudinal rows, scales in medial row gradually increasing in size posteriorly, posterior scales in those rows hardly or not larger than those in flanking rows; lateral line moderately downward curved, descending below the rostro-caudal line, each scale marked by a short, simple tube generally reaching the centre of the scale; dorsal fin starting above the base of the ventral fins, acute, emarginate, slightly lower than the body, much higher but less than twice as high as base length, spine medium-sized, posteriorly serrated with small teeth, with a flexible part considerably shorter than the head; pectoral and ventral fins acute, pectoral fins slightly longer than ventral fins, contained $6\frac{1}{3}$ to $6\frac{2}{3}$ times in the length of the body, not reaching ventral fins, ventral fins not reaching anal fin; anal fin acute, emarginate, much lower but much less than twice as low as dorsal fin, much higher but much less than



Fig. 61. *Hampala ampalong* Blkr. Atl. Ichth. Cypr. Tab. XXVII, Fig. 1. TL figure 146 mm.

twice as high as base length, third ray simple, rather thin, bony only for the basal half; caudal fin scaled only at the base, with a deep incision, lobes acute, contained $4\frac{1}{2}$ to $4\frac{1}{4}$ times in the length of the body. Colour: upper part of the body bluish-green, lower part silver, iris yellow; 2 round or oblong black spots on each flank, anterior one placed 311 between dorsal fin and ventral fin above the lateral line, posterior one slightly behind the base of the anal fin in the lateral line; fins yellowish or faintly pink, or dorsal and caudal fin pink, the others pearly.

B. 3. D. $4/8$ or $4/9$. P. $1/14$ to $1/16$. V. $2/8$. A. $3/5$ or $3/6$. C. $*17/8$ or $7/17/7$, short flanking ones included.

Syn. *Capoëta ampalong* Blkr, Diagn. Nieuwe vischs. Sumatra, Nat. T. Ned. Ind. III p. 594.

Hab. Borneo (Pontianak), in rivers.

Sumatra (Palembang), in rivers.

Length of 3 specimens 120''' to 149'''

Remark. *Hampala ampalong* is very closely related to *Hampala macrolepidota* Val. However, it is easy recognizable by the two black spots on each side of the body, one of which is placed between the dorsal fin and the ventral fin, and the other a little behind the origin of the anal fin. In specimens of *Hampala macrolepidota* of the same size as the ones described above, the head is shorter, the lower jaw symphyseal knob much less developed and the upper jaw shorter. Moreover there are three scales less in the lateral line.

HYPSELOBAGRUS Blkr. –

TAMBRA.

Body oblong, covered with large scales, back angular. Jaws enclosed in terete, simple lips. Barbels 4, nasal and upper jaw barbels, or 2 upper jaw barbels or no barbels. Snout conical, prominent. Mouth slightly inferior, gape ending anterior to the eye, in shape reminding of a horse shoe when the mouth is closed. Anal sheath not covered with larger scales. Dorsal fin starting in front or above ventral fins and ending far anterior to anal fin, simple ray bony, not serrated on the posterior side. Anal fin shorter than dorsal fin.

- Subg. *Hypselobarbus* Blkr. 4 barbels, nasal and upper jaw barbels.
 " *Gonoptopterus* Blkr. 2 barbels, upper jaw barbels.
 " *Tambra* Blkr. No barbels.

Remark. In his essay "on the Fishes of the Dukhum" Mr Sykes described and depicted three species under the names *Barbus mussullab*, *Barbus kolus*, and *Cyprinus ambramioides*, which show the habitus of the genus *Cyclocheilichthys*, however offer more peculiarities in the organization, which have induced me too perceive them tentatively as belonging to a proper genus. From the figures and descriptions of Mr Sykes nothing special can be gathered concerning the posterior lip groove, the shape of the anterior suborbital bones and the covering of the base of the dorsal fin, which I suspect do not differ fundamentally from those in *Cyclocheilichthys*.

312 However, the dorsal fin spine is extremely slender and without teeth while the anal fin is not concave and in the two first mentioned species even extremely convex or squarely rounded. Moreover remarkable is the peculiar upwards curvature of the lateral line above or a little in front of the vent (which however seems to be lacking in *Cyprinus abramioides*) and wart-like covering of the cheeks or of the snout with large pores, the last of which are said not to occur constantly. Furthermore the dorsal fin has from 10 to 20 branched rays.

These species in all respects deserve a closer examination. *Barbus mussullah*, because it possesses 4 barbels, belongs to the subgenus *Hypselobarbus*; – *Barbus kolus*, because of its 2 barbels, to the subgenus *Gonoptopterus*; – and *Cyprinus abramioides* Syk., which has no barbels at all, to the subgenus *Tambra*, which name the species bears in Deccan. This last one because of its long dorsal fin maybe should be raised to a proper genus. Heckel indeed brings it to his genus *Gibelion*, which however is not acceptable and based on generically very different species, as *Cyprinus catla* belongs to the genus *Catla* and *Varicorhinus bobbree* probably belongs to the genus *Gymnostomus*.

SYSTEMUS McCL,
 Ind. Cyprinid., Asiat Research. Vol. XIX p. 284;
 Heck. Fisch. Syr. p. 26; Poiss. XVI p. 299. –
 LALAWAK.

Body oblong, compressed, covered with large scales, back angular. Jaws enclosed in terete, simple lips, upper lip strongly downward protractile. Barbels 4, nasal and upper jaw barbels, or 2 upper jaw barbels or no barbels. Snout short, obtuse or slightly obtuse, not prolonged. Supramaxillary bones not reaching the tip of the snout. Anterior suborbital bone pentagonal, the acute tip facing upward. Eyes not covered by palpebral membrane. Mouth slightly anterior or inferior, gape not or slightly oblique, in shape reminding of a horse shoe when the mouth is closed. Lower jaw shorter than upper jaw with a more or less visible tubercle at the symphysis. Postlabial groove on both sides parallel to the margin of the mouth, not united with the groove on the opposite site. Gill opening ample, prolonged to a point below the preoperculum. Anal sheath not covered with larger scales. Dorsal fin starting above or slightly behind ventral fins and ending far anterior to anal fin, base enclosed in a scaled sheath, posterior simple ray bony, serrated or smooth. Anal fin shorter than dorsal fin. **313** Caudal fin scaled only at the base. Pharyngeal teeth spoon-shaped 2.3.5/5.3.2 or 2.3.4/4.3.2 or with a rod-like neck, tuberculate 1.3.4/4.3.1 or 2.3.4/4.3.2.

- Subg. *Barbodes* Blkr. 4 barbels, nasal and upper jaw barbels.
 " *Capoëta* Val. 2 barbels, upper jaw barbels.
 " *Systemus* McCl., No barbels.

Remark. The genus *Systemus*, as described here, mainly differs from *Barbus* by a stocky body, a short snout, thin lips, a more or less terminal mouth, a dorsal fin surrounded by a scale sheath, a pentagonal anteriormost suborbital bone with a sharp upwards directed angle, and by the double posterior lip groove as the grooves of both sides are not joint in the middle.

Mr McClelland was the first to erect the genus *Systemus*, however, he gave it another meaning as the one described above, i.e. "Intermaxillares protractile, dorsal and anal short, the former opposite to the ventrals and preceded by a spinous ray: body elevated, and marked by two or more distinct dark spots, or diffuse spots either on the fins or opercula, prominence on the apex of the lower jaw obscure". The first and last mentioned of these characters *Systemus* has in common with other related genera and to the mentioned markings not only no generic value can be attached, even as a specific character it can only be used cautiously in a restricted sense.

Mr Valenciennes accepted the genus *Systemus*, but restricted its meaning to that of species, which agree with his genus *Barbus* but completely lack barbels, which did not prevent him to include various of these species in his genus *Leuciscus*. In the same way I myself have placed several species in *Systemus*, which in this work were separated for the indicated reasons.

Heckel, accepting the same generic name, gave a new meaning to it by the diagnosis he published, i.e. "Dentes cochleares 2.3.5/5.3.2. Os anticum. Labia mollia subteretia. Cirri 2 in angulo oris, aut nulli. Pinna dorsalis basi brevis; analis brevior illa radio osseo super pinnas ventrales incipiens. Tractus intestinalis 2-2½ long. Corp." [Teeth spoon-shaped 2.3.5/5.3.2. Mouth terminal. Lips soft, slightly terete. Two barbels in the angle of the mouth, or no barbels at all. Dorsal fin with short base, beginning above the ventral fins, anal fin shorter than dorsal fin with a bony ray. Intestinal tract 2-2½ times as long as the body.]

One can remark concerning this diagnosis that the formula of the teeth does not fit on all species; that the mouth opening in various species is more inferior than terminal; that the dorsal fin spine in some species is implanted behind the basis of the ventral fins, and that the numerous species of this genus with 4 barbels are excluded, notwithstanding the fact that Heckel himself was one of the principal ³¹⁴ opponents of the value of barbels for defining the genera of Cyprinoids.

I have tried to give natural borders to this genus. This was not difficult for the numerous species I have in my possession, but numerous other species I only know from existing, usually short, descriptions, and usually insufficient figures, and therefore it is impossible to determine in how far the characters given by me are applicable to all those species.

My subgenus *Barbodes* comprises species, which according to older notions on the genera would all belong to *Barbus*.

I have retained the name *Capoëta* for the species that possess only upper jaw barbels, and to which *Capoëta amphibia* Val. belongs.

Furthermore I have conceived the subgenus *Systemus* in the way in which Mr Valenciennes accepts the genus *Systemus*.

The Sunda Islands are rich in species of *Systemus*, just like the rivers of South Asia. Many species are very closely related and demand a detailed investigation to define them sharply. I have succeeded smoothly in that definition as far as the species of my own collection are concerned, however with the existing recourses it is impossible to define sharply many only superficially known species.

My collection comprises 35 species of *Systemus*, 22 of which belong to the subgenus *Barbodes*, 5 to *Capoëta* and 8 to *Systemus*. 29 of those species inhabit the rivers of the Sunda Islands, i.e. 21 of *Barbodes*, 5 of *Capoëta* and 3 of *Systemus*, the remainder of my species are native to Bengal.

All my species of *Barbodes* possess a serrated dorsal fin spine and large scales the number of which in the lateral line varies between 23 and 38.

They can be placed into three groups.

The first of these groups is characterized by a convex anal fin with 9 to 10 branched rays. To this group belongs *Systemus (Barbodes) marginatus* Blkr.

In both remaining groups the anal fin is constantly concave and contains only 5 to 7 branched rays. One of these groups moreover is characterized by the strong development of the dorsal fin spine, which is also armed with relatively large teeth. The scales are generally longitudinally striped, either only on the free half, or also on the basal half. To these belong *Systemus (Barbodes) amblycephalus* Blkr, *Systemus (Barbodes) koilometopon* Blkr. and a number of other species.

In the third group the dorsal fin spine is remarkably less well developed and only armed with small, little visible teeth, whereas the scales are constantly radially striped, as the stripes run from a common ³¹⁵ centre to the perimeter of the scale. In this group can be placed *Systemus (Barbodes) maculatus* Blkr, *Systemus (Barbodes) lateristriga* Blkr. and some other species.

Among the extra-archipelagic species of *Barbodes* rather many can be placed in still another group, namely in that in which the dorsal fin spine is entirely smooth or without teeth. To this group belong all African species. The dorsal spine in some species becomes even so slender, that it hardly can retain the name spine. To this group belong *Systemus (Barbodes) bynni* (*Cyprinus bynni* Forsk.), *Systemus (Barbodes) surkis* (*Barbus surkis* Rüpp.), *Systemus (Barbodes) intermedius* (*Barbus intermedius* Rüpp.), *Systemus (Barbodes) perince* (*Barbus perince* Rüpp.), *Systemus (Barbodes) pallidus* (*Barbus pallidus* Smith), *Systemus (Barbodes) Burchelli* (*Barbus Burchelli* Smith), etc. However, I am in some doubt concerning these and other extra archipelagic species with regard to the squamation of the dorsal and anal fin. All the scale sheaths of dorsal and anal fins in all species of my collection are indeed well developed, and very obvious, whereas I find them not only undescribed in the *Barbus* species with unserrated dorsal spine, they are also not or very doubtfully indicated in the existing figures. Moreover, I observe the same void in the descriptions and figures of more species of *Barbodes* with a serrated dorsal spine, of which the existence of a scale sheath is without doubt.

Of the more than 90 species, which according to my opinion, till now can be placed in the genus *Systemus*, almost 60 belong to the subgenus *Barbodes*. The subgenera *Capoëta* and *Systemus* together account for only a third of those species.

Of the subgenus *Capoëta* I possess five species, which can easily be distinguished from each other. Two of these, *Systemus (Capoëta) padangensis* and *Systemus (Capoëta) sumatranus* have a serrated, the remaining ones, *Systemus (Capoëta) brevis*,

Systemus (Capoëta) *leiacanthus* and *Systemus* (Capoëta) *oligolepis* an unserrated dorsal spine. *Systemus* (Capoëta) *padangensis* because of its multi-rayed anal fin (A 3/8 or 3/9) is what *Systemus* (*Barbodes*) *marginatus* is in the subgenus *Barbodes*. *Systemus* (Capoëta) *sumatranus* and *Systemus* (Capoëta) *oligolepis* offer the peculiarity that the lateral line is lacking on the posterior half of the body which one also finds in various Bengalese species of the subgenus *Systemus*, whereas both remaining species are more related to *Systemus luteus* Heck. and *Systemus albus* Heck. from Syria, but differ principally by a lesser number of scales in the lateral line and one ray less in the dorsal fin.

The extra-archipelagic species of Capoëta are not numerous. Apart from both mentioned Heckelian species and the typical species of Mr Valenciennes. 316 (Capoëta *amphibia*), *Cyprinus chola* Buch. and *Systemus chrysostomus* McCl. can be placed therein with some certainty. I have summed up among these species also *Varicorhinus beso* Rupp., however this species apparently also has a strong relationship with the genus *Hypselobarbus*.

Concerning the subgenus *Systemus*, which comprises all species without barbels, I possess of these 6 species, but only three of them belong to the Sunda Islands. Those three species mutually have a large relationship, and distinguish themselves from the extra-archipelagic ones by a very strong developed much serrated dorsal spine, rather numerous scales, 33 to 37 in, and 8 to 9 above the lateral line and a blunt obliquely truncated snout. All of them seem to grow much larger than the extra-archipelagic species. Earlier I was of the opinion that they were endemic to the Sunda Islands, however the album of Siamese fishes of Count Francis De Castelnau has taught me that *Systemus* (*Systemus*) *bulu* very probably also inhabits the rivers of Siam and that related species are also found there. For the rest the remaining species of this subgenus are restricted to South Asia. In several of these species the dorsal fin loses its more or less spinous character, which has induced Mr Valenciennes to place them in his very complicated genus *Leuciscus* (*Leuciscus stigma* Val., *Leuciscus Duvaucelii* Val., *Leuciscus thermalis* Val., etc). Of the Bengalese species of *Systemus* I possess *Cyprinus sophore* Buch., *Cyprinus phutunio* Buch. and *Cyprinus cosuatis* Buch., which all are described in more detail in my *Nalezingen op de ichthyologische fauna van Bengalen en Hindostan*. None of these species has more than 25 scales in a longitudinal row and the dorsal spine is serrated only in *Systemus ticto*, *Systemus phutunio* and *Systemus gelius*.

My archipelagic species of *Systemus* can be adequately separated from each other and distinguished from the remaining known species according to the following scheme.

- I. 4 barbels, nasal and upper jaw barbels (subg. *Barbodes*). V. 2/8. D 2/8 or 4/9.
 1. Anal fin with rays 3/5 to 3/7.
 - A. Dorsal spine thick, armed with large teeth.
 - a. 35 to 38 scales in the lateral line. A. 3/5 or 3/6.
 - † Length of head greater than depth. Caudal fin with a longitudinal, intramarginal, blackish stripe on both lobes.
 - Ö 37 or 38 scales in the lateral line, 9 above lateral line, without longitudinal stripes or with very sparse longitudinal stripes.
 - Depth of head contained $3\frac{1}{2}$ to $3\frac{3}{5}$ times in its length. Dorsal fin without black spot.

Systemus (*Barbodes*) *belinka* Blkr.

- Ô' 36 scales in the lateral line, 8 above the lateral line, free half and basal half with conspicuous longitudinal, slightly 317 ray-like stripes. Depth of body contained $2\frac{3}{5}$ to 3 times in its length. Dorsal fin with a large black spot anteriorly.

Systemus (Barbodes) Schwanefeldi Blkr.

- †' Depth of head equal to length. Caudal fin without any stripes.
 Ô 35 or 36 scales in the lateral line, 7 above lateral line, with conspicuous longitudinal stripes, slightly ray-like. Depth of body contained about 3 times in its length.

Systemus (Barbodes) amblycephalus Blkr.

- b. 30 to 33 scales in the lateral line. Length of head greater than depth.
 † 7 scales above the lateral line. A. $\frac{3}{5}$ or $\frac{3}{6}$. Barbels about equal to the eye diameter.
 Ô 32 or 33 scales in the lateral line. Width of gill cover contained $1\frac{2}{3}$ to $1\frac{3}{4}$ times in its depth. Depth of tail contained $1\frac{1}{2}$ to $1\frac{3}{5}$ times in the length of the head.

Systemus (Barbodes) erythropterus Blkr.

- Ô' 30 or 31 scales in the lateral line. Width of gill cover contained twice in its depth. Depth of tail contained $1\frac{1}{3}$ to $1\frac{1}{2}$ times in the length of the head.

Systemus (Barbodes) bramoides Blkr.

- †' 6 scales above lateral line.
 Ô Barbels shorter than the eye.
 O Anal fin with rays $\frac{3}{6}$ or $\frac{3}{7}$. 31 to 33 scales in the lateral line. Dorsal fin starting slightly behind to hardly behind the base of the ventral fins. Upper jaw barbels longer than nasal barbels.
 ó Width of gill cover contained $1\frac{2}{3}$ to $1\frac{3}{4}$ times in its height. Depth of the body contained $\frac{3}{4}$ to 3 times in its length. Head acute. Rostro-dorsal profile concave on the nape.

Systemus (Barbodes) javanicus Blkr.

- ó' Width of gill cover contained twice in its depth.
 Ô Head acute, depth contained $1\frac{1}{4}$ times in its length. Depth of the body contained 3 times in its length. Rostro-dorsal profile very concave on the nape.

Systemus (Barbodes) koilometopon Blkr.

- Ô' Head obtuse, depth contained $1\frac{1}{5}$ to $1\frac{1}{8}$ times in its length. Depth of the body contained $3\frac{1}{2}$ to $3\frac{3}{4}$ times in its length. Rostro-dorsal profile not concave on the nape.

318 *Systemus (Barbodes) gonionotus* Blkr.

- O' Anal fin with rays $\frac{3}{5}$ or $\frac{3}{6}$. 30 scales in the lateral line. Dorsal fin starting above base of ventral fins.

- ó Depth of body contained about $3\frac{3}{4}$ times in its length. Barbels nearly equal in length, slightly shorter than the eye. Rostro-dorsal profile nearly straight.

Systemus (Barbodes) Huguenini Blkr.

- Ô Barbels longer than the eye. Dorsal fin starting above the base of the ventral fins.

- Anal fin with rays $\frac{3}{5}$ to $\frac{3}{7}$. 30 to 31 scales in the lateral line.

- ó Depth of body contained $3\frac{1}{4}$ times in its length.
Rostro-dorsal profile convex.

Systemus (Barbodes) hypselonotus Blkr.

- c. Less than 30 scales in the lateral line, 6 above the lateral line. Dorsal fin starting above the base of the ventral fins, anal fin with rays $\frac{3}{5}$ or $\frac{3}{6}$.

- † 28 or 29 scales in the lateral line. Depth of body contained about 4 times in its length. Length of head greater than depth.

- Ô Eye diameter contained $2\frac{1}{3}$ to $2\frac{1}{2}$ times in the length of the head.
Barbels shorter than the eye.

Systemus (Barbodes) macrophthalmus Blkr.

- † 2 6 scales in the lateral line. Depth of body contained nearly $2\frac{1}{2}$ times in its length. Depth of head equal to length.

- Ô Eye diameter contained nearly 3 times in the length of the head.
Barbels not shorter than the eye.

Systemus (Barbodes) platysoma Blkr.

- B. Dorsal spine medium-sized or weak, armed with small teeth. Scales striped with rays originating from a common centre. A. $\frac{3}{5}$ or $\frac{3}{6}$.

- a. 31 to 34 scales in the lateral line, 5 above the lateral line.

- † Depth of the body contained nearly 4 to $3\frac{2}{5}$ times in its length. Depth of head contained $1\frac{1}{4}$ to $1\frac{1}{6}$ times in its length. Nasal barbels slightly or not shorter than the eye. Upper and lower part of caudal fin with a wide violet-black margin.

Systemus (Barbodes) rubripinna Blkr.

- b. 23 to 27 scales in the lateral line.

- † 6 scales above lateral line. Dorsal and anal fin not emarginate.

- Ô Barbels shorter than the eye. Depth of the body contained about $3\frac{1}{3}$ times in its length. Snout obtuse.

Systemus (Barbodes) bunter Blkr.

- 319 † 5 scales above the lateral line.

- Ô Body with transverse black bands. Depth of the body contained $2\frac{2}{5}$ to $3\frac{1}{2}$ times in its length.

- 4 broad transverse black bands bordered with yellow. Depth of head contained about $1\frac{1}{4}$ times in its length. Dorsal and anal fins acute. Upper jaw barbels not much longer than the eye.

Systemus (Barbodes) tetrazona Blkr.

- Ó' 2 broad transverse black bands and a black longitudinal band on the tail. Head obtuse, depth contained slightly more than once to once in its length. Dorsal and anal fins obtuse. Upper jaw barbels much longer than the eye.

Systemus (Barbodes) lateristriga Blkr.

- Ô' Body with 6 black longitudinal bands.
 Ó Depth of the body contained $3\frac{1}{3}$ to 4 times in its length; head acute, depth contained $1\frac{1}{2}$ to $1\frac{1}{4}$ times in its length. Dorsal and anal fin acute, emarginate. Upper jaw barbels longer than the eye.

Systemus (Barbodes) fasciatus Blkr.

- Ô'' Body without transverse or longitudinal bands.
 Ó Head very obtuse, truncate, depth contained about $1\frac{1}{2}$ times in its length. Depth of the body contained $4\frac{3}{8}$ times in its length. Upper jaw barbels longer than the eye. Dorsal and anal fins acute, not emarginate.

Systemus (Barbodes) obtusirostris Blkr.

- Ó' Head acute or slightly acute. Barbels considerably longer than the eye. Dorsal and anal fins acute. Depth of the body contained slightly over 3 to $4\frac{1}{2}$ times in its length.
 Ó Nucho-dorsal line strongly convex. Scales on the middle of the flanks not much larger than the other scales, 3 between lateral line and ventral base.

Systemus (Barbodes) maculatus Blkr.

- Ó' Nucho-dorsal line nearly straight or hardly convex. Scales on the middle of the flanks much larger than those on the anterior and posterior part of the body, 2 between lateral line and ventral base.

320 *Systemus (Barbodes) goniosoma* Blkr.

2. Anal fin obtuse, convex, rays $3/9$ or $3/10$. Dorsal spine thick, armed with medium-sized teeth. 28 or 29 scales in the lateral line, 5 above the lateral line.
 A. Head obtuse, length equal to depth or slightly greater. Barbels much shorter than the eye. Dorsal and caudal fin with a rather broad black margin.

Systemus (Barbodes) marginatus Blkr.

- II 2 barbels, upper jaw barbels only (subgenus *Capoëta*).
 1. Dorsal spine medium-sized, dentate. Barbels much shorter than the eye. Dorsal fin starting above ventral fins. D. $4/8$ or $4/9$.
 A. 38 or 39 scales in the lateral line, 7 above the lateral line. Lateral line visible on all of the body. A. $3/8$ or $3/9$. V $2/9$. Depth of the body about $4\frac{1}{2}$ times in its length. Scales without stripes or with very sparse stripes.

Systemus (Capoëta) padangensis Blkr.

- B. 21 scales in the lateral line, 6 above lateral line. Lateral line not visible behind the vent. A. 3/5 or 3/6. V 2/8. Depth of the body contained $2\frac{3}{4}$ to 3 times in its length. 4 transverse blackish-violet bands on the body. Scales striped with rays originating from a common centre.

Systemus (Capoëta) sumatranus Blkr.

2. Dorsal spine thin, without teeth. A. 3/5 or 3/6. V. 2/8 or 2/9. D. 4/8 or 4/9.
 A. 24 to 27 scales in the lateral line, 5 above lateral line. Lateral line visible on all of the body. Scales striped with rays originating from a common centre.
 a. Depth of the body contained $3\frac{1}{4}$ to $3\frac{1}{2}$ times in its length. Head contained $4\frac{1}{2}$ to nearly 5 times in the length of the body. Head-tail bands diffuse, silver.

Systemus (Capoëta) brevis Blkr.

- b. Depth of the body contained $3\frac{2}{5}$ to $3\frac{3}{5}$ times in its length. Head contained 5 to $5\frac{1}{2}$ times in the length of the body. Tail with a round, blackish-violet spot.

Systemus (Capoëta) leiacanthus Blkr.

- B. 16 scales in the lateral line, 4 above lateral line. Lateral line visible only on the anterior part of the body. Scales with longitudinal stripes on the free half and on the basal half.
 a. Depth of the body contained $3\frac{1}{4}$ to $3\frac{1}{2}$ times in its length.

321 *Systemus (Capoëta) oligolepis* Blkr.

III No barbels (subgenus *Systemus*)

1. Dorsal spine thick, serrated with large teeth. Snout obtuse, truncate. Teeth 2.3.4/4.3.2.
 A. 36 or 37 scales in the lateral line. Anal fin with rays 3/5 to 3/6.
 a. 9 scales above the lateral line. Head contained $6\frac{1}{2}$ times in the length of the body. Depth of the body contained about $2\frac{2}{3}$ times in its length. Depth of dorsal fin contained nearly twice in the depth of the body, much less than twice as high as base length. V. 2/8.

Systemus (Systemus) Waandersi Blkr.

- b. 8 scales above lateral line. Head contained $4\frac{2}{3}$ to $5\frac{1}{3}$ times in the length of the body. Depth of the body contained 3 to $3\frac{2}{3}$ times in its length. Dorsal fin not much lower than the body, twice as high as base length. V. 2/9.

Systemus (Systemus) bulu Blkr.

- B. 33 to 35? scales in the lateral line, 8 above the lateral line.
 Anal fin with rays 3/6 or 3/7.
 a. Head contained slightly over 5 to $5\frac{1}{2}$ times in the length of the body. Depth of the body contained $3\frac{1}{2}$ times in its length. Dorsal fin not much lower than the body, much less than twice as high as base length. V. 2/9.

Systemus (Systemus) lawak Blkr.

Systemus (Barbodes) belinka Blkr. –
Staartvinbandige Lalawak [Caudal fin band Lalawak].
 Atl. Cypr. Tab. XXXI fig. 1.

A *Systemus (Barbodes)* with an oblong compressed body, depth of body contained $3\frac{3}{5}$ to $3\frac{1}{2}$ times in its length, width contained $2\frac{1}{4}$ to $2\frac{1}{2}$ times in its depth. Head slightly obtuse, contained $4\frac{3}{4}$ to $5\frac{1}{3}$ times in length of body with caudal fin, $3\frac{1}{2}$ to 4 times in length of body without caudal fin; depth of head contained $1\frac{1}{5}$ to $1\frac{1}{6}$ times in its length, width contained $1\frac{3}{4}$ to $1\frac{3}{5}$ times in its length; eye diameter contained $2\frac{1}{4}$ to $2\frac{3}{4}$ times in the length of the head, eye diameter contained 1 to $1\frac{1}{5}$ times in the postocular part of the head; palpebral membrane covering the external margin of the iris only, opening nearly circular; snout slightly obtuse, convex, shorter than the eye, not sticking out in front of the mouth; nostrils closer to the orbit than to the tip of the snout; rostro-dorsal profile hardly or not concave between the snout and the nape, very convex on the nape; interorbital line slightly convex; anterior suborbital bone pentagonal, depth slightly or not greater than length, lower margin nearly horizontal, anterior and posterior lower margins truncate or convex, upper margins concave united into an upward facing angle close to the nose; lower half traversed by a longitudinal, nearly horizontal crest; 2nd suborbital bone elongate-quadrangular, length more than $5\frac{2}{3}$ twice as great as depth, more than twice as low as 1st suborbital bone; upper jaw longer than lower jaw, moderately vertically downward protrusible, ending below the anterior rim of the eye, contained about 3 times in the length of the head; gape strongly oblique, barbels thin, upper jaw barbels slightly longer than nasal barbels, slightly longer or shorter than the eye; lower jaw at the symphysis with a conical, obtuse, little conspicuous tubercle, lower part without visible pores; lips thin, terete, not conspicuously rugose; width of gill cover contained nearly 2 times to 2 times in its depth, lower margin nearly straight or slightly convex; gill opening ending below the posterior margin of the preoperculum. Pharyngeal teeth slightly hooked to slightly spoon-shaped to grinding, 2.3.5/5.3.2; more or less tuberculate on the chewing surface; scapula triangular, obtuse, rounded; back strongly elevated, angular, higher than the belly; belly flat anterior to ventral fins, angular at the flanks, behind ventral fins rounded, not ridged; depth of tail contained $1\frac{1}{5}$ to 2 times in the length of the head; scales generally without visible longitudinal stripes, seldom with very sparse stripes, 37 or 38 scales in the lateral line, 15 in a transverse row (without the lowest ventral scales) of which 9 ($8\frac{1}{2}$) above the lateral line, 15 or 16 in a longitudinal row between occiput and dorsal fin, lowest ventral scales in three longitudinal rows, scales in medial row not larger than those in flanking rows; lateral line strongly curved, each scale marked by a simple tube generally reaching the centre of the scale; dorsal fin starting above the base of the ventral fins, acute, emarginate, depth contained $1\frac{1}{3}$ to $1\frac{1}{2}$ times in the depth of the body,

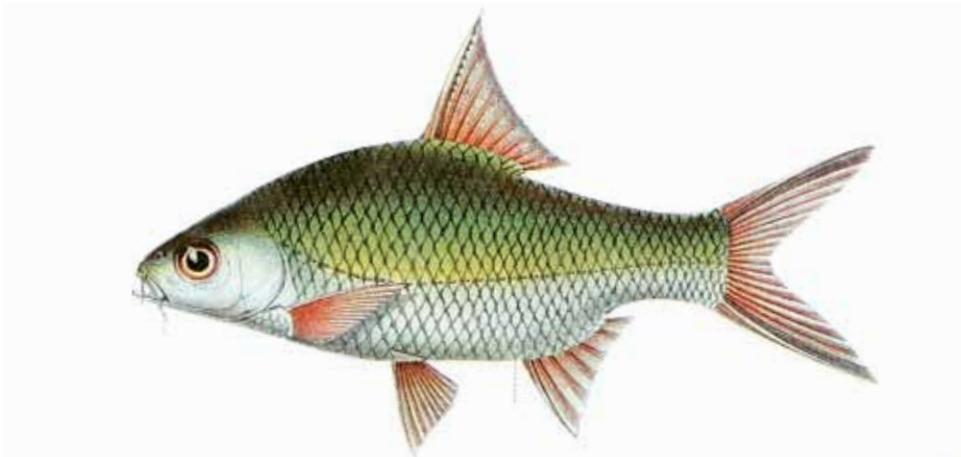


Fig. 62. *Puntius (Barbodes) belinka* Blkr. Atl. Ichth. Cypr. Tab. XXXVII, Fig. 1. TL figure 94 mm.

much deeper but much less than twice as deep as base length, spine thick, posteriorly serrated with large teeth, with a flexible part not or hardly longer than the head; pectoral fins and ventral fins acute, nearly equal in length, contained $6\frac{1}{2}$ to 7 times in the length of the body, pectoral fins reaching or nearly reaching ventral fins, ventral fins reaching or nearly reaching anal fin; anal fin acute, emarginate, much lower but much less than twice as low as dorsal fin, not much higher than base length, simple third ray medium-sized, bony only on the base; caudal fin scaled only at the base, with a deep incision, lobes acute, contained $3\frac{1}{2}$ to $3\frac{3}{4}$ times in the length of the body. Colour: upper part of the body green, lower part silver, iris yellow, upper part dark; scales on back, flanks and tail each with a small transverse, crescent-shaped, dark or violet band; fins pink, upper part of dorsal fin, except for the top of the tip, broadly blackish-dark, caudal fin with a longitudinal, intermarginal dark-violet band on each lobe.

B. 3. D. $4/8$ or $4/9$. V. $1/14$. V. $2/8$. A. $3/5$ or $3/6$. C. $8/17/8$, short flanking ones included.

Syn. *Belinka* Mal. Sumatr.

Hab. Sumatra (Padang, Solok, Sinkara), in rivers and lakes.

Length of 9 specimens $61''$ to $113''$.

Remark. For a long time I have taken these specimens for juvenile specimens of *Systemus* (*Barbodes*) *Schwanefeldi*, till I came in the possession of proper juvenile specimens of the last mentioned species, which have taught me that they totally agree in habitus with the older specimens and disagree essentially from *Systemus* (*Barbodes*) *belinka*.

The most important of these differences have been noted in the description of *Systemus* (*Barbodes*) *Schwanefeldi*. The coloration of *Systemus* (*Barbodes*) *belinka* also inclines more to bluish, and that of *Systemus* (*Barbodes*) *Schwanefeldi* more to olive. In the species in question the tail is lower in relation to the length of the head.

My specimens all originate from the west coast of Sumatra, where it occurs up to high in the drainage areas. I cannot determine whether the species becomes larger than my largest specimens

328 *Systemus* (*Barbodes*) *Schwanefeldi* Blkr. –
Schwanefeld's Lalawak.
 Atl. Cypr. Tab. XXXVII.

A *Systemus* (*Barbodes*) with an oblong, compressed body, depth of body contained 3 to $2\frac{3}{5}$ times in its length, width contained $2\frac{2}{3}$ to $3\frac{1}{4}$ times in its depth. Head slightly obtuse, contained slightly over 5 to 6 times in length of body with caudal fin, $3\frac{1}{2}$ to nearly 4 times in length of body without caudal fin; depth of head contained $1\frac{1}{2}$ to $1\frac{1}{8}$ times in its length, width contained about $1\frac{1}{2}$ times in its length; eye diameter contained $2\frac{1}{2}$ to 3 times in the length of the head, eye diameter contained $1\frac{1}{2}$ times to once in the postocular part of the head, distance between the eyes once to $1\frac{1}{2}$ times their diameter; palpebral membrane covering the external margin of the iris only, opening nearly circular; snout slightly obtuse, convex, shorter than the eye, not sticking out in front of the mouth; nostrils closer to the orbit than to the tip of the snout; rostro-dorsal profile strongly concave between snout and nape, strongly convex on the nape; interorbital line convex; anterior suborbital bone pentagonal, depth slightly or not greater than length, lower margin nearly horizontal, anterior and posterior lower margins convex, upper margins concave, united into an acute, upward pointing angle close to the nostrils; traversed about the middle by a longitudinal, nearly horizontal crest; 2nd suborbital bone obliquely quadrangular, depth greater anteriorly than posteriorly, length about twice as great as depth; about twice as low as 1st suborbital bone; upper jaw longer than lower jaw, moderately vertically downward protrusible, ending below the anterior part of the eye, contained about 3 times in the length of the head; gape rather oblique; barbels thin, generally slightly longer than the eye, nasal barbels generally slightly shorter than upper jaw barbels; lower jaw at the symphysis with a conical, obtuse tubercle, the underside without visible pores;

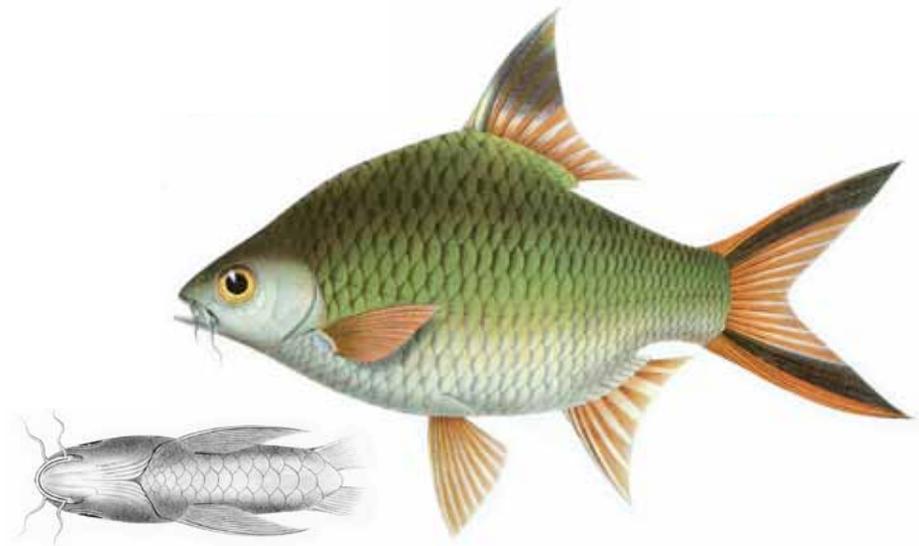


Fig. 63. *Puntius (Barbodes) Schwanefeldi* Blkr. Atl. Ichth. Cypr. Tab. XXXV, Fig. 3. TL figure 256 mm.

lips thin, terete, lightly transversely rugose; width of gill cover contained $1\frac{3}{4}$ to 2 times in its depth, lower margin nearly straight or slightly concave; gill opening ending below the posterior margin of the preoperculum. Pharyngeal teeth hooked to slightly spoon-shaped to grinding, 2.3.5/5.3.2; on the chewing surface rugose-tuberculate; scapula obtuse, rounded; back strongly elevated, much higher than the belly; belly flat anterior to ventral fins, angular at the flanks, behind ventral fins rounded, not ridged; depth of tail contained $1\frac{2}{3}$ to nearly $1\frac{1}{2}$ times in the length of the head; scales generally for the free half and sometimes also the basal half with longitudinal, slightly ray-like stripes; 36 in the lateral line, 13 in a transverse row (without the lowest ventral scales) of which 8 ($7\frac{1}{2}$) above the lateral line, 14 in a longitudinal row between occiput and dorsal fin, lowest ventral scales in three longitudinal rows, scales in medial row not or hardly larger than those in flanking rows; lateral line strongly curved, descending below rostro-caudal line, each scale marked by a simple tube generally not reaching the centre of the scale; dorsal fin starting above the base of the ventral fins, acute, emarginate, depth contained $1\frac{1}{3}$ to $1\frac{3}{4}$ times in the depth of the body, much deeper but much less than twice as deep as base length; spine thick, posteriorly serrated with rather large teeth, with a flexible part not much longer than the head; pectoral fins and ventral fins acute, nearly equal in length, contained $5\frac{1}{2}$ to $6\frac{1}{2}$ times in the length of the body, pectoral fins reaching or nearly reaching ventral fins, ventral fins reaching or nearly reaching anal fin; anal fin acute, emarginate, much lower but much less than twice as low as dorsal fin, not much deeper than base length, simple third ray medium-sized, bony only at the base; caudal fin scaled only at the base, with a deep incision, lobes acute, contained $3\frac{3}{5}$ to $3\frac{2}{5}$ times in the length of the body. Colour: upper part of the body green, lower part silver, iris yellow, upper part dark; scales on back, flanks and tail generally with a small, violetish band at the base; dorsal fin for the basal half beautiful red, for the top half violet-black, the tip itself red, however; pectoral fins, ventral fins and anal fin pink, caudal fin pink, upper and lower margin red, with a longitudinal, intra-marginal violet-dark band on each lobe.

B. 3. D. $4/8$ or $4/9$. P. $1/14$ or $1/15$. V. $2/8$. A. $3/5$ or $3/6$. C. $7/17/7$, short flanking ones included.

Syn. *Barbus Schwanefeldii* Blkr. Nieuwe tient. Vischs. Sumatra, Nat. T. Ned. Ind. V p. 517 (partly).

324 *Lampun Lampong.*

Hab. Sumatra (Pangabuang, Palembang, Moara-kompeh, Padang, Solok, Sinkara), in rivers and lakes.
Borneo (Pontianak), in rivers.
Length of 7 specimens 88'' to 260''.

Remark. My above mentioned description of *Systemus* (*Barbodes*) *Schwanefeldi* is, as became apparent since then, made on the basis of two different species, i.e. after large specimens of *Systemus* (*Barbodes*) *Schwanefeldi* and smaller ones of *Systemus* (*Barbodes*) *belinka*, which I earlier took for juvenile specimens of the first mentioned species. A mistake, which I only recognized after I also had received smaller specimens of *Systemus* (*Barbodes*) *Schwanefeldi*. I can now determine specific differences. In *Systemus* (*Barbodes*) *belinka* I constantly find one or two scales more in the lateral line and one longitudinal row more above the lateral line. Furthermore, the scales are totally not striated or show only very few faintly visible longitudinal small stripes. Moreover the body is constantly more slender and in none of my specimens anything can be observed of the large black dorsal fin blotch of *Systemus* (*Barbodes*) *Schwanefeldi*.

Till now I only know this species from Sumatra and Borneo.

Systemus (*Barbodes*) *amblycephalus* Blkr. –
Rondkoppige Lalawak [Round-headed Lalawak].
Atl. Cypr. Tab. XXXVIII.

A *Systemus* (*Barbodes*) with an oblong, compressed body, depth of body contained about 3 times in its length, width contained nearly 3 times in its depth. Head obtuse, contained about 6 times in length of body with caudal fin, about 4½ times in length of body without caudal fin; depth of head contained about once in its length, width about 1½ times; eye diameter contained about ¾ times in the length of the head, eye diameter contained about 1⅓ times in the postocular part of the head, distance between the eyes nearly 1½ times their diameter; palpebral membrane covering the external margin of the iris only, opening nearly circular; snout obtuse, convex, shorter than the eye, not sticking out in front of the mouth; nostrils closer to the orbit than to the tip of the snout; rostro-dorsal profile convex nearly everywhere, not convex only in the region of the occiput and nape; interorbital line convex; anterior suborbital bone pentagonal, depth about equal to length, lower part nearly horizontal, anterior and posterior lower margins short, convex, upper margins concave, united into an acute, upward facing angle close to the nostrils, lower half traversed by a longitudinal, crest, not parallel to the lower margin; 2nd suborbital bone oblong-quadrangular, length nearly twice as great as depth; about twice as low as 1st suborbital bone; upper jaw longer than lower jaw, moderately vertically downward protrusible, ending below the anterior part of the eye, contained 3 times in the length of the head; gape slightly oblique; barbels thin, upper jaw barbels slightly longer than nasal barbels, hardly longer than the eye; lower jaw at the symphysis with a conical, obtuse, short, hardly visible tubercle, underside without conspicuous pores; lips thin, terete, not rugose; width of gill cover contained about 1½ times in its depth, lower margin nearly straight; branchial opening ending below the posterior margin of the preoperculum. Pharyngeal teeth hooked to slightly spoon-shaped to grinding, 2.3.5/5.3.2; on the chewing surface rugose-tuberculate, internal 2 teeth in the longest row conical, acuminate at the tip without chewing surface; scapula triangular, obtuse, rounded; back strongly elevated, angular, much ³²⁵ higher than the belly; belly flat anterior to ventral fins, angular at the flanks, behind ventral fins rounded, not ridged; depth of tail contained about 1½ times in the length of the head; scales for the free half and basal half with longitudinal or slightly ray-like stripes, 35 or 36 scales in the lateral line, 12 in a transverse row (without the lowest ventral scales) of which 7 (6½) above the lateral line, 10 or 11 in a longitudinal row between occiput and dorsal fin, lowest ventral scales in three longitudinal rows, scales in medial row gradually increasing in size posteriorly, scales in posterior scales larger than those in

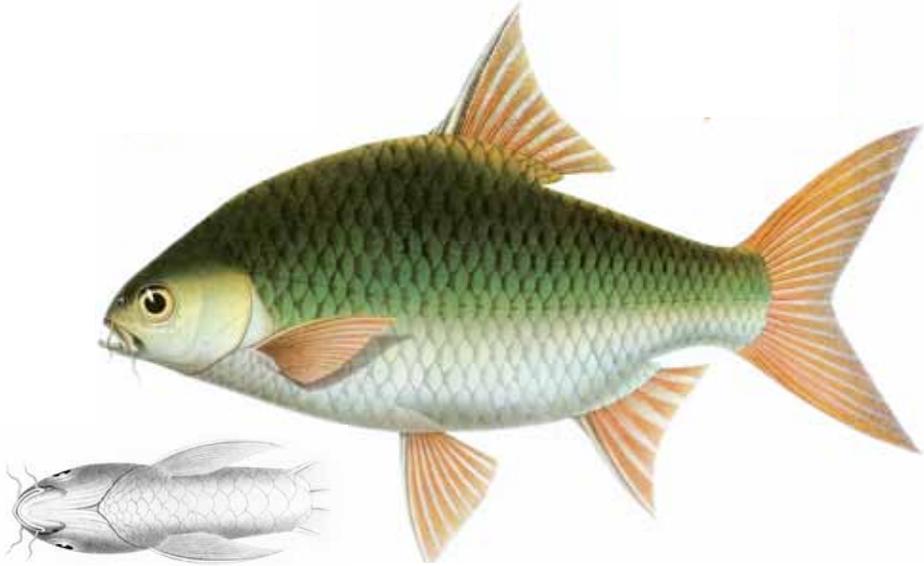


Fig. 64. *Puntius (Barbodes) amblycephalus* Blkr. Atl. Ichth. Cypr. Tab. XXXVI, Fig. 2. TL figure 283 mm.

flanking rows; lateral line curved, reaching rostro-caudal line, each scale marked by a simple tube generally not reaching the centre of the scale; dorsal fin starting slightly behind the base of the ventral fins, acute, emarginate, not much less than twice as low as the body, considerably less high but very much less than twice as high as base length, spine very thick, posteriorly armed with large teeth, with a flexible part hardly longer than the head; pectoral fins and ventral fins acute, nearly equal in length, contained slightly over 6 times in the length of the body, pectoral fins reaching ventral fins, ventral fins not reaching anal fin; anal fin acute, emarginate, not very much lower than dorsal fin, not very much higher than base length, simple third ray medium-sized, bony only at the base; caudal fin scaled only at the base, with a deep incision, lobes acute, contained nearly 4 times in the length of the body. Colour: upper part of the body green, lower part silver, iris yellow, upper part dark; scales on back, flanks and tail each with a small, violetish transverse band at the base; dorsal and caudal fin pink or yellowish with a dark margin, pectoral fins pink or yellowish, ventral fins and anal fin whitish.

B. 3. D. 4/8 or 4/9. P. 1/15. V. 2/8. A. 3/5 or 3/6. C. 7/17/7, short flanking ones included.

Syn. *Barbus amblycephalus* Blkr, Achtste bijdr. ichth. Borneo, Nat. T. Ned. Ind. VIII p. 166.

Hab. Borneo (Pangaron), in rivers.

Length of sole specimen 290'''.

Remark. Closely related to *Systemus (Barbodes) erythropterus* Blkr, the species in question differs primarily from it by a more convex profile, 3 to 4 scales more in the lateral line, shorter barbels, a less curved lateral line, a lower dorsal fin, a lower and much more blunt head, etc. By its scale formula it also approaches *Systemus (Barbodes) Schwaneveldi*, but it has a different habitus, a much more blunt and higher head, no black dorsal fin spot or caudal fin bands, etc.

The species till now has become know to me by only one specimen form southern Borneo, and is, as far as is known, the Cyprinoid species which is the most easterly restricted in the Archipelago. *Systemus (Barbodes) maculatus* Blkr. and a few other

Cyprinoids indeed also inhabit in the most eastern part of southern Borneo, but their distribution is also extended far westerly in the Archipelago till Sumatra and Singapore.

Systemus (Barbodes) erythropterus Blkr. –
Roodvinnige Lalawak [Red finned Lalawak]
Atl. Cypr. Tab. XXXIX.

A *Systemus (Barbodes)* with an oblong, compressed body, depth of body contained $3\frac{2}{3}$ to $3\frac{1}{2}$ times in its length, width contained $2\frac{2}{3}$ to 3 times in its depth. Head slightly obtuse, contained $5\frac{3}{4}$ to $6\frac{1}{2}$ times in length of body with caudal fin, slightly over 4 to $4\frac{1}{2}$ times in length of body without caudal fin; depth of head contained $1\frac{1}{5}$ to $1\frac{1}{4}$ times in its length, width about $1\frac{1}{5}$ times; eye diameter contained $2\frac{2}{3}$ to 3 times in the length of the head, eye diameter contained slightly over once ³²⁶ to $1\frac{1}{3}$ times in the postocular part of the head, distance between the eyes once to $1\frac{1}{3}$ times their diameter; palpebral membrane covering the external margin of the iris only, opening nearly circular; snout obtuse, convex, shorter than the eye, not sticking out in front of the mouth; nostrils closer to the orbit than to the tip of the snout; rostro-dorsal profile between forehead and nape, especially in younger animals slightly concave, strongly convex on the nape; interorbital line convex; anterior suborbital bone pentagonal, depth greater than length, lower margin nearly horizontal, anterior and posterior lower margins generally convex, upper margins concave, united into an acute, upward pointing angle close to the nostrils, lower half traversed by a longitudinal, nearly horizontal crest; 2nd suborbital bone oblong-quadrangular, depth greater anteriorly than posteriorly, length less than twice as great as depth, generally less than twice as low as 1st suborbital bone; upper jaw longer than lower jaw, moderately vertically downward protrusible, ending below the anterior rim of the eye, contained 3 to $3\frac{1}{4}$ times in the length of the head; gape slightly oblique; barbels thin, upper jaw and nasal barbels nearly equal in length, slightly to not longer than the eye; lower jaw at the symphysis with a conical, obtuse, short, hardly visible tubercle, underside without conspicuous pores; lips thin, terete, lower inner surface transversely rugose; width of gill cover contained $1\frac{1}{2}$ to $1\frac{3}{4}$ times in its depth, lower margin nearly straight; gill opening ending below the posterior margin of the preoperculum. Pharyngeal teeth hooked to slightly spoon-shaped to grinding, 2.3.5/5.3.2; tuberculate on the chewing surface, internal 2 teeth in the longest row conical, acuminate without chewing surface;



Fig. 65. *Puntius (Barbodes) erythropterus* Blkr. Atl. Ichth. Cypr. Tab. XXVI, Fig. 1. TL figure 249 mm.

scapula triangular, obtuse, rounded; back strongly elevated, angular, much higher than the belly; belly flat anterior to ventral fins, angular at the flanks, behind ventral fins rounded, not ridged; depth of tail contained $1\frac{1}{2}$ to about $1\frac{3}{5}$ times in the length of the head; scales for the free half with longitudinal stripes, for the basal half not or hardly striped; 32 or 33 scales in the lateral line, 12 in a transverse row (without the lowest ventral scales) of which 7 ($6\frac{1}{2}$) above the lateral line, 12 in a longitudinal row between occiput and dorsal fin, lowest ventral scales in three longitudinal rows, gradually increasing in size posteriorly, posterior scales larger than those in flanking rows; lateral line strongly curved, descending below the rostro-caudal line, each scale marked by a simple tube generally not reaching the centre of the scale; dorsal fin starting above the base of the ventral fins, acute, emarginate, depth contained about $1\frac{3}{5}$ times in the depth of the body, not much less than twice as high as base length, spine thick, posteriorly serrated with rather large teeth, with a flexible part considerably longer than the head; pectoral fins and ventral fins acute, nearly equal in length, contained 6 to 7 times in the length of the body, pectoral fins not reaching ventral fins, ventral fins not reaching anal fin; anal fin acute, emarginate, much lower but much less than twice as low as dorsal fin, much higher but much less than twice as high as base length, simple third ray medium-sized, bony only at the base; caudal fin scaled only at the base, with a deep incision, lobes acute, contained $3\frac{2}{3}$ to 4 times in the length of the body. Colour: upper part of the body green, lower part silver, iris yellow, upper part dark; scales on back, flanks and tail generally with a violetish transverse band at the base; fins beautiful red or pink, dorsal and caudal fin generally with a dark margin.

B. 3. D. 4/8 or 4/9. P. 1/15. V. 2/8. A. 3/5 or 3/6. C. 8/17/8, short flanking ones included.

Syn. *Barbus erythropterus* Blkr, Verh. Bat. Gen. XXIII Ichth. Midd. Oost-Java p. 15.
Lalawak, *Wader-mejrah* Mal. Javan.

Hab. Java (Batavia, Surabaya, Kediri), in rivers.
Borneo (Pengaron), in rivers.

Length of 13 specimens 125''' to 248'''.

I discovered this species in 1848 in Surabaya and described it at the above mentioned place after a specimen with a length of 175'''. Since then I also found it in Batavia, while I also received it simultaneously with the related *Systemus* (*Barbodes*) *amphycephalus* Blkr. from south-east Borneo. In relationship it ³²⁷ stands between the last-mentioned species and *Systemus* (*Barbodes*) *bramoides*. In habitus it resembles *Systemus* (*Barbodes*) *amblycephalus* most, however, it has less scales in the lateral line, the heads much less blunt and longer than high, etc. Its main differences with *Systemus* (*Barbodes*) *bramoides* lie in the relative width of the gill cover, the relative height of the tail and the constantly larger number of scale in the lateral line. On Java they are much less common than *Systemus* (*Barbodes*) *bramoides*.

Systemus (*Barbodes*) *bramoides* Blkr. –
Bleiachtige Lalawak [Bleak-like Lalawak].
Atl. Cypr. Tab. XL.

A *Systemus* (*Barbodes*) with an oblong, compressed body, depth of body contained $3\frac{1}{4}$ to 3 times in its length, width contained $2\frac{2}{3}$ to slightly over 3 times in its depth. Head slightly obtuse, contained $5\frac{1}{2}$ to $6\frac{2}{3}$ times in length of body with caudal fin, 4 to $4\frac{3}{4}$ times in length of body without caudal fin; depth of head contained $1\frac{1}{2}$ to $1\frac{1}{8}$ times in its length, width $1\frac{3}{5}$ to $1\frac{1}{2}$ times; eye diameter contained $2\frac{1}{2}$ to slightly over 3 times in the length of the head, eye diameter contained once to $1\frac{1}{2}$ times in the postocular part of the head, distance between the eyes once to $1\frac{1}{2}$ times their diameter; palpebral membrane covering the external margin of the iris only, opening nearly circular; snout slightly obtuse, convex, shorter than the eye, not sticking out in front of the mouth; nostrils closer to the orbit than to the tip of the snout; rostro-dorsal profile between snout and nape in younger animals slightly concave, in old animals concave, strongly convex on the nape; anterior suborbital bone pentagonal, depth slightly greater than

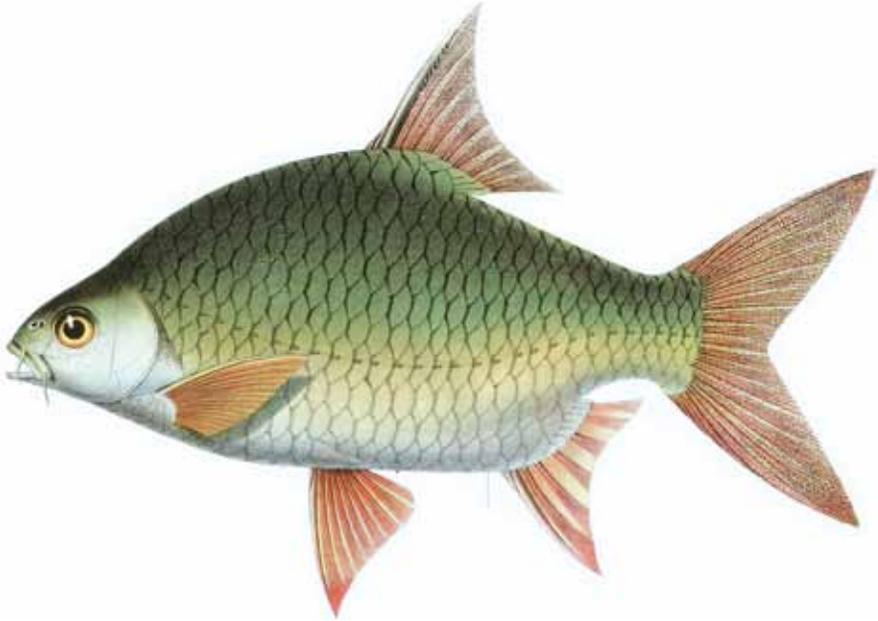


Fig. 66. *Puntius (Barbodes) bramoides* Blkr. Atl. Ichth. Cypr. Tab. XXV, Fig. 2. TL figure 225 mm.

length, lower margin oblique, anterior and posterior lower margins convex or truncate, upper margins slightly concave, united into an acute, upward pointing angle close to the nostrils, lower half traversed by a longitudinal, slightly obliquely descending crest; 2nd suborbital bone obliquely quadrangular, depth much greater anteriorly than posteriorly, length less than twice as great as depth, less than twice as low as 1st suborbital bone; upper jaw longer than lower jaw, moderately downward protrusible, ending below the anterior rim of the eye, contained 3 to 3½ times in the length of the head; gape slightly oblique; barbels thin, upper jaw barbels slightly longer than nasal barbels, not or slightly longer or shorter than the eye; lower jaw at the symphysis with an obtuse, little conspicuous tubercle, underside without visible pores; lips thin, terete, transversely rugose; width of gill cover contained about 2 times in its depth, lower margin slightly convex or nearly straight; gill opening ending below the posterior margin of the preoperculum. Pharyngeal teeth hooked to slightly spoon-shaped to grinding, 2.3.5/5.3.2; on the chewing surface rugose-tuberculate; scapula triangular, obtuse, rounded; back elevated, angular, higher than the convex belly; belly flat anterior to ventral fins, angular at the flanks, behind ventral fins rounded, not ridged; depth of tail contained 1⅓ to 1½ times in the length of the head; scales for the free half and generally also for the basal half with slightly ray-like stripes; 30 or 31 scales in the lateral line, 12 in a transverse row (without the lowest ventral scales) of which 7 (6½) above the lateral line, 12 or 13 in a longitudinal row between occiput and dorsal fin, lowest ventral scales in three longitudinal rows, scales in medial row gradually increasing in size posteriorly, posterior scales larger than in flanking rows; lateral line curved, descending below the rostro-caudal line, each scale marked by a simple tube not or hardly reaching the centre of the scale; dorsal fin starting above or hardly behind the base of the ventral fins, acute, emarginate, depth contained 1½ to 1¾ times in the depth of the body, much higher but much less than twice as high as base length, spine thick, posteriorly armed with large teeth, with a flexible part considerably longer than the head; pectoral fins and ventral fins acute, nearly equal in length, contained 6 to 6¾ times in the length of the body, pectoral fins in younger animals reaching or nearly reaching ventral fins, in old animals ventral fins ⁸²⁸ not reaching anal fin; anal fin acute, emarginate, much lower but much less than twice as low as dorsal fin, not much higher than base length, simple

third ray medium-sized, bony only at the base; caudal fin scaled only at the base, with a deep incision, lobes acute, contained $3\frac{3}{5}$ to $3\frac{4}{5}$ times in the length of the body. Colour: upper part of the body green, lower part silver, iris yellow, upper part tinged with pink and a dark colour; fins faintly pink-hyaline, ventral fins, anal and caudal fin with red tips, upper part of dorsal fin generally with dark speckles.

B. 3. D. 4/8 or 4/9. P. 1/14 to 1/16. V. 2/8. A. 3/5 or 3/6. C. 7/17/7, short flanking ones included.

Syn. *Barbus bramoides* Val., Poiss. XVI p. 119, Fisch. Syr. p. 28.

Barbeau brémoides Val. Poiss XVI p. 119.

Barbus bremoides Val., Poiss. XVI p. X.

Barbus wadon Blkr, Verh. Bat. Gen. XXIII Ichth. Midd. Oost-Java p. 14.

Lalawak, *Lalawak*, *Wadon* Mal. *Gengehek*, *Turap-hawu*, *Regis* Sundan. *Wader*, *Lukas* Javan.

Hab. Java (Batavia, Tjibitong, Tandjong-oost, Buitenzorg, Tjampo, Tjikao, Parongkalong, Kuningan, Banjumas, Ngawi, Surabaya), in rivers.

Length of 27 specimens 95''' to 248'''.

Remark. My earlier *Barbus wadon*, described on the basis of juvenile specimens from Surabaya, does not differ specifically from *Barbus bramoides* Val. like I believed earlier. The description of *Barbus bramoides* in the large *Histoire naturelle des Poissons* certainly concerns the species described here, of which I observed a large number of specimens of different sizes. It is closely related to *Systemus* (*Barbodes*) *erythropterus* and mainly differs from it only by a more blunt profile, less wide gill cover, a higher caudal fin, and one or two scales less in the lateral line.

On Java this species is very common. With *Systemus* (*Barbodes*) *rubripinnis* it is the most commonly caught species of the genus, at least in the lower regions.

Systemus (*Barbodes*) *javanicus* Blkr. –
Javaansche Lalawak [*Javanese Lalawak*].
Atl. Cypr. tab XLII.

A *Systemus* (*Barbodes*) with an oblong, compressed body, depth of body contained $3\frac{3}{4}$ to 3 times in its length, width contained $2\frac{2}{3}$ to 3 times in its depth. Head slightly acute, contained slightly over 5 to 6 times in length of body with caudal fin, 4 to $4\frac{3}{5}$ times in length of body without caudal fin; depth of head contained $1\frac{1}{4}$ to $1\frac{1}{2}$ times in its length, width $1\frac{1}{3}$ to $1\frac{2}{3}$ times; eye diameter contained slightly over 3 to $3\frac{2}{3}$ times in the length of the head, eye diameter contained $1\frac{1}{2}$ to $1\frac{2}{3}$ times in the postocular part of the head, distance between the eyes $1\frac{1}{3}$ to $1\frac{2}{3}$ times their diameter; palpebral membrane covering the external margin of the iris only, much broader anteriorly than posteriorly, opening nearly circular; snout slightly acute, lightly convex, shorter than the eye, not sticking out in front of the mouth; nostrils closer to the orbit than to the tip of the snout; rostro-dorsal profile concave between snout and nape, convex on the nape; anterior suborbital bone pentagonal, depth about equal to length, lower margin oblique, anterior and posterior lower margins convex or truncate, upper margins slightly concave, united into an acute upward pointing angle close to the nostrils, lower half traversed by a longitudinal, obliquely descending crest; 2nd suborbital bone elongate-quadrangular, depth slightly or not greater anteriorly than posteriorly, length twice or more than twice as great as depth, more than twice as low [625](#) as 1st suborbital bone; upper jaw longer than lower jaw, moderately downward protrusible, ending hardly anterior to the eye or below the anterior margin of the eye, contained $3\frac{1}{3}$ to $3\frac{1}{2}$ times in the length of the head; gape rather oblique; barbels thin, upper jaw barbels much longer than to twice as long as nasal barbels, more than twice to less than twice as short as the eye; lower jaw at the symphysis with a short, obtuse, little conspicuous tubercle, underside without visible pores; lips medium-sized, terete, transversely lightly rugose; width of gill cover contained $1\frac{2}{3}$ to $1\frac{3}{4}$ times in its depth, lower margin slightly convex; gill opening ending below the posterior margin of the preoperculum. Pharyngeal teeth hooked-slightly spoon-shaped to grinding, 2.3.5/5.3.2; on the chewing surface more or less tuberculate; scapula triangular, ob-

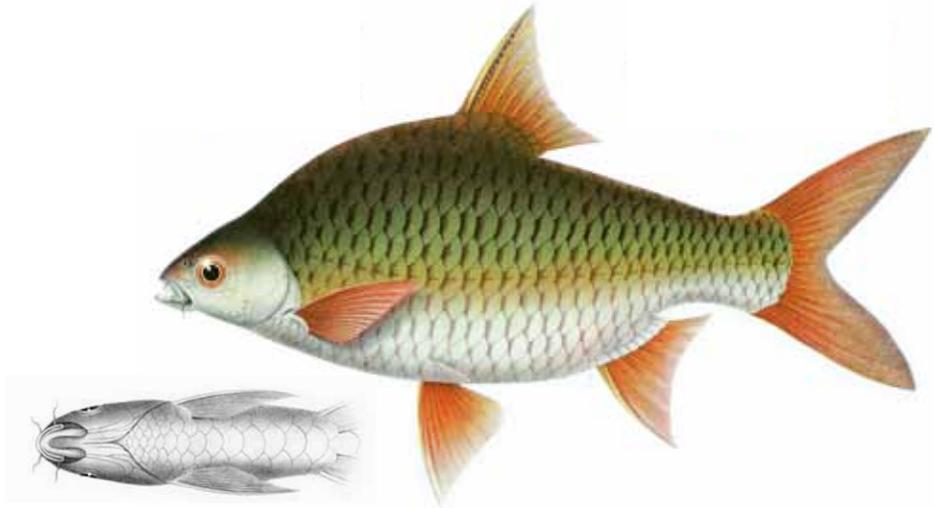


Fig. 67. *Puntius (Barbodes) javanicus* Blkr. Atl. Ichth. Cypr. Tab. XXXVII, Fig. 2. TL figure 302 mm.

tusely rounded; back elevated, angular, higher than the convex belly; belly flat anterior to ventral fins, angular at the flanks, behind ventral fins obtusely ridged; depth of tail contained $1\frac{1}{3}$ to $1\frac{1}{2}$ times in the length of the head; scales for the free half and for the basal half with longitudinal stripes; 31 to 33 scales in the lateral line, 11 in a transverse row (without the lowest ventral scales) of which $6\frac{1}{2}$ above the lateral line, 11 or 12 in a longitudinal row between occiput and dorsal fin, lowest ventral scales in three longitudinal rows, scales in medial row gradually increasing in size posteriorly, posterior scales in those rows generally larger than those in flanking rows; lateral line curved, descending below the rostro-caudal line, each scale marked by a simple tube which does not reach the centre of the scale; dorsal fin starting hardly behind the base of the ventral fins, acute, emarginate, depth contained $1\frac{1}{3}$ to $1\frac{1}{4}$ times in the depth of the body, twice as deep to not much less than twice as deep as base length, spine thick, posteriorly serrated with rather large teeth, with a flexible part not much longer than the head; pectoral fins and ventral fins acute, pectoral fins generally longer than ventral fins, contained $5\frac{3}{4}$ to 6 times in the length of the body, pectoral fins in younger fishes generally reaching the ventral fins, in adults generally not reaching the ventral fins; anal fin acute, emarginate, much lower but much less than twice as low as dorsal fin, considerably higher to much less than twice as high as base length, simple third ray bony only at the base; caudal fin scaled only at the base, with a deep incision, lobes acute, contained 4 to $4\frac{1}{4}$ times in the length of the body. Colour: upper part of the body green, lower part silver, iris yellow, scales on back, flanks and tail each with a transverse crescent shaped violet-dark band at the base; fins pink-greenish, pectoral and ventral fins of a fainter colour, unequal more or less speckled.

B. 3. D. $\frac{4}{8}$ or $\frac{4}{9}$. P. $\frac{1}{14}$ or $\frac{1}{15}$. V. $\frac{2}{8}$. A. $\frac{3}{6}$ or $\frac{3}{7}$. C. $\frac{7}{17/7}$ or $\frac{8}{18/8}$, short flanking ones included.

Syn. *Barbus javanicus* Blkr, Verslag verz. vissch. van Oost-Java, Nat. T. Ned. Ind. IX p. 403.
Lawak, Lalawak Mal. *Turu-behaw* Sundan.

Hab. Java (Batavia, Krawang, Bekassi, Tjiandjur, Parongkalong, Ngawi, Gempol), in rivers.
Length of 33 specimens 139'' to 315''.

Remark. Of all species in my collection *Systemus (Barbodes) javanicus* Blkr. is most closely related to *Systemus (Barbodes) gonionotus* Blkr. However, it can be distinguished by a higher body, a more acute and relatively larger head, a more pointed snout, a concave profile anterior to the nape, and a remarkable broader gill cover (the

width of which in *Systemus* (*Barbodes*) *gonionotus* goes twice in its length) etc. The differences are very apparent when equal sized specimens of both species are compared. On the other hand the species in question is related to *Systemus* (*Barbodes*) *bramoides*, but can easily be distinguished from it by the formula of its anal fin rays and of the longitudinal scale rows above the lateral line. 330 It is especially common in the river Tjitarum and is sometimes caught in large quantities in its delta branches and from there taken overseas to the market in Batavia.

Systemus (*Barbodes*) *koilometopon* Blkr. –
Spitskoppige Lalawak [*Acute headed Lalawak*].
Atl. Cypr. Tab. XXXI.

A *Systemus* (*Barbodes*) with an oblong compressed body, depth of body contained about 3 times in its length, width contained about $2\frac{3}{5}$ times in its depth. Head slightly acute, contained 5 to $5\frac{1}{4}$ times in length of body with caudal fin, 4 to nearly 4 times in length of body without caudal fin; depth of head contained $1\frac{1}{4}$ times in its length, width about $1\frac{1}{2}$ times; eye diameter contained slightly over 3 times in the length of the head, eye diameter contained $1\frac{1}{3}$ times in the postocular part of the head, distance between the eyes $1\frac{1}{5}$ times their diameter; palpebral membrane covering the external margin of the iris only, broader anteriorly than posteriorly, opening nearly circular; snout slightly acute, convex, shorter than the eye, not sticking out in front of the mouth; nostrils closer to the orbit than to the tip of the snout; rostro-dorsal profile strongly concave on crown and nape, convex on the anterior part of the back; anterior suborbital bone pentagonal, depth about equal to length, lower margin oblique, anterior and posterior lower margins convex, upper margins slightly concave, united into an acute, upward pointing angle close to the nostrils, lower half traversed by a longitudinal, obliquely descending crest; 2nd suborbital bone elongate-quadrangular, depth hardly greater anteriorly than posteriorly, length more than twice as great as depth; more than twice as low as 1st suborbital bone; upper jaw longer than lower jaw, moderately downward protrusible, hardly sticking out in front of the eye, contained $3\frac{3}{5}$ to $3\frac{1}{2}$ times in the length of the head; gape strongly oblique; barbels slender, upper jaw barbels much longer than nasal barbels, about twice as short as the eye; lower jaw at the symphysis with an obtuse, little conspicuous tubercle, underside on both branches with some little conspicuous pores in a longitudinal row; lips thin, terete, transversely rugose; width of gill cover contained about twice in its depth, lower margin convex; gill opening ending below the posterior part of the preoperculum. Pharyngeal teeth hooked to slightly spoon-shaped to grinding, 2.3.5/5.3.2; on the chewing surface more or less tuberculate; scapula triangular, obtusely rounded; back strongly elevated, angular, higher than the convex belly; belly flat anterior to ventral fins, angular at the flanks, behind ventral fins obtusely ridged; depth of tail contained about $1\frac{3}{5}$ times in the length of the head; scales with longitudinal stripes or ray-like stripes originating from a common centre on the free half and on the basal half; 31 scales in the lateral line, 11 in a transverse row (without the lowest ventral scales) of which 6 ($5\frac{1}{2}$) above the lateral line, 11 in a longitudinal row between occiput and dorsal fin, lowest ventral scales in three longitudinal rows, scales in medial row not or hardly larger than those in flanking rows; lateral line strongly curved, descending below the rostro-caudal line, each scale marked by a simple tube not reaching the centre of the scale; dorsal fin starting hardly behind the base of the ventral fins, acute, emarginate, depth contained about $1\frac{2}{5}$ times in the depth of the body, about twice as high as base length, spine very thick, posteriorly armed with large teeth, with a flexible part considerably longer than the head; pectoral fins and ventral fins acute, pectoral fins slightly longer than ventral fins, contained $5\frac{1}{4}$ to $5\frac{1}{5}$ times in the length of the body, reaching or nearly reaching ventral fins, ventral fins not reaching anal fins; anal fin acute, emarginate, not much less than twice as low as dorsal fin, much less than twice as high as base length, simple third ray thin, bony only at the base; caudal fin scaled only at the base, with a deep incision, lobes acute, contained $3\frac{3}{4}$ to nearly 4 times in the length of the body. Colour: upper part of the body green, lower part silver, iris yellowish or pink; fins yellowish-hyaline or pink-hyaline.

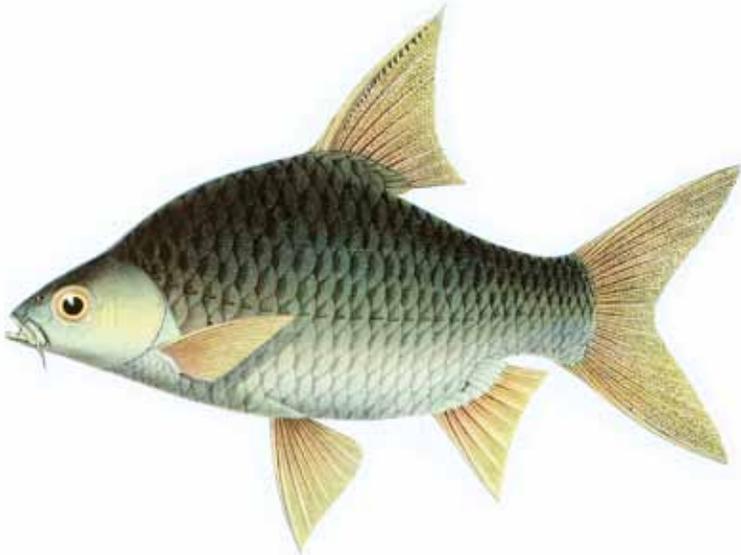


Fig. 68. *Puntius (Barbodes) koilometopon* Blkr. Atl. Ichth. Cypr. Tab. XXX, Fig. 1. TL figure 155 mm.

B. 3. D. 4/8 or 4/9. P. 1/15. V. 2/8. A. 3/6 or 3/7. C. 7/17/7 or 8/18/8, short flanking ones included.

331 Syn. *Barbus koilometopon* Blkr, Descr. Specier. Pisc. Javan. Nov., Nat. T. Ned. Ind. XIII p. 347.
Lalawak, Lawak Mal. Batav.

Hab. Java (Batavia, Bekassi), in rivers.

Length of 2 specimens 153''' and 164'''.

Remark. Among the archipelagic species of *Barbodes* there are three, which have in common, six scale rows above the lateral line, six or seven branched rays in the anal fin, barbels that are shorter than the eye, 31 to 33 scales in the lateral line, and the origin of the dorsal fin slightly posterior to the basis of the pelvic fins. These species are the above described *Systemus (Barbodes) javanicus*, *Systemus (Barbodes) koilometopon* and *Systemus (Barbodes) gonionotus*.

The species in question however can be separated with enough sharpness from both its relatives; from *Systemus (Barbodes) javanicus*, by its remarkably more slender gill cover, lower, more acute head and more concave profile of the nape; – and from *Systemus (Barbodes) gonionotus* likewise by the more concave profile and much more pointed and lower head and moreover by a relatively remarkably higher body.

The two specimens of my collection are the only ones that I have seen till now.

Systemus (Barbodes) gonionotus Blkr. –
Hoekruggige Lalawak [Angle-backed Lalawak].
Atl. Cypr. Tab. XLI.

A *Systemus (Barbodes)* with an oblong, compressed body, depth of body contained $3\frac{1}{2}$ to $3\frac{3}{4}$ times in its length, width contained $2\frac{1}{2}$ to $2\frac{3}{4}$ times in its depth. Head slightly obtuse, contained $5\frac{1}{2}$ to $6\frac{1}{3}$ times in length of body with caudal fin, 4 to $4\frac{1}{2}$ times in length of body without caudal fin; depth of head

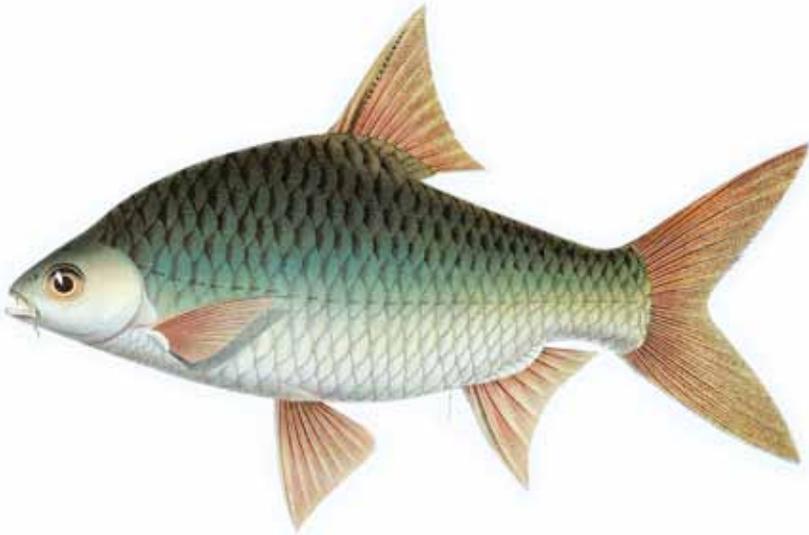


Fig. 69. *Puntius (Barbodes) gonionotus* Blkr. Atl. Ichth. Cypr. Tab. XXVIII, Fig. 1. TL figure 227 mm.

contained $1\frac{1}{5}$ to $1\frac{1}{8}$ times in its length, width contained $1\frac{1}{5}$ to about $1\frac{1}{2}$ times in its length; eye diameter contained 3 to $3\frac{1}{2}$ times in the length of the head, eye diameter contained $1\frac{1}{3}$ to $1\frac{1}{3}$ times in the postocular part of the head, distance between the eyes $1\frac{1}{4}$ to $1\frac{1}{2}$ times their diameter; palpebral membrane covering the external margin of the iris only, broader anteriorly than posteriorly, opening nearly circular; snout obtuse, strongly convex, shorter than the eye, not sticking out in front of the mouth; nostrils closer to the orbit than to the tip of the snout; rostro-dorsal profile in younger animals nearly straight between snout and nape; interorbital line convex; nape strongly convex; anterior suborbital bone pentagonal, depth about equal to length, lower margin oblique, anterior and posterior lower margins convex or slightly truncate, upper margins slightly concave, united into an acute, upward pointing angle close to the nostrils, lower half traversed by a longitudinal, obliquely descending crest; 2nd suborbital bone elongate-quadrangular, depth not much greater anteriorly than posteriorly, length more than twice as great as depth; more than twice as low as 1st suborbital bone; upper jaw longer than lower jaw, moderately downward protrusible, hardly sticking out in front of the eye or ending below the anterior margin of the eye, contained about $3\frac{1}{2}$ times in the length of the head; gape slightly oblique; barbels thin, upper jaw barbels much longer than nasal barbels, more than twice as short as the eye; lower jaw at the symphysis with an obtuse tubercle, slightly hooked at the tip, lower part without visible pores; lips thin, terete, lightly transversely rugose; width of gill cover contained about twice in its depth, lower margin slightly convex; gill opening ending below the posterior part of the preoperculum. Pharyngeal teeth hooked to slightly spoon-shaped to grinding, 2.3.5/5.3.2; on the chewing surface tuberculate; ³³² scapula triangular, obtusely rounded; back elevated, angular, higher than the convex belly; belly flat anterior to ventral fins, angular at the flanks, behind ventral fins rounded, not ridged; depth of tail contained $1\frac{3}{4}$ to $1\frac{1}{2}$ times in the length of the head; scales for the free half and for the basal half with longitudinal, slightly ray-like stripes, 31 scales in the lateral line, 11 in a transverse row (without the lowest ventral scales) of which 6 ($5\frac{1}{2}$) above the lateral line, 12 in a longitudinal row between occiput and dorsal fin, lowest ventral scales in three longitudinal rows, scales in medial row gradually increasing in size posteriorly, posterior scales in those rows larger than those in the flanking rows; lateral line curved, descending below the rostro-caudal line, each scale marked by a generally simple tube not reaching the centre of the scale; dorsal fin starting slightly behind the base of the ventral fins, acute, emarginate,

height contained $1\frac{3}{5}$ to $1\frac{1}{2}$ times in the depth of the body, slightly less than twice as high as base length, spine thick, posteriorly serrated with large teeth, with a flexible part not much longer than the head; pectoral fins and ventral fins acute, nearly equal in length, contained nearly 6 to $6\frac{1}{2}$ times in the length of the body, in younger animals pectoral fins reaching or nearly reaching ventral fins, ventral fins not reaching anal fin; anal fin acute, emarginate, considerably lower than dorsal fin, much higher, but much less than twice as high as base length, the simple third ray medium-sized, bony only at the base; caudal fin scaled only at the base, with a deep incision, lobes acute, contained $3\frac{3}{4}$ to slightly over 4 times in the length of the body. Colour: upper part of the body green, lower part silver, iris yellow, upper part darkish; dorsal, pectoral and caudal fins pink-hyaline or yellowish-hyaline, ventral and anal fins white.

