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Notes on the Ichthyology of Surinam (Dutch Guiana)
4
Additional records of Siluriform Fishes (1)

by

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The present paper deals with part of a recently acquired collection of freshwater fishes, captured by Mr. J. VAN DER KAMP, Amsterdam, during his military service in Surinam in the years 1956 and 1957. All material is finely preserved and ecological data as well as numerous black and colour photographs by the collector add to the scientific interest of the collection.

FAMILY *Siluridae*

1. *Selenaspis herzbergi* (BLOCH), figs. 1 to 3.

Silurus herzbergii BLOCH, 1794, Ausl. Fische, 8 : 33, pl. 367 (Surinam)

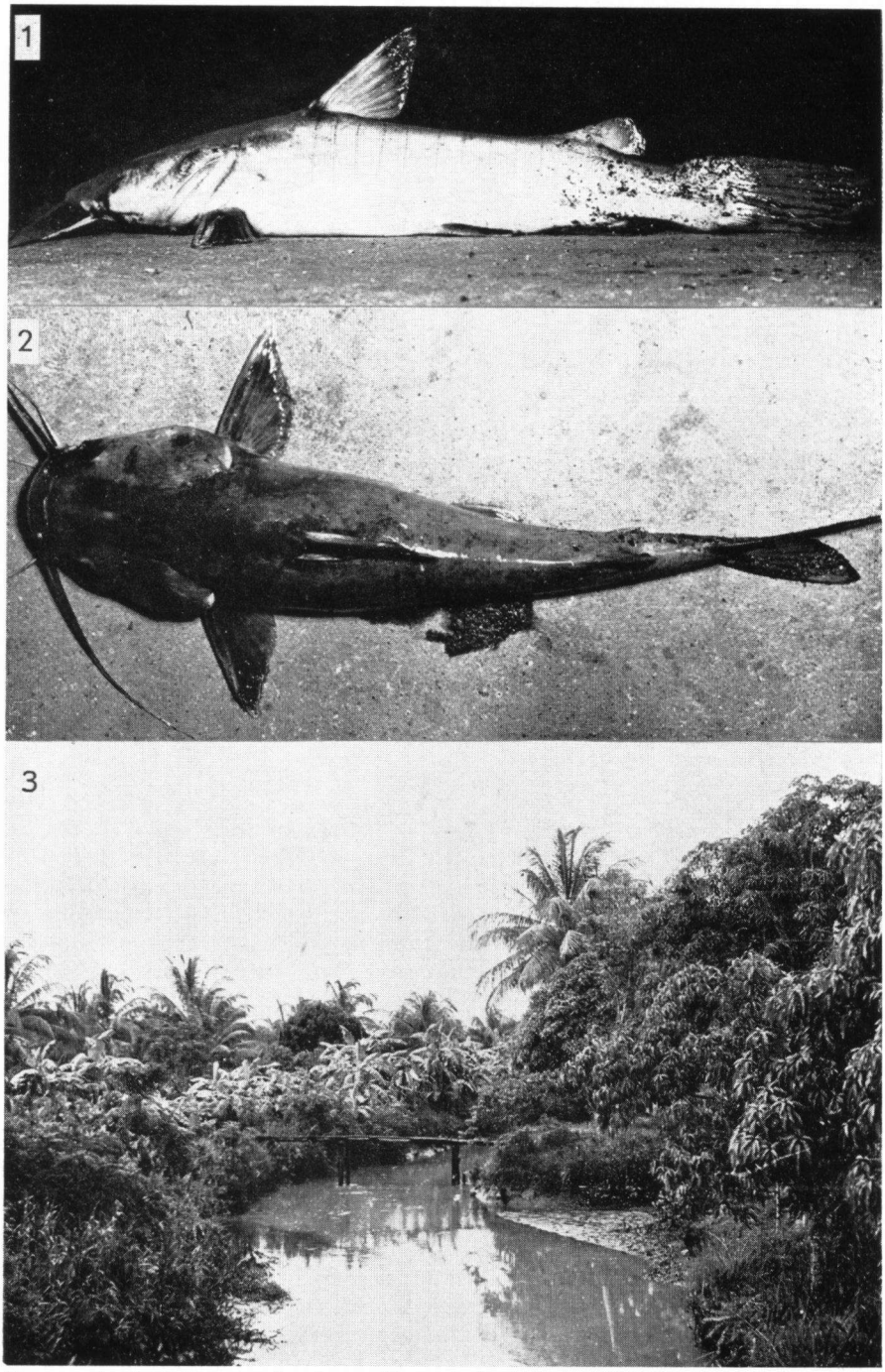
One specimen was caught by native fisherman in a canal near the military camp and hospital at Nieuw Nickerie (fig. 3, photo of habitat). Being large and too heavy to be preserved and collected, two photographs were taken, next to counts and measurements, which made it possible to identify this specimen as the White Cat (Witi kati) of the natives. The specimen measured 680 mm total length; the largest specimen yet recorded of this species measured less than 400 mm. It has previously been reported from Surinam by BOESEMAN (1953 : 3).