B. 3. D. $4/8$ or $4/9$. P. $1/14$. V. $2/8$. A. $3/6$ or $3/7$. C. $8/17/8$, short flanking ones included.

Syn. *Barbus goniotus* Blkr, Verh. Bat. Gen. v. kunst. wet. XXIII Ichth. Midd. Oost-Java p. 15.

Lalawak, *Lawak* Mal. *Wader*, *Beder*, *Luntjar*, *Tawes*, Javan.

Hab. Java (Batavia, Surabaya), in rivers.

Length of 3 specimens $119'''$ to $240'''$

Remark. The convex head, which is a little longer than high, the blunt snout, the straight profile, and the slender gill cover, are the main characters by which the species in question distinguishes itself from the related species *Systemus* (*Barbodes*) *koilometopon* and *Systemus* (*Barbodes*) *javanicus*. In habitus it agrees more with *Systemus* (*Barbodes*) *erythropterus* and *Systemus* (*Barbodes*) *amblycephalus*, however the posterior insertion of the dorsal fin and the formulas of the scale rows and anal fin rays give safe characters on the basis of which it cannot be mistaken for any of these species.

The species seems to be rather rare on Java, as they have only been sent to me from the two principal capitals of this island.

Systemus (*Barbodes*) *Hugenini* Blkr. –
Hugenin's Lalawak.
Atl. Cypr. Tab. XXXII fig. 3.

A *Systemus* (*Barbodes*) with an oblong, compressed body, depth of body contained about $3\frac{3}{4}$ times in its length, width contained nearly 3 times in its depth. Head slightly obtuse, contained 6 times in length of body with caudal fin, about $4\frac{1}{2}$ times in length of body without caudal fin; depth of head contained $1\frac{1}{4}$ times in its length, width nearly twice; eye diameter contained about 3 times in the length of the head, eye diameter contained slightly more than once in the postocular part of the head, distance between the eyes slightly more than once the eye diameter; palpebral membrane covering the external margin of the iris only, 333 opening nearly circular; snout obtuse, convex, slightly truncate, shorter than the eye, not sticking out in front of the mouth; nostrils closer to the orbit than to the tip of the snout; rostro-dorsal profile sloping on top of the head and on the nape, nearly straight, at the front part of the back convex; anterior suborbital bone pentagonal, depth hardly greater than length, lower margin nearly horizontal, anterior and posterior lower margins convex, upper margins slightly concave, united into an acute, upward pointing angle close to the nostrils, traversed around the middle by a longitudinal crest nearly parallel to the lower margin of the bone; 2nd suborbital bone obliquely quadrangular, depth much greater anteriorly than posteriorly, length less than twice as great as depth, less than twice as low as 1st suborbital bone; upper jaw longer than lower jaw, moderately downward protrusible, hardly sticking out in front of the eye, contained about $3\frac{1}{2}$ times in the length of the head; gape slightly oblique; barbels thin, nasal and upper jaw barbels nearly equal in length, slightly shorter than the eye; lower jaw at the symphysis with an obtuse, little conspicuous tubercle, underside without visible pores; lips thin, terete, transversely rugose; width of gill cover contained nearly twice in its depth, lower margin slightly concave; gill opening ending below the posterior margin of the preoperculum. Pharyngeal teeth hooked to slightly spoon-shaped to grinding,

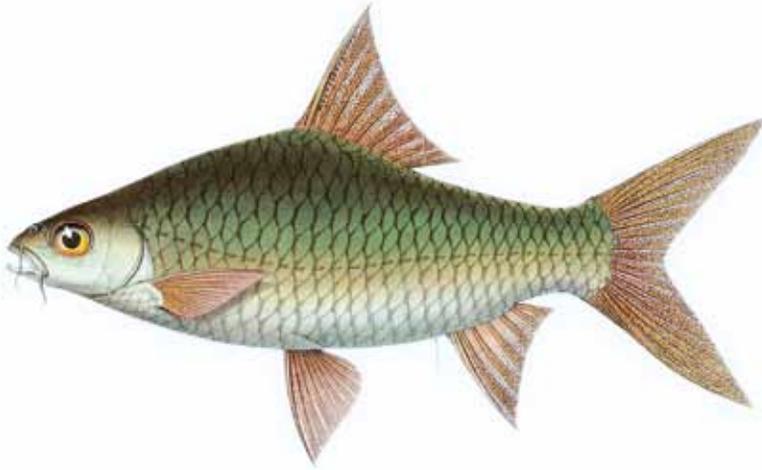


Fig. 70. *Puntius (Barbodes) Hugeni* Blkr. Atl. Ichth. Cypr. Tab. XXXII, Fig. 3. TL figure 170 mm.

2.3.5/5.3.2; on the chewing surface more or less tuberculate; scapula triangular, rounded at the tip; back elevated, angular, considerably higher than the convex belly; belly flat anterior to ventral fins, angular at the flanks, behind ventral fins rounded, not ridged; depth of tail contained nearly $1\frac{3}{5}$ times in the length of the head; scales on the free half and on the basal half with longitudinal or slightly ray-like stripes, 30 scales in the lateral line, 11 in a transverse row (without the lowest ventral scales) of which 6 ($5\frac{1}{2}$) above the lateral line, about 10 in a longitudinal row between occiput and dorsal fin, lowest ventral scales in three longitudinal rows, scales in medial row larger than those in flanking rows; lateral line curved, descending below the rostro-caudal line, each scale marked by a simple tube generally reaching the centre of the scale; dorsal fin starting above the base of the ventral fins, acute, depth contained about $1\frac{3}{5}$ times in the depth of the body, much higher but much less than twice as high as base length, spine thick, posteriorly serrated with large teeth, with a flexible part not much longer than the head; pectoral and ventral fins acute, nearly equal in length, contained about $6\frac{1}{2}$ times in the length of the body, pectoral fins not reaching ventral fins, ventral fins not reaching anal fin; anal fin acute, emarginate, not much lower than dorsal fin, about twice as high as base length, the simple third ray slender, bony only at the base; caudal fin scaled only at the base, with a deep incision, lobes acute, contained $3\frac{3}{5}$ to $3\frac{3}{4}$ times in the length of the body. Colour: upper part of the body green, lower part silver, scales on back, flanks and tail each with a small, transverse violetish band at the base; iris yellow, upper part darkish; dorsal, fins yellowish or pink, unequal, with dark speckles.

B. 3. D. $\frac{4}{8}$ or $\frac{4}{9}$. P. $\frac{1}{14}$. V. $\frac{2}{8}$. A. $\frac{3}{5}$ or $\frac{3}{6}$. C. $\frac{7}{17/7}$, short flanking ones included.

Syn. *Barbus Hugeni* Blkr, Diagn. Nieuwe vischs. Sumatra, Nat. T. Ned. Ind. IV p. 294.

Hab. Sumatra, in the river Ombiling.

Length of sole specimen 179''.

Remark. Related to *Systemus (Barbodes) gonionotus* and *Systemus (Barbodes) hypselonotus*, the species in question mainly distinguishes itself from both species by its more slender body and a nearly straight profile from the forehead till the dorsal fin. Moreover it differs from the first mentioned species by one ray less in the anal fin, longer barbels, especially longer snout barbels, which however remain shorter than the eye, by the implantation of the dorsal fin above the pelvic fins, etc., – and from *Systemus (Barbodes) hypselonotus* by shorter barbels.

334 *Systemus (Barbodes) hypselonotus* Blkr. –
Hoogruggige Lalawak [High-backed Lalawak].
 Atl. Cypr. Tab. XXXIV fig. 3.

A *Systemus (Barbodes)* with an oblong, compressed body, depth of body contained about $3\frac{1}{4}$ times in its length, width contained about $2\frac{2}{3}$ times in its depth. Head slightly obtuse, contained slightly over 5 times in length of body with caudal fin, about $3\frac{3}{4}$ times in length of body without caudal fin; depth of head contained about $1\frac{1}{5}$ times in its length, width about $1\frac{3}{4}$ times; eye diameter contained about $2\frac{1}{2}$ times in the length of the head, eye diameter contained slightly more than once in the postocular part of the head, distance between the eyes $\frac{3}{4}$ to $\frac{5}{6}$ times their diameter; palpebral membrane covering the external margin of the iris only, opening nearly circular; snout obtuse, convex, slightly truncate, much shorter than the eye, not sticking out in front of the mouth; nostrils closer to the orbit than to the tip of the snout; rostro-dorsal profile nearly straight between snout and nape, at the nape convex; anterior suborbital bone pentagonal, length hardly or not greater than depth, lower margin nearly horizontal, anterior and posterior lower margins convex or truncate, upper margins slightly concave, united into an acute, upward pointing angle close to the nostrils, lower half traversed by a longitudinal crest parallel to the lower margin of the bone; 2nd suborbital bone obliquely quadrangular, length about twice as great as depth, deeper anteriorly than posteriorly; about twice as low as 1st suborbital bone; upper jaw longer than lower jaw, moderately downward protrusible, ending below the anterior rim of the eye, contained about 3 times in the length of the head; gape rather oblique; barbels thin, considerably longer than the eye, nasal barbels slightly shorter than upper jaw barbels; lower jaw at the symphysis with a low, obtuse, little conspicuous tubercle, underside without visible pores; lips thin, terete, not conspicuously rugose; width of gill cover contained about $1\frac{3}{4}$ times in its depth, lower margin nearly straight; gill opening ending below the posterior part of the preoperculum. Pharyngeal teeth hooked to slightly spoon-shaped to grinding, 2.3.5/5.3.2; on the chewing surface tuberculate, 2 internal teeth in longest row conical and acuminate at the tip; scapula triangular, obtusely rounded; back elevated, angular, higher than the convex belly; belly flat anterior to ventral fins, angular at the flanks, behind ventral fins rounded, not ridged; depth of tail contained about $1\frac{2}{3}$ times in the length of the head; scales for the free half and for the basal half not or hardly striped, 30 or 31 scales in the lateral line, 11 or 12 in a transverse row (without the lowest ventral scales) of which 6 ($5\frac{1}{2}$) above the lateral line, about 12 in a longitudinal row between occiput and dorsal fin; lateral line curved, descending below the rostro-caudal line, each scale marked by a simple tube generally reaching the centre of the scale; dorsal fin starting above the base of the ventral fins, acute, emarginate; depth contained $1\frac{2}{5}$ to $1\frac{1}{2}$ times in the depth of the body, much higher but much less than twice as high as base length, spine thick, posteriorly serrated with large teeth, with a flexible part longer than the head; pectoral and ventral fins acute, pectoral fins slightly longer



Fig. 71. *Puntius (Barbodes) hypselonotus* Blkr. Atl. Ichth. Cypr. Tab. XXXIV, Fig. 3. TL figure 72 mm.

than ventral fins, contained about $6\frac{1}{2}$ times in the length of the body, nearly reaching the ventral fins, ventral fins not reaching the anal fin; anal fin acute, emarginate, much lower but much less than twice as low as dorsal fin, not much higher than base length, the simple third ray slender, bony only at the base; caudal fin scaled only at the base, with a deep incision, lobes acute, contained $3\frac{3}{5}$ to $3\frac{1}{2}$ times in the length of the body. Colour: upper part of the body green, lower part silver; iris yellow, upper part dark; dorsal, fins yellowish or pink-hyaline, upper part of dorsal fin dark or with darkish speckles.

B. 3. D. $4/8$ or $4/9$. P. $1/15$. V. $2/8$. A. 305 or $3/6$ or $3/7$. C. $7/17/7$ or $8/17/8$, short flanking ones included.

Syn. *Barbus hypselonotus* V. Hass. Algem. Konst- en Letterb. 1823 II p. 132: Val., Poiss. XVI p. 126; Blkr, Descript. spec. pisc. javan. nov. Nat. T. Ned. Ind. XIII p. 349.

Barbus hypoeconatus Bull. Féruss. 1824 Zoöl. P. 375.

Barbeau hypsylonote Val., Poiss. XVI p. 126.

Regis Sundan.

Hab. Java (Tjampea), in rivers.

Length of 2 specimens $75''$ and $78''$.

335 Remark. The short description of this species in the large *histoire naturelle des Poissons* is totally insufficient for the recognition of the species and for this reason I would be uncertain concerning the identity of my specimens if I would not have been in the possession of a drawing of *Barbus hypselonotus*, left by Van Hasselt and taken after a specimen of 71 mm length, caught in Lebek, in the residency of Bantam.

The species can be recognized by its long upper jaw barbels, strongly armed dorsal spine, high body, blunt snout and by its 30 or 31 scales in the lateral line and 6 longitudinal scale rows above the lateral line.

The two specimens of my collection are the only ones that I have seen till now. The species therefore seems to be rare.

Systemus (Barbodes) macrophthalmus Blkr. –
Grootoogige Lalawak [*Large-eyed Lalawak*].
 Atl. Cypr. Tab. XXXI fig. 2.

A *Systemus (Barbodes)* with an oblong, compressed body, depth of body contained about 4 times in its length, width contained about $2\frac{1}{2}$ times in its depth. Head obtuse, contained about $5\frac{1}{4}$ times in length of body with caudal fin, $3\frac{3}{4}$ to 4 times in length of body without caudal fin; depth of head contained about $1\frac{1}{2}$ times in its length, width about $1\frac{2}{3}$ times; eye diameter contained $2\frac{1}{3}$ to $2\frac{1}{2}$ times in the length of the head, eye diameter contained once or nearly once in the postocular part of the head, distance between the eyes nearly once their diameter; palpebral membrane covering the external margin of the iris only, opening nearly circular; snout obtuse, convex, slightly truncate, nearly twice as short as the eye, not sticking out in front of the mouth; nostrils closer to the orbit than to the tip of the snout; rostrum dorsal profile convex, nearly straight between snout and nape; anterior suborbital bone pentagonal, depth hardly or not greater than length, lower margin nearly horizontal, anterior and posterior lower margins convex or truncate, upper margins slightly concave, united into an acute, upward pointing angle close to the nostrils, traversed around the middle by a longitudinal crest not parallel to the lower margin of the bone; 2nd suborbital bone elongate-quadrangular, very low, length about three times as great as depth, three to about four times as low as 1st suborbital bone; upper jaw longer than lower jaw, moderately downward protrusible, ending below the anterior rim of the eye, contained about $3\frac{1}{2}$ times in the length of the head; gape rather oblique; barbels thin, upper jaw barbels slightly longer than nasal barbels, much less than twice as short as the eye; lower jaw at the symphysis with an obtuse, short, little conspicuous tubercle, at the underside with 4 little conspicuous pores on each branch placed in a longitudinal row; lips thin, terete, with hardly or not visible transverse ridges; width of gill cover contained

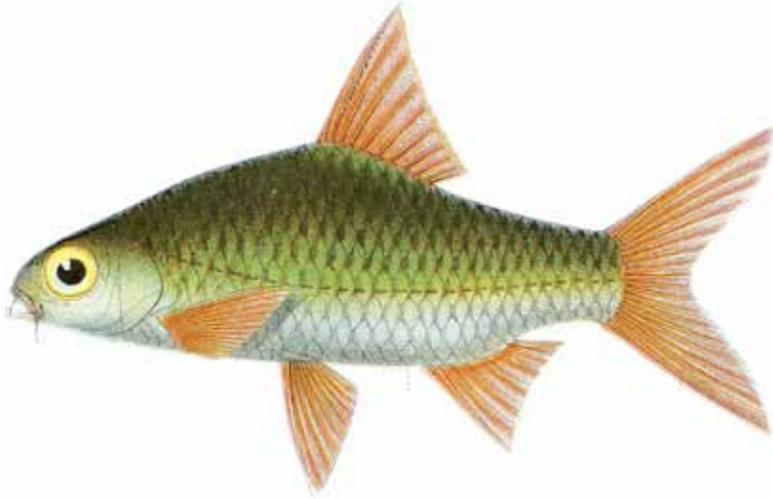


Fig. 72. *Puntius (Barbodes) macrophthalmus* Blkr. Atl. Ichth. Cypr. Tab. XXXV, Fig. 1. TL figure 96 mm.

$1\frac{3}{4}$ to $1\frac{1}{2}$ times in its depth, lower margin slightly concave or straight; gill opening ending below the posterior margin of the preoperculum. Pharyngeal teeth hooked to slightly spoon-shaped 2.3.5/5.3.2; tuberculate at the tip only; scapula triangular, obtusely rounded; back elevated, angular, much higher than the belly; belly flat anterior to ventral fins, angular at the flanks, behind ventral fins rounded, not ridged; depth of tail contained $1\frac{1}{2}$ to $1\frac{3}{5}$ times in the length of the head; scales on the free half frequently, on the basal half rarely with longitudinal stripes, 28 or 29 scales in the lateral line, 11 in a transverse row (without the lowest ventral scales) of which 6 ($5\frac{1}{2}$) above the lateral line, about 10 in a longitudinal row between occiput and dorsal fin, scales in medial row larger than those in flanking rows; lateral line curved, reaching the rostro-caudal line, each scale marked by a simple tube reaching the centre of the scale; dorsal fin starting above the base of the ventral fins, acute, emarginate, not much ³³⁶ lower than the body, twice or nearly twice as high as base length, spine thick, posteriorly armed with large teeth, with a flexible part not much longer than the head; pectoral fins and ventral fins acute, nearly equal in length, contained $6\frac{1}{3}$ to $6\frac{1}{2}$ times in the length of the body, pectoral fins reaching or nearly reaching ventral fins, ventral fins reaching or nearly reaching anal fin; anal fin acute, emarginate, much lower but much less than twice as low as dorsal fin, much higher than but much less than twice as high as base length, the simple third ray thin, bony only at the base; caudal fin scaled only at the base, with a deep incision, lobes acute, contained about $3\frac{1}{2}$ times in the length of the body. Colour: upper part of the body green, lower part silver; iris yellow, upper part dark; fins yellowish- pink, upper part of dorsal fin with dark speckles.

B. 3. D.4/8 or 4/9. P. 1/14. V. 2/8. A. $\frac{3}{5}$ or $\frac{3}{6}$. C. 1/17/7 or 8/17/7, short flanking ones included.

Syn. *Barbus macrophthalmus* Blkr, Versl. verz. visschs. Oost-Java, Nat. T. Ned. Ind. IX p. 404.

Wader Jav. *Lawak*, *Lalawak* Mal.

Hab. Java (Batavia, Surabaya), in rivers.

Length of 5 specimens 75'' to 115''.

Remark. In my above mentioned description the printing error is present, that the width of the head would go only $1\frac{1}{5}$ in its length and that the lateral line would contain 26 scales. In relationship the species stands between *Systemus (Barbodes) hypselonotus* and *Systemus (Barbodes) platysoma*, however it is easily recognizable by the formula of its scales, the height of the body, the length of the barbels, the relatively very large eyes, etc.

Systomus (Barbodes) platysoma Blkr. –
Platlivoige Lalawak [Flat-bodied Lalawak].
 Atl. Cypr. Tab. XXX fig. 2.

A *Systomus (Barbodes)* with an oblong, compressed body, depth of body contained nearly $2\frac{1}{2}$ times in its length, width contained about 3 times in its depth. Head obtuse, contained about $5\frac{2}{3}$ times in length of body with caudal fin, nearly 4 times in length of body without caudal fin; depth of head contained once in its length, width about $1\frac{1}{2}$ times; eye diameter contained nearly 3 times in the length of the head, eye diameter contained $1\frac{1}{3}$ to $1\frac{1}{4}$ times in the postocular part of the head, distance between the eyes slightly more than once their diameter; palpebral membrane covering the external margin of the iris only, opening nearly circular; snout obtuse, convex, obliquely truncate, much shorter than the eye, not sticking out in front of the mouth; nostrils closer to the orbit than to the tip of the snout; rostro-dorsal profile convex, slightly concave only above or anterior to the eyes, interorbital line convex; anterior suborbital bone pentagonal, depth hardly or not greater than length, lower margin nearly horizontal, anterior and posterior lower margins convex or truncate, upper margins slightly concave, united into an acute, upward pointing angle close to the nostrils, traversed around the middle by a longitudinal crest not parallel to the lower margin of the bone; 2nd suborbital bone obliquely oblong-quadrangular, depth greater anteriorly than posteriorly, length less than twice as great as depth, less than twice as low as 1st suborbital bone; upper jaw longer than lower jaw, strongly vertically downward protrusible, ending below the anterior half of the eye, contained about 3 times in the length of the head; gape rather oblique; barbels thin, nasal and upper jaw barbels nearly equal in length, hardly or not longer than the eye; lower jaw at the symphysis with an obtuse, short, little conspicuous tubercle, underside without visible pores; lips thin, terete, lightly transversely rugose; width of gill cover contained $1\frac{1}{3}$ to $1\frac{1}{2}$ times in its depth, lower margin slightly convex; gill opening ending below the posterior part of the preoperculum. Pharyngeal teeth hooked to slightly spoon-shaped to grinding, 2.3.5/5.3.2; rugose-tuberculate on the

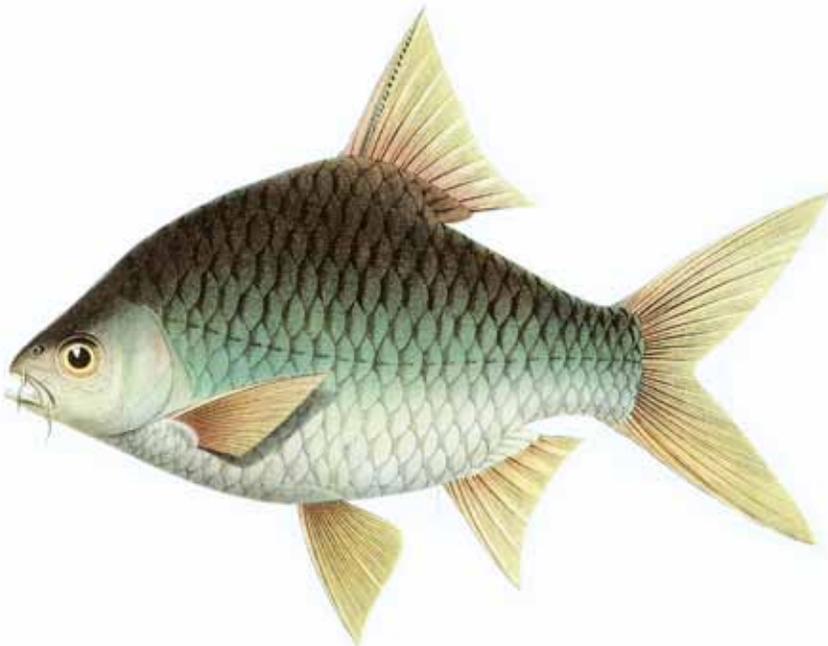


Fig. 73. *Puntius (Barbodes) platysoma* Blkr. Atl. Ichth. Cypr. Tab. XXX, Fig. 2. TL figure 178 mm.

chewing surface; scapula ³³⁷ triangular, obtuse, rounded; back strongly elevated, angular, higher than very much deepened belly; belly flat anterior to ventral fins, behind ventral fins rounded, not ridged; depth of tail contained about $1\frac{1}{2}$ times in the length of the head; scales with longitudinal, slightly ray-like stripes on the free half and the basal half, about 26 scales in the lateral line, 11 or 12 in a transverse row (without the lowest ventral scales) of which 6 ($5\frac{1}{2}$) above the lateral line, about 10 in a longitudinal row between occiput and dorsal fin, lowest ventral scales in three longitudinal rows, scales in medial row gradually increasing in size posteriorly, posterior scales in those rows slightly larger than those in flanking rows; lateral line strongly curved, descending below the rostro-caudal line, each scale marked by a simple tube, generally not reaching the centre of the scale; dorsal fin starting above the base of the ventral fins, acute, emarginate, not much less than twice as low as the body, much higher, but much less than twice as high as base length, spine thick, posteriorly serrated with large teeth, with a flexible part slightly longer than the head; pectoral fins and ventral fins acute, nearly equal in length, contained about $5\frac{1}{2}$ times in the length of the body, pectoral fins nearly reaching ventral fins, ventral fins nearly reaching anal fin; anal fin acute, emarginate, much lower but much less than twice as low as dorsal fin, not much higher than base length, the simple third ray bony only for the basal half; caudal fin scaled only at the base, with a deep incision, lobes acute, contained about $3\frac{1}{4}$ times in the length of the body. Colour: upper part of the body green, lower part silver; iris yellow, upper part dark; fins yellowish-pink-hyaline, upper part of dorsal fin with dark speckles.

B. 3. D. 4/8 or 4/9. P. 1/12 or 1/13. V. 2/8. A. 3/5 or 3/6. C. 7/17/7 or 8/17/8, short flanking ones included.

Syn. *Barbus platysoma* Blkr, Verslag verzam. vissch. Oost-Java, Nat. T. Ned. Ind. IX p. 404.
Wader Javan.

Hab. Java (Surakarta), in rivers.
Length of sole specimen 180'''.

Remark. On Java *Systomus* (*Barbodes*) *platysoma* seems to be the substitute of *Systomus* (*Barbodes*) *Schwaneveldi* Blkr. of Sumatra. In relationship it stands most closely to *Barbus balleroides* Val. from which it differs however (judging from the short description of Mr Valenciennes) by less scales on a longitudinal and a transverse row. It is easily recognizable by its extremely high body, the low number of scales in a longitudinal row with simultaneously a strongly developed and with large teeth armed dorsal spine, etc.

I discovered it in the year 1846, during a short sojourn in Surakarta, in a single specimen, the only one that I ever laid my eyes on.

Systomus (*Barbodes*) *rubripinna* Blkr. –
Blaauwruuggige Lalawak [*Blue-backed Lalawak*].
Atl. Cypr. Tab. XXXI fig. 3.

A *Systomus* (*Barbodes*) with an oblong, compressed body, depth of body contained nearly 4 to $3\frac{1}{2}$ times in its length, width contained about 2 times in its depth. Head obtuse, contained $\frac{4}{4}$ to $\frac{6}{4}$ times in length of body with caudal fin, $\frac{3}{4}$ to nearly 5 times in length of body without caudal fin; depth of head contained $\frac{1}{4}$ to $\frac{1}{6}$ times in its length, width $\frac{1}{3}$ to $\frac{1}{3}$ times; eye diameter contained 3 to $3\frac{1}{2}$ times in the length of the head, eye diameter contained $\frac{1}{2}$ to 2 times in the postocular part of the head, distance between the eyes $\frac{1}{4}$ to nearly 2 times their diameter; palpebral membrane covering the external margin of the iris only, broader anteriorly than posteriorly, opening nearly circular; snout obtuse, convex, shorter than the eye, not sticking out in front of the mouth; nostrils closer to the orbit than to the tip of the snout; rostro-dorsal profile generally convex everywhere, sometimes slightly concave between crown and nape; interorbital line convex; ³³⁸ anterior suborbital bone pentagonal, depth about equal to length, lower margin oblique, anterior and posterior lower margins concave, truncate or convex, upper margins



Fig. 74. *Puntius (Barbodes) rubripinna* Blkr. Atl. Ichth. Cypr. Tab. XXXIII, Fig. 3. TL figure 228 mm.

concave, united into an acute, upward pointing angle close to the nostrils, lower half traversed by a longitudinal, horizontal crest not parallel to the lower margin of the bone; 2nd suborbital bone elongate-quadrate, depth not much greater anteriorly than posteriorly, length twice or nearly twice as great as depth, about twice as low as 1st suborbital bone; upper jaw longer than lower jaw, moderately downward protrusible, ending below the anterior rim of the eye, contained 3 to 3½ times in the length of the head; gape slightly oblique; barbels thin, nasal barbels slightly or not shorter than the eye, upper jaw barbels generally considerably longer than the eye; lower jaw at the symphysis with an obtuse, short, little conspicuous tubercle, lower part on each branch with 3 or 4 pores, arranged in a longitudinal row, often not visible; lips medium-sized, terete, lightly transversely striped; width of gill cover contained nearly 2 to 1½ times in its depth, lower margin nearly straight; branchial opening ending below the posterior rim of the preoperculum. Pharyngeal teeth hooked to slightly spoon-shaped to grinding, 2.3.5/5.3.2; rugose-tuberculate on the chewing surface; scapula triangular, strongly obtusely rounded; back elevated, angular, higher than the convex belly; belly flat anterior to ventral fins, slightly angular at the flanks, behind ventral fins rounded, not ridged; depth of tail contained 1¼ to 1½ times in the length of the head; scales with ray-like stripes originating from a common centre, 31 to 34 scales in the lateral line, 10 in a transverse row (without the lowest ventral scales) of which 5 (4½) above the lateral line, 10 or 11 in a longitudinal row between occiput and dorsal fin, lowest ventral scales in three longitudinal rows, scales in medial row not larger than those in flanking rows; lateral line curved, reaching the rostro-caudal line, each scale marked by a simple tube reaching or nearly reaching the centre of the scale; dorsal fin in younger animals starting above the base of the ventral fins, in adults above or hardly behind the base of the ventral fins, acute, emarginate, depth contained 1½ to 1¾ times in the depth of the body, much deeper but very much less than twice as deep as base length, spine thick, posteriorly lightly serrated with small teeth, with a flexible part hardly shorter or hardly longer than the head; pectoral fins and ventral fins acute, pectoral fins slightly longer than ventral fins, contained 5¾ to nearly 7 times in the length of the body, not reaching the ventral fins, ventral fins not reaching the anal fin; anal fin acute, not or slightly emarginate, much lower but very much less than twice as low as dorsal fin, much higher but very much less than twice as high as base length, the simple third ray thin, bony only at the base; caudal fin scaled at the base only, with a deep incision, lobes acute, contained 4½ to 4¾ times in the length of the body. Colour: upper part of the body green, lower part silver; iris yellow, upper part dark; gill cover with a large fiery spot; tail in younger animals often with a round, diffuse, violet spot in the lateral line close to the base of the caudal fin; scapular region in juveniles and old fishes generally

with an oblong, transverse, violet spot; fins at the base yellowish- pink, posterior part of pectoral and caudal fins, anterior half of ventral and anal fins red; anterior part of dorsal fin, upper and lower part of caudal fin with a margin of a deeper violet.

B. 3. D. 4/8 or 4/9. P. 1/14 or 1/15. V. 2/8. A. 3/5 or 3/6. C. 7/17/7, short flanking ones included.

Syn. *Barbus rubripinna* V. Hass., *Algemeene Konst- en Letterb.* 1823 II p. 132.

Barbus rubripinnis Val., Poiss. XVI p. 146; Blkr, *Verslag verzam. vissch. Oost. Java, Nat. Tijdschr. Ned. Ind.* IX p. 406.

Barbeau au nageoires rouges Val., Poiss. XVI p. 146.

Barbus gardonides Val., Poiss. XVI p. 118 (partly)

Barbus orphoides Val., Poiss. XVI p. 146?

Barbeau orphoide Val., Poiss. XVI p. 146?

Barbus saranella Blkr, *Verh. Bat. Gen. XXIII Ichth. Midd.-Oost-Java* p. 16.

Marotja, Marotjotja Mal. Bat; *Sisik-milik, Ampa* Sund. *Brek, Pekisseh, Lundjar, Wader* Jav.

339 Hab. Java (Batavia, Tjibitong, Bekassi, Serang, Rankasbetong, Tjampea, Buitenzorg, Banjumas, Purworedjo, Pasuran, Grati, Ngantang), in rivers and lakes.

Length of 52 specimens 60''' to 248'''.

Remark. I suspect Mr Valenciennes has placed specimens of the above described species, which he seems to have observed in specimens sent to the Netherlands by Kuhl and Van Hasselt, to his *Barbus gardonides*. I possess *Barbus gardonides* from Calcutta but not from Java, where it does not seem to occur. It distinguishes itself from *Barbus rubripinna* V. Hass. principally by two longitudinal scale rows more, of which one row lies above the lateral line and one below the lateral line. In specimens of both species of the same size I moreover find, that in *Barbus gardonides* Val. the head goes only $3\frac{3}{4}$ times in the length of the body without the caudal fin and in that of *Barbus rubripinna* V. Hass. amply 4 times. In that of *Barbus gardonides* Val. the height of the head goes $1\frac{1}{3}$ to $1\frac{1}{4}$ in its length, in that of *Barbus rubripinna* V. Hass. only $1\frac{1}{6}$ times. In that of *Barbus gardonides* Val. the width of the gill cover goes only $1\frac{2}{3}$ times in its height, in that of *Barbus rubripinna* V. Hass. almost 2 times, etc. Therefore there is no doubt that both belong to different species.

The description of *Barbus rubripinnis* Val. in the large *Histoire naturelle des Poissons* is very short and insufficient and taken from juvenile specimens of not even four inches. The dorsal spine erroneously is said to be without serrations.

It seems to me that *Barbus orphoides* Val. can be reduced to *Systemus* (*Barbodes*) *rubripinnis*. The description of Mr Valenciennes is made after larger specimens than those that served for his description of *Barbus rubripinnis*. Indeed Mr Valenciennes also mentions that in *Barbus orphoides* the dorsal fin spine is not serrated and that there are only 27 scales in a longitudinal row, however the dorsal spine teeth in older specimens sometimes are also so small, that they easily escape attention, and when the scales have not been properly preserved their count could easily be mistaken by a few. In my opinion that *Barbus orphoides* Val. and *Barbus rubripinnis* Val. are the same species, I am strengthened by the statement of Mr Valenciennes that he would have taken his specimens of *Barbus rubripinnis* for juvenile specimens of *Barbus orphoides* if the habitus did not differ and the dorsal spine was not weaker. My specimens of *Systemus* (*Barbodes*) *rubripinna* have the dorsal spine relatively thicker as they become older, whereas the shape is rather variable in specimens from different localities. My specimens from Paseruan all have the head much more blunt and the body more slender than those from West Java.

340 A more detailed comparison of the specimens which I described in 1849 far removed from my cabinet, under the name of *Barbus sarananella*, taught me that they are neither specifically different from *Systemus* (*Barbodes*) *rubripinna*, so that *Barbus sarananella* can be removed from the series of species.

The species in question is very common in Batavia and belongs there to the most commonly caught Cyprinoids. It is extended far over Java, but seems to be restricted to the lower regions of the drainage areas. Till now I did not receive it from any of the other Sunda Islands, which somewhat surprises me as the species is not restricted to Java, as it also occurs near Bangkok judging from the several times cited sketchbook of Count Fr. de Castelnau.

Systemus (*Barbodes*) *bunter* Blkr. –
Soendasche Lalawak [*Sundanese Lalawak*].
Atl. Cyp Tab. XXVIII fig. I.

A *Systemus* (*Barbodes*) with an oblong, compressed body, depth of body contained about $3\frac{1}{3}$ times in length of body with caudal fin, about $2\frac{2}{3}$ times in length of body without caudal fin. Head obtuse, convex, contained about 5 times in length of body with caudal fin, nearly 4 times in length of body without caudal fin; depth of head contained $1\frac{1}{6}$ to $1\frac{1}{7}$ times in its length; eye diameter contained about $3\frac{1}{3}$ times in the length of the head, eye diameter contained about $1\frac{1}{2}$ times in the postocular part of the head; palpebral membrane covering the external margin of the iris only, opening nearly circular; snout obtuse, convex, shorter than the eye, not sticking out in front of the mouth; nostrils closer to the orbit than to the tip of the snout; rostro-dorsal profile lightly concave between forehead and nape, strongly convex on the nape, interorbital line convex; anterior suborbital bone pentagonal; upper jaw longer than lower jaw, ending below the anterior rim of the eye, contained nearly $3\frac{1}{2}$ times in the length of the head; gape oblique; barbels thin, upper jaw barbels slightly longer than nasal barbels, shorter than the eye; depth of gill cover less than twice as great as length, lower margin nearly straight; scapula obtuse, rounded; back elevated, angular, higher than convex belly; depth of tail contained $1\frac{2}{3}$ to $1\frac{3}{4}$ times in the length of the head; about 24 scales in the lateral line, 10 in a transverse row (without the lowest ventral scales) of which 6 ($5\frac{1}{2}$) above the lateral line, about 9 in a longitudinal row between occiput and dorsal fin; lateral line curved, descending below the rostro-caudal line, each scale marked by a simple tube; dorsal fin starting above the base of the ventral fins, acute, not emarginate, about twice as low as the body, not or only slightly higher than base length, spine thin, posteriorly serrated with conspicuous small teeth, with a flexible part shorter than the head; pectoral fins and ventral fins acute, pectoral fins slightly longer than ventral fins, nearly reaching ventral fins, ventral fins not reaching anal fin; anal fin acute, not emarginate, considerably lower than dorsal fin, not much higher than base length, the simple third ray nearly completely cartilaginous; caudal fin scaled only at the base, with a deep incision, lobes acute, contained $4\frac{1}{3}$ to $4\frac{2}{3}$ times in the length of the body. Colour: upper part of the body green, lower part silver; iris yellow, scales on back, flanks and tail each with a small oblong, transverse, violetish band at the base; fins pink or red, with an uneven dark margin; without visible dorsal or caudal spot.

B. 3. D. $4/8$ or $4/9$. P. $1/14$. V. $2/8$. A. $3/5$ or $3/6$. C. $7/17/7$, short flanking ones included.

Syn. *Barbus bunter* Blkr, Descr. spec. pisc. Javan. nov. Nat. T. Ned. Ind. XIII p. 350,
Bunter Sundan.

Hab. Java (Tjampea), in rivers.

Length of described specimen 115''.

341 Remark. The single specimen that I possessed of this species, has got lost. However, I had had a figure made if it, to which I had to restrict myself when I made the description.



Fig. 75. *Puntius (Barbodes) bunter* Blkr. Atl. Ichth. Cypr. Tab. XXXVIII, Fig. 3. TL figure 101 mm.

The species is related to *Systomus (Barbodes) maculatus*, but distinguishes itself from it by much shorter barbels, a more blunt head, a convex dorsal fin, and, if my figure concerning this is right, which I dare say with certainty, by one longitudinal scale row more above the lateral line.

Systomus (Barbodes) tetrazona Blkr. –
Vierbandige Lalawak [Four-banded Lalawak].
 Atl. Cypr. Tab. XXXIII fig. 2.

A *Systomus (Barbodes)* with an oblong, compressed body, depth of body contained about $3\frac{1}{2}$ times in its length, width contained about $2\frac{1}{2}$ times in its depth. Head slightly acute, slightly convex, contained $4\frac{3}{4}$ to $4\frac{1}{4}$ times in length of body with caudal fin, about $3\frac{3}{4}$ times in length of body without caudal fin; depth of head contained about $1\frac{1}{4}$ times in its length, width nearly 2 times; eye diameter contained about $2\frac{3}{5}$ times in the length of the head, eye diameter contained about once in the postocular part of the head, distance between the eyes about once their diameter; palpebral membrane covering the external margin of the iris only, opening nearly circular; snout slightly acute, convex, shorter than the eye, not sticking out in front of the mouth; nostrils closer to the orbit than to the tip of the snout; rostro-dorsal profile convex on nape and head, slightly concave between nape and occiput; interorbital line slightly convex; anterior suborbital bone pentagonal, length hardly greater than depth, lower margin oblique, anterior and posterior lower margins convex or truncate, upper margins concave, united into an acute, upward pointing angle close to the nostrils, lower half traversed by a longitudinal, horizontal crest not parallel to the lower margin of the bone; 2nd suborbital bone elongate-quadrangular, depth greater anteriorly than posteriorly, length more than twice as great as depth, more than twice as low as anterior suborbital bone; upper jaw longer than lower jaw, strongly downward protrusible, ending anterior to the eye or below the anterior margin of the eye, contained slightly over 3 times in the length of the head; gape rather oblique; barbels thin, upper jaw barbels considerably longer than nasal barbels, not much longer than the eye; lower jaw at the symphysis with an obtuse, hardly visible tubercle, underside without visible pores; lips thin, terete, without visible transverse stripes; width of gill cover contained $1\frac{3}{4}$ times



Fig. 76. *Puntius (Barbodes) tetrazona* Blkr. Atl. Ichth. Cypr. Tab. XLIII, Fig. 7. TL figure 56 mm.

$1\frac{1}{2}$ times in its depth, lower margin slightly convex; gill opening ending below the posterior margin of the preoperculum. Pharyngeal teeth hooked to slightly spoon-shaped with a rod-like neck, 2.3.4/4.3.2, (or 2.3.5/5.3.2 ??); 2 internal teeth in longest row conical, acuminate at the tip; scapula triangular, obtusely rounded; back elevated, angular, much higher than belly; belly flat anterior to ventral fins, angular at the flanks, behind ventral fins ridged; depth of tail contained about $1\frac{1}{2}$ times in the length of the head; scales on the middle of the body not conspicuously larger than scales on the anterior and posterior parts of the body, ventral scales striped with rays originating from a common simple or reticulate centre, 24 scales in the lateral line, 9 in a transverse row (without the lowest ventral scales) of which 5 ($4\frac{1}{2}$) above the lateral line below the dorsal fin, 3 between the lateral line and the base of the ventral fins and the vent, 7 or 8 in a longitudinal row between occiput and dorsal fin, lowest ventral scales in three longitudinal rows, scales in medial row larger than those in flanking rows; lateral line slightly curved, reaching the rostro-caudal line, each scale marked by a simple tube surpassing the centre of the scale; dorsal fin starting above the base of the ventral fins, acute, emarginate, depth contained about $1\frac{1}{2}$ times in the depth of the body, much higher but much less than twice as high as base length, spine medium-sized, posteriorly serrated with well visible small teeth, with a flexible part slightly shorter than the head; pectoral fins and ventral fins acute, pectoral fins slightly longer than ventral fins, contained $5\frac{2}{3}$ to $5\frac{3}{4}$ times in the length ³⁴² of the body, nearly reaching the ventral fins, ventral fins not reaching the anal fin; anal fin acute, not or slightly emarginate, much lower but less than twice as low as dorsal fin, much higher but much less than twice as high as base length, the simple third ray thin, bony only at the base; caudal fin scaled only at the base, with a deep incision, lobes acute, contained about $4\frac{1}{4}$ times in the length of the body. Colour: upper part of the body olive, lower part silver; iris yellow or pink; upper part of the head blackish-violet; body with 4 transverse, broad, blackish-violet bands bordered with yellow, 1st nucho-scapular band broader at the top than at the bottom, broadly rounded, 2nd dorso-ventral band descending from the total base of the dorsal fin and ending obtusely slightly below the lateral line, 3rd from dorsal to anal fin broader in the middle than at the top and lower side, reaching the anterior anal rays, 4th caudal band broader in the middle than at the top and lower side covering all of the tail; fins pink, anterior and upper part of dorsal fin with a dark margin.

B. 3. D. 4/8 or 4/9. P. 1/14. V. 2/8. A. 3/5 or 3/6. C. 6/17/6, short flanking ones included.

Syn. *Barbus tetrazona* Blkr, Act. Soc. Scient. Ind. Neerl. II Tiende bijdr. ichth. Borneo p. 14.

Hab. Borneo (Kahajan), in rivers.

Length of sole specimen 57'''.

Remark. This beautiful marked species is very easily recognizable by its four broad transverse blackish-violet body bands, of which both anterior ones, which are broadly rounded ventrally, end approximately on the middle of the flanks, whereas both posterior ones extend to the lower edge of the body. It is related to *Systemus (Barbodes) lateristriga* Blkr, however, apart from the colour markings, easily distinguishable from

that species by a more acute and lower head, more pointed dorsal and anal fin, lower upper jaw barbels, etc.

My specimen from the Krajang river is the only one till now observed by me.

Systomus (Barbodes) lateristriga Blkr. –
Zijstrepige Lalawak [Side striped Lalawak].
Atl. Cypr. Tab. XXXII fig. 2.

A *Systomus (Barbodes)* with an oblong, compressed body, depth of body contained $3\frac{1}{2}$ to $2\frac{1}{2}$ times in its length, width contained $2\frac{2}{3}$ to $2\frac{1}{4}$ times in its depth. Head obtuse, convex, contained $4\frac{3}{4}$ to $5\frac{1}{2}$ times in length of body with caudal fin, $3\frac{3}{5}$ to $4\frac{1}{3}$ times in length of body without caudal fin; depth of head contained slightly more than once to once in its length, width contained $1\frac{3}{5}$ to $1\frac{1}{2}$ times in its length; eye diameter contained about $2\frac{1}{2}$ to $3\frac{2}{3}$ times in the length of the head, eye diameter contained once to $1\frac{3}{4}$ times in the postocular part of the head, distance between the eyes nearly once to $1\frac{1}{2}$ times their diameter; palpebral membrane covering the external margin of the iris only, opening nearly circular; snout obtuse, convex, not sticking out in front of the mouth, in younger animals shorter than the eye, in very old fishes not shorter than the eye; nostrils closer to the orbit than to the tip of the snout; rostro-dorsal profile generally concave or slightly convex between snout and nape, strongly concave at the nape; interorbital line slightly concave, interorbital line convex; anterior suborbital bone pentagonal, length hardly or not greater than depth, lower margin convex, anterior and posterior lower margins convex or truncate, upper margins concave, united into an acute, upward pointing angle close to the nostrils, the middle traversed by a longitudinal, generally ramose crest; 2nd suborbital bone elongate-quadrangular, length not to slightly greater than depth, much less than twice as low as 1st suborbital bone; upper jaw longer than lower jaw, strongly downward protrusible, ending anterior to the eye or below the anterior part of the eye, contained 3 to $2\frac{2}{3}$ times in the length of the head; gape strongly oblique; barbels thin, nasal barbels slightly or not longer than the eye, upper jaw barbels ³⁴³ much longer than the eye; lower jaw at the symphysis without visible tubercle, underside without visible pores; lips fleshy, terete, lightly transversely rugose on the oral surface; width of gill cover contained $1\frac{3}{4}$ to $1\frac{1}{2}$ times in its depth, lower margin nearly straight or slightly concave; gill opening ending below the posterior margin of the preoperculum. Pharyngeal teeth hooked-spoon-shaped, 2.3.4/4.3.2; scapula triangular, obtusely rounded;



Fig. 77. *Puntius (Barbodes) lateristriga* Blkr. Atl. Ichth. Cypr. Tab. XXXII, Fig. 2. TL figure 176 mm.

belly flat anterior to ventral fins, angular at the flanks, behind ventral fins obtusely ridged; depth of tail contained about $1\frac{2}{3}$ to $1\frac{1}{2}$ times in the length of the head; back elevated, angular, higher than convex belly; scales on the middle of the body not conspicuously larger than scales on the anterior and posterior parts of the body, with vertical ray-like stripes originating from a common simple or reticulate centre, 23 to 25 scales in the lateral line, 10 in a transverse row (without the lowest ventral scales) of which 5 ($4\frac{1}{2}$) above the lateral line, 3 between the lateral line and the base of the ventral fins and the vent, 7 or 8 in a longitudinal row between occiput and dorsal fin, lowest ventral scales in three longitudinal rows, scales in medial row gradually increasing in size posteriorly, the posterior scales in this row not or hardly larger than those in flanking rows; lateral line strongly curved, descending below the rostro-caudal line, each scale marked by a simple tube reaching or not reaching the centre of the scale; dorsal fin starting above the base of the pectoral fins, in juveniles acute, hardly or not emarginate, in adults often obtuse, generally convex, depth contained $1\frac{2}{3}$ to over 2 times in the depth of the body, not much higher to not higher than base length, spine tapering, posteriorly serrated with well visible small teeth, with a flexible part not too much shorter than the head; pectoral fins acute, slightly longer than ventral fins, contained 6 to $5\frac{1}{2}$ times in the length of the body, reaching or nearly reaching ventral fins; ventral fins in younger animals acute, in adults slightly obtuse to obtusely rounded, reaching or not reaching anal fin; anal fin in younger animals acute, obtuse, not or hardly emarginate, in old animals very much less than twice as high as base length, the simple third ray thin, bony only at the base; caudal fin scaled only at the base, with a deep incision, lobes acute, contained nearly 4 to $4\frac{1}{2}$ times in the length of the body. Colour: upper part of the body green, lower part silver, upper part of the head violet particularly in old animals; iris yellow, upper part dark; body with 3 transverse broad violet bands, the 1st band occipito-nuchal, the 2nd band dorso-axillary, the 3rd, a dorso-ventral band, ending acutely below the lateral line, at the top totally or largely covering the base of the dorsal fin; upper part of the back behind the fin and on the middle of the height of the tail with a blackish-violet longitudinal band; caudal band starting above or slightly anterior to anal fin and prolonged unto the middle of the caudal fin; on several specimens a roundish, violet-black supra-anal spot opposite the anterior part of the anal fin; fins pink, dorsal and anal fin red at the base, caudal fin and intramarginal rays red; anal fin with a violet border.

B. 3. D. 4/8 or 4/9. P. 1/13 or 1/14. V. 2/8. A. 3/5 or 3/6. C. 7/17/7, short flanking ones included.

Syn. *Barbus lateristriga* Val., Poiss. XVI p. 120; Blkr, Bijdr. ichth. fauna v. Blitong, Nat. T. Ned.

Ind. III p. 95.

Barbeau au trait latéral Val., Poiss. XVI p. 120.

Dokkum Sundan.

Hab. Java (Batavia, Buitenzorg, Tjampea, Sadingwetan, Tjipanas), in rivers.

Sumatra (Telokbetong, Lahat, Solok), in rivers.

Borneo (Bangkajang), in rivers.

Singapura, in rivers.

Banka, in rivers.

Biliton (Tjirutjup), in rivers.

Length of 18 specimens 60''' to 180'''.

Remark. Kuhl and Van Hasselt also observed this species in West Java in Sadingwetan, ³⁴⁴ which name was mistakenly taken by Mr Valenciennes for the name of the endemic species.

The species is very easy recognizable by its colour pattern. Apart from the transverse flank bands and the longitudinal tail stripe, usually a round black-violet spot is found above the anal fin base.

In older specimens the neck is much more convex than in the younger ones and the dorsal and anal fins become very blunt and rounded in these specimens. My largest specimen seems to belong to the final adult age.

The Dokkum is spread over the Sunda Islands, but nowhere seems to occur in high numbers. In Batavia it is very rare.

Systomus (Barbodes) fasciatus Blkr. –
Gebande Lalawak [Banded Lalawak].
 Atl. Cypr. Tab. XXXIII fig. 6.

A *Systomus (Barbodes)* with an oblong, compressed body, depth of body contained $3\frac{1}{2}$ to 4 times in its length, width contained slightly over 2 to $2\frac{1}{4}$ times in its depth. Head slightly acute, contained $4\frac{3}{4}$ to slightly over 5 times in length of body with caudal fin, $3\frac{3}{4}$ to 4 times in length of body without caudal fin, depth of head contained $1\frac{1}{5}$ to $1\frac{1}{4}$ times in its length, width contained $1\frac{1}{5}$ to nearly 2 times in its length; eye diameter contained $2\frac{2}{5}$ to $3\frac{1}{4}$ times in the length of the head, eye diameter contained once to $1\frac{1}{5}$ times in the postocular part of the head, distance between the eyes nearly once to slightly over once their diameter; palpebral membrane covering the external margin of the iris, broader anteriorly than posteriorly, opening nearly circular; snout slightly acute, convex, shorter than the eye, not sticking out in front of the mouth; nostrils closer to the orbit than to the tip of the snout; rostro-dorsal profile on forehead and crown sloping, nearly straight, convex on the nape; interorbital line slightly convex; anterior suborbital bone pentagonal, length hardly or not greater than depth, lower margin obliquely convex, anterior and posterior lower margins obliquely convex or truncate, upper margins concave, united into an acute, upward pointing angle close to the nostrils, lower half traversed by a longitudinal obliquely descending crest; 2nd suborbital bone elongate-quadrangular, depth not or hardly greater anteriorly than posteriorly, length more than twice as great as depth, more than twice as low as 1st suborbital bone; upper jaw longer than lower jaw, moderately downward protrusible, ending below the anterior margin of the eye or hardly anterior to the eye, contained $3\frac{1}{4}$ to $3\frac{1}{2}$ times in the length of the head; gape rather oblique; barbels thin, nasal barbels shorter than upper jaw barbels, not or hardly shorter than the eye, upper jaw barbels slightly to considerably longer than the eye; lower jaw at the symphysis with an obtuse, hardly visible tubercle, underside without visible pores; lips thin, terete, lightly transversely striped; width of gill cover contained about $1\frac{1}{4}$ times in its depth, lower margin nearly straight or slightly concave; gill opening ending below the posterior margin of the preoperculum. Pharyngeal teeth hooked to spoon-shaped, 2.3.4/4.3.2; scapula triangular, obtusely rounded; back elevated, angular, much deeper than belly; belly flat anterior to ventral fins, angular on the flanks, behind ventral fins obtusely ridged; depth of tail contained about $1\frac{1}{5}$ times in the length of the head; scales on the middle of the body not conspicuously larger than scales on the anterior and posterior parts of the

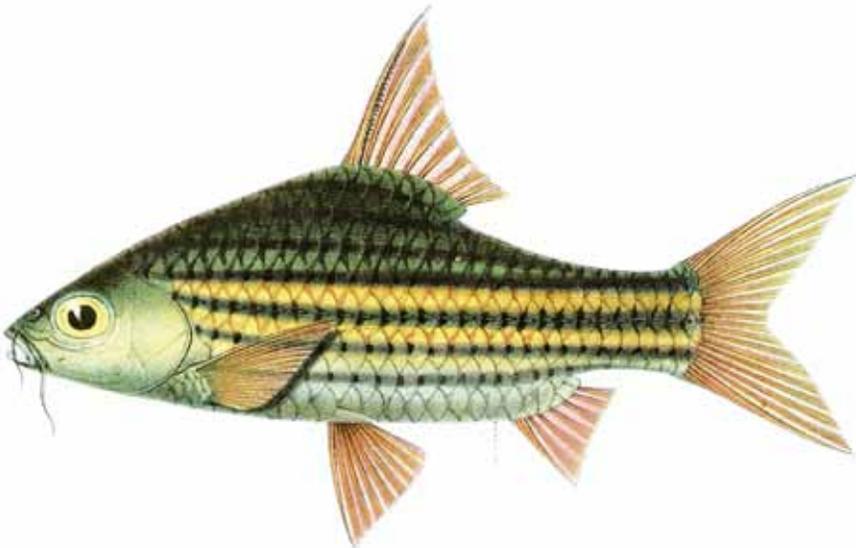


Fig. 78. *Puntius (Barbodes) fasciatus* Blkr. Atl. Ichth. Cypr. Tab. XXXVIII, Fig. 1. TL figure 106 mm.

body, ventral scales striped with rays originating from a common simple or reticulate centre, 26 to 27 scales in the lateral line, 10 in a transverse row (without the lowest ventral scales) of which 5 (4½) above the lateral line, also anterior to the dorsal fin, 3 or 4 between the lateral line and the base of the ventral fins and the vent, 10 in a longitudinal row between occiput and dorsal fin, lowest ventral scales in three longitudinal rows gradually increasing in size posteriorly, posterior scales in those rows larger than those in flanking rows; lateral line nearly straight, sloping downward only anteriorly, not or hardly reaching the rostro-caudal line, each scale marked by a simple tube surpassing the centre of the scale; ³⁴⁵dorsal fin starting above the base of the pectoral fins, acute, emarginate, depth contained 1½ to 1¼ times in the depth of the body, much less than twice as deep to slightly less than twice as deep as base length, spine very thin, posteriorly rough with conspicuous small teeth, with a flexible part, in younger animals slightly longer, in older animals slightly shorter than the head; pectoral and ventral fins acute, nearly equal in length, contained 5½ to 6½ times in the length of the body, pectoral fins reaching or nearly reaching ventral fins, ventral fins reaching or nearly reaching anal fin; anal fin acute, not or slightly emarginate, not much less than twice as low as dorsal fin, not much higher than base length, the simple third ray thin, cartilaginous; caudal fin scaled only at the base, with a deep incision, lobes acute, contained 4 to 4½ times in the length of the body. Colour: upper part of the body olive, flanks golden-red, lower part silver; iris yellow, upper part dark; body with 6 longitudinal dark-violet bands, 1st and 2nd bands nucho-dorsal, 3rd postoculo-caudal band reaching the upper part of the base of the caudal fin, 4th oculo-caudal band reaching the middle of the base of the caudal fin, 5th scapulo-caudal band reaching the lower part of the base of the caudal fin and 6th ventral band reaching the anal fin; fins pink or red, anal fin of a fainter colour than the other fins.

B. 3. D. 4/8 or 4/9. P. 1/14 to 1/16. V. 2/8. A. 3/5 or 3/6. C. 5/17/5 or 6/17/6, short flanking ones included.

Syn. *Barbus fasciatus* Blkr, Nalez. ichthyol. faun. Banka, Nat. T. Ned. Ind. V p. 190.

Hab. Sumatra (Moarakompeh), in rivers.

Banka (Marawang), in rivers.

Borneo (Kahajan), in rivers.

Length of 4 specimens 93'' to 120''.

Remark. *Systemus* (*Barbodes*) *fasciatus* is easily recognizable by its longitudinal dark body bands, long barbels, slender lightly serrated dorsal fin spine, acute profile, etc.

My specimens from Banka and Borneo are shorter in their shapes than that of Sumatra, but completely marked in the same way. The lower most of the 6 bands usually is only faintly visible and in one of my specimens hardly visible.

Systemus (*Barbodes*) *obtusirostris* Blkr. –
Stompsnuitige Lalawak [Blunt-snouted Lalawak].
Atl. Cypr. Tab. XXXIV fig. 1.

A *Systemus* (*Barbodes*) with an oblong, compressed body, depth of body contained 4½ times in its length with caudal fin, about 3½ times in its length without caudal fin, width of the body contained about 1¾ times in its depth. Head obtuse, convex, strongly truncate, contained 5 times in length of body with caudal fin, 3½ to 3¾ times in length of body without caudal fin; depth of head contained about 1½ times in its length, width about 1½ times; eye diameter contained about 2¾ times in the length of the head, eye diameter contained about 1½ times in the postocular part of the head, distance between the eyes about once the eye diameter; palpebral membrane covering the external margin of the iris only, opening nearly circular; snout strongly obtuse, truncate, much shorter than the eye, not sticking out in front of the mouth; nostrils open, placed about halfway between the orbit and the tip of the snout, posterior nostrils very large; rostro-dorsal profile convex everywhere; interorbital line convex; anterior sub-orbital bone pentagonal, depth greater than length, lower margin convex, anterior and posterior lower margins convex or truncate, upper margins concave, united into an acute, upward pointing angle close



Fig. 79. *Puntius (Barbodes) amblyrhynchus* nom. nov. Blkr. Atl. Ichth. Cypr. Tab. XLIII, Fig. 5. TL figure 47 mm.

to the nostrils, lower half with a longitudinal crest not parallel with the lower margin of the bone; 2nd suborbital bone oblong-quadrangular, length about twice as great as depth, more than twice as low as 1st suborbital bone; upper jaw not longer than lower jaw, moderately downward protrusible, ending below the anterior margin of the eye, ³⁴⁶ contained about 3½ times in the length of the head; gape strongly oblique; barbels thin, nasal barbels not or hardly shorter than the eye, upper jaw barbels longer than the eye; lower jaw at the symphysis with a conical, well visible tubercle, underside without visible pores; lips fleshy, terete, without visible stripes or sheaths; length of gill cover less than twice as great as depth, lower margin nearly straight or slightly convex; branchial opening ending below the posterior part of the preoperculum. Pharyngeal teeth hooked to spoon-shaped, 2.3.5/5.3.2; scapula triangular, obtuse, rounded; belly flat anterior to ventral fins, angular at the flanks, behind ventral fins obtusely ridged?; depth of tail contained about 1⅓ times in the length of the head; back slightly elevated, angular, much higher than the belly; scales on the middle of the body not conspicuously larger than scales on the anterior and posterior parts of the body, with vertical ray-like stripes originating from a common simple or reticulate centre, 23 or 24 scales in the lateral line, 9 in a transverse row (without the lowest ventral scales) of which 5 (4½) above the lateral line, 8 or 9 in a longitudinal row between occiput and dorsal fin; lateral line lightly curved, nearly reaching the rostro-caudal line, each scale marked by a simple tube reaching the centre of the scale; dorsal fin starting above the base of the ventral fins, acute, not emarginate, depth contained about 1¼ times in the depth of the body, much higher but much less than twice as high as base length, spine thin, posteriorly serrated with well visible small teeth, with its flexible part not or hardly shorter than the head; pectoral fins and ventral fins acute, nearly equal in length, contained about 6 times in the length of the body, pectoral fins reaching the ventral fins; ventral fins nearly reaching the anal fin; anal fin acute, not emarginate, much lower than base length but much less than twice as low, nearly twice as high as base length; the simple third ray thin, nearly completely cartilaginous; caudal fin scaled only at the base, with a deep incision, lobes acute, contained about 3¼ times in the length of the body. Colour: upper part of the body green, lower part silver; iris yellow, back with an oblong, longitudinal violet-blue spot at the base of the spine; fins yellowish- or pink-hyaline.

B. 3. D. 4/8 or 4/9. P. 1/14 or 2/15. V. 2/8. A. 3/5 or 3/6. C. 7/17/7 or 8/17/8, short flanking ones included.

Syn. *Barbus obtusirostris* v. Hass., Algem. Konst- en Letterb. 1823 II p. 123; Bull. Féru. 1824 Zoöl. P. 375; Val., Poiss. XVI p. 125; Blkr, Descr. pisc. javan. Nov. Nat. T. Ned. Ind. XIII p. 353. *Barbeau à museau obtus* Val., Poiss. XVI p. 125.

Bunter Sundan.

Hab. Java (Tjampea), in rivers.

Length of sole specimen 49''.

Remark. Amongst its related species *Systemus (Barbodes) obtusirostris* can be easily recognized by its blunt head with truncated snout and not bulging upper jaw, which, when the mouth is open seems even shorter than the lower jaw; and also by its more pointed and relatively large fins, the not concave dorsal and anal fins, etc. My specimen is the only one I have observed till now, so that the species seems to be very rare.

Systemus (Barbodes) maculatus Blkr. –
Gevlekte Lalawak [Maculated Lalawak].
 Atl. Cypr. Tab. XXXIII fig. 4, XXXIV fig. 6. 7.

A *Systemus (Barbodes)* with an oblong, compressed body, depth of body contained slightly over 3 to 4½ times in its length with caudal fin, nearly 2½ to 3 times in its length without caudal fin; width of the body contained nearly 2 to 2½ times in its depth. Head slightly acute, convex, contained 4⅔ to 5⅔ times in length of body with caudal fin, 3½ to 4⅔ times in length of body without caudal fin, depth of head contained 1⅙ to 1⅓ times in its length, width 1¼ to 1⅓ times; eye diameter contained 3 to 3⅓ times in the length of the head, eye diameter contained 1¼ to 1½ times in ³⁴⁷ the postocular part of the head, distance between the eyes once to 1⅓ times their diameter; palpebral membrane covering the external margin of the iris only, broader anteriorly than posteriorly, opening nearly circular; snout slightly acute or slightly obtuse, convex, not sticking out in front of the mouth, shorter than the eye; nostrils closer to the orbit than to the tip of the snout; rostro-dorsal profile strongly convex on the head, convex on the nape, between crown and nape sometimes slightly concave; interorbital line slightly convex or convex; anterior suborbital bone pentagonal, depth not or slightly greater than length, lower margins concave oblique, convex, anterior and posterior lower margins convex or truncate, upper margins concave, united into an acute, upward pointing angle close to the nostrils, lower half traversed by a longitudinal crest, sprouting a branch at the underside; 2nd suborbital bone quadrangular, depth not or hardly greater anteriorly than posteriorly, length about twice as great as depth, about twice as low as 1st suborbital bone, third suborbital maximally convex, twice to more than thrice as thin as the eye; upper jaw longer than lower jaw, moderately downward protrusible, ending hardly anterior to the eye or below the anterior margin of the eye, contained 3⅓ to 3½ times in the length of the head; gape oblique; barbels fleshy, nasal barbels slightly to much longer than the eye, upper jaw barbels always much longer than the eye; lower jaw at the symphysis with a short, obtuse tubercle, underside with about 5 pores on both branches, not always visible, placed in a longitudinal row; lips fleshy, terete, on the oral surface with conspicuous transverse stripes; width of gill cover contained 1⅓ to 2 times in its depth, lower margin nearly straight or slightly concave; gill opening ending below the posterior rim of the preoperculum. Pharyngeal teeth hooked-spoon-shaped, 2.3.5/5.3.2; scapula triangular, obtusely or slightly obtusely rounded; belly flat anterior to ventral fins, angular at the flanks, behind ventral fins obtusely ridged; back slightly elevated, angular, much higher than the belly; depth of tail contained 1⅓ to 1¼ times in the length of the head; scales on the middle of the body not conspicuously larger than scales on the anterior and posterior part of the body, slightly to not oblique (lower angle of free margin placed not or only slightly anterior to upper angle), striped with rays originating from a common simple or reticulate centre; 23 or 27 scales in the lateral line, 10 in a transverse row (without the lowest ventral scales) of which 5 (4½) above the lateral line below the dorsal spine, 3 between the lateral line and the base of the ventral fins and the vent, 9 in a longitudinal row between occiput and dorsal fin, lowest ventral scales in 3 longitudinal rows, middle scales in medial row sometimes larger than the others, not larger than those in flanking rows; lateral line curved, reaching the rostro-caudal line, but rarely descending below it, each scale marked by a simple tube generally reaching the centre of the scale; dorsal fin above or hardly behind the base of the ventral fins, acute, angular, depth contained 1¼ to 1⅕ times in the depth of the body, much deeper than base length, but much less than twice as deep, spine tapering, posteriorly serrated with conspicuous small teeth, with its flexible part slightly to considerably shorter than the head; pectoral fins acute, at the tip frequently rounded, reaching or not reaching the ventral fins, contained 5⅔ to 6½ times in the length of the body; ventral fins slightly obtuse, rounded at the tip, not reaching the anal fin; anal fin acute, not emarginate, much lower than dorsal fin but much less than twice as low, much higher but generally much less than twice as high as base length, the simple third ray bony only at the base; caudal fin scaled only at the base, with a deep incision, lobes acute, contained 4 to 4⅔ times in the length of the body. Colour: upper part of the body green or olive, lower part silver or golden; iris yellow, upper part dark; no supra-ocular dark spot; scales on back, flanks and tail each with a transverse violetish band at the base, seldom centre darkish with a round spot, rarely also with a violet-blue longitudinal head-tail band above the lateral line or with several large violet-black spots placed in a longitudinal

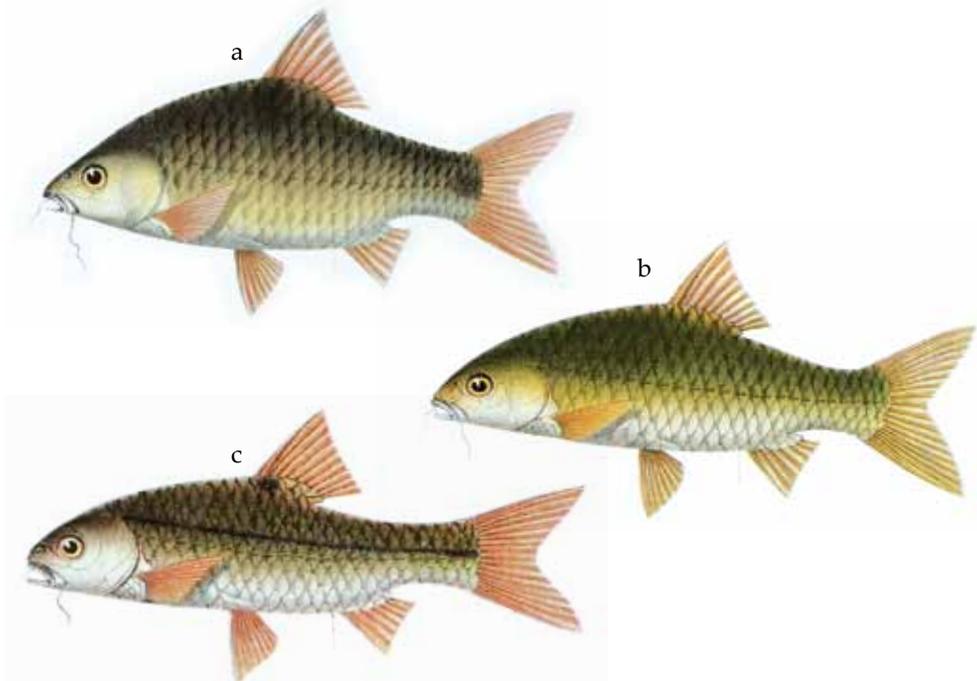


Fig. 80a, b, c. *Puntius (Barbodes) maculatus* Blkr. Atl. Ichth. Cypr. Tab. XXXIII, Fig. 1, XL, Fig. 1, XLIII, Fig. 6. TL figures 145, 121, 71 mm, respectively.

row; larger or smaller violet-blue spot on the back close to the base of the anterior dorsal rays and on the tail in the lateral line close to the base of the caudal fin and sometimes also on the belly close to the anterior base of the anal fin; fins yellowish- or pink-hyaline or carmine-red, generally with an unequal lightly speckled margin of dark spots, anal fin at the anterior part of the base sometimes with a small violet-blue spot.

B. 3. D. 4/8 or 4/9. P. 1/14 to 1/16. V. 2/8. A. 3/5 or 3/6. C. 7/17/7, short flanking ones included.

348 Syn. *Barbus maculatus* V. Hass., Algem. Konst- en letterb. 1823 II p. 132; Bullet. Féruss. 1824, Zoöl; Val. Poiss. XVI p. 147.

Barbus binotatus Kuhl; Val., Poiss. XVI p. 126; Blkr, Verslag vissch. Oost-Java, Nat. T. Ned. Ind. IX p. 408.

Barbeau tacheté Val., Poiss. XVI p. 147.

Barbeau aux deux marques Val., Poiss. XVI p. 126.

Barbus oresigenes Blkr, Verh. Bat. Gen. XXIII Ichth. Midd. Oost-Java p. 17.

Barbus blitonensis Blkr, Bijdr. ichthyol. Bliotong, Nat. T. Ned. Ind. III p. 96

Barbus kusanensis Blkr, Zesde bijdr. ichth. Borneo, Nat. T. Ned. Ind. III p. 429.

Barbus polyspilos Blkr, Descript. spec. pisc. Jav. nov. Nat. T. Ned. Ind. XIII p. 352.

Bunter Sund; *Wader Jav*; *Tanah, Sepadak* Benkul.

Hab. Java (Batavia, Serang, Perdana, Tjibiliong, Tjimanok, Pandeglang, Tjampea, Buitenzorg, Tjitjurup, Tjipanas, Tjiandjur, Garut, Patengan, Pandjallu, Amberawa, Diëng, Pasuruan, Malang, Bator, Ngantang, Grati, Bondowosso), in rivers and lakes.

Sumatra (Benkulen, Padang, Priaman, Meninju, Solok, Telokbetong, Lahat), in rivers and lakes.

Borneo (Prabukarta, Bangkajang), in rivers.
 Biliton (Tirutjup), in rivers.
 Singapura, in rivers.
 Bali (Boleling), in rivers.
 Nias, in rivers.

Length of 166 specimens 38'' to 149''.

Remark. *Systemus* (*Barbodes*) *maculatus* was mentioned for the first time at the above mentioned place by Van Hasselt, but first described, however only very briefly, by Mr Valenciennes. I possess a copy of a figure of this species, left by Van Hasselt, which has entirely the habitus and colour markings of my juvenile specimens. Mr Valenciennes wrongly places this species in the group of his genus *Barbus* with unserrated dorsal fin spine, after having it first described under the name *Barbus binotatus* and placed it rightly between species with a serrated dorsal fin spine.

Systemus (*Barbodes*) *maculatus* is a very widely spread species, as I have received it already from eight different Sunda Islands. It is also one of the species van Cyprinoids which stretches the most far eastwards, till Bali and the east coast of Borneo. On Java it is, especially in the mountain streams, very common. However, because of its usually small size it is not in demand as a source of food. It lives till high in the mountains, as I myself have even encountered it in the small lakes of the mountain plains of Diëng, in central Java at a height of more than 6000 feet above sea level.

The few sharp characters, which I found in the nominal species, which I earlier described under the names *Barbus oresigenes*, *Barbus bilitonensis*, *Barbus kusanensis* and *Barbus polyspilos*, give me occasion to try [349](#) to collect a large number of them, in order to, if possible fix these characters with more certainty. Thus I have examined now more than 160 specimens and instead of reaching the desired goal, I have come to the conclusion that all four mentioned species are not specifically different from *Systemus* (*Barbodes*) *maculatus*, notwithstanding important differences in habitus and height of the body and head and in colour pattern.

My specimens, from which I described *Barbus oresigenes*, belong to the more slender forms without back spot and tail spot, blunter head and longer barbels.

The specimen from Biliton after which I drafted the description of *Barbus bilitonensis*, belongs to a less slender variety with angular back and a large back spot.

The specimen from the Kusan river in eastern Borneo, after which the description of *Barbus kusanensis* was taken, belongs to the most thick-set forms of the species, with a relatively large head and without black spot.

Also the specimens that have served for my description of *Barbus polyspilos*, belong the less slender form, in which scales are marked with small brownish gray spots and the profile is little convex.

The numerous differences in shape and colour markings are not or only partly depending on age, gender and place of occurrence.

My specimens from Borneo, Banka and Biliton all have a relatively high body, both juvenile and older specimens, however on Java and Sumatra higher and slender forms occur together. The back spot and tail spot often disappear in older specimens, however in juvenile specimens they are not always present either. On the contrary I possess adult specimens, however only of the thick-set variety, in which the back spot is not only present but extremely large and distinct.

The head-tail band is only present in specimens of juvenile and intermediate age, however only in a few specimens. When it is present, this band always runs across the scale row situated immediately above the lateral line. In some specimens it is divided in various larger and smaller spots.

The round scale spots of my earlier *Barbus polyspilos* seem to depend on a certain roughness in the mating season.

Systomus (Barbodes) goniosoma Blkr. –
Hoekige Lalawak [Angular Lalawak].
Atl. Cypr. Tab. XXXIII fig. 3.

A *Systomus (Barbodes)* with an oblong, compressed body, depth of body contained about $3\frac{2}{5}$ times in its length with caudal fin, about $2\frac{2}{3}$ times in its length without caudal fin; width of the body contained about $2\frac{1}{3}$ times in its depth. Head acute, not convex, contained slightly over 5 times in length of body with caudal fin, nearly 4 times in length of body 350 without caudal fin; depth of head contained $1\frac{1}{2}$ to $1\frac{2}{3}$ times in its length, width nearly $1\frac{2}{3}$ times; eye diameter contained about $3\frac{1}{2}$ times in the length of the head, eye diameter contained nearly about $1\frac{1}{4}$ times in the postocular part of the head, distance between the eyes about $1\frac{2}{3}$ their diameter; palpebral membrane covering the external margin of the iris only, broader anteriorly than posteriorly, opening nearly circular; snout acute, not sticking out in front of the mouth, not or hardly shorter than the eye; nostrils much closer to the orbit than to the tip of the snout; rostro-dorsal profile on all of the head sloping, straight, on the nape sloping, slightly convex; interorbital line nearly straight; anterior suborbital bone obliquely pentagonal, depth about equal to length, lower margin obliquely convex, anterior and posterior lower margins truncate or convex, upper margins concave, especially the anterior one, united into an acute, upward pointing angle close to the nostrils, lower half traversed by a longitudinal crest, sprouting a branch at the underside; 2nd suborbital bone quadrangular, depth not or hardly greater anteriorly than posteriorly, length slightly more than twice as great as depth, about twice as low as 1st suborbital bone; 3rd suborbital bone maximally convex, slightly more than twice as thin as the eye; upper jaw longer than lower jaw, moderately downward protrusible, ending hardly anterior to the eye, contained about $3\frac{1}{2}$ times in the length of the head; gape oblique; barbels thin, nasal and upper jaw barbels nearly equal in length, considerably longer than the eye; lower jaw at the symphysis with a conical, obtuse, little conspicuous tubercle, underside with about 5 pores on both branches, placed in a longitudinal row; lips fleshy, terete, on the oral surface lightly transversely striped; width of gill cover contained about $1\frac{3}{4}$ times in its height, lower margin nearly straight; gill opening ending below the posterior part of the preoperculum. Pharyngeal teeth hooked to spoon-shaped, 2.3.5/5.3.2; scapula triangular, strongly obtusely rounded; belly flat anterior to ventral fins, angular at the flanks, behind ventral fins obtusely ridged; back strongly elevated, angular, not much higher than strongly convex belly; depth of tail contained about $1\frac{5}{8}$ times in the length of the head; scales on the middle of the body very conspicuously larger than the scales on the anterior and posterior part of the body and strongly oblique (lower half of free margin placed rather far anterior to the upper half of the free margin) and with ray-like stripes originating from a common simple or reticulate centre, 24 scales in the lateral line, 10 in a transverse row (without the lowest ventral scales) of which 5 ($4\frac{1}{2}$) above the lateral line below the dorsal spine, only 2 between the lateral line and the base of the ventral fins and the vent, 9 in a longitudinal row between occiput and dorsal fin, lowest ventral scales in 3 longitudinal rows, posterior scales in medial row nearly equal in size to those in the flanking rows; lateral line strongly curved, descending below the rostro-caudal line, each scale marked by a simple tube reaching or surpassing the centre of the scale; dorsal fin starting slightly behind the base of the ventral fins, acute, hardly emarginate, depth contained about $1\frac{3}{4}$ times in the depth of the body, much higher but much less than twice as high as base length, spine medium-sized, posteriorly serrated with numerous well visible small teeth, with its flexible part contained about $1\frac{1}{2}$ times in the length of the head; pectoral fins



Fig. 81. *Puntius (Barbodes) goniosoma* Blkr. Atl. Ichth. Cypr. Tab. XXXI, Fig. 1. TL figure 146 mm

acute, slightly longer than ventral fins, contained about $6\frac{1}{3}$ times in the length of the body, not reaching the ventral fins; ventral fins angular, obtuse, not reaching the anal fin; anal fin slightly acute, hardly emarginate, much lower than dorsal fin but much less than twice as low, considerably higher than base length but much less than twice as high, the simple third ray nearly totally cartilaginous; caudal fin scaled only at the base, with a deep incision, lobes acute, contained about $4\frac{1}{2}$ times in the length of the body. Colour: upper part of the body slightly olive, lower part silver; iris yellow, upper part dark; dark or violet supra-ocular spot; scales on back, flanks and tail each violetish at the base; fins pink or pink-hyaline, with uneven dark speckles.

B. 3. D. $4/8$ or $4/9$. P. $1/15$. V. $2/8$. A. $3/5$ or $3/6$. C. $6/14/6$, short flanking ones included.

Hab. Sumatra (Benkulen), in rivers.

Length of sole specimen 146'''.

Remark. *Systemus (Barbodes) goniosoma* belongs to the group of the genus which have in a longitudinal series only about 25 scales which from a common centre are radially striped, ³⁵¹ a short weakly serrated dorsal fin spine and long barbels. In this group it can be recognized by its acute profile, high body, very angular back profile, low head, large scales at the centre of the body, a dorsal fin that is placed entirely behind the pelvic fins, and a strongly curved lateral line. Moreover it has two scales between the undivided pelvic fin ray and the lateral line and between the vent and the lateral line. Maybe the dark spot above the gill cover is also characteristic for this species just like the presence of only 14 branched anal fin rays as the caudal fin does not bear traces of an unnatural development.

Systemus (Barbodes) marginatus Blkr. –
Gerande Lalawak [Margined Lalawak].
 Atl. Cypr. Tab. XXXII fig. 1.

A *Systemus (Barbodes)* with an oblong, compressed body, depth of body contained 4 to $3\frac{1}{4}$ times in its length, width contained $2\frac{2}{3}$ to 3 times in its depth. Head obtuse, contained $5\frac{1}{2}$ to nearly $6\frac{1}{2}$ times in

length of body with caudal fin, 4 to $4\frac{3}{4}$ times in length of body without caudal fin; depth of head contained once to $1\frac{1}{2}$ times in its length, width nearly $1\frac{2}{3}$ to $1\frac{3}{4}$ times; eye diameter contained $2\frac{1}{4}$ to $2\frac{3}{4}$ times in the length of the head, eye diameter contained nearly once to slightly over once in the postocular part of the head, distance between the eyes about once their diameter; palpebral membrane covering the external margin of the iris, broader anteriorly than posteriorly, opening nearly circular; snout obtuse, convex, slightly truncate, shorter than the eye, not sticking out in front of the mouth; nostrils closer to the orbit than to the tip of the snout; rostro-dorsal profile between snout and nape nearly straight or slightly concave, convex on the nape; interorbital line convex; anterior suborbital bone pentagonal, depth hardly or not greater than length, lower margin oblique, anterior and posterior lower margins concave, truncate or convex, upper margins concave, united into an acute, upward pointing angle close to the nostrils, traversed around the middle by a longitudinal crest; 2nd suborbital bone obliquely quadrangular, depth greater anteriorly than posteriorly, length more than twice to less than twice as great as depth, twice to nearly twice as low as 1st suborbital bone; upper jaw longer than lower jaw, moderately vertically downward protrusible, ending anterior to the eye or below the anterior margin of the eye, contained 3 to $3\frac{1}{2}$ times in the length of the head; gape slightly oblique; barbels thin, upper jaw barbels much longer than nasal barbels, twice or nearly twice as short as the eye; lower jaw at the symphysis with an obtuse, short tubercle, underside without visible pores; lips medium-sized, terete, lightly transversely rugose; depth of gill cover twice or nearly twice as great as width, lower margin nearly straight; gill opening ending below the posterior rim of the preoperculum. Pharyngeal teeth hooked-spoon-shaped, 2.3.4/4.3.2; scapula triangular, obtusely rounded; back elevated, angular, higher than convex belly; belly flat anterior to ventral fins, angular at the flanks, behind ventral fins obtusely ridged; depth of tail contained about $1\frac{1}{2}$ times in the length of the head; the free half of the scales with slightly ray-like stripes, the basal half generally not striped on the anterior part of the body, sparsely striped slightly ray-like on the posterior part of the body, 28 or 29 scales in the lateral line, 10 in a transverse row (without the lowest ventral scales) of which 5 ($4\frac{1}{2}$) above the lateral line, 8 or 9 in a longitudinal row between occiput and dorsal fin, lowest ventral scales in 3 longitudinal rows, scales in medial row gradually increasing in size posteriorly, posterior scales in this row generally larger than those in the flanking rows; lateral line slightly curved, reaching the rostro-caudal line, each scale marked by a simple tube reaching the centre of the scale; dorsal fin starting above the base of the ventral fins, acute, lightly emarginate, depth contained $1\frac{1}{3}$ to $1\frac{2}{3}$ times in the depth of the body, much higher than base length but much less than twice as high, spine thick, posteriorly serrated with medium-sized teeth, with its flexible part ³⁵² not much longer than the head ; pectoral and ventral fins acute, pectoral fins



Fig. 82. *Puntius (Barbodes) obtusirostris* Blkr. Atl. Ichth. Cypr. Tab. XXXII, Fig. 1. TL figure 177 mm.

generally slightly longer than ventral fins, contained 6 to 6½ times in the length of the body, not reaching the ventral fins; ventral fins not reaching the anal fin; anal fin obtuse, lower margin straight or convex, nearly twice as low to considerably less than twice as low as dorsal fin, not or only slightly higher than base length, the simple third ray bony only at the base; caudal fin scaled only at the base, with a deep incision, lobes acute, contained 3¾ to 4 times in the length of the body. Colour: upper part of the body green, lower part silver; iris yellow, upper part dark; generally with an oblong, transverse, blackish scapular spot; scales on back, flanks and tail each with a crescent-shaped, transverse blackish-violet band at the base; fins pink-hyaline, pectoral, ventral and anal fins of fainter colour than the others, dorsal and caudal with a black margin.

B. 3. D 4/8 or 4/9. P. 1/14. V. 2/8. A. 3/9 or 3/10. C. 8/17/8 or 9/17/9, short flanking ones included.

Syn. *Barbus marginatus* Val., Poiss. XVI p. 122; Blkr, Nieuwe tientall. vischs Sumatra, Nat. T. Ned. Ind. V p. 518.

Barbeau bordé Val., Poiss. XVI p. 122.

Lalawak, *Lalawak* Mal. Bat., *Regis*, *Gingehek* Sundan, *Kapyah* Lampong.

Hab. Java (Batavia, Lebak, Rankasbetong, Sadjira, Tjikaniki, Tjampea, Buitenzorg, Tjiandjur, Tjipanas, Kuningan, Lelles, Parongkalong, Surakarta, Ngawi, Pasuruan, Grati, Malang, Ngantang, Lesti), in rivers and lakes.

Sumatra (Pangabuang, Pajakombo, Trussan, Priaman, Lahat), in rivers.

Length of 63 specimens 65''' to 201'''.

Remark. *Systemus* (*Barbodes*) *marginatus* belongs to a proper type in the subgenus *Barbodes*, externally recognizable by a relatively multi-rayed not concave anal fin, a character that I cannot recover in any *Barbodes* species known to me.

The species is generally spread across Java, but is more common in the higher than in the lower stretches of the drainage areas. It is also present in the mountainous areas of Sumatra.

Systemus? (*Barbodes*) *carassioides* Blkr. –
Twijfelachtige Lalawak [Doubtful *Lalawak*].

A *Barbodes* with 4 barbels, bony ray in dorsal and anal fin, dorsal spine serrated (Heck.).

Syn. *Barbus carassioides* Heck., Fisch. Syr. p. 29.

Hab. Borneo.

Remark. Heckel mentions this species in his *Fische Syriens*. I do not know if it is described anywhere in more detail, but it appears from Heckel's list of Cyprinoids that it has four barbels and a serrated dorsal fin spine.

I possess five new species of *Barbodes* from Borneo i.e. *Systemus* (*Barbodes*) *Schwanefeldi*, *Systemus* (*Barbodes*) *amblycephalus*, *Systemus* (*Barbodes*) *erythropterus*, *Systemus* (*Barbodes*) *tetrazona* and *Systemus* (*Barbodes*) *fasciatus*. Maybe Heckel's species belongs to one of the three first mentioned ones, however without further data nothing can be decided concerning this.

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Systemus (*Capoëta*) *padangensis* Blkr. –
Padangse Lalawak [*Padangian Lalawak*].
Atl. Cypr. Tab XXXIV fig. 8.

A *Systemus* (*Capoëta*) with a slightly elongate, compressed body, depth of body contained nearly 5 to 4½ times in its length, width contained nearly 2 to 2½ times in its depth. Head slightly acute, contained

5 to $5\frac{1}{2}$ times in length of body with caudal fin, $3\frac{2}{3}$ to slightly over 4 times in length of body without caudal fin; depth of head contained $1\frac{1}{3}$ to $1\frac{1}{4}$ times in its length, width 2 to $1\frac{1}{4}$ times; eye diameter contained nearly 3 times in the length of the head, distance between the eyes $\frac{3}{4}$ to once their diameter; palpebral membrane covering the external margin of the iris only, opening nearly circular; snout slightly obtuse, convex, shorter than the eye, not sticking out in front of the mouth; nostrils closer to the orbit than to the tip of the snout; rostro-dorsal profile sloping on top of the head, nearly straight, anterior to the eyes and on the nape convex; interorbital line convex; anterior suborbital bone pentagonal, depth slightly greater than length, margins concave except for the lower nearly horizontal margin; two upper margins united into an acute, upward pointing angle close to the nostrils, traversed around the middle by a simple, low, longitudinal crest; 2nd suborbital bone elongate, nearly square, more than twice as low as the 1st suborbital bone; upper jaw longer than lower jaw, strongly vertically downward protrusible, ending below the lower margin of the eye or hardly anterior to the eye, contained $3\frac{1}{2}$ to $3\frac{2}{3}$ times in the length of the head; gape rather oblique; barbels thin, twice or more than twice as short as the eye; lower jaw at the symphysis with a conical, obtuse, short tubercle, underside without visible pores; lips thin, terete, not rugose; width of gill cover contained $1\frac{1}{2}$ to $1\frac{3}{5}$ times in its depth, lower margin slightly convex or nearly straight; gill opening ending below the posterior rim of the preoperculum. Pharyngeal teeth slightly hooked-spoon-shaped or slightly with a rod-like neck, 2.2.4/4.2.2; scapula triangular, slightly obtusely rounded; back rather elevated, slightly angular, much higher than the belly; belly flat anterior to ventral fins, slightly angular at the flanks, behind ventral fins rounded, not ridged; depth of tail contained 2 to slightly over 2 times in the length of the head; scales generally without visible stripes, for the free part sometimes with sparse, diverging stripes; 38 or 39 scales in the lateral line, 12 in a transverse row (without the lowest ventral scales) of which 7 ($6\frac{1}{2}$) above the lateral line, 12 or 13 in a longitudinal row between occiput and dorsal fin, on the lowest part of the belly in 3 longitudinal rows, scales in medial row larger than those in flanking rows; lateral line nearly straight, sloping downward, curved only anteriorly, hardly or not reaching the rostro-caudal line, each scale marked by a simple tube generally reaching or surpassing the centre of the scale; dorsal fin starting above the base of the ventral fins, acute, emarginate, not much lower than the body, not much higher than base length, spine medium-sized, posteriorly serrated with very conspicuous teeth, with its flexible part slightly shorter than the head; pectoral and ventral fins acute, pectoral fins hardly longer than ventral fins, contained slightly over 7 to $6\frac{1}{3}$ times in the length of the body, not reaching the ventral fins; ventral fins not reaching the anal fin; anal fin slightly acute, not or hardly emarginate, much lower than dorsal fin but much less than twice as low, hardly or not higher than base length, the simple third ray bony only at the base; caudal fin scaled only at the base, with a deep incision, lobes acute, contained 4 to nearly 4 times in the length of the body. Colour: upper part of the body bluish-green, lower part silver; iris yellow, upper part dark; scales on back, flanks and tail

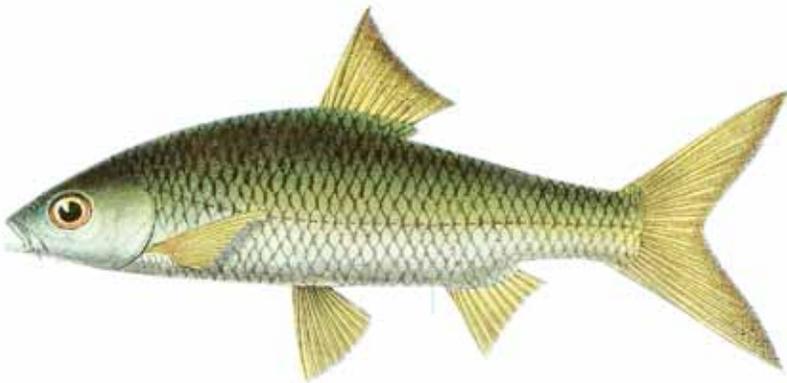


Fig. 83. *Puntius (Capoëta) padangensis* Blkr. Atl. Ichth. Cypr. Tab. XXXIV, Fig. 1. TL figure 98 mm.

generally each with a small, transverse blackish or dark band at the base; fins hyaline or yellowish, dorsal and caudal fin with a slight blackish margin, lower part of dorsal rays blackish.

B. 3. D. 4/8 or 4/9. P. 1/14 or 1/15. V. 2/9. A. 3/8 or 3/9. C. 6/17/6 or 7/17/7, short flanking ones included.

Syn. *Capoëta padangensis* Blkr, Diagn. nieuw. Vischs. Sumatra Tient. I-IV, Nat. T. Ned. Ind. III p. 593.

Bako Mal. Sumatr.

Hab. Sumatra (Padang, Meninju, Sinkara), in rivers and lakes.

Length of 3 specimens 61''' to 116'''.

354 Remark. This species has a peculiar habitus, somewhat resembling that of the genus *Dules*. Because of its 8 or 9 branched anal fin rays it reminds of *Systemus* (*Barbodes*) *marginatus* Blkr, however the anal fin is pointed and not blunt and rounded as in the last mentioned species, the snout barbels of which place it outside the subgenus *Capoëta*. It is easily recognizable by numerous distinct characters. In the meantime I believe it maybe is most closely related to *Systemus* (*Barbodes*) *marginatus*. Till now I only received it from the west coast of Sumatra.

Systemus (*Capoëta*) *sumatranus* Blkr. –
Sumatrasche Lalawak [*Sumatran Lalawak*].
Atl. Cypr. Tab. XXXII fig. 1.

A *Systemus* (*Capoëta*) with an oblong, compressed body, depth of body contained $2\frac{3}{4}$ to 3 times in its length, width contained about $2\frac{1}{2}$ times in its depth. Head slightly obtuse, contained $4\frac{1}{3}$ to $4\frac{1}{4}$ times in length of body with caudal fin, 3 to $3\frac{1}{4}$ times in length of body without caudal fin; depth of head contained slightly more than once in its length, width contained about $1\frac{2}{3}$ times in its length; eye diameter contained about $2\frac{1}{2}$ times in the length of the head, distance between the eyes nearly once their diameter; palpebral membrane covering the external margin of the iris only, opening nearly circular; snout obtuse, convex, shorter than the eye, not sticking out in front of the mouth; nostrils closer to the orbit than to the tip of the snout; rostrum-dorsal profile concave on top of the head, convex on the nape; interorbital line nearly straight; anterior suborbital bone obliquely pentagonal, depth hardly greater than length, higher posteriorly than anteriorly, lower margin nearly horizontal, convex, anterior margin short, upper margins concave, united into an acute, upward pointing angle close to the nostrils, lower half traversed by a low longitudinal crest; 2nd suborbital bone thin, elongate, more than twice as low as 1st suborbital bone; upper jaw longer than lower jaw, strongly vertically downward protrusible, ending anterior to the eye or below the anterior margin of the eye, contained slightly over 3 times in the length of the head; gape strongly oblique; barbels less than twice as short as the eye; lower jaw without visible tubercle at the symphysis, lower part without visible pores; lips thin, terete, not rugose; width of gill cover contained about twice in its depth, lower margin nearly straight or slightly convex; gill opening ending below the posterior margin of the preoperculum. Pharyngeal teeth slightly hooked to compressed, 2.3.4/4.3.2; suborbital bone triangular, obtuse with a rounded angle; back elevated, angular, higher than elevated belly; belly nearly flat anterior to ventral fins, ridged behind ventral fins; depth of tail contained about $1\frac{3}{4}$ times in the length of the head; scales striped with rays originating from a common centre, 21 in a longitudinal row, 11 in a vertical row (without the lowest ventral scales) of which 6 ($5\frac{1}{2}$) above the lateral line, 8 in a longitudinal row between occiput and dorsal fin, on the lowest part of the belly in 3 longitudinal rows, scales in medial row not smaller than those in flanking rows; lateral line sloping downward, ending above or behind the tip of the pectoral fins, each scale marked by a simple tube surpassing the centre of the scale; dorsal fin starting above the base of the ventral fins, acute, hardly emarginate, not much less than twice as low as the body, not much higher than base length, spine thin, posteriorly serrated with conspicuous small teeth, with its flexible part slightly shorter than the



Fig. 84. *Puntius (Capoëta) sumatranus* Blkr. Atl. Ichth. Cypr. Tab. II, Fig. 11. TL figure 40 mm.

head; pectoral and ventral fins acute, pectoral fins slightly longer than ventral fins, contained about $5\frac{2}{3}$ times in the length of the body, reaching the ventral fins; ventral fins reaching the anal fin; anal fin not or slightly emarginate, much lower than dorsal fin but much less than twice as low, not much higher than base length, the simple third ray thin, bony only at the base; caudal fin scaled only at the base, with a deep incision, lobes acute, contained about $3\frac{1}{2}$ times in the length of the body. Colour: upper part of the body beautiful green, lower part silver, snout beautiful red; iris pink or yellow, upper part dark; scales on the free margin with a dark border; 4 transverse 355 blackish-violet bands on the body, 1st ocular band on the nape united with the lateral band from the opposite side, ventrally ending on the preoperculum, 2nd dorso-ventral band much broader at the top than below, starting slightly anterior to the dorsal fin and ending a little anterior to the base of the ventral fin, 3rd dorso-anal band slightly curved backward, equally broad everywhere, starting a little behind the dorsal fin, entering the posterior part of the anal fin and ending on the anterior part of the anal fin, 4th caudal band close to the base of the caudal fin; dorsal and ventral fins nearly totally black, red only at the base and bordered with red; other fins beautiful red.

B. 3. D. 4/8 or 4/9. P. 1/12. V. 2/8. A. 3/5 or 3/6. C. 8/17/8, short flanking ones included.

Syn. *Capoëta tetrazona* Blkr, Nalez. vischf. Sumatra, Nat. T. Ned. Ind. IX p. 262.

Hab. Sumatra (Lahat), in rivers.

Length of 5 specimens 30'' to 42''.

Remark. This small but elegant species is very easily recognizable by its four black body bands, high body, serrated dorsal fin spine, numerous scales, the lateral line ending above the pelvic fins, etc. It has much in common with certain small species of *Systemus* from Bengal, with regard to colour markings and lateral line, which in *Systemus sophore* McCl., *Systemus ticto* McCl., *Systemus phutunio* Val., *Systemus gelio* Val. (all in my possession) and probably also in other species, just like in *Capoëta oligolepis* and the species in question is interrupted and ends at a smaller or larger distance from the caudal fin.

I have changed the species name "tetrazona", because it was already given to a species of the subgenus *Barbodes*.

Systemus (Capoëta) brevis Blkr. –
Korte Lalawak [Short Lalawak].
 Atl. Cypr. Tab. XXXIV fig. 2.

A *Systemus (Capoëta)* with an oblong compressed body, depth of body contained $3\frac{1}{3}$ to $3\frac{1}{4}$ times in its length, width contained about 2 times in its depth. Head slightly acute, contained $4\frac{1}{2}$ to nearly 5 times in length of body with caudal fin, $3\frac{2}{3}$ to $3\frac{3}{4}$ times in length of body without caudal fin; depth of head contained $1\frac{1}{3}$ to $1\frac{1}{4}$ times in its length, width contained about twice in its length; eye diameter

contained about 3 times in the length of the head, distance between the eyes nearly once their diameter; palpebral membrane covering the external margin of the iris only, opening nearly circular; snout slightly obtuse, convex, shorter than the eye, not sticking out in front of the mouth; nostrils closer to the orbit than to the tip of the snout; rostro-dorsal profile on top of the head sloping, nearly straight, convex on the nape; interorbital line slightly convex; anterior suborbital bone pentagonal, depth hardly greater than length, lower margin nearly horizontal, convex, 2 upper margins nearly straight or concave, united into an upward pointing angle close to the nostrils, lower half traversed by a longitudinal, nearly simple crest; 2nd suborbital oblong-quadrangular, more than twice as low as anterior suborbital bone; upper jaw longer than lower jaw, ending anterior to the eye or below the anterior margin of the eye, contained slightly over 3 to 3½ times in the length of the head; gape rather oblique; barbels thin, shorter than the eye; lower jaw at the symphysis with a conical, obtuse, short tubercle, underside without visible pores; lips thin, terete, not rugose; width of gill cover contained about 1½ times in its depth, lower margin nearly straight or slightly convex; gill opening ending below the posterior rim of the preoperculum. Pharyngeal teeth slightly hooked to grinding, 1.3.4/4.3.1; scapula triangular, obtusely rounded; back elevated, angular, much deeper than the belly; belly flat anterior to ventral fins, behind ventral fins obtusely ridged; depth of tail contained 1⅓ to 1¼ times in the length of the head; scales with sparse ray-like stripes originating from a common centre, 356 24 to 26 scales in the lateral line, 9 in a transverse row (without the lowest ventral scales) of which 5 (4½) above the lateral line, 9 in a longitudinal row between occiput and dorsal fin, on the lowest part of the belly in 3 longitudinal rows, scales in medial row larger than those in flanking rows; lateral line lightly curved, hardly reaching the rostro-caudal line, each scale marked by a simple tube generally reaching the centre of the scale; dorsal fin starting above the base of the ventral fins, acute, emarginate, much lower than the body, much higher than base length but much less than twice as high, spine thin, totally without teeth, with its flexible part not or hardly longer than the head; pectoral and ventral fins acute, nearly equal in length, contained slightly over 6 times in the length of the body, pectoral fins reaching or nearly reaching the ventral fins; ventral fins reaching or nearly reaching the anal fin; anal fin acute, emarginate, much lower than dorsal fin but much less than twice as low, but considerably less than twice as high as base length, the simple third ray thin, bony only at the base; caudal fin scaled only at the base, with a deep incision, lobes acute, contained about 4 times in the length of the body. Colour: upper part of the body green, lower part silver; iris yellow, upper part dark; fins yellowish-hyaline or pink-hyaline; head-tail band broad, silver, diffuse quasi subcutaneous.

B. 3. D. 4/8 or 4/9. P. 1/14. V. 2/8. A. 3/5 or 3/6. C. 7/17/7 or 6/17/6, short flanking ones included.

Syn. *Capoëta brevis* Blkr, Verh. Bat. Gen. XXIII Ichth. Midd. Oost-Java p. 21.

Lukas, *Wader* Javan.

Hab. Java (Surabaya, Gombong), in rivers.

Length of 3 specimens 58'' to 75''.



Fig. 85. *Puntius (Capoëta) brevis* Blkr. Atl. Ichth. Cypr. Tab. XXXVI, Fig. 3. TL figure 68 mm.

Remark. Among my species of the subgenus *Capoëta*, there are three in which the dorsal fin spine is entirely smooth, without any trace of teeth. Two of these are related to each other by the formula and structure of the scales, the lateral line that extends till the caudal fin base, and its general habitus. These species are the one in question and *Systemus* (*Capoëta*) *leiacanthus*. They are separated only by less important characters. In the species in question the shape of the body is more thick-set and the head relatively larger, whereas a longitudinally faintly bordered silver coloured band and the absence of a dark tail spot facilitate the diagnosis. It seems to inhabit the rivers of Central and East Java.

Systemus (*Capoëta*) *leiacanthus* Blkr. –
Gladdoornige Lalawak [*Smooth-spined Lalawak*].
 Atl. Cypr. Tab. XXXIV fig. 5.

A *Systemus* (*Capoëta*) with an oblong compressed body, depth of body contained $3\frac{1}{2}$ to $3\frac{3}{4}$ times in its length, width contained $2\frac{1}{3}$ to $2\frac{1}{2}$ times in its depth. Head slightly obtuse, contained 5 to $5\frac{1}{3}$ times in length of body with caudal fin, nearly 4 to slightly over 4 times in length of body without caudal fin; depth of head contained $1\frac{1}{4}$ to $1\frac{1}{2}$ times in its length, width nearly 2 to $1\frac{1}{3}$ times; eye diameter contained $2\frac{2}{3}$ to $2\frac{3}{4}$ times in the length of the head, distance between the eyes about once their diameter; palpebral membrane covering the external margin of the iris only, opening nearly circular; snout slightly obtuse, convex, shorter than the eye, not sticking out in front of the mouth; nostrils closer to the orbit than to the tip of the snout; rostro-dorsal profile slightly concave between forehead and nape, convex on the nape; interorbital line convex; anterior suborbital bone pentagonal, depth hardly greater than length, lower margin nearly horizontal, 2 upper margins concave, united into an acute, upward pointing angle close to the nostrils, lower half traversed by a simple longitudinal crest; 2nd suborbital oblong, ³⁵⁷ quadrangular, more than twice as low as anterior suborbital bone; upper jaw longer than lower jaw, moderately downward protrusible, ending below the anterior margin of the eye or hardly anterior to the eye, contained $3\frac{1}{2}$ to $3\frac{3}{4}$ times in the length of the head; gape rather oblique; barbels thin, not much shorter than the eye; lower jaw at the symphysis with a conical, obtuse, short tubercle, underside without visible pores; lips thin, terete, not rugose; width of gill cover contained about twice in its depth, lower margin straight or slightly convex; gill opening ending below the posterior margin of the preoperculum. Pharyngeal teeth slightly hooked to grinding, 1.3.4/4.3.1; scapula triangular, obtusely rounded; back elevated, angular, much higher than the belly; belly flat anterior to ventral fins, angular at the flanks, behind ventral fins rounded, not ridged; depth of tail contained $1\frac{3}{4}$ to $1\frac{1}{2}$ times in the length of the head; scales with sparse ray-like stripes originating from a common simple or reticulate centre, 24 to 27 scales in the lateral line, 9 in a transverse row (without the lowest ventral scales) of which 5 ($4\frac{1}{2}$) above the lateral line, 8 or 9 in a longitudinal row between occiput and dorsal fin, on the lowest part of the belly in 3 longitudinal rows, scales in the medial row gradually increasing in size posteriorly, posterior scales in those rows larger than those in the flanking rows; lateral line lightly curved, reaching the rostro-caudal line, each scale marked by a simple tube generally reaching the centre of the scale; dorsal fin starting above the base of the ventral fins, acute, emarginate, much lower than the body, not much higher than base length, spine thin, totally without teeth, with its flexible part slightly longer or not longer than the head; pectoral and ventral fins acute, pectoral fins slightly longer than ventral fins, contained about 6 times in the length of the body, hardly or not reaching the ventral fins; ventral fins not reaching the anal fin; anal fin acute, emarginate, much lower than dorsal fin but much less than twice as low, considerably higher than base length but much less than twice as high, the simple third ray slender, bony only at the base; caudal fin scaled only at the base, with a deep incision, lobes acute, contained $3\frac{3}{4}$ to nearly 4 times in the length of the body. Colour: upper part of the body green, lower part silver, scapular region golden; scales on the back and on the upper part of the flanks each with a small transverse darkish or violetish



Fig. 86. *Puntius (Capoëta) leiacanthus* Blkr. Atl. Ichth. Cypr. Tab. XXXVI, Fig. 1. TL figure 86 mm.

band at the base; tail in younger animals generally with a profoundly blue round spot in the lateral line, close to the base of the caudal fin; iris yellow, upper part dark; dorsal fins and caudal fin orange-pink more or less bordered with dark spots, other fins yellowish or hyaline.

B. 3. D. 4/8 or 4/9. P. 1/12. V. 2/8 or 2/9. A. 3/5 or 3/6. C. 7/17/7 or 6/17/6, short flanking ones included.

Syn. *Capoëta javanica* Blkr, Versl. verz. vissch. Oost-Java Nat. T. Ned. Ind. IX p. 412.

Hab. Java (Pasuruan, Grati, Gombong), in rivers and lakes.

Length of 23 specimens 69''' to 90'''.

Remark. *Systemus (Capoëta) leiacanthus* is closely related to *Systemus (Capoëta) brevis* and mainly distinguishes itself from it by a more slender body, a smaller head, a dark round tail spot and the absence of a silver longitudinal lateral band. The species seems to be restricted to Central and East Java. As the species name, already was given to *Systemus (Barbodes) javanicus*, I had to alter it, since my earlier *Barbus javanica* and *Capoëta javanica* have been placed under one and the same generic name.

Systemus (Capoëta) oligolepis Blkr. –
Grootschubbige Lalawak [Large-scaled Lalawak].
Atl. Cypr. Tab. XXXIII fig. 5.

A *Systemus (Capoëta)* with an oblong, compressed body, depth of body contained $3\frac{1}{2}$ to $3\frac{3}{4}$ times in its length, width contained 2 to $2\frac{1}{2}$ times ³⁵⁸ in its depth. Head slightly obtusely convex, contained about $4\frac{1}{2}$ times in length of body with caudal fin, about $3\frac{1}{3}$ times in length of body without caudal fin; depth of head contained about $1\frac{1}{5}$ times in its length, width contained about $1\frac{3}{4}$ times in its length; eye diameter contained about $2\frac{1}{2}$ times in the length of the head, distance between the eyes about $\frac{3}{4}$ times their diameter; palpebral membrane covering the external margin of the iris only, opening nearly circular; snout obtuse, convex, shorter than the eye, not sticking out in front of the mouth; nostrils closer to the orbit than to the tip of the snout; rostro-dorsal profile concave on all of the head and on the nape; interorbital line convex; anterior suborbital bone pentagonal, depth hardly greater than length, lower margin nearly horizontal and convex at the lower sides, lateral upper margins straight or slightly concave, united into an acute, upward pointing angle close to the nostrils, lower half traversed by a low,



Fig. 87. *Puntius (Capoëta) oligolepis* Blkr. Atl. Ichth. Cypr. Tab. II, Fig. 12. TL figure 46 mm.

longitudinal crest; 2nd suborbital oblong-quadrangular, about twice as low as the first suborbital bone; upper jaw longer than lower jaw, strongly downward protrusible, ending below the anterior rim of the eye, contained slightly over 3 times in the length of the head; gape rather oblique; barbels thin, shorter than the eye; lower jaw at the symphysis with a hardly visible tubercle, underside without visible pores; lips thin, terete, not rugose; width of gill cover contained nearly twice in its depth, lower margin nearly straight or slightly convex; gill opening ending below the posterior margin of the preoperculum. Pharyngeal teeth hooked to spoon-shaped, 2.3.4/4.3.2 or 1.3.4/4.3.1; scapula triangular, obtusely rounded; back elevated, angular, much higher than the belly; belly flat anterior to ventral fins, behind ventral fins rounded, not ridged; depth of tail contained nearly 2 times in the length of the head; scales reticulate at the centre, with longitudinal stripes on the free half and the basal half, 16 scales in the lateral line, 7 in a transverse row (without the lowest ventral scales) of which 4 (3½) above the lateral line, 6 in a longitudinal row between occiput and dorsal fin, on the lowest part of the belly in 3 longitudinal rows, scales in medial row larger than those in flanking rows; lateral line curved, not visible on the tail; dorsal fin starting slightly in front of the ventral fins, acute, not emarginate, considerably lower than the body, much higher than base length but much less than twice as high, spine very thin, totally without teeth, with its flexible part slightly shorter than the head; pectoral and ventral fins acute, nearly equal in length, contained nearly 6 times in the length of the body, pectoral fins reaching the ventral fins; ventral fins reaching the anal fin; anal fin acute, not emarginate, nearly twice as low as dorsal fin, much higher than base length but much less than twice as high, the simple third ray very thin, totally or nearly totally cartilaginous; caudal fin scaled only at the base, with a deep incision, lobes acute, contained about 4 times in the length of the body. Colour: upper part of the body shiny metallic green, lower part silver; iris yellow, upper part dark; scales on back, flanks and tail each with an oblong, nearly square or crescent-shaped violet-black band at the base; fins beautiful red, with a broad black margin.

B. 3. D. 4/8 or 4/9. P. 1/12. V. 2/8. A. 3/5 or 3/6. C. 5/17/5 or 6/17/6, short flanking ones included.

Syn. *Capoëta oligolepis* Blkr, Diagn. Nieuw vischs. Sumatra Tient. V-X Nat. T. Ned. Ind. IV p. 296.

Hab. Sumatra (Priaman, Meninju), in rivers and lakes.

Length of 5 specimens 30'' to 47''.

Remark. I discovered this species early in 1853 in specimens that I owe to the famous traveller Ida Pfeifer. Later I received another specimen from Prianam from Mr H. Diepenhorst. The species is remarkable because of the low number of scales, by the lack of lateral line tubes on the posterior half of the body, and in relationship closely approaches certain small species of *Systomus* from Bengal, from which it is distinguished by its upper jaw barbels.

359 *Systemus (Systemus) Waandersi* Blkr,
 Nat. T. Ned. Ind. XVI p. 358,
Waandersche Lalawak [Waanders' Lalawak].
 Atl. Cypr. Tab. XXXVI.

A *Systemus (Systemus)* with a rhomboid-oblong compressed body, depth of body contained about $2\frac{2}{3}$ times in its length, width contained about 3 times in its depth. Head obtuse, strongly convex, contained about $6\frac{1}{2}$ times in length of body with caudal fin, about $4\frac{2}{3}$ times in length of body without caudal fin; depth of head contained hardly more than once in its length, width contained about $1\frac{1}{2}$ times in its length; eye diameter contained about $2\frac{3}{4}$ times in the length of the head, distance between the eyes $1\frac{1}{3}$ to $1\frac{1}{4}$ times their diameter; palpebral membrane covering the external margin of the iris only, broader anteriorly than posteriorly, opening nearly circular; snout obtuse, strongly convex, much shorter to less than twice as short as the eye, not sticking out in front of the mouth; nostrils closer to the orbit than to the tip of the snout; rostro-dorsal profile concave between forehead and nape, very convex on the nape; anterior suborbital bone pentagonal, depth much less than twice as great as length, lower part not much broader than upper part, lower margin convex, lower lateral margins slightly truncate or concave, upper margins concave, united into an acute, upward pointing angle close to the nostrils, lower half traversed by a longitudinal crest strongly ascending at the back; 2nd suborbital bone twice as low as first suborbital bone, lower margin convex; upper jaw longer than lower jaw, strongly vertically downward protrusible, ending below the anterior part of the eye, contained about $3\frac{1}{4}$ times in the length of the head; gape slightly oblique; lower jaw at the symphysis with a conical, obtuse, conspicuous tubercle, slightly hooked at the tip, underside without visible pores; lips medium-sized, terete; width of gill cover contained slightly over twice in its depth, lower margin slightly concave; gill opening nearly vertical, ending below the posterior margin of the preoperculum. Pharyngeal teeth hooked to slightly spoon-shaped to grinding, 2.3.4/4.3.2, rugose-tuberculate on the chewing surface; scapula triangular, obtusely rounded; back strongly elevated, angular, much higher than convex belly; belly flat anterior to ventral fins, angular on the flanks, behind ventral fins obtusely ridged; depth of tail contained about $1\frac{1}{2}$ times in the length of the head; scales on the free part with longitudinal stripes, on the basal part with

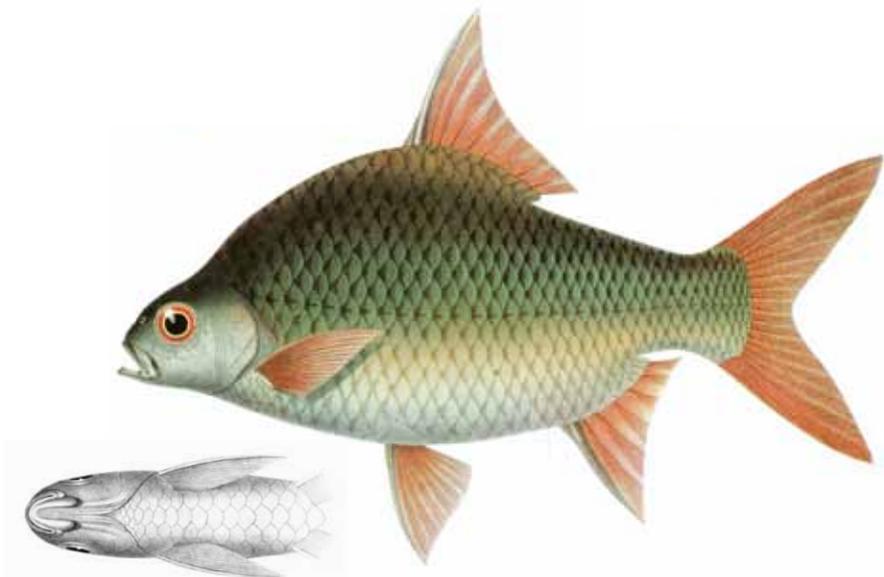


Fig. 88. *Puntius (Puntius) Waandersi* Blkr. Atl. Ichth. Cypr. Tab. XXXIV, Fig. 2. TL figure 293 mm.

very sparse longitudinal stripes or none at all; 36 or 37 scales in the lateral line, 16 in a transverse row (without the lowest ventral scales) of which 9 ($8\frac{1}{2}$) above the lateral line, 14 or 15 in a longitudinal row between occiput and dorsal fin, on the lowest part of the belly in 3 longitudinal rows, scales in the medial row gradually increasing in size posteriorly, not or hardly larger than those in the flanking rows; lateral line slightly curved, not or hardly reaching the dorso-caudal line, each scale marked by a simple tube not reaching the centre of the scale; dorsal fin starting hardly behind the base or above the posterior part of the base of the ventral fins, acute, emarginate, depth contained nearly twice in the depth of the body, much higher than base length but much less than twice as high, spine thick, posteriorly armed with very conspicuous medium-sized teeth, with its flexible part considerably shorter than the head; pectoral and ventral fins acute, nearly equal in length, contained about 6 times in the length of the body, pectoral fins not reaching the ventral fins; ventral fins not reaching the anal fin; anal fin acute, emarginate, much lower than dorsal fin but much less than twice as low, much higher than base length but much less than twice as high, the simple third ray thick, nearly completely bony; caudal fin scaled only at the base, with a deep incision, lobes acute, contained about $3\frac{1}{2}$ times in the length of the body. Colour: upper part of the body green, lower part silver; iris yellow, upper part dark; fins yellowish- or pink-hyaline, dorsal and caudal fin more or less bordered with dark.

B. 3. D. 4/8 or 4/9. P. 1/16. V. 2/8. A. 3/5 or 3/6. C. 6/17/6, short flanking ones included.

Hab. Java (Ngawi), in rivers.

Length of sole specimen 310''.

360 Remark. Most closely related to *Systemus bulu*, the species in question primarily distinguishes itself from that species by a body shape that still more approaches a high diamond, one longitudinal scale row more above the lateral line, a smaller head with a more convex snout, a remarkably less developed dorsal fin spine, one ray less in the pelvic fins, etc.

I have named it in honour of my friend the major of the artillery J.T. van Bloemen Waanders, who discovered it in Ngawi and benevolently put at my disposal this specimen together with other natural history specimens.

Systemus (Systemus) bulu Blkr.

Vierde Bijdr. ichth. Borneo, Nat T. Ned Ind. II p. 207. –

Draadloze Lalawak [*Barbelless Lalawak*].

Atl. Cypr. Tab. XXXV.

A *Systemus (Systemus)* with an oblong, compressed body, depth of body contained $3\frac{2}{5}$ to 3 times in its length, width contained $2\frac{1}{2}$ to 3 times in its depth. Head obtuse, obliquely slightly truncate, contained $4\frac{2}{3}$ to $5\frac{2}{3}$ times in length of body with caudal fin, $3\frac{1}{4}$ to nearly 4 times in length of body without caudal fin; depth of head contained $1\frac{1}{4}$ times to hardly more than once in its length, width contained $1\frac{1}{2}$ to $1\frac{2}{3}$ times in its length; eye diameter contained $2\frac{1}{2}$ to nearly 3 times in the length of the head, distance between the eyes nearly once to slightly more than once times their diameter; palpebral membrane covering the external margin of the iris only, opening nearly circular; snout obtuse, truncate, elevated, in juveniles twice as short, in adults less than twice as short as the eye, not sticking out in front of the mouth; nostrils very close to the orbit; rostro-dorsal profile with an obtuse angle on the head, rounded at the angle, concave between forehead and nape, very convex on the nape; interorbital line convex or slightly convex; anterior suborbital bone pentagonal, depth greater than width at the upper part, lower part much broader than upper part, rounded at the angles; lower and upper lateral margins concave, upper margins united into an acute, upward pointing angle close to the nostrils, lower half traversed by a longitudinal crest strongly ascending at the back; 2nd suborbital bone less than twice as low as first suborbital bone, lower margin convex; upper jaw longer than lower jaw, strongly vertically downward protrusible, ending below the anterior part of the eye, contained slight-

ly over 3 to nearly 3 times in the length of the head; gape slightly oblique; lower jaw at the symphysis with a conical, well visible tubercle, slightly hooked at the tip, underside without visible pores; lips medium-sized, terete; width of gill cover contained about twice in its depth, lower margin nearly straight; gill opening ending below the posterior margin of the preoperculum. Pharyngeal teeth grinding, 2.3.4/4.3.2; scapula triangular, obtuse, rounded at the tip; back strongly elevated, much higher than the belly; belly flat anterior to ventral fins, angular at the flanks, behind ventral fins rounded, not ridged; depth of tail contained 2 to $1\frac{1}{4}$ times in the length of the head; scales with longitudinal stripes on the free part, on the basal part with very sparse longitudinal stripes or none at all; 36 or 37 scales in the lateral line, 13 or 14 in a transverse row (without the lowest ventral scales) of which $8\frac{1}{2}$ above the lateral line, 13 in a longitudinal row between occiput and dorsal fin, on the lower part of the belly in 3 longitudinal rows, scales in the medial row larger than those in the other rows; lateral line lightly curved, not or hardly reaching the rostro-caudal line, each scale marked by a short, simple tube generally not reaching the centre of the scale; dorsal fin starting above the base of the ventral fins, acute, emarginate, not much lower than the body, about twice as high as base length, spine thick, posteriorly armed with large teeth, with its flexible part much longer than ³⁶¹ the head; pectoral and ventral fins acute, pectoral fins slightly shorter than the ventral fins, contained 6 to $6\frac{1}{2}$ times in the length of the body, pectoral fins reaching or nearly the ventral fins, ventral fins reaching or nearly reaching the anal fin; anal fin acute, emarginate, much lower than dorsal fin but much less than twice as low, about twice as high as base length, the simple third for the largest part bony; caudal fin scaled only at the base, with a deep incision, lobes acute, contained $3\frac{3}{5}$ to 4 times in the length of the body. Colour: upper part of the body faintly green, lower part silver; scales on back and flanks in adolescent and older animals generally for the basal part marked with a transverse, violet-dark small band, the transversely placed small bands more or less in a row, resembling oblique transverse bands; iris yellow, upper part dark; dorsal and caudal fin red, generally with a margin of dense dark speckles, pectoral, ventral and anal fins yellowish or pink.

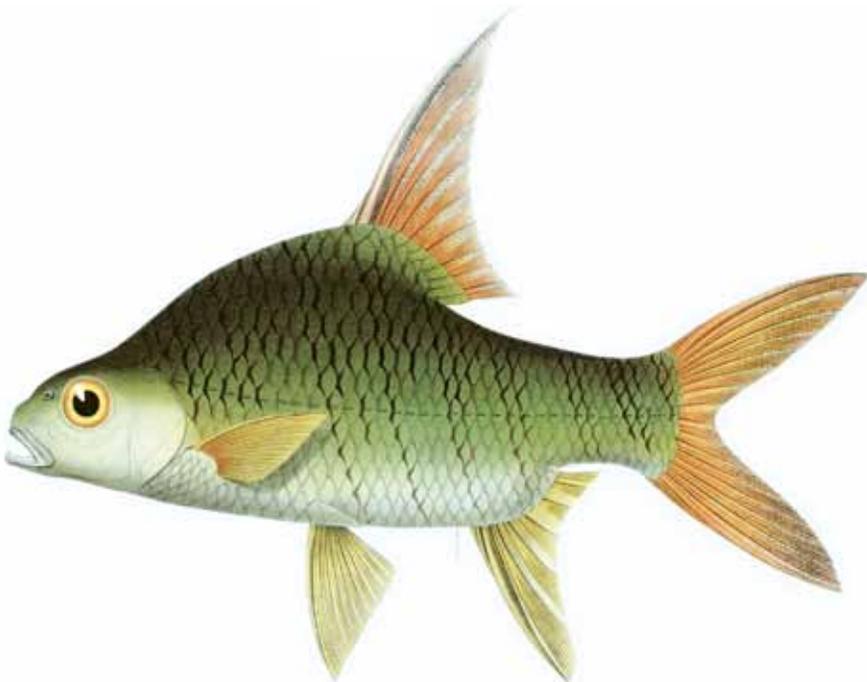


Fig. 89. *Puntius (Puntius) bulu* Blkr. Atl. Ichth. Cypr. Tab. XXVI, Fig. 2. TL figure 254 mm.

B. 3. D. 4/8 or 4/9. P. 1/16 to 1/18. V. 2/9. A. 3/5 or 3/6. C. 7/17/7, short flanking ones included.

Syn. *Bulu-bulu* Mal. Bandjermas.

Hab. Borneo (Bandjermasin, Kahajan, Pontianak), in rivers.

Sumatra (Palembang, Lahat), in rivers.

Length of 10 specimens 96''' to 300'''.

Remark. The species in question is not rare in the large streams of Borneo and Sumatra, but it does not seem to occur on Java, where it is replaced by *Systemus* (*Systomus*) *lawak*. It is most closely related to *Systemus* (*Systomus*) *Waandersi* but distinguishes itself from it by a longitudinal scale row less above the lateral line, by a much larger and less blunt head, by a less high body, a remarkably less strongly developed dorsal fin spine, a lower tail relative to the head length, one ray more in the pelvic fins, etc. Judging from a figure found in the several times cited sketchbook of Mr de Castelnau, this species also lives in the rivers of Siam.

Systomus (*Systomus*) *lawak* Blkr.

Verslag verzamel. Visschen van Oost-Java, Nat. Tijdschr. Ned. Ind. IX p. 411. –

Ongebaarde Lalawak [Unbarbelled *Lalawak*].

Atl. Cypr. Tab. XXXIV fig. 4.

A *Systemus* (*Systomus*) with an oblong, compressed body, depth of body contained about $3\frac{1}{2}$ times in its length, width contained $2\frac{2}{3}$ to 3 times in its depth. Head slightly obtuse, contained slightly over 5 to $5\frac{1}{2}$ times in length of body with caudal fin, $3\frac{1}{2}$ to $3\frac{3}{4}$ times in length of body without caudal fin; depth of head contained $1\frac{1}{4}$ times, width contained about 2 times in its length; eye diameter contained $2\frac{1}{2}$ to $2\frac{3}{4}$ times in the length of the head, distance between the eyes $\frac{3}{4}$ times to once their diameter; palpebral membrane covering the external margin of the iris only, opening nearly circular; snout obtuse, convex, obliquely truncate, about twice as short as the eye, hardly sticking out in front of the mouth; nostrils closer to the orbit than to the tip of the snout; rostrum-dorsal profile hardly concave between snout and nape, convex on the nape; interorbital line slightly convex; anterior suborbital bone triangular, depth about equal to length, posterior margin nearly vertical, tip rounded, pointing forward, in the middle traversed by a longitudinal keel; 2nd suborbital bone more than twice as low as anterior suborbital bone; upper jaw longer than lower jaw, strongly vertically downward protrusible, ending below the anterior part of the eye, contained about $3\frac{1}{3}$ times in the length of the head; gape slightly oblique; lower jaw at the 362 symphysis with a conical tubercle, slightly hooked at the tip, underside without visible pores; lips medium-sized, terete, without visible ridges; width of gill cover contained about $1\frac{3}{4}$ times in its depth, lower margin nearly straight or slightly convex; gill opening nearly vertical, ending below the posterior margin of the preoperculum. Pharyngeal teeth 2.3.4/4.3.2, with 2 or 3 tubercles at the tip, (slightly hooked to grinding); scapula triangular, acute or slightly acutely rounded; back strongly elevated, angular, much deeper than the belly; belly flat anterior to ventral fins, behind ventral fins rounded or hardly ridged; depth of tail contained about $1\frac{3}{4}$ times in the length of the head; scales on the lower half and basal half with longitudinal, slightly ray-like stripes; 33 to 35? scales in the lateral line, 13 or 14 in a transverse row (without the lowest ventral scales) of which 8 ($7\frac{1}{2}$) above the lateral line, 14 or 15 in a longitudinal row between occiput and dorsal fin; lateral line lightly curved, reaching the rostrum-caudal line, each scale marked by a simple tube generally not reaching the centre of the scale; dorsal fin starting above the base of the ventral fins, acute, emarginate, not much lower than the body, much higher than base length but much less than twice as high, spine rather thick, posteriorly armed with medium-sized, very conspicuous teeth, with its flexible part longer than the head; pectoral and ventral fins acute, nearly equal in length, contained 6 to $6\frac{1}{2}$ times in the length of the body, pectoral fins not reaching or hardly reaching the ventral fins, ventral fins not reaching or hardly reaching the anal fin; anal fin acute, emarginate, considerably

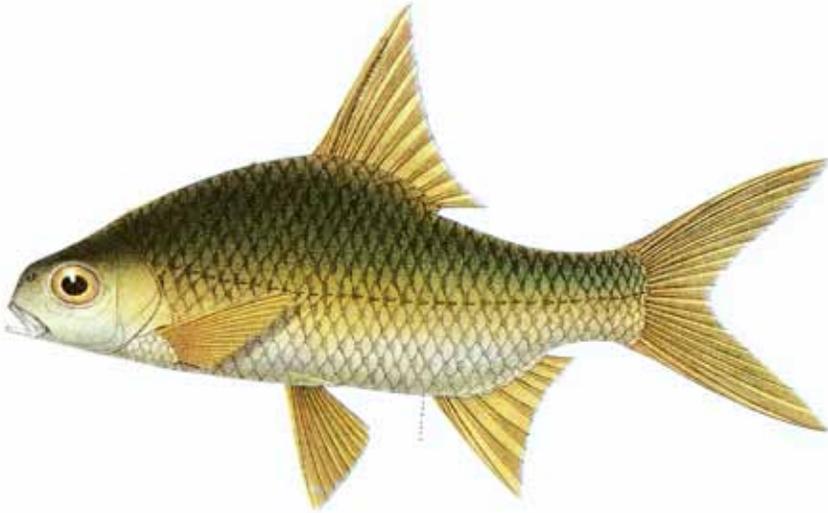


Fig. 90. *Puntius (Puntius) lawak* Blkr. Atl. Ichth. Cypr. Tab. XL, Fig. 2, TL figure 102 mm.

lower than dorsal fin, not much higher than base length, its simple third ray bony only for the basal half; caudal fin scaled only at the base, with a deep incision, lobes acute, contained about $3\frac{1}{2}$ times in the length of the body. Colour: upper part of the body green, lower part silver; iris yellow; fins pink or yellowish-hyaline.

B. 3. D. $4/8$ or $4/9$. P. $1/15$. V. $2/9$. A. $3/6$ or $3/7$. C. $6/17/6$ or $7/17/7$, short flanking ones included.

Syn. Lawak or Lalawak Mal. Bat.

Hab. Java (Batavia, Surabaya), in rivers.

Length of 2 specimens $86''$ and $108''$.

Remark. This species is easy recognizable among its relatives by the formula of its anal fin rays (= $3/6$ or $3/7$) which in other species is = $3/5$ or $3/6$. Otherwise it is most closely related to *Systomus bulu* Blkr, but distinguishes itself by even less scales on the lateral line, a remarkable less developed dorsal fin spine, a lower head, etc.

CYCLOCHEILICHTHYS Blkr. –

CIRCLE-LIP CARP.

Body oblong, strongly compressed, covered with large or medium-sized scales, back strongly angular. Jaws enclosed in terete, simple lips, upper jaw strongly downward protrusible. Barbels 4, nasal and upper jaw barbels, or 2 upper jaw barbels or none. Snout conical, prominent. Anterior suborbital bone triangular, the acute tip pointing forward. Mouth slightly inferior, hardly oblique gape ending anterior to the eye, in shape of a horse shoe when the mouth is closed. Lower jaw shorter than upper jaw with a more or less tuberculate symphysis. One postlabial groove, parallel to the free margin of the jaw, following the shape of the gape. ³⁶³ Anal sheath without larger scales. Dorsal fin starting above or hardly behind the ventral fins and ending far anterior to the anal fin, at the base enclosed in a scaled sheath, posterior simple ray bony, serrated. Anal fin shorter than dorsal fin. Ventral fin with rays $2/9$. Pharyngeal teeth spoon-shaped or slightly spoon-shaped, on both sides 7 to 10, in three rows.

Subg. *Cyclocheilichthys* Blkr. 4 barbels, nasal and upper jaw barbels.

" *Siaja* Blkr. 2 barbels, upper jaw barbels only.

" *Anemathichthys* Blkr. No barbels.

Remark. I possess a number of no less than 12 archipelagic species, which I earlier, as I too much accepted the generic characters of Mr Valenciennes, almost all have described partly as species of *Barbus*, partly as species of *Capoëta*, partly as species of *Systemus*, according as to they possessed four, two or no barbels.

A more detailed investigation of those species made me realize, that they are so closely related in habitus and structure of body, head, lips and fins, that they can be placed in a single natural genus. This species in relationship stands between *Barbus* and *Systemus*, as defined by myself. It is mainly distinguished from *Barbus* by a high and flat body and an angular back and a broad scale sheath that envelops the basis of the dorsal fin, and from *Systemus* primarily by the cone-shaped snout, elongated triangular, with the tip anteriorly directed anterior suborbital bone, and a single horse shoe shaped posterior lip groove which lies parallel to the free lower lip edge. More for the convenience of grouping the species than on the basis of the weight of the characters I divide the genus in the three aforementioned subgenera, according to the absence or the presence of two or four barbels. I possess four species of the subgenus *Cyclocheilichthys*, five of *Siaja* and three of *Anemathichthys*.

Amongst the known extra-Archipelagic species I do not see a single one that I could place with some certainty in the genus *Cyclocheilichthys*. However, it seems that the eastern part of South Asia feeds species of this genus. I see at least one species depicted in the often quoted sketchbook of Siamese fishes of the Count F. De Castelnau, which appears to me to concern a juvenile specimen of *Cyclocheilichthys armatus*.

The species of my collection can be separated from each after the following scheme.

364 I. Nasal and upper jaw barbels. (Subg. *Cyclocheilichthys*).

a. Lateral line bifid or trifold on each scale. 40 scales in the lateral line, 6 above the lateral line. Lower jaw at the symphysis with a slightly hooked tubercle.

+ Distance between the tip of the snout and the nape contained $2\frac{1}{4}$ to $2\frac{1}{2}$ times in the distance between occiput and posterior dorsal ray. Depth of tail contained less than twice in the length of the head. Nucho-dorsal line strongly convex.

Cyclocheilichthys (Cyclocheilichthys) enoplos Blkr.

+ Distance between the tip of the snout and the nape contained only twice in the distance between occiput and posterior dorsal ray. Depth of tail contained more than twice in the length of the head. Nucho-dorsal line hardly convex.

Cyclocheilichthys (Cyclocheilichthys) macracanthus Blkr.

b. Lateral line marked by a simple tube on each scale. 37 or 38 scales in the lateral line, 7 above the lateral line. Lower jaw at the symphysis without tubercle or with a hardly visible one.

+ Head contained $5\frac{1}{4}$ to $5\frac{1}{2}$ times in the length of the body. Depth of tail contained $1\frac{1}{2}$ times in the length of the head. No dark caudal spot.

Cyclocheilichthys (Cyclocheilichthys) armatus Blkr.

- †' Head contained $4\frac{2}{3}$ to $4\frac{3}{4}$ times in the length of the body. Depth of tail contained twice to slightly more than twice in the length of the head. Round, blackish caudal spot.

Cyclocheilichthys (Cyclocheilichthys) repasson Blkr.

II Barbels 2, upper jaw barbels only (subg. *Siaja*)

- a. 59 or 60 scales in the lateral line, 9 above the lateral line. D. 4/14 to 4/18, spine thin.
- † Depth of body contained 5 to $4\frac{3}{4}$ times in its length. Height of anal fin more than twice as great as length. Dorsal fin starting anterior to ventral fins.

Cyclocheilichthys (Siaja) microlepis Blkr.

- b. 34 to 37 scales in the lateral line, 6 or 7 above the lateral line. D. 4/8 or 4/9, spine thick. Depth of body contained $3\frac{2}{3}$ to $4\frac{1}{3}$ times in its length.
- † Barbels simple. Inframaxillary bones diverging behind the symphysis and converging again posteriorly. Black caudal spot.
- Ó Dorsal fin starting above the base of the ventral fins. 7 scales above the lateral line.
- Depth of body contained $3\frac{2}{3}$ times in its length. 35 scales in the lateral line. Ventral fins contained 5 times in the length of the body. Barbels very thin, more than 3 times as short as the eye.

Cyclocheilichthys (Siaja) macropus Blkr.

- ' Depth of body contained nearly 4 times to $4\frac{1}{2}$ times in its length. 37 scales in the lateral line. Ventral fins contained $6\frac{1}{2}$ to 7 times in the length of the body. Barbels more than twice as short as the eye.

Cyclocheilichthys (Siaja) siaja Blkr.

- ' Dorsal fins starting slightly behind the base of the ventral fins. 6 scales above lateral line.
- Depth of body contained $3\frac{3}{4}$ times in its length. 34 scales in the lateral line.

Cyclocheilichthys (Siaja) Deventeri Blkr.

- †' Barbels branched. Inframaxillary bones equidistant everywhere. No black caudal spot.
- Dorsal fin starting above the basis of the ventral fins. 6 scales above lateral line.
- Depth of body contained $3\frac{3}{4}$ to $3\frac{2}{3}$ times in its length. 35 scales in the lateral line.

Cyclocheilichthys (Siaja) heteronoma Blkr.

III No barbels (Subg. *Anematichthys*).

- a. 34 to 36 scales in the lateral line, 7 above lateral line. D. 4/8 or 4/9, spine robust.
- † Dorsal fin starting behind the base of the ventral fins. Depth of body contained $3\frac{1}{2}$ to 4 times in its length. Black caudal spot.
- Head contained $4\frac{1}{4}$ to $4\frac{3}{4}$ times in the length of the body. Depth of tail contained twice in the length of the head. Scales on body each with a squarish, blackish spot at the base. P. 1/16.

Cyclocheilichthys (Anematchthys) apogon Blkr.

Ó' Head contained $4\frac{1}{2}$ to $5\frac{1}{4}$ times in the length of the body. Depth of tail contained $1\frac{3}{4}$ to $1\frac{1}{2}$ times in the length of the head. P 1/14.

Cyclocheilichthys (Anematchthys) apogonides Blkr.

- †' Dorsal fin starting above the base of the ventral fins. No caudal spot, but a black head-tail band. Depth of the body contained $4\frac{1}{2}$ times in its length.
 O Head contained nearly 5 times in the length of the body. Depth of tail contained $2\frac{3}{4}$ to $2\frac{1}{2}$ times in the length of the head. Pectoral fins violet, dorsal and caudal fin with a broad black margin. P. 1/16 or 1/17.

Cyclocheilichthys (Anematchthys) jantochir Blkr.

366 *Cyclocheilichthys (Cyclocheilichthys) enoplos* Blkr. –
Grootdoornige Kringlipkarper [Large-spined Circle-lip Carp].
 Atl. Cypr. Tab. XXXVII fig. 3.

A *Cyclocheilichthys (Cyclocheilichthys)* with an oblong, compressed body, depth of body contained 4 to slightly over 4 times in its length, width contained $2\frac{1}{4}$ to about $2\frac{1}{2}$ times in its depth. Head acute, contained slightly over 5 to $5\frac{1}{2}$ times in length of body with caudal fin, $3\frac{3}{4}$ to $4\frac{1}{4}$ times in length of body without caudal fin; depth of head contained $1\frac{3}{5}$ to nearly $1\frac{1}{2}$ times, width contained 2 to $1\frac{1}{2}$ times in its length; distance between the tip of the snout and the nape contained $2\frac{1}{4}$ to $2\frac{1}{2}$ times in the distance between occiput and posterior dorsal ray; eye diameter contained $3\frac{3}{4}$ to 4 times in the length of the head, diameter contained $1\frac{1}{2}$ to nearly 2 times in the postocular part of the head; palpebral membrane covering the external margin of the iris only, broader anteriorly and at the top than posteriorly, opening nearly circular; snout acute, convex, slightly sticking out in front of the mouth, in younger fishes shorter than the eye, in adults longer than the eye; nostrils much closer to the orbit

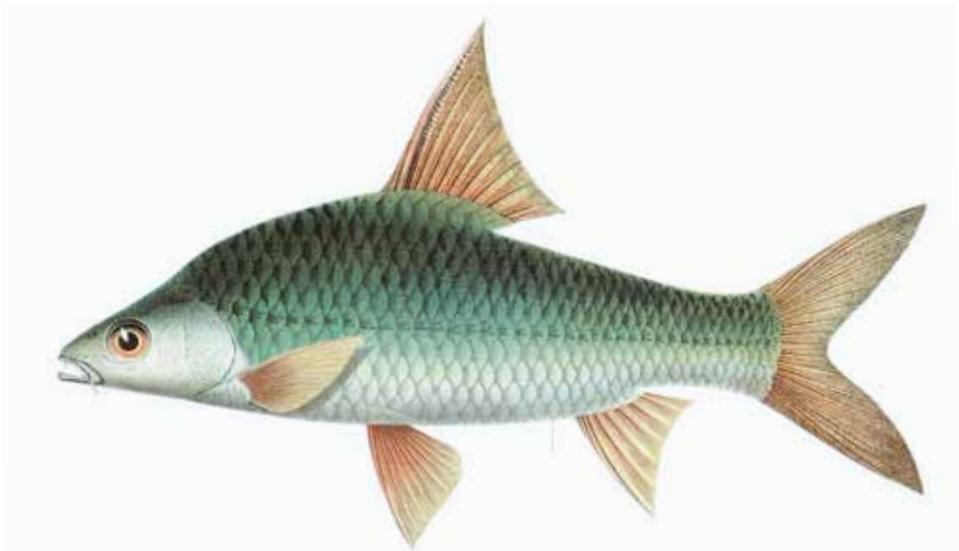


Fig. 91. *Cyclocheilichthys (Cyclocheilichthys) enoplos* Blkr. Atl. Ichth. Cypr. Tab. XXVII, Fig. 2, TL figure 221 mm.

than to the tip of the snout; rostro-dorsal profile slightly concave or convex between nape and snout, convex on the nape; interorbital line slightly convex to slightly concave; anterior suborbital bone oblong, triangular, depth considerably less than twice the length, posterior margin nearly vertical, convex, tip acute, pointing forward, lower half traversed by a longitudinal, nearly horizontal crest; 2nd suborbital bone oblong-quadrangular, higher anteriorly than posteriorly, length about twice as great as depth, about twice as low as 1st suborbital bone; upper jaw longer than lower jaw, strongly vertically downward protrusible, ending below the anterior margin of the eye, contained about $3\frac{2}{5}$ to $3\frac{3}{5}$ times in the length of the head; gape slightly oblique; barbels thin, upper jaw barbels longer than nasal barbels, about twice as short as the eye; lower jaw at the symphysis with a conical, obtuse tubercle, slightly hooked at the tip, underside on both branches with 3 or 4 hardly visible pores, placed in a longitudinal row; lips medium-sized, terete, transversely rugose; width of gill cover contained $1\frac{3}{4}$ to $1\frac{1}{2}$ times in its depth, lower margin nearly straight; gill opening ending below the posterior rim of the preoperculum. Pharyngeal teeth hooked-slightly spoon-shaped, 2.3.5/5.3.2, 2 internal teeth in largest row conical, acuminate at the tip, chewing surface not concave; scapula triangular, rounded at the tip; back angular, elevated, much higher than the belly; belly flat anterior to ventral fins, angular at the flanks, behind ventral fins rounded, not ridged; depth of tail contained less than twice in the length of the head; scales for the lower half and basal half with longitudinal stripes; 40 scales in the lateral line, 12 in a transverse row (without the lowest ventral scales) of which 6 ($5\frac{1}{2}$) above the lateral line, 11 or 12 in a longitudinal row between occiput and dorsal fin, the scales on the lowest part of the belly in three longitudinal rows, scales in medial row gradually increasing in size posteriorly, posterior scales in those rows larger than those in flanking rows; lateral line straight, sloping downward only anteriorly, not reaching the rostro-caudal line, each scale marked by a dichotome or branched tube; dorsal fin starting above the base of the ventral fins, acute, emarginate, not much lower or slightly lower than the body, twice or more than twice as high as base length, spine very thick, posteriorly serrated with large teeth, with its flexible part longer than the head, contained 3 to $3\frac{1}{2}$ times in the length of the body without caudal fin; pectoral and ventral fins acute, nearly equal in length, contained 6 to $6\frac{1}{2}$ times in the length of the body, pectoral fins reaching or nearly reaching the ventral fins; ventral fins not reaching the anal fin; anal fin acute, emarginate, considerably less than twice as low as dorsal fin, twice or more than twice as high as base length, the simple third ray thin, bony only at the base; caudal fin scaled only at the base, with a deep incision, lobes acute, contained $4\frac{1}{4}$ to $4\frac{3}{4}$ times in the length of the body. Colour: upper part of the body green, lower part silver; iris yellow, upper part dark; cheeks and forehead with very thin, dense, transverse faintly pink stripes, not always visible; fins yellowish, dorsal and caudal fin with a dark margin.

B. 3. D. 4/8 or 4/9. P. 1/16 or 1/17. V. 2/9. A. 3/5 or 3/6. C. 6/17/6 or 7/17/7, short flanking ones included.

Syn. *Barbus enoplos* Blkr, Verh. Bat. Gen. XXIII Ichth. Midd. Oost-Java p. 16.

367 *Tjakkul*, *Wader* Javan.

Hab. Java (Surabaya, Ngawi), in rivers.

Length of 5 specimens 148''' to 450'''.

Remark. My species of the subgenus *Cyclocheilichthys* belong to two types. One type is recognizable by a more slender body, a more slender and more pointed head, and especially by the peculiarity that the lateral line tubes on each scale are double, on some scales even triple, a peculiarity that I do not know from any other Cyprinoid species.

To these types belong *Cyclocheilichthys enoplos*, which I discovered in 1848 in Surabaya, and *Cyclocheilichthys macracanthus*, a Sumatran species, which seem to replace the Javanese species on Sumatra.

Both species have a very close relationship which each other and even the same formulas of the scales and fin rays, however they definitely differ from each other by the shape of the head, tail, etc.

The species in question does not seem to occur on West Java. The western most locality known to me is the large Solo river near Ngawi, in the residence Madiun, from where the largest of my specimens was sent to me.

Cyclocheilichthys (Cyclocheilichthys) macracanthus Blkr. –
Langdoornige Kringlipkarper [Long-spined Circle-lip Carp].
Atl. Cypr. Tab. XXIV.

A *Cyclocheilichthys (Cyclocheilichthys)* with an oblong, compressed body, depth of body contained 4 to slightly over 4 times in its length, width contained 2 to $2\frac{1}{4}$ times in its depth. Head acute, contained $4\frac{3}{4}$ to slightly over 5 times in length of body with caudal fin, $3\frac{3}{5}$ to $3\frac{3}{4}$ times in length of body without caudal fin; depth of head contained about $1\frac{1}{2}$ times, width contained $1\frac{1}{6}$ to $1\frac{3}{4}$ times in its length; distance between the tip of the snout and the nape contained twice in the distance between occiput and the posterior part of the dorsal ray; eye diameter contained $3\frac{3}{4}$ to nearly 4 times in the length of the head, diameter contained $1\frac{3}{5}$ to $1\frac{1}{2}$ times in the postocular part of the head, distance between the eyes slightly more than once to $1\frac{1}{4}$ times their diameter; palpebral membrane covering the external margin of the iris only, opening nearly circular; snout acute, convex, slightly shorter than the eye or (at a higher age) slightly longer, not or hardly sticking out in front of the mouth; nostrils much closer to the orbit than to the tip of the snout; rostro-dorsal profile between nape and forehead nearly straight or slightly concave, lightly convex on the nape; interorbital line nearly straight or slightly concave; anterior suborbital bone oblong-triangular, length not much less than twice the depth, posterior margin nearly vertical, convex, tip acute pointing forward, lower half traversed by a longitudinal, nearly horizontal crest; 2nd suborbital bone oblong-quadrangular, higher anteriorly than posteriorly, length about twice as great as height, about twice as low as 1st suborbital bone; upper jaw longer than lower jaw, strongly vertically downward protrusible, ending hardly anterior to the eye or below the anterior margin of the eye, contained $3\frac{3}{5}$ to $3\frac{1}{3}$ times in the length of the head; gape slightly



Fig. 92. *Cyclocheilichthys (Cyclocheilichthys) macracanthus* Blkr. Atl. Ichth. Cypr. Tab. XXIV, Fig. 2, TL figure 257 mm.

oblique; barbels thin, upper jaw barbels longer than nasal barbels, about twice as short as the eye; lower jaw at the symphysis with a conical, obtuse tubercle, slightly hooked at the tip, underside on both branches with about 4 pores, placed in a longitudinal row; lips medium sized, terete, transversely rugose; width of gill cover contained about $1\frac{3}{4}$ times in its height, lower margin nearly straight; gill opening ending below the posterior margin of the preoperculum. Pharyngeal teeth hooked to spoon-shaped, 2.3.5/5.3.2 or 2.3.4./4.3.2, internal 2 teeth or 1 tooth in largest ³⁶⁶ row conical, acuminate at the tip, chewing surface not concave; scapula triangular, rounded at the tip; back elevated, angular, much higher than the belly; belly flat anterior to ventral fins, angular at the flanks, behind ventral fins rounded, not ridged; depth of tail contained more than twice in the length of the head; scales with longitudinal stripes on the free half and often also on basal half; 40 scales in the lateral line, 12 in a transverse row (without the lowest ventral scales) of which 6 ($5\frac{1}{2}$) above the lateral line, 11 in a longitudinal row between occiput and dorsal fin, scales on the lowest part of the belly in three longitudinal rows, scales in medial row gradually increasing in size posteriorly, posterior scales in those rows larger than those in flanking rows; lateral line straight, sloping downward slightly only anteriorly, not reaching the rostro-caudal line, each scale marked by a dichotome tube; dorsal fin starting above the base of the ventral fins, acute, emarginate, slightly higher than the body, more than twice as deep as base length, spine very thick, posteriorly serrated with large teeth, the flexible part longer than the head, contained about 3 times in the length of the body without caudal fin; pectoral and ventral fins acute, nearly equal in length, contained 6 to $6\frac{3}{4}$ times in the length of the body, pectoral fins reaching or nearly reaching the ventral fins; ventral fins not reaching the anal fin; anal fin acute, emarginate, considerably less than twice as low as dorsal fin, twice or more than twice as high as base length, the simple third ray thin, bony only at the base; caudal fin scaled only at the base, with a deep incision, lobes acute, contained $4\frac{1}{2}$ to $4\frac{3}{4}$ times in the length of the body. Colour: upper part of the body green, lower part silver; cheeks, snout and forehead with transverse, very thin faintly pink, not always visible stripes; iris yellow, upper part dark; fins yellowish, dorsal and caudal fin with a margin of dark speckles.

B. 3. D. 4/8 or 4/9. P. 1/17 or 1/18. V. 2/9. A. 3/5 or 3/6. C. 6/17/6 or 7/17/7, short flanking ones included.

Syn. *Barbus macracanthus* Blkr, Nieuw. tient. vischs. Sumatra, Nat. T. Ned. Ind. V p. 516.
Djollli Palemb.

Hab. Sumatra (Palembang), in rivers.
Length of 3 specimens 230'' to 270''.

Remark. The species in question has the forked lateral line tubes and most peculiarities in the shape in common with *Cyclocheilichthys enoplos*, however it differs from it by its relatively lower and longer head, little concave profile between snout and nape and little convex profile of the nape itself, a more slender tail, which height goes more than twice in the length of the head, and because the distance from the snout to the nape goes only two times in the distance from the back of the head to the posteriormost dorsal fin ray.

All my specimens originate from the Moessi, where they were caught near the capital Palembang.

Cyclocheilichthys (Cyclocheilichthys) armatus Blkr. –
Gewapende Kringlipkarper [Armed Circle-lip Carp].
Atl. Cypr. Tab. XXV. [Tab. XXIV, fig. 1]

A *Cyclocheilichthys (Cyclocheilichthys)* with an oblong compressed body, depth of body contained $3\frac{5}{6}$ to $3\frac{1}{2}$ times in its length, width contained 3 to $2\frac{3}{4}$ times in its depth. Head acute, contained $5\frac{1}{4}$ to $5\frac{1}{2}$ times in length of body with caudal fin, $3\frac{3}{4}$ to $4\frac{1}{4}$ times in length of body without caudal fin; depth of head

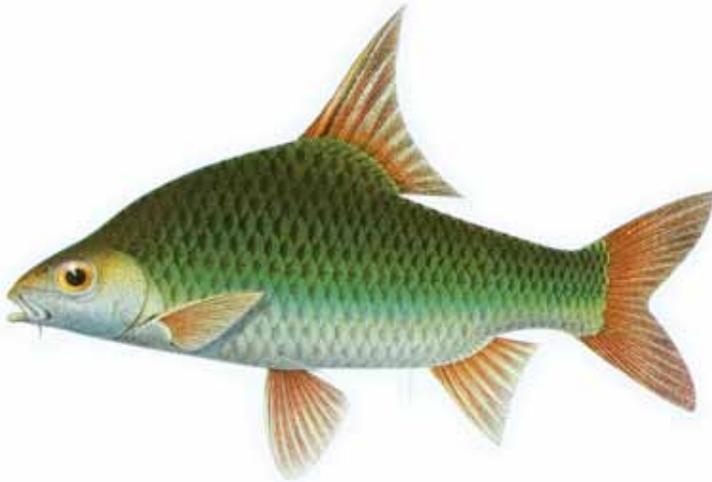


Fig. 93. *Cyclocheilichthys (Cyclocheilichthys) armatus* Blkr. Atl. Ichth. Cypr. Tab. XXIV, Fig. 1. TL figure 203 mm.

contained about $1\frac{1}{2}$ times, width contained about 2 times in its length; distance between the tip of the snout and the nape contained $3\frac{1}{2}$ to $3\frac{3}{5}$ times in the distance between occiput and posterior dorsal ray; eye diameter contained nearly 3 to slightly over 3 times in the length of the head, diameter contained once to $1\frac{1}{4}$ times in the postocular part of the head, distance between the eyes slightly more than $\frac{3}{4}$ times to slightly more than once their diameter; palpebral membrane covering the external margin of the iris only, opening nearly circular; snout acute, convex, ³⁶⁹ in younger animals shorter than the eye, in old animals hardly or not shorter than the eye, not or hardly sticking out in front of the mouth; nostrils much closer to the orbit than to the tip of the snout; rostro-dorsal profile concave between snout and nape, convex on the nape; interorbital line nearly straight or slightly concave; anterior suborbital bone oblong-triangular, length much less than twice the depth, posterior margin nearly vertical, lower part rounded, tip acute, pointing forward, lower half traversed by a longitudinal, nearly horizontal crest; 2nd suborbital bone elongate-quadrangular, higher anteriorly than posteriorly, twice or nearly twice as low as 1st suborbital bone; upper jaw longer than lower jaw, strongly vertically downward protrusible, ending hardly anterior to the eye, contained $3\frac{3}{5}$ to $3\frac{3}{5}$ times in the length of the head; gape slightly oblique; barbels thin, nasal barbels about twice as short as upper jaw barbels, upper jaw barbels twice or more than twice as short as the eye; lower jaw at the symphysis without visible tubercle, underside without visible pores; lips medium-sized, terete, transversely rugose; width of gill cover contained about twice in its depth, lower margin nearly straight; gill opening ending below the posterior margin of the preoperculum. Pharyngeal teeth hooked to spoon-shaped, 2.3.5/5.3.2; scapula triangular, acutely rounded at the tip; back strongly elevated, angular, much higher than the belly; belly flat anterior to ventral fins, angular at the flanks, rounded behind ventral fins, not ridged; depth of tail contained about $1\frac{1}{3}$ times in the length of the head; scales on the free half and generally also on basal half with longitudinal or slightly ray-like stripes; 37 scales in the lateral line, 13 in a transverse row (without the lowest ventral scales) of which 7 ($6\frac{1}{2}$) above the lateral line, 14 in a longitudinal row between occiput and dorsal fin, scales on the lowest part of the belly in three longitudinal rows, scales in medial row gradually increasing in size posteriorly, posterior scales in those rows larger than those in flanking rows; lateral line nearly straight, sloping downward only anteriorly, not reaching rostro-caudal line, each scale marked by a simple tube generally not surpassing the centre of the scale; dorsal fin starting above the base of the ventral fins, acute, emarginate, not much

lower than the body, much higher than base length but much less than twice as high, spine very thick, posteriorly armed with large teeth, with the flexible part not much longer than the head; pectoral and ventral fins acute, nearly equal in length, contained $6\frac{1}{4}$ to $6\frac{1}{2}$ times in the length of the body, pectoral fins hardly reaching or not reaching the ventral fins; ventral fins not reaching the anal fin; anal fin acute, emarginate, much lower than dorsal fin but much less than twice as low, twice or nearly twice as high as base length, the simple third ray medium-sized, only basal half bony; caudal fin scaled only at the base, with a deep incision, lobes acute, contained $4\frac{1}{2}$ to 5 times in the length of the body. Colour: upper part of the body green, lower part silver; cheeks, snout and forehead with transverse, very thin, generally pink, not always visible stripes; iris yellow, upper part dark; fins hyaline-pink or yellowish, dorsal and caudal fin more or less speckled with dark.

B. 3. D. $\frac{4}{8}$ or $\frac{4}{9}$. P. $\frac{1}{17}$ or $\frac{1}{18}$. V. $\frac{2}{9}$. A. $\frac{3}{5}$ or $\frac{3}{6}$ or $\frac{3}{7}$. C. $\frac{8}{17/8}$ or $\frac{7}{17/7}$, short flanking ones included.

Syn. *Barbus armatus* Val., Poiss. XVI p. 121.

Barbeau armé Val., Poiss. XVI p. 121.

Barbus Valenciennesii Blkr, Verh. Bat. Gen. XXIII Ichth. M.O. Java p. 17.