The following description is based on the photographs and field notes : D 17, A 16 or 17, P. I10; the proportion rates (in 1000ths of the standard length, which is 568 mm) are, head 294, depth (of living fish) 212, eye about 13, interorbital width about 130, snout about 76.

The very small eye of this specimen apparently is normal for this size. The most striking distinguishing character of the genus, the internarial membrane is clearly visible on the photograph (fig. 2), and though it is found in young specimens of related genera also, it is not as typical for those as it is for *Selenaspis*. The dorsal plate and the occipital process agree with those in the species with which it is now identified.

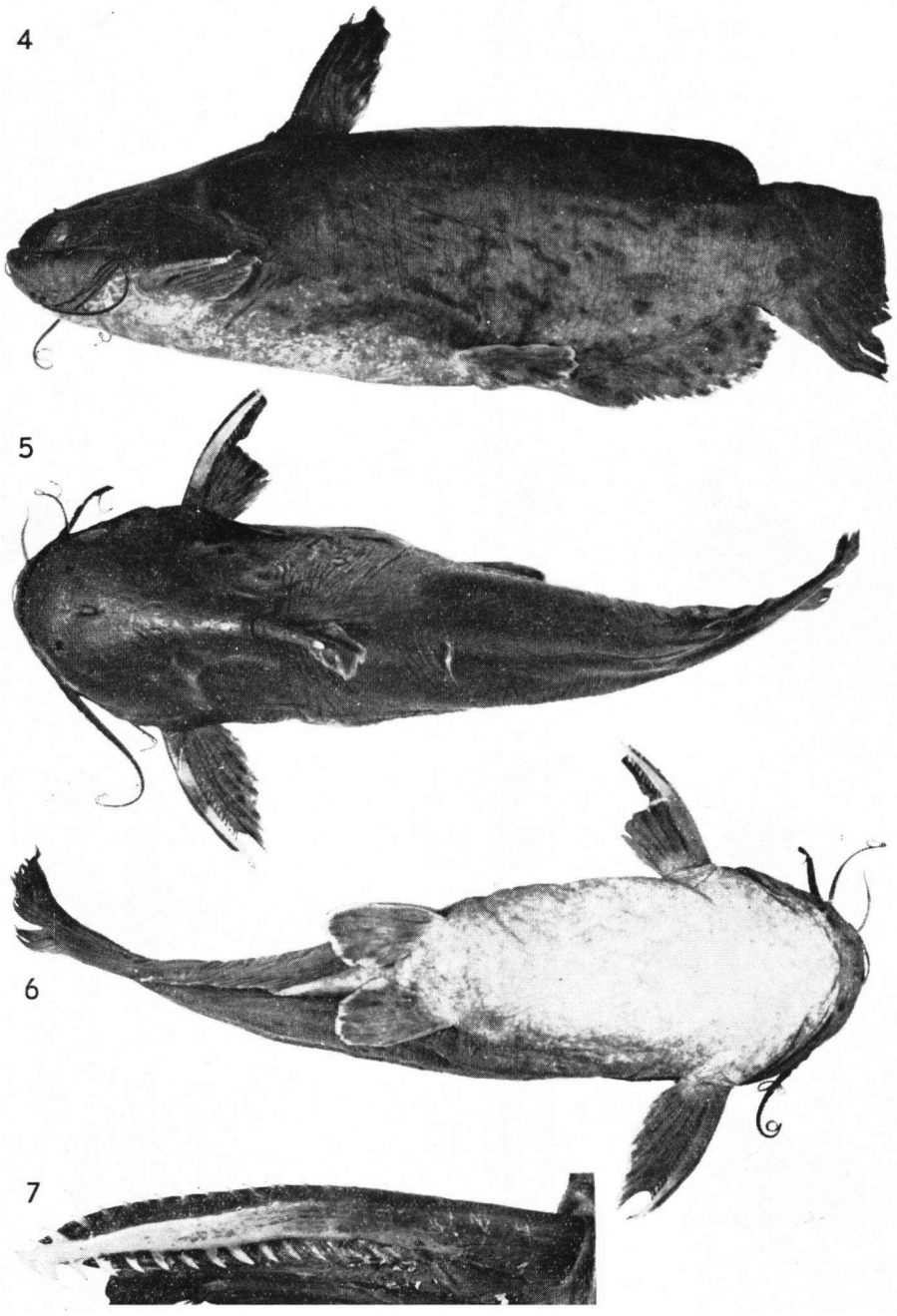
Colour of living specimen: Just after it was caught, this white cat showed a greyish-blue groundcolour, a dark back, and dirty white belly

*) Received May 27, 1957.



FIGURES 1—3. *Selenaspis herzbergi* (BLOCH), lateral and dorsal views of living specimen, and photograph of sampling place (caught under little bridge, with a rope, iron hook and piece of raw meat).

Photographs by J. VAN DER KAMP, 1956



FIGURES 4—7. *Trachycorystes galeatus* (LINNÉ), lateral, dorsal, and ventrals views, and dorsal view of left pectoral spine; all of specimen ZMA. 102016, ♂, 195 mm total length.

Photographs by the author

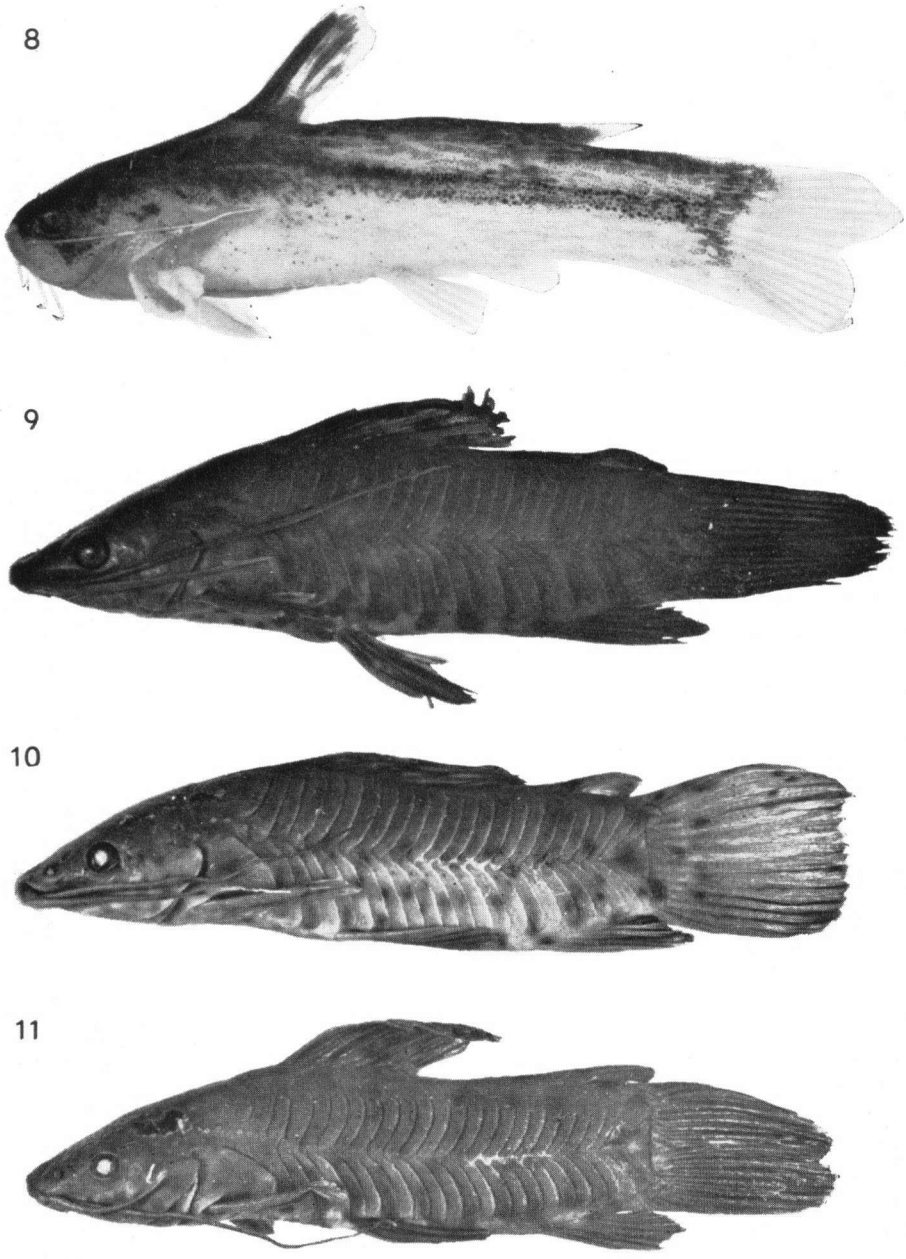


FIGURE 8. *Centromochlus creutzbergi* BOESEMAN, ZMA. 102006, ♂, 31.6 mm st.l., 9—11. *Hoplosternum thoracatum surinamense* HOEDEMAN, 9 = ZMA. 101972, ♂, 34.0 mm. st.l., 10 = ZMA. 101978, ♀, 40.0 mm st.l., 11 = ZMA. 101986, ♂, 37.5 mm st.l.

Photographs by the author

and throat. The sides were marked with 12 narrow dark dotted stripes, extending on to about the midaxis of the body. The caudal and caudal fin were dark brown to blue-black marbled. The other fins were plain at the base, whitish, with dark brown to orange outer margins in dorsal and adipose, orange in the anal fin, each with milkwhite flecks on the tips of the finrays, and along the outer margin of the adipose. The ventrals were uniform greyish, pectorals darker, with an intramarginal white irregular stripe.

The maxillary barbels, which reach to about the middle of the depressed pectorals, are dark blue-brown, flat; the mental barbels reach to about the base of the pectorals, the postmental barbels slightly beyond the orbits, both pairs are milkwhite.

The spines are almost smooth anteriorly, with weak serrae along the upper ends in dorsal and pectorals; the inner margins ?.