Lawaak, *Lalawaak* Mal. Bat; *Wader* Javan; *Seren*, *Sakka* Sundan.

Hab. Java (Batavia, Perdana, Parongkalong, Surabaya), in rivers.

Sumatra (Lahat), in rivers.

Length of 15 specimens 120''' to 232'''.

Remark. The species that I earlier considered only hesitatingly as a species different from *Barbus armatus* Val. and described under the name *Barbus Valenciennesii*, since then appeared to me not easily to different from the above mentioned one.

It belongs to a different type of the subgenus *Cyclocheilichthys* than *Cyclocheilichthys* 370 *enoplos* and *Cyclocheilichthys macracanthus*, because of its single lateral line tubes, more thick-set body and more blunt profile.

To this type belong two of my species, *Cyclocheilichthys armatus* and *Cyclocheilichthys repasson*, which stand in approximately the same relation to each other as *Cyclocheilichthys enoplos* and *Cyclocheilichthys macracanthus*, and whose differences can be found in the length and height proportions of the head, the eyes and the tail, to which can be added some peculiarities in the colouration.

Cyclocheilichthys armatus can primarily be distinguished from *Cyclocheilichthys repasson* by a higher body, shorter and more blunt head, a higher tail and the absence of a blackish tail spot. It is not rare on Java and seems to occur especially frequently in the Kalimas in East Java. However, it also occurs in the rivers of Sumatra, from where I received it from Lahat, on the higher part in the area of the Moessi, in the Palembang residency.

Cyclocheilichthys (Cyclocheilichthys) repasson Blkr. –
Vierdradige Kringlipkarper [Four-barbelled Circle-lip Carp].
Atl. Cypr. Tab. XXVI.

A *Cyclocheilichthys (Cyclocheilichthys)* with an oblong, compressed body, depth of body contained nearly $3\frac{2}{3}$ to $3\frac{1}{2}$ times in its length, width contained $2\frac{1}{2}$ to $2\frac{2}{3}$ times in its depth. Head acute, contained $4\frac{2}{3}$ to $4\frac{3}{4}$ times in length of body with caudal fin, $3\frac{2}{3}$ to $3\frac{3}{4}$ times in length of body without caudal fin; depth of head contained about $1\frac{1}{2}$ times, width contained about 2 times in its length; distance between the tip of the snout and the nape contained $2\frac{3}{4}$ to nearly 3 times in the distance between occiput and posterior dorsal ray; eye diameter contained $2\frac{2}{3}$ to 3 times in the length of the head, diameter contained nearly once to once in the postocular part of the head, distance between the eyes $\frac{2}{3}$ times to nearly once their



Fig. 94. *Cyclocheilichthys (Cyclocheilichthys) repasson* Blkr. Atl. Ichth. Cypr. Tab. XXV, Fig. 1. TL figure 224 mm.

diameter; palpebral membrane covering the external margin of the iris only, opening nearly circular; snout acute, convex, in younger animals and in old fishes shorter than the eye, hardly sticking out in front of the mouth; nostrils much closer to the orbit than to the tip of the snout; rostro-dorsal profile concave between snout and nape, strongly convex on the nape; interorbital line nearly straight or slightly concave; anterior suborbital bone oblong-triangular, length not much greater than depth, posterior margin nearly vertical, convex, tip acute, pointing forward, lower half traversed by a longitudinal, nearly horizontal crest; 2nd suborbital bone elongate-quadrangular, higher anteriorly than posteriorly, length about twice as great as depth; twice or more than twice as low as 1st suborbital bone; upper jaw longer than lower jaw, strongly vertically downward protrusible, ending hardly anterior to the eye, contained $3\frac{2}{3}$ to $3\frac{1}{2}$ times in the length of the head; gape slightly oblique; barbels thin, upper jaw barbels longer than nasal barbels, twice or more than twice as short as the eye; lower jaw at the symphysis without visible tubercle, underside without visible pores; lips medium-sized, terete, transversely rugose; width of gill cover contained nearly twice to slightly more than twice in its depth, lower margin nearly straight or slightly convex; gill opening ending below the posterior margin of the preoperculum. Pharyngeal teeth hooked to spoon-shaped, 2.3.5/5.3.2; scapula triangular, slightly acutely rounded; back strongly elevated, angular, much higher than the belly; belly flat anterior to ventral fins, angular at the flanks, behind ventral fins rounded, not ridged; depth of tail contained twice to slightly over twice in the length of the head; scales on the free half and on the basal half with longitudinal stripes or slightly ray-like stripes; 37 or 38 scales in the lateral line, 13 in a transverse row (without the lowest ventral scales) of which 7 ($6\frac{1}{2}$) above the lateral line, 12 or 13 in a longitudinal row between occiput and dorsal fin, scales on the lowest part of the belly in three longitudinal rows, scales in the medial row gradually increasing in size posteriorly, posterior scales in this row larger than those in [371](#) flanking rows; lateral line nearly straight, sloping downward only anteriorly, not reaching the rostro-caudal line, each scale marked by a simple tube generally not reaching the centre of the scale; dorsal fin starting above the base of the ventral fins, acute, emarginate, not or not much lower than the body, not much less than twice as high as base length, spine very thick, posteri-

only serrated with large teeth, with the flexible part considerably longer than the head; pectoral and ventral fins acute, nearly equal in length, contained $5\frac{3}{4}$ to 6 times in the length of the body, pectoral fins reaching the ventral fins; ventral fins not reaching the anal fin; anal fin acute, emarginate, much lower than dorsal fin but much less than twice as low, twice or nearly twice as high as base length, the simple third ray bony only for the basal half; caudal fin scaled only at the base, with a deep incision, lobes acute, contained $3\frac{3}{5}$ to $4\frac{1}{3}$ times in the length of the body. Colour: upper part of the body green, lower part silver; iris yellow, upper part dark; snout, cheeks and forehead with transverse, very thin, reddish, densely packed stripes, not always visible; scales on back, flanks and tail each with a quadrangular, triangular or crescent-shaped blackish-violet spot, tail with a large, round black-violet spot in the lateral line, bordering on the base of the caudal fin; fins pink, dorsal and caudal fin with a dark margin.

B. 3. D. $4/8$ or $4/9$. P. $1/17$ or $1/18$. V. $2/9$. A. $3/5$ or $3/6$. C. $7/17/7$, short flanking ones included.

Syn. *Barbus repasson* Blkr. Diagn. beschrijv. nieuwe vischs. Sumatra Tient. V tot X, Nat. T. Ned. Ind. IV p. 295.

Repasson Lampong.

Hab. Sumatra (Pangabuang, Moerakompeh), in rivers.

Length of 3 specimens $170'''$ to $220'''$.

Remark. *Cyclocheilichthys repasson* is very closely related to *Cyclocheilichthys armatus*, however distinguishes itself from it by a larger head and larger eyes, more pointed snout, a tail spot and scale spots. Moreover in *Cyclocheilichthys armatus* the height of the tail goes only $1\frac{2}{3}$ times in the length of the head and on the contrary the distance from the snout tip to the neck $3\frac{2}{5}$ to $3\frac{1}{2}$ times in the distance from the back of the head till the posteriormost dorsal fin ray. In *Cyclocheilichthys armatus* often also one anal fin ray more present than in *Cyclocheilichthys repasson*, however this character is not constant.

I have only obtained the species described here from the rivers of East Sumatra.

Cyclocheilichthys (Siaja) microlepis Blkr. –
Kleinschubbigje Kringlipkarper [*Small-scaled Circle-lip Carp*].
Atl. Cypr. Tab. XXVIII fig. 2.

A *Cyclocheilichthys (Siaja)* with an elongate or oblong, compressed body, depth of body contained 5 to $4\frac{3}{4}$ times in its length, width contained about 2 times in its depth. Head acute, contained $4\frac{3}{4}$ to nearly $5\frac{1}{3}$ times in length of body with caudal fin, $3\frac{3}{5}$ to $4\frac{1}{4}$ times in length of body without caudal fin; depth of head contained $1\frac{2}{3}$ to $1\frac{1}{2}$ times in its length, width $2\frac{1}{4}$ to $1\frac{5}{8}$ times; eye diameter contained $2\frac{2}{3}$ to 3 times in the length of the head, distance between the eyes $\frac{3}{5}$ to $\frac{3}{4}$ times their diameter; palpebral membrane covering the external margin of the iris only, opening nearly circular; snout slightly acute, convex, in younger and in old animals shorter than the eye, not sticking out in front of the mouth; nostrils much closer to the orbit than to the tip of the snout; rostro-dorsal profile nearly straight or slightly concave between snout and nape, convex on the nape; anterior suborbital bone oblong-triangular, length less than twice as great as depth, posterior margin nearly vertical, lower margin nearly horizontal, tip acute, ³⁷² pointing forward, lower half with a low, longitudinal, not branched crest, close to the lower margin of the bone; 2nd suborbital bone obliquely elongate-quadrangular, higher anteriorly than posteriorly; twice or more than twice as low as 1st suborbital bone; upper jaw longer than lower jaw, strongly vertically downward protrusible, ending hardly anterior to the eye or below the anterior margin of the eye, contained $3\frac{1}{2}$ to $3\frac{1}{2}$ times in the length of the head; gape slightly oblique; barbels thin, twice or more than twice as short as the eye; lower jaw at the symphysis with a conical, obtuse, short tubercle, underside without visible pores; lips medium-sized, terete, their free parts not rugose; width of gill cover contained $1\frac{2}{3}$ to nearly 2 times in its height, lower margin nearly straight; gill opening nearly vertical,

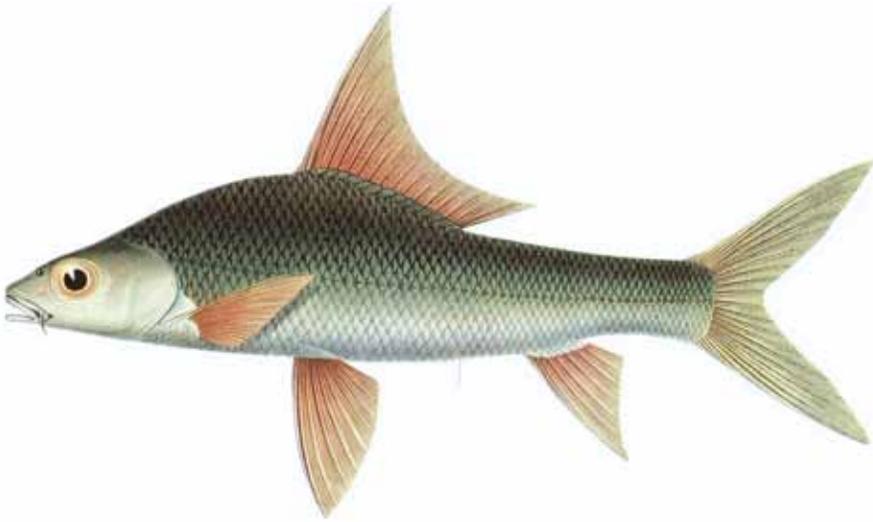


Fig. 95. *Cyclocheilichthys (Siaja) microlepis* Blkr. Atl. Ichth. Cypr. Tab. XXVII, Fig. 3. TL figure 222 mm.

ending below the anterior part of the gill cover or below the posterior margin of the preoperculum. Pharyngeal teeth hooked to spoon-shaped, 2.3.5/5.3.2; scapula triangular, slightly obtusely or slightly acutely rounded; back elevated, angular, much higher than the belly; belly flat anterior to ventral fins, angular at the flanks, behind ventral fins rounded, not ridged; depth of tail contained more than twice in the length of the head; scales on the free half and often also on the basal half with longitudinal or slightly ray-like stripes; 59 or 60 scales in the lateral line, 17 in a transverse row (without the lowest ventral scales) of which $9\frac{1}{2}$ above the lateral line, 17 or 18 in a longitudinal row between occiput and dorsal fin, scales on the lowest part of the belly in five longitudinal rows, scales in medial row gradually increasing in size posteriorly, posterior scales in this row slightly larger than those in flanking rows; lateral line straight, sloping downward only anteriorly, not reaching the rostro-caudal line, each scale marked by a short, simple tube generally not reaching the centre of the scale; dorsal fin starting slightly above the base of the ventral fins, acute, emarginate, slightly lower than the body, slightly higher than its base length, spine thin, posteriorly serrated with conspicuous, small teeth, with the flexible part longer than the head; pectoral and ventral fins acute, pectoral fins slightly shorter than ventral fins, contained 6 to $6\frac{1}{4}$ times in the length of the body, pectoral fins reaching the ventral fins; ventral fins not reaching the anal fin; anal fin acute, emarginate, much lower than dorsal fin but much less than twice as low, twice or nearly twice as high as base length, the simple third ray thin, bony only for the basal half; caudal fin scaled only at the base, with a deep incision, lobes acute, contained $4\frac{1}{4}$ to $4\frac{1}{2}$ times in the length of the body. Colour: upper part of the body green, lower part silver; iris yellow; dorsal and caudal fins pink with a border of dark speckles, other fins pink-yellowish or yellowish-hyaline.

B. 3. D. 4/14 or 4/15 to 4/17 or 4/18. P. 1/16 to 1/18. V. 2/9. A. 3/5 or 3/6. C. 6/17/6 or 7/17/7, short flanking ones included.

Syn. *Capoëta microlepis* Blkr, Vierde bijdr. ichthyol. Borneo, Nat. Tijdschr. Ned. Ind. II p. 206.

Hab. Borneo (Bandjermasin, Pontianak), in rivers.

Sumatra (Palembang), in rivers.

Length of 4 specimens 135''' to 272'''.

Remark. The long multi rayed dorsal fin armed with a serrated spine and the two upper jaw barbels of the species in question remind one of a Cyprinion. Investi-

gation of the mouth parts however, reveals that it belongs to the Cheilognathines and the structure of its lips and the habitus of the head and the body point to a place in the genus *Cyclocheilichthys*, whereas its two upper jaw barbels indicate they belong to the subgenus *Siaja*.

However, it diverges from all other known species of *Siaja*, firstly by its numerous dorsal fin rays and the slender and finely toothed dorsal spine, secondly by the numerosness of its scales, both in the longitudinal and the transverse rows.

373 *Siaja microlepis* therefore is sharply characterized in the large family of the Cyprioids. In general habitus it most approaches *Cyclocheilichthys macracanthus*, however its small scales, numerous dorsal fin rays and slender dorsal fin spine make it easy to recognize it at first glance.

Till now I have received of this species only specimens caught in the Barito, the Kapuas and the Moessi, the three largest rivers of the Indian Archipelago.

Cyclocheilichthys (Siaja) macropus Blkr. –
Grootvoetige Kringlipkarper [Large feet Circle-lip Carp].
Atl. Cypr. Tab. XXVII fig. 2.

A *Cyclocheilichthys (Siaja)* with an oblong, compressed body, depth of body contained about $3\frac{2}{3}$ times in its length, width contained about 2 times in its depth. Head acute, contained $4\frac{1}{2}$ times in length of body with caudal fin, $3\frac{1}{3}$ to $3\frac{1}{4}$ times in length of body without caudal fin; depth of head contained nearly $1\frac{1}{2}$ times, width contained nearly twice in its length; eye diameter contained about $2\frac{2}{5}$ times in the length of the head, distance between the eyes about $\frac{3}{5}$ times their diameter; palpebral membrane covering the external margin of the iris only, opening nearly circular; snout acute, convex, shorter than the eye, not or hardly sticking out in front of the mouth; nostrils much closer to the orbit than to the tip of the snout; rostro-dorsal profile between snout and nape slightly concave, lightly convex on the nape; interorbital line nearly straight or slightly concave; anterior suborbital bone oblong-triangular, length much less than twice as great as depth, posterior margin nearly vertical, rounded at the underside, tip acute, pointing forward, lower half traversed by a longitudinal, nearly horizontal crest; 2nd suborbital bone elongate-obliquely quadrangular, much higher anteriorly than posteriorly; about twice as low as anterior suborbital bone; upper jaw longer than lower jaw, strongly vertically downward protrusible, ending in front of the eye, contained about $3\frac{2}{3}$ times in the length of the head; gape slightly oblique; barbels very thin, very short, about three times as short as the eye, hardly visible; lower jaw at the symphysis with an obtuse, hardly visible tubercle, underside without visible pores; lips medium-sized, terete, transversely rugose; width of gill cover contained $1\frac{2}{3}$ times in its depth, lower margin slightly convex or nearly straight; gill opening nearly vertical, ending below the posterior margin of the preoperculum. Pharyngeal teeth hooked to spoon-shaped, 2.3.4/4.3.2; scapula triangular, obtusely rounded; back elevated, strongly angular, much higher than the belly; belly flat anterior to ventral fins, angular at the flanks, behind ventral fins rounded, not ridged; depth of tail contained twice in the length of the head; scales on the free half and often also on the basal half with slightly ray-like stripes, 35 scales in the lateral line, 13 in a transverse row (without the lowest ventral scales) of which 7 ($6\frac{1}{2}$) above the lateral line, 12 or 13 between occiput and dorsal fin, scales on the lowest part of the belly in three longitudinal rows, scales in medial row gradually increasing in size posteriorly, posterior scales in that row slightly larger than those in flanking rows; lateral line nearly straight, sloping downward only anteriorly, not or hardly reaching rostro-caudal line, each scale marked by a simple tube generally surpassing the centre of the scale; dorsal fin starting above the base of the ventral fins, acute, emarginate, not or hardly lower than the body, not much less than twice as high as base length, spine very thick, posteriorly armed with large teeth, with the flexible part longer than the head; pectoral and ventral fins acute, pectoral fins considerably shorter than ventral fins, contained about $6\frac{1}{4}$ times in the length of the body, reaching the ventral fins; ventral fins contained

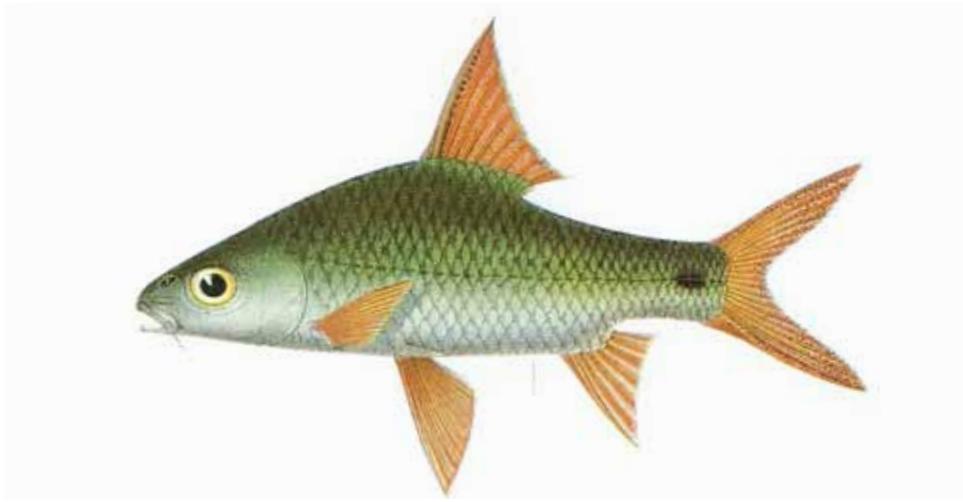


Fig. 96. *Cyclocheilichthys (Siaja) macropus* Blkr. Atl. Ichth. Cypr. Tab. XXXV, Fig. 2. TL figure 92 mm.

about 5 times in the length of the body, not reaching the anal fin; anal fin acute, emarginate, much lower than dorsal fin but much less than twice as low, about twice as high as base length, the simple third ray medium-sized, bony only for the basal half; caudal fin scaled only at the base, with a deep incision, lobes acute, contained about $3\frac{3}{5}$ times in the length of the body. Colour: upper part of the body faintly green, lower ³⁷⁴ part silver; iris yellow, upper part dark; scales on the upper part of the body bordered with gold; tail with a round, blackish-violet spot in the lateral line close to the base of the caudal fin; fins faintly pink, dorsal and caudal fins with a darkish border and more or less speckled with dark.

B. 3. D. $\frac{4}{8}$ or $\frac{4}{9}$. P. $\frac{1}{15}$ or $\frac{1}{16}$. V. $\frac{2}{9}$. A. $\frac{3}{5}$ or $\frac{3}{6}$. C. $\frac{7}{17/7}$, short flanking ones included.

Hab. Borneo (Pontianak), in rivers.

Length of sole specimen 97'''.

Remark. I received my single specimen of the here described species some years ago from Pontianak. It has a large resemblance with *Siaja siaja*, however can easily be separated from it by a higher body, extremely thin and small lip barbels, 2 scales less in a longitudinal row, relatively very large pelvic fins, the formula of the pharyngeal teeth and very thin and sort barbels.

Cyclocheilichthys (Siaja) siaja Blkr. –
Tweedradige Kringlipkarper [Two-barbelled Circle-lip carp].
Atl. Cypr. XXXIX fig. 3.

A *Cyclocheilichthys (Siaja)* with an oblong, compressed body, depth of body contained $\frac{4}{5}$ to nearly 4 times in its length, width contained 2 to $2\frac{2}{3}$ times in its depth. Head acute, contained $\frac{4}{5}$ to $4\frac{3}{4}$ times in length of body with caudal fin, $\frac{3}{5}$ to $3\frac{3}{4}$ times in length of body without caudal fin; depth of head contained $1\frac{1}{2}$ times in its length, width about twice; eye diameter contained about 3 times in the length of the head, distance between the eyes $\frac{3}{4}$ times to once their diameter; palpebral membrane covering the external margin of the iris only, opening nearly circular; snout acute, convex, slightly shorter than the eye, not or hardly sticking out in front of the mouth; nostrils much closer to the orbit

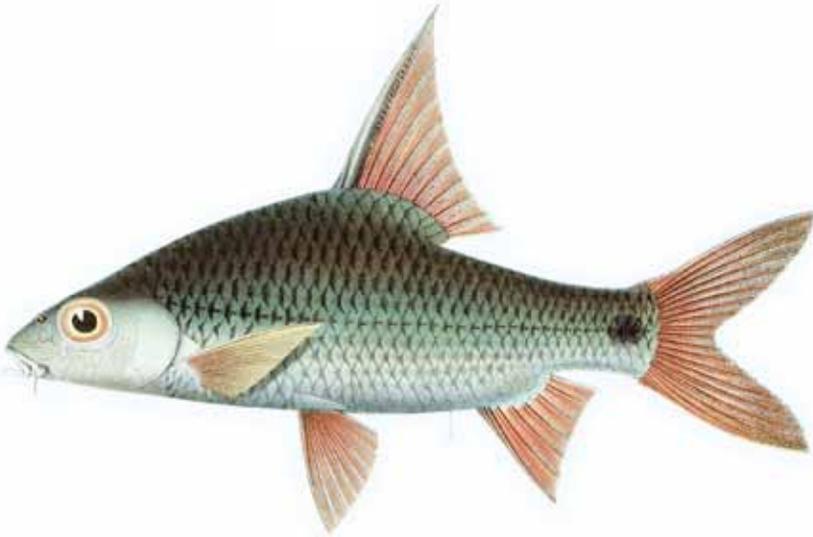


Fig. 97. *Cyclocheilichthys (Siaja) siaja* Blkr. Atl. Ichth. Cypr. Tab. XXIX, Fig. 3. TL figure 189 mm.

than to the tip of the snout; rostro-dorsal profile between snout and nape slightly concave, convex on the nape; interorbital line nearly straight or slightly concave; anterior suborbital bone oblong, length much less than twice as great as depth, posterior margin nearly vertical, rounded at the underside, tip acute, pointing forward, lower half traversed by a longitudinal, nearly horizontal crest; 2nd suborbital bone oblong-quadrangular, more than twice as low as first suborbital bone; upper jaw longer than lower jaw, strongly vertically downward protrusible, ending anterior to the eye, contained $3\frac{1}{3}$ to $3\frac{3}{5}$ times in the length of the head; gape slightly oblique; barbels thin, about twice as short as the eye; lower jaw at the symphysis with a conical, obtuse, short tubercle, underside without visible pores; lips medium-sized, terete, transversely rugose; width of gill cover contained $1\frac{3}{4}$ to 2 times in its depth, lower margin nearly straight or slightly convex; gill opening nearly vertical, ending below the posterior margin of the preoperculum. Pharyngeal teeth hooked to spoon-shaped, 2.3.5/5.3.2; scapula triangular, at the tip slightly acutely rounded; back elevated, angular, much higher than belly; belly flat anterior to ventral fins, angular at the flanks, behind ventral fins rounded, not ridged; depth of tail contained slightly over twice to $2\frac{1}{3}$ times in the length of the head; scales in younger animals not or hardly striped, in old animals on the free half and often also on the basal half with slightly ray-like longitudinal stripes, 37 scales in the lateral line, 13 in a transverse row (without the lowest ventral scales) of which 7 ($6\frac{1}{2}$) above the lateral line, 14 or 15 in a longitudinal row between occiput and dorsal fin, scales on the lowest part of the belly in three longitudinal rows, scales in medial row gradually increasing in size posteriorly, posterior scales in this row larger than those in flanking rows; lateral line nearly straight, sloping downward only anteriorly, not reaching rostro-caudal line, each scale marked by a simple, short tube not reaching the centre of the scale; dorsal fin starting above the base of the ventral fins, acute, emarginate, slightly or hardly lower than the body, much less than twice to nearly twice as high as base length, spine very thick, posteriorly armed with large teeth, with the flexible part in younger animals $\frac{3}{5}$ shorter than the head, in old animals longer than the head; pectoral and ventral fins acute, nearly equal in length, contained $6\frac{1}{4}$ to 7 times in the length of the body, pectoral fins reaching or nearly reaching the ventral fins, ventral fins not reaching the anal fin; anal fin acute, emarginate, much lower than the dorsal fin but much less than twice as low, nearly twice to twice as high as base length, the simple third ray bony only for the basal half; caudal fin scaled only

at the base, with a deep incision, lobes acute, contained slightly over 4 to $4\frac{1}{4}$ times in the length of the body. Colour: upper part of the body green, lower part silver; cheeks and snout with numerous transverse, very thin red stripes; iris yellow, upper part dark; suprascapular region often with an oblong violet-black spot; tail generally with a round black spot in the lateral line, close to the base of the caudal fin; scales on back, flanks and tail each with a black, transverse triangular or crescent-shaped black-violet spot; pectoral fins yellowish or pink, other fins pink or red, dorsal and caudal membranes generally more or less speckled with dark or blackish spots.

B. 3. D. $4/8$ or $4/9$. P. $1/18$. V. $2/9$. A. $3/5$ or $3/6$. C. $8/17/8$ or $7/17/7$, short flanking ones included.

Syn. *Capoëta enoplos* Blkr, Vijfde bijdr. ichth. Borneo, Nat. T. Ned. Ind. II p. 431.

Capoëta siaja Blkr, Vijfde bijdr. ichth. Borneo, Nat. T. Ned. Ind. II p. 432.

Siaja Mal. Sum.

Hab. Borneo (Sambas, Pontianak), in rivers.

Sumatra (Padang, Solok, Meninju, Sinkara), in rivers and lakes.

Length of 8 specimens 97''' to 198'''.

Remark. *Capoëta siaja*, which I earlier took for a proper species and only briefly mentioned at the cited place, since then, after having received several specimens of different size, has appeared to be the same species as *Capoëta enoplos*. The shoulder spot and the tail spot are missing in some specimens, probably as a result of a less well state of preservation. I have used the sweet-sounding inland name of the species as subgeneric one and also retained it as specific name, because the name *enoplos* already has been given to a species of the subgenus *Cyclocheilichthys*. *Cyclocheilichthys* (*Siaja*) *siaja* possesses again the entire type of the genus, of which only *Cyclocheilichthys* (*Siaja*) *microlepis* forms an exception by its multi-rayed dorsal fin. It is characterized by its 37 scales in the lateral line, by its relatively short pelvic fins, which go $6\frac{1}{4}$ to 7 times in the length of the body and by the height of the body itself, which goes almost 4 to $4\frac{1}{3}$ in its length, and by the length of its barbels.

Cyclocheilichthys (*Siaja*) *Deventeri* Blkr. –

Van Deventer's Circle-lip carp.

Atl. Cypr. Tab. XXVII fig. 1.

A *Cyclocheilichthys* (*Siaja*) with an oblong, compressed body, depth of body contained $3\frac{3}{4}$ times in its length, width contained about $2\frac{2}{3}$ times in its depth. Head slightly acute, contained slightly over 5 times in length of body with caudal fin, $3\frac{3}{4}$ times in length of body without caudal fin; depth of head contained $1\frac{1}{2}$ to $1\frac{1}{4}$ times in its length, width about twice; eye diameter contained about 3 times in the length of the head, distance between the eyes nearly once their diameter; palpebral membrane covering the external margin of the iris only, opening nearly circular; snout slightly acute, convex, shorter than the eye, not sticking out in front of the mouth; nostrils closer to the orbit than to the tip of the snout; rostro-dorsal profile slightly concave between snout and nape, convex on the nape; interorbital line [376](#) slightly convex; anterior suborbital bone oblong-triangular, length less than twice as great as depth, posterior margin nearly vertical, lower margin nearly horizontal, tip acute, pointing forward, lower half traversed by a longitudinal, not branched crest, close to the lower margin of the bone; 2nd suborbital bone elongate-quadrangular, more than twice as low as the 1st suborbital bone; upper jaw longer than lower jaw, strongly downward protrusible, ending below the anterior margin of the eye or hardly anterior to the eye, contained about $3\frac{1}{2}$ times in the length of the head; gape rather oblique; barbels thin, slightly shorter than the eye; lower jaw at the symphysis with an obtuse, hardly visible tubercle, underside without visible pores; lips medium-sized, terete; width of gill cover contained about $1\frac{1}{4}$ times in its depth, lower margin nearly straight; gill opening ending below the posterior part of the preoperculum. Pharyngeal teeth hooked to grinding 2.3.5/5.3.2 (?); scapula triangular, obtusely



Fig. 98. *Cyclocheilichthys (Siaja) Deventeri* Blkr. Atl. Ichth. Cypr. Tab. XXXVII, Fig. 3. TL figure 100 mm.

rounded; back elevated, angular, much higher than the belly; belly flat anterior to ventral fins, angular at the flanks, behind ventral fins ridged; depth of tail contained about twice in the length of the head; several scales on the basal and free half with longitudinal ray-like stripes originating from a common centre, about 34 scales in the lateral line, 11 or 12 in a transverse row (without the lowest ventral scales) of which 6 (5½) above the lateral line, about 12 in a longitudinal row between occiput and dorsal fin; lateral line straight, sloping downward only anteriorly, not descending below the rostro-caudal line, each scale marked by a simple tube generally reaching the centre of the scale; dorsal fin starting slightly behind the base of the ventral fins, acute, emarginate, slightly lower than the body, not much less than twice as high as base length, spine medium-sized, posteriorly serrated with well visible teeth, with the flexible part longer than the head; pectoral and ventral fins acute, nearly equal in length, contained about 6 times in the length of the body, pectoral fins reaching the ventral fins, ventral fins not reaching the anal fin; anal fin acute, lightly emarginate, nearly twice as low as dorsal fin, not much higher than base length, the simple third ray slender, bony only at the base; caudal fin scaled only at the base, with a deep incision, lobes acute, contained about 4 times in the length of the body. Colour: upper part of the body green, lower part silver; iris yellow; several scales on back, flanks and tail with a transverse, thin band at the base, consisting of dark speckles; tail with a diffuse, round, blue-violet spot in the lateral line, close to the base of the caudal fin; fins orange-yellow or pink, dorsal and caudal fin bordered with dark speckles.

B. 3. D. 4/8 or 4/9. P. 1/12. V. 2/9. A. 3/5 or 3/6. C. 7/17/7 or 8/17/8, short flanking ones included.

Syn. *Capoïta Deventeri* Blkr, Verslag verzam. visschs. Oost-Java, Nat. T. Ned. Ind. IX p. 413.

Hab. Java (Grati), in the lake.

Length of sole specimen 113''.

Remark. I am not completely sure about the numbers of the lower pharyngeal bone teeth of this species. During a more detailed investigation of these teeth in my single specimen I have counted only 3.4/4.3, however I can see the traces of sockets of teeth that have dropped out, without being able to give their numbers.

Siaja Deventeri has much in common with *Siaja siaja* and *Siaja macropus*, but it easy recognizable by the position of the dorsal fin entirely behind the basis of the pelvic fins and by the presence of only 6 longitudinal scale rows above the lateral line.

The only known catch locality of this species is the lake of Grati, in East Java, from where I received my specimen by the benevolence of Mr S. van Deventer, now Inspector of Finance, after which I have named this species.

377 *Cyclocheilichthys (Siaja) heteronema* Blkr. –
Franjedradige Kringlipkarper [Fringe-barbeled Circle-lip Carp].
 Atl. Cypr. Tab. XXIX fig. 1.

A *Cyclocheilichthys (Siaja)* with an oblong, compressed body, depth of body contained $3\frac{3}{4}$ to $3\frac{2}{3}$ times in its length, width contained $2\frac{1}{4}$ to $3\frac{1}{3}$ times in its depth. Head slightly obtuse, contained nearly 5 times in length of body with caudal fin, $3\frac{3}{5}$ to $3\frac{1}{2}$ times in length of body without caudal fin; depth of head contained about $1\frac{1}{5}$ times, width contained about $1\frac{3}{4}$ times in its length; eye diameter contained about $2\frac{1}{2}$ times in the length of the head, eye diameter contained once in the postocular part of the head, distance between the eyes about $\frac{2}{3}$ times their diameter; palpebral membrane covering the external margin of the iris only, opening nearly circular; snout obtuse, strongly convex, shorter than the eye, hardly sticking out in front of the mouth; nostrils closer to the orbit than to the tip of the snout; rostro-dorsal profile between forehead and nape slightly concave, convex on the nape; anterior suborbital bone pentagonal, depth hardly or not greater than length, lower margin horizontal, anterior and posterior lower margins short, convex or truncate, upper margins nearly straight or slightly concave, united into an acute, upward pointing angle close to the nostrils, lower half traversed by a longitudinal, horizontal crest, parallel to the lower margin of the bone; 2nd suborbital bone elongate-quadangular, length more than twice as great as depth, about twice as low as 1st suborbital bone; upper jaw longer than lower jaw, strongly vertically downward protrusible, ending below the anterior rim of the eye, contained slightly over 3 times in the length of the head; gape slightly oblique; barbels fleshy at the base, thick, divided into 7 to 9 threads, threads partly united at the base, unequal in length, longest threads hardly or not shorter than the eye; lower jaw at the symphysis with a conical, conspicuous tubercle, underside without visible pores; lips thin, terete, not conspicuously rugose; width of gill cover contained $1\frac{3}{4}$ to nearly 2 times in its depth, lower margin nearly straight or slightly concave; gill opening ending below the posterior margin of the preoperculum. Pharyngeal teeth

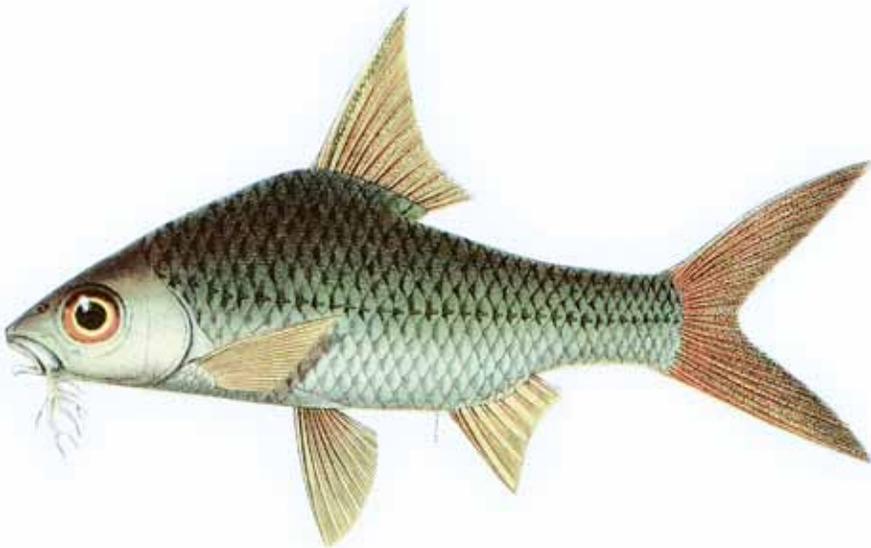


Fig. 99. *Cyclocheilichthys (Siaja) heteronema* Blkr. Atl. Ichth. Cypr. Tab. XXIX, Fig. 1. TL figure 110 mm.

hooked to spoon-shaped, 1.2.4/4.2.1; scapula triangular, tip acutely rounded; back elevated, angular, much higher than the belly; belly flat anterior to ventral fins, angular at the flanks, behind ventral fins ridged; depth of tail contained about twice in the length of the head; several scales on the free half with generally sparse slightly ray-like stripes, basal half not striped; 35 scales in the lateral line, 12 in a transverse row (without the lowest ventral scales) of which 6 (5½) above the lateral line, 13 or 14 in a longitudinal row between occiput and dorsal fin, lowest ventral scales in three longitudinal rows, scales in medial row gradually increasing in size posteriorly, posterior scales in this row not or hardly larger than those in flanking rows; lateral line hardly curved, not reaching rostro-caudal line, each scale marked by a simple tube reaching or surpassing the centre of the scale; dorsal fin starting above the base of the ventral fins, acute, emarginate, slightly lower than the body, nearly twice as high as base length, spine thick, posteriorly serrated with large teeth, with the flexible part not much longer than the head; pectoral and ventral fins acute, pectoral fins slightly longer than ventral fins, contained about 6 times in the length of the body, reaching the ventral fins; ventral fins reaching or nearly reaching the anal fin; anal fin acute, emarginate, much lower but much less than twice as low as dorsal fin, not much higher than base length, the simple third ray thin, nearly totally cartilaginous; caudal fin scaled only at the base, with a deep incision, lobes acute, contained 3½ to 3⅔ times in the length of the body. Colour: upper part of the body green, lower part silver; iris yellow, upper part dark; fins pink-orange or red, caudal fin bordered with dark speckles.

B. 3. D. 4/8 or 4/9. P. 1/16. V. 2/9. A. 3/5 or 3/6. C. 7/17/7, short flanking ones included.

Syn. *Barbus heteronema* Blkr, Zevende bijdr. ichth. Borneo, Nat. T. Ned. Ind. V. p. 446

Hab. Borneo (Sambas), in rivers.

Length of 2 specimens 108'' and 114''.

Remark. A more detailed investigation of my specimens has made me realise, ³⁷⁸ that the snout barbels in this species do not exist as I believed earlier. What I have taken as such in one of my specimens, now seems to me to be a torn thread-like piece of skin. On the right side of the same specimen, where the skin is entire, I can not perceive any trace of a snout barbel, no more than in the other specimen. The species is very peculiar because of its multibranching upper jaw barbels, a structure, which, as far as is known to me, has not been found in any other fish in the family of Cyprinoids. It exhibits still another peculiarity, which I can not find in any other species of Cyclocheilichthys. In all other species namely, both lower jaw bones have a concave lower edge, leaving an elongate oval space in between them. As those bones posteriorly approach each other closely and are united at the symphyses. In *Siaja heteronema* that oval space does not exist, as the lower jaw bones are not concave, and are closely aligned along their entire length.

As otherwise the species is entirely build after the type of *Cyclocheilichthys*, I do not believe that in these peculiarities in the structure of the lower jaw and the barbels a motive should be sought to raise it to a proper genus.

Cyclocheilichthys (Anemathichthys) apogon Blkr. –
Baardelooze Kringlipkarper [Beardless Circle-lip carp].
Atl. Cypr. Tab. XXIX fig. 2.

A *Cyclocheilichthys (Anemathichthys)* with an oblong, compressed body, depth of body contained 3½ to 3⅔ times in its length, width contained 2½ to 2⅔ times in its depth. Head acute, contained 4¾ to 4¼ times in length of body with caudal fin, 3½ to 3⅔ times in length of body without caudal fin; depth of head contained 1¼ to 1⅓ times, width contained about twice in its length; eye diameter contained nearly 3 to 3½ times in the length of the head, distance between the eyes nearly once to 1¼ times the eye diameter; palpebral membrane covering the external margin of the iris only, opening nearly circular; snout slightly acute, convex, in younger fishes shorter than the eye, in adults shorter than the eye, not sticking out

in front of the mouth; nostrils much closer to the orbit than to the tip of the snout; rostro-dorsal profile between snout and nape concave, convex at the nape; interorbital line slightly concave; anterior suborbital bone oblong-triangular, posterior margin shorter, vertical, tip acute, pointing forward; 2nd suborbital bone slender, oblong-quadrangular, twice or more than twice as low as anterior suborbital bone; upper jaw longer than lower jaw, strongly nearly vertically downward protrusible, ending hardly anterior to the eye, contained slightly over 3 times to 3 times in the length of the head; gape slightly oblique; lower jaw with a tubular, conical, short, obtuse symphysis, the lower part without visible pores; lips medium-sized, terete, transversely rugose; width of gill cover contained $1\frac{3}{5}$ times to 2 times in its height, lower margin nearly straight or slightly convex; branchial opening nearly vertical, ending below the posterior margin of the preoperculum. Pharyngeal teeth hooked to spoon-shaped 2.3.4/4.3.2; scapula triangular, obtuse, with a rounded angle; back strongly elevated, angular, much deeper than belly; belly flat anterior to ventral fins, angular at the flanks, behind ventral fins ridged; depth of tail contained twice to nearly twice in the length of the head; scales with ray-like stripes on the free half and the basal half; 34 or 35 scales in the lateral line, 12 or 13 in a transverse row except the lowest ventral scales of which 7 ($6\frac{1}{2}$) above the lateral line, 15 in a longitudinal row between the occiput and the dorsal fin, lowest ventral scales in three longitudinal rows, scales in medial row except the posterior ones smaller than those ³⁷⁹ in flanking rows; lateral line nearly straight, sloping downward only anteriorly, not reaching the rostro-caudal line, each scale marked by a short, undivided tube generally not reaching the centre of the scale; dorsal fin starting slightly behind the base of the ventral fins, acute, emarginate, considerably lower than the body, twice to nearly twice as deep as base length, spine robust, armed with large teeth posteriorly, with its flexible part not or not much longer than the head; pectoral and ventral fins acute, nearly equal in length, contained $5\frac{1}{3}$ to 6 times in the length of the body, pectoral fins reaching or surpassing the base of the ventral fins; ventral fins not reaching anal fin; anal fin acute, emarginate, much lower but much less than twice as low as dorsal fin, not much deeper than its base length, its undivided third ray bony only for the basal half;

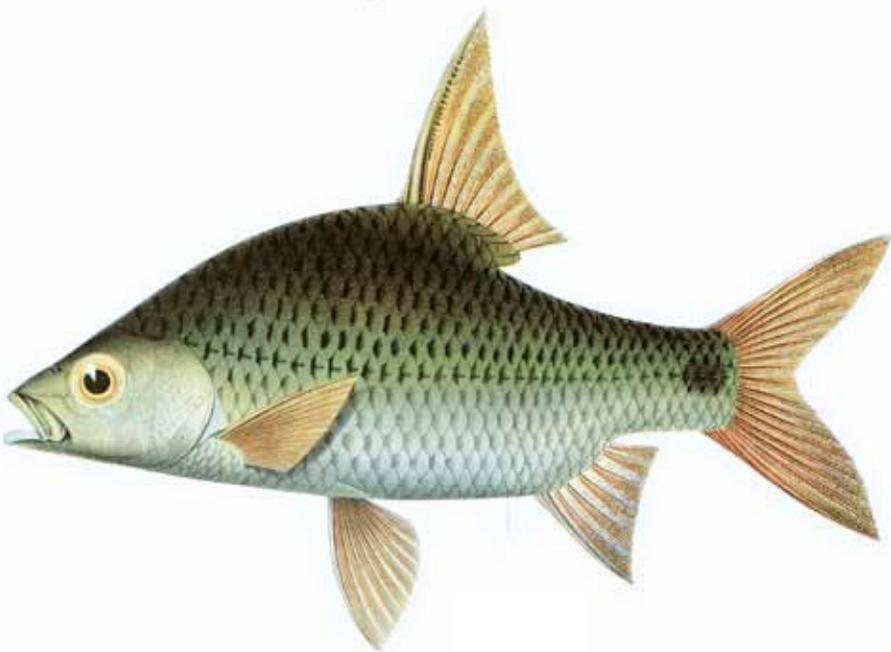


Fig. 100. *Cyclocheilichthys (Anemathichthys) apogon* Blkr. Atl. Ichth. Cypr. Tab. XXIX, Fig. 2. TL figure 206 mm.

caudal fin scaled only at the base, with a deep incision, lobes acute, contained $3\frac{1}{2}$ to 4 times in the length of the body. Colour: upper part green, lower part silver; snout and forehead olive or violetish; cheeks generally with numerous very thin, vertical, slightly wavy parallel red stripes; iris yellow; scales on back, flanks and tail nearly all with a transverse, triangular spot, crescent shaped or oblong-quadrangular, black; tail in younger fishes and generally also in adults with a round, black spot in the lateral line, close to the base of the caudal fins; fins red or pink, on the upper part of the dorsal fin, the posterior part of the caudal fin and the lower part of the anal fin generally more or less speckled with dark.

B. 3. D. 4/8 or 4/9. P. 1/16. V. 2/9. A. 3/5 or 3/6. C. 7/17/7, short flanking ones included.

Syn. *Barbus apogon* Kuhl name, Val., Poiss. XVI p. 299.

Systemus apogon Val., Poiss. XVI p. 299; Blkr, Zesde bijdr. ichth. Borneo, Nat. T. Ned.

Ind. III p. 428.

Redang Sundan.; *Lawak, Lalawak* Mal. Batav.

Hab. Java (Batavia, Bekasi, Buitenzorg), in rivers.

Borneo (Prabukarta, Sambas), in rivers.

Sumatra (Palembang, Lahat, Solok), in rivers.

Banka (Toboali, Marawang), in rivers.

Length of 13 specimens 81'' to 210''.

Remark. The species in question was already known to Kuhl and Van Hasselt, however it was first described at the above mentioned place by Mr Valenciennes on the basis of specimens sent by Kuhl and Van Hasselt. However this description leaves to be desired and is erroneous with regard to the formula of the fin rays (D. 2/10. P. 12. V. 9. A. 7 C. 20). In a fresh condition it is easily recognizable by the square black spots at the basis of each scale. Java feeds a closely related species in which the scale spots are crescent-shaped and it moreover differs by a remarkably smaller head, a more slender dorsal fin spine and with regard to the higher tail relative to the head length.

Cyclocheilichthys (*Anemathichthys*) *apogon* is not rare on Java and because I also received it from Borneo, Banka and Sumatra, it seems to be one of the most widely distributed species of its genus. On Java and Sumatra it is found rather high in the highlands (Buitenzorg, Solok).

Cyclocheilichthys (*Anemathichthys*) *apogonoides* Blkr. –
Javasche Kringlipkarper [*Javanese Circle-lip Carp*].
Atl. Cypr. Tab. XXX fig. 3.

A *Cyclocheilichthys* (*Anemathichthys*) with an oblong, compressed body, depth of body contained 4 to $3\frac{1}{2}$ times in its length, 380 width contained $2\frac{1}{2}$ to 3 times in its depth. Head acute, contained $4\frac{1}{2}$ to $5\frac{1}{4}$ times in length of body with caudal fin, $3\frac{1}{2}$ to 4 times in length of body without caudal fin; depth of head contained $1\frac{1}{3}$ to $1\frac{1}{2}$ times, width contained twice to nearly twice in its length; eye diameter contained 3 to $3\frac{1}{2}$ times in the length of the head, distance between the eyes once to slightly more than once the eye diameter; palpebral membrane covering the external margin of the iris only, opening nearly circular; snout slightly acutely convex, in younger and old animals shorter than the eye, not sticking out in front of the mouth; nostrils much closer to the orbit than to the tip of the snout; rostro-dorsal profile concave between snout and nape, convex on the nape; interorbital line nearly straight; anterior suborbital bone oblong-triangular, posterior margin shorter, vertical, tip acute, pointing forward, length much less than twice as great as depth; 2nd suborbital bone thin, oblong-quadrangular, twice or more than twice as low as anterior suborbital bone; upper jaw longer than lower jaw, strongly vertically downward protrusible, ending hardly anterior to the eye or below the anterior margin of the eye, contained slightly over 3 times to $3\frac{1}{2}$ times in the length of the head; gape rather oblique; lower jaw at the symphysis with a conical, short,

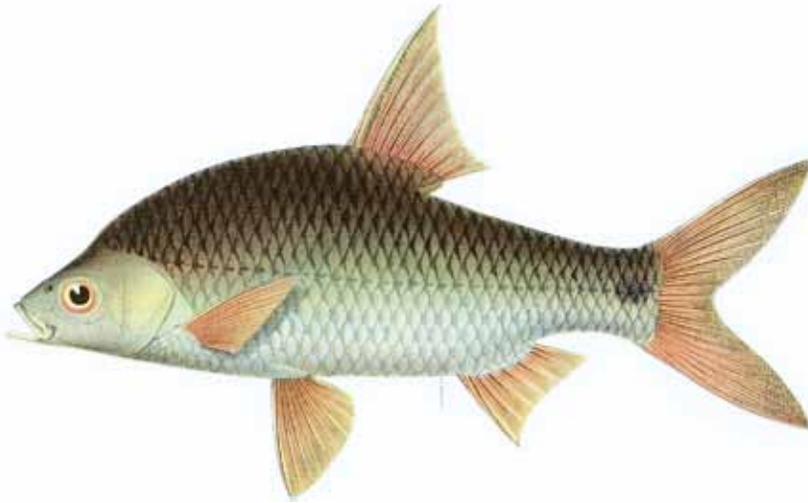


Fig. 101. *Cyclocheilichthys (Anemathichthys) apogonoides* Blkr. Atl. Ichth. Cypr. Tab. XXX, Fig. 3. TL figure 171 mm.

obtuse tubercle, the lower part without visible pores; lips medium-sized, terete, transversely rugose; width of gill cover contained twice to $1\frac{3}{4}$ times in its height, lower margin nearly straight; gill opening nearly vertical, ending below the posterior margin of the preoperculum. Pharyngeal teeth hooked to spoon-shaped, 2.3.4/4.3.2. or 1.3.4/4.3.2; scapula triangular, obtuse, with a rounded angle; back strongly elevated, angular, much higher than the belly; belly flat anterior to ventral fins, angular at the flanks, ridged behind ventral fins; depth of tail contained $1\frac{3}{4}$ to $1\frac{1}{2}$ times in the length of the head; scales on the free half and generally also on the basal half with ray-like stripes; 36 scales in the lateral line, 13 in a transverse row (without the lowest ventral scales) of which 7 ($6\frac{1}{2}$) above the lateral line, 15 in a longitudinal row between occiput and dorsal fin, scales on the lowest part of the belly in three longitudinal rows, scales in medial row gradually increasing in size posteriorly, posterior scales larger than those in flanking rows; lateral line nearly straight, sloping downward only anteriorly, not reaching the rostro-caudal line, each scale marked by a short, simple tube generally not reaching the centre of the scale; dorsal fin starting behind the base of the ventral fins, acute, emarginate, considerably lower than the body, nearly twice to twice as deep as base length, spine thick, posteriorly armed with large teeth, with the flexible part slightly longer or not longer than the head; pectoral and ventral fins acute, nearly equal in length, contained $5\frac{1}{2}$ to 6 times in the length of the body, pectoral fins reaching the base of the ventral fins or slightly surpassing them; ventral fins not reaching the anal fin; anal fin acute, emarginate, much lower than dorsal fin but much less than twice as low, not much higher than base length, the simple third ray bony only for the basal half; caudal fin scaled only at the base, with a deep incision, lobes acute, contained $3\frac{2}{3}$ to $4\frac{1}{4}$ times in the length of the body. Colour: upper part of the body green, lower part silver; iris yellow; scales on back, flanks and tail generally nearly all with a stripe on the base or an oblong, thin, transverse, dark spot; tail in younger animals and generally also in old animals with a round, blackish spot in the lateral line, close to the base of the caudal fin; fins pink, of uneven colour, generally more or less speckled with dark.

B. 3. D. 4/8 or 4/9. P. 4/14. V. 2/9. A. 3/5 or 3/6. C. 7/17/7, short flanking ones included.

Syn. *Systemus apogonoides* Blkr, Verslag verzam. vissch. Oost-Java, Nat. T. Ned. Ind. IX p. 410.
Lawak, Lalawak Mal. Bat.; *Tjorendjang* Sund.

Hab. Java (Batavia, Bekassi, Pandjallu, Ngawi, Surabaya, Pasuruan), in rivers.

Length of 71 specimens 82''' to 176'''.

Remark. I have named this species "apogonoides" for its close relationship with *Cyclocheilichthys* (*Anemathichthys*) *apogon*. Complete series of specimens of various sizes of both species have enabled me to determine the specific differences with certainty. They are principally found in the relatively much smaller head in the species in question; in 381 the larger height of the tail relative to the head; in the remarkably more slender dorsal fin spine, and the more crescent-shaped than square scale spot, whereas moreover in this case specific meaning can be attached to the smaller number of pectoral fin rays. Moreover in older specimens the snout remains shorter than the eye, which is not the case in *Anemathichthys apogon*. It also does not seem to become as large as the latter species.

The species seems to be found often in the river Tjitarum (Krawang) and to be spread all over Java, till rather high in the highlands (lake of Pandjalloe). I have not received it from outside Java.

Cyclocheilichthys (*Anemathichthys*) *janthochir* Blkr. –
Violethandige Kringlelipkarper [Violet-handed Circle-lip Carp].
Atl. Cypr. Tab. XXVIII fig. 3.

A *Cyclocheilichthys* (*Anemathichthys*) with an oblong, compressed body, depth of body contained about $4\frac{1}{3}$ times in its length, width contained $2\frac{1}{3}$ to $2\frac{1}{4}$ times in its depth. Head acute, contained nearly 5 times in length of body with caudal fin, $3\frac{2}{3}$ to $3\frac{1}{2}$ times in length of body without caudal fin; depth of head contained $1\frac{1}{2}$ times in its length, width about twice; eye diameter contained about $3\frac{1}{3}$ times in the length of the head, distance between the eyes about once the eye diameter; palpebral membrane covering the external margin of the iris only, opening nearly circular; snout slightly acutely convex, hardly or not longer than the eye, not sticking out in front of the mouth; nostrils much closer to the orbit than to the tip of the snout; rostro-dorsal profile between snout and nape slightly concave, convex on the nape; interorbital line nearly straight or slightly concave; anterior suborbital bone oblong-triangular, length nearly twice as great as depth, posterior margin vertical, tip acute, pointing forward; 2nd suborbital bone thin, oblong-quadrangular, twice or more than twice as low as anterior suborbital bone; upper jaw longer than lower jaw, strongly nearly vertically downward protrusible, ending anterior to the eye, contained $3\frac{1}{2}$ to $3\frac{2}{3}$ times in the length of the head; gape slightly oblique; lower jaw at the symphysis with a conical, short, obtuse tubercle, underside without visible pores; lips medium sized, terete, transversely rugose; width of gill cover contained $1\frac{2}{3}$ to $1\frac{1}{4}$ times in its depth, lower margin nearly straight; gill opening nearly vertical, ending below the posterior margin of the preoperculum. Pharyngeal teeth hooked to spoon-shaped, 2.3.4/4.3.2; scapula obtuse, obliquely truncate posteriorly; back elevated, angular, much higher than the belly; belly flat anterior to ventral fins, slightly angular at the flanks, behind ventral fins rounded, not ridged; depth of tail contained $2\frac{1}{4}$ to $2\frac{1}{2}$ times in the length of the head; scales on the free half with slightly ray-like longitudinal stripes; 35 scales in the lateral line, 12 or 13 in a transverse row (without the lowest ventral scales) of which 7 ($6\frac{1}{2}$) above the lateral line, 15 in a longitudinal row between occiput and dorsal fin, scales on the lowest part of the belly in three longitudinal rows, scales in medial row not larger than those in flanking rows; lateral line nearly straight, sloping downward only anteriorly, not reaching the rostro-caudal line, each scale marked by a simple tube generally reaching the centre of the scale; dorsal fin starting above the base of the ventral fins, acute, emarginate, slightly lower than the body, much higher than base length but much less than twice as high, spine rather thick, posteriorly armed with very conspicuous teeth, with the flexible part not or hardly longer than the head; pectoral and ventral fins acute, nearly equal in length, contained slightly over 6 times to $6\frac{1}{2}$ times in the length of the body, pectoral fins reaching or nearly reaching ventral fins, ventral fins not reaching the anal fin; anal fin acute, emarginate, much lower than dorsal fin but much less than twice as low, about twice as high as base length, the simple third ray bony only for the basal half; caudal fin 382 scaled only at the base,



Fig. 102. *Cyclocheilichthys (Anemathichthys) janthochir* Blkr. Atl. Ichth. Cypr. Tab. XXXI, Fig. 3. TL figure 194 mm.

with a deep incision, lobes acute, contained $4\frac{1}{4}$ to $4\frac{1}{2}$ times in the length of the body. Colour: upper part of the body green, lower part silver; iris yellow; cheeks with numerous, densely packed, vertical, very thin, reddish stripes; snout and forehead deeply olive; thin oculo-caudal black-violet band in the lateral line; scales on back, flanks and tail all with a crescent-shaped, transverse, violetish stripe; dorsal and caudal fin pink or carmine-red with a broad, blackish border, anterior part of dorsal fin with a large, diffuse, trigonal deeply violet spot; pectoral fins violetish, ventral and anal fins pearly or yellowish.

B. 3. D. 4/8 or 4/9. P. 1/16 or 1/17. V. 2/9. A. 3/5 or 3/6. C. 7/17/7 or 6/16/6, short flanking ones included.

Syn. *Systemus janthochir* Blkr, Zevende bijdr. ichth. Borneo, Nat. T. Ned. Ind. V p. 448.

Hab. Borneo (Pontianak), in rivers.

Length of 2 specimens 195'' and 202''.

Remark. Of both remaining species of *Anemathichthys*, the species in question is already easily recognizable by its more slender body and because the dorsal fin begins above and not behind the pelvic fins. The recognition moreover is still made easier by remarkably more slender tail relative to the head length, by the black longitudinal body stripe, the broad black dorsal fin and caudal fin edges, and the violet pectoral fins.

As far as the present knowledge reaches, this species is proper to West Borneo, where it inhabits the Kapuas.

BARBUS CUV.,

Regn. anim. ed. 1a II p. 192; Heck., Fisch. Syriens p. 27;

McCl., Ind Cyprin. Asiat. Research. XIX p. 26. –

BARBEL.

Body oblong or elongate, compressed, covered with medium-sized scales, back slightly or moderately angular. Jaws enclosed in terete, fleshy lips, upper jaw downward protrusable. Barbels 4, nasal

and upper jaw barbels. Snout more or less prominent. Mouth inferior or slightly inferior, gape not oblique or slightly oblique, ending anterior to the eye, mouth in shape reminding of a horse shoe when the mouth is closed. Single postlabial groove, parallel to the free margin of the jaw following the shape of the gape. Anal sheath without larger scales. Dorsal fin starting above or anterior to ventral fins and ending far anterior to anal fin, no scaled sheath at the base, posterior undivided ray bony, dentate. Anal fin shorter than dorsal fin. Pharyngeal teeth spoon-shaped, on each side 7 to 10 in three rows.

Remark. As the genus *Barbus* is defined above, the species placed in this work in *Labeobarbus*, *Cyclocheilichthys* and *Systemus* are excluded from it. ³⁸³ All species from the Indian Archipelago, which were mentioned by earlier writers and also earlier by myself, as species of *Barbus*, partly belong to the mentioned genera, partly to *Leptobarbus*, *Luciosoma* and *Barbichthys*.

I do not know this genus from nature, but further studies are needed to determine it with more certainty than is possible with the present data.

LABEOBARBUS Rupp.,

Neue Nachtr. Beschreib. U. Abbild. Neuer Fische im Nil entdeckt 1835 p. 14. –

LIP BARBEL.

Body oblong or elongate, compressed, covered with large scales, back slightly or moderately angular. Jaws sometimes enclosed in terete, sometimes lobed, lips, upper jaw strongly downward protrusible. Barbels 4, nasal and upper jaw barbels. Snout more or less prominent. Mouth inferior or slightly inferior, gape not or hardly oblique, ending anterior to the eye, closed mouth reminding of the shape of a horse shoe. Single postlabial groove parallel to the free margin of the jaw following the shape of the gape. Anal sheath not covered with larger scales. Dorsal fin starting above or anterior to ventral fins and ending far anterior to anal fin, posterior simple ray without teeth. Ventral fins with rays 2/8. Anal fin shorter than dorsal fin. Pharyngeal teeth spoon-shaped or slightly spoon-shaped, on each side 7 to 10 in three rows.

Remark. As the genus *Barbus* was erected by Cuvier, it comprised the four barbelled species of various genera that have been erected since. Of those genera, the genera of the Phalacrognathines *Opistocheilus* Blkr, *Schizopyge* Heck. and *Oreinus* McCl. and the genera of the Cheilognathines, *Schizothorax* Heck., *Racoma* McCl., *Aulopyge* Heck. and *Hypselobarbus* Blkr. could easily and by sharp characters be separated from *Barbus* Cuv.

It was more difficult after the separation of these genera to arrange the very numerous remaining species of *Barbus* Cuv. The many varieties in shape in numerous species was bound to lead to an attempt to arrange them under different genera. However, in order to test these splittings successfully the availability of all those shape varieties was necessary and a basic study of the more or less accurately described species of the various writers, a study for which the first condition was that all species would be carefully examined for all characters of any importance. Among those characters I count the lip structure, the shape and extension of the posterior lip groove, the ³⁸⁴ shape of the anterior suborbital bone, the being scaled or not of the basis of the dorsal fin, the extend of the gill opening, the shape and formula of the pharyngeal bones etc.

However, when one cannot examine the species from nature, one remains completely

in uncertainty concerning this for many species described and depicted by excellent ichthyologists and one also wonders whether the figures given by them in which the dorsal fin bases are depicted scaleless, indeed represent nature or not.

Mr Rüppell raised to a proper genus those Barbels in which the lower lip is lobe-like extended. But if the genus *Labeobarbus* would only be distinguished from *Barbus* by the lower lip lobe, it would not be acceptable, as that lobe in various species exhibits all degrees of development, so that one can hardly distinguish a trace of it in some.

Heckel has separated still other species from *Barbus* Cuv. under the generic name *Luciobarbus*, based on the insignificant difference in the number of pharyngeal teeth and a more pointed snout than the common species of *Barbus*. If this genus cannot be defined in a more natural and sharper way, it is no more tenable than *Labeobarbus*, according to the definition of Mr Rüppell.

The species of this genus, placed by recent ichthyologists in *Barbus*, *Labeobarbus* and *Luciobarbus* therefore are in need of a revision.

I was unable to proceed with this, as I am entirely restricted to my own collection, which, except for one Bengalese species, only contains archipelagic species.

However, the study of these species has induced me to place a large number of species till now arranged under *Barbus* in *Systomus*, whereas I placed a number of other species with the addition of some related ones with only two and without barbels in the genus *Cyclochelichthys*.

I was able to determine sharply the characters of this genus, but the not being available of a sufficient series of the numerous shape varieties of *Barbus* Cuv. puts me out of the possibility to describe with sufficient sharpness the borders of *Barbus* proper or possibly other genera that could be separated from it. Therefore I have only provisionally accepted the genus *Labeobarbus* Rüppell, but restricted it to those species in which the posteriormost dorsal fin spine is not serrated. When studied from nature, maybe one will find that *Labeobarbus* thus defined is liable for further splitting according to absence of presence of a scale sheath at the dorsal fin basis, etc.

This scale sheath in all my species is clearly developed, but judging from the existing figures, seems [385](#) to be lacking in various species from the continent.

My collection contains only four species that I can place in *Labeobarbus*, based on the foregoing contemplations. Three of these species have become known by Mr Valenciennes under the names *Barbus tambra*, *Barbus soro* and *Barbus douronensis*, whereas the fourth was first described by me under the name of *Labeobarbus tambroides*. On Java they are very common Lip Carps, which are also kept in ponds and there can reach a high age, as the native inhabitants takes care of their feeding and do not dare to remove them from the ponds because of a superstitious respect. All these species can be placed in the genus *Labeobarbus* as defined by Mr Rüppell, but the differences on lobe shape of the lower lip shows that this genus cannot be based on this character only, as the lower lip lobe is already hardly visible in *Barbus douronensis*, and in *Barbus soro* the lower lip simply is wrapped downwards or backwards over its entire width without showing a separate lobe. For the rest those four species are extremely closely related. All of them have the dorsal fin spine well developed, but without any trace of teeth, the dorsal fin base covered by a rather high scale sheath, very large scales of which only 21 to 28 go in the lateral line and only 4 above

the lateral line, the anterior suborbital bone obliquely square or pentagonal, the gill covers radial-like finely ribbed, the anal fin not or little noticeably concave and with 5 or 6 branched rays, the pelvic fins with 8 branched rays, the posterior lip groove going round the entire jaw edge and the pharyngeal teeth with wrinkly knobby masticating surfaces.

My species have a large relationship with some South Asiatic species, which with a similar general shape and an almost equal scale formula, show the same differences regarding the more or less lobe shaped elongation of the lower lip and of which some reach a length of 5 or 6 foot. These species are *Labeobarbus macrolepis* Heck., *Barbus tor* Val., *Barbus megalepis* McCl., *Barbus progeneius* McCl., *Barbus putitora* McCl., *Barbus hexagonolepis* McCl., *Barbus macrocephalus* McCl. Till now the species, with the exception of *Barbus macrolepis* Heck., have been made known too little, notwithstanding the fact that all of them have been depicted, and for this reason the correct differentiation of these and the archipelagic species is somewhat hampered. However, it seems to me that my four species can be sufficiently distinguished from the aforementioned ones and all others of the genus with the following scheme

386 I. Dorsal fin scaled at the base, spine robust, without teeth. Gill cover ray-like rugose. Snout acute or slightly acute.

A. 21 to 28 scales in the lateral line, 4 above the lateral line.

a. Lower lip with a well developed, very conspicuous lobe.

† Upper lip prolonged into a lobe. 24 to 26 scales in the lateral line. D. 4/9 or 4/10. P. 1/15 or 1/16. Depth of the body contained 4 to 4½ times in its length. Head acute, contained 4¾ to 5¼ times in the length of the body, depth contained 1½ to 1¼ times in its length.

Labeobarbus tambroides Blkr.

† Upper lip round, not prolonged. 22 or 23 scales in the lateral line. D 4/8 or 4/9 or 4/10. P. 1/14 to 1/16. Depth of body contained slightly over 4 times to slightly over 5 times in its length. Head contained nearly 5 to 5½ times in the length of the body, depth contained 1½ to 1½ times in its length.

Labeobarbus tambra Blkr.

b. Lower lip with a hardly visible lobe or simply back-sheathed over its total width.

Upper lip round, not prolonged. D 4/8 or 4/9 or 4/10. P. 1/14 to 1/16.

† Lower lip over the total length simply back-sheathed. 26 to 28 scales in the lateral line. Depth of body contained 4¼ to 5 times in its length. Head contained 5 to 6 times in the length of the body, depth contained 1½ to 1¼ times in its length.

Labeobarbus soro Blkr.

† Lower lip with a hardly distinguishable lobe. 21 to 23 scales in the lateral line. Depth of body contained 4¼ to 4⅔ times in its length. Head contained 5½ to nearly 6 times in the length of the body, depth contained 1½ to 1½ times in its length.

Labeobarbus douronensis Blkr.

Labeobarbus tambroides Blkr,
Overz. Ichth. Faun. Sumatra, Nat T. Ned. Ind. VII p. 92. –
Tambra-achtige Lipbarbeel [*Tambra-like Lip Barbel*].
Atl. Cypr. Tab. XXIII.

A *Labeobarbus* with an oblong, compressed body, depth of body contained 4 to $4\frac{1}{3}$ times in its length, width contained about 2 times in its depth. Head acute, not or hardly convex, contained $4\frac{3}{4}$ to $5\frac{1}{4}$ times in length of body with caudal fin, $3\frac{1}{2}$ to slightly over 4 times in length of body without caudal fin; depth of head contained $1\frac{1}{3}$ to $1\frac{1}{4}$ times, width contained $1\frac{1}{4}$ to $1\frac{3}{5}$ times in its length; eye diameter contained slightly over 3 to 4 times in the length of the head, eye diameter ³⁸⁷ contained $1\frac{1}{4}$ to $1\frac{3}{5}$ times in the postocular part of the head; distance between the eyes once to $1\frac{1}{5}$ times their diameter; palpebral membrane covering the external margin of the iris only, broader anteriorly than posteriorly, opening nearly circular; snout acute, in younger animals shorter than the eye, in adults longer than the eye, not sticking out in front of the mouth, nearly straight or slightly convex; nostrils much closer to the orbit than to the tip of the snout; rostro-dorsal profile nearly straight or slightly convex on the head, convex on the nape; anterior suborbital bone obliquely pentagonal, length not or hardly greater than depth, lower margin oblique, convex, anterior and posterior lower margins generally concave, anterior margin oblique, posterior margin nearly vertical, upper margins concave (posterior margin much shorter than anterior margin) united into an acute, forward pointing angle close to the nostrils, traversed around the middle by a longitudinal crest ascending posteriorly; 2nd suborbital bone obliquely quadrangular, much higher anteriorly than posteriorly, length about twice as great as height, about twice as low as 1st suborbital bone; upper jaw longer than lower jaw, strongly vertically downward protrusible, ending below the anterior margin of the eye, contained nearly 3 to slightly over 3 times in the length of the head; gape slightly oblique; barbels thin, upper jaw barbels slightly longer than nasal barbels, slightly longer to considerably longer than the eye; lips very broad, fleshy, transversely striped on the oral surface, upper lip protracted into a lobe which generally is obtusely rounded, lower lip into a lobe, generally longer than that of the upper lip, obtusely or acutely rounded; lower jaw at the symphysis with a conical, obtuse well visible tubercle, underside without visible pores; gill cover ray-like rugose, width contained $1\frac{1}{2}$ to $1\frac{3}{4}$ times in its depth, lower margin nearly straight or slightly convex; gill opening ending below the posterior margin of the preoperculum. Pharyngeal teeth hooked to slightly spoon-shaped to grinding, 2.3.5/5.3.2, on the chewing surface partly rugose-tuberculate; scapula obtusely or slightly acutely rounded, obliquely

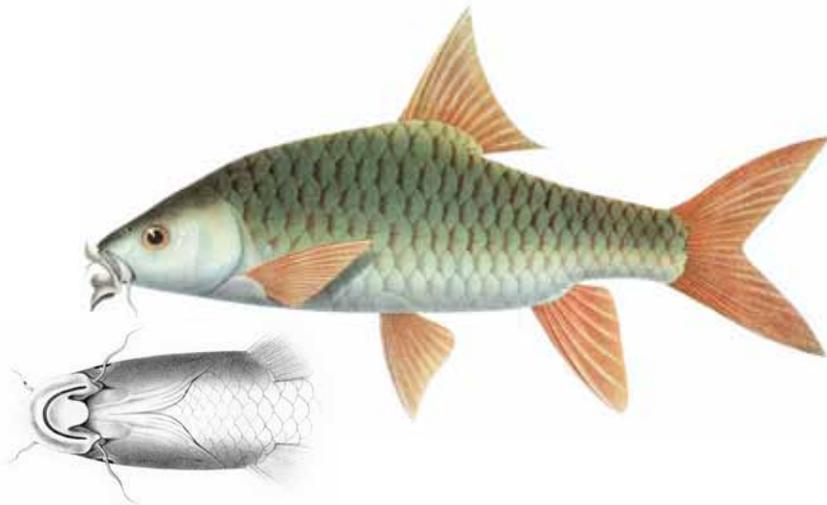


Fig. 103. *Labeobarbus tambroides* Blkr. Atl. Ichth. Cypr. Tab. XXIII, TL figure 320 mm.

truncate posteriorly; belly flat anterior to ventral fins, angular at the flanks, behind ventral fins obtusely ridged; back elevated, angular, much higher than the belly; scales on the free half and basal half with slightly ray-like longitudinal stripes; 24 to 26 scales in the lateral line, 9 in a transverse row (without the lowest ventral scales) of which 4 ($3\frac{1}{2}$) above the lateral line, 8 or 9 in a longitudinal row between occiput and dorsal fin, lowest ventral scales in three longitudinal rows, middle and posterior scales in medial row nearly equal, larger than anterior scales, but not larger than those in flanking rows; lateral line slightly curved, sloping downward anteriorly, nearly straight posteriorly, not or hardly reaching the rostro-caudal line, each scale marked by a simple tube reaching or not reaching the centre of the scale; dorsal fin starting above the base of the ventral fins, acute, emarginate, hardly lower to considerably lower than the body, twice to much less than twice as high as base length, spine medium-sized, posteriorly totally glabrous, without teeth, with the flexible part slightly longer to considerably longer than the head; pectoral and ventral fins acute, pectoral fins slightly longer than ventral fins, contained $5\frac{1}{2}$ to 6 times in the length of the body, pectoral fins not or hardly reaching the ventral fins, ventral fins not or hardly reaching the anal fin; anal fin acute, in younger animals hardly emarginate, in adults not emarginate, considerably lower to not lower than dorsal fin, more than twice as high as base length, the simple third ray thin, nearly totally cartilaginous; caudal fin scaled only at the base, with a deep incision, lobes acute, nearly equal, contained $3\frac{3}{4}$ to $4\frac{1}{3}$ times in the length of the body. Colour: upper part of the body olive, lower part silver; total body sometimes orange-green; iris yellow, upper part dark; all scales on the body towards the base with a membrane with a metallic copper or violetish splendid conspicuous sheen; fins yellowish or pink or, but more rarely, slightly olive, frequently more or less speckled with dark.

B. 3. D. $4/9$ or $4/10$. P. $1/15$ or $1/16$. V. $2/8$. A. $3/5$ or $3/6$. C. $6/17/6$ or $7/17/7$, short flanking ones included.

Syn. *Tambra* and *Hampal* Sundan.

Hab. Java (Tjampea, Buitenzorg, Tjipanas, Banjubiru, Ngantang), in rivers.

Sumatra (Benkulen, Padang, Meninju, Solok, Pajakombo, Lahat), in rivers and lakes.

Length of 14 specimens $88''$ to $430''$.

Remark. *Labeobarbus tambroides* Blkr. constantly differs from *Labeobarbus tambra* ³⁸⁸ by the presence of the upper lip lobe, which already is much developed in the smallest specimens, and by a larger and more pointed lower lip lobe. Moreover various other differences exist, which however are not apparent in specimens of different sizes. *Labeobarbus tambroides* always has one to four scales more in the lateral line, the back higher and more angular, and the profile of the head less or even not at all convex. The older the specimens are, the more the differences become apparent. In two of my specimens of both species of $430''$ [TL], one perceives at first glance various differences, apart from those of the lip structure and squamation. The specimen of *Labeobarbus tambra* has a remarkably more slender body and head and simultaneously has a remarkably more concave snout. Some measurements taken with these specimens, relate to each other as follows.

	<i>Labeobarbus</i>	
	<i>tambra</i> Blkr	<i>tambroides</i> Blkr
Height of the body in its entire length.	$5\frac{1}{3}$	$4\frac{1}{6}$.
Length from the head to the caudal fin	ca 4	4.
Height of the head in its length	$1\frac{1}{2}$	$1\frac{1}{4}$ to $1\frac{1}{5}$.
Height of the tail in the length of its head	$2\frac{1}{2}$	$2\frac{5}{6}$.
Width of the dorsal fin spine in millimetres	3	6.
Schoulder blade rounded	crescent shape	triangular
Pectoral fins above or before the pelvic fins and ending	before	above.
Profile of the snout	very convex	little convex.
Profile of the anterior back	little convex	very convex.

On Java *Labeobarbus tambroides* is not as common as *Labeobarbus tambra*, however on the other hand it is not rare in the freshwater of West Sumatra, whereas I have not yet received *Labeobarbus tambra* from there.

Among the South Asiatic species of *Labeobarbus* there are several, which are equally very closely related to the species in question. To these belong especially *Labeobarbus macrolepis* Heck., *Barbus tor* Val. and *Barbus progeneius* McCl., which all possess a very much developed lip lobe and only 25 to 27 scales in a longitudinal row.

However, *Labeobarbus macrolepis* Heck. distinguishes itself by a larger head, one scale more in the lateral line, 2 to 3 rays more in the pectoral fin, 1 ray less in the dorsal fin, a much longer anal fin, etc. – *Barbus tor* and *Barbus progeneius* have the same formula of the lateral line scales, but judging from the figure of Mr MacClelland there are only 3 scale rows above the lateral line in *Barbus progeneius* (including the one of the dorsal fin scale sheath) and this species moreover ³⁸⁹ has a much more slender body with a very low back, a much shorter dorsal fin and lower anal fin, etc., whereas *Barbus tor* in habitus seems to depart little from the species in question and mainly differs from it by its relatively larger head and thinner not lobe-shaped upper lip.

Labeobarbus tambra Blkr,

Descr. specier. Pisc. Jav. Nov. Nat. T. Ned. Ind. XIII p. 355. –

Vorstellijke Lipbarbeel [*Royal Lip-barbel*].

Atl. Cypr. Tab. XXII.