This specimen, caught on August 28, 1956, was said to belong to a common species, reaching a boys length, but it is doubtful if the natives will be able to distinguish between the various forms. Anyhow, these fish seem to ascend rivers from the brackish coastal waters in July and August. probably to reproduce. Juveniles of less than 100 mm seem to be extremely scarce in museum collections, and specimens of one or two weeks old are not even known, or probably have not yet been identified as such. Future collecting should be done with this in mind, and probably August is the month in which newly hatched young can be found in the mud of very shallow waters, or in holes in the sandy bottom of swiftly streaming brooks and rivers.

2. *Trachycorystes galeatus* (LINNÉ), figs. 4 to 7.

Silurus galeatus LINNÉ, 1766 : 503 (based on SEBA, 1748).

ZMA. 102016, Coropina creek, between road to Zanderij and Cage d'Amour, in shallow part of the sandy beach, April 26, 1956, 2 ♂♂, 195 and 182 mm total length.
D I6, I6, A 21, 23, V 6, 6, and P I7, I7 for the 195 and 182 mm specimen respectively.

The groundcolour is light brownish, with yellow-white ventral surface, and a prominent purplish marbling or fleck-design. The fins show white outer margins.

This species is known from Surinam for a long time, and probably LINNAEUS' types came from that area.

Vernacular name: Noja or Tinganoli.

3. *Centromochlus creutzbergi* BOESEMAN, fig. 8.

Centromochlus creutzbergi BOESEMAN, 1953, Zool. Meded., Leiden, 32 : 7—8, fig. 1c, Djaicreek, Surinam

ZMA. 102006, Coropina creek, near Republiek, October 20, 1956, 1 ♂, 31,6 mm st.l., 38.4 mm total length.
D I3, A 8, V 6, P I5; agreeing in detail with the original description. Detailed proportion rates can be found in the photograph.