A *Labeobarbus* with an oblong, compressed body, depth of body contained slightly over 4 to slightly over 5 times in its length, width contained 2 to 1½ times in its depth. Head slightly acute, convex, contained nearly 5 to 5½ times in length of body with caudal fin, nearly 4 to 4½ times in length of body without caudal fin; depth of head contained 1½ to 1¾ times, width contained ¾ to 1⅓ times in its length; eye diameter contained 3½ to 5½ times in the length of the head, eye diameter contained 1½ to 2¼ times in the postocular part of the head; distance between the eyes ¼ to 2½ times their diameter; palpebral membrane covering the external margin of the iris only, broader anteriorly than posteriorly, opening nearly circular; snout slightly acute, not to nearly twice as long as the eye, not sticking out in front of the mouth; nostrils much closer to the orbit than to the tip of the snout; rostrum-dorsal profile on snout and nape convex, on forehead and crown nearly straight or slightly convex; anterior suborbital bone obliquely pentagonal, length not or hardly greater than depth, lower margin obliquely convex; anterior and posterior lower margins generally concave, anterior margin oblique, posterior margin nearly vertical, upper margins concave or slightly concave (posterior margin generally much shorter than anterior margin) united into an acute, upward pointing angle close to the nostrils, traversed around the middle by a longitudinal crest strongly ascending posteriorly; 2nd suborbital bone quadrangular, much higher anteriorly than posteriorly, length twice to less than twice as great as depth, about twice as low as 1st suborbital bone; upper jaw longer than lower jaw, strongly vertically downward protrusible, ending below the anterior margin of the eye or hardly anterior to the eye, contained 3 to 3¾ times in the length of the head; gape slightly oblique; barbels thin, upper jaw barbels generally slightly longer than nasal barbels, slightly to much longer than the eye; lips very broad, fleshy, transversely striped on the oral surface, upper lip not lobed, lower lip protracted into a medium-sized, broad, obtuse lobe; lower jaw at the symphysis with a conical, obtuse, short tubercle, underside on both branches with several conspicuous pores, placed in a longitudinal row, not always visible; gill cover ray-like rugose, width contained 1½ to nearly 2 times in its depth, lower margin slightly concave to slightly convex; gill opening ending below the posterior margin of the preoperculum. Pharyngeal teeth hooked to slightly spoon-shaped to grinding, 2.3.5/5.3.2, on the chewing surface tumid or rugose-tuberculate; scapula triangular, obtusely rounded; belly flat anterior to ventral fins, slightly angular at the flanks, behind ventral fins rounded, not ridged; back elevated, angular, much

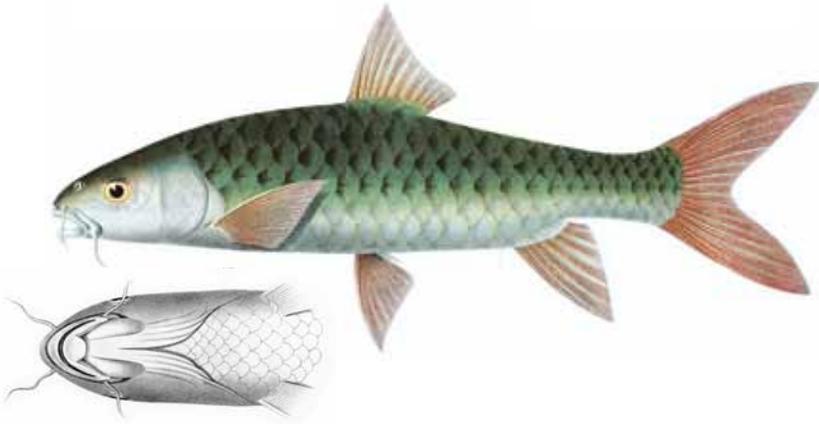


Fig. 104. *Labeobarbus tambra* Blkr. Atl. Ichth. Cypr. Tab. XXII, Fig. 2. TL figure 330 mm.

higher than the belly; scales on the free half and basal half with slightly ray-like longitudinal stripes; 22 or 23 scales in the lateral line, 8 in a transverse row (without the lowest ventral scales) of which 4 ($3\frac{1}{2}$) above the lateral line, 8 or 9 in a longitudinal row between occiput and dorsal fin, lowest ventral scales in three longitudinal rows, middle and posterior scales in medial row nearly equal, larger than anterior scales, but not larger than those in flanking rows; lateral line slightly curved, lightly concave anteriorly, nearly straight posteriorly, not reaching or hardly reaching the rostro-caudal line, each scale marked by a simple tube generally not reaching the centre of the scale; dorsal fin starting above the base of the ventral fins, acute, emarginate, slightly lower to considerably lower than the body, much higher than base length but much less than twice as high, spine thin, posteriorly totally glabrous, without teeth, with the flexible part not shorter to much shorter than the head; pectoral and ventral fins acute, pectoral fins slightly longer than ventral fins, contained $5\frac{1}{2}$ to slightly over 6 times in the length of the body, not reaching ³⁹⁰ the ventral fins, ventral fins not reaching the anal fin; anal fin acute, generally convex, in older animals rounded at the tip, slightly lower to slightly higher than dorsal fin, more than twice as high as base length, the simple third ray thin, nearly completely cartilaginous; caudal fin scaled only at the base, with a deep incision, lobes acute, nearly equal, contained $4\frac{1}{4}$ to about $4\frac{1}{2}$ times in the length of the body. Colour: upper part of the body olive, or dark- or slightly-olive to olive; flanks and lower part silver or golden-green; iris yellow, upper part dark; all scales on the body towards the base on the membrane with a metallic copper or violetish splendid conspicuous sheen; fins yellowish or faintly pink or, in old animals slightly olive or slightly violet.

B. 3. D. $4/9$ or $4/10$, sometimes also $4/8$ or $4/9$. P. $1/14$ to $1/16$. V. $2/8$, seldom also $2/7$. A. $3/5$ or $3/6$. C. $5/17/5$ or $7/17/7$, short flanking ones included.

Syn. *Barbus tambra* Val., Poiss. XVI p. 143; Heck., Fisch. Syriens p. 29.

Barbeau tambra Val., ibid.

Tambra Sundan.

Hab. Java (Buitenzorg, Lebak, Parongkalong, Bandung, Petengan, Kuningam, Lelles, Pandjallu, Banjubiru, Bator, Ngantang), in rivers and lakes.

Length of 9 specimens $150''$ to $652''$.

Remark. Mr Valenciennes in his description of this species does not mention the lobe-like elongated lower lip, which peculiarity he surely could not observe in the dry specimen examined by him.

The species is easy to distinguish from the related South Asiatic ones by the low number of scales in the lateral line. It has this character of only 22 or 23 lateral line scales in common with *Labeobarbus douronensis*, however in this species the lower lip lobe is so little developed, that it is hardly visible, whereas the body is remarkably higher in specimens of the same length, and the back more angular, with a simultaneous less convex profile of the snout.

Labeobarbus tambra occurs all over Java, but avoids the turbid river mouths. It is often kept in ponds, and reaches a length of more than three foot. Its meat is not unpalatable and is judged as very good in the interior of Java where one cannot get sea fish.

Labeobarbus soro Blkr. –
Soro-Lipbarbeel [*Soro-Lip-barbel*].
Atl. Cypr. Tab. XX

A *Labeobarbus* with an oblong or slightly elongate, compressed body, depth of body contained $4\frac{1}{4}$ to 5 times in its length, width contained about twice in its depth. Head slightly acute, convex, contained 5 to 6 times in length of body with caudal fin, $3\frac{3}{4}$ to $4\frac{1}{2}$ times in length of body without caudal fin; depth of head contained $1\frac{1}{3}$ to $1\frac{1}{4}$ times in its length, width 2 to $1\frac{2}{3}$ times; eye diameter contained $3\frac{1}{2}$ to nearly 4 times in the length of the head, eye diameter contained $1\frac{1}{2}$ to $1\frac{3}{4}$ times in the postocular part of the head; distance between the eyes $1\frac{1}{4}$ to $1\frac{2}{3}$ times their diameter; palpebral membrane covering the external margin of the iris only, opening nearly circular; snout slightly acutely convex, in younger animals shorter than the eye, in old animals longer than the eye, not sticking out in front of the mouth; nostrils closer to the orbit than to the tip of the snout; rostro-dorsal profile convex on crown and nape, nearly straight or slightly concave only on the forehead; interorbital line nearly straight or slightly concave; anterior suborbital bone obliquely pentagonal, length not or hardly greater than depth, lower margin obliquely convex; ³⁹¹ anterior and posterior lower margins concave, anterior margin oblique, posterior margin nearly vertical, upper margins concave (posterior margin much shorter than anterior margin) united into an acute, upward pointing angle close to the nostrils, traversed around the middle by a longitudinal crest which ascends posteriorly; 2nd suborbital bone obliquely quadrangular, much higher anteriorly than posteriorly, length less than twice as great as depth, twice or less than twice as low as 1st suborbital bone; upper jaw longer than lower jaw, strongly vertically downward protrusible, ending below the anterior rim of the eye, contained nearly 3 to slightly over 3 times in the length of the head; gape slightly oblique; barbels thin, nasal barbels not or slightly longer than the eye, upper jaw barbels much longer than the eye; lower jaw at the symphysis with a conical, obtuse very conspicuous tubercle, underside without conspicuous pores; lips fleshy, transversely rugose on the oral surface, upper lip terete, not protracted, lower lip broad, simply back-sheathed for the total width, broad between lateral sheaths, behind the symphysis fused with lower jaw; gill cover rugose ray-like, width contained $1\frac{1}{2}$ to $1\frac{3}{4}$ times in its depth, lower margin nearly straight or slightly concave; gill opening ending below the posterior rim of the preoperculum. Pharyngeal teeth hooked to slightly spoon-shaped to grinding 2.3.5/5.3.2, on the chewing surface rugose-tuberculate; scapula triangular, obtusely rounded; belly flat anterior to ventral fins, angular at the flanks, behind ventral fins rounded, not ridged; back rather elevated, angular, higher than the belly; scales on the basal half and free half with longitudinal stripes or slightly ray-like stripes, 26 to 28 scales in the lateral line, 8 in a transverse row (without the lowest ventral scales) of which 4 ($3\frac{1}{2}$) above the lateral line, 9 in a longitudinal row between occiput and dorsal fin, lowest ventral scales in three longitudinal rows, scales in medial row gradually increasing in size posteriorly, posterior scales not larger than those in flanking rows; lateral line lightly curved, nearly reaching the rostro-caudal line, each scale marked by a simple tube not reaching the centre of the scale; dorsal fin starting above or hardly anterior to the base of the ventral fins, acute, emarginate, only slightly lower than the body,



Fig. 105. *Labeobarbus soro* Blkr. Atl. Ichth. Cypr. Tab. XX, Fig. 2. TL figure 284 mm.

much higher than base length but much less than twice as high, spine tapering, totally glabrous, with the flexible part not or only slightly longer than the head; pectoral and ventral fins acute, pectoral fins slightly longer than ventral fins, contained $5\frac{2}{3}$ to $5\frac{3}{4}$ times in the length of the body, pectoral fins not reaching the ventral fins, ventral fins not reaching the anal fin; anal fin acute, not or hardly emarginate, in older animals convex, not much lower than dorsal fin, much more than twice as high as base length, the simple third ray thin, bony only at the base; caudal fin scaled only at the base, with a deep incision, lobes acute, upper lobe hardly longer than lower lobe, contained nearly 4 to $4\frac{1}{4}$ times in the length of the body. Colour: upper part of the body olive, lower part slightly olive to golden or silver; iris yellow; scales on back, flanks and tail each with a transverse, crescent-shaped, violet band at the base; fins yellowish or pink-greenish.

B. 3. D. $4/8$ or $4/9$ or $4/10$. P. $1/14$ or $1/15$. V. $2/8$. A. $3/5$ or $3/6$. C. $6/17/6$ or $7/17/7$, short flanking ones included.

Syn. *Barbus soro* Val., Poiss. XVI p. 144; Heck., Fisch Syr. p. 29; Blkr, Overz. ichth. faun. Sumatra, Nat. T. Ned. Ind. VIII p. 90.

Barbeau soro Val., Poiss. XVI p. 144.

Soro Sundan; *Wader* Javan.

Hab. Java (Darma, Garut, Surakarta, Banjubiru), in rivers and ponds.

Sumatra (Benkulan, Solok, Padang), in rivers.

Length of 8 specimens $90''$ to $290''$.

Remark. *Labeobarbus soro* is found in many places in the interior of Java and reaches a length of almost a meter. I have observed specimens of that size in the ponds of Darma, a pleasure-ground of the old sultans of Cheribon at the south-eastern foot of the Tjermai, as well as in the so-called blue-water (Banjoebiroe) in the residence Pasuruan. These fishes are often kept ³⁹² in ponds and very tame, so that they little shrink from people and come close to them to obtain food thrown to them. In many places, like in Banjubiru and Darma, they live in a kind of inviolability, as no native because of a kind of superstition will dare to take them out of the pond, while the fishes that leave the pond voluntarily are caught and consumed without any fear. This does not prevent however, that the soro in the ponds has dangerous enemies in some birds of prey, and

in the pond of Darma I saw various specimens, whose age was estimated by the inhabitants there as ca 100 years, with deep scars on the back, according to them the result of wounds inflicted by birds of prey.

Kuhl and Van Hasselt already recorded the Soro in the freshwater of Bantam.

However, the species was first described by Mr Valenciennes, but not extensive enough to distinguish it from its South Asiatic relative.

It is most closely related to *Barbus putitora* McCl., *Barbus hexagonolepis* McCl. and *Barbus macrocephalus* McCl. From the last mentioned species it is easy to distinguish by its relatively much shorter head; – from *Barbus hexagonolepis* by its much more pointed profile and ordinary shape of the visible part of the scales; – from *Barbus putitora* similarly by its much more pointed head, which in *Barbus putitora* would be very blunt. It would not seem superfluous to me that it should be compared to *Barbus putitora* in more detail, as it could be only a cultured or climatic variety of it. The distinction with which this species was treated and still is treated by the Javanese and especially by the distinguished Javanese, does not make it entirely improbable that in the Hindu age of Java this species was brought here from Hindustan, whereas it is also must be mentioned that this species also is found in the east of China.

Labeobarbus douronensis Blkr. –
Semah-Lipbarbeel [*Semah-Lip-barbel*].
Atl. Cypr. Tab. XXI.

A *Labeobarbus* with an oblong, compressed body, depth of body contained $4\frac{1}{4}$ to $4\frac{2}{3}$ times in its length, width contained about twice in its depth. Head slightly acutely convex, contained $5\frac{1}{2}$ to nearly 6 times in length of body with caudal fin, nearly 4 to $4\frac{1}{2}$ times in length of body without caudal fin; depth of head contained $1\frac{1}{2}$ to $1\frac{2}{3}$ times, width contained $1\frac{1}{2}$ to $1\frac{1}{2}$ times in its length; eye diameter contained 3 to $4\frac{1}{4}$ times in the length of the head, eye diameter contained $1\frac{1}{2}$ to 2 times in the postocular part of the head; distance between the eyes slightly more than once to $1\frac{3}{4}$ times their diameter; palpebral membrane covering the external margin of the iris only, broader anteriorly than posteriorly, the opening nearly circular; snout slightly acutely convex, not protruding anterior to the mouth, in younger animals shorter than the eye, in old animals longer than the eye; nostrils much closer to the orbit than to the tip of the snout; rostro-dorsal profile on head and nape convex; interorbital line convex or nearly straight; anterior suborbital bone obliquely pentagonal, length not or hardly larger than height, lower margin obliquely convex; anterior and posterior lower margins concave, anterior margin oblique, posterior margin nearly vertical, upper margins concave (posterior margin much shorter than anterior margin) united into an acute, upward pointing angle close to the nostrils, traversed around the middle by a longitudinal crest ascending posteriorly; 2nd suborbital bone obliquely 893 quadrangular, much higher anteriorly than posteriorly, length twice to much less than twice as great as depth, twice as low to much less than twice as low as 1st suborbital bone; upper jaw longer than lower jaw, strongly vertically downward protrusible, ending below the anterior margin of the eye or hardly anterior to the eye, contained 3 times to $3\frac{3}{4}$ times in the length of the head; gape slightly oblique; barbels thin, nasal barbels not to slightly longer than the eye, upper jaw barbels slightly to much longer than the eye; lower jaw at the symphysis with a conical, obtuse very conspicuous tubercle, underside without conspicuous pores; lips fleshy, transversely rugose on the oral surface, upper lip terete, not prolonged, lower lip broad, not lobed or lobed only over a very short distance, between the lateral folds behind the symphysis rather broadly fused with the lower jaw; gill cover ray-like rugose, width contained $1\frac{2}{3}$ to $1\frac{1}{2}$ times in its depth, lower margin nearly straight or slightly concave; gill opening ending below the posterior rim of the preoperculum. Pharyngeal teeth hooked to slightly spoon-shaped to grinding, 2.3.5/5.3.2, on the chewing surface rugose-tuberculate; scapula triangular,

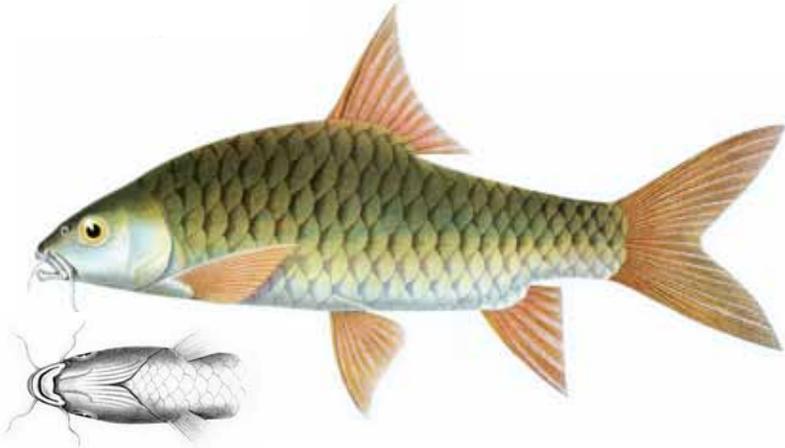


Fig. 106. *Labeobarbus douronensis* Blkr. Atl. Ichth. Cypr. Tab. XXI, Fig. 2. TL figure 276 mm.

obtusely rounded; belly flat anterior to ventral fins, angular at the flanks, behind ventral fins rounded, not ridged; back rather elevated, angular, higher than the belly; scales on the basal half and free half with longitudinal stripes or slightly ray-like stripes, 21 to 23 scales in the lateral line, 8 in a transverse row (without the lowest ventral scales) of which 4 ($3\frac{1}{2}$) above the lateral line, 7 or 8 in a longitudinal row between occiput and dorsal fin, lowest ventral scales in three longitudinal rows, scales in medial row gradually increasing in size posteriorly, scales in this row not larger than those in flanking rows; lateral line curved, slightly to not descending between the rostro-caudal line, each scale marked by a simple tube reaching or not reaching the centre of the scale; dorsal fin starting above or hardly anterior to the ventral fins, acute, emarginate, not much lower than the body, much less than twice as deep to nearly twice as high as base length, spine tapering, totally glabrous, with the flexible part slightly longer to not longer than the head; pectoral and ventral fins acute, pectoral fins slightly longer than ventral fins, contained $5\frac{1}{3}$ to $5\frac{3}{4}$ times in the length of the body, not or nearly reaching the ventral fins, ventral fins not reaching the anal fin; anal fin acute, not or hardly emarginate, in old animals slightly convex, not much lower than dorsal fin, much more than twice as high as base length, the simple third ray thin, bony only at the base; caudal fin scaled only at the base, with a deep incision, lobes acute, upper lobe slightly to not longer than lower lobe, contained nearly 4 to $4\frac{1}{2}$ times in the length of the body. Colour: upper part of the body olive, lower part olive-golden or silver; iris yellow or red; scales on back, flanks and tail each with a oblong, diffuse, transverse violetish spot on the base; fins yellowish-pink or red.

B. 3. D. $4/8$ or $4/9$ or $4/10$. P. $1/14$ to $1/16$. V. $2/8$. A. $3/5$ or $3/6$. C. $7/17/7$ or $8/17/8$, short flanking ones included.

Syn. *Barbus douronensis* val., Poiss. XVI p. 141; Blkr, Overz. Ichth. Faun. v. Sumatra, Nat. T. Ned. Ind. VII p. 91.

Barbeau douro Val., Poiss. XVI p. 141

Barbus douronensis Heck., Fisch. Syr. P. 29.

Barbus tambra Schl., Verh. Over de vereischten van Natuurk. afbeeldingen p. 45 fig. 11. Sore Sund.; Wader Jav, Sund.; Semah Benkul.

Hab. Java (Buitenzorg, Tjitjurup, Tjitarik), in rivers.

Sumatra (Benkulen, Telokbetong, Solok), in rivers.

Length of 20 specimens $98''$ to $350''$.

Remark. Build after the type of *Barbus soro* Val. and very closely related to it, *Labeobarbus douronensis* is distinguished from it principally by larger and less numerous scales on a longitudinal series. In specimens of medium age of both species it is moreover apparent, that in *Labeobarbus soro* the profiles ³⁹⁴ of head and back are stronger and more constantly convex, the body more slender and the upper jaw longer. Juvenile specimens of both species are difficult to distinguish in another way than by the number of scales.

I have no reasons for not placing my above described specimens in *Barbus dourou* Val. I keep this name, although it is based on a misconception. The name "dourr" referred to by Mr Valenciennes, neither is the name of a place, nor of a species, but probably a corruption of a "wader", under which name the Javanese indicate various species.

Labeobarbus douronensis together with *Labeobarbus tambra* is the species of the genus which has the least scales in a longitudinal series. However, it moreover differs from *Labeobarbus tambra* by the not worth mentioning development of the lip lobe, a higher body, a more angular back and higher head with simultaneously more acute, hardly more convex snout, etc.

I know this species as far as Java is concerned only from the western part of the island or so called Sunda-lands, where it mainly inhabits the mountain streams.

I also note here that the figure of Mr Schlegel, referred to above, to me seems to concern the species in question and not *Barbus tambra* Val., at least not *Labeobarbus tambra* according to my description.

HEMIBARBUS BLKT. –
FALSE BARBEL.

Body elongate, compressed, covered with large scales, back low, not higher than the belly. Jaws enclosed in terete, simple lips, upper jaw strongly downward protrusible. Barbels 2, upper jaw barbels. Snout not or hardly protruding anterior to the mouth. Anterior suborbital bone elongate, with an acute, forward pointing tip. Eyes not covered by palpebral membrane. Mouth slightly inferior, gape ending anterior to the eye, in shape reminding of a horse shoe when the mouth is closed. Anal sheath not covered with larger scales. Lateral line slightly curved. Belly not keeled. Dorsal fin starting anterior to ventral fins and ending far anterior to anal fin, with few rays, scaleless at the base, the posterior simple ray bony, without teeth. Anal fin shorter than dorsal fin. Pharyngeal teeth strongly acute 4/4.

Remark. The abovementioned writers of the Fauna Japonica have produced two Japanese Cyprinoids as *Gobio*, although neither of these two species can be placed in that genus. One *Gobio*, described and depicted under the name ³⁹⁵ of *Gobio esocinus* belongs to the genus *Pseudogobio* of the Labeonines. The other species, depicted and described under the name *Gobio barbus*, is more closely related to the genus *Gobio*, but is distinguished from it by its dorsal fin spine and single rowed pharyngeal teeth.

The genus in relationship stands between *Cyclocheilichthys* and *Barbus*. It would, be possible, also because of the shape of the anteriormost suborbital bone, to place it in the subgenus *Siaja* of *Cyclocheilichthys*, if the scale sheath of the dorsal fin and a branched ray in the anal fin were not lacking, characters whose weight is translated internally by only one row very sharp pharyngeal teeth.

From *Barbus*, at least from a series of species of this genus, the genus *Hemibarbus* differs externally only by the presence of only two barbels. I would consider it only as a subgenus of *Barbus* if not exactly also the dentition departed too much of *Barbus*.

Gobio barbatus T. Schl. till now is the only species that can be placed in *Hemibarbus*.

PSEUDOPHOXINUS Blkr. –
FALSE SMELT.

Body oblong, compressed, covered with small scales, back slightly elevated. Jaws enclosed in terete, simple lips. No barbels. Snout acute, convex, not or hardly protruding anterior to the mouth. Mouth anterior, gape slightly oblique, ending anterior to the eye. Jaws equal. Eyes superior, not covered by palpebral membrane. Anal sheath not covered with larger scales. Lateral line moderately curved. Belly not keeled. Dorsal fin starting behind ventral fins and ending rather far anterior to anal fin, with few rays, scaleless at the base, posterior simple ray bony, without teeth. Anal fin shorter than dorsal fin. Pharyngeal teeth with a rod-like neck 5/4.

Remark. I propose the genus *Pseudophoxinus* at the cost of the genus *Phoxinellus* Heck. in which Heckel placed two species which differ remarkably from each other. It differs from *Phoxinellus* by a totally different habitus of head and body, regular scales over the entire body and a bony not serrated dorsal spine. *Phoxinellus zeregi* Heck. is the only known species that can be placed in this genus till now.

ROHTEICHTHYS Blkr. –
SIRIDING CARP.

Body oblong, compressed, covered with small scales, back elevated, ³⁹⁶ angular. Jaws enclosed in terete, simple lips, upper lip hardly protrusible. No barbels. Snout short, not prolonged. Anterior suborbital bone nearly triangular, with an acute, forward pointing tip. Eyes not covered by palpebral membrane. Mouth anterior, gape medium-sized, oblique, ending anterior to the eye. Lower jaw with a tubercle at the symphysis, slightly hooked at the tip. Single postlabial groove parallel to the margin of the mouth. Branchial opening ending below the eye. Nuchal scales starting anterior to gill cover. Lateral line running along the middle of the flanks. Dorsal fin with few rays, starting behind the base of the ventral fins, at the base enclosed in a scaled sheath, posterior simple ray bony, serrated. Anal fin with few rays, shorter than dorsal fin. Anal sheath not covered with larger scales. Ventral fins 2/9. Caudal fin scaled only at the base. Pharyngeal teeth hooked to spoon-shaped 2.3.5/5.3.2.

Remark. I base this genus on the species which I earlier named *Systemus* and *Rohtee microlepis*. It is very closely related to *Rohtee* Syk., but differs primarily from it by the poorly rayed anal fin and wider gape. The formula of the anal fin rays = 3/5 or 3/6 is entirely that of *Systemus*, *Labeobarbus* and related genera, whereas that formula in *Rohtee* (= 17 to 47) answers more to that of *Abramis*.

Rohteachthys microlepis till now is the only known species of the genus.

Rohteachthys microlepis Blkr. –
Kleinschubbige Siriding-karper [Small scaled Siriding Carp].
Atl. Cypr. Tab XLVII.

A *Rohteachthys* with an oblong, compressed body, depth of body contained 3½ to 4 times in its length, width contained 2½ to 3 times in its depth. Head acute, contained slightly over 4 to 4½ times in length

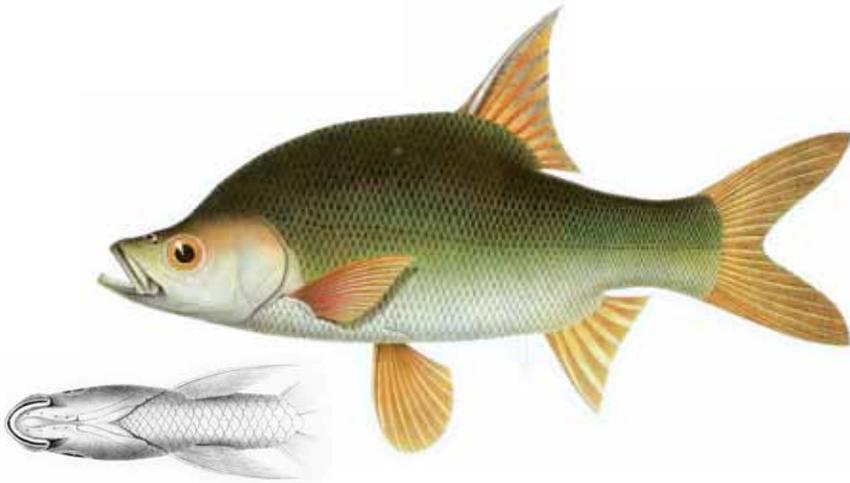


Fig. 107. *Rohteichthys microlepis* Blkr. Atl. Ichth. Cypr. Tab. XL, Fig. 3. TL figure 295 mm.

of body with caudal fin, $3\frac{2}{5}$ to $3\frac{3}{5}$ times in length of body without caudal fin, depth of head contained $1\frac{1}{5}$ to $1\frac{1}{2}$ times in its length, width $2\frac{1}{2}$ to $2\frac{1}{4}$ times; eye diameter contained 3 to 4 times in the length of the head, distance between the eyes nearly once to slightly more than once the eye diameter; palpebral membrane covering the external margin of the iris only, the opening circular; snout acute, slightly convex, in younger animals slightly shorter than the eye, in old animals not shorter than the eye, not protruding anterior to the snout; nostrils close to the orbit; rostro-dorsal profile strongly concave between snout and nape; interorbital line slightly convex; anterior suborbital bone triangular, tip acute, pointing forward, rounded posteriorly, length much greater than depth, with a longitudinal, nearly horizontal ridge on the lower half; 2nd suborbital bone 3 times to more than 3 times as low as 1st suborbital bone; upper jaw slightly shorter than lower jaw, strongly downward and forward protrusible, contained about $2\frac{2}{5}$ times in the length of the head, ending slightly anterior to the eye or below the anterior margin of the eye; gape strongly oblique; lower jaw strongly ascending, at the symphysis with a slightly conical, low tubercle; lips broad, especially the lower lip, thin, simple; lower jaw on the lower part of each branch with 6 to 8 conspicuous pores, ³⁹⁷ placed in one longitudinal row; width of gill cover contained $1\frac{1}{2}$ to $1\frac{3}{4}$ times in its height, lower margin slightly convex or nearly straight; gill opening ending below the pupil. Pharyngeal teeth hooked to spoon-shaped to grinding, 2.3.5/5.3.2; scapular bone triangular, obtuse; back strongly elevated, angular, much higher than the belly; belly flat anterior to the ventral fins, angular at the flanks; behind the ventral fins acutely ridged; scales without longitudinal stripes or with hardly visible longitudinal stripes, 70 to 72 scales in the lateral line, 26 or 27 in a transverse row (without the lowest ventral scales) of which 13 or 14 above the lateral line, 28 to 30 in a longitudinal row between occiput and dorsal fin, lowest ventral scales in five longitudinal rows, nearly equal in size; lateral line nearly straight, sloping downward only anteriorly, not descending below the rostro-caudal line, each scale marked by a short, simple tube generally surpassing the centre of the scale; dorsal fin placed between ventral fins and anal fin, closer to anal fin than to ventral fins, acute, emarginate, depth contained $1\frac{1}{4}$ to $1\frac{1}{2}$ times in the depth of the body, much higher than base length, spine thick, posteriorly serrated with large teeth, with the flexible part no shorter or not much shorter than the head; pectoral fins slightly acutely rounded, ventral fins slightly obtusely rounded, nearly equal in length, contained $5\frac{1}{2}$ to 6 times in the length of the body, pectoral fins reaching or slightly surpassing the base of the ventral fins; anal fin acute, emarginate, about twice as low as the body, much less than twice as high as base length, the simple third ray bony only on the basal half; caudal fin scaled only at the base, with a deep incision, lobes acute,

contained $3\frac{3}{8}$ to more than 4 times in the length of the body. Colour: upper part of the body faintly green, lower part silver; iris yellow; tail with a round, blackish, diffuse spot close to the middle of the base of the caudal fin; fins yellowish- pink, dorsal fin with a margin of dense, dark speckles.

B. 3. D. 4/8 or 4/9. P. 1/15. V. 2/9. A 3/5 or 3/6. C. 6/17/16 or 7/17/7, the short flanking ones included.

Syn. *Barbus microlepis* Blkr, Bijdr. ichth. Borneo, Nat. Tijdschr. Ned. Ind. I p. 12.
Systemus microlepis Blkr, Derde bijdr. ichth. Borneo, Nat. T. Ned. Ind. II p. 60.
Rohtee microlepis Blkr, Enum. spec. pisc. Arch. Ind. p. 153.

Hab. Borneo (Bandjermasin), in rivers.
 Sumatra (Lahat, Palembang), in rivers.

Length of 3 specimens 95''' to 308'''.

Remark. The physiognomy of this species in many ways is similar to that of *Rohtee Vigorsii* Syk., however according to my present view it belongs to a proper generic type, primarily because of its little rayed anal fin.

I described it originally in March 1850, after a juvenile specimen of only 95''' length from Bandjermasin, under the name of *Barbus microlepis* and placed it later in the genus *Systemus*. Since then I received a few larger ad excellent preserved specimens, which enabled me to remarkably improve my earlier description in many ways.

ROHTEE Syk.,
 Fish of the Dukhun, Transact. Zoöl. Soc. II p. 364 =
 OSTEORAMA Heck., Fisch. Syr. p. 43. –
 ROHTEE.

Body oblong, compressed, covered with small or medium-sized scales, back angular. Jaws enclosed in terete, simple lips. No barbels. Snout short, not prolonged. Eyes not covered by palpebral membrane. Mouth anterior or slightly anterior, gape short, oblique, ending ³⁹⁸ anterior to the eye. Lower jaw with a tubercle at the symphysis, slightly hooked at the tip. Gill opening wide. Nuchal scales starting above or anterior to gill cover. Lateral line running along the middle of the flanks. Dorsal fin with few rays, starting above or behind the base of the ventral fins, posterior simple ray bony, serrated. Anal fin elongate, with many rays. Anal sheath not covered with larger scales. Caudal fin scaled only at the base. Pharyngeal teeth spoon-shaped, 2.3.5/5.3.2.

Remark. Colonel Sykes erected this genus in the year 1838 in his treatise "on the Fishes of the Dukhun" however he gave it the following insufficient definition: "Carpus with a lozenge shaped body, rather long dorsal and anal fins, the former seated on the angle of the back, with the first complete ray serrated posteriorly; scales minute". He placed four species from Deccan in it, i.e. *Rohtee Ogelbii* Syk., *Rohtee Vigorsii* Syk., *Rohtee pangut* Syk. and *Rohtee ticto* Syk. The two last mentioned species answer not even to the definition, which Mr Sykes himself gave of his genus *Rohtee* and indeed belong to the genus *Systemus*, as it is defined in this work.

Heckel reformed the genus *Rohtee* of Mr Sykes and gave it the name *Osteobrama* with a more distinct definition as follows: "dentes cochleariformes 2.3.5/5.3.2. Os subinferum, obliquum; labia teretia; cirri nulli. Pinna dorsalis brevis, radio osseoserrato, vel ante super pinnas ventrales incipiens; analis basi nelongata. Corpus compressum. Tractus intestinalis 2 long. Corp." [teeth spoon-shaped 2.3.5/5.3.2. Mouth slightly inferior, oblique, lips terete, no barbels. Dorsal fin short with a bony, serrated ray, beginning

in front of or above the ventral fins. Intestinal tract 2-2½ times as long as the body.] Heckel placed in this genus both species of Rohtee depicted by Mr Sykes, as well as *Cyprinus cotis* Buch.

On p 56 of the 17th volume of the large *Histoire naturelle* Mr Valenciennes similarly described a species of Rohtee under the name *Leuciscus Duvaucelii*, however, in fig. 488 depicted under the name *Leuciscus Alfredianus* and under this name also mentioned in the table of contents of the 17th volume, which species is a totally different one from that which in the same volume on p 71 similarly is described under the name *Leuciscus Duvaucelii* and depicted on tab 491. I am surprised that Mr Valenciennes has placed *Leuciscus Duvaucelii* on p. 58 in his genus *Leuciscus*, as he himself says of it “Le premier rayon de la dorsale est fort et un peu dentelé.” [the first ray of the dorsal fin is strong and slightly serrated] As I have demonstrated it can be placed in *Systemus*.

I am inclined to accept that *Leuciscus rhomboidalis* Val. described after a Chinese illustration, similarly belongs to Rohtee.

For the rest the five species differ still rather considerably from each other. The formula of the anal fin rays differs considerably = 47?, 36, 36, 28 and 17. ³⁹⁹ The number of scales seems to vary between 50 and more than 70. The snout varies from rather blunt and convex to pointed, and the mouth opening from more or less inferior to entirely terminal.

ACANTHOBARAMA Heck., Fisch. Syt. p. 43 =
TRACHIBRAMA Heck. –
SPINE BREAM.

Body oblong, compressed, covered with medium-sized or small scales, back angular. Jaws enclosed in terete, simple lips, upper jaw slightly protrusible. No barbels. Snout short, not prolonged. Mouth anterior, gape oblique. Anal sheath not covered with larger scales. Belly not keeled. Dorsal fin with few rays, starting behind the base of the ventral fins, posterior simple ray bony, without teeth. Anal fin with many rays, longer than dorsal fin. Lateral line moderately curved. Nuchal scales starting above gill cover or preoperculum. Pharyngeal teeth with a rod-like neck 5/5, smooth.

Remark. This genus forms a link between the Barbels and the Breams. Heckel has made known four species from Syria, *Acathobrama marmid*, *Acanthobrama cupida*, *Acanthobrama centisquama* and *Acanthobrama arrhada*. Mr Basilewski has added to this two more species from China and Mongol, under the names *Abramis pekinensis* and *Abramis mantschuricus*, which species mainly distinguish themselves by larger scales from the Syrian ones.

RHODEUS Ag.,
Mem. Neuchat. I 1836; Heck., Fisch. Syr. p. 26.; Heck. Kner, Fisch. oestr. Mon. p. 100. –
BITTERLING.

Body oblong, compressed, covered with large scales, back and elevate belly convex. Jaws enclosed in terete, simple lips. No barbels. Snout obtuse, short, convex, not protruding anterior to the mouth. Mouth nearly terminal, gape small, oblique. Anal sheath not covered with larger scales. Belly not keeled. Dorsal fin slightly elongate, but with few rays, starting behind ventral fins and ending above anal fin, posterior simple ray bony, without teeth. Anal fin equal in length to dorsal fin, with few or

with many rays. Lateral line visible only on the anterior part of the body. Nuchal scales starting behind the eye. Pharyngeal teeth knife-like 5/5.

400 Remark. The genus *Rhodeus* to me seems to be most closely related to *Acanthobrama* Heck., from which it differs only by the relatively long dorsal fin with very slender spine, the short, only in the posterior shoulder area visible lateral line and by the knife-like shape of the pharyngeal teeth.

The latest diagnosis of the genus known to me is that of Heckel and Kner in their work on the fishes of the Austrian monarchy. There they presented illustration of the only known species of the genus with regard to the dorsal fin does not answer to the diagnosis of Heckel and Kner, as this fin starts behind the pelvic fins and is even largely situated above the anal fin. The figure of *Rhodeus amarus* Ag. in Bloch seems to be more accurate concerning this.

CHANODICHTHYS Blkr. = LEPTOCEPHALUS Basil.,

Ichth. Chin. Boreal in Nouv. Mém. Soc. Impér. Natural. Moscou X 1855 p. 234. –

BANDANG CARP.

Body oblong-elongate, compressed, covered with medium-sized scales, unequal in size, back angular. Jaws enclosed in terete, simple lips. No barbels. Snout acute. Mouth anterior, gape oblique. Lower jaw not protruding anterior to upper jaw, low, not hooked at the symphysis. Dorsal fin starting above or hardly behind ventral fins and ending far anterior to anal fin, posterior simple ray bony, without teeth. Anal fin with many rays, longer than dorsal fin. Swimbladder trilobed. Lateral line slightly curved. Nuchal scales starting above gill cover. Anal sheath not covered with larger scales.

Remark. The genus *Chanodichthys* in relationship stands between *Acanthobrama* and *Culter*. Mr Basilewski mentions it under the name *Leptocephalus* Pall., a name unknown to me as a Cyprinoid genus and also not included in the Nomenclator of Mr Agassiz and which moreover became current as a genus from the Helmichthyoid family. Therefore I had to choose another genus name which I have derived from the undeniable resemblance in habitus of the typical species (*Leptocephalus mongolicus* Basil.) to the genus *Chanos*. It seems to me that *Leuciscus aethiops* Basil. despite its shorter anal fin belongs to *Chanodichthys* as well or at least to a very closely related type.

401 PSEUDOCULTER Blkr. –

THORN-KNIFE CARP.

Body elongate, compressed, covered with medium-sized scales, back low. Jaws enclosed in terete, simple lips. No barbels. Snout short, not prominent. Mouth superior, gape slightly vertical. Lower jaw protruding anterior to upper jaw, narrow. Belly not ridged. Dorsal fin starting behind ventral fins and ending anterior to anal fin, posterior simple ray bony, without teeth. Anal fin with many rays, longer than dorsal fin. Lateral line running along the middle of the flanks, hardly curved. Anal sheath not covered with larger scales. Swim-bladder bilobed.

Remark. I exclude *Culter pekinensis* Basil. and *Culter exiguus* Basil. from the genus *Culter* based on the not keeled belly, the hardly curved lateral line that is situated on the

middle of the flank, and the bipartite swimbladder, characters, probably accompanied by others of importance, which cannot be gathered from the short description of Mr Basilewski. The known ones however, are in themselves already of enough value to place these species in a genus different from Culter. It seems to be closely related to Chanodichthys.

HEMICULTER Blkt. –
BONE-KNIFE CARP.

Body elongate, compressed, covered with medium-sized or small scales, back low. Jaws enclosed in terete, simple lips. No barbels. Snout short, not prominent. Mouth anterior or slightly superior, gape oblique. Lower jaw hardly protruding anterior to upper jaw. Belly not ridged. Dorsal fin starting behind ventral fins and ending anterior to anal fin, posterior simple ray bony, without teeth. Anal fin truncated. Lateral line maximally down-folded anteriorly, next very close to the ventral line, curved upward posteriorly. Anal sheath not covered with larger scales. Swim-bladder bilobed.

Remark. The species briefly described by Mr Basilewski under the name Culter leucisculus is neither a Culter, nor a Pseudoculter. It must differ from the species of these genera as Mr Basilewski expresses himself “nucha non abbreviata, maxilla inferiore Leucisco simili” [nape not shortened, lower jaw similar to Leuciscus], whereas the “pinna analis abbreviata” [the shortened anal fin] and the strongly curved lateral line, just like in Chela, similarly makes them depart remarkably from it. Therefore I have provisionally ⁴⁰² placed it under a proper genus name, which genus I suspect, after a more detailed knowledge of the species, to be a natural one.

AULOPYGE Heck.,
Fish. Syr. p. 31: Susswasserf oestreich. Monarch. p. 95. –
UKLIVA or OSTRUL.

Body oblong or elongate, compressed, not covered with scales. Jaws enclosed in terete, simple lips. Barbels 4, nasal and upper jaw barbels. Snout acute, prominent. Simple nostrils on both sides. Gape inferior, in shape reminding of a horse shoe, when the mouth is closed. Lower jaw shorter than upper jaw. Dorsal fin starting above ventral fins and ending anterior to anal fin, posterior simple ray bony, serrated. Anal fin shorter than dorsal fin. Pharyngeal teeth scalpriform 4/4. Female with a fleshy process attached to the first rays of the anal fin, perforated by urogenital and anal canal.

Remark. Of this peculiar genus till now is only known the species, first described and depicted by Heckel in the above named work under the name Aulopyge Hügeli. The female of Aulopyge has a cloaca tube anterior in the anal fin from which the generic name is derived.

MEDA Gir.,
Cypr. Fish. Unit. Stat., Proceed. Acad. Nat. Sc. Philad. VIII p. 191. –
BARE CARP.

Body oblong, compressed, bare, scaleless. Jaws enclosed in terete, simple lips. No barbels. Snout not or hardly protruding anterior to the mouth. Mouth nearly terminal, with an oblique gape ending below the eye. Eyes superior, not covered by palpebral membrane. Lateral line hardly curved. Belly not keeled.

Dorsal fin with few rays, starting slightly behind ventral fins, posterior simple ray solid, bony, posteriorly grooved but without teeth. Anal fin? Isthmus narrow. Pharyngeal teeth thin, prehensile, 1.4/4.1, no chewing surface.

Remark. *Meda* seems to be a natural and peculiar genus, which however, just like the *Meda fulgida* Gir., the only known species, was only briefly described by Mr Girard. Neither from the genus nor from the species anything is mentioned concerning the anal fin. In habitus the genus seems to resemble *Phoxinus* and *Phoxinella*.

403 *CHEDRUS* Swains.,

Nat. Hist. Fish. II (1839) p. 285 = *Pachystomus* Heck., Fisch. Syr. p. 48. partly. –
CELL-JAW CARP.

Body oblong or slightly elongate, compressed, covered with large scales, back low. Jaws covered by lips, upper jaw slightly protrusible. No barbels. Snout convex, not protruding anterior to the mouth. Mouth anterior, gape oblique, ending anterior to or below the eye. Eyes superior, not covered by palpebral membrane. Snout and jaws with very densely packed, hexagonal cells. Suborbital bones maximally developed. Scapular bone maximally developed. Thoracic triangle scaleless. Lateral line moderately curved. Belly not keeled anterior to ventral fins. Dorsal fin with few rays, starting behind ventral fins and ending above the beginning of the anal fin, with few rays, posterior simple ray cartilaginous. Anal fin with few rays, not longer than dorsal fin. Pharyngeal teeth hooked with a rod-like neck 4.5/5.4.

Remark. Swainson erected this genus based on the species depicted in the illustrations of Indian Zoology under the name *Cyprinus chedra* Hamilt., but he described it only with a few words "Jaws equal; tuberculated; dorsal fin placed very near to the caudal". The species itself he named *Chedrus Grayi*.

The honey-comb-like cells, not only on the snout, but also on the lips or jaws, the chest area being partly scaleless and the extraordinary development of the suborbital bones and of the scapula, in my opinion give every right in relation to the remaining characters to see in *Chedrus* a very natural genus that can be sharply distinguished from related ones like *Leuciscus*, *Alburnus* etc.

Heckel did not seem to have noted the genus *Chedrus* Swans. and placed the species which belonged to it, in his genus *Pachystomus*. This genus however is not acceptable as too indefinitely described. In any case the name *Chedrus*, which was already proposed in the year 1839, should be retained. Heckel placed 8 species in his genus *Pachystomus*, however, knew none of these from nature. Those species therefore belong partly to *Chedrus* and partly to *Morara* and the subgenus *Shacra* of the genus *Opsarius*.

PLARGYRUS Raf.,

Ichth. Oh.; Gir., Cypr. Fish. Un. Stat. Proc. Ac. Nat. Sc. Phil. VIII p.195. –
HYPSOLEPIS Baird. – BARE-BREST CARP.

Body oblong or slightly elongate, compressed, covered with large, high, short scales, **404** back rather elevated. Jaws equal, covered by thin, simple lips. No barbels. Snout convex, not protruding anterior to the mouth. Mouth anterior, gape medium-sized, oblique, ending anterior to the eye. Eyes superior, not covered by palpebral membrane. Lateral line slightly curved. Belly not keeled. Dorsal fin with few rays, starting above or anterior to ventral fins and ending anterior to the anal fin, with few rays, posterior

simple ray completely cartilaginous. Anal fin with few rays, not or only slightly longer than dorsal fin. Thoracic region scaleless. Isthmus narrow. Pharyngeal teeth prehensile, compressed 2.4/4.2., provided with a chewing surface.

Remark. Judging from the beautiful illustration of *Leuciscus frontalis* Ag., which is placed in *Plargyrus*, *Plargyrus* is related to *Chedrus* Swns. Both because of the bareness of the chest and the large pores or cells on the forehead, snout and lower jaw. Mr Girard sums up 6 species of this genus, however from none of these species I find anything described about the being scaled or not scaled of the chest area, which therefore must be further investigated.

CATLA Val.,

Hist. nat. poiss. XVII p. 305 = GIBELION Heck., Fisch. Syr. p. 24 ex parte =
SPOON-JAW CARP.

Body oblong, compressed, covered with large scales, back elevated, angular. Jaws covered by thin, simple lips. No barbels. Snout acute, slightly depressed, not protruding anterior to the mouth. Anterior suborbital bone oblong-rounded, on the longitudinal diameter nearly horizontal. Other suborbital bones thin. Mouth anterior, oblique gape ending anterior to the eye. Upper jaw not emarginate at the symphysis, moderately protrusible. Lower jaw with wide, slightly spoon-shaped branches, not shorter than upper jaw, symphysis without tubercle. Single postlabial groove parallel to the free margin of the lower jaw, in shape reminding of a horse shoe. Lower lip back-folded, hanging from the total free margin of the jaw. Eyes superior, not covered by palpebral membrane. Belly not keeled. Dorsal fin starting above or hardly anterior to ventral fins and ending anterior to anal fin, scaleless at the base, posterior simple ray totally cartilaginous. Pectoral fins shorter than the head. Anal fin with few rays, much shorter than dorsal fin. Lateral line strongly curved. ⁴⁰⁵ Gill opening wide, ending below the eye. Gill covers not rugose. Pharyngeal teeth masticatory, aggregated, on the chewing surface obliquely truncate, flat, at the tip lightly hooked, 2.4.5/5.4.2.

Remark. The genus *Catla* was proposed by Mr Valenciennes, and indeed can be considered as a very natural genus. It is related to my genera *Thynnichthys* and *Hypophthalmichthys*, however easy to separate from these by its many rayed dorsal fin and the lower lip which is folded back along the entire edge of the jaw. Some specimens which I possess have given me the opportunity to take the above mentioned characters from nature. As a generic character probably can be added the posteriorly triangular relatively very broad upper jaw bone.

HYPHOPHTHALMICHTHYS Blkr. –

LOW-EYE CARP.

Body oblong or slightly elongate, compressed, covered with medium-sized scales, back elevated, angular. Jaws covered by thin, simple lips. No barbels. Snout acute, slightly depressed, not protruding anterior to the mouth. Anterior suborbital bone oblong-oval or triangular, directed obliquely downward and backward. Mouth anterior [terminal], oblique gape ending anterior to the eye. Upper jaw not emarginate at the symphysis, moderately protrusible. Lower jaw with elevated branches, longer than upper jaw, with a hardly visible tubercle at the symphysis. Eyes posterior or inferior, not covered by palpebral membrane. Belly not keeled. Dorsal fin starting behind ventral fins and ending anterior to anal fin, scaleless at the base, with few rays, posterior simple ray totally cartilaginous. Pectoral fins shorter than the head. Anal fin with many rays, much longer than dorsal fin. Lateral line strongly curved. Gill covers strongly ray-like rugose.

Remark. I base the genus *Hypophthalmichthys* on three closely related East- Asiatic species, known in science under the names *Leuciscus molitrix* Val., *Leuciscus nobilis* Gray and *Cephalus mantschuricus* Basil.

The genus belongs to the group of *Catla* and *Thynnichthys*, but distinguishes itself; - from the first by the short dorsal fin, which starts behind the pelvic fins and the on the contrary multi-rayed anal fin, which is much longer than the dorsal fin (which in *Catla* is exactly the reverse) and probably also by the differently formed posterior lip groove; - 406 from *Thynnichthys*, to which it is most closely related, similarly because it has a dorsal fin that starts behind the pelvic fin and is much shorter than the anal fin, by wrinkly radiated gill covers, a strongly curved lateral line, totally posterior to even inferior eyes and the prognathous lower jaw.

THYNNICHTHYS Blkr. –
TUNNY CARP.

Body oblong-elongate, compressed, covered with medium-sized scales, back elevated, angular. Jaws covered by thin, simple lips. No barbels. Snout acute, slightly depressed, not protruding anterior to the mouth. Anterior suborbital bone nearly triangular, tip pointing downward. Mouth anterior, oblique gape ending anterior to the eye. Upper jaw not emarginate at the symphysis, moderately protrusable. Lower jaw with slender branches, slightly obliquely compressed, not shorter than upper jaw, with a small tubercle at the symphysis. Postlabial groove on both sides parallel to the free margin of the jaw, not united with the groove on the opposite side. Eyes posterior or slightly superior, not covered by palpebral membrane. Belly not keeled. Dorsal fin starting above or hardly anterior to ventral fins and ending far anterior to anal fin, scaleless at the base, with few rays, posterior simple ray totally cartilaginous. Pectoral fins shorter than the head. Anal fin with few rays, shorter than dorsal fin. Lateral line hardly curved. Gill opening ending below gill cover. Gill covers not rugose. Pharyngeal teeth masticatory, aggregated, on the chewing surface obliquely truncate, flat, 2.4.5/5.4.2.

Remark. I base the genus *Thynnichthys* on two species from Borneo and Sumatra, which are remarkable because of their Tuna-like habitus. In relationship the genus is close to *Catla*. The small mouth slit, the not concave upper jaw and not hook-like lower jaw, and the pavement-like pharyngeal jaw teeth point at its more peaceful habits than those of *Rasbora*, *Opsarius*, *Aspius*, etc. For the rest it differs from *Catla* in several characters. In *Catla* the dorsal fin is multi-rayed (4/14 or 4/15), the lower jaw strongly developed and has adopted a spoon-like shape, the lower lip is broad and folded downwards from the entire free edge of the lower jaw, while the very broad gill opening runs till below the eyes and the pharyngeal teeth, although they belong to the *dentis aggregati*, have the masticating surfaces slightly concave and the points somewhat hook-like.

Both my species can be recognized as follows.

- 407 I. 70 to 75 scales in the lateral line, 17 or 18 above the lateral line. Depth of body contained $4\frac{1}{4}$ to $4\frac{2}{5}$ times in its length.

Thynnichthys polylepis Blkr.

- II. 58 to 60 scales in the lateral line, 12 above the lateral line. Depth of body contained about 5 times in its length.

Thynnichthys thynnoides Blkr.

Thynnichthys polylepis Blkr. –
Veelschubbige Tonijnkarper [*Much scaled Tunny Carp*].
 Atl. Cypr. Tab. LI fig. 4.

A *Thynnichthys* with an oblong, compressed body, depth of body contained $4\frac{1}{4}$ to $4\frac{2}{5}$ times in its length, width contained slightly over 3 times in its depth. Head acute, not convex, contained $4\frac{2}{5}$ to $4\frac{3}{5}$ times in length of body with caudal fin, $3\frac{1}{3}$ to $3\frac{1}{2}$ times in length of body without caudal fin, crown scaleless; depth of head contained $1\frac{1}{3}$ to $1\frac{1}{4}$ times in its length, width 2 to slightly over 2 times in its length; eyes slightly posterior, eye diameter contained 3 to $3\frac{3}{4}$ times in the length of the head, eye diameter contained $1\frac{1}{3}$ to nearly 2 times in the postocular part of the head, distance between the eyes once to $1\frac{1}{3}$ times their diameter; palpebral membrane covering the external margin of the iris only, broader anteriorly than posteriorly, the opening nearly circular; rostro-dorsal profile on the head sloping, on the forehead not or hardly concave, on nape and back convex; interorbital line convex; snout acute, not convex, in younger animals considerably shorter than the eye, in old animals slightly shorter, tip located anterior to the middle of the eye, anterior profile rounded, slightly crescent-shaped; nostrils not or hardly closer to the orbit than to the tip of the snout, posterior nostrils hardly twice as large as anterior nostrils; anterior suborbital bone triangular or slightly pentagonal-heart-shaped, width larger than length (height), base pointing upward and slightly forward, sides convex or with an obtuse angle, united into a slightly acute downward and backward pointing angle, no visible crest; 2nd suborbital bone elongate-quadrangular, much higher anteriorly than posteriorly, length more than twice as great as height; about twice as low as 1st suborbital bone; 3rd and 4th suborbital bones low, 3rd bone broader than 4th bone, far removed from the posterior margin of the preoperculum; jaws equal, oral margins acute especially anteriorly; upper jaw thin, hidden below nasal bones, moderately downward protrusible, not emarginate at the symphysis, ending anterior to the eye, contained $4\frac{1}{2}$ to 5 times in the length of the head; lower jaw not emarginate towards the symphysis, symphysis itself hardly tuberculate or hooked; branches slightly obliquely compressed, underside with little conspicuous pores in one longitudinal row; lips thin, without conspicuous transverse stripes, groove in the upper lip ending slightly anterior to the angle of the mouth, groove of lower lip extending from the angle of the mouth to the inframaxillary symphysis, gape moderately oblique; width of gill cover contained $1\frac{1}{3}$ to $1\frac{2}{3}$ times in its depth, lower margin nearly straight; gill membrane behind the gill cover prolonged into an obtusely rounded lobe; gill opening ending below the anterior part of the gill cover. Pharyngeal teeth aggregated, 2.4.5/5.4.2, each strongly compressed, with an obliquely truncate, flat chewing surface; dorsal line of the body higher than convex ventral line; belly

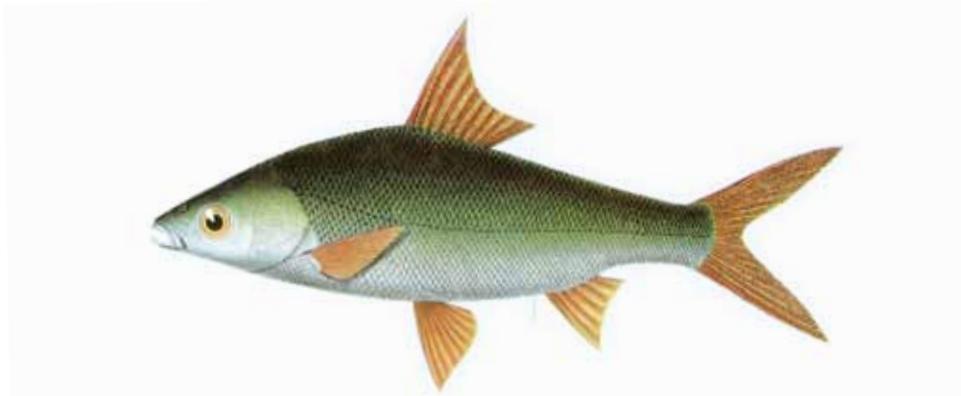


Fig. 108. *Thynnichthys polylepis* Blkr. Atl. Ichth. Cypr. Tab. XLI, Fig. 1. TL figure 173 mm.

flat anterior to ventral fins, behind ventral fins rounded, not ridged; scales nearly vertical, unequal in size on the total body, dorsal scales not smaller than those on the flanks, with numerous concentric stripes, well visible with the aid of a lens, on the basal half no longitudinal stripes visible with the naked eye, on the free half none or sparse stripes, 70 to 75 scales in the lateral line, about 33 in a transverse row (without the lowest ventral scales) of which 17 or 18 above the lateral line, about 30 in a longitudinal row between the occiput and the dorsal fin, lowest ventral scales in 7 to 9 longitudinal rows, 408 scales in all rows unequal in size; lateral line curved anteriorly, broad, obliquely descending to a point behind the ventral fins, nearly straight posteriorly, not much closer to the base of the ventral fins than to the dorsal line, each scale marked by a simple tube generally surpassing the centre of the scale; scapular bone triangular, obtusely rounded; dorsal fin starting hardly anterior to ventral fins, scaleless at the base, acute, emarginate, not lower or not much lower than the body, much deeper but much less than twice as high as base length, simple 4th ray thin, cartilaginous, not much shorter than the head; pectoral fins scaleless at the base, acute, not or hardly longer than ventral fins, contained 6½ to 7 times in the length of the body, not reaching the ventral fins, the simple ray thin; ventral fins inserted in the lowest part of the belly, acute, not reaching the anal fin; anal fin scaleless, acute, emarginate, considerably less than twice as low as dorsal fin, rather much less than twice as high as base length, the simple third ray slender, cartilaginous; caudal fin scaled only at the base, with a deep incision, lobes acute, lower lobe slightly longer than upper lobe, contained 3% to 3½ times in the length of the body. Colour: upper part of the body bluish-green, lower part silver; iris yellowish, upper part dark; lobe of gill membrane with a dark postopercular spot; fins faintly pink, dorsal and caudal fin more or less speckled with dark.

B. 3. D. 4/8 or 4/9 or 4/10. P. 1/17 or 1/18. V. 2/8. A. 3/5 or 3/6. C. 7/17/8 or 6/17/7, short flanking ones included.

Hab. Sumatra (Palembang), in rivers.

Borneo (Pontianak), in rivers.

Length of 3 specimens 88''' to 181'''.

Remark. In my contributions to the ichthyology of Borneo, the species in question is mentioned (not described) as *Leuciscus thynnoides*. Till now I did not receive *Thynnichthys thynnoides* from Borneo and the mentioning of it amongst the fishes of Borneo was based on the fact that I had not examined the species in question in detail and took it for the same as *Thynnichthys thynnoides*. However it certainly is different from the last mentioned, and distinguished by remarkably more scales on a longitudinal and a transverse row and moreover by a higher body and a higher and less acute head.

Thynnichtys thynnoides Blkr. –

Slanke Tonijnkarper [*Slender Tunny Carp*].

Atl. Cypr. Tab. LI fig. 2.

A *Thynnichthys* with an oblong, compressed body, depth of body contained about 5 times in its length, width contained about twice in its depth. Head acute, not convex, contained about 4½ times in length of body with caudal fin, about ¾ times in length of body without caudal fin, crown scaleless; depth of head contained 1½ times, width contained slightly over 2 times in its length; eyes slightly posterior, eye diameter contained about 4 times in the length of the head, eye diameter contained about twice in the postocular part of the head, distance between the eyes about 1½ times their diameter; palpebral membrane covering the external margin of the iris only, broader anteriorly than posteriorly, the opening nearly circular; rostro-dorsal profile sloping on the head, slightly concave on the forehead, on nape and back convex; interorbital line convex; snout acute, not convex, not or hardly shorter than the eye, tip located anterior to the middle of the eye, anterior profile rounded with an

obtuse angle; nostrils hardly closer to the orbit than to the tip of the snout, posterior nostrils hardly twice as large as anterior nostrils; anterior suborbital bone triangular heart-shaped, width slightly larger than length (height), base upward and slightly forward pointing; sides convex, united into a rounded, downward and backward pointing angle, middle traversed by a longitudinal crest, the underside sprouting branches and descending downward and backward; 2nd suborbital bone elongate-quadrangular, much higher ⁴⁰⁹ anteriorly than posteriorly, length more than twice as great as depth, about twice as low as 1st suborbital bone; 3rd and 4th suborbital bones low, 3rd bone broader than 4th bone, far removed from the posterior margin of the preoperculum; jaws equal, oral margins acute especially anteriorly; upper jaw thin, hidden below the nasal bones, moderately downward protrusible, not emarginate at the symphysis, ending anterior to the eye, contained slightly over 4 times in the length of the head; lower jaw not emarginate towards the symphysis, symphysis itself hardly tuberculate, not hooked; branches slightly obliquely compressed, lower part without visible pores; lips thin, without visible transverse stripes, groove in the upper lip ending slightly anterior to the angle of the mouth, groove of lower lip extending from the angle of the mouth to the symphysis of the lower jaw; gape moderately oblique; width of gill cover contained about 1 $\frac{3}{5}$ times in its height, lower margin nearly straight; gill membrane behind the gill cover prolonged into a rounded lobe, ; gill opening ending below the anterior part of the gill cover. Pharyngeal teeth aggregated 2.4.5/5.4.2, each strongly compressed, with an obliquely truncate, flat chewing surface; dorsal line of the body convex, higher than convex ventral line; belly flat anterior to ventral fins, behind ventral fins rounded, not ridged; scales nearly vertical, dorsal scales hardly smaller than those on the flanks, scales on the flanks unequal in size everywhere on the body, with numerous concentric stripes, well visible with the aid of a lens, on the basal half no longitudinal stripes visible with the naked eye, on the free half none or sparse stripes, 58 to 60 scales in the lateral line, 20 or 21 in a transverse row (without the lowest ventral scales) of which 12 above the lateral line, about 25 in a longitudinal row between occiput and dorsal fin; lateral line anteriorly with a broad curve, strongly obliquely descending to a point behind the ventral fins, nearly straight posteriorly, not much closer to the base of the ventral fins than to the dor-



Fig. 109. *Thynnichthys thynnoides* Blkr. Atl. Ichth. Cypr. Tab. XLII, Fig. 1. TL figure 131 mm.

[N.B. In the Atlas Ichthyologie Cypr. Tab XIX, Fig. 2, a second, larger specimen of this species is figured as well.]

sal line, each scale marked by a simple tube reaching or surpassing the centre of the scale; scapular bone triangular, obtusely rounded; dorsal fin starting above ventral fins, scaleless at the base, acute, emarginate, hardly lower than the body, much higher than base length but much less than twice as high, the 4th ray simple, thin, cartilaginous, considerably shorter than the head; pectoral fins scaleless at the base, acute, not longer than ventral fins, nearly reaching ventral fins, contained about 7 times in the length of the body, the simple ray slender; ventral fins inserted in the lowest part of the belly, acute, not reaching the anal fin; anal fin scaleless, acute, emarginate, much lower than dorsal fin, but much less than twice as low, much higher than base length, but much less than twice as high, the simple third ray thin, cartilaginous; caudal fin scaled at the base, with a deep incision, lobes acute, lower lobe slightly longer than upper lobe, contained about 4 times in the length of the body. Colour: upper part of the body bluish-green or olive, lower part silver; iris yellowish, upper part dark; lobe of gill membrane with a dark postopercular spot; fins faintly pink, dorsal and caudal fin more or less speckled with dark.

B. 3. D. 4/8 or 4/9. P. 1/18. V. 2/8. A. 3/5 or 3/6. C. 6/17/6 or 7/17/7, short flanking ones included.

Syn. *Leuciscus thynnoides* Blkr, Diagn. beschr. vischs. Sumatra, Tient. I-IV, Nat. T. Ned. Ind.

III p. 599.

Hab. Sumatra (Palembang), in rivers.

Length of sole specimen 135''.

Remark. I discovered this species in the year 1852 and described it under the name of *Leuciscus thynnoides* after the only specimens that I possess of it. It seems to be very rare.

AMBLYPHARYNGODON Blkr. =

MOLA Heck., Fisch Syr. Addend. et corrig. p. 257.

BLUNT TEETH CARP.

Body oblong or elongate, compressed, covered with ⁴¹⁰ small scales, back slightly elevated, angular. Jaws covered by thin, simple lips. No barbels. Snout acute, slightly depressed, not protruding anterior to the mouth. Anterior suborbital bone triangular, tip pointing downward. Mouth anterior, oblique gape ending anterior to the eye. Upper jaw not emarginate at the symphysis, moderately protrusible. Lower jaw not shorter than upper jaw, branches thin, flat, slightly obliquely compressed, at the symphysis with a small tubercle. Postlabial groove on both sides parallel with the free margin of the jaw, not united with the groove on the opposite side. Eyes posterior, not covered by palpebral membrane. Belly not keeled. Dorsal fin starting behind ventral fins and ending hardly anterior to anal fin, scaleless at the base, with few rays, posterior simple ray totally cartilaginous. Pectoral fins shorter than the head. Anal fin with few rays, shorter than dorsal fin. Lateral line hardly curved. Gill opening ending below the eye. Gill cover not rugose. Pharyngeal teeth molariform, on the chewing surface oblong-rounded and transversely rugose, 1.2.3/3.2.1.

Remark. The genus *Amblypharyngodon* was already recognized by Heckel. In the addenda and corrigenda of his *Fische Syriens* he mentioned by the way that *Cyprinus mola* Buch. belonged to a proper genus, which he named *Mola* and briefly characterized with the words "Dentes semilunares [crescent-shape teeth] 1.2.3/3.2.1." As the name *Mola* was already given to a genus of *Gymnodonts* (*Mola* Risso), it cannot be retained, reason why I propose that of *Amblypharyngodon*. I first was of the opinion that the species belonging to *Thynnichthys* could be placed in *Amblypharyngodon* and indeed they are most closely related to them. However, the genus *Thynnichthys* has a differently build dentition, a character that is externally translated in the placement of

the dorsal fin anterior or above the pelvic fins and its ending far anterior to the anal fin, as well as the small mouth slit ending under the gill cover.

As belonging to the genus *Amblypharyngodon* I count *Cyprinus mola* Buch. and moreover *Leuciscus microlepis* from Bengal and *Leuciscus melettina* Val. from Bombay.

DEVARIO Heck.,
Fische syriens p. 25, Nachtr. p. 184. –
DEVARI.

Body oblong, compressed, covered with large scales, back and belly strongly convex. Jaws covered by terete, simple lips. ⁴¹¹ No barbels. Snout short, not protruding anterior to the mouth. Mouth nearly terminal, gape small. Anal sheath not covered with larger scales. Belly not keeled. Dorsal fin elongate, with many rays, largely placed opposite the elongate, with many rays anal fin, posterior simple ray cartilaginous. Lateral line strongly curved, close to the ventral line. Nuchal scales starting behind the eye. Pharyngeal teeth.???

Remark. After Heckel had erected in 1842 the genus *Devario* after *Cyprinus devario* Buch. and *Perilampus ostreographus* McCl., species which he did not know from nature, he reviewed the genus in 1847 and placed therein, apart from both mentioned ones, still 6 Japanese species described and depicted by Mr Schlegel under the name *Capoëta*. The naturalness of the genus was spoiled because of this, as two of these Japanese species, *Capoëta elongata* T. Schl. and *Capoëta gracilis* T. Schl. belong to the genus *Gnathopogon* and the 4 others to the genus *Acheilognathus*.

I accept *Devario* in the sense that was original given to it by Heckel, and add yet two species, *Devario McClellandi* and *Devario cyanotaenia*, which are depicted in the Indian *Cyprinidae* but not described.

As I was not able to investigate any species from nature and the structure of the lips and dentition are not described, the placement of the genus is still uncertain, and it would not surprise me if it would belong to the *Phalacrognathes* and indeed near *Acheilognathus*.

LUCIOSOMA Blkr,
Nalez. vischf. Sumatra, Nat. T. Ned. Ind. IX p. 236. –
PIKE CARP

Body elongate, compressed, covered with large scales, back very low, broad. Jaws covered by thin, simple lips, upper jaw slightly protrusible. Barbels 4, fleshy nasal and upper jaw barbels or no barbels. Snout acute, not protruding anterior to the mouth, tip located anterior to the eye. Anterior suborbital bone pentagonal, tip acute, pointing upward. Posterior suborbital bones much more developed than anterior bones. Eyes superior, not covered by palpebral membrane. Mouth anterior, with a broad, oblique gape ending below the eye. Upper jaw emarginate at the symphysis. Lower jaw not or hardly shorter than upper jaw, hooked at the symphysis, the hook entering the intermaxillary incision. Postlabial groove on both sides parallel to the free margin of the jaw, not united ⁴¹² with the groove on the opposite side. Scales on the body nearly equal in size, nuchal scales starting far behind the eye. Belly not keeled. Ventral fins inserted in the lowest part of the belly. Lateral line strongly curved, much closer to the ventral line than to the dorsal line. Dorsal fin with few rays, largely located

above the anal fin, scaleless at the base, posterior simple ray totally cartilaginous. Pectoral fins longer than the head, the first ray solid. Anal fin with few rays, not or not much longer than dorsal fin. Gill opening ending below the preoperculum. Pharyngeal teeth hooked, slightly spoon-shaped or predatory 2.4.4/4.4.2 or 2.4.5/5.4.2.

Subg. *Luciosoma* Blkr. Nasal and upper jaw barbels.

" *Trinematichthys* Blkr. No barbels.

Remark. I based this genus on the species described and depicted by Mr Valenciennes under the name *Barbus setigerius*. That species however, has not much relationship with the genus *Barbus*, but on the contrary in organization stands closer to *Aspius* and *Chela* and can be considered as a transition between those genera. The genus is characterized by its more or less pike-like slender body, its low back, dorsal fin implanted partly above the anal fin, a not keeled belly, a low fleshy thick back, a wide gape reaching till below the eyes, a hooked lower jaw and concave upper jaw, relatively very broad posterior suborbital bones, long pectoral fins, three rowed pharyngeal teeth, etc.

Apart from *Barbus setigerius* I possess two more species of this genus, one closely related to *Luciosoma setigerum*, the other remarkable because of the complete absence of barbels and earlier described by me under the name *Leuciscus trinema*. This is a species however, which in general structure of body, head and fins answers completely to *Luciosoma*, and which I only on the basis of the absence of barbels have placed in a subgenus, which I propose to name *Trinemathichthys*.

I used to be of the opinion that the genus is endemic to the Sunda Islands, but from a figure of Count Francis de Castelnau I gather that it also occurs in Siam, just like various other genera that till very recently were only known from the Sunda Islands.

The species of my collection can easily be separated from each other as follows.

I. Nasal and upper jaw barbels (Subg. *Luciosoma*)

413

A. 42 or 43 scales in the lateral line, 6 above the lateral line.

- a. Blackish head-tail band. Caudal fin with on a blackish longitudinal band on both lobes. Ventral fin prolonged into a rather long thread.

Luciosoma (Luciosoma) setigerum Blkr.

- b. Flanks with blackish round spots in one longitudinal row. Caudal fin with 3 longitudinal, blackish bands. Ventral fin hardly prolonged.

Luciosoma (Luciosoma) spilopleura Blkr.

II. No barbels. (Subg. *Trinematichthys*)

A. 43 to 45 scales in the lateral line, 6 above the lateral line.

- a. Ventral fins and anal fin prolonged into a thread. Caudal fin on both sides with a blackish longitudinal band.

Luciosoma (Trinematichthys) trinema Blkr.

Luciosoma (Luciosoma) setigerum Blkr,
 Nalez. vischf. v. Sumatra, Nat. Tijdschr. Ned. Ind. IX p. 264. –
Vierdradige Snoekkarper [Four barbed Pike Carp].
 Atl. Cypr. Tab. LI fig. 3.

A *Luciosoma (Luciosoma)* with an elongate, compressed body, depth of body contained $5\frac{3}{4}$ to $6\frac{1}{2}$ times in its length, width contained $1\frac{1}{4}$ to nearly 2 times in its depth. Head acute, contained 5 to $5\frac{3}{5}$ times in length of body with caudal fin, 4 to $4\frac{2}{3}$ times in length of body without caudal fin; depth of head contained about $1\frac{3}{4}$ times, width contained $2\frac{1}{4}$ to 2 times in its length; eye diameter contained $3\frac{3}{4}$ to about 4 times in the length of the head, eye diameter contained $1\frac{2}{3}$ to $1\frac{3}{4}$ times in the postocular part of the head, distance between the eyes $1\frac{1}{4}$ to $1\frac{1}{3}$ times their diameter; palpebral membrane covering the external margin of the iris only, the opening nearly circular; snout acute, in younger animals not longer than the eye, in old animals only slightly longer than the eye, not protruding anterior to the mouth; nostrils closer to the orbit than to the tip of the snout, posterior nostrils oblong, large, more than twice as large as anterior nostrils; rostro-dorsal profile sloping on the head, nearly straight, convex on the nape; interorbital line convex; 3rd suborbital bone very broad, much larger than 1st suborbital bone, posterior lower margin strongly convex; jaws nearly equal when the mouth is closed, upper jaw moderately downward protrusible, ending below the anterior half of the eye, contained twice to slightly more than twice in the length of the head; gape large, strongly oblique; nasal barbels fleshy, inserted between the nasal bones and the anterior suborbital bones, twice or more than twice as long as the eye; upper jaw barbels much longer than the eye, but much less than twice as long; lower jaw strongly ascending, at the symphysis with a conical tubercle, slightly hooked at the tip; lips medium-sized, terete; height of gill cover less than twice as great as width, lower margin nearly straight or slightly concave; Pharyngeal teeth hooked to spoon-shaped, 2.4.4/4.4.2 or 2.4.5/5.4.2; scapular bone triangular, acute; back low, lightly convex, lower than the belly; scales on the free half with ray-like stripes, 42 or 43 scales in the lateral line, 8 or 9 in a transverse row of which 6 ($5\frac{1}{2}$) above the lateral line, about 25? in a longitudinal row between occiput and dorsal fin; ⁴¹⁴ lateral line curved downward, much closer to the ventral line than to the dorsal line, each scale marked by a simple tube; dorsal fin starting far behind the ventral fins, placed with the middle opposite the anterior anal rays, acute, emarginate, in younger animals not higher than the body, in old animals higher than the body, about twice as high as base length, the simple ray cartilaginous on the posterior side, thin, flexible, without teeth, not shorter or not much shorter than the body; pectoral fins acute, broad, reaching the ventral fins, contained 5 to $4\frac{1}{2}$ times in the length of the body ventral fins broad, 1st ray prolonged into a thread, bifid at the tip, reaching the anal fin, contained about $4\frac{1}{2}$ times in the length of the body,



Fig. 110. *Luciosoma (Luciosoma) setigerum* Blkr. Atl. Ichth. Cypr. Tab. XLI, Fig. 2. TL figure 197 mm.

caudal fin scaled only at the base, with a deep incision, lobes acute, contained $4\frac{1}{3}$ to $4\frac{2}{5}$ times in the length of the body; anal fin acute, emarginate, not much lower to not lower than the dorsal fin, much higher than base length but much less than twice as high, the simple ray thin on the posterior side, totally cartilaginous, flexible; Colour: upper part of the body green, a deeper green on the margins of the scales, lower part silver; iris yellowish or pink, blackish-violet head-tail band in old animals continuous, in younger animals sometimes consisting of about 30 round spots arranged in a longitudinal row, merging on the upper half of the tail with the band on the upper part of the caudal fin; fins yellowish or faintly pink, dorsal, anal and caudal fin on the basal half beautiful red, caudal fin on the middle of both lobes with a blackish-violet longitudinal band.

B. 3. D. 2/7 or 2/8 or 3/7 or 3/8. P. 1/14. V. 2/8. A. 3/6 or 3/7. C. 7/17/7 or 8/17/8, short flanking ones included.

Syn. *Barbus setigerus* Val., Poiss. XVI p. 153 fig. 469.

Barbeau setigère Val., ibid.

Barbus podonemus Blkr, Verh. Bat. Gen. XXIII Ichth. Midd.-Oost-Java p. 18.

Wader Javan.

Hab. Java (Batavia, Bekassi, Rankasbetong, Lebak, Kediri, Surabaya, Gempol), in rivers.
Sumatra (Lahat, Solok), in rivers.

Length of 18 described specimens 90'' to 205''.

Remark. The description and figure of this species in the large *Histoire naturelle des Poissons* leave to be desired in more than one way. Thus the figure shows nothing of the longitudinal band and caudal fin bands, whereas the dorsal fin with almost its entire length is placed above the anal fin. I therefore described it at the start of 1849 during my stay in Ambawara in Central Java, far away from my cabinet, as a proper species based on specimens from Surabaya, whose state of preservation moreover left to be desired. Since then I observed many specimens on which my new description was based. However these specimens were all lost as a result of a theft of stoppered jars from my cabinet by one of my servants who sold the jars to Chinese buyers after throwing away their contents. For this reason I was unable to give further detail of certain peculiarities, I missed earlier, like those of the shape of the anteriormost suborbital bone, the being nipped of the inner side of the lips, the number of scales in a row between the head and the origin of the dorsal fin, etc.

415 *Luciosoma (Luciosoma) spilopleura* Blkr,

Nalez. vischf. Sumatra, Nat. Tijdschr. Ned. Ind. IX p. 265. –

Gevlekte Snoekkarper [*Spotted Pike-carp*].

Atl. Cypr. Tab. LI fig. 1.

A *Luciosoma (Luciosoma)* with an elongate, compressed body, depth of body contained nearly 6 times in its length, width contained $1\frac{3}{4}$ to nearly 2 times in its depth. Head acute, contained slightly over 5 times in length of body with caudal fin, $3\frac{2}{3}$ to $3\frac{3}{4}$ times in length of body without caudal fin; depth of head contained about $1\frac{1}{2}$ times, width contained about $2\frac{1}{4}$ times in its length; eye diameter contained about $3\frac{2}{5}$ times in the length of the head, eye diameter contained about $1\frac{1}{2}$ times in the postocular part of the head, distance between the eyes slightly more than once the eye diameter; palpebral membrane covering the external margin of the iris only, the opening nearly circular; snout acute, slightly convex, not longer than the eye, not protruding anterior to the mouth; nostrils closer to the orbit than to the tip of the snout, posterior nostrils oblong, large, more than twice as large as anterior nostrils; rostro-dorsal profile sloping on the head, nearly straight, convex on the nape; interorbital line convex; anterior suborbital bone oblong, length much greater than depth, rounded posteriorly,

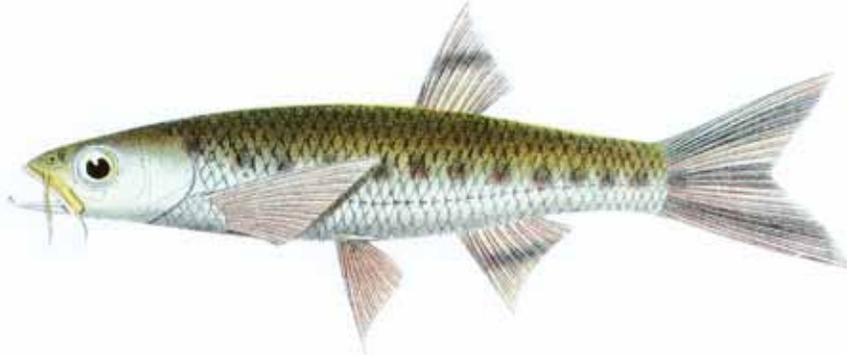


Fig. 111. *Luciosoma (Luciosoma) spilopleura* Blkr. Atl. Ichth. Cypr. Tab. XXII, Fig. 1. TL figure 105 mm.

anteriorly very acute, lower margin convex, oblique; 2nd suborbital bone oblong-quadrangular, much lower than 1st suborbital bone, length more than twice as great as depth; 3rd suborbital bone very broad, much larger than 1st suborbital bone, posterior lower margin strongly convex; jaws equal when the mouth is closed, upper jaw moderately downward protrusible, ending below the anterior half of the eye; contained twice in the length of the head; gape large, strongly oblique; nasal barbels fleshy, inserted between the nasal bones and the anterior suborbital bones, about twice as long as the eye; upper jaw barbels thinner than nasal barbels, only slightly longer than the eye; lower jaw strongly ascending, at the symphysis with a conical tubercle, slightly hooked at the tip; lips medium-sized, terete, on the external surface totally glabrous, on the internal (oral) surface covered with numerous short papillae; width of gill cover contained $\frac{1}{4}$ to $1\frac{1}{3}$ times in its depth, lower margin slightly concave; gill opening wide, ending below the posterior part of the eye. Pharyngeal teeth hooked to spoon-shaped, 2.4.5/5.4.2; scapular bone triangular; back low, lightly convex, lower than the belly; scales on the free half and generally also on the basal half with longitudinal stripes or slightly ray-like stripes, about 42 scales in the lateral line, 8 or 9 in a transverse row of which (on the middle of the body) 6 ($5\frac{1}{2}$) above the lateral line, about 21 in a longitudinal row between occiput and dorsal fin; lateral line curved downward, much closer to the ventral line than to the dorsal line, each scale marked by a simple tube, generally surpassing the centre of the scale; dorsal fin starting far behind the base of the ventral fins, placed with the middle rays opposite the anterior anal rays, acute, emarginate, depth contained $1\frac{1}{3}$ to $1\frac{1}{4}$ times in the depth of the body, much higher than base length but much less than twice as high, the simple ray thin on the posterior side, flexible, totally cartilaginous, without teeth, much shorter than the body, pectoral fins acute, broad, reaching the ventral fins, contained $4\frac{2}{3}$ to $4\frac{3}{4}$ times in the length of the body, ventral fins acute, broad, 1st ray slightly prolonged, reaching or nearly reaching the anal fin, contained about $6\frac{1}{2}$ times in the length of the body; caudal fin scaled only at the base, with a deep incision, contained about 4 times in the length of the body; anal fin acute, emarginate, not lower than the dorsal fin, not much higher than base length, the simple ray thin on the posterior side, flexible, totally cartilaginous; Colour: upper part of the body green, lower part silver; iris pink or yellow; on both flanks 13 oblong-round bluish-violet spots placed in a longitudinal row; fins yellowish or pink-hyaline; caudal fin pink with 3 longitudinal blackish-violet bands, middle band on the middle of the rays, side bands starting on the short side rays of the fin and ending on the posterior margin of the fin inside the tips; dorsal and anal fin around the middle with a longitudinal, darkish band.

B. 3. D. 2/7 or 2/8. P. 1/14. V. 2/8. A. 3/6 or 3/7. C. 8/17/8, short flanking ones included.

Hab. Sumatra (Lahat), in rivers.

Length of sole specimen 108'''.

416 Remark. This species is closely related to *Luciosoma setigerum*, however certainly a proper species. It is primarily recognizable by its single row of large elongated not numerous lateral spots and three dark caudal fin bands, of which the middle one covers the centre of the fin and the lateral ones begin on the short edged rays and leave the fin tips free; moreover by the longitudinal dorsal and anal fin bands, the little elongated pelvic fins, the relatively large eyes, longer barbels, etc.

I also see this species well recognisable depicted in the album of Siamese fishes of Count de Castelnau.

Luciosoma (Luciosoma) trinema Blkr. –
Driedradige Snoekkarper [Three threaded Pike-carp].
Atl. Cypr. Tab. LII fig. 4.

A *Luciosoma* (*Trinematichthys*) with an elongate, compressed body, depth of body contained $5\frac{3}{4}$ to 6 times in its length, width contained $1\frac{2}{3}$ times to nearly twice in its depth. Head acute, not convex, contained slightly over 5 to $5\frac{1}{2}$ times in length of body with caudal fin, $4\frac{1}{2}$ to $4\frac{3}{4}$ times in length of body without caudal fin, crown scaleless; depth of head contained about $1\frac{2}{3}$ times in its length, width nearly 2 times; eyes superior, eye diameter contained nearly 4 to slightly over 4 times in the length of the head, eye diameter contained $1\frac{2}{3}$ to $1\frac{3}{4}$ times in the postocular part of the head, distance between the eyes $1\frac{1}{4}$ to $1\frac{1}{2}$ their diameter; palpebral membrane covering the external margin of the iris only, the opening nearly circular; rostro-dorsal profile on the head sloping, nearly straight, on nape and back convex; interorbital line convex; snout acute, rounded, not convex, hardly or not longer than the eye, tip located approximately anterior to the middle of the eye; nostrils much closer to the orbit than to the tip of the snout, posterior nostrils about twice as large as anterior nostrils; anterior suborbital bone oblong, nearly triangular, length greater than depth, at the shorter base convex or with an obtuse backward pointing angle, upper and lower sides longer, at the front united into a slightly acutely rounded forward and slightly upward pointing angle, in the middle traversed by a longitudinal, backward descending crest; 2nd suborbital bone elongate-quadrangular, hardly deeper posteriorly than anteriorly, length about twice as great as depth, less than twice as low as 1st suborbital bone; 3rd and 4th suborbital bones very broad, nearly reaching the posterior margin of the preoperculum, not much thinner than the eye diameter; especially oral margins of jaws acute par-

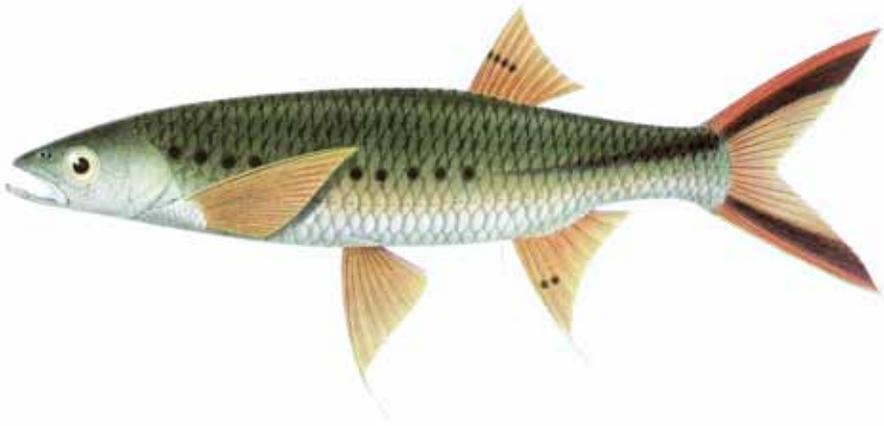


Fig. 112. *Luciosoma (Luciosoma) trinema* Blkr. Atl. Ichth. Cypr. Tab. XLI, Fig. 3. TL figure 218 mm.

ticularly anteriorly, upper jaw hardly shorter than lower jaw, moderately downward protrusible, profoundly emarginate at the symphysis, ending below the pupil, contained slightly more than twice in the length of the head; lower jaw emarginate towards the symphysis, symphysis itself provided with a medium-sized hook entering the intermaxillary incision, branches obliquely compressed, the lower part with several little visible pores in one longitudinal row; lips thin, terete, on the oral surface transversely rugose, groove of upper lip short, ending slightly anterior to the angle of the mouth, groove of lower lip extending from the angle of the mouth up to the inframaxillary incision; gape strongly oblique; width of gill cover contained about $1\frac{1}{2}$ times in its depth, lower margin nearly straight; gill opening ending hardly behind the posterior margin of the eye. Pharyngeal teeth predatory, lightly hooked, 2.4.5/5.4.2, each below the hook with a superficial, oblong, hardly conspicuous small fossa; dorsal line of the body convex, not much higher than convex belly; belly between pectoral and ventral fins flat, broad, rest lightly compressed, rounded, not ridged; scales oblique (lower angle conspicuous, located anterior to conspicuous upper angle) on the free half and generally also on the basal half with longitudinal or slightly ray-like stripes, towards the tail gradually decreasing in size, 43 to 45 scales in the lateral line, 9 in a transverse row of which 6 ($5\frac{1}{2}$) above the lateral line, 21 or 22 in a longitudinal row between the occiput and the dorsal fin, scales ⁴¹⁷ in the thoraco-gular region much smaller than the postaxillary scales; lateral line strongly curved in a regular manner, much closer to the base of the ventral fins than to the dorsal profile, posteriorly gradually ascending and ending at the middle of the base of the caudal fin, each scale marked by a simple tube, generally not surpassing the centre of the scale; scapular bone triangular, tip acute; dorsal fin starting far behind the base of the ventral fins, placed with the posterior rays opposite the anterior anal rays, scaleless at the base, acute, emarginate, depth contained $1\frac{1}{3}$ to $1\frac{1}{4}$ times in the depth of the body, much higher than base length but much less than twice as high, the simple 2nd ray thin, cartilaginous, much shorter than the head; pectoral fins inserted nearly horizontally, scaled at the base, longer than the head, contained $4\frac{2}{3}$ to $4\frac{1}{2}$ times in the length of the body, reaching the ventral fins, the simple ray solid; ventral fins inserted in the lowest part of the belly, acute, without thread much shorter than pectoral fins, 2nd simple ray prolonged into a thread, reaching the posterior part of the anal fin; anal fin at the base lightly scaled, acute, emarginate, the simple third ray thin, cartilaginous, prolonged into a thread nearly reaching the caudal fin, without thread not or hardly lower than dorsal fin, higher than base length; caudal fin scaled only at the base, with a deep incision, lobes acute, lower lobe longer than upper lobe, contained slightly over 4 to $4\frac{1}{4}$ times in the length of the body. Colour: upper part of the body green, lower part silver, anterior part of the back and upper part of the head deeply olive; iris yellow; dark-violet head-tail band on the anterior half of the body little conspicuous or composed from separate spots, on the tail rather broad, very conspicuous, located above the lateral line; fins pink or yellowish-pink; dorsal and anal fin anteriorly at midheight with 2 to 4 blackish-violet spots, caudal fin on the middle of both lobes with a broad, blackish-violet longitudinal band, upper band merging with head-tail band.

B. 3. D. 2/7 or 2/8. P. 1/15 or 1/16. V. 2/8. A. 3/6 or 3/7. C. 5/17/7 or 5/17/8, short flanking ones included.

Syn. *Leuciscus trinema* Blkr, Diagn. beschr. nieuw. vischs. Sumatra, Nat. T. Ned. Ind. III p. 600.

Hab. Sumatra (Palembang), in rivers.
Borneo (Sintang), in rivers.

Length of 2 specimens 175''' and 226'''.

Remark. I discovered this species in the year 1852 and described it after my specimen from Palembang. Since then I received a larger and better preserved specimen from the interior of West Borneo. The species seems to be rare on both islands or at least inhabits rather the higher regions of the drainage areas.

PERILAMPUS McCL.,
Ind. Cypr. Asiat. Res. XIX p. 39; Heck., Fisch. Syr. p. 45. –
BRUSH CARP.

Body oblong or slightly elongate, compressed, covered with large scales, back lower than belly. Jaws covered by thin, simple lips, upper lip slightly protrusible. Barbels 4, nasal barbels fleshy, upper jaw barbels very long, setaceous. Snout acute, low, not protruding anterior to the mouth, tip located anterior to or above the upper margin of the eye. Eyes posterior, not covered by palpebral membrane. Mouth anterior, oblique gape ending anterior to the eye. Scales on the body nearly equal in size, nuchal scales starting behind the eye. Belly not keeled. Ventral fins ⁴¹⁸ inserted in the lowest part of the belly. Lateral line strongly curved, very much closer to the ventral line than to the dorsal line. Dorsal fin with several rays, partly located above the anal fin, posterior simple ray totally cartilaginous. Pectoral fins shorter than the head. Anal fin with many rays, much longer than dorsal fin. Caudal fin hardly emarginate.

Remark. I accept the generic name *Perilampus* of Mr MacClelland only for a few species that were placed in it by him, and conceive it only in restricted sense. The way Mr MacClelland described it, it also contained species of *Chela*, *Laubuca*, *Devario* and *Esomus*. At least his *Perilampus devario* and *ostreographus* belong to *Devario*; his *Perilampus percus*, *psilopterus* and *cachius* to *Chela*; his *Perilampus recurvirostris*, *macropterus* and *thermophilus* to *Esomus*; his *Perilampus guttatus* to *Laubuca* and his *Perilampus aequipinnatus* maybe to *Opsarius*. All those species are excluded by the above given diagnosis, which defines a genus that is closely related to *Esomus* and principally differs from it by a lateral line which runs visible closely to the belly profile, short pectoral fins, which are shorter than the head, a multirayed anal fin, which is remarkably longer than the dorsal fin. The dentition is not known and one finds oneself also in uncertainty regarding the peculiar structure of the jaws. But it may be expected that these will not differ from those in *Esomus*.

Heckel accepted the genus *Perilampus* McCl. in a completely different sense and liked to restrict it to the characters of *Chela* with long, pelvic fins implanted closer to the pectoral fins. Of both species he placed in *Perilampus*, *Perilampus psilopterus* McCl. belongs to *Chela* and *Perilampus macropterus* McCl. to *Esomus*, as was already said above.

ESOMUS Swains.,
Nat. Hist. Fish. II p. 285; Heck., Fisch. Syr. p. 44 = *NURIA* Val., Poiss. XVI p. 181.
NURIA.

Body elongate or slightly elongate, compressed, covered with large scales, back not or hardly lower than belly. Jaws covered by thin, simple lips, upper lip slightly protrusible. Barbels 4, nasal barbels fleshy, close to upper jaw barbels, upper jaw barbels very long, setaceous. Snout short, low, not protruding anterior to the mouth, tip located anterior to or above the upper margin of the eye. Anterior suborbital bone triangular, tip acute, pointing downward. Eyes posterior, not covered by palpebral ⁴¹⁹ membrane. Mouth anterior, strongly oblique gape ending anterior to the eye. Upper jaw at the symphysis prominent, not emarginate. Lower jaw not or hardly shorter than upper jaw, without tubercle or hook at the symphysis. Scales on the body nearly equal in size, nuchal scales starting behind the eye. Belly not keeled. Ventral fins inserted in the lowest part of the belly. No visible lateral line. Dorsal fin with few rays, totally or largely located above the anal fin, posterior simple ray totally cartilaginous. Pectoral fins shorter than the head. Gill opening ending below the preoperculum. Pharyngeal teeth acute, not or hardly curved 5/5.

Remark. Swainson based his genus *Esomus* on *Cyprinus danrica* Buch. and described it rather well. Mr Valenciennes described the same genus about three years later with the name *Nuria*.

Esomus is a natural and sharply characterized genus, which as far as relationship is concerned, stands between *Chela*, *Luciosoma* and *Laubuca*, genera in which the dorsal fin is placed partly or entirely above the anal fin. It misses the sharply keeled belly of *Chela* and *Laubuca*, just like the multi-rayed anal fin of these genera. The structure of the mouth parts in essence answers to that of *Laubuca*, although the lower jaw is remarkably higher. Similarly the scales start further behind the eyes. The genus moreover is peculiar by its long barbels, of which the upper jaw barbels are brush-like stiff, at least in the single species in my possession. Moreover, the barbels, just like in the remaining four barbeled species, are real snout barbels and upper jaw barbels, and not all four upper jaw barbels (lipbarbels following the terminology of Mr Valenciennes) as indicated by Mr Valenciennes. The fact is, at least in *Esomus danrica*, that the snout barbels are implanted far posterior at the edge of the snout close to the upper jaw barbels. The nearness may be the reason they were mistaken for upper jaw barbels. The dentition moreover possesses the peculiarity that it consists of only 5 slender, not or hardly curved, acute teeth which are placed in a single row.

Apart from this dentition and by the peculiarity of the upper jaw barbels, *Esomus* differs from *Luciosoma*, the genus with which it has the most close relationship, by the structure of the mouth parts, as in *Luciosoma* the gape is very wide, the upper jaw concave at the symphysis, and the lower jaw provided with a process at the symphysis, which fits in the incision of the upper jaw.

420 *TINCA* Rond.;

Cuv., Règn. Anim. ed. 1^a II p. 193; Ag., Mém. Neuch. I;
Heck., Fisch. Syr. p. 38; Heck. Kner., Fisch. oestr. Mon. p. 75. –

TENCH.

Body oblong, compressed, covered with small scales, back angular. Jaws enclosed in terete, simple lips, upper lip slightly protrusible. Barbels 2, upper jaw barbels. Snout convex, not protruding anterior to the mouth. Eyes superior, not covered by palpebral membrane. Mouth anterior, small, oblique gape ending anterior to the eye. Lower jaw not shorter than upper jaw, not hooked at the symphysis. Upper jaw not emarginate at the symphysis. Dorsal fin starting behind ventral fins and ending anterior to anal fin, with few rays, scaleless at the base, posterior simple ray cartilaginous, without teeth. Anal fin shorter than dorsal fin, with few rays. Caudal fin slightly emarginate. Belly not keeled. Lateral line slightly curved. Pharyngeal teeth clavate 4/5. Swimbladder bilobed.

Remark. After having proposed the genus *Gobio*, which he defined on its short dorsal and anal fins without spines and by its barbels, Cuvier distinguished the genus *Tinca* from it only by its very small scales. Mr Agassiz added to that as generic character the plumpness of the body, the small concaveness of the caudal fin, and the clubshape of the pharyngeal teeth. Heckel defined the formula of these teeth and added to the diagnosis also the roundness of the dorsal and anal fin, the dorsal fin being implanted posterior to the pelvic fins, the mouth opening being terminal and the mucousness of the scales.

Mr Valenciennes has made various objections against the characters drafted by Cuvier and Mr Agassiz. He is of the opinion that the genera *Gobio* Cuv. and *Tinca* Cuv. in essence do not differ from each other and that therefore one of both names has to be removed from the row of the genera. The objections of Mr Valenciennes judged properly, indeed are not without weight, however, when one keeps in mind the differences in habitus of *Tinca* and the species of *Gobio*, which with regard to the body shapes are build on entirely different types, otherwise necessarily subjective characters gain a higher value and they can serve to translate as it were the more important character of the general structure of the body, which cannot be easily expressed in words. Together with most of the more recent ichthyologists I therefore believe that *Tinca* Cuv. indeed represents a natural genus, and that there is no reason to unite it with *Gobio*.

421 ARGYREUS Heck.,

Fisch Syr. p. 50; Gir., Cypr. Unit. Stat. Proceed. Acad. Nat. Scienc.
Philad. VIII p. 185. –

RHINICHTHYS Ag., Lake super. p. 353 = AGOSIA Gir. l.c. p. 186. –

NOSE CARP.

Body elongate, slightly terete, covered with small, membranous scales, back low. Jaws, upper jaw enclosed in a terete, simple lip, lower jaw with a cartilaginous edge, not labiate? Barbels 2, upper jaw barbels. Snout conical, more or less protruding anterior to the mouth. Mouth inferior, gape in shape reminding of a horse shoe when the mouth is closed, ending anterior to the eye. Eyes superior, not covered by palpebral membrane. Lateral line straight. Belly not keeled. Dorsal fin with few rays, starting above or hardly behind ventral fins and ending anterior to anal fin, posterior simple ray totally cartilaginous. Anal fin with few rays, shorter than dorsal fin. Pharyngeal teeth predatory, 1.4/4.2 or 2.4/4.2 or 4/4.

Remark. In 1842 Heckel based the genus *Argyreus* on *Cyprinus atronasmus* Mitch. Mr Agassiz placed the same species in his genus *Rhinichthys*, which he erected in 1850 after his *Rhinichthys marmoratus* and then still considered to belong to the *Catostomines*. However much both these genera are the same, one would not conclude that from the diagnoses of both ichthyologists. Mr Girard restored the generic name proposed by Heckel and placed no less than 9 different species in it.

If *Argyreus* and *Rhinichthys* had not been erected by Heckel and Mr Agassiz, I would not hesitate to place the genus in the *Chondrostomines*. The structure of the mouth parts, as I see them depicted in *Argyreus atronasmus* Heck. and *Rhichthys marmoratus* Ag. in every way give occasion to that and Mr Girard even talks of a cartilaginous membranous sheath, which in some species would loosely cover the lower jaw, just like it is generally found in *Chondrostomines* and *Labeonines*. The genus should be investigated in more detail concerning its place in the natural system.

The genus *Agosia*, proposed by Mr Girard, would mainly differ from *Argyreus* as its pharyngeal teeth, although of the same shape as in *Argyreus*, possess a chewing plane and are placed in a single row (4/4). It will probably have to be combined with *Argyreus*. If *Argyreus* indeed belongs to the *Cheilognathines*, it is related to *Gobio*.

422 CHROSOMUS Raf.,

Ichth. Ohiens.; Agass., Fish. Tennessee River, Amer. Journ. Sc. and Arts 2^d Ser.
Vol. XVII, Ichth. Faun. Pacif. Slope N. Amer. Ibid. Vol. XIX. –

COLOR CARP.

Body elongate, fusiform, covered with small, membranous scales. Jaws covered by simple lips. No barbels. Head slightly conical, snout slightly acute, protruding a little anterior to the mouth. Mouth terminal. Lateral line hardly curved, hardly interrupted, nearly continuous. Dorsal fin with few rays, posterior simple ray totally cartilaginous. Anal fin with few rays. Pharyngeal teeth slightly hooked at the tip 5/5, chewing surface thin.

Remark. Mr Agassiz considers the genus *Chrosomus* as very closely related to *Phoxinus*, from which it also only seems to differ by a more continuing lateral line, a more spindle shaped body, a more acute head, a shorter lower jaw, some peculiarities in the structure of scales and lateral line and a somewhat differently shaped and formulated pharyngeal jaw teeth. *Chrosomus erythogaster* till now is the only known species.

TIAROGA Gir.,

Cypr. Fish. Unit. Stat. Acad. Nat. Scienc. Philad. VIII p. 204. –

TIAROGA.

Body elongate, slightly fusiform-compressed, covered with small scales. Jaws enclosed in terete, simple lips. No barbels. Head slightly conical, depressed. Snout not protruding anterior to the mouth. Mouth terminal, gape medium-sized, oblique. Upper jaw slightly longer than lower jaw. Eyes superior. Lateral line not or hardly curved. Dorsal fin with few rays, beginning posterior to the ventral fins, posterior simple ray cartilaginous. Anal fin with few rays. Isthmus very broad. Pharyngeal teeth predatory 1.3/3.1, no chewing surface.

Remark. Mr Girard places only one species in this genus, his *Tiaroge cobitia*. In relationship it seems to stand between *Chrosomus* and *Phoxinus*, and to differ from these by a smaller gill slit and the formula of its pharyngeal teeth, which do not possess a chewing plane.

PHOXINUS Rondel.;

Ag., Mem Neuchat. I; Heck., Fisch. Syr. p. 50; Heck. Kner, Fisch. oestr. Mon. p. 210. –

PRIL.

Body elongate, fusiform, covered with very small scales, back 423 low. Jaws enclosed in terete, simple lips. No barbels. Snout obtuse, convex, hardly protruding anterior to the mouth. Anterior suborbital bone not elongate. Eyes superior, not covered by palpebral membrane. Mouth anterior, gape slightly oblique, ending anterior to the eye. Upper jaw not emarginate at the symphysis, lower jaw shorter than upper jaw, not hooked at the symphysis. Dorsal fin beginning posterior to the ventral fins and ending hardly anterior to the anal fin, with few rays, scaleless at the base, posterior simple ray cartilaginous, without teeth. Anal fin not longer than dorsal fin, with few rays. Caudal fin moderately emarginate, lobes acute. Belly not keeled. Lateral line hardly curved. Isthmus very broad. Pharyngeal teeth predatory 2.4/4.2 or 2.5/4.2.

Remark. The genera *Gobio* and *Tinca*, in the classification placed far away from *Phoxinus*, to me appear to be related. *Phoxinus* has the scales and the small concave

caudal fin of *Tinca* and resembles *Gobio* in body shape and dentition. It differs from both genera by the absence of barbels and a far posteriorly implanted dorsal fin. *Cyprinus phoxinus* L. till now is the only known species of this genus.

PHOXINELLUS Heck.,
Fisch. Syr. p. 49: Heck., Fisch. oestr. Mon. p. 245 –
BARE SKIN CARP.

Body elongate, fusiform, skin scaleless, scales only in the lateral line, back low. Jaws enclosed in terete, simple lips. No barbels. Snout obtuse, convex, hardly protruding anterior to the mouth. Anterior suborbital bone not elongate. Eyes superior, not covered by palpebral membrane. Mouth anterior, gape slightly oblique, ending anterior to the eye. Upper jaw not emarginate at the symphysis, lower jaw shorter than upper jaw, not hooked at the symphysis. Dorsal fin beginning posterior to the ventral fins and ending anterior to the anal fin, with few rays, scaleless at the base, posterior simple ray cartilaginous, without teeth. Anal fin not longer than dorsal fin, with few rays. Caudal fin strongly emarginate, lobes acute. Belly not keeled. Lateral line moderately curved. Pharyngeal teeth grinding 5/4.

Remark. The genus *Phoxinellus*, as it is copied above, with some changes, from Heckel, is very closely related to *Phoxinus*, but distinguishes ⁴²⁴ itself from it by the absence of scales on the body except for the lateral line (which ends approximately above the vent), as well as by single rowed pharyngeal teeth.

Heckel placed in the genus, apart from the typical European species (*Phoxinellus alepidotus*) also a species from Syria, which he named *Phoxinellus zeregi*. However, this species cannot belong the same genus, as it differs from the European species by a totally different habitus of its body and snout, regular scales over the entire body and a rather well developed dorsal fin spine. This species therefore will have to be placed in a proper genus of its own, which I propose to name *Pseudophoxinus*.

CIRRHINA Cuv.,
Regn. Anim. ed. 1^a II p. 193; Valenc. Poiss. XVI 217 =
ISOCEPHALUS Heck., Fisch. Syr. p. 39. –
SNOUT BARBEL CARP.

Body oblong, compressed, covered with large scales, back elevated. Jaws enclosed in terete, simple lips. Barbels 2, nasal barbels. Snout convex, not or hardly protruding anterior to the mouth. Eyes superior, not covered by palpebral membrane. Mouth anterior, oblique gape ending anterior to the eye. Upper jaw not emarginate at the symphysis, lower jaw slightly shorter than upper jaw, not hooked at the symphysis. Dorsal fin starting anterior to ventral fins and ending far anterior to anal fin, with few rays, scaleless at the base, posterior simple ray cartilaginous, without teeth. Pectoral fins shorter than the head. Anal fin shorter than dorsal fin, with few rays. Caudal fin with a deep incision, lobes acute. Belly not keeled. Lateral line slightly curved. Pharyngeal teeth...?

Remark. When Cuvier proposed the genus *Cirrhina*, he simply characterized it as having a larger dorsal fin than *Gobio* and the barbels in the middle of the upper lip. He placed in it only *Cyprinus cirrhosus* Bl. and later also *Cyprinus mrigala* Buch. and *Cyprinus nandina* Buch.

Mr MacClelland accepting the Cuvierian name in a slightly changed form as *Cirrhinus*, described it in a totally different way as follows: "Lower jaw composed of two

short limbs loosely attached together in front, where instead of a prominent apex, there is a depression; lips soft and fleshy with four cirri; dorsal without spiny rays". By this diagnosis the genus was reduced to the Acheilognathines, however the 9 species considered to belong to *Cirrhinus* by Mr MacClelland, belong to different genera, to Rohita, *Morulis*, *Labeo*, *Hypselobarbus*, etc., just like the Cuvierian species belong to the genera *Mrigala* and *Rohita*.

⁴²⁵ Mr Valenciennes gave a new diagnosis of *Cirrhina* and drafted the characters of it as follows "elles n'ont que deux barbillons, les maxillaries (rostrales mihi) seuls ou les antérieurs sont restés; les labiaux manquent, elles ont une dorsale de moyenne étendue, sans épines; tous les rayons sont flexibles et les lèvres, minces, ne donnent à la bouche aucune forme particulière. Le museau n'est pas avancé au dessous (dessus) de l'ouverture orale" [they have only two barbels, only the maxillary barbels {my rostral barbels} or the anterior ones have remained, the lipbarbels are lacking, they have a medium sized dorsal fin, without spines, only flexible rays, and the thin lips, do not give the mouth a special shape. The snout is not extended below the mouth opening.]. By this diagnosis the position of *Cirrhinus* in the classification again was made entirely doubtful, and moreover the species, placed by Mr Valenciennes in his genus *Cirrhinus*, belong to very different genera. It seems however, that it was the intention to include only the round lipped species in the genus, by which it would have been arranged in the department of the Cheilognathines.

It is in this sense that I have conceived and described this genus above. However, in this way remain excluded all species of Cuvier and of Mr MacClelland and also various species of Mr Valenciennes himself. Heckel did not accept the genus *Cirrhina* but resolved it in his genus *Isocephalus*, which is nothing else then a combination of very diverse species, none of which was examined by Heckel from nature. It comprises species of *Cirrhina*, *Mrigala*, *Labeo* and even of *Schismatorhynchus*.

I exclude from *Cirrhina* all species that with regard to their lip structure belong to the Phalacrogathines and then the genus is immediately sharply defined by its snout barbels (in the absence of lip barbels) and the absence of a dorsal fin spine. The species, which then remain, are small in number, and as I know none of these species from nature and the existing descriptions and figures do not shed enough light over them, their lip structure remains to be defined further. Judging from the illustration of Mr Valenciennes, *Cirrhina* *Dussumieri* Val. definitively seems to be a *Cirrhina* in the sense described in the diagnosis and it is also this species that I consider to be the type and at the same time the only one known of the genus till now.

GOBIO CUV.,

Règn. an. ed. 1^a II p. 193; Ag., Mém. Neuch. I;
Heck. Fisch. Syr.; Heck. Kner, Fisch. oestr. Monarch. p. 90;
Gir., Cypr. N. Am. Proc. Ac. Nat. Sc. Phil. VIII 1856 p. 188. –

GUDGEON.

Body elongate, fusiform-compressed, covered with large or medium-sized scales, back low. Jaws enclosed in terete, simple lips, upper jaw moderately protrusible. Barbels 2, upper jaw barbels. Snout convex, prolonged, not or slightly protruding anterior to the mouth. Anterior suborbital bone elongate. Eyes superior, not covered by palpebral membrane. ⁴²⁶ Mouth anterior, gape nearly horizontal, ending

anterior to the eye. Upper jaw not emarginate at the symphysis, lower jaw shorter than upper jaw, not hooked at the symphysis. Dorsal fin starting in front or hardly behind ventral fins and ending far anterior to anal fin, with few rays, scaleless at the base, posterior simple ray cartilaginous, without teeth. Pectoral fins shorter than the head. Anal fin shorter than dorsal fin, with few rays. Caudal fin deeply emarginate, lobes acute. Belly not keeled. Lateral line hardly curved. Pharyngeal teeth predatory teeth 2.5/5.2, or 2.4/4.1, or 3.5/5.2. Swimbladder bilobed.

Remark. The species presented by authors as extra-European species of *Gobio* in habitus exhibit such large differences with the European or typical species, that they do deserve a new detailed investigation to further determine their true relationships. For some of these species it can be determined with certainty that they do not belong to *Gobio*. Thus *Gobio barbatus* T. Schl. from Japan in my opinion is a *Pseudogobio*. – *Gobio bendilisis* Val. from Bengal probably belongs to the genus *Opsarius*; *Gobio angra* McCl. Val. most probably to *Labeo*. The Abyssinian species, described and depicted by Mr Rüppell as *Gobio hirticeps* and *Gobio quadrimaculatus*, I rather consider to belong to the genus *Chrossocheilos*. *Gobio boga* McCl., *Gobio pangusia* McCl., and *Gobio isurus* McCl. are species of *Labeo*. *Gobio ricnorhynchus* McCl. and *Gobio malacostomus* McCl. belong to the genus *Schismatorhynchus*. The archipelagic species, which I myself earlier described as belonging to *Gobio*, are further defined by me as being species of *Lo-bocheilos*. Moreover, Heckel is inclined to consider *Gobio damascinus* Val. as a species of his genus *Scaphiodon* and the habitus of *Gobius cataractae* Val considerably departs, especially with regard to the head, from the typical European species. When both last species are included in *Gobio*, 10 species of the genus are now known.

**SARCOCHELICHTHYS Blkr. –
FLESHY LIP CARP.**

Body slightly elongate, compressed, covered with large scales, back low. Jaws enclosed in terete, very fleshy lips? No barbels. Snout convex, strongly elevated, truncate, protruding anterior to the mouth. Eyes superior, not covered by palpebral membrane. Mouth nearly terminal, gape slightly oblique, small, ending anterior to the eye. Upper jaw not emarginate at the symphysis, lower jaw shorter than upper jaw, not hooked at the symphysis. ⁴²⁷ Lateral line hardly curved. Dorsal fin starting anterior to ventral fins and ending far anterior to anal fin, with few rays, scaleless at the base, posterior simple ray flexible, without teeth. Pectoral fins shorter than the head. Anal fin shorter than dorsal fin, with few rays. Caudal fin with a deep incision, lobes acute. Belly not keeled.

Remark. I erect the genus *Sarcocheilichthys* on the basis of the species described and figured by the famous authors of the *Fauna Japonica* with the name *Leuciscus variegatus*. This species departs so much in habitus from the other the remaining *Leuciscines*, that it appears to me to be the type of a genus of its own. However, the characters cannot be sufficiently determined from the data of Mr Schlegel, as not enough attention has been paid there to peculiarities of the structure of jaws and lips and the dentition has not been mentioned at all.

I am even not averse to the idea that the species belongs to the *Labeonines*, and therefore has a jaw and lip structure which answers to that, a point however, which should be examined further after nature. It seems to be an intermediate form between the *Labeonines* and the *Catostomines* and is not without a certain resemblance to *Gobio* and *Morara* as well.

ELOPICHTHYS Blkr. –
LIZARD CARP.

Body elongate, slightly compressed, covered with medium-sized scales, back very low. Jaws covered by thin, simple lips. No barbels. Snout acute, prolonged, not protruding anterior to the mouth. Nasal bones strongly developed. Mouth anterior, gape oblique, large, ending below the eye. Upper jaw slightly protrusible, not emarginate at the symphysis? Lower jaw not shorter than upper jaw, at the symphysis with a tubercle, hooked at the tip. Eyes superior, not covered by palpebral membrane. Belly not keeled. Dorsal fin starting above or hardly behind the base of ventral fins and ending far anterior to anal fin, with few rays, scaleless at the base, posterior simple ray totally cartilaginous. Anal fin with several rays, not longer than dorsal fin. Pectoral fins shorter than the head. Ventral fins inserted in the lowest part of the belly. Lateral line strongly curved. Swimbladder trilobed.

Remark. The genus *Elopichthys*, which I propose to name so because of the resemblance of the habitus of the species with *Elopus saurus* L., is related to ⁴²⁸ *Aspius* and *Opsarius*. I suspect that the upper jaw is not concave at its outer edge, however the existing descriptions and illustrations of both known species give no information concerning that. I suspect this on the basis of similarity in structure of the snout with those of *Thynnichthys* and *Catla*, whose sharp and peculiar habitus is caused by a further development of the nasal bones. In *Elopichthys* these bones are extremely strong developed, at least I do not believe that Mr Richardson, in his diagnosis of *Leuciscus bambusa*, mentioning the “intermaxilaribus robustis duris acie instructis” [the robust, hard intermaxillary (= premaxillary) bones set in a row] has had the intermaxillary [= premaxillary], but the nasal bones in front of him and that its intermaxillary bones, just like in *Thynnichthys*, are thin and hidden under the nasal bones when they are not expanded [protruded]. I myself at least committed a similar mistake during my first investigation of the species of *Thynnichthys*. However a further examination soon taught me this, as the thin intramaxillary bones with a pair of tweezers could easily be pulled out from under the nasal bones. It seems to me that if my opinion regarding the above mentioned assertion of Mr Richardson is correct, one of the generic characters of the genus *Elopichthys* will have to be sought in the extraordinary development of the nasal bones. The dentition is not known, but it will probably also be found to differ from that of *Aspius* and *Opsarius*. Among the generic characters of *Elopichthys* moreover can be brought the long tail, the large distance between the dorsal and the anal fin, the shortness of the anal fin and the tripartite swimbladder.

ASPIUS Ag.,

Mem. Soc. Neuch. I.; Heck., Fisch. Syr. p. 46; Heck. Kner, Fisch. oestr. Mon. p. 142. –
SCHIED.

Body elongate, slightly terete, covered with medium-sized or large scales, back low, not or hardly higher than the belly. Jaws covered by simple lips, upper jaw protrusible, emarginate at the symphysis, lower jaw prominent, at the symphysis with a tubercle entering the intermaxillary incision. No barbels. Snout acute, not protruding anterior to the mouth. Mouth superior, gape strongly oblique, ending below the eye. Eyes superior, not covered by palpebral membrane. Lateral line strongly curved, closer to the ventral line than to the dorsal line. Belly not keeled anterior to ventral fins, behind ventral fins not ridged. Dorsal fin with few rays, starting behind ventral fins and ending hardly anterior to anal fin, posterior simple ray totally cartilaginous. Pectoral fins much shorter than the head. Anal fin with ⁴²⁹

several rays, much longer to slightly longer than dorsal fin. Pharyngeal teeth predatory, cylindrical, smooth 3.5/5.3 or 2.5/5.2.

Remark. *Aspius* is closest related to *Alburnus*, but sharply separated from it by larger mouth slit, which extends till under the eye, and the not being keeled of the belly behind the pelvic fins, whereas the teeth formula is also somewhat different. It also remains a question here, to what extent generic value can be attached to these characters. Having a keeled or a rounded belly in certain genera, [as] in *Systomus* and *Cyclocheilichthys*, at most is a character for the distinguishing of species. The large mouth slit in generic respect seems to be of more value. Anyway the species of *Aspius* have a peculiar habitus, which is caused by the large mouth slit, by the small superior eyes and the acute snout being more elongated. The genus is based on *Cyprinus aspius* L., whereas Heckel has also placed some Asiatic species in *Aspius*. I believe that his *Squalius berag* and *Squalius lepidus* can also be placed in it and moreover *Squalius albus* Bp., *Squalius Turkyi* Heck., *Squalius microlepis* Heck., *Squalius tenellus* Heck. and maybe some other species.

GILA Baird Gir.,

Rep. Exped. Zuni a. Colorado rivers, Fish. p. 148;

Gir., Cypr. Fish. Un. Stat. Proc. Acad. Nat. Sc. Phil. VIII p. 205. =

TIGOMA Gir. ib. p. 205 = CHEONDA Gir., ib. p. 207 –

GILA.

Body elongate, compressed, covered with small or medium-sized unequal scales, back rather elevated. Jaws nearly equal, covered by terete, simple lips. No barbels. Snout acute, prolonged, depressed, not protruding anterior to the mouth. Mouth terminal, gape large, oblique, ending below the eye. Eyes superior, not covered by palpebral membrane. Lateral line slightly or moderately curved. Belly not keeled. Dorsal fin starting behind ventral fin and ending above or hardly anterior to anal fin, with few rays, posterior simple ray cartilaginous. Pectoral fins partly inserted in the lowest part of the belly. Anal fin with several rays, not or only slightly longer than dorsal fin. Tail thin. Isthmus narrow. Pharyngeal teeth predatory, compressed 1.4/5.2 or 2.5/5.2.

Remark. *Togoma* Gir. and *Cheonda* Gir. differ too little from *Gila*, to consider them as genera different from it, reason why they are united here. The 430 genus in habitus most resembles *Aspius*, and seems to be its substitute in America just like *Ptychocheilus* Ag. I even doubt it very much whether it can be separated as a genus from *Ptychocheilus*. However, I don't know any figure of *Ptychocheilus*, the species of which seem to possess a squatter, strong tail and a smaller gill opening, whereas Mr Agassiz mentions the broad tranverse plied lips of *Ptychocheilus*.

PTYCHOCHEILUS Ag.,

Ichth. faun. Pacif. Sl. N. Am., Am. J. Sc. Arts 2^d Ser. Vol. XIX; Gir., Cypr. Fish. Unit.

Stat., Pros. Ac. Nat. Sc. Phil. VIII p. 208 = CLINOSTOMUS Gir., ib. p. 211 –

PLY-LIP CARP

Body oblong or elongate, fusiform- compressed, covered with medium-sized unequal scales. Jaws enclosed in fleshy, simple lips. No barbels. Head elongate, snout acute, prolonged, hardly protruding anterior to the mouth. Mouth terminal or slightly terminal, gape large. Lower jaw sometimes longer than upper jaw. Eyes superior, not covered by palpebral membrane. Lateral line moderately curved. Belly not

keeled Dorsal fin starting behind ventral fins, with few rays, posterior simple ray cartilaginous. Anal fin with several rays, not or hardly longer than dorsal fin. Tail robust. Isthmus medium-sized. Pharyngeal teeth predatory 2.4/4/2 or 2.5/4.2 or 2.5/5.2 or 1.4/4.2, no chewing surface.

Remark. Ptychocheilus seems to be closely related to *Aspius* and with the very closely related genus *Gila* to replace *Aspius* in the new world. – *Clinostomus* Gir. essentially cannot be distinguished from it, and I am even inclined, as is already mentioned above, to neither consider *Gila* Baird as essentially different.

OPSARIUS McCL.,

Ind. Cypr. Res. Asiat. Soc. Beng. XIX p. 295, 413; Heck., Fisch. Syr. p. 53. –

SHAKRA.

Body oblong or slightly elongate, compressed, covered with large or medium-sized scales, back lower than elevated belly. Jaws covered by thin, simple lips, upper lip slightly protrusable. Barbels 4, nasal and upper jaw barbels, or 2 upper jaw barbels or none. Snout acute, not protruding anterior to the mouth. Mouth anterior, gape strongly oblique, ending below the eye or behind the eye. Upper jaw emarginate at the symphysis. ⁴³¹ Lower jaw not shorter than upper jaw, at the symphysis generally hooked with a bony tubercle. Eyes superior, not covered by palpebral membrane. Dorsal fin with few rays, starting above or mostly behind ventral fins and ending slightly anterior to or above anal fin, posterior simple ray totally cartilaginous. Pectoral fins shorter than the head. Anal fin with several rays, longer than dorsal fin. Lateral line strongly curved, closer to the ventral line than to the dorsal line. Teeth predatory 2.3.5/5.3.2 or 2.3.4/4.3.2.

Subg. *Shacra* Blkr. - Nasal and upper jaw barbels.

" *Bendilisis* Blkr. - Upper barbels only.

" *Opsarius* Blkr. - No barbels.

Remark. The genus *Opsarius* was first proposed by Mr MacClelland, however not entirely in the same sense as it is described above. He also included the species of *Chela*, a genus which was already accepted earlier by Buchanan and Cuvier, species moreover, which depart remarkably from those of *Opsarius* as accepted here.

It is difficult to define the borders between *Aspius* and *Opsarius*. The difference mainly seem to lie in the fact that the body in *Opsarius* is remarkably more compressed and also more slender in habitus with the belly line more convex than the back line, and that the pharyngeal jaw teeth are placed in three rows.

I do not know the genus from nature. It does not seem to occur in the Indian archipelago, but on the contrary to be represented in numerous species in the waters of South-Asia and the Japanese islands, whereas one species seems to occur even in the Nile.

By far the most species have no barbels. I have placed all these species in the subgenus *Opsarius*, while I propose the subgeneric name *Bendilisis* for the species with two barbels and *Shacra* for those with four barbels. The numerous species in various peculiarities are rather variable, in particular however in the place of implantation of the dorsal fin. In the Japanese species the dorsal fin is implanted above the pelvic fins, which is also the case in some Bengalese species. In most cases however, the dorsal fin starts at a smaller or larger distance from the pelvic fins and usually ends only above the first part of the anal fin. Among the Japanese species there are a few, which posses

shapes that answer more to those in *Aspius*, however they differ rather sharply from these by a dorsal fin that starts above the pelvics and three rowed pharyngeal jaw teeth.

⁴³² In the meantime I am of the opinion that a general review of all species is necessary after the in this work proposed concentration of the genera placed in the genera *Abramis*, *Scardinus*, *Leuciscus*, *Alburnus*, *Aspius* and *Opsarius*, and at the same time one should look for foundations for their better determinations.

LEPTOBARBUS Blkr. –
SLENDER CARP.

Body oblong-elongate, compressed, covered with large scales, back low angular. Jaws enclosed in terete, simple lips, upper lip slightly forward protrusible. Barbels 4, nasal and upper jaw barbels. Snout acute, depressed, not protruding anterior to the mouth. Anterior suborbital bone pentagonal, tip acute, pointing upward. Mouth anterior, gape oblique, ending hardly anterior to the eye, in form reminding of a horse shoe when the mouth is closed. Lower jaw shorter than upper jaw, symphysis without tubercle. Postlabial groove on both sides parallel with the free margin of the jaw, not united with the groove on the opposite side. Gill opening ending below the preoperculum. No anal sheath covered with larger scales. Lateral line lightly curved. Dorsal fin starting above ventral fins and ending far anterior to anal fin, scaleless at the base, posterior simple ray flexible, nearly totally cartilaginous. Anal fin shorter than dorsal fin. Pharyngeal teeth spoon-shaped, on the chewing surface pluri-crenulate at the margins 2.3.5/5.3.2.

Remark. I now consider to belong to a proper genus the species, which I already described in the year 1851 under the name *Barbus Hoeveni*. The flexible cartilaginous posteriormost branched dorsal fin ray, the flat sharp snout, the oblique mouth slit and the notched chewing pad edges of the pharyngeal teeth remove it from the genus *Barbus*, while these characters in connection with the entirely scaleless dorsal fin base prohibit placing it in one of the genera that are closely related to *Barbus*. The general structure and habitus make the genus approach *Luciosoma* and *Rasbora*, from which it otherwise still differs in important characters. The lower jaw bones seen from below, together form a complete horse shoe, as both branches leave an elongate round space between them. There are only 3 unbranched dorsal fin rays and not four, as in *Barbus* and related genera.

Till now I do not know a second species of this genus, which according to our present state of knowledge is restricted to Sumatra and Borneo.

⁴³³ *Leptobarbus Hoevenii* Blkr. –
Van der Hoeven's Slender Carp. –
Atl. Cypr. Tab. XLVIII.

A *Leptobarbus* with a slightly elongate, compressed body, depth of body contained slightly over 5 to 4 $\frac{2}{3}$ times in its length, width contained 1 $\frac{1}{2}$ to 2 times in its depth. Head depressed, acute, contained 4 $\frac{1}{4}$ to 5 $\frac{1}{4}$ times in length of body with caudal fin, 3 $\frac{1}{3}$ to 4 times in length of body without caudal fin; depth of head contained 1 $\frac{1}{3}$ to 1 $\frac{1}{2}$ times, width contained nearly 2 to 1 $\frac{3}{4}$ times in its length; eye diameter contained 3 to 3 $\frac{3}{4}$ times in the length of the head, eye diameter contained slightly over once to 1 $\frac{2}{3}$ times in the postocular part of the head, distance between the eyes 1 $\frac{1}{4}$ to 1 $\frac{2}{3}$ times their diameter; palpebral membrane covering the external margin of the iris, broader anteriorly than posteriorly, the opening nearly circular; snout acute, sloping, nearly straight or slightly convex, in younger animals shorter than

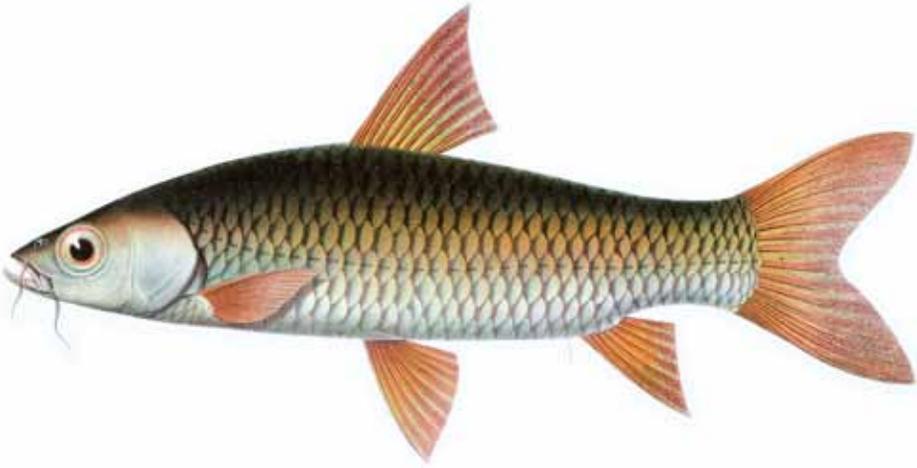


Fig. 113. *Leptobarbus hoevenii* Blkr. Atl. Ichth. Cypr. Tab. XXXI, Fig. 2. TL figure 266 mm.

the eye, in old animals not longer than the eye, not protruding anterior to the mouth; nostrils closer to the orbit than to the tip of the snout; rostro-dorsal line on all of the head sloping, nearly straight or slightly convex, on nape convex; interorbital line slightly convex; anterior suborbital bone irregularly pentagonal, lower margin oblique, anterior and posterior lower margins short, anterior margin truncate, posterior margin oblique, upper margins strongly concave, much longer than lower margins, united into an acute, upward pointing angle close to the nostrils, with a longitudinal crest close to the lower margin of the bone; 2nd suborbital bone very low, elongate, higher anteriorly than posteriorly; upper jaw not longer than lower jaw, only slightly forward protrusible, ending anterior to the eye or below the anterior margin of the eye, contained nearly 3 to 3½ times in the length of the head, oral margin acute; gape oblique; barbels thin, nasal and upper jaw barbels nearly equal in length, considerably longer than the eye; lower jaw without tubercle at the symphysis, oral margin acute, lower part on each branch with 6 or 7 pores placed in a longitudinal row; lips thin, terete, on the oral surface lightly transversely striped; width of gill cover contained 1½ to 1⅓ times in its height, lower margin nearly straight; gill opening ending below the posterior part of the preoperculum. Pharyngeal teeth hooked to spoon-shaped, 2.3.5/5.3.2, margins of chewing surface especially in older animals pluricrenulate, however, 2 internal teeth in longest row not crenulate; scapular bone triangular, strongly obtuse; belly flat anterior to ventral fins, angular at the sides, behind ventral fins rounded, not ridged; back slightly elevated, not much higher than convex belly; scales on the free half and the basal half with slightly ray-like longitudinal stripes, 36 to 38 scales in the lateral line, 19 in a vertical row (without the lowest ventral scales) of which 5 (4½) above the lateral line, 10 or 11 in a longitudinal row between occiput and dorsal fin, lowest ventral scales in three longitudinal rows, scales in the medial row gradually increasing in size posteriorly, not larger than those in the flanking rows; lateral line curved, descending below the rostro-caudal line, each scale marked by a simple tube reaching or nearly reaching the centre of the scale; dorsal fin starting above the ventral fins, base without scaled sheath, acute, not or hardly emarginate, not or only slightly lower than the body, twice to more than twice as high as base length, spine very thin, nearly totally cartilaginous, flexible, not much shorter to no shorter than the head; pectoral and ventral fins acute, nearly equal in length, contained 6⅓ to 7⅓ times in the length of the body, pectoral fins not reaching ventral fins, ventral fins not reaching anal fin; anal fin acute, not or slightly emarginate, considerably lower than dorsal fin but much less than twice as low, twice or more than twice as high as base length, the simple third ray very slender, to-

tally cartilaginous; caudal fin scaled only at the base, with a deep incision, lobes acute, contained $4\frac{1}{4}$ to $3\frac{3}{4}$ times in the length of the body. Colour: upper part of the body olive, lower part silver, iris yellow, upper part dark; oblong, transverse, blackish scapular spot; scales on back, flanks and tail each with an oblong, transverse violet spot at the base; fins beautiful pink or red, caudal fin generally with a dark margin.

B. 3. D. $3/7$ or $3/8$. P. $1/16$ or $1/15$. V. $2/8$. A. $3/5$ or $3/6$. C. $6/17/6$ or $7/17/7$, short flanking ones included.

Syn. *Barbus Hoevenii* Blkr, Vierde bijdr. Ichth. Borneo, Nat. T. Ned. Ind. III p. 207.

434 Hab. Sumatra (Palembang), in rivers.

Borneo (Bandjermassin, Kahajan, Pengaron, Pontianak), in rivers.

Length of 12 specimens $114''$ and $278''$.

Remark. One of my smallest specimens in the centre of each lobe of the caudal fin has a broad, violet-black transverse band, of which there is no trace in any of my other specimens. For the rest it offers no differences, so it can only be considered as a variety.

The species does not seem to be rare in the large drainage areas of Borneo and East Sumatra.

GNATHOPOGON Blkr. –

JAW THREAD CARP.

Body elongate, compressed, covered with large scales, back low. Jaws enclosed in thin, simple lips. Barbels 2, upper jaw barbels. Snout acute, slightly depressed, not protruding anterior to the mouth. Mouth anterior, gape oblique, ending anterior to the eye. Eyes superior, not covered by palpebral membrane. Belly not keeled. Dorsal fin with few rays, starting in front or above ventral fins and ending anterior to anal fin, scaleless at the base, posterior simple ray totally cartilaginous. Pectoral fins shorter than the head. Anal fin with few rays ($3/5$ or $3/6$). Lateral line hardly curved. Teeth....?

Remark. I propose the genus in question based on two Japanese species depicted and described in the Fauna Japonica under the names *Capoëta elongata* and *Capoëta gracilis*. *Gnathopogon* is closest related to *Rasbora*, however it belongs to a different generic type as its dorsal fin is placed opposite the pelvic fins, the almost straight lateral line that runs across the centre of the body, and the upper jaw barbels, in addition to which probably can be mentioned unknown particularities in the structure of the mouth parts and pharyngeal teeth.

PSEUDORASBORA Blkr. –

FALSE PARAAI

Body slightly elongate or elongate, compressed, covered with large scales, back low. Jaws enclosed in thick, fleshy lips, upper lip moderately protrusable. No barbels. Snout acute, depressed, not protruding anterior to the mouth. Anterior suborbital bone pentagonal, tip acute, pointing upward. Mouth superior, gape short, nearly vertical, ending far anterior to the eye. Jaws without incision of tube at the symphysis. 435 Postlabial groove on both sides simple, longitudinal, separated from the groove on the opposite side by a wide isthmus. Eyes posterior, not covered by palpebral membrane. Belly flat, strongly obtuse. Dorsal fin with few rays, starting above or hardly in front ventral fins and ending far anterior to anal fin, scaleless at the base, posterior simple ray totally cartilaginous. Anal fin with few rays (16 or 17). Lateral line hardly curved. Gill opening ending below the middle of the gill cover. Pharyngeal teeth hooked-compressed $5/5$.

Remark. The genus *Pseudorasbora* in habitus has a very large similarity with *Rasbora* Blkr, but it differs from it by a very small vertical mouth slit, different structure of jaws and lips, only single rowed pharyngeal teeth and little curved lateral line. The genus seems to be restricted to the freshwater of Japan.

RASBORA BLKR. –
PARAAI.

Body slightly elongate or elongate, compressed, covered with large scales, back low. Jaws enclosed in terete, simple lips, upper lip slightly protrusible. No barbels. Snout acute, slightly depressed, not protruding anterior to the mouth. Anterior suborbital bone pentagonal, tip acute, pointing upward. Mouth anterior, gape strongly oblique, ending anterior to the eye or below the anterior part of the eye. Upper jaw with a short process towards the symphysis, symphysis itself emarginate, taking in the hook of the lower jaw. Lower jaw not shorter than upper jaw, emarginate towards the symphysis, symphysis itself hooked with a bony tubercle. Postlabial groove on both sides parallel to the free margin of the jaw, not united with the groove on the opposite side. Eyes slightly superior, not covered by palpebral membrane. Belly not keeled. Dorsal fin with few rays, starting behind ventral fins and ending anterior to anal fin, scaleless at the base, posterior simple ray totally cartilaginous. Anal fin with few rays (3/5 or 3/6). Lateral line strongly curved, much closer to ventral line than to dorsal line. Gill opening ending below the preoperculum. Pharyngeal teeth slightly spoon-shaped to hooked 2.4.5/5.4.2 or 2.4.4/4.4.2 or 3.5/5.3.

436 I base the genus *Rasbora* on a number of species with an obvious similarity in general habitus, shape and structure of the fins and organization of the mouthparts. It is related to *Opsarius* McCl. were Heckel also placed the species already known prior to my research in *Opsarius*

However, these species and a number of others, discovered by myself in the Indian archipelago, can be placed in a separate natural genus, which can easily be distinguished from *Opsarius* as it is defined above, by its short anal fin, which in none of the species has more than 5 or 6 branched rays, and by the small mouth slit ending before the eye or at most reaches the anterior eye rim.

I possess of *Rasbora* no less than eleven species. One of those species, originating from Bengal, probably is the same as Buchanan's *Cyprinus rasbora*. The remaining ten species all live in the rivers of the Sunda Islands and have been described by myself for the first time, although one of them, *Rasbora lateristriga*, was already known to Van Hasselt. They all show a large similarity with each other in general shape of body, head, fins, squamation and configuration of the lateral line, however they are sufficiently distinguishable from each other by characters found in the numbers of the scales, and pectoral fin rays, the implantation place and height of the dorsal fin, the height of the body, the length of the head and the coloration. The last mentioned character is very characteristic for many species.

For the rest I have placed in the above given list of species of *Rasbora*, various species under escort of a question mark, as their true relationship can only be determined after detailed research.

The species of my collection with the following scheme can be separated from the remaining known ones and from each other.

- I. 5 scales above the lateral line, less than 40 in the lateral line.
 - A. 30 to 36 scales in the lateral line.
 - a. Dorsal fin closer to the base of the ventral fins than to the anal fin. Depth of body contained $4\frac{2}{3}$ to $6\frac{1}{4}$ times in its length.
 - † Body with longitudinal violet or black bands.
 - Ó 3 lightly curved bands on the body, upper bands shaped from more or less merging spots, anteriorly prolonged into a scapular-rostral band, posteriorly prolonged up to the posterior margin of the tail.
 - 31 to 33 scales in the lateral line, head contained $4\frac{3}{4}$ to $5\frac{1}{3}$ times, pectoral fins contained $5\frac{1}{3}$ to 6 times in the length of the body. P. 1/14 or 1/15. V. 2/8.

Rasbora cephalotaenoa Blkr. 437

- Ó' One single band on the body.
 - 437 ○ Rostro-caudal band more or less curved on the middle of the flanks. Dorsal and anal fin with a blackish band anteriorly.
 - Ô 30 to 32 scales in the lateral line. Head contained $4\frac{1}{3}$ to $5\frac{3}{4}$ times, pectoral fins contained $5\frac{1}{3}$ to $5\frac{1}{2}$ times in the length of the body. P. 1/12. V. 2/7.

Rasbora Einthoveni Blkr.

- ' Scapulo-caudal band straight. Round violet spot close to the anterior part of the base of the caudal fin. Fins without bands.
 - 30 or 31 scales in the lateral line. Head contained $5\frac{1}{4}$ to $6\frac{1}{4}$ times, pectoral fins contained $5\frac{1}{2}$ to 6 times in the length of the body. P. 1/15 or 1/16. V. 2/8.

Rasbora lateristriata Blkr.

- ' Blackish band starting in a large spot above the anal fin and extending from there to the posterior margin of the caudal fin. Postscapular region with a blackish round spot. Anal and dorsal fins without bands.
 - Ô 30 scales in the lateral line. Head contained $4\frac{1}{2}$ to $5\frac{1}{4}$ times in the length of the body, pectoral fins contained $4\frac{1}{2}$ to $5\frac{1}{3}$ times in the length of the body. P. 1/12 or 1/13. V. 2/7.

Rasbora kallochroma Blkr.

- †' Body without violet or blackish bands.
 - Ó Dorsal fin hardly closer to ventral fins than to anal fin, lower than the body. Caudal fin very wide posteriorly, with a black margin, contained 4 to $4\frac{3}{4}$ times in the length of the body.
 - 32 to 36 scales in the lateral line. P. 1/13 to 1/16. Head contained $4\frac{2}{3}$ to nearly 6 times, pectoral fins contained 5 to $5\frac{1}{2}$ times in the length of the body.

Rasbora dusonensis Blkr.

- Ó' Dorsal fin considerably closer to ventral fins than to anal fin, not lower than the body. Caudal fin without black margin, contained $3\frac{3}{4}$ to 4 times in the length of the body.

- 32 scales in the lateral line. P. 1/13. V. 2/7. Head 6 to slightly over 6 times, pectoral fins contained about $5\frac{3}{4}$ times in the length of the body.

Rasbora leptosoma Blkr.

- b. Dorsal fin placed halfway between ventral fins and anal fin. Depth of the body contained slightly over 4 to slightly over 5 times in its length.
- 438 † Head-tail band silver, the upper part traversed by a thin bluish band.
- Ó 30 scales in the lateral line. Head contained 5 to 6 times, pectoral fins contained $5\frac{1}{2}$ to $5\frac{3}{4}$ times in the length of the body. P. 1/12 or 1/13. V. 2/7 to 2/9.

Rasbora argyrotaenia Blkr.

- c. Dorsal fin closer to anal fin than to ventral fins. Depth contained $5\frac{1}{2}$ to $5\frac{3}{4}$ times in its length.
- † Head-tail band silver, traversed in the middle by a thin bluish band.
- Ó 32 scales in the lateral line. Head contained nearly 6 to slightly over 6 times, pectoral fins contained $5\frac{3}{4}$ to 6 times in the length of the body. P. 1/13. V. 2/8.

Rasbora borneënsis Blkr.

- B. Less than 30 scales in the lateral line. No violet or black bands on the body.
- a. Dorsal fin much closer to the base of the ventral fins than to the anal fin. Depth of body contained about $4\frac{1}{2}$ times in its length.
- † 27 or 28 scales in the lateral line. Head contained slightly over 5 times, pectoral fins contained about $5\frac{3}{4}$ times in the length of the body. P. 1/14. V. 2/8.

Rasbora Buchanani Blkr.

- b. Dorsal fin placed halfway between ventral fins and anal fin. P. 1/13.
- † 25 or 26 scales in the lateral line. Depth of the body contained 5 to $5\frac{1}{2}$ times in its length. Head contained about 5 times, pectoral fins contained 5 to $5\frac{1}{2}$ times in the length of the body. Anal fin without black spot. 2nd and 3rd suborbital bones very broad. Pharyngeal teeth 2.4.5/5.4.2.

Rasbora sumatrana Blkr.

- † 22 to 24 scales in the lateral line. Depth of body contained about $4\frac{1}{2}$ times in its length. Head contained about $4\frac{1}{2}$ times, pectoral fins contained 6 times in the length of the body. Anal fin with a large black spot at the tip. 2nd and 3rd suborbital bones slender. Pharyngeal teeth 3.5/5.3.

Rasbora bankanensis Blkr.

Rasbora cephalotaenia Blkr. –
Gebande Paraai [Banded Paraai].
 Atl. Cypr. Tab. L fig. 5.

A *Rasbora* with an elongate, compressed body, depth of body contained 5 to $5\frac{3}{4}$ times in its length, width contained $1\frac{2}{3}$ to nearly 2 times in its depth. Head acute, not convex, contained $4\frac{3}{4}$ to $5\frac{1}{4}$ times in length of body with caudal fin, $3\frac{3}{4}$ to 4 times in length of body without caudal fin, crown scaleless;



Fig. 114. *Rasbora cephalotaenia* Blkr. Atl. Ichth. Cypr. Tab. XVII, Fig. 3. TL figure 128 mm.

depth of head contained $1\frac{3}{5}$ to [439](#) $1\frac{1}{2}$ times in its length, width nearly 2 to $1\frac{3}{4}$ times; eyes slightly posterior, eye diameter contained 3 to $3\frac{3}{4}$ times in the length of the head, eye diameter contained slightly more than once to $1\frac{1}{3}$ times in the postocular part of the head, distance between the eyes slightly more than once to nearly $1\frac{1}{2}$ times their diameter; palpebral membrane covering the posterior margin of the iris only, the opening nearly circular; rostro-dorsal profile sloping on the head sloping, nearly straight or slightly concave, on nape and back convex; interorbital line slightly convex; snout acute, not convex, slightly to no shorter than the eye, tip located anterior to the superior part of the eye; nostrils not much closer to the orbit than to the tip of the snout, posterior nostrils more than twice as large as anterior nostrils; anterior suborbital bone nearly triangular, base shorter, pointing upward, sides longer, descending, united inferiorly into a generally slightly acutely rounded or slightly truncate downward pointing angle, traversed by an obliquely backward descending longitudinal crest; 2nd suborbital bone oblong-quadrangular, higher posteriorly than anteriorly, length less than twice as large as depth, twice to less than twice as low as 1st suborbital bone; 3rd and 4th suborbital bones broad, nearly reaching the posterior margin of the preoperculum, less than twice to twice as low as the eye diameter; jaws nearly equal, oral margins acute especially anteriorly; upper jaw moderately forward protrusible, profoundly emarginate at the symphysis, ending anterior to the eye or below the anterior margin of the eye, contained nearly $2\frac{2}{3}$ to 3 times in the length of the head; lower jaw emarginate versus the symphysis, symphysis itself provided with an hook or very conspicuous tubercle, entering the intermaxillary incision, obliquely compressed branches on the lower part with one longitudinal row of pores, not always visible; lips thin, oral surface transversely striped; groove of upper lip ending slightly anterior to the angle of the mouth, groove of lower lip extending from the angle of the mouth towards the inframaxillary incision; gape strongly oblique; width of gill cover contained $1\frac{2}{5}$ to $1\frac{1}{2}$ times in its depth, lower margin nearly straight or slightly concave; gill opening ending below the preoperculum; Pharyngeal teeth predatory, conspicuously hooked, 2.4.5/5.4.2, each below the hook with a superficial, oblong or oval well visible small fossa; dorsal profile convex, not or hardly higher than convex ventral line; belly flat anterior to ventral fins, angular at the sides, behind ventral fins rounded, not ridged; scale nearly vertical, on the free half and the basal half with slightly ray-like longitudinal stripes, caudal scales conspicuously smaller than those on the middle of the flanks, 31 to 33 scales in the lateral line, 10 ($9\frac{1}{2}$) in a transverse row of which 5 ($4\frac{1}{2}$) above the lateral line, 12 or 13 in a longitudinal row between occiput and dorsal fin, lowest ventral scales in three to five longitudinal rows, scales in the medial row hardly increasing in size posteriorly, larger than those in the flanking rows; lateral line strongly curved, three times or more than three times as close to the base of the ventral fins as to the dorsal line, gradually ascending posteriorly and ending on the middle of the caudal fin, each scale marked by a simple tube reaching or not reaching the centre of the scale; scapular bone triangular, slightly obtuse at the tip; dorsal fin placed between

ventral fins and anal fin, much closer to ventral fins than to anal fin, scaleless at the base, acute, convex, not or hardly lower than the body, twice or nearly twice as high as base length, the simple 2nd ray thin, cartilaginous, considerably shorter than the head; pectoral fins scaleless at the base, acute, contained $5\frac{1}{3}$ to 6 times in the length of the body, not or hardly reaching the ventral fins, the ray simple, thin; ventral fins inserted in the lowest part of the belly, acute, shorter than pectoral fins, not reaching the anal fin; anal fin at the base enclosed in a scaled, low sheath, emarginate, considerably to slightly lower than the dorsal fin, considerably to slightly higher than base length, the simple third ray thin, cartilaginous; caudal fin scaled at the base, with a deep incision, lobes acute, lower lobe hardly longer than upper lobe, contained 4 to $4\frac{2}{3}$ times in the length of the body. Colour: upper part of the body faintly green or olive, golden or silver at the flanks, lower part silver; rostro-opercular band violet-blue or black, generally interrupted by the eye; iris silver or yellow; every scale on the back with an oblong, transverse, thin, violetish spot at the base; flanks with 3 longitudinal, violet-blue or black bands, 2 upper head-tail bands closely together, composed from roundish spots (one on each scale), the lower one with some accessory spot below and in front, in one longitudinal line, lower axillo-anal band ending close to the posterior anal ray, continuous, not interrupted; fins pink or pink-hyaline, more or less speckled with ⁴⁴⁰ dark, caudal fin in the middle generally with a longitudinal violet-blue or black band, confluent with the head-tail bands.

B. 3. D. 2/7 or 2/8. P. 1/14 or 1/15. V. 2/8. A. 3/5 or 3/6. C. 6/17/6 or 7/17/7, short flanking ones included.

Syn. *Leuciscus cephalotaenia* Blkr, Bijdr. ichth. Fauna Biliton, Nat. T. Ned. Ind. III p. 97.

Hab. Borneo (Kahajan), in rivers.

Banka (Merawang, Baturussak), in rivers.

Biliton (Tjirutjup), in rivers.

Length of 17 specimens 70''' to 128'''.

Remark. I described this species already in the year 1851 after specimens from the island Biliton, but since then I received still other specimens from Banka and Borneo.

Among all its relatives it is recognizable by its peculiar band markings, 31-33 scales in the lateral line, 14 or 15 branched pectoral fin rays, etc.

Rasbora Einthoveni Blkr. –

Einthoven's Paraai.

Atl. Cypr. Tab XLIX fig. 5.

A *Rasbora* with a slightly elongate, compressed body, depth of body contained $4\frac{2}{3}$ to 5 times in its length, width contained $1\frac{2}{3}$ to nearly 2 times in its depth. Head acute, not convex, contained $4\frac{1}{3}$ to $5\frac{3}{4}$ times in length of body with caudal fin, $3\frac{1}{2}$ to $4\frac{1}{2}$ times in length of body without caudal fin, crown scaleless; depth of head contained $1\frac{1}{2}$ to $1\frac{2}{3}$ times in its length, width nearly 2 to $1\frac{3}{4}$ times; eyes slightly posterior, eye diameter contained $2\frac{2}{3}$ to 3 times in the length of the head, eye diameter contained slightly more than once to $1\frac{1}{4}$ times in the postocular part of the head, distance between the eyes nearly once to $1\frac{1}{4}$ times their diameter; palpebral membrane covering the posterior margin of the iris only, the opening nearly circular; rostro-dorsal profile on the head sloping, nearly straight or slightly convex, on nape and back convex; interorbital line convex; snout acute, not convex, shorter than the eye, tip located anterior to the upper part of the eye; nostrils closer to the orbit than to the tip of the snout, posterior nostrils about twice as large as anterior nostrils; anterior suborbital bone nearly triangular, base shorter, pointing upward, sides longer, descending, united into a slightly acutely rounded downward pointing angle, traversed by a longitudinal, obliquely backward descending crest; 2nd suborbital bone obliquely quadrangular or nearly triangular, much higher posteriorly than anteriorly, length less than twice as large as depth, nearly twice to much less than twice as low as 1st suborbital bone; 3rd suborbital bone much broader than 4th suborbital bone, nearly reaching the posterior margin of the preoperculum, twice to much less than twice as thin as the eye diameter; jaws

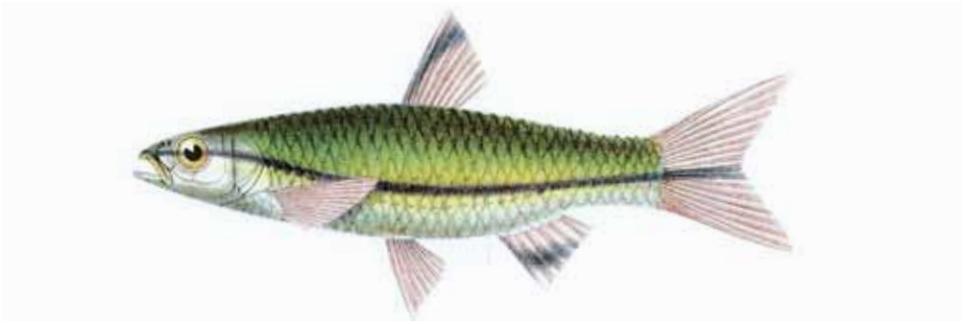


Fig. 115. *Rasbora Einthoveni* Blkr. Atl. Ichth. Cypr. Tab. XXI, Fig. 1. TL figure 83 mm.

nearly equal, oral margins acute especially anteriorly; upper jaw moderately forward protrusable, at the symphysis conspicuously emarginate and slightly behind the symphysis strongly emarginate, from there anteriorly bilobed, ending hardly anterior to the eye or below the anterior margin of the eye, contained 3 to nearly 3 times in the length of the head; lower jaw moderately emarginate towards the symphysis, the symphysis itself provided with a very conspicuous hook entering the intermaxillary incision, obliquely compressed branches on the lower part without visible pores; lips thin, oral surface without visible transverse stripes; groove of upper lip ending slightly anterior to the angle of the mouth, groove of lower lip extending from the angle of the mouth to the inframaxillary incision; gape strongly oblique; width of gill cover contained $1\frac{3}{5}$ to $1\frac{1}{2}$ times in its depth, lower margin nearly straight or slightly concave; gill opening ending below the posterior suborbital bones. Pharyngeal teeth predatory, conspicuously hooked, 2.4.5/5.4.2 or 2.4.4/4.4.2, each below the hook with a oblong, superficial slightly visible small fossa; dorsal line of the body convex, not or hardly lower than convex ventral line; belly flat anterior to ventral fins, behind ventral fins rounded, not ridged; scales nearly vertical, on the free half and the basal half with slightly ray-like longitudinal stripes, scales on the middle of the flanks larger than on the rest of the body, 30 to 32 scales in the lateral line, 9 ($8\frac{1}{2}$) in a transverse row of which 5 ($4\frac{1}{2}$) above ⁴⁴¹ the lateral line, 12 or 13 in a longitudinal row between occiput and dorsal fin, lowest ventral scales in three longitudinal rows, scales in the medial row nearly equal in size, not or hardly larger than those in flanking rows; lateral line strongly curved, more than three times as close to the base of the ventral fins as to the dorsal line, gradually ascending posteriorly and ending on the middle of the base of the caudal fin, each scale marked by a simple tube reaching or surpassing the centre of the scale; scapular bone triangular, slightly acutely rounded; dorsal fin placed between ventral fins and anal fin, much closer to ventral fins than to anal fin, scaleless at the base, acute, convex, slightly lower than the body, about twice as high as base length, the simple 2nd ray thin, slightly shorter than the head; pectoral fins acute, contained $5\frac{1}{3}$ to $5\frac{1}{2}$ times in the length of the body, not or hardly reaching the ventral fins, the simple ray thin; ventral fins inserted in the lowest part of the belly, acute or acutely rounded, contained $6\frac{3}{4}$ to $7\frac{1}{2}$ times in the length of the body, not or hardly reaching the anal fin; anal fin at the base enclosed in a scaled, low sheath, acute, moderately to not emarginate, considerably lower to twice as low as dorsal fin, much higher to slightly higher than base length, the simple third ray thin, cartilaginous; caudal fin scaled at the base, with a deep incision, lobes acute or slightly acutely rounded, contained 4 to $4\frac{3}{4}$ times in the length of the body. Colour: upper part of the body green, olive or dark, lower part pearly or pink; iris yellow or silver; very conspicuous dark rostral-caudal band, intersecting the lateral line anteriorly and posteriorly, on the tail generally a lot broader than anteriorly, frequently more or less curved downward, in old animals thinner than in juveniles, tapering again above the base of the caudal fin and prolonged up to the tips of the middle rays of the caudal fin; fins pink to hyaline or pink, dorsal and anal fin anteriorly generally with an oblique, dark, intermarginal band towards the tip.

B. 3. D. 2/7 or 2/8. P. 1/12. V. 2/7. A. 3/5 or 3/6. C. 7/17/7 or 8/17/8, short ones on the sides included.

Syn. *Leuciscus Einthovenii* Blkr., Vijfde bijdr. ichth. Borneo, Nat. T. Ned. Ind. II p. 434.

Hab. Borneo (Kahajan), in rivers.

Biliton (Tjirutjup), in rivers.

Banka (Marawang, Tobaali, Barurussak), in rivers.

Singapore, in rivers.

Length of 32 specimens 30''' to 85'''.

Remark. The first specimen of this species that I laid my eyes on originated from Borneo. Since then I received numerous other specimens, both from Borneo and from Biliton, Banka and Singapore.

The species in relationship stands between *Rasbora cephalotaenia* and *Rasbora lateristriga*, but is distinguished from both, apart from a somewhat convex head profile, by having only 12 branched rays in the pectoral fin and the oblique bands on the dorsal and anal fin, and moreover still from *Rasbora cephalotaenia* by a single body stripe and from *Rasbora lateristriga* as that stripe already starts on the snout, curves downwards on the flanks and for the rest extends till the posterior edge of the caudal fin.

It seems to stay within smaller size than both forenamed species.

Rasbora lateristrata Blkr. –
Zijstreepige Paraai [Lateral stripe Paraai].
Atl. Cypr. tab. XLIX fig. 2.

A *Rasbora* with an elongate body, depth of body contained $5\frac{1}{4}$ to $5\frac{3}{8}$ times in its length, width contained about 2 times in its depth. Head acute, not convex, contained $5\frac{1}{4}$ to $6\frac{1}{4}$ times in length of body with caudal fin, slightly over 4 times to $4\frac{3}{4}$ times in length of body without caudal fin, crown scaleless; depth of head contained $1\frac{1}{3}$ to $1\frac{1}{2}$ times in its length, ⁴⁴² width 2 to $1\frac{1}{2}$ times; eyes slightly posterior, eye diameter contained nearly 3 to slightly over 3 times in the length of the head, eye diameter slightly more than once to $1\frac{1}{2}$ times in the postocular part of the head, distance between the eyes once to $1\frac{1}{4}$ times their diameter; palpebral membrane covering the external margin of the iris only, the opening nearly circular; rostro-dorsal profile on the head sloping, nearly straight, on nape and back convex; interorbital line convex; snout acute, not convex, shorter than the eye, tip placed anterior to the posterior part of the eye; nostrils closer to the orbit than to the tip of the snout, posterior nostrils more than twice as large as

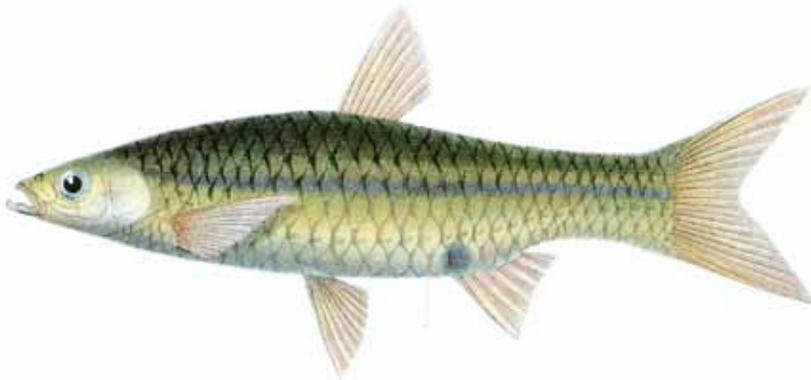


Fig. 116. *Rasbora lateristrata* Blkr. Atl. Ichth. Cypr. Tab. XVII, Fig. 2. TL figure 118 mm.

anterior nostrils; anterior suborbital bone nearly triangular, base shorter, pointing upward, sides longer, descending, united inferiorly into a slightly acutely rounded or slightly truncate downward pointing angle, traversed by a longitudinal, obliquely backward descending crest; 2nd suborbital bone oblong-quadrangular, considerably deeper posteriorly than anteriorly, length only slightly larger than posterior height, much less than twice as low as 1st suborbital bone; 3rd and 4th suborbital bones broad, nearly reaching the posterior margin of the preoperculum, much thinner than the eye diameter; jaws, oral margins acute especially anteriorly; upper jaw not shorter than lower jaw, slightly forward protrusible, at the symphysis profoundly emarginate, ending anterior to the eye or below the anterior margin of the eye, contained nearly 3 to slightly over 3 times in the length of the head; lower jaw strongly emarginate towards the symphysis, symphysis itself provided with a rather elevated hook, entering the intermaxillary incision, branches obliquely compressed, lower part with some pores, not always visible, in one longitudinal row; lips thin, no visible transverse stripes; groove of upper lip ending slightly anterior to the angle of the mouth, groove of lower lip extending from the angle of the mouth to the inframaxillary incision; gape strongly oblique; width of gill cover contained 1½ to 1⅓ times in its depth, lower margin slightly convex to slightly concave; gill opening ending below posterior margin of the eye. Pharyngeal teeth predatory, conspicuously hooked, 2.4.5/5.4.2, each below the hook with a oblong or oval, superficial, well visible small fossa; dorsal line of the body convex, not or hardly lower than convex ventral line; belly flat anterior to ventral fins, behind ventral fins rounded, not ridged; scales nearly vertical, on the free half and the basal half with slightly ray-like longitudinal stripes, scales on the middle of the flanks larger than on the rest of the body, 30 or 31 scales in the lateral line, 9 (8½) in a transverse row of which 5 (4½) above the lateral line, 12 or 13 in a longitudinal row between occiput and dorsal fin, lowest ventral scales in three longitudinal rows, scales in the medial row gradually increasing in size posteriorly, scales in those rows hardly or not larger than those in flanking rows; lateral line strongly curved, more than three times as close to the base of the ventral fins as to the dorsal line, gradually ascending posteriorly and ending on the middle of the base of the caudal fin, each scale marked by a simple tube reaching or surpassing the centre of the scale; scapular bone triangular, slightly acutely or slightly obtusely rounded; dorsal fin placed between ventral fins and anal fin, considerably closer to ventral fins than to anal fin, scaleless at the base, acute, convex, not or only slightly lower than the body, about twice as high as base length, the simple 2nd ray thin, cartilaginous, hardly or not shorter than the head; pectoral fins acute, not scaled at the base, considerably longer than the ventral fins, contained 5½ to 6 times in the length of the body, not reaching the ventral fins, the simple ray thin; ventral fins inserted in the lowest part of the belly, acute, not reaching the anal fin; anal fin at the base enclosed in a scaled, low sheath, acute, emarginate, only slightly lower than the dorsal fin, considerably higher than base length, the simple third ray thin, cartilaginous; caudal fin scaled at the base, with a deep incision, lobes acute, nearly equal, contained 4 to 4½ times in the length of the body. Colour: upper part of the body green, lower part silver; iris silver; head-tail band silver, subcutaneous, generally hardly visible, head-tail band violet-blue, frequently only posteriorly visible, belly above the anterior base of the anal fin generally with a round or oblong violet-blue or blackish spot; fins hyaline or pink-hyaline, caudal fin posteriorly generally slightly bordered with dark.

B. 3. D. 2/7 or 2/8. P. 1/15 or 1/16. V. 2/8. A. 3/5 or 3/6. C. 7/17/7 or 8/17/8, short flanking ones included.

443 Syn. *Leuciscus lateristriatus* V. Hass., Algem. Konst- en Letterb. 1823 II p. 132, Bulet. Féuss. 1824 Zoöl.; Blkr, Overz. ichth. faun. van Sumatra, Nat. T. Ned. Ind. III p. 94.

Tjetjerreh Mal. Bat.; *Parai*, *Gallengung* Sund.

Hab. Java (Perdana, Tandjong-oost, Tjampea, Buitenzorg, Tjipanas, Bandung, Pandjallu, Banjumas), in rivers and lakes.

Sumatra (Telokbetong, Lahat, Pajakombo, Meninju), in rivers and lakes.

Length of 20 specimens 55''' to 121'''.

Remark. *Rasbora lateristriata* was first described by myself, but all the same, judging from an illustration, which is in my possession, was already known to Van Hasselt who at the above referred place mentioned it under the name *Leuciscus lateristriatus*. It

is related to the longitudinally with violet or black banded species *Rasbora cephalotænia*, *Rasbora Einthoveni* and *Rasbora kallochroma*, but it distinguishes itself from all those by its relatively smaller head, by the longitudinal bluish-violet body stripe only extending from the gill cover till the caudal fin basis and which is straight, by its more angular backline and by the spot close to the basis of anterior part of the anal fin. Moreover it has the head profile straight and not somewhat convex as in *Rasbora Einthovenii* and it also misses the oblique bands on the dorsal and anal fin of this species, the only one of the archipelagic species, with which it might be mistaken.

Till now *Rasbora lateristriata* has only become known to me from Java and Sumatra. It seems to grow larger than the three above mentioned species.

Rasbora kallochroma Blkr. –
Fraaikleurige Paraai [Nice coloured Paraai].
Atl. Cypr. Tab. L fig. 1.

A *Rasbora* with an elongate, compressed body, depth of body contained about 5 times in its length, width contained about 2 times in its length. Head acute, not convex, contained $4\frac{1}{2}$ to about $5\frac{1}{4}$ times in length of body with caudal fin, $3\frac{1}{2}$ to 4 times in length of body without caudal fin, crown scaleless; depth of head contained $1\frac{3}{5}$ to $1\frac{1}{2}$ times, width contained $1\frac{3}{5}$ to $1\frac{1}{2}$ times in its length; eyes slightly posterior, eye diameter contained nearly 3 times to 3 times in the length of the head, eye diameter contained slightly over once to $1\frac{1}{3}$ times in the postocular part of the head, distance between the eyes $1\frac{1}{4}$ to $1\frac{1}{5}$ times their diameter; palpebral membrane covering the external margin of the iris only, the opening nearly circular; rostro-dorsal profile on the head sloping, nearly straight or slightly convex, on nape and back convex; inter-orbital line convex; snout acute, not convex, much shorter than the eye, tip located anterior to the upper part of the eye; nostrils closer to the orbit than to the tip of the snout, posterior nostrils more than twice as large as anterior nostrils; anterior suborbital bone nearly triangular, base shorter, pointing upward, sides much longer, descending, united inferiorly into a slightly acutely rounded or slightly truncate downward pointing angle, traversed by a longitudinal, obliquely backward descending crest; 2nd suborbital bone oblong-quadrangular, much deeper posteriorly than anteriorly, length less than twice as great as depth, less than twice as low as 1st suborbital bone; 3rd and 4th suborbital bones broad, reaching the posterior margin of the preoperculum, not much thinner than the eye diameter; jaws, oral margins acute especially anteriorly; upper jaw not shorter than lower jaw, moderately forward protrusible, at the symphysis conspicuously emarginate and slightly behind the symphysis strongly emarginate, from there

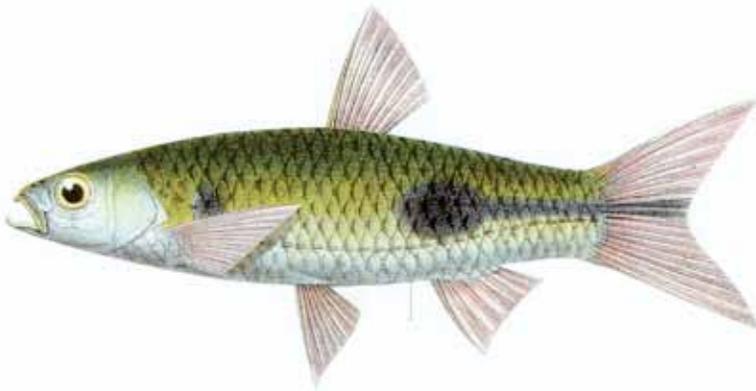


Fig. 117. *Rasbora kallochroma* Blkr. Atl. Ichth. Cypr. Tab. XX, Fig. 1. TL figure 85 mm.

bilobed anteriorly, ending hardly anterior to the eye or below the anterior margin of the eye, contained about 3 times in the length of the head; lower jaw strongly emarginate towards the symphysis, ⁴⁴⁴ symphysis itself provided with a uniform tubercle, entering the intermaxillary incision, branches nearly horizontally compressed, lower part without visible pores; lips thin, no visible transverse stripes; groove of upper lip ending slightly anterior to the angle of the mouth, groove of lower lip extending from the angle of the mouth nearly up to the inframaxillary incision; gape strongly oblique; width of gill cover contained about $1\frac{1}{2}$ times in its depth, lower margin slightly concave or nearly straight; gill opening ending below posterior suborbital bones; Pharyngeal teeth predatory, conspicuously hooked, 2.4.5/5.4.2, each below the hook with a oblong, superficial, little visible small fossa; dorsal line of the body convex, not or hardly higher than convex ventral line; belly flat anterior to ventral fins, behind ventral fins rounded, not ridged; scales nearly vertical, on the free half and the basal half with slightly ray-like longitudinal stripes, scales on the middle of the flanks conspicuously larger than on the rest of the body, 30 scales in the lateral line, 9 ($8\frac{1}{2}$) in a transverse row of which 5 ($4\frac{1}{2}$) above the lateral line, about 12 in a longitudinal row between occiput and dorsal fin, lowest ventral scales in three longitudinal rows, gradually increasing in size posteriorly, scales in medial row larger than those in lateral rows; lateral line strongly curved, more than three times as close to the base of the ventral fins as to the dorsal line, gradually ascending posteriorly and ending at the lower base of the caudal fin, each scale marked by a simple tube reaching or surpassing the centre of the scale; scapular bone triangular, slightly acutely rounded; dorsal fin placed between ventral fins and anal fin, closer to ventral fins than to anal fin, acute, convex, not or hardly lower than the body, the simple 2nd ray thin, cartilaginous, slightly shorter than the head; pectoral fins scaled at the base, acute, contained $4\frac{1}{2}$ to about $5\frac{1}{2}$ times in the length of the body, reaching or nearly reaching the ventral fins, the simple ray thin; ventral fins acute, not or hardly reaching the anal fin, contained $6\frac{1}{2}$ to 7 times in the length of the body; anal fin at the base enclosed in a scaled, low sheath, acute, slightly emarginate, not much lower than dorsal fin, considerably higher than base length, the simple third ray thin, cartilaginous; caudal fin scaled at the base, with a deep incision, lobes acute, contained 3 to $4\frac{1}{4}$ times in the length of the body. Colour: upper part of the body green or darkish, lower part pink or silver; several scales on the back with an oblong, transverse, trigonal dark spot at the base; iris silver or yellow; flanks in the postscapular region with a roundish black spot and above the anal fin about the middle of the depth of the body with a very large quadrangular or oblong or irregular black spot, posteriorly and at the bottom generally prolonged into a band entering the middle of the base of the caudal fin; between postscapular and supra-anal spot generally with some black droplets in one longitudinal row; fins pink-red or hyaline, ventral fins and anal fin at the tip lightly bordered with black.

B. 3. D. 2/7 or 2/8. P. 1/12 or 1/13. V. 2/7. A. 3/5 or 3/6. C. 6/17/6 or 7/17/7, short flanking ones included.

Syn. *Leuciscus kalochroma* Blkr, Nieuwe bijdr. ichth. faun. Born., Nat. T. Ned. Ind. I p. 272.

Hab. Borneo (Bandjermasin, Sambas), in rivers.

Banka (Baturussak), in rivers.

Length of 14 specimens 48''' to 85'''.

Remark. *Rasbora kallochroma*, just like the related *Rasbora Einthoveni*, has the profile of the head somewhat convex, only seven branched rays in the pelvic fins and 12 or 13 branched rays in the pectoral fins, but it distinguishes itself from *Rasbora Einthoveni* by higher 2nd and 3rd suborbital bones and longer pectoral fins and for the rest it is easily recognizable by its colouration. A little posterior to the axil a round black spot is found, which only reaches the lateral line with its lower side. The flanks from that spot to above the vent is without proper band markings. Above the anal fin ⁴⁴⁵ a second larger black spot is found, now elongated round, then again more squarish in shape, which similarly lies slightly above the lateral line, and which stretches to slightly before the anal fin. From the posterior margin of this spot a blackish band runs to the posterior edge of the caudal fin.

I described *Rasbora kallochroma* already in 1850 after ill preserved specimens from Borneo. Later I received also excellently preserved specimens from Banka, which have enabled me to greatly improve my earlier description.

Rasbora dusonensis Blkr. –

Duson's Paraai.

Atl. Cypr. Tab. XLIX fig. 3.

A *Rasbora* with an elongate, compressed body, depth of body contained nearly 5 to $5\frac{1}{2}$ times in its length, width contained nearly twice to $1\frac{2}{3}$ times in its depth. Head acute, not convex, contained $4\frac{2}{3}$ to about nearly 6 times in length of body with caudal fin, nearly $3\frac{1}{2}$ to $4\frac{1}{2}$ times in length of body without caudal fin, crown scaleless; depth of head contained $1\frac{1}{2}$ to $1\frac{2}{3}$ times contained times in its length; eyes slightly posterior, eye diameter contained 3 to $3\frac{1}{2}$ times in the length of the head, eye diameter contained $1\frac{1}{4}$ to $1\frac{1}{2}$ times in the postocular part of the head, distance between the eyes once to $1\frac{1}{3}$ times their diameter; palpebral membrane covering the external margin of the iris only, the opening nearly circular; rostro-dorsal profile on the head sloping, nearly straight, on nape and back convex; interorbital line convex; snout acute, not convex, in younger animals shorter than the eye, in adults not shorter than the eye, tip placed anterior to the upper part of the eye; nostrils closer to the orbit than to the tip of the snout, posterior nostrils about twice as large as anterior nostrils; anterior suborbital bone generally triangular (only in old animals frequently broadly truncate at the tip, nearly quadrangular), base shorter, pointing upward, sides longer, descending, united inferiorly into a slightly obtusely or acutely rounded (or truncate) downward pointing angle, traversed by a longitudinal, obliquely backward descending crest; 2nd suborbital bone oblong-quadrangular, not or hardly lower posteriorly than anteriorly, length less than twice to twice as great as depth, about twice as low as 1st suborbital bone; 3rd and 4th suborbital bones low, rather far removed from the posterior margin of the preoperculum, 4th suborbital bone much thinner than the 3rd, 3rd suborbital bone twice to more than twice as thin as the eye; jaws, oral margins acute especially anteriorly; upper jaw not shorter than lower jaw, hardly forward protrusible, at the symphysis conspicuously emarginate, ending anterior to the eye, contained slightly over 3 to about $3\frac{3}{5}$ times in the length of the head; lower jaw moderately emarginate towards the symphysis, symphysis itself with a rather elevated tubercle entering the intermaxillary incision, slightly hooked, branches obliquely compressed, lower part with some visible pores in one longitudinal row; lips thin, lightly transversely striped; groove of upper lip ending slightly anterior to the angle of the mouth, groove of lower lip extending from the angle of the mouth up to the inframaxillary incision; gape strongly oblique; width of gill cover contained $1\frac{1}{2}$ to $1\frac{2}{3}$ times in its depth, lower margin slightly nearly straight or slightly concave; gill opening ending below posterior suborbital bones. Pharyngeal teeth predatory, conspicuously hooked, 2.4.5/5.4.2, each below the hook with a oblong,

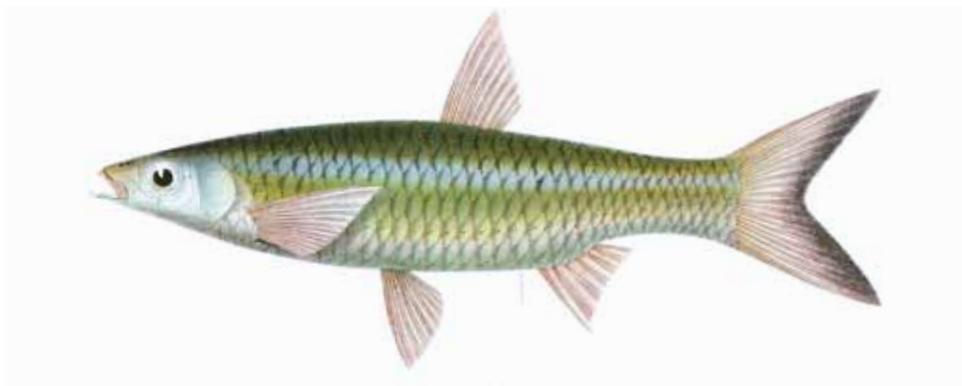


Fig. 118. *Rasbora dusonensis* Blkr. Atl. Ichth. Cypr. Tab. XIX, Fig. 1. TL figure 163 mm.

superficial, well visible small fossa; dorsal line of the body convex, generally lower than convex ventral line; belly flat anterior to ventral fins, behind ventral fins rounded, not ridged; scales oblique (lower angle of the free part placed anterior to the upper part), caudal scales very conspicuously smaller than those on the middle of the flanks, scales on the free half and the basal half with slightly ray-like longitudinal stripes, 32 to 36 scales in the lateral line, 9 (8½) in a transverse row of which 5 (4½) above the lateral line, 13 in a longitudinal row between occiput and dorsal ⁴⁴⁶ fin, the lowest ventral scales in three longitudinal rows, scales in medial row gradually increasing in size posteriorly, larger than those in flanking rows; lateral line strongly curved, more than three times as close to the base of the ventral fins as to the dorsal line, each scale marked by a simple tube not or hardly reaching the centre of the scale; scapular bone short, triangular, acutely or slightly acutely rounded; dorsal fin placed about halfway between ventral fins and anal fin, closer to ventral fins than to anal fin, acute, convex, depth contained slightly more than once to 1½ times in the depth of the body, about twice as high as base length, the simple 2nd ray thin, cartilaginous, not much shorter than the head; pectoral fins acute, lightly scaled at the base, much longer than ventral fins, contained 5 to 5½ times in the length of the body, reaching or nearly reaching ventral fins, the simple ray thin; ventral fins inserted in the lowest part of the belly, acute, not reaching anal fin, ray undivided, slender; anal fin at the base enclosed in a scaled, low sheath, acute, emarginate, considerably lower than dorsal fin but less than twice as low, slightly higher than base length, the simple third ray thin, cartilaginous; caudal fin scaled at the base, with a deep incision, lobes acute, nearly equal, contained 4 to 4¾ times in the length of the body. Colour: upper part of the body green, lower part pearly-silver; iris silver or yellow; silver head-tail band quasi subcutaneous, frequently not visible without removing scales; fins hyaline or pink-hyaline or yellowish-hyaline, caudal fin with a broad black border.

B. 3. D. 2/7 or 2/8. P. 1/13 to 1/16. V. 2/8. A. 3/5 or 3/6. C. 6/17/6 to 7/17/7, short flanking ones included.

Syn. *Leuciscus dusonensis* Blkr, Bijdr. ichth. Kenn. Borneo, Nat. T. Ned. Ind. I p. 14.

Hab. Borneo (Bandjermasin, Kahajan, Pengaron, Prabukarta, Sambas, Pontianak), in rivers. Sumatra (Palembang), in rivers.

Length of 64 specimens 55''' to 166'''.

Remark. *Rasbora dusonensis* seems to be a very common species in the rivers of Borneo as I have usually found one or more individuals in collections of freshwater fishes that I had the pleasure to receive from the various parts of Borneo. The species also grows larger than all other archipelagic species of the genus. From Sumatra I only received it from Palembang, and from the album of Siamese Fishes of Count de Castelnau I perceive it also lives in the Meinam in Siam.

The body is without markings except for a weakly transparent silverish band, which one observes in nearly all species of *Rasbora*, however as a rule the caudal fin posteriorly is very broad and sharply black rimmed, which greatly facilitates the recognition of the species. It belongs indeed to the type of *Rasbora lateristriata* and distinguishes itself moreover from the related species as the dorsal fin is situated only a little closer to the pelvic fins than to the anal fin, and is less deep than the body, the caudal fin fits 4 to 4¾ times in the length of the body, and the pelvic fins possesses 8 branched rays. In habitus it resembles *Rasbora lateristriata* most. Moreover it is remarkable that in *Rasbora dusonensis* the number of scales in the lateral line varies from 30 to 33.

Rasbora leptosoma Blkr. –
Slanke Paraai [*Slender Paraai*]
Atl. Cypr. tab. XLIX fig. 1.

A *Rasbora* with an elongate, compressed body, depth of body contained 5½ to 5¾ times in its length, width contained about twice in its depth. Head acute, not or hardly convex, contained 6 to slightly over

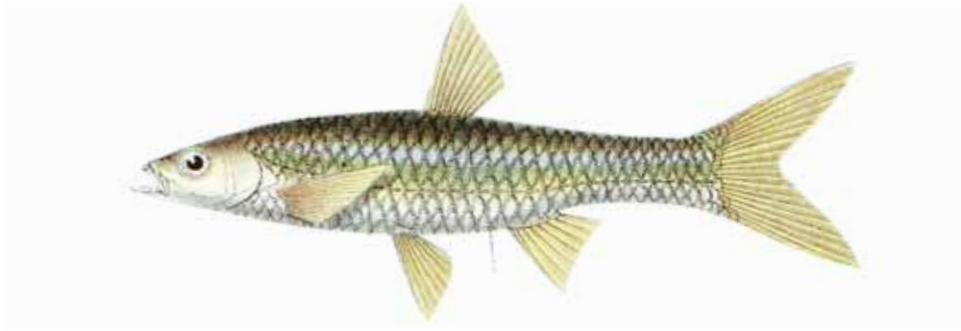


Fig. 119. *Rasbora leptosoma* Blkr. Atl. Ichth. Cypr. Tab. XLIII, Fig. 4. TL figure 89 mm.

6 times in length of body with caudal fin, ⁴⁴⁷ $4\frac{1}{2}$ to $4\frac{3}{4}$ times in length of body without caudal fin, crown scaleless; depth of head contained about $1\frac{2}{3}$ times in its length, width about twice; eyes slightly posterior, eye diameter contained $2\frac{2}{3}$ to 3 times in the length of the head, eye diameter contained once to $1\frac{1}{2}$ times in the postocular part of the head, distance between the eyes about once the eye diameter; palpebral membrane covering the external margin of the iris only, the opening nearly circular; rostro-dorsal profile on the head sloping, slightly convex or nearly straight, on nape and back convex; interorbital line convex; snout acute, not or hardly convex, shorter than the eye, tip placed anterior to the upper part of the eye; nostrils closer to the orbit than to the tip of the snout, posterior nostrils twice or more than twice as large as anterior nostrils; anterior suborbital bone nearly triangular, base shorter, pointing upward, sides longer, descending, united inferiorly into a slightly acutely rounded downward pointing angle, traversed by a longitudinal, obliquely backward descending crest; 2nd suborbital bone elongate-quadrangular, not or hardly higher posteriorly than anteriorly, length about twice as great as depth, more than twice as low as 1st suborbital bone; 3rd suborbital much broader than 2nd and 4th suborbital bones, rather far removed from the posterior margin of the preoperculum, about twice as thin as the eye diameter; jaws, oral margins acute especially anteriorly; upper jaw longer than lower jaw, slightly forward protrusible, at the symphysis moderately emarginate, ending below the anterior margin of the eye, contained about $2\frac{2}{3}$ times in the length of the head; lower jaw strongly emarginate towards the symphysis, symphysis itself provided with a well visible hook, entering the intermaxillary incision, branches obliquely compressed, lower part with some visible pores in one longitudinal row; lips thin, not conspicuously transversely striped on the oral surface; groove of upper lip ending slightly anterior to the angle of the mouth, groove of lower lip extending from the angle of the mouth up to the inframaxillary incision; gape strongly oblique; width of gill cover contained about $1\frac{1}{2}$ times in its depth, lower margin nearly straight or slightly convex; gill opening ending below posterior suborbital bones; Pharyngeal teeth predatory, conspicuously hooked, 2.4.5/5.4.2, each below the hook with a oblong, superficial, slightly visible small fossa, scapular bone triangular, with an acute angle; dorsal line of the body convex, not or hardly lower than convex ventral line; belly slightly flattened anterior to ventral fins; scales nearly vertical, on the free half and the basal half with longitudinal stripes, stripes little visible, however, scales on the middle of the flanks larger than on the rest of the body, about 32 scales in the lateral line, 9 ($8\frac{1}{2}$) in a transverse row of which 5 ($4\frac{1}{2}$) above the lateral line, 12 or 13 in a longitudinal row between occiput and dorsal fin; lateral line strongly curved, more than twice as close to the base of the ventral fins as to the dorsal line, gradually ascending posteriorly, ending on the lower part of the base of the caudal fin, each scale marked by a simple tube more or less reaching the centre of the scale; dorsal fin placed between ventral fins and anal fin, considerably closer to ventral fins than to anal fin, scaleless at the base, acute, convex, slightly to hardly higher than the body, about twice as high as base length, the simple 2nd ray thin, cartilaginous, longer than the head; pectoral fins scaleless at the base, acute, contained about $5\frac{3}{4}$ times in the length of the body, not reaching the ventral fins, the simple ray thin; ventral fins inserted in the lowest part of the belly, acute, contained slightly over 7 to $7\frac{1}{2}$ times in

the length of the body, not or hardly reaching the anal fin; anal fin at the base enclosed in a scaled sheath, acute, emarginate, not much lower than dorsal fin, much higher than base length, but much less than twice as high, the simple third ray thin, cartilaginous; caudal fin scaled at the base, with a deep incision, lobes acute, contained $3\frac{3}{4}$ to 4 times in the length of the body; Colour: upper part of the body green, lower part pearly-silver; silver peritoneum visible under the diaphanous skin; iris silver or yellow; silver head-tail band mainly visible when scales have been removed; fins yellowish- hyaline, dorsal and caudal fin and scales on back and sides more or less speckled with dark.

B. 3. D. 2/7 or 2/8. P. 1/13. V. 2/7. A. 3/5 or 3/6. C. 7/17/7, short flanking ones included.

Syn. *Leuciscus leptosoma* Blkr, Nalez. vischfauna Sumatra, Nat. T. Ned. Ind. IX Pag. 269.

Hab. Sumatra (Lahat), in rivers.

Length of 4 specimens 65'' to 94''.

448 Remark. This species is most closely related to *Rasbora borneënsis*, but distinguishes itself from it by the more anterior placement of the dorsal fin, one ray less in the pelvic fin, less clearly striped scales, a deeper incised lower jaw hook, a higher dorsal fin and longer anal fin, etc. My four specimens all originate from Lahat, in the interior of Palembang.

Rasbora argyrotaenia Blkr. –
Zilverbandige Paraai [*Silver-striped Paraai*].
Atl. Cypr. Tab. L fig. 6.

A *Rasbora* with an oblong-elongate, compressed body, depth of body contained slightly over 4 to slightly over 5 times in its length, width contained twice to $2\frac{2}{3}$ times in its depth. Head acute, not convex, contained 5 to 6 times in length of body with caudal fin, $3\frac{3}{4}$ to $4\frac{1}{2}$ times in length of body without caudal fin, crown scaleless, depth of head contained about $1\frac{1}{4}$ to $1\frac{3}{5}$ times in its length, width twice to $1\frac{3}{5}$ times; eyes slightly posterior, eye diameter contained $2\frac{2}{3}$ to 3 times in the length of the head, eye diameter contained slightly more than once to $1\frac{1}{3}$ times in the postocular part of the head, distance between the eyes once to $1\frac{1}{3}$ times their diameter; palpebral membrane covering the external margin of the iris only, the opening nearly circular; rostro-dorsal profile on the head sloping, nearly straight, on nape and back convex; inter-orbital line convex; snout acute, not convex, shorter than the eye, tip placed anterior to the upper part of

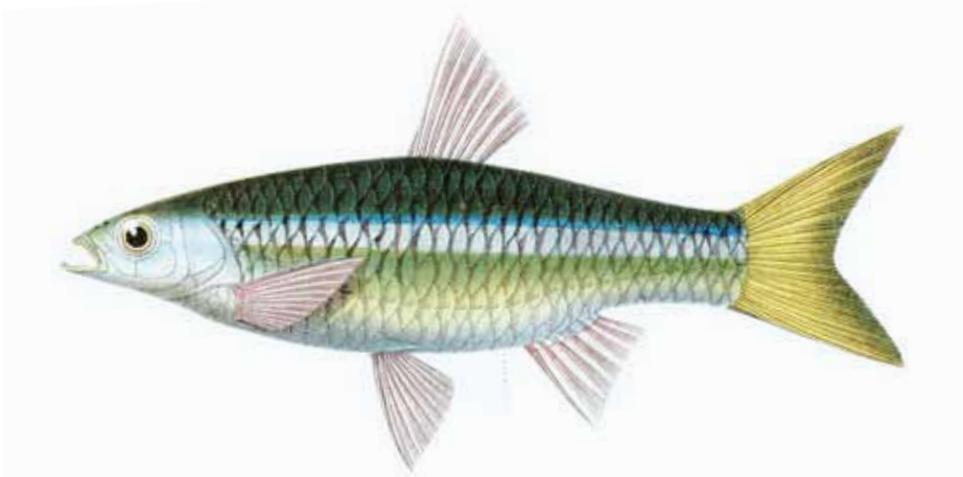


Fig. 120. *Rasbora argyrotaenia* Blkr. Atl. Ichth. Cypr. Tab. XXI, Fig. 3. TL figure 104 mm.

the eye; nostrils closer to the orbit than to the tip of the snout, posterior nostrils more than twice as large as anterior nostrils; anterior suborbital bone nearly triangular, base shorter, pointing upward, sides longer, descending, united inferiorly into a slightly obtusely rounded or slightly truncate downward pointing angle, traversed by a longitudinal, obliquely backward descending crest; 2nd suborbital bone oblong-quadrangular, not or slightly higher posteriorly than anteriorly, length generally less than twice as great as depth, twice or less than twice as low as 1st suborbital bone; 3rd and 4th suborbital bones broad, nearly reaching the posterior margin of the preoperculum, much thinner than the eye diameter, but much less than twice as thin; jaws, oral margins acute especially anteriorly; upper jaw not shorter than lower jaw, moderately forward protrusible, lightly emarginate at the symphysis, ending anterior to the eye, contained about $3\frac{1}{3}$ times in the length of the head; lower jaw lightly emarginate towards the symphysis, symphysis itself provided with a small tubercle, entering the intermaxillary incision, branches obliquely compressed, lower part generally with some little visible pores in one longitudinal row; lips thin, no visible transverse stripes; groove of upper lip ending slightly anterior to the angle of the mouth, groove of lower lip extending from the angle of the mouth up to the inframaxillary incision; gape strongly oblique; width of gill cover contained $1\frac{1}{2}$ to $1\frac{2}{3}$ times in its depth, lower margin nearly straight or slightly concave; gill opening ending below the posterior suborbital bones; Pharyngeal teeth predatory, conspicuously hooked, 2.4.5/5.4.2, each below the hook with a oblong, superficial, little visible small fossa, dorsal profile convex, not or not much lower than convex ventral line; belly flat anterior to ventral fins, behind ventral fins rounded, not ridged; scales nearly vertical, on the free half and the basal half with slightly ray-like longitudinal stripes, scales on the middle of the flanks larger than on the rest of the body, 30 in the lateral line, 9 ($8\frac{1}{2}$) in a transverse row of which 5 ($4\frac{1}{2}$) above the lateral line, 12 or 13 in a longitudinal row between occiput and dorsal fin; lowest ventral scales in three longitudinal rows, scales in medial row gradually increasing in size posteriorly, scales in those rows not or hardly larger than those in flanking rows; lateral line strongly curved, three times or more than three as close to the base of the ventral fins as to the dorsal line, gradually ascending posteriorly and ending on the middle of the base of the caudal fin, each scale marked by a simple tube reaching or surpassing the centre of the scale; scapular bone short, triangular, acutely or slightly acutely rounded, dorsal fin placed about halfway between ventral fins and anal fin, scaleless at the base, acute, convex, depth contained slightly more than once to $1\frac{1}{3}$ times in the depth of the body, twice or less than twice as high as base length, the simple 2nd ray thin, cartilaginous, slightly to not shorter than the head; pectoral fins acute, lightly scaled at the base, considerably longer ⁴⁴⁹ than ventral fins, contained $5\frac{1}{3}$ to $5\frac{2}{3}$ times in the length of the body, not reaching ventral fins, the simple ray thin; ventral fins inserted in the lowest part of the belly, acute, not reaching anal fin; anal fin at the base enclosed in a scaled sheath, acute, emarginate, much lower than dorsal fin but much less than twice as low, slightly higher than base length, the simple third ray thin, cartilaginous; caudal fin scaled at the base, with a deep incision, lobes acute, lower lobe generally slightly longer than upper lobe, contained slightly over 4 times to $4\frac{1}{4}$ times in the length of the body; Colour: upper part of the body faintly green, lower part of head and belly silver, behind the belly hyaline; scales on the anterior part of the body on the middle of the flanks each with a transverse, crescent-shaped thin band, composed from dark speckles; silver head-tail quasi subcutaneous band broader posteriorly than anteriorly, on top a thinner or broader shining-green, after death blue bordered with blue or nearly covered with blue, frequently not visible because of the bluish band covering it; iris silver, fins, except on the caudal fin, white-hyaline, on the middle length or depth of the anterior margin sometimes decorated with a blood-red spot; caudal fin beautiful yellow, base frequently darkish-violet.

B. 3. D. 2/7 or 2/8. P. 1/12 or 1/13. V. 2/7 to 2/9. A. 3/5 or 3/6. C. 6/17/7 or 7/17/8, short flanking ones included.

Syn. *Leuciscus argyrotaenia* Blkr, Verh. Bat. Gen. XXIII Ichth. Midd. Oost-Java p. 21.

Leuciscus cyanotaenia Blkr, ibid. p. 21.

Leuciscus Schwenkii Blkr, Act. Soc. Reg. Sc. Ind. Neerl. III Zesde Bijdr. Vischf. Sumatra p. 47. Tjetjerreh Mal.; Parai Sund.; Wader, Lundjar-andong, Lundjar-pareh Jav.

Hab. Java (Batavia, Perdana, Tjibiliong, Tjiringin, Serang, Tandjong-oost, Tjampea, Buitenzorg, Tjitjurup, Parongkalong, Banjumas, Gombong, Ambarawa, Purworedjo, Surakarta, Patjitan, Surabaya, Pasuruan, Grati, Ngantang, Lesti, Malang, Bondowosso), in rivers and lakes.

Sumatra (Palembang, Lahat, Telokbetong, Padang, Trussan, Meninju, Pajakombo), in rivers and lakes.

Bali (Boleling), in rivers.

Length of more than 100 specimens 45''' to 106'''.

Remark. Closely related to *Rasbora lateristriata* Blkr. and *Rasbora dusonensis* Blkr, the species in question differs from these however by a remarkably less slender body, a little developed knob at the symphysis of the lower jaw, the absence of the upper anal fin spot, a further posterior position of the dorsal fin, remarkably less deep anal fin, etc.

On Java the species is very common and is found till rather high in the various drainages. The specimens from the higher regions usually have a more slender body and as a rule exhibit the blue stripe on the silver lateral band more clearly. Earlier I described this variety as a proper species under the name *Leuciscus cyanotaenia*, but since then I have observed so numerous stepwise transitions between both forms that it has become clear that all belong only to a single species.

Similarly *Leuciscus Swenkii*, which I described as a new species at the referred place after a specimen from Sumatra, now seems to me not to differ specifically from *Rasbora argyrotaenia*. The transverse crescent-shaped black-brown scale bands or spots recorded of that specimen often are also present in the specimens of *Rasbora argyrotaenia* from Java.

450 *Rasbora borneënsis* Blkr. –
Borneosche Paraai [*Bornean Paraai*].
 Atl. Cypr. Tab. L fig. 4.

A *Rasbora* with an elongate, compressed body, depth of body contained $5\frac{1}{3}$ to $5\frac{2}{3}$ times in its length, width contained about twice in its depth. Head acute, slightly convex, contained nearly 6 to slightly over 6 times in length of body with caudal fin, $4\frac{3}{5}$ to $4\frac{3}{4}$ times in length of body without caudal fin, crown scaleless, depth of head contained about $1\frac{1}{2}$ times in its length, width about twice; eyes slightly posterior, eye diameter contained $2\frac{3}{5}$ to nearly 3 times in the length of the head, eye diameter contained once to slightly more than once in the postocular part of the head, distance between the eyes about once the eye diameter; palpebral membrane covering the external margin of the iris only, the opening nearly circular; rostrum dorsal profile on the head sloping, slightly convex, on nape and back convex; interorbital line convex; snout acute, slightly convex, shorter than the eye, tip located anterior to the upper part of the eye; nostrils closer to the orbit than to the tip of the snout, posterior nostrils about twice as large as anterior nostrils; anterior suborbital bone nearly triangular, base shorter, pointing upward, sides longer, descending, united inferiorly into a slightly acutely rounded downward pointing angle, traversed by a longitudinal, obliquely backward descending crest; 2nd suborbital bone elongate-quadrangular, not or hardly higher

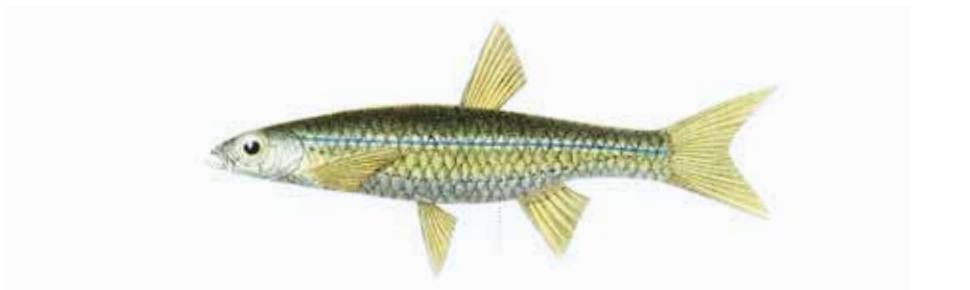


Fig. 121. *Rasbora borneënsis* Blkr. Atl. Ichth. Cypr. Tab. XIV, Fig. 2. TL figure 70 mm.

posteriorly than anteriorly, length more than twice as great as depth, more than twice as low as 1st suborbital bone; 3rd suborbital bone much broader than 2nd and 4th suborbital bones, rather far removed from the posterior margin of the preoperculum, about twice as thin as the eye diameter; jaws, oral margins acute especially anteriorly; upper jaw not longer than lower jaw, slightly forward protrusable, at the symphysis moderately emarginate, ending below the anterior margin of the eye, contained about 3 times in the length of the head; lower jaw lightly emarginate towards the symphysis, symphysis itself provided with a soft tubercle entering the intermaxillary incision, branches obliquely compressed, lower part generally without visible pores; lips thin, without conspicuous transverse stripes on the oral surface; groove of upper lip ending slightly anterior to the angle of the mouth, groove of lower lip extending from the angle of the mouth up to the inframaxillary incision; gape strongly oblique; width of gill cover contained about 1½ times in its depth, lower margin nearly straight or slightly convex; gill opening ending below posterior suborbital bones. Pharyngeal teeth predatory, conspicuously hooked, 2.4.5/5.4.2, each below the hook with a oblong, superficial, little visible small fossa, scapular bone triangular, acutely rounded; dorsal line of the body convex, not or slightly lower than convex ventral line; belly nearly flat anterior to ventral fins; scales nearly vertical, on the free half and the basal half with slightly ray-like longitudinal stripes, stripes well visible; scales on the middle of the flanks larger than those on the rest of the body, about 32 scales in the lateral line, 9 (8½) in a transverse row of which 5 (4½) above the lateral line, 12 or 13 in a longitudinal row between occiput and dorsal fin; lateral line strongly curved, more than twice as close to the base of the ventral fins as to the dorsal line, gradually ascending posteriorly, ending on the lower part of the base of the caudal fin, each scale marked by a simple tube more or less reaching the centre of the scale; dorsal fin much closer to anal fin than to ventral fins, scaleless at the base, acute, convex, not or hardly lower than the body, about twice as deep as base length, the simple 2nd ray thin, cartilaginous, hardly shorter than the head; pectoral fin scaleless at the base, acute, considerably longer than ventral fins, contained 5¾ to 6 times in the length of the body, not reaching ventral fins, the simple ray thin; ventral fins inserted in the lowest part of the belly, acute, contained 7½ to 8 times in the length of the body, not reaching anal fin; anal fin at the base enclosed in a scaled sheath, acute, emarginate, not much lower than dorsal fin, much higher than base length, but much less than twice as high, the simple third ray thin, cartilaginous; caudal fin scaled at the base, with a deep incision, lobes acute, contained 4½ to 4¼ times in the length of the body. Colour: upper part of the body green, lower part pearly-silver, silver peritoneum visible below the transparent skin; iris silver or yellow, head-tail band mainly visible when scales have been removed, covered or traversed by a blue-violet stripe; fins yellowish-hyaline, dorsal and caudal fin just like the scales on back and flanks more or less speckled with dark.

B. 3. D. 2/7 or 2/8. P. 1/13. P. 2/8. A. 3/5 or 3/6. C. 7/17/7, short flanking ones included.

451 Hab. Borneo (Bandjermasin), in rivers.

Length of 2 specimens 64''' and 74'''.

Remark. I have preserved both my specimens of the species in question for a long time, without having recognized them, among my very numerous specimens of *Rasbora dussonensis* and I have only noticed them during the present investigation of my Cyprinoids.

The species is most closely related to *Rasbora leptosoma*, but easily distinguishable from it as the dorsal fin is closer to the anal than to the pelvic fins and moreover the fins in general are less developed, just like the lower jaw knob and incision. Moreover, the pelvic fins have one ray less, while also the violet stripe over the silver coloured head-tail band can facilitate the recognition.

Rasbora Buchanani Blkr. –
Buchanan's Paraai.
Atl. Cypr. tab. L fig. 3.

A *Rasbora* with an oblong-elongate, compressed body, depth of body contained about 4½ times in its length, width contained about 2⅓ times in its depth. Head acute, not convex, contained slightly over 5

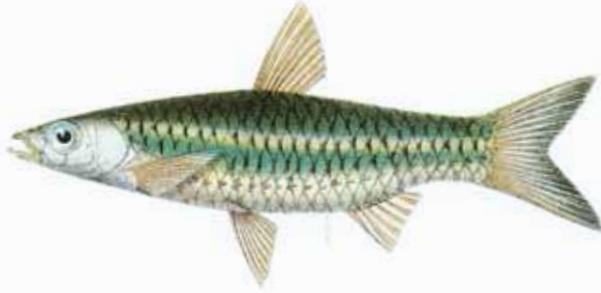


Fig. 122. *Rasbora Buchananii* Blkr. Atl. Ichth. Cypr. Tab. XIV, Fig. 4. TL figure 74 mm.

times in length of body with caudal fin, slightly over 4 times in length of body without caudal fin, crown scaleless, depth of head contained about $1\frac{2}{3}$ times, width contained slightly more than twice in its length; eyes posterior, eye diameter contained about 3 times in the length of the head, eye diameter contained $1\frac{1}{3}$ to $1\frac{1}{2}$ times in the postocular part of the head, distance between the eyes about once the eye diameter; palpebral membrane covering the external margin of the iris only, the opening nearly circular; rostro-dorsal profile on the head sloping, nearly straight, on nape and back convex; interorbital line convex; snout acute, not convex, shorter than the eye, tip placed anterior to the upper part of the eye; nostrils closer to the orbit than to the tip of the snout, posterior nostrils more than twice as large as anterior nostrils; anterior suborbital bone nearly triangular, base shorter, pointing upward, sides longer, descending, united inferiorly into a slightly obtusely rounded downward pointing angle, traversed by a longitudinal, obliquely backward descending crest; 2nd suborbital bone oblong-quadrangular, not or hardly higher posteriorly than anteriorly, length less than twice as great as depth, about twice as low as 1st suborbital bone; 3rd suborbital bone much broader than 4th suborbital bone, not reaching the posterior margin of the preoperculum, much narrower than eye diameter, but much less than twice as thin; jaws, oral margins acute especially anteriorly; upper jaw not shorter than lower jaw, moderately forward protrusible, at the symphysis hardly emarginate, ending below the anterior margin of the eye, contained hardly more than 3 times in the length of the head; lower jaw lightly emarginate towards the symphysis, symphysis itself provided with a medium-sized tubercle, entering the intermaxillary incision, branches obliquely compressed, lower part with some little conspicuous pores arranged in one longitudinal row; lips thin, without visible transverse stripes; groove of upper lip ending slightly anterior to the angle of the mouth, groove of lower lip extending from the angle of the mouth up to the inframaxillary incision; gape strongly oblique; width of gill cover contained about $1\frac{1}{2}$ times in its height, lower margin slightly concave; gill opening ending below 3rd suborbital bone. Pharyngeal teeth predatory, conspicuously hooked, 2.4.5/5.4.2, each below the hook with a oblong, superficial, little visible small fossa; dorsal line of the body convex, hardly or not lower than convex ventral line; belly flat anterior to ventral fins, behind ventral fins rounded, not ridged; scales nearly vertical, on the free half and the basal half with slightly ray-like longitudinal stripes, scales on the middle of the flanks larger than those on the rest of the body, 27 or 28 scales in the lateral line, 9 ($8\frac{1}{2}$) in a transverse row (lowest ventral scales included) of which 5 ($4\frac{1}{2}$) above the lateral ⁴⁵²line, 10 or 11 in a longitudinal row between occiput and dorsal fin, lowest ventral scales in three longitudinal rows, scales in medial row gradually increasing in size posteriorly; lateral line strongly curved, three times or more than three times as close to the base of the ventral fins as to the dorsal line, gradually ascending posteriorly and ending on the middle part of the base of the caudal fin, each scale marked by a simple tube reaching or surpassing the centre of the scale; scapular bone short, slightly acutely rounded; dorsal fin much closer to the base of the ventral fins than to the anal fin, acute, slightly convex, depth contained slightly more than once in the depth of the body, about twice as high as base length, the simple 2rd ray thin, cartilaginous, slightly shorter than the head; pectoral fins acute, considerably longer than ventral fins, contained about $5\frac{3}{4}$

times in the length of the body, not reaching ventral fins, the simple ray thin; ventral fins inserted in the lowest part of the belly, acute, not reaching anal fin; anal fin at the base enclosed in a scaled, low sheath, acute, emarginate, much lower than dorsal fin, but much less than twice as low, considerably higher than base length, the simple third ray thin, cartilaginous; caudal fin scaled at the base, with a deep incision, lobes acute, lower lobe slightly longer than upper lobe, contained about $4\frac{1}{4}$ times in the length of the body. Colour: upper part of the body green, lower part pearly; iris silver or yellowish; head-tail band diffuse, silver; fins pink-hyaline or yellowish-hyaline, caudal fin with a rather wide black border posteriorly.

B. 3. D. 2/7 or 2/8. P. 1/14. V. 2/8. A. 3/5 or 3/6. C. 7/17/7 or 8/17/8, short flanking ones included.

Syn. *Cyprinus rasbora* Buch. Gang. Fish. p. 329, 391 tab. 2 fig. 90?

Leuciscus rasbora McCl., Indian Cyprin. Asiat. Research. XIX p. 292?

Leuciscus rasbora McCl., Ind. Cyprin. Asiat. Res. XIX p. 407? Val., Poiss. XVI p. 335? Cant.,

Catal. Mal. Fish. p. 268?; Blkr, Verh. B.G. XXV Nalez. ichth. Beng. p. 140.

Opsarius rasbora Heck., Fisch. Syr. p. 53?

Cyprin rasbora Val., Poiss. XVI p. 335?

Hab. Calcutta, in the river Hooghly.

Length of sole specimen 76''.

Remark. Very closely related to *Rasbora agyrotaenia* Blkr, the species in question distinguishes itself thereof mainly by a lower, more slender head, two or three scales less in the lateral line and a remarkably more anterior position of the dorsal fin.

My description is made after a specimen from Calcutta. I do not possess the species from the Indian archipelago.

Rasbora Buchanani is first described and depicted by Buchanan in his work on the fishes of the Ganges. The description however is little distinguishing, and would also entirely fit on various other species of the genus. The illustration of Buchanan is rather good and makes the species rather well recognizable. However, it shows a few scales too little in a longitudinal series.

Mr MacClelland mentioned the species also as inhabitant of Assam and gave a new description of it. He mentions the number of scales in a longitudinal row as only 25, however there are certainly 27 or 28 in the lateral line. He found in the stomach fragments of insects.

Mr Valenciennes has mentioned *Rasbora Buchanani* after the descriptions and illustrations of Buchanan and Mr MacClelland, but does not seem to have known the species from nature.

Mr Cantor was the first to make the species known as an inhabitant of the island Pinang. ⁴⁵³ He mentions only 23 scales between the gill cover and caudal fin, which number answers rather well to that observed by me if one, following my present method of counting of the scales, adds the anterior lateral line scales and the caudal fin scales.

In 1853 I received the abovementioned specimen of Calcutta from Mr Th. Cantor, and described it in my "Nalezingen op de ichthyologie van Bengalen en Hindostan." In that description a few inaccuracies have slipped which have been improved in the one given above.

In my opinion however, it is not yet entirely certain that this description concerns *Cyprinus rasbora* Buch., basing my doubt regarding this primarily on the short and slender head of my specimen, which according to the illustration of Buchanan and the description of Mr Cantor would only fit $4\frac{1}{2}$ times in the length of the body, whereas in my specimen it fits amply 5 times in that length.

When it would appear later that my specimen differs specifically from Buchanan's species, a new specific name will have to be given to it.

Rasbora sumatrana Blkr. –
Sumatran Paraai.
Atl. Cypr. Tab. L fig. 2.

A *Rasbora* with an elongate, compressed body, depth of body contained 5 to about $5\frac{1}{2}$ times in its length, width contained about 2 times in its depth. Head acute, not convex, contained about 5 times in length of body with caudal fin, $3\frac{3}{4}$ to 4 times in length of body without caudal fin, crown scaleless, depth of head contained about $1\frac{1}{2}$ times in its length, width about $1\frac{3}{4}$ times; eyes slightly posterior, eye diameter contained 3 to $3\frac{1}{2}$ times in the length of the head, eye diameter contained $1\frac{1}{3}$ to $1\frac{1}{2}$ times in the postocular part of the head, distance between the eyes $1\frac{1}{3}$ to $1\frac{1}{2}$ times their diameter, palpebral membrane covering the external margin of the iris only, the opening nearly circular; rostro-dorsal profile on the head sloping, nearly straight, on nape and back convex; snout acute, not convex, shorter than the eye, tip placed anterior to the upper part of the eye; nostrils closer to the orbit than to the tip of the snout, posterior nostrils hardly more than twice as large as anterior nostrils; anterior suborbital bone nearly triangular, base shorter, pointing upward, sides longer, descending, united inferiorly into a slightly acutely rounded downward pointing angle, traversed by a longitudinal, obliquely backward descending crest; 2nd suborbital bone pentagonal, lower margin angular, much higher posteriorly than anteriorly, length not or hardly greater than depth, not or only slightly lower than 1st suborbital bone; 3rd suborbital bone very broad, more than twice as broad as 4th suborbital bone, nearly reaching the posterior margin of the preoperculum, not much thinner than the eye diameter; jaws, oral margins acute especially anteriorly; upper jaw not shorter than lower jaw, moderately forward protrusible, at the symphysis conspicuously emarginate and slightly behind the symphysis strongly emarginate, from there bilobed anteriorly, ending hardly anterior to the eye or below the lower margin of the eye, contained about $2\frac{3}{4}$ to $2\frac{1}{2}$ times in the length of the head; lower jaw emarginate towards the symphysis, symphysis itself provided with a very conspicuous hook entering the intermaxillary incision, branches obliquely compressed, lower part with some conspicuous pores arranged in one longitudinal row; lips thin, oral surface with transverse stripes; groove of upper lip ending slightly anterior to the angle of the mouth, groove of lower lip extending from the angle of the mouth up to the inframaxillary incision; gape strongly oblique; width of gill cover contained $1\frac{1}{2}$ to $1\frac{3}{4}$ times in its depth, lower margin nearly



Fig. 123. *Rasbora sumatrana* Blkr. Atl. Ichth. Cypr. Tab. XX, Fig. 3. TL figure 102 mm.

straight or slightly convex; gill opening ending below the posterior suborbital bones. Pharyngeal teeth predatory, conspicuously ⁴⁵⁴ hooked, 2.4.5/5.4.2, each below the hook with an oval, well visible small fossa; dorsal line of the body convex, slightly to not lower than convex ventral line; belly flat anterior to ventral fins; scales nearly vertical, on the free half and the basal half with slightly ray-like longitudinal stripes, scales on the middle of the flanks conspicuously larger than those on the rest of the body, 25 or 26 scales in the lateral line, 9 (8½) in a transverse row of which 5 (4½) above the lateral line, 10 in a longitudinal row between occiput and dorsal fin, lowest ventral scales in medial row not or hardly larger than those in flanking rows; lateral line strongly curved, more than three times as close to the base of the ventral fins as to the dorsal line, gradually ascending posteriorly and ending on the middle of the base of the caudal fin, each scale marked by a simple tube reaching or surpassing the centre of the scale; scapular bone triangular, slightly acutely or slightly obtusely rounded; dorsal fin placed about halfway between ventral fins and anal fin, scaleless at the base, not shorter to slightly shorter than the body, about twice as high as base length, the simple 2nd ray thin, cartilaginous, slightly to hardly shorter than the head; pectoral fins acute, contained 5 to 5½ times in the length of the body, reaching or nearly reaching ventral fins, the simple ray thin; ventral fins inserted in the lowest part of the belly, acute, contained 6 to 6¾ times in the length of the body, reaching or nearly reaching anal fin; anal fin at the base enclosed in a scaled, low sheath, acute, emarginate, much lower than dorsal fin, considerably higher than base length, the simple third ray thin, cartilaginous; caudal fin scaled at the base, with a deep incision, lobes acute, contained 3¾ to about 4 times in the length of the body. Colour: upper part of the body green or olive, lower part silver; iris yellow or pink; no visible silver head-tail band; fins pink or pink-hyaline.

B. 3. D. 2/7 or 2/8. P. 1/13. V. 2/8. A. 3/5 or 3/6. C. 7/17/7 or 8/17/8, short flanking ones included.

Syn. *Leuciscus sumatranus* Blkr, Diagn. nieuw. vischs. Sumatra Tient. I-IV, Nat. T. Ned. Ind. III p. 601.

Hab. Sumatra (Solok), in rivers.

Length of 3 specimens 85'' to 115''.

Remark. In the species in question the pharyngeal teeth are relatively well developed, which it also has in common with *Rasbora kallosoma*. Among its relatives it is easy recognizable by its low number of scales, the absence of all band and spot markings, the strong lower jaw hook, the lobe-shape tip of the intramaxillary bones, its high and angular second suborbital bone, very broad third suborbital bone with simultaneously a little developed fourth posterior suborbital bone, etc.

Rasbora bankanensis Blkr. –
Bankasche Paraai [*Bankanese Paraai*].
Atl. Cypr. Tab. XLIX fig. 4.

A *Rasbora* with an oblong-slightly elongate, compressed body, depth of body contained about 4½ times in its length, width contained about 2 times in its depth. Head acute, not convex, contained about 4½ times in length of body with caudal fin, about 3½ times in length of body without caudal fin, crown scaleless; depth of head contained about 1½ times in its length, width nearly twice; eyes slightly posterior, eye diameter contained about 2½ times in the length of the head, eye diameter contained slightly more than once in the postocular part of the head, distance between the eyes about once the eye diameter; palpebral membrane covering the external margin of the iris only, the opening nearly circular; rostro-dorsal profile on the head sloping, nearly straight, on nape and back convex; interorbital line convex; snout acute, not convex, shorter than the eye, tip placed approximately anterior to the middle of the eye; nostrils closer to the orbit than to the tip of the snout, posterior nostrils hardly more than twice as large as anterior nostrils; anterior suborbital bone nearly ⁴⁵⁵ triangular, base shorter, pointing upward, sides much longer, descending, united inferiorly into a slightly acutely rounded downward pointing angle, traversed by a longitudinal, obliquely backward descending crest; 2nd suborbital bone



Fig. 124. *Rasbora bankanensis* Blkr. Atl. Ichth. Cypr. Tab. XIV, Fig. 3. TL figure 61 mm.

oblong-quadrangular, slightly deeper posteriorly than anteriorly, length about twice as great as depth, more than twice as low as 1st suborbital bone; 3rd and 4th suborbital bones rather thin, rather far removed from the posterior margin of the preoperculum, twice or more than twice as thin as the eye diameter; jaws, oral margins acute especially anteriorly; upper jaw slightly longer than lower jaw, hardly forward protrusible, at the symphysis lightly emarginate, ending below the anterior margin of the eye, contained about $2\frac{3}{4}$ times in the length of the head; lower jaw lightly emarginate towards the symphysis, symphysis itself provided with a medium-sized tubercle, entering the intermaxillary incision, branches obliquely compressed, lower part without visible pores; lips thin, without visible transverse stripes; groove of upper lip ending slightly anterior to the angle of the mouth, groove of lower lip extending from the angle of the mouth up to the inframaxillary incision; gape strongly oblique; width of gill cover contained about $1\frac{3}{4}$ times in its depth; gill opening ending below the posterior suborbital bones; Pharyngeal teeth predatory, conspicuously hooked, 3.5/5.3, each below the hook with an oblong, hardly visible small fossa; dorsal line of the body convex, not or only slightly lower than convex ventral line; belly flat anterior to ventral fins; scales nearly vertical, scales on the middle of the flanks larger than those on the rest of the body, scales on the free half and the basal half with slightly ray-like longitudinal stripes, 22 to 24 scales in the lateral line, 9 ($8\frac{1}{2}$) in a transverse row of which 5 ($4\frac{1}{2}$) above the lateral line, 10 or 11 in a longitudinal row between occiput and dorsal fin; lateral line strongly curved, three times or more than three times as close to the base of the ventral fins as to the lateral line, gradually ascending posteriorly and ending on the lower part of the base of the caudal fin, each scale marked by a simple tube reaching or surpassing the centre of the scale; scapular bone triangular, obtusely rounded; dorsal fin placed about halfway between ventral fins and anal fin, scaleless at the base, acute, convex, not or hardly lower than the body, slightly more than twice as high as base length, the simple 2nd ray thin, cartilaginous, slightly shorter than the head; pectoral fins acute, contained about 6 times in the length of the body, not reaching ventral fins, the simple ray thin; ventral fins inserted in the lowest part of the belly, acute, contained about 8 times in the length of the body; not reaching anal fin; anal fin acute, emarginate, not much lower than dorsal fin, not much higher than base length, the simple third ray thin, cartilaginous; caudal fin scaled at the base, with a deep incision, lobes acute, contained about 4? times in the length of the body. Colour: upper part of the body green (or darkish?), lower part silver (or golden?); iris yellow or silver; fins pink, dorsal fin towards the tip and caudal fin on the membrane violetish-dark; anal fin at the tip with a large, black spot.

B. 3. D. 2/7 or 2/8. P. 1/13. V. 2/8. A. 3/5 or 3/6. C. 6/17/6 or 7/17/7, short flanking ones included.

Syn. *Leuciscus bankanensis* Blkr, Nalez. Ichth. Faun. Banka, Nat. T. Ned. Ind. V p. 192.

Hab. Banka (Marawang), in rivers.

Length of sole specimen 64''.

Remark. Notwithstanding this species in habitus and fin shape entirely agrees with the remaining archipelagic species of *Rasbora*, it has a remarkably different dentition

and therefore provides another example, that, no matter how important the dentition in Cyprinids is for the determination of some groups and genera, this character must be used with caution, if one does not wish to relapse in the erection of genera that are not acceptable. For the rest the species, apart from the dentition, can be distinguished from its relatives, by its short body, its ⁴⁵⁶ relatively large head and short lower jaw, the low number of scales in a longitudinal row, the large black spot on the tip of the anal fin, low 2nd and 3rd suborbital bones, etc.

Rasborichthys Blkr. –
Membrane eye carp.

Body elongate, compressed, covered with medium-sized scales, back low. Jaws enclosed in thin, simple lips. No barbels. Snout acute, short, not protruding anterior to the mouth, slightly depressed. Anterior suborbital bone triangular, tip acute, pointing downward. Mouth anterior, gape strongly oblique, ending anterior to the eye. Upper jaws at the symphysis not emarginate, slightly protrusible. Lower jaw at the symphysis with a well visible tubercle, branches nearly horizontally compressed. Postlabial groove on both sides parallel to the free margin of the jaw, not united with the groove on the opposite side. Eyes slightly superior, largely covered by palpebral membrane. Belly not keeled. Dorsal fin with few rays, starting behind ventral fins and ending anterior to anal fin, scaleless at the base, posterior simple ray totally cartilaginous. Anal fin with many rays, much longer than dorsal fin. Lateral line hardly curved. Gill opening ending below the preoperculum. Pharyngeal teeth knife-like 1.3.5/5.3.1 or 3.5/5.3.

Remark. The genus *Rasborichthys* is based on the species, which I have made known in the 2nd Volume of the “Acta Societas Scientiarum Indo-Neerlandicae” under the name *Leuciscus Helfrichii*. This genus in relationship stands between *Rasbora* and *Opsarius*, but cannot be united with none of these. It can at once be distinguished from both by the broad eye membrane which covers the eye almost completely leaving in the middle only a small opening, as well as by the not being concave of the upper jaw. From *Rasbora* it differs moreover yet by the relatively very long anal fin and the triangular, with the anterior directed tip, suborbital bone; and from *Opsarius* by the small mouth slit which ends before the eye. As far as the present knowledge reaches, the genus *Rasborichthys* is proper to Borneo.

Rasborichthys Helfrichii Blkr. –
Helfrich's Vliesoogkarper [*Helfrich's Membrane eye Carp*].
Atl. Cypr. Tab. XLIX fig. 6.

A *Rasborichthys* with an elongate, compressed body, depth of body contained $5\frac{3}{4}$ to 6 times in its length, width contained about 2 times ⁴⁵⁷ in its depth. Head acute, hardly convex, contained about $5\frac{3}{4}$ to $6\frac{3}{4}$ times in length of body with caudal fin, $4\frac{1}{2}$ to $4\frac{3}{4}$ times in length of body without caudal fin, crown scaleless; depth of head contained $1\frac{1}{2}$ to $1\frac{3}{4}$ times in its length, width about twice; eyes slightly superior, eye diameter contained $2\frac{3}{4}$ to $3\frac{1}{4}$ times in the length of the head, eye diameter contained slightly more than once to $1\frac{1}{4}$ times in the postocular part of the head, distance between the eyes $\frac{3}{4}$ times to nearly once the eye diameter; palpebral membrane very broad, covering the complete iris anteriorly and posteriorly, the opening oblong, vertical; rostro-dorsal profile on the head sloping, slightly convex, on nape and back convex; interorbital line convex; snout acute, not or hardly convex, considerably shorter than the eye, tip placed anterior to the upper part of the eye; nostrils hardly closer to the orbit than to the tip of the snout, posterior nostrils much larger than anterior nostrils;



Fig. 125. *Rasborichthys Helfrichii* Blkr. Atl. Ichth. Cypr. Tab. XXII, Fig. 3. TL figure 111 mm.

anterior suborbital bone triangular, base shorter, pointing upward, sides longer, descending, united inferiorly into an acutely rounded downward pointing angle, traversed by a longitudinal, obliquely backward descending crest; 2nd suborbital bone elongate-quadrangular, higher anteriorly than posteriorly, length more than twice as great as depth, more than twice as low as 1st suborbital bone; 3rd and 4th suborbital bones low (thin), far removed from the posterior margin of the preoperculum, three times as thin as the eye diameter; jaws nearly equal, oral margins acute especially anteriorly; upper jaw slightly forward protrusible, ending hardly anterior to the eye or below the anterior margin of the eye, at the symphysis not emarginate, contained $3\frac{1}{3}$ to $3\frac{1}{2}$ times in the length of the head; lower jaw emarginate towards the symphysis, symphysis itself with a well visible tubercle, branches nearly horizontally compressed, lower part without visible pores; lips thin, no visible transverse stripes; groove of upper lip ending slightly anterior to the angle of the mouth, groove of lower lip extending from the angle of the mouth up to the inframaxillary symphysis; gape strongly oblique; width of gill cover contained nearly 2 times in its depth; gill opening ending below the preoperculum; Pharyngeal teeth knife-like 1.3.5/5.3.1 or 3.5/5.3, each with a strongly acute tip, chewing surface oblique, concave; dorsal line of the body convex, not or hardly higher than convex ventral line; belly flat anterior to ventral fins, behind ventral fins ridged; scales nearly vertical, without visible, longitudinal stripes, caudal scales slightly smaller than those on the rest of the body, 55 to 60 scales in the lateral line, 16 or 17 in a transverse row (without the lowest ventral scales) of which 10 above the lateral line, about 26 in a longitudinal row between occiput and dorsal fin; the lowest ventral scales in three longitudinal rows, scales in medial row gradually increasing in size posteriorly, not or hardly larger than those in flanking rows; lateral line sloping anteriorly up to the tip of the pectoral fins, next nearly straight, considerably closer but much less than twice as close to the ventral fins than to the dorsal line, each scale marked by a simple tube reaching or surpassing the centre of the scale; scapular bone triangular, obtusely rounded; dorsal fin placed about halfway between ventral fins and anal fin, scaleless at the base, acute, not or hardly emarginate, slightly lower than the body, about twice as high as base length, the simple 2nd ray thin, cartilaginous, slightly shorter than the head; pectoral fins acute, contained nearly 7 times in the length of the body, not reaching ventral fins, scaleless at the base, the simple ray thin; ventral fins acute, contained $7\frac{1}{2}$ to 8 times in the length of the body, not reaching anal fin; anal fin scaleless at the base, acute, emarginate, much lower than dorsal fin but much less than twice as low, length much greater than depth, at the base contained 6 to $6\frac{1}{4}$ times in the length of the body, the simple third ray thin, cartilaginous; caudal fin scaled at the base, with a deep incision, lobes acute, contained about $4\frac{1}{2}$ times in the length of the body. Colour: upper part of the body yellowish-green, lower part silver-hyaline; iris silver or yellow; diffuse, silver pleuro-caudal band; back with dark speckles, fins yellowish-hyaline.

B. 3. D. 2/7 or 2/8. P. 1/14. V. 2/8. A. 3/18 or 3/19. C. 7/17/7 or 8/17/8, short flanking ones included.
 Syn. *Leuciscus Helfrichii* Blkr, Act. Soc. Reg. Scient., Ind. Neerl. II Tiende bijdrage ichthyol.
 Borneo p. 15.
 Hab. Borneo (Kahajan), in rivers.
 Length of 2 specimens 94''' and 117'''.

458 Remark. The species in question seems to be very rare and till now was only sent to me from the Kahajan river. It has a gracious, slender appearance and for the rest is remarkable because of its large eye and slender suborbital bones. I have named it in honour of Mr C. Helfrich, to whom science owes the knowledge of various fish species from Borneo.

ABRAMIS CUV.,

Regn. anim. ed. 1st II p. 194; Heck., Fisch. Syr. p. 42;

Heck. Kner, Fisch. oestr. Mon. p. 104 = BLICCA Heck. = BALLERUS Heck. =

BLICOPSIS Heck., Fisch. Syr. p. 42, 43. –

WHITE BREAM.

Body oblong, strongly compressed, covered with large scales, back elevated, angular. Jaws covered by thin, simple lips, upper lip slightly protrusible. No barbels. Snout obtuse, convex, not to hardly sticking out anterior to the mouth. Mouth anterior, gape oblique, ending anterior to the eye. Lower jaw shorter than upper jaw, not hooked at the symphysis. Eyes superior, not covered by palpebral membrane. Lateral line lightly curved. Belly not keeled anterior to ventral fins, behind ventral fins with a scaleless ridge. Dorsal fin with few rays, starting behind ventral fins and ending anterior to anal fin or above the anterior part of the anal fin, posterior simple ray completely cartilaginous. Anal fin with many rays, much longer than dorsal fin. Pharyngeal teeth grinding 5/5, or prehensile or predatory 2.5/5.2 or 3.5/5.3.

Remark. Cuvier restricted his diagnosis of the genus to the few words “ni spines ni barbillions; dorsale courte, placée en arrière des ventrales; anale longue”. Neither spines nor barbels dorsal fin short, placed behind the ventral fins, anal fin long.

Mr Valenciennes rejected the genus *Abramus* Cuv., and united it with his genus *Leuciscus*, which comprises all different genera in which after Cuvier the old genus *Leuciscus* was split. Surely the assertion of Mr Valenciennes is well-founded, that the characterization of *Abramis* by Cuvier is too indefinite to split it on the basis of that from *Leuciscus* Cuv., however, most of the recent ichthyologists have not joined him in his opinion that the very numerous species which he placed under the generic name *Leuciscus*, would produce no characters constant, definite or important enough to justify the splitting of *Leuciscus* in various new genera.

After a new detailed study of the species which I possess myself and which have been made known by others from the various regions of the old and new world, **459** I have equally come to the conviction that the species of *Leuciscus* Val. indeed can be placed in various natural genera. However, one must keep in mind, that nature with regard to the Cyprinoids, notwithstanding they represent about one eighth part of all known fish species of the present creation, do not show the lavishness in characters, which for instance in the Silurids attracts the attention, – that it even has used only a relatively small number of characters for the more than 1000 species of carp-like fishes that are now known, and that those characters therefore obtain a higher weight than they would possess in families of a larger diversity in organization.

In the mean time I also nurse the conviction that one has gone too far in the erection

of new genera and that especially abuse has been made of the dentition to create new genera only on that basis. It seems to me that this has also been the case with regard to the species of *Abramis* Cuv.

Thus Heckel has based four different genera on *Cyprinus brama* L., *Cyprinus blicca* Bl., *Cyprinus Buggenhagii* Bl. and *Cyprinus ballerus* L., which he named *Abramis*, *Blicca*, *Blicopsis* and *Ballerus*. Later he rejected his genus *Ballerus*, but he could, in my opinion, with no less ground, also have rejected the genera *Blicca* and *Blicopsis*, which differ from *Abramis* in nothing unless some differences in the dentition of *Abramis* (according to his opinion) are distinguished.

I consider all species summed up under the four mentioned generic names to belong to a single genus, for which the name *Abramis*, as first proposed, should be retained.

LUXILUS Raf.,

Ichth. Ohiens.; Gir., Cypr. Fish. Unit Stat., Proc. Ac. Nat. Sc. Philad. VIII p. 202 =

STILBE De Kay, Zool. N. York Fish. p. 204 = RICHARDSONIUS Gir., l.c. p. 201. –

STILBE.

Body oblong, strongly compressed, covered with large scales, back elevated, angular. Jaws equal, covered by thin, simple lips. No barbels. Snout not protruding anterior to the mouth. Mouth terminal, gape small, oblique, ending anterior to the eye. Eyes slightly superior, not covered by palpebral membrane. Lateral line strongly curved. Belly not keeled. Dorsal fin with few rays, starting behind ventral fins and ending above or hardly anterior to anal fin, posterior simple ray completely cartilaginous. Anal fin with many rays, much longer than dorsal fin. Isthmus narrow. Pharyngeal teeth compressed 5/5, on the chewing surface crenate at the angles, ⁴⁶⁰ or predatory teeth 2.4/4.3 or 2.5/5.2 without a chewing surface, but a noncrenate ridge instead.

Remark. The genus *Luxilus* has the habitus of *Abramis*. – Stilbe De Kay does not differ essentially from it and *Richardsonius* Gir. cannot be distinguished from it unless by a somewhat different shape and formula of the pharyngeal teeth. The relationship with *Abramis* Cuv. is so large, that a generic differentiation of it seems hardly justifiable.

ALBURNUS Rond.;

Heck., Fisch Syr. p. 46; Heck. Kner, Fisch oestr. Mon. p. 131;

Girard, Cypr. Fish. N. Amer. Proc. Ac. Nat. Sc. Phil. VIII 1856 p. 193 =

ALBURNELLUS Gir., = LEUCASPIUS Heck. Kner l.c. p. 145. –

WHITE MINNOW.

Body oblong-elongate or elongate, compressed, covered with large deciduous scales, back not higher than belly, low. Jaws covered by thin lips, upper lip slightly protrusible, emarginate at the symphysis, lower jaw prominent, at the symphysis with a tubercle entering the intermaxillary incision. No barbels. Snout short, acute, not protruding anterior to the mouth. Mouth superior, strongly oblique, ending anterior to the eye. Eyes posterior or superior, not covered by palpebral membrane. Lateral line strongly curved. Belly not keeled anterior to ventral fins, behind ventral fins keeled. Dorsal fin with few rays, starting behind ventral fins and ending above or hardly anterior to anal fin, posterior simple ray completely cartilaginous. Anal fin with many rays, much longer to considerably longer than dorsal fin. Pharyngeal teeth predatory, smooth, 2.5/5.2 or 2.4/4.2, or grinding, crenulate on the chewing surface 5/5.

Remark. The genus *Alburnus*, as described above, in relationship stands between *Abramis* and *Scardinius* and also shows already the relationship between *Abramis* and

Pelecus, exemplifying one of the intermediates of these genera. Moreover, it constantly distinguishes itself from Scardinius as the anal fin is remarkably longer than the dorsal fin. Concerning this it has a large resemblance with Abramis, but distinguishes itself again from it, apart from its more slender body, lower back and snout, by the very oblique mouth slit, which is directed upwards. The incision in the intermaxillaries with the therein fitting lower jaw knob I see also mentioned in some species of Abramis. The characters ⁴⁶¹ of Alburnus thus cannot be defined very sharply, which makes the value of this genus very doubtful. Moreover one of the species, *Cyprinus bipunctatus* L., placed by Heckel in Alburnus, rather should be classified under Abramis, which is also the case for *Alburnus coeruleus* Heck.

Heckel and Kner recently have proposed a new genus after a species discovered by them in Lembang, which they have named *Leucaspius abruptus*. However, the species as far as habitus, squamation and fin shape are concerned, fits entirely within the borders of Alburnus. It differs only by its one rowed notched teeth from the remaining species of Alburnus and has externally the peculiarity, just like *Alburnus delineatus* (*Squalius delineatus* Heck.) that the lateral line, although strongly declining just like in Alburnus, is only visible on the anterior part of the body, a peculiarity that is also found in species of *Systemus*. I have placed this species on the list occurring at the head of this group under the genus Alburnus.

HYBOPSIS Ag.,

Fish tenness. River, Amer. Journ. Sc. Arts. 2nd Ser. Vol. XVII 1854.;

Gir., Cypr. Fish. Unit. Stat., Proc. Ac. Nat. Ac. Philad. VIII p. 210 – HUDSONIUS Gir. –
BLUNT MINNOW.

Body elongate, compressed, covered with large scales. Jaws covered by thin, simple lips. Barbels 2, upper jaw barbels or no barbels. Head slightly conical, snout short, rounded or truncate, protruding anterior to the mouth. Upper jaw protrusible, ending below the anterior margin of the eye. Mouth inferior, gape ending hardly anterior to the eye. Lateral line not or hardly curved. Dorsal fin with few rays, starting above ventral fins, posterior simple ray completely cartilaginous. Anal fin with few rays, shorter than dorsal fin to hardly longer. Isthmus narrow. Pharyngeal teeth compressed, hooked 1.4/4.1, or 0.4/4.1 or 2.4/4.2 or 2.4/4.1 or 0.4/4.2, chewing surface thin.

Subg. *Hybopsis* Ag. - Barbels 2, upper jaw barbels.

" *Hudsonius* Gir., No barbels.

Remark. Mr Agassiz in his diagnosis does not mention barbels, which however are present according to Mr Girard. *Hudsonius* Gir. would only differ from *Hybopsis* by the absence of barbels therefore it is only introduced here as subgenus.

⁴⁶² LEUCOSOMUS Heck.,

Fish. Syr. p. 52; Gir., Cypr. Fish. Un. St. Proc. Acad. Nat. Sc. Philad. VIII p. 189 =
CHEILONEMUS Baird = POGONICHTHYS Gir., Descr. New. Fish. Un. Stat., ib. VIII p. 187 =
NOCOMIS Gir., ib. VIII p. 190. –

THREAD MINNOW.

Body elongate or slightly elongate, fusiform-compressed, covered with large scales. Jaws enclosed in terete, simple lips. Barbels 2, upper jaw barbels. Snout slightly or not protruding anterior to the mouth.

Mouth anterior or slightly inferior, gape large. Eyes superior, not covered by palpebral membrane. Lateral line curved. Belly not keeled. Dorsal fin with few rays, starting above or behind ventral fins and ending slightly anterior to anal fin, posterior simple ray cartilaginous. Anal fin with few rays, not longer than dorsal fin. Pharyngeal teeth predatory, compressed 2.4/4.2 or 2.5/4.3 or 2.5/4.2 or 1.4/4.2 or 1.4/4.1.

Remark. According to the diagnosis of the genus *Pogonichthys* given by Mr Girard himself, it would mainly differ from *Leucosomus* by the presence of a chewing pad on the pharyngeal teeth, which for the rest are of the same type and similarly placed, so that there seems to be no sufficient basis to separate it from *Leucosomus*. The differences between *Leucosomus* and *Nocomus* Gir. are, at least according to the diagnosis of Mr Girard, of no higher weight, so that maybe also *Nocomis* should be resolved in *Leucosomus*. The type of *Leucosomus* is *Leucosomus Storeri* Val. (*Leuciscus pulchellus* Stor.), but apart from this species one now knows still a number of others.

Leucosomus by its upper jaw barbels and dentition reminds one of the genus *Gobio*, however it has more the habitus of *Leuciscus* or *Alburnus*.

CERATICHTHYS Baird Gir.,
Cypr. Fish. unit Stat., proc. Acad. Nat. Sc. Philad. VIII p. 212. –
Beard minnow.

Body elongate, slightly fusiform-compressed, covered with large scales. Jaws covered by simple lips. Barbels 2, upper jaw barbels. Head depressed at the top, snout convex, protruding anterior to the mouth. Mouth nearly terminal, gape medium-sized, horizontal. Eyes superior, not covered by palpebral membrane. Lateral line hardly curved. Dorsal fin with few rays, starting above ventral fins and ending anterior to anal fin, posterior simple ray ⁴⁶³ cartilaginous. Anal fin with few rays, hardly or not longer than dorsal fin. Isthmus broad. Pharyngeal teeth prehensile 4/4.

Remark. *Ceratichthys* seems to be most closely related to *Leucosomus* Heck. and distinguishes itself mainly from it by a smaller mouth slit, a next to straight back line and one rowed pharyngeal teeth.

SEMOTILUS Raf.,
Ichth. Ohiens.; Gir., Cypr. Fish. un. Stat., Proc. Acad. Nat. Scienc. Philad. VIII p. 203. –
FALSE MINNOW.

Body oblong or slightly elongate, compressed, covered with large scales, back elevated. Jaws equal, enclosed in terete, simple lips. No barbels. Snout convex, not protruding anterior to the mouth. Mouth terminal, gape oblique, rather large. Eyes superior, not covered by palpebral membrane. Lateral line slightly curved. Belly not keeled. Dorsal fin with few rays, starting above ventral fins and ending above or hardly anterior to anal fin, posterior simple ray completely cartilaginous. Anal fin with few rays, not or hardly longer than dorsal fin. Isthmus narrow. Pharyngeal teeth predatory 2.5/5.2 or 2.4/5.2, no chewing surface.

Remark. The genus *Semotilus* in my opinion seems to be closely related to the two-barbeled genus *Leucosomus* Heck.

SCARDINIUS Bp.,

Faun. Ital. III; Heck., Fisch. Syr. p. 47; Heck. Kner, Fisch. oestr. Mon. p. 153 =
Idus Heck., Fisch. Syr. p. 47. –

ROACH.

Body oblong, compressed, covered with large scales, back angular. Jaws covered by thin, simple lips, upper lip slightly protrusible. No barbels. Snout short, hardly or not convex, not protruding anterior to the mouth. Mouth anterior, gape oblique, ending anterior to the eye. Lower jaw hardly shorter than upper jaw. Eyes superior, not covered by palpebral membrane. Lateral line moderately curved. Belly not keeled anterior to ventral fins. Dorsal fin with few rays, starting behind ventral fins and ending anterior to anal fin or above the beginning of the anal fin, posterior simple ray completely cartilaginous. Anal ⁴⁶⁴ fin with few rays, shorter to hardly longer than dorsal fin. Pharyngeal teeth predatory, on the chewing surface compressed, crenulate or serrated or smooth 3.5/5.3.

Remark. Scardinius is an intermediate between Leuciscus and Abramis. It has the short anal fin of Leuciscus, however the dorsal implanted behind the pelvic fins just like Abramis, from which nominal genus it externally only differs by the short anal fin and the not or hardly convex snout and the relatively very oblique mouth slit. The serrated or notched pharyngeal teeth one finds neither in Abramis nor in Leuciscus. Scardinius therefore can be sharply distinguished from both mentioned genera. However, it remains a question whether a generic value can be attached to those characters, which I doubt very much.

The genus Idus differs in nothing from Scardinius, unless by the smoothness of the pharyngeal teeth pads and thus ought to be united with Scardinius.

LEUCISCUS Rond.;

Klein.; Cuv., Regne anim. ed. 1^a II p. 194; Heck., fisch. Syr. p. 49; Heck. Kner, Fisch. oestreich. Mon. p. 169 = LEUCOS Heck., Fisch Syr p. 48 = SQUALIUS Bp., Faun. Ital., =
Telestes Bp., F. Ital. –

WHITE-FISH.

Body oblong or elongate, compressed or slightly terete, covered with large or medium-sized scales, back elevated to low. Jaws covered by thin, terete, simple lips, upper lip slightly protrusible. No barbels. Snout obtuse or slightly obtusely convex, short, not to hardly anterior to the mouth. Mouth anterior, gape more or less oblique, ending anterior to the eye. Eyes superior or slightly posterior, not covered by palpebral membrane. Lateral line moderately to strongly curved. Belly not keeled anterior to ventral fins. Dorsal fin with few rays, starting above or hardly behind ventral fins and ending anterior to the anal fin, posterior simple ray completely cartilaginous. Anal fin with few rays, hardly longer to no longer than dorsal fin. Pharyngeal teeth grinding 6/5 or 5/5, or predatory 2.5/5.2 or 2.5/4.2.

Remark. The relationship of Leuciscus, as it is described above, with Abramis is so large that the assertion of Mr Valenciennes concerning the not generic differences between Abramis and Leuciscus, if only applied on the species of Leuciscus and Leucos, as this genus is understood by the more recent ⁴⁶⁵ ichthyologists, in my opinion would be very acceptable. Leuciscus then would stand in the same relationship to Abramis, as Rohtichthys to Rothee, or, if one would reverse the relationship of the lengths of the dorsal fin and the anal fin, as Cyclocheilichthys (Siaja) microlepis to the remaining species of Cyclocheilichthys. Abramis obtains then even hardly the value of a subgenus in

relation to *Leuciscus*, and still other genera of the Leusicini erected by the more recent ichthyologists with regard to their generic value stand in an approximately similar relationship.

Without accepting the genera in this way, I have only mentioned them here with the characters attached to them by the ichthyologists, to keep a clear view at least in the chaos of related species of the large genus *Leuciscus*. *Leuciscus* Heck. differs in nothing from *Leuciscus* Heck., unless by a tooth less in the left pharyngeal bone, and therefore is here united with *Leuciscus*. I was also of the opinion that the genus *Squalius* Bp. is not essentially different from *Leuciscus*. Indeed it would not differ in anything essentially from *Leuciscus* unless by a change in the dentition (dentes raptatorii 2.5/5.2), a change that is not represented externally by any character. Moreover Heckel has placed some species in his genus *Squalinus*, like *Squalinus berag* and *Squalinus lepidus*, which show entirely the habitus of *Aspius*, and also, at least *Squalius lepidus*, have the shape of the jaws entirely corresponding to that of *Aspius*, from which genus they were separated by Heckel only on the basis of peculiarities in the dentition.

Telestes Bp. can be separated with just as little reason from *Squalinus* and *Leuciscus*. To the blackish longitudinal band on the body, which would narrow down to be the character of the genus, in any case cannot be attached more than specific value.

Leuciscus, accepted in the above described sense as a nominal genus, in essence only differs from *Abramis*, as the dorsal fin starts above or hardly behind the origin of the pelvic fins and is not or only a little shorter than the anal fin.

ALBURNUS Gir.,
Cyprin. Fish. Unit. Stat., Proc., Ac. Nat. Sc. Phil. VIII p. 194. –
BLUNT WHITE FISH.

Body oblong or elongate, compressed, covered with large scales. Jaws covered by terete lips. No barbels. Snout thickened, protruding anterior to the mouth. Mouth inferior, gape medium-sized. Lateral line hardly curved. Dorsal fin with few rays, starting above ventral fins, ⁴⁶⁶ posterior simple ray completely cartilaginous. Anal fin with few rays. Isthmus narrow. Pharyngeal teeth prehensile, smooth 2.4/4.2 or 1.4/4.2, chewing surface thin (sometimes twisted).

Remark. The genus *Alburnops* seems to be closely related to *Leuciscus* and only differs from it by deciduous scales and a thick snout. A sharper delimitation is very desirable.

CYPRINELLA Gir.,
Cyprin. Fish. Unit. Stat., Proc., Ac. Nat. Sc. Phil. VIII p. 166. =
MONIANA Gir., *ibid* p. 199 –
CARP MINNOW.

Body oblong or slightly elongate, compressed, covered with large or medium-sized, high, short scales. Jaws covered by thin, simple lips. No barbels. Snout convex, more or less protruding anterior to the mouth. Mouth slightly anterior, gape oblique, short. Eyes superior, not covered by palpebral membrane. Lateral line moderately curved. Belly not keeled. Dorsal fin starting above or hardly behind ventral fins, with few rays, posterior simple ray cartilaginous. Anal fin with few rays, not or hardly longer than

dorsal fin. Isthmus narrow. Pharyngeal teeth predatory, thin, compressed 4/4 or 1.4/4.1, no chewing surface, but a lightly crenulate crest instead.

Remark. I see no sufficient basis, why *Moniana* is considered by Mr Girard as a genus differing from his genus *Cyprinella*, as according to the diagnosis given by Mr Girard himself the genera differ from each other only by a minor change in the formula of the pharyngeal teeth. I therefore provisionally consider all species placed in *Moniana* as belonging to *Cyprinella*, which value as a genus according to me similarly is to be doubted.

CODOMA Gir.,
Cyprin. Fish. unit. Stat., Proc., Ac. Nat. Sc. Phil. VIII p. 194. –
CODOMA MINNOW.

Body oblong or slightly elongate, compressed, covered with medium-sized, scales. Jaws equal, covered by terete lips. No barbels. Head short. Snout rounded, not protruding anterior to the mouth. Mouth terminal, gape ending anterior to the eye. Lateral line slightly curved. Dorsal fin with few rays, starting slightly behind ventral fins, posterior simple ray cartilaginous, without teeth. Anal fin with few rays. ⁴⁶⁷ Isthmus rather broad. Pharyngeal teeth predatory 4/4, no chewing surface.

Remark. Mr Girard in the referred article places this genus between *Alburnops* and *Plargyrus*. For *Codoma* holds the same, which is already noted regarding *Cyprinella* and *Alburnops*.

SMILOGASTER Blkr. –
ACUTE-BELLY CARP.

Body oblong, compressed, covered with small, not radial scales, back elevated. Jaws equal, covered by terete, simple lips. No barbels. Snout angular. Belly keeled, strongly convex. Lateral line running along the middle of the flanks. Dorsal fin with few rays, provided with a serrated spine. Pectoral fins medium-sized, anal fin with many rays, elongate. Anal sheath without larger scales. Pharyngeal teeth compressed 2.2.4/4.2.2, chewing surface oblique, truncate, periphery with many tubercles.

Remark. The species made known by Mr Valenciennes under the name of *Leuciscus Belangeri*, because of its knife-like keeled belly, belongs to the group of *Chela* and is therein, because of its dorsal spines, related to *Culter* Bas. but easy to recognize by its deep body, the teeth on the dorsal spine, not superior mouth opening, not or little bend lateral line, etc.

CULTER Basil.,
Ichth. Chin. Bor., Nouv. Mém. Sociét. Impér. Natural. Moscou X 1855 p. 236. –
SPINE-KNIFE FISH.

Body elongate, compressed, covered with medium-sized or small scales, very unequal in size, back very low, much lower than convex belly. Jaws covered by terete, simple lips. No barbels. Snout short, not prominent. Mouth superior, gape nearly vertical. Lower jaw protruding anterior to the upper jaw, elevated, narrow. Gill opening wide. Belly keeled. Dorsal fin starting behind ventral fins and ending anterior to the anal fin, posterior simple ray bony, without teeth. Anal fin with many rays, longer than dorsal fin. Lateral line strongly curved. Nuchal scales starting above the preoperculum. No anal sheath covered with larger scales. Swimbladder trilobed.

468 Remark. The genus *Culter* in habitus has much of *Pellona* and belongs in the large series of Cheilognathines in the proximity of *Chela*, on account of the general shape of the body. However, it is easily distinguishable from it by the remarkably more anterior implanted dorsal fin and the strongly developed dorsal spine. Mr Basilewski places in his genus *Culter* 6 species from Northern China, which he has named *Culter albunus*, *Culter erythropterus*, *Culter mongolicus*, *Culter pekinensis*, *Culter exiguous* and *Culter leucisculus*. The first three of these species rather certainly belong to this genus, as it is describe above, and have with *Chela* the sharply keeled belly in common, but it seems to me that the remaining three species cannot remain in this genus.

Leuciscus recurviceps Richds. is also a species of *Culter*, just like probably also *Leuciscus acutus* Richds. and *Leuciscus machaeroides* Richds., at least, if these have after the illustrations of the known species of Reeves the posteriormost undivided dorsal fin ray bony.

LAUBUCA Blkr. –
LAUBUKA.

Body oblong, strongly compressed, covered with large scales, back lower than elevated belly. Jaws covered by thin, simple lips, upper lip slightly protrusable. No barbels. Snout short, low, not protruding anterior to the mouth, tip placed above or anterior to the upper margin of the eye. Anterior suborbital bone quadrangular. Eyes posterior, not covered by palpebral membrane. Mouth anterior-superior, gape strongly oblique, ending anterior to the eye. Upper jaw prominent at the symphysis, not emarginate. Lower jaw not or hardly shorter than upper jaw, without tubercle or hook at the symphysis. Scales on the body nearly equal in size, nuchal scales starting far behind the eye. Belly keeled from gula up to vent, with a thin ridge. Gulo-ventral line convex in a regular manner. Ventral fins inserted laterally, above the ridge of the belly. Lateral line strongly curved, much closer to ventral line than to dorsal line. Dorsal fin with few rays, totally or largely located above anal fin, posterior simple ray completely cartilaginous. Pectoral fins longer than the head. Anal fin with many rays, much longer than dorsal fin to twice as long, at the base enclosed in a scaled sheath. Gill opening ending below the eye. Pharyngeal teeth hooked, predatory 2.4/5/5.4.2.

469 Remark. I accept the name given by Buchanan for the typical species of this genus as the name for the genus itself. I restrict it to those species, which, in general habitus of body and fins answer to *Chela*, however differ from it by a different shape of the jaws, by the absence of the hook-like processus on the lower jaw, equally by the absence of a concavity of the symphysis of the upper jaw, by the usual way far behind the eye starting neck scales, the more regular squamation, and a larger gill slit which extends till under the eye. I was able to determine these characters in detail in the only species that I possess of this genus and which is the same as *Perilampus guttatus* McCl. or *Cyprinus laubuca* Buch.

CHELA. Buch.,

Account Fish. Gang. p. 285; Swains, Nat. Hist. Fish. II p. 285; Heck., Fisch. Syr. p. 44 =

OXYGASTER V. Hass., Alg. Konst- en Letterb. 1823 II p. 133 =

PELECUS Ag., Mem. Neuch. I 1836; Heck., Fisch. Syr. p. 45; Heck. Kner, Fisch. oestr.

Mon. p. 126 = SALMOPHASIA Swains., Nat. Hist. Fish. II p. 285. –

KNIFE-CARP.

Body oblong or elongate, strongly compressed, covered with large or small scales, back lower than elevated belly. Jaws covered by thin, simple lips, upper lip slightly protrusable. No barbels. Snout short, low, not

protruding anterior to the mouth, tip placed above or anterior to the upper margin of the eye. Anterior suborbital bone triangular or quadrangular, thinner part pointing downward. Eyes posterior or inferior, not covered by palpebral membrane. Mouth anterior-superior, gape strongly oblique, ending anterior to the eye. Upper jaw emarginate at the symphysis. Lower jaw not shorter than upper jaw, emarginate towards the symphysis, symphysis itself hooked with a bony tubercle, hook entering the intermaxillary incision. Postlabial groove on both sides parallel with the free margin of the jaw, not united with the groove on the opposite side. Scales on the body generally very unequal in size, nuchal scales starting above the eye. Belly keeled from gula up to vent keeled, with a thin ridge. Gulo-ventral line convex in a regular way. Ventral fins inserted laterally, above the ridge of the belly. Lateral line strongly curved, much closer to ventral line than to dorsal line. Dorsal fin with few rays, totally or largely located above anal fin, posterior simple ray completely cartilaginous.⁴⁷⁰ Pectoral fins longer than the head. Anal fin with many rays, much longer to more as five times as long as dorsal fin, at the base enclosed in a scaled sheath. Gill opening ending below the preoperculum. Pharyngeal teeth predatory teeth 2.4.5/5.4.2 or 2.5/5.2 or 4.4/4.4.

Remark. The genus *Chela* is one of the most natural and best definable of the family. In relationship it stands between *Laubuca* and *Macrochirichthys*. From *Laubuca* it distinguishes itself by a different structure of the jaws, as the upper jaw in *Laubuca* is not concave and at the symphysis even sharply protruding, while the lower jaw has no hook or knob. Moreover, in *Laubuca* the entire head is scaleless, so that the neck scales start only far behind the eye just as in the common *Leusicini*. The genus *Pelecus* Ag. differs in nothing essential from *Chela*, however the European species, on which Mr Agassiz based this genus, has only two rows of pharyngeal teeth and the lateral line more irregularly bend. *Salmo phasia* Swains. is equally of the same importance as *Chela*. I possess 4 species of *Chela*, one from Bengal (*Chela bacaila* Blkr. = *Cyprinus bacaila* Buch.) and three from the Indian Archipelago. South Asia however still produces about twenty other species. The archipelagic species can be separated from those ones and from each other according to the following scheme.

- I. Anal fin with rays 3/27 or 3/32. Lateral line curved in a regular manner. Teeth 2.4.5/5.4.2. Anterior suborbital bone triangular, tip pointing downward. Pectoral fins reaching or surpassing the base of the ventral fins, ventral fins inserted far behind pectoral fins, not reaching anal fin.
 - A. Depth of body contained $3\frac{3}{4}$ to $4\frac{1}{2}$ times in its length.
 - a. 60 to about 63 scales in the lateral line, about 13 above the lateral line. Eyes inferior. Pectoral fins nearly reaching anal fin, caudal fin on each lobe with a blackish, longitudinal band, anal fin contained $3\frac{3}{4}$ to $3\frac{2}{3}$ times in the length of the body.

Chela hypophthalmus Blkr.

- b. 40 to about 45 scales in the lateral line, about 7 above the lateral line. Eyes posterior. Pectoral fins slightly surpassing the base of the ventral fin, caudal fin without bands, anal fin contained $3\frac{3}{5}$ to 4 times in the length of the body.

Chela oxygastroides Blkr.

- B. Depth of body contained 5 to 6 times in its length.
 - a. 50 to 60 scales in the lateral line, 11 or 12 above the lateral line.⁴⁷¹ Eyes posterior. Pectoral fins hardly or not surpassing the base of the ventral fins, caudal fin on both lobes with a blackish, longitudinal band, anal fin contained $4\frac{1}{4}$ to $4\frac{2}{5}$ times in the length of the body.

Chela anomalurus Blkr.

Chela hypophthalmus Blkr. –
Laagoogige Meskarper [Low-eyed Knife-carp].
 Atl. Cypr. Tab. LII fig. 3.

A Chela with an oblong, compressed body, depth of body contained 4 to $3\frac{3}{4}$ times in its length, width contained about 3 times in its depth. Head acute, contained about $6\frac{1}{4}$ times in length of body with caudal fin, nearly 5 times in length of body without caudal fin, upper part scaled up to the anterior part of the eye, depth of head contained hardly more than once, width contained slightly more than twice in its length; eyes posterior-inferior, eye diameter contained slightly over 3 times in the length of the head, eye diameter contained about $1\frac{1}{3}$ times in the postocular part of the head, distance between the eyes about once the eye diameter, palpebral membrane covering the external margin of the eye only, the opening nearly circular; rostro-dorsal profile concave only on the forehead, on nape and back convex; interorbital line strongly convex; snout acute, lightly convex, shorter than the eye, tip placed higher than the upper margin of the eye; nostrils hardly closer to the orbit than to the tip of the snout, posterior nostrils hardly twice as large as anterior nostrils; anterior suborbital bone triangular, base shorter, nearly horizontal, sides longer, descending, united inferiorly into a slightly acutely rounded downward pointing angle, traversed in the middle by a slightly vertical crest; 2nd suborbital bone elongate-quadrangular, not or hardly deeper posteriorly than anteriorly, length about twice as great as depth, more than twice as low as 1st suborbital bone; jaws, oral margins acute especially anteriorly; upper jaw hardly shorter than lower jaw, slightly forward protrusible, rather profoundly emarginate at the symphysis, strongly descending, ending anterior to the eye, contained slightly more than 3 to $3\frac{1}{2}$ times in the length of the head; lower jaw strongly ascending, emarginate towards the symphysis, symphysis itself with a medium-sized hook entering the intermaxillary incision, branches nearly vertically compressed, lower part with several conspicuous pores in one longitudinal row; lips thin, simple; groove of upper lip short, ending slightly anterior to the angle of the mouth, groove of lower lip extending from the angle of the mouth up to the inframaxillary incision; gape nearly vertical; width of gill cover contained about $1\frac{1}{3}$ times in its height; lower margin slightly concave; gill opening ending below the posterior margin of the preoperculum. Pharyngeal teeth predatory, conspicuously hooked 2.4.5/5.4.2, each below the hook with a thin, oblong, hardly visible small fossa; dorsal line of the body lightly convex, much lower than ventral line; belly strongly compressed, on the total length ending in an acute keel; ventral line from gula to vent convex in a regular manner, nowhere concave; scales generally without visible longitudinal stripes, extremely different in size, nuchal, dorsal and upper caudal scales small, thoracic and lower caudal scales medium-sized, all scales much smaller than those on the middle of the flanks, about 60 to 63 scales in the lateral line, about 20 in a transverse row (close to the base of the ventral fins) of which about 12 above the lateral

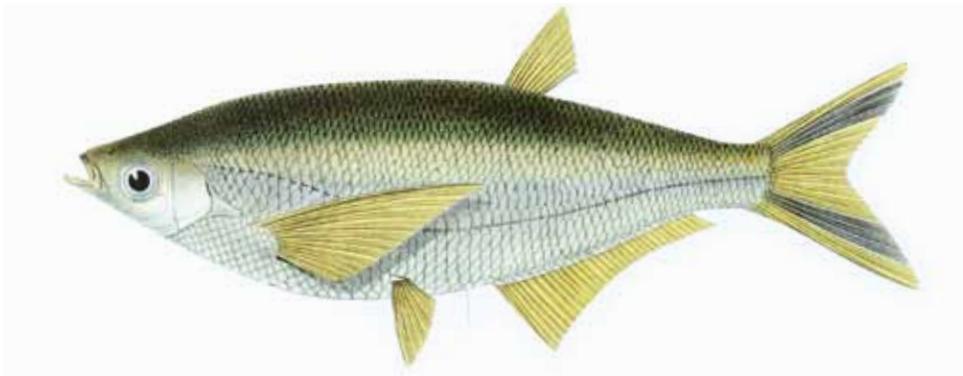


Fig. 126. *Chela hypophthalmus* Blkr. Atl. Ichth. Cypr. Tab. XLII, Fig. 3. TL figure 162 mm.

line; lateral line strongly curved, anteriorly curved with a moderate concavity, pointing downward, descending up to a point behind the ventral fins, more than twice as close to the base of the ventral fins than to the dorsal line, above the anal fin gradually ascending, ending on the middle of the base of the caudal fin, each scale marked by a simple tube generally surpassing the centre of the scale; scapular bone with a broad, longitudinal groove, triangular, at the tip slightly acutely rounded; dorsal fin placed completely opposite to the anterior part of the anal fin, scaleless at the base, acute, not emarginate, about twice as low as the body, slightly more than twice as high as base length, the simple 2nd ray thin, cartilaginous; pectoral fins scaled at the base, acute, much longer than the head, contained $3\frac{1}{4}$ to $3\frac{1}{2}$ times in the length of the body, reaching or nearly reaching the vent, the simple ray 472 rather robust; ventral fins inserted above the keel of the belly, nearly three times as short as the pectoral fins, nearly reaching the vent; anal fin short, enclosed in a scaled sheath, acute, emarginate, depth contained slightly more than twice in the depth of the body, length slightly more than twice as great as depth, length contained $4\frac{1}{3}$ to $4\frac{1}{4}$ times in the length of the body, the simple third ray thin, cartilaginous; caudal fin scaled only at the base, with a deep incision, lobes acute, lower lobe longer than upper lobe, contained about $4\frac{1}{2}$ (?) times in the length of the body. Colour: upper part of the body green, lower part silver-hyaline or pearly; head-tail band shining-silver, much broader in the middle than anteriorly and posteriorly, visible especially when the scales have been removed; iris yellow or silver; fins yellowish-hyaline, caudal fin darkish on the basal half of both lobes.

B. 3. D. 2/7 or 2/8. P. 1/11 or 1/12. V. 2/6. A. 3/29 or 3/30. C. 6/17/6 or 7/17/7, short flanking ones included.

Hab. Sumatra (Palembang), in rivers.

Length of 2 specimens 155'' and 165''.

Remark. I am not entirely certain that both my specimens of this species originate from Palembang. I have preserved them for a long time in the same bottle in which I kept my specimens of *Chela oxygastroides* and from which species I earlier by inattention did not distinguish them. However, it is easily distinguishable from it by its remarkably smaller scales, lower pectoral fins, a blunter head, lower placed eyes through which the interorbital profile is much more convex than in *Chela oxygastroides*, etc.

Chela oxygastroides Blkr. –
Korte Meskarper [*Short Knife-carp*].
Atl. Cypr. tab. LII fig. 2.

A *Chela* with an oblong, compressed body, depth of body contained $4\frac{1}{2}$ to nearly 4 times in its length, width contained nearly 3 to 3 times in its depth. Head acute, contained $5\frac{1}{2}$ to 6 times in length of body with caudal fin, $4\frac{1}{3}$ to 5 times in length of body without caudal fin, upper part scaled up to the anterior part above the eye, depth of head $1\frac{1}{4}$ to $1\frac{1}{2}$ times in its length, width about $2\frac{1}{4}$ times; eyes posterior, eye diameter contained $2\frac{2}{3}$ to 3 times in the length of the head, eye diameter contained slightly more than once to $1\frac{1}{2}$ times in the postocular part of the head, distance between the eyes $\frac{2}{3}$ times to once their diameter; palpebral membrane covering the external margin of the eye only, the opening nearly circular; rostro-dorsal profile concave or slightly concave only on forehead, on nape and back convex; interorbital line moderately convex; snout acute, not or hardly convex, in younger animals and adults considerably shorter than the eye, tip placed higher than the upper margin of the eye; nostrils closer to the orbit than to the tip of the snout, posterior nostrils about twice as large as anterior nostrils; anterior suborbital bone triangular, base shorter, nearly horizontal, sides longer, descending, united inferiorly into a slightly acutely rounded downward pointing angle, traversed in the middle by a slightly vertical crest; 2nd suborbital bone elongate-quadrangular, generally higher posteriorly than anteriorly, length generally more than twice as great as height, more than twice as low as 1st suborbital bone; jaws, oral margins acute especially anteriorly; upper jaw hardly shorter than

lower jaw, slightly forward protrusible, at the symphysis rather profoundly emarginate, strongly descending, ending anterior to the eye, contained 3 to $3\frac{1}{2}$ times in the length of the head; lower jaw strongly ascending, emarginate towards the symphysis, symphysis provided with a medium-sized hook, fitting in the intermaxillary incision, branches nearly vertically compressed, lower part with several conspicuous pores in one longitudinal row; lips thin, simple; groove of upper lip ending slightly anterior to the angle of the mouth, groove of lower lip extending from the angle of the mouth up to the inframaxillary incision; gape nearly vertical; width of gill cover contained $1\frac{1}{3}$ to $1\frac{1}{4}$ times in its depth, lower margin nearly straight or slightly concave; branchial opening ending below the posterior margin of the preoperculum. Pharyngeal teeth predatory, conspicuously hooked 2.4.5/5.4.2, each below the hook with a thin, oblong, hardly visible small fossa; dorsal line ⁴⁷³ of the body lightly convex, much lower than ventral line; belly strongly compressed, on the total length ending in an acute ridge; ventral line from gula to vent convex in a regular manner, nowhere concave; scales generally without visible longitudinal stripes, extremely different in size, nuchal scales small, thoracic and caudal scales medium-sized, all scales much smaller than those on the middle of the flanks, 40 to about 43 scales in a longitudinal row, about 12 to about 14 in a transverse row (close to the base of the ventral fins) of which about 7 above the lateral line; lateral line strongly curved, anteriorly curved with a moderate concavity, pointing downward, descending up to a point behind the ventral fins, less than twice as close to the base of the ventral fins as to the dorsal line, gradually ascending above the anal fin, ending on the middle of the base of the caudal fin, each scale marked by a simple tube generally surpassing the centre of the scale; scapular bone with a broad, longitudinal groove, triangular, tip slightly acutely rounded; dorsal fin completely opposite to the anterior part of the anal fin, scaleless at the base, acute, not emarginate, depth contained nearly twice to twice in the depth of the body, more than twice as high as base length, the simple 2nd ray thin, cartilaginous; pectoral fins scaled at the base, acute, much longer than the head, contained $3\frac{3}{5}$ to 4 times in the length of the body, considerably surpassing the base of the ventral fins; the simple ray rather robust; ventral fins inserted above the keel of the belly, acute, more than twice as short as pectoral fins, not reaching anal fin; anal fin at the base enclosed in a scaled sheath, acute, emarginate, depth contained nearly twice to twice in the depth of the body, length nearly twice to more than twice as great as depth, length contained $4\frac{1}{3}$ to 4 times in the length of the body, the simple third ray thin, cartilaginous; caudal fin scaled only at the base, with a deep incision, lobes acute, lower lobe longer than upper lobe, contained $4\frac{1}{3}$ to $4\frac{5}{6}$ times in the length of the body. Colour: upper part of the body green, lower part silver-hyaline or pearly; head-tail band shining-silver, much broader in the middle than anteriorly and posteriorly, visible especially when the scales have been removed; iris yellow or silver; fins yellowish-hyaline, more or less speckled with dark, caudal fin frequently with a longitudinal, diffuse, darkish band on the middle on both lobes.



Fig. 127. *Chela oxygastroides* Blkr. Atl. Ichth. Cypr. Tab. XLII, Fig. 4. TL figure 145 mm.

B. 3. D.2/7 or 2/8. P. 1/11 to 1/13. V.2/6. A. 3/28 to 3/32. C. 6/17/6 or 7/17/7, short flanking ones included.

Syn. *Leuciscus oxygastroides* Blkr. Zesde bijdr. ichth. Borneo, Nat. T. Ned. Ind. III p. 432.

Hab. Java (Batavia), in rivers.

Sumatra (Palembang), in rivers.

Borneo (Prabukarta, Sambas), in rivers.

Length of 6 specimens 90''' to 148'''.

Remark. *Chela oxygastroides* in relationship stands between *Chela anomalurus* and *Chela hypophthalmus*, but distinguishes itself from both by larger scales of the entire body, especially however of the neck and back, as well as by the absence of longitudinal caudal fin bands. On the three large Sunda Islands it seems to be little rarer than *Chela anomalurus*, however on Java I only received it of the western part of the island.

Chela anomalurus Blkr. –
Slanke Meskarper [*Slender Knife-carp*].
Atl. Cypr. Tab. LII fig. 1.

A *Chela* with an elongate, compressed body, depth of body contained 5 to 6 times in its length, width contained 3 to 2½ times in its depth. Head acute, contained 6 to 6½ times in length of body with caudal fin, 4 4/3 [¾] to 5 times in length of body without caudal fin, upper part scaled up to a point above the posterior margin of the eye, depth of head contained 1½ to 1¾ times in its length, width 2½ to 2⅝ times; eyes posterior, eye diameter contained 3 times to slightly over 3 times in the length of the head, eye diameter contained once to slightly more than once in the postocular part of the head, distance between the eyes ⅔ to ⅓ times their diameter; palpebral membrane covering the external margin of the eye only, the opening nearly circular; ⁴⁷⁴rostro-dorsal profile concave on the head and on the anterior part of the nape, convex on the back; interorbital line lightly convex; snout acute, not or hardly convex, in younger animals and adults considerably shorter than the eye, tip placed higher than the upper margin of the eye; nostrils closer to the orbit than to the tip of the snout, posterior nostrils more than twice as large as anterior nostrils; anterior suborbital bone triangular, base shorter, nearly horizontal, sides longer, descending, united inferiorly into a slightly acutely rounded, downward pointing angle, traversed in the middle by a slightly vertical crest; 2nd suborbital bone elongate-quadrangular, hardly higher anteriorly than posteriorly, length more than twice as great as depth, more than three times as low as 1st suborbital bone; jaws, oral margins acute especially anteriorly; upper jaw shorter than lower jaw, slightly forward protrusible, profoundly emarginate at the symphysis, strongly descending, ending anterior to the eye, contained slightly over 3 to nearly 3 times in the length of the head; lower jaw strongly ascending, emarginate towards the symphysis, symphysis provided with a medium-sized hook, fitting in the intermaxillary incision, branches nearly vertically compressed, lower part with numerous conspicuous pores in one longitudinal row; lips thin, simple; groove of upper lip ending slightly anterior to the angle of the mouth, groove of lower lip extending from the angle of the mouth up to the inframaxillary incision; gape nearly vertical; width of gill cover contained about 1¼ times in its depth; lower margin nearly straight or slightly concave; gill opening ending below the posterior margin of the preoperculum or below the posterior suborbital bone. Pharyngeal teeth predatory, conspicuously hooked 2.4.5/5.4.2, each below the hook with a thin, oblong, hardly visible small fossa; dorsal line of the body lightly convex, much lower than ventral line; belly strongly compressed, over the total length ending in an acute, slightly membranous keel; ventral line from gula to vent convex in a regular manner, nowhere concave; scales generally without visible longitudinal stripes, extremely different in size, nuchal, dorsal, upper caudal and thoracic scales small, much smaller than the other scales but especially than those on the middle of the flanks, 50 to 60 scales in the longitudinal line, 17 to 20 in a transverse row (close to the base of the

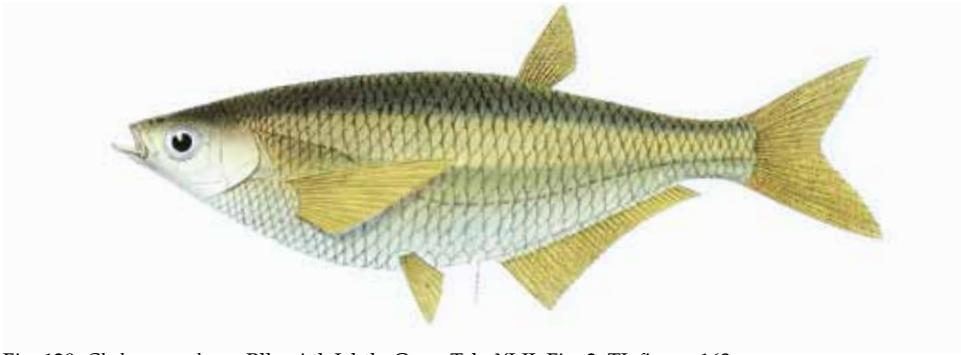


Fig. 128. *Chela anomalurus* Blkr. Atl. Ichth. Cypr. Tab. XLII, Fig. 2. TL figure 163 mm.

ventral fins) of which 11 or 12 above the lateral line; lateral line strongly curved, anteriorly curve of a moderate concavity, pointing downward, descending up to a point above the base of the ventral fins and there much more than more than two times to more than three times as close to the base of the ventral fins as to the dorsal line, above the anal fin gradually ascending, ending on the middle of the base of the caudal fin, each scale marked by a simple tube reaching or surpassing the centre of the scale; scapular bone with a broad, longitudinal groove, deeply bipartite, triangular, at the tip slightly acutely rounded; dorsal fin completely or nearly completely placed opposite to the anterior part of the anal fin, scaleless at the base, acute, not emarginate, depth contained $1\frac{1}{2}$ times to nearly twice in the depth of the body, more than twice as high as base length, the simple second ray thin, cartilaginous; pectoral fins scaleless at the base, acute, much longer than the head, contained $4\frac{1}{4}$ to $4\frac{3}{4}$ times in the length of the body, reaching or slightly surpassing the base of the ventral fins, the simple ray rather robust; ventral fins inserted above the keel of the belly, acute, much shorter than pectoral fins but less than twice as short, not reaching anal fin; anal fin at the base enclosed in a scaled sheath, acute, emarginate, depth contained $1\frac{1}{2}$ times to nearly twice in the depth of the body, length twice to nearly twice as great as depth, length contained $4\frac{1}{4}$ to $4\frac{3}{4}$ times in the length of the body, the simple third ray thin, cartilaginous; caudal fin scaled only at the base, with a deep incision, lobes acute, lower lobe longer than upper lobe, contained $4\frac{1}{4}$ to $4\frac{3}{4}$ times in the length of the body. Colour: upper part of the body green, lower part silver-hyaline or pearly; head-tail band shining-silver, broader in the middle than anteriorly and posteriorly, visible especially when the scales have been removed, partly covered by a head-tail violet-blue band, frequently complete anteriorly, more rarely not visible, broader on the tail than anteriorly; iris yellowish or silver; fins yellowish-hyaline; both lobes of caudal fin with a longitudinal, intramarginal blue-violet band, band on upper lobe united with violet-blue head-tail band.

B. 3. D. $2/7$ or $2/8$. P. $1/13$ or $1/14$. V. $2/7$. A. $3/27$ to $3/31$. C. $7/17/7$ or $7/17/8$, short flanking ones included.

Syn. *Clypea anomalura* V. Hass., Mss.

Oxygaster anomalurus V. Hass., Alg. Konst- en Letterb. 1823 II p.133, Bull. Féruss. 1824 Zoöl.

Cyprinus oxygaster Cuv.

475 *Leuciscus oxygaster* Val., Poiss., XVII p. 360; Blkr, Zevende bijdr. ichth. Borneo, Nat. T. Ned. Ind. V p. 453.

Able à ventre aigu Val., Poiss. XVII p. 360.

Bulu-manat Lampong.

Hab. Java (Batavia, Surakarta, Kediri, Surabaya, Gempol), in rivers.

Sumatra (Pangabuang provinc. Lampong), in rivers.

Borneo (Pengaron), in rivers.

Length of 8 specimens $95''$ to $174''$.

Remark. Van Hasselt discovered this species on Java and at first took it for a herring. Later he brought it to a genus of its own, which he named *Oxygaster*, which name, as it was proposed later than *Chela* can be kept no more as that of *Pelecus*. The first somewhat more detailed description of the species science owes to Mr Valenciennes, but it is too short and does not reflect the colours correctly. The species is not rare on Java and occurs both on the east as on the west side of the island.

MACROCHIRICHTHYS Blkr. –
TIMATIMA.

Body elongate, strongly compressed, covered with small scales, back very low, lower than elevated belly. Jaws covered by thin, simple lips, upper lip slightly protrusible. No barbels. Snout short, low, not protruding anterior to the mouth, tip placed above the upper margin of the eye. Anterior suborbital bone triangular, tip pointing downward. Eyes posterior, not covered by palpebral membrane. Mouth superior, gape broad, nearly vertical, strongly descending below the eye. Upper jaw emarginate at the symphysis. Lower jaw longer than upper jaw, at the symphysis with a hook very conspicuously entering the intermaxillary incision. Postlabial groove very short, on both upper and lower jaw ending slightly anterior to the angle of the mouth. Scales on the body unequal in size, nuchal scales starting at the eye. Belly from gula up to vent keeled, with a thin ridge. Gulo-ventral line very convex anteriorly, strongly concave behind axilla. Ventral fins inserted laterally, above the ridge of the belly. Lateral line slightly curved, closer to ventral line than to dorsal line of the body. Dorsal fin with few rays, completely or largely placed above anal fin, posterior simple ray completely cartilaginous. Pectoral fins longer than the head, 1st ray robust, broad. Anal fin with many rays, much longer than dorsal fin. Gill opening ending ⁴⁷⁶ below the eye. Pharyngeal teeth predatory, slightly spoon-shaped 4.4/4.4.

Remark. The genus *Macrochirichthys* is most closely related to *Chela* and differs from it mainly by a very large mouth slit, a strongly developed lower jaw hook, a very wide and till under the eye extending gill opening, a little bend lateral line, a very short posterior lip groove, a very concave belly line behind the axil and a strongly bony first pectoral fin ray. By its slender habitus, the profile of the belly and the very wide mouth slit it differs in habitus still rather remarkably from *Chela* and it can be considered as a genus of the Cyprinoids that in its shapes is most closely related to the Clupeoids and Chirocentroids.

I possess only one single species of this genus, however maybe *Leuciscus macrochirus* Val. from Java can also be placed in it, a species which I till now have not seen and in any case differs from my *Macrochirichthys uranoscopus* by its elongated pectoral fin ray, remarkably less numerous scales, etc.

Macrochirichthys uranoscopus Blkr. –
Sterrenkijkende Timatima [Stargazing *Timatima*].
Atl. Cypr. Tab. LIII fig. 1.

A *Macrochirichthys* with an elongate, compressed body, depth of body contained $7\frac{1}{2}$ to 5 times in its length, width contained $2\frac{1}{2}$ to $3\frac{1}{2}$ times in its depth. Head acute, contained $5\frac{1}{2}$ to $6\frac{2}{3}$ times in length of body with caudal fin, $4\frac{4}{5}$ to $5\frac{2}{3}$ times in length of body without caudal fin, upper part scaled up to a point above the anterior margin of the eye, depth of head contained $1\frac{1}{2}$ to $1\frac{1}{4}$ times in its length, width $3\frac{3}{4}$ to $2\frac{3}{4}$ times; eye diameter contained 4 to nearly 5 times in the length of the head, eye diam-

eter contained $1\frac{3}{4}$ times to slightly more than twice in the postocular part of the head, distance between the eyes $\frac{2}{3}$ times to once their diameter, removed from the rostro-dorsal line; palpebral membrane covering the external margin of the eye only, the opening nearly circular; rostro-dorsal profile concave on the head and on the front part of the nape, convex on the back; snout acute, not or hardly convex, without the upper jaw in younger animals shorter than the eye and in adults not longer than the eye, tip placed higher than the upper margin of the eye; nostrils much closer to the orbit than to the tip of the snout, posterior nostrils about twice as large as anterior nostrils; anterior suborbital bone triangular, base shorter, nearly horizontal, sides longer, descending, united inferiorly into an acute, more or less rounded, downward pointing angle, traversed in the middle by a ramose, obliquely backward descending crest; 2nd suborbital bone obliquely quadrangular, higher posteriorly than anteriorly, length greater than depth, in juveniles much more than twice as low as 1st suborbital bone, in adults less than twice as low as 1st suborbital bone, sometimes vertically bipartite; jaws, oral margins acute; upper jaw shorter than lower jaw, slightly forwards protrusible, profoundly emarginate at the symphysis, strongly descending, descending below the anterior margin of the eye or slightly anterior to the eye, contained nearly twice to twice in the length of the head; lower jaw strongly ascending, emarginate towards the symphysis, symphysis prolonged into a large hook, fitting in the intermaxillary incision, branches slightly vertically compressed, lower part with numerous well visible pores in one longitudinal row; lips thin, simple; groove of upper lip extending from the angle of the mouth up to the tip of the snout; groove of lower lip extending from the angle of the mouth up to a point only slightly anterior to the angle; gape nearly vertical; width of gill cover contained $1\frac{1}{2}$ to $1\frac{3}{5}$ times in its depth; lower margin nearly straight, slightly concave or slightly convex; gill opening ending below the eye. Pharyngeal teeth thin, predatory, lightly ¹⁷⁷hooked, 4.4/4.4, each below the tip generally with a small, spoon-shaped small fossa, internal tooth in anterior row closer to the pharyngeal symphysis than to the internal tooth in the posterior row; back lightly convex, much lower than the belly; belly strongly compressed, on the total length ending in an acute slightly membranous keel/ridge; ventral line strongly concave behind the base of the pectoral fins; scales small, extremely different in size, scales on the middle of the flanks very conspicuously larger than the others, on the posterior margin of extreme concavity, pointing downward, largely not striped, the others on the free half with longitudinal, but generally sparse stripes, 150 to 175 in the lateral line (in the largest specimen), 32 to 40 (in the largest specimen) in a transverse row (close to the base of the ventral fins) of which about 22 above the lateral line; lateral line moderately curved, considerably closer to the ventral line than to the dorsal line, in very young animals about the eye diameter removed from the base of the ventral fins, in older animals much more than twice to twice the eye diameter, each scale obliquely marked by a simple tube; scapular bone elongate, thin, acutely rounded; dorsal fin completely or nearly completely opposite to the anterior part of the anal fin, scaleless at the base, acute, not emarginate, depth contained

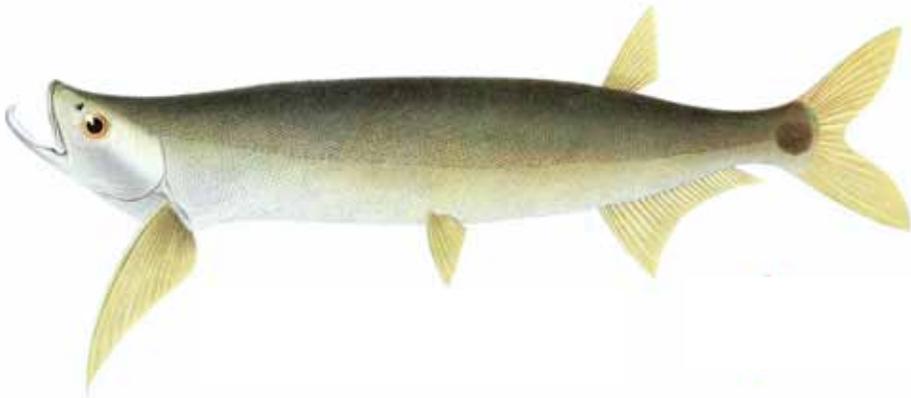


Fig. 129. *Macrochirichthys uranoscopus* Blkr. Atl. Ichth. Cypr. Tab. XLIII, Fig. 1. TL figure 331 mm.

1½ times to twice in the depth of the body, twice to more than twice as high as base length, the simple third ray thin, cartilaginous; pectoral fins acute, much longer than the head, contained nearly 4 to 4½ times in the length of the body, the simple 2nd ray robust; ventral fins inserted above the keel of the belly, acute, more than twice as short as the pectoral fins, anal fin scaleless at the base, acute, emarginate, slightly to much lower than the body, length considerably greater than depth, the simple third ray thin, cartilaginous; caudal fin scaled at the base, with a deep incision, lobes acute, lower lobe longer than upper lobe, contained about 6½ times in the length of the body. Colour: upper part of the body slightly olive, lower part silver; in juveniles colours hyaline, head-tail band broad, diffuse, shiny silver; iris yellow; tail with a roundish black spot in the lateral line close to the base of the caudal fin; fins yellowish-hyaline.

B. 3. D. 3/7 or 3/8. P. 1/15 or 1/16. V. 2/7. A. 3/22 or 3/23 to 3/24 or 3/25. C. 6/17/8 or 5/17/7, flanking short ones included.

Syn. *Leuciscus uranoscopus* Blkr, Bijdr. ichthyol. Borneo, Nat. Tijdschr. Ned. Ind. I p. 14.
Timatima Palemb.

Hab. Sumatra (Palembang), in rivers.

Borneo (Bandjermasin, Kahajan, Pengaron, Pontianak, Sintang), in rivers.

Length of 16 specimens 115''' to 518'''.

Remark. I discovered this species in the year 1850 and described it for the first time at the above mentioned place after a specimen from Borneo, the only one I then possessed. *Leuciscus recurviceps* Richds., which I there mentioned as related to the species in question, does belong to the same group of the family but can be placed in the genus *Culter* Basil.

Macrochirichthys uranoscopus does not seem to be rare in the large rivers of Borneo and Sumatra. As appears from a sketch drawing in the album of Siamese fishes of Count Fr. De Castelnau it also inhabits the rivers of Siam.

Macrochirichthys ?? = *Leuciscus macrochirus* Val.,
Poiss XVII p. 259. –
Twijfelachtige Timatima [Dubious *Timatima*].

Description according to Valenciennes [translated from French]:

"This fish has an elongate body like the razor (*Cyprinus cultratus*), the height of the body is about 1/6 478 of the total length; the head is of the same proportion; the mouth is very widely split; lower jaw much longer than the upper jaw; eye is of medium size; dorsal fin small, originating behind the first rays of the anal which is long; the caudal fin is forked; the ventral fins small and short; the pectoral fin on the contrary is very long and ending in a thread; almost a quarter of the total length. D. 8. A. 25. C. 19. P. 14. v. 7. – The lateral line is straight and situated at the middle of the height; the scales very small, numbering 90 between the gill cover and the caudal fin. The colour is silvery, with a gray spot below the pectoral fin. The specimen is almost a foot long.

Syn. *Clupea macrochiura* K. v. H. acc. Val. (op cit.)

Able macrochire Val. Poiss. XVII p. 259.

Hab. Java

Remark. It is difficult to conclude from the short description of Mr Valenciennes to which genus *Leuciscus macrochirus* belongs. Is it a *Macrochirichthys* or a *Chela*? The large mouth slit and the strongly protruding lower jaw, as well as the very much elongated pectoral fins make me inclined to consider it as a *Macrochirichthys*, however on the contrary I see nothing mentioned of the peculiarly bend belly line of *Macrochirichthys*.

Till now I have not observed any species, which I might bring back to *Leuciscus machrochir*. An elongated pectoral fin ray is also found in *Luciosoma trinema*, but one can hardly say of this species that it has a compressed belly just like *Cyprinus cultratus*.

479 FAMILY CYPRINODONTOIDEI.
TOOTHCARPS

Cyprini with tooth bearing jaws; body and head scaled, upper as well as lower pharyngeal bones with small, multi-rowed teeth; no pseudobranchia; gill membrane with 4 to 6 rays.

Remark. The Cyprinodontoids are sharply separated from the Cyprinoids by the presence of teeth in the jaws, a 4- to 6-rayed gill membrane, and upper pharyngeal jaws armed with teeth. None of these characters is found in the Cyprinoids.

The Cyprinodontoids usually are live bearing fishes. In various genera this character is externally translated in a special structure of the anal and its insertion closer to the pectoral fins, an organization which apparently stands in connection to the copulation, necessary for the fertilisation of the eggs inside the body of the mother. In these genera the males differ from the females in such a way that one, unconscious of this, would certainly not consider them as belonging to one species.

Already at the start of this century one has gained some detailed knowledge about these small but graceful fishes that belong to this family and the peculiar genus *Anableps* was already erected by Artedi in the first part of the last century.

Schneider pointed in 1801 to the genus *Poecilia* and Lacepède in 1803 to the genera *Cyprinodon*, *Fundulus* and *Hydragyra*.

Lesueur recognized the genus *Mollienesia*.

Cuvier in his genus *Lebias* gave the genus *Cyprinodon* of Lacepède only a different name.

Mr MacClelland discovered the genus *Aplocheilus* in 1838.

All those genera however were insufficiently described, just like the species belonging to them.

Mr Valenciennes detangled the history of the American, European 480 and west-Asiatic Cyprinodontoids and in the large *Histoire naturelle des Poisons* gave sharp definitions to the generic types known to him and at the same time enriching the family with the genera *Grundulus*, *Orestias* and *Panchax*.

Since then important discoveries have been made in the same family.

Heckel in 1848 gave his genus *Xiphophorus*, Mr Poey some years later his genera *Girardinus* and *Limia*, Mr Gervais his genus *Tellia*, Mr Agassiz, the founder of the family, the genera *Heterandria* and *Zygonectes* and Mr Girard the genera *Lucania* and *Adinia*.

However, the genera that were proposed after Mr Valenciennes probably cannot all be retained. For instance *Limia* Poey can be united with *Gambusia* and maybe *Heterandria* and *Zygonectes*, whose characters are not sufficiently known to me, fall together with some or other genus erected by Heckel and Poey. All that is known of the characters of *Heterandria* is related to the anal fin, which in males is slender and high, and more anterior inserted than in the females, characters which are recovered in many other genera.

Heckel's genus *Xiphophorus* on the contrary comprises no less than three genera. His *Xiphophorus Helli* is the type of that genus, however *Xiphophorus gracilis* and *Xiphophorus bimaculatus* are proper generic types, as *Xiphophorus gracilis* belongs to my genus *Hemixiphophorus*, which since then appeared to me not to differ essentially from the earlier by Mr Poey erected genus *Gambusia*, while I have placed *Xiphophorus bimaculatus* in my genus *Pseudoxiphophorus*.

I am also of the opinion that a Japanese toothcarp, which was placed in *Fundulus* by Mr Schlegel, can be considered to belong to a proper generic type, which I have named *Fundulichthys*.

Of the ca 100 known Cyprinodontoids by far the most inhabit the New World. The *Anablepini* and *Orestiasini* seem to be entirely restricted to South America. The *Cyprinodontini* are numerous both in North and South America as well as on the large Antilles.

With the exception of *Tellia*, *Fundulichthys* and *Cyprinodon* all *Cyprinodont* genera are American. *Cyprinodon* is as numerous in species in the Old as in the New World, although in the Old World it goes hardly further than Mosambique, the countries bordering the Mediterranean and the Red Sea and Persia. The genus *Tellia* seems to be restricted to North Africa, just like the genus *Fundulichthys* is restricted to Japan. The *Aplocheilines* entirely belong to Asia and the Asiatic Islands of Japan and Netherlands India. – In total the number of species of the Old World amounts to only one fourth of that of the New World.

In the Indian Archipelago the whole family is represented by only ⁴⁸¹ two species of *Aplocheilines*, of which one is even the same as that, which is known in Bengal under the name of *Pantjak* or *Panga*.

The genera and groups of the *Cyprinodontoids* can be reviewed as follows. I only remark here, that in the means which were to my disposition, I did not find the generic characters of *Heterandria* and *Zygonectes* sufficiently clearly indicated, reason why I am unable to mention them here.

Key to the genera of Cyprinodontoidei

CYPRINODONTINI. Anal fin not elongate, with few to several rays. Scales large.

- A. No ventral fins. Teeth in jaws, in one row, tricuspidate.

Tellia Gerv.

- B. Ventral fins.

- I. Teeth in one row, tricuspidate. Dorsal fin short, nearly opposite anal fin. B. 5. Jaws depressed.

Cyprinodon Lac. = *Lebias* Cuv.

- II. Teeth in one row, acute. Lower jaw short. Gape oblique.

1. Dorsal fin short, in males starting behind, in female above short anal fin. Anal fin in males with the anterior rays clawed at the tip, not bow-shaped, serrated anterior to the tip, caudal fin without prolonged rays. B. 5.

Girardinus Poey (or *Heterandia* Ag. in its place?)

2. Anal fin inserted behind the beginning of the dorsal fin. Head slightly convex, slightly obtuse.

Lucania Gir.

3. Dorsal fin and anal fin with many rays.

Girardinichthys Blkr.

III. Teeth multiple-rowed, rows uniform.

1. Middle teeth longer than other teeth. Dorsal fin short, placed between ventral fins and short anal fin. B. 4. Caudal fin bilobed.

Fundulichthys Blkr.

482 2. Teeth in external row longer than those in other rows.

- a. Dorsal fin elongate, more than twice to many times longer than anal fin. Ventral fins and anal fin in males very close. B. 5.
 - † Lower jaw low. Gape oblique. Caudal fin in males without prolonged rays.
 - Ô Dorsal fin starting above the base of the pectoral fins and ending far behind the short anal fin. Upper jaw angular, depressed, protrusable. Mouth quadrangular.

Molliensia Les.

- Ô Dorsal fin starting behind the tip of the ventral fins and ending far behind the short anal fin. Anal fin in males with much prolonged anterior rays, not serrated or hooked.

Pseudoxiphophorus Blkr.

- † Lower jaw elevated, angular. Gape vertical. Caudal fin in males prolonged on lower rays.
 - Ô Dorsal fin starting above or hardly behind the tip of the pectoral fins and ending behind the short anal fin. Anterior rays of anal fin in males prolonged at the tip, serrated and sagittiform.

Xiphophorus Heck.

- b. Dorsal fin back-folded? Far behind pectoral fins, short. Gape oblique.
 - † Lower jaw elevated. Mouth superior. Ventral fins back-folded far behind the tip of the pectoral fins; anal fin slightly elongate; dorsal fin slightly short, shorter than anal fin, ending above anal fin; caudal fin bilobed. B.5. Swimbladder bipartite.

Grundulus Val.

- † Lower jaw low. Gape oblique. Dorsal fin and anal fin opposite to each other or nearly opposite.
 - Ô B. 6.

- O Dorsal fin with few rays, anal fin in males very close to ventral fins, anterior rays prolonged, at the top simply hooked or clawed.

Gambusia Poey = *Limia* Poey = *Hemixiphophorus* Blkr. =
Heterandria Ag. partly and strongly related to *Zygonectes*
Ag. = *Adinia* Gir.?

- 483 O' Dorsal fin with several rays, not or hardly shorter than anal fin.
Upper jaw protrusable. Anterior anal rays not prolonged in males?

Hydrargyra Lac.

- Ô B. 5. Anal fin not much shorter to not much longer than dorsal fin.
- O Upper jaw angular, depressed, protrusable. Mouth quadrangular.
Teeth in external row curved, mobile.

Poecilia Bl. Schn.

- O' Upper jaw rounded. Mouth nearly round.

Fundulus Lac.

APLOCHEILINI. Dorsal fin short, opposite to posterior part of elongate anal fin. Scales large.
Ventral fins.

- A. No vomerine teeth. Teeth in jaws multiple-rowed, those in external row larger. Upper jaw depressed, strongly protrusable. B. 5 or 6.

Panchax Val.

- B. No vomerine teeth. Teeth in jaws multiple-rowed. Upper jaw not protrusable.
Scales deciduous. B. 5.

Aplocheilus McCl.

ORESTIASINI. No ventral fins. Scales large, on head and nape slightly scutiform. Belly scaleless.
B. 5. Jaws not depressed.

- A. Dorsal and anal fin with many rays, opposite each other. Teeth in jaws multiple-rowed, simple.

Orestias Val.

ANABLEPINI. Dorsal fin short, implanted completely behind anal fin. Pupil with a quasi double
frenulum of the cornea. Body elongate, cylindrical. B. 5.

- A. Scales large or medium-sized. Teeth in jaws multiple-rowed, those in external row larger,
mobile. Ovary double.

Anableps Art.

484 *Cyprinodontoidei species known up till now.*

Tellia apoda Gervais.	Afr., Algeria.
Cyprinodon calaritanus Val. = Lebias calaritana Bonell. =	
Cyprinodon fasciatus Val. = Lebias fasciata Val. = Apharius fasciatus	
Nardo = Lebias flava Costa.	Eur., Italy.
" iberus Val. = Hydrargyra hispanica Val. sec. Bellotti.	Eur., Spain.
" lunatus Val. = Cyprinus leuciscus Forsk.? =	
Lebias lunatus Ehr. = Lebias dispar Rüpp.	Afr. As., Syria, Egypt., Abyss.
" Moseas Val.	Afr., Egypt. Red sea.
" Hammonis Val. = Cyprinodon Ammonis Ehr =	
Lebias dispar fem. Rüpp.	Afr. Asia, Egypt, Syria.
" mento Val. = Lebias mento Heck.	Asia, Syria.
" cypris = Lebias cypris Heck.	" Syria.
" sophiae = Lebias sophiae Heck.	" Persia.
" punctatus = Lebias punctatus Heck.	" Persia.
" crystalodon = Lebias crystalodon Heck.	" Persia.
" variegatus Lac. = Lebias ellipsoides Lac. =	
Lebias rhomboidalis Val. Esox ovinus Mitch. =	
Lebias ovinus De Kay.	N. Am., N. York, Fird., N. Orl.
" parvus Baird Gir.	N. Am., Long-island.
" elegans Baird Gir.	N. Am., Rio Grd. del Nort.
" bovinus Baird Gir.	N. Am., Rio Grd. del Nort.
" macularius Baird Gir.	N. Am., Gila riv.
" gibbosus., Baird Gir.	N. Am., Indianola.
" lineatus = Lebias lineatus Jen.	N. Am., Maldonado.
" ? multidentatus = Lebias multidentata Jen. or	
a proper genus.	S. Am., Montevideo.
" californiensis Gir.	N. Am., California.
" eximius Gir.	N. Am., Chihuahua riv.
" orthonotus Peters.	Africa, Quellimane.
Lucania venuta Gir. = Limia venusta Gir.	N. Am., Texas.
" affinis Gir.	N. Am., Matamoras.
Girardinus metallicus Poey.	Antilles, Cuba.
" formosus Gir. = Heterandria formosa Ag.	N. Am., Florid. S. Carol.
" occidentalis Gir.	N. Am., Sonora. St Cruz riv.
" sonoriensis Gir.	N. Am., Mexico.
Girardinichtbys innominatus Blkr = Lucaniae sp. Proc. Acad.	
485 Philad. 1859 p. 119.	N. Am., Mexico.
Heterandria affinis Baird Gir.	N. Am., Medin. & Salad. Riv.
" occidentalis Baird Gir.	N. Am., Gila riv.
Zygonectes olivaceus Ag. = Poecilia olivacea Stor.	N. Am., Alabama.
" Nottii Ag.	N. Am.
" lineolatus Ag.	N. Am.
" guttatus Ag.	N. Am.
" dispar Ag.	N. Am.
" hieroglyphicus Ag.	N. Am.
" lateralis Ag.	N. Am.
" zonatus Ag.	N. Am.
" tenellus Gir. = Fundulus tenellus B. Gir.	N. Am., Russellville.
" pulchellus Gir.	N. Am., Arkansas.
Fundulichthys virescens Blkr. = Fundulus virescens T. Schl.	Japan.

Molliensia latipinna Les. = Poecilia multilineata Les.	N. Am., N. Orl., Florid., Louis.
" fasciata M. Trosch. = Molinesia fasciata Trosch.	N. Am., Mexico.
" surinamensis M. Trosch. =	
Molinesia surinamensis M. Trosch.	S. Am., Surinam.
Pseudoxiphophorus bimaculatus Blkr. =	
Xiphophorus bimaculatus Heck.	N. Am., Mexico.
Xiphophorus Helli Heck.	N. Am., Mexico.
Grundulus bogotensis Val. = Poecilia bogotensis Humb.	S. Am. St. Fé de Bogota.
Gambusia punctata Poey.	Antilles, Cuba.
" Holbrookii Gir. = Heterandria Holbrookii Ag.	N. Am., Florida or., Charlest.
" puncticulata Poey.	Antilles, Cuba.
" lineolata = Limia lineolata Gir. = Poecilia lineolata Gir.	N. Am., Texas.
" poecilioides Blkr. = Linea poecilioides Gir.	N. Am., Texas.
" cubensis Blkr. = Limia cubensis Poey.	Antilles, Cuba.
" formosa Blkr. = Limia formosa Gir.	N. Am., Paolo alto.
" vittata Blkr. = Poecilia vittata Guich. = Limia vittata Poey.	Antilles, Cuba.
" Heckeli Blkr. = Xiphophorus gracilis Heck.	N. Am., Mexico.
" Couchiana Blkr. = Limia Couchiana Gir.	N. Am., N. Leon.
" matamorensis Blkr. = Limia matamorensis Gir.	N. Am., Matamora.
" multifasciata Blkr. = Adinia multifasciata Gir. =	
Limia poecilioides fem. Gir. (Ichth. U. St. and Mexic.	
Bound tab. 38 fig. 12. 14).	N. Am. Texas.
" nobilis Gir. = Heterandria nobilis 13. Gir.	N. Am., R. gr. del Nort.
" affinis Gir.	N. Am., Texas.
486 Zygonectes patruelis Gir. = Heterandria patruelis B. Gir.	N. Am., Rio Nueces.
" speciosa Gir.	N. Am., New Leon.
" gracilis Gir.	N. Am., Matamoras.
" senilis Gir.	N. Am., Chihuahua.
Hydrargyra swampina Lac. = Hydrangyra diaphana Les.? =	
Atherina swampina Bosc.	N. Am., N. Jersey, Canada.
" vernalis Val.	N. Am., U.S.A.
" majalis Val. = Cobitis heteroclita Schoepff = Cobitis	
majalis Walb. = Poecilia majalis Bl. Schn. = Cyprinodon	
flavulus Val. = Hydrargyra trifasciata Stor. = Hydrargyra	
atircauda De Kay.	N. Am., N. York.
" Luciae Baird.	N. Am., N. Jersey.
" catenata Ag. = Poecilia catenata Stor.	N. Am.
" similis Baird Gir.	N. Am., Indianola.
" formosa Stor.	N. Am., Boston.
" zebra Gir.	N. Am., N. Mexico.
" maculata Pet.	Africa, Mossamb.
Poecilia vivipara Bl. Schn. = Poecilia surinamensis Val. =	
Poecilia? Schneideri Val.	S. Am., Guyan. Bah., Antill.
" unimacula Val.	S. Am., Rio de Janeiro.
" sphenops Val.	S. Am., Vera.cruz.
" dominicensis Val.	Antilles, St. Domingo.
" punctata Val.	S. Am., Montevideo.
" gracilis Val.	S. Am., Montevideo.
" melanopleura Gosse.	Antilles, Jamaica.
" decemmaculata Jen.	S. Am., Maldonado.

- Fundulus coenicolus Val. = Cobitis heteroclita L. (not formerly of Cuv.) =
 Poecilia coenicola Bl. Schn. = Poecilia fasciata Bl. Schn. =
 Fundulus mudfish Lac. = Esox pisciculus Mitch. =
 earlier Fundulus fasciatus Val. = Hydrargyra ornata Les. =
 Fundulus zebra De Kay = Fundulus viridescens De Kay. N. Am., N. York, N. Orl.
 " pisculentus Val. = Esox pisculentus Mitch. =
 Hydrargyra diaphana Les. N. Am., Eastern U.S.A.
 " nigrofasciatus Val. = Hydrargyra nigrofasciata Les. N. Am., N. York, Rhode. isl.
 " zonatus Val. = Esox zonatus Mitch. N. Am., S. Carolin.
 " cingulatus Val. N. Am., U.S.A.
 " fonticola Val. Antill., Martin., Portorico.
 " brasiliensis Val. S. Am., Brasilia.
 " multifasciatus Val. = Hydrargyra multifasciata Les. N. Am., L. Saratoga.
 487 " grandis Baird Gir. N. Am., Texas, Indianola.
 " seminolis Gir. N. Am., Florida or.
 " fuscus Ayr. N. Am., Brookhaven.
 " floridensis Gir. N. Am., Charlotte Bay.
 " parvipinnis Gir. N. Am., California.
 * Panchax Buchananii Val. = Esox panchax Buch. = Homalopsis javanicus
 V. Hass. = Aplocheilus panchax McCl. = Panchax Kuhlii Val. =
 Aplocheilus rubrastigma Jerd? = Panchax panchax Cant. =
 Panchax melanopterus Blkr. Bengal., Sunda Arch.
 " lineatum Val. West Hindustan.
 " cyanophthalma Blyth, or rather a species of Aplocheilus? Bengal.
 * Aplocheilus javanicus Blkr. Java.
 " MacClellandi Blkr. Bengal.
 " chrysostigmus McCl. Bengal.
 " melastigmus McCl. Bengal.
 " latipes Blkr. = Poecilia latipes T. Schl. Japan.
 Orestias Cuvieri Val. S. Am., Lake Titicaca.
 " Pentlandii Val. S. Am., Lake Titicaca.
 " Humboldtii Val. S. Am., L. Titic, Peru, Lim.
 " Jussieui Val. S. Am., L. Titic., Chinchera.
 " Agassii Val. S. Am., Coracor., Cusco 1400'.
 " Mülleri Val. S. Am., Lake Titicaca.
 " Owenii Val. S. Am., Cusco, L. Ureos.
 " albus Val. S. Am., Lake Titicaca.
 " luteus Val. S. Am., Lake Titicaca.
 " Tschudi Cast. S. Am., Lake Titicaca.
 Anableps Gronovii Val. = Anableps tetraphthalmus Auct. S. Am., Guyana.
 " microlepis M. Trosch. = Anableps coarctatus Val? S. Am., Guyana.
 " elongatus Val. S. Am., Guyana.

Fossil Cyprinodontoidei (All from the molasse.).

- Poecilia Lemetherei. Ag. Paris.
 Cyprinodon cephalotes Blkr. = Lebias cephalotes Ag. S. Gall.
 " perpusillus Ag. = Lebias perpusillus Ag. Oeningen
 " gobio Blkr. = Lebias gobio Münster. Fichtelgebirge.
 " Meyeri Blkr. = Lebias Meyeri Ag. Frankfurt.
 " crassicaudus Blkr. = Lebias crassicaudus Ag. Pedemont.

488 PANCHAX Val.,

Hist. nat. Poiss. XVIII p. 282 = HOMALOPSIS Van Hass. –
TJUPANG.

Body elongate, compressed, covered with large scales, back very low, belly higher and thinner than back. Head and broad snout depressed. Upper jaw strongly protrusible, depressed. Gape terminal. Intermaxillary and infracmaxillary teeth multiple-rowed, those in external row larger than those in other rows. Vomerine teeth small. Dorsal fin with few rays, opposite posterior part of anal fin. Ventral fins inserted far behind the base of the pectoral fins. Anal fin with many rays, elongate. Gill opening ample. Membrane brachiostegeal with 5 or 6 rays.

Remark. The genus *Panchax* is the only genus of the Cyprinodontoids in which the vomer is armed with teeth and it is therefore already identifiable by that. The upper margin of the mouth opening is still entirely formed by the interjaw bones [premaxillaries], and as it is build for the rest after the type of the Cyprinodontoids, and answers to that in gill structure, the depressed head and upper jaw, dentition, squamation and fin shape, I have not hesitated to insert it in this family, in which it forms a separate group with the genus *Aplocheilus*.

The reasons, which have compelled Mr Valenciennes to place *Panchax* in his *Esoces*, seem to be little acceptable. That the vomer has teeth, is not sufficient for the separation from the Cyprinodontoids, and that it has the snout broad and flat, the gill opening wide and the dorsal fin short and inserted till behind the anal fin, neither justifies to remove it from the Cyprinodontoids, as totally the same characters are found in many Cyprinodontoids.

Panchax Buchanani Val.

Poiss. XVIII p. 284; Blkr. Verh. Bat. Gen. DL. XXV Nalez. ichth. Bengal. P. 144 –

Buchanan's Tjupang. –
Atl. Cypr. Tab. LIII fig. 3.

A *Panchax* with an elongate body, slightly cylindrical anteriorly, compressed posteriorly, depth contained about 6 to about 7 times in its length. Head prism-shaped, upper part flat, contained 4 to 4½ times in the length of the body; eyes posterior, eye diameter contained about 3 times in the length of the head; upper jaw protrusible; gape ending anterior to the eye; teeth in jaws multiple-rowed, curved, those in external row larger than those in other rows; vomerine teeth small; scales on flanks cycloid, about 32 in the lateral line; lateral line inconspicuous; dorsal fin placed partly behind anal fin posteriorly in the second third of the body, short, rounded, lower than the body; pectoral and ventral fins acute, pectoral fins longer than ventral fins, ventral fins without prolonged ray; anal fin obtuse, convex, at the base contained about 5 times in the length of the body, caudal fin rounded, contained about 4½ times 489 in the length of the body. Colour: upper part of the body green, deeper on the margins of the scales; crown

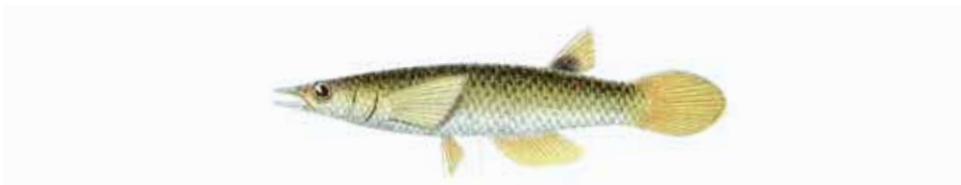


Fig. 130. *Panchax Buchanani* Val. Atl. Ichth. Cypr. Tab. XLIII, Fig. 3. TL figure 57 mm.

and back at the base with a golden or shiny white spot; dark oculo-maxillary band; dorsal fin orange or pink-hyaline, lower part dark or black; other fins greenish or pink-hyaline; caudal fin completely and anal fin partly bordered with black, caudal fin variegated with green-dark points.

B. 5 or 6. D. 1/7 or 1/8. P. 1/12 to 1/14. V. 1/5. A. 2/13 or 1/14. C. 13 or 15 plus short flanking ones.

Syn. *Esox panchax* Buch., Gang. Fish. p. 211, 380 tab. 3 fig. 69.

Homalopsis javanicus V. Hass., unpublished drawing.

Aplocheilus panchax Mc Cl., Ind. Cypr. Asiat. Res. XIX, II p. 301, 426, tab. 42 fig. 2.

Pancha de Buchanan Val., Poiss. XVIII p. 284.

Panchax Kuhlii Val., ibid. p. 285.

Pancha de Kuhl Val., ibid. p. 285.

Panchax panchax Cant., Cat. Mal. Fish. p. 252.

Panchax melanopterus Blkr, Verh. Bat. Gen. XXIV Snoek. p. 22.

Pangchak Bengal.

Tjupang Mal. Batav.

Hab. Java (Batavia, Tjandjong-oost, Tjampea, Buitenzorg, Pandjallu, Surabaya, Pasuruan, Les-ti), in rivers and lakes.

Sumatra, in rivers.

Borneo (Bandjermasin), in rivers.

Bengala (Calcutta), in rivers.

Length of more than 100 specimens 25''' to 57'''.

Remark. A detailed comparison of my specimens from the Indian Archipelago with those from Bengal, has convinced me, that they do not differ specifically. I only do not observe in the Bengal specimens the longitudinal band on the anal fin, however this is also not present in all my archipelagic specimens.

Apart from the abovementioned places, the species is also known from Pinang.

Mr Valenciennes has described four species of Panchax, i. e. *Panchax lineatum* Val. from Bombay, *Panchax Buchanani* Val. from Bengal and *Panchax Kuhlii* Val. and *Panchax pictum* Val. from Java. – *Panchax pictum* Val. belongs to a totally different genus and is made known in more detail by myself under the name *Betta trifasciata*. Earlier I did not know the similar identity of *Betta trifasciata* with *Panchax pictum*, but it became apparent, after I came in the possession of a drawing, left by Van Hasselt and provided with the name *Anastoma pictum*. Van Hasselt noticed very well the generic difference of both species and placed *Panchax Buchanani* in his genus *Homalopsis*, whereas he placed *Betta picta* (*Betta trifasciata* Blkr) in his genus *Anastoma*.

Of the four species of Mr Valenciennes thus only two remain, i.e. *Panchax Buchanani* and *Panchax lineatum*.

490 APLOCHEILUS McCL.,

Ind. Cyprin. As. Res. XIX p. 301, 426;

Blkr, Ichth. warn. Bantam, Nat. T. Ned. Ind. VII p. 322. –

IMPUN.

Body oblong, compressed, covered with large scales that easily fall off, back very low, belly more or less ridged, higher than back. Head and broad snout depressed. Upper jaw not protrusible. Gape terminal. Intermaxillary [upper jaw] and inframaxillary [lower jaw] teeth in one row, simple: no vomerine teeth. Supramaxillary bone placed behind intermaxillary bone. Scales deciduous. Dorsal fin with few rays, opposite posterior part of anal fin. Ventral fins inserted far behind the base of the pectoral fins. Anal fin with many rays, elongate. Gill opening ample. Brachioistegal membrane with 5 rays.

Remark. *Aplocheilus* was described first by Mr MacClelland. He has indicated the characters correctly, however mistakenly placed *Esox panchax* Buch. in the same genus. To this it can be blamed that Mr Cantor in his Catalogue of Malayan Fishes (p. 252) considers the diagnosis of Mr MacClelland as very incorrect and rejects the genus *Aplocheilus*.

Aplocheilus by its flat upper jaw is related to *Panchax* Val., but differs from it, apart from a different habitus, by a not protrusible upper jaw, only a single row of teeth in the jaws and the absence of vomerine teeth. It is easily distinguishable from the other genera of the Cyprinodontoids by the flat upper jaw, the single rowed undivided teeth, the long anal fin, the short, above the posterior part of the anal fin inserted dorsal fin, the presence of pelvic fins and the absence of vomerine teeth.

Aplocheilus javanicus Blkr.

Ichthyol. Waarn. Bantam, Nat. T. Ned. Ind. VII p. 233. –

Javasche Impoen [*Javanese Impun*].

Atl. Cypr. Tab. LIII fig. 2.

An *Aplocheilus* with an oblong, compressed body, depth contained 4 to 4½ times in its length, width contained about twice in its depth. Head prism-shaped, acute, upper part flat, contained 4½ to nearly 5 times in the length of the body; eyes posterior, eye diameter contained 2¼ to 2½ times in the length of the head; jaws very short, upper jaw not protrusible; gape small, more than twice as short as the eye; teeth in jaws one-rowed, conical, those placed towards the angle of the mouth larger than the rest; scales cycloid, about 30 in a longitudinal row; lateral line inconspicuous; dorsal fin acute, convex, placed opposite the posterior part of the anal fin, lower than the body; pectoral fins acute, about twice as long as angular, ventral fins, contained 3⅓ to 3¾ times in the length of the body; caudal fin obtuse, rounded, contained about 5 times in the length of the body, anal fin slightly emarginate, lower than dorsal fin at the base contained about 3⅓ times in the length of the body. Colour: upper part of the body yellowish-green, on the belly transparent, head-tail band very thin, violet; fins yellowish-hyaline.

B. 5. D. 1/6. P. 1/10 or 1/11. V. 1/15. A. 1/24. C. 13 or 15 plus short flanking ones.

491 Syn. *Impun* Sundan.

Hab. Java (Perdana), in river Panimbang.

Length of 14 specimens 24''' to 34'''.

Remark. The species in question closely resembles *Aplocheilus MacClelandi* Blkr, a species illustrated after a drawing from the collection Buchanan Hamilton (plate 55 fig. 4) but not described in the above mentioned work of Mr MacClelland. The figure however shows only 20 anal fin rays and the height of the body is only fits 3¾ times in its length. In my opinion it will have to be examined in more detail whether *Aplocheilus chrysostigmus* McCl. and *Aplocheilus melastigmus* McCl. belong to this genus. They are more slender species than both above mentioned ones. The habitus of the body and the length of the anal fin indicate that they indeed belong to *Aplocheilus* and not to *Panchax*. However, *Aplocheilus chrysostigma* would only possess 17, but on the con-



Fig. 131. *Aplocheilus javanicus* Blkr. Atl. Ichth. Cypr. Tab. XLIII, Fig. 2. TL figure 28 mm.

trary *Aplocheilos melastigma* 22 anal fin rays. In my opinion *Poecilia latipes* T. Schl. from Japan can be placed in *Aplocheilus*, notwithstanding that it is said to possess only 3 gill rays, a point which however deserves to be confirmed in more detail. It has entirely the habitus of *Aplocheilus* and also a very long anal fin with 50 rays.

I wrote this in Batavia from the first of June to October 1859.

Postscript.

By far the largest part of this work had already been finished, when I came in the possession of the Proceedings of the Academy of Natural Sciences of Philadelphia, 1859, in which Mr Girard adds still numerous new Cyprines to the already known ones. The earliest discoveries of Mr Girard however mainly concern the Cyprionodontoids. I was able to include Mr Girard's new species of this family in the list of known species of Cyprionodontoids on pp 484-487, but not in the geographical synopsis of the family on p. 43. The numbers in this synopsis therefore are not longer correct⁴⁹² and the there mentioned number of 76 should be increased to 116.

Of Mr Girard's new genera *Adinia* and *Lucania*, only *Lucania* seems to be acceptable, whereas on the contrary one of the species of *Luciana* is the type of a new genus that I have named *Girardinichthys*. I would be very desirable that the Cyprionodontoids would become subject of a monograph in which it would be investigated and elucidated in detail also with regard to its generic relationships.

The *Barbus* species from Mosambique, summed up on p. 281, I recently found described in the *Monatbericht der Königl. Akademie der Wissenschaften zu Berlin*, 1952 (p. 683). Mr Peters has indicated two species as species of *Dangila*, i.e. *Barbus (Dangila) trimaculata* and *Barbus (Dangila) inermis*, and these therefore have to be transferred from the list of the *Barbines* to that of the *Labeonines*. In the list of *Barbines*, on the contrary, must be included *Leuciscus zambezensis*, the true genus of which still has to be determined, unless with *Opsaridium zambezensis* the same species is meant. The descriptions of the remaining Cyprinoids from Mosambique by Mr Peters because of their briefness, do not allow to getting an idea concerning their generic relationships.

Batavia, June 1860