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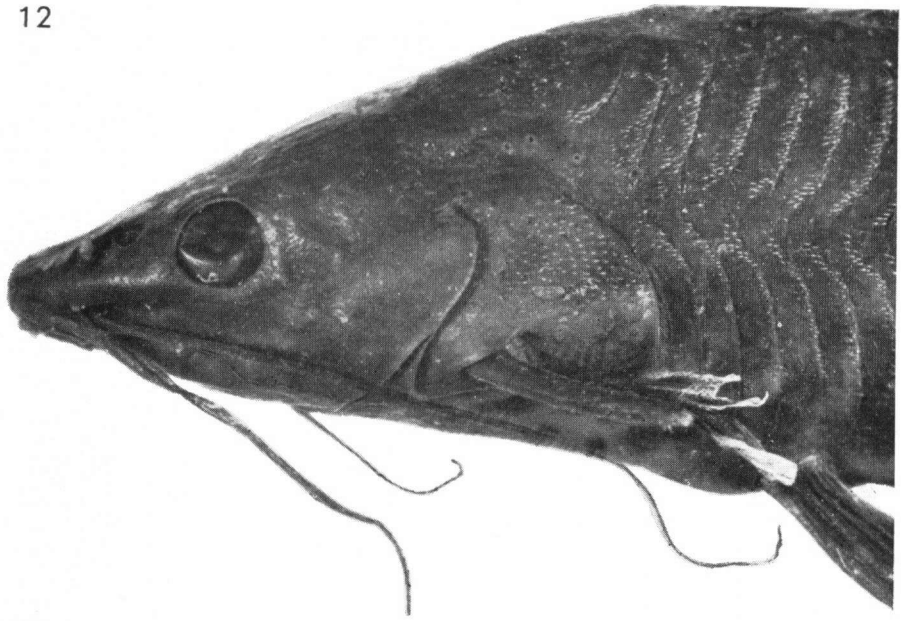

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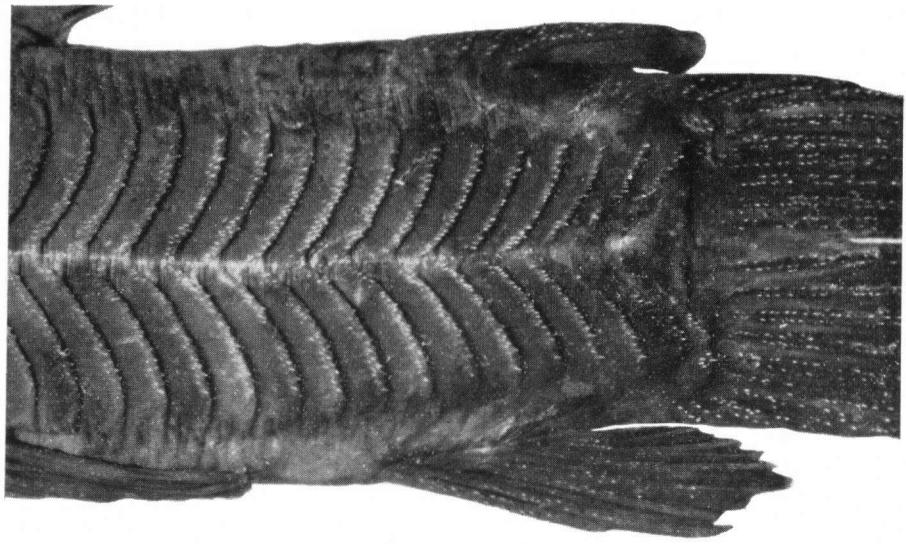


FIGURES 12 and 13. *Hoplosternum thoracatum surinamense*, ZMA. 101986, ♂, 37.4 mm. st.l., 12 = head showing the incomplete developed armature, the sensory pores, and the relative large eye, 13 = caudal region, also showing the weakly developed scutes, with soft spines at the outer posterior margins.

Photographs by the author

This species is known from the single type specimen from Djaicreek, Maroni system. The present specimen is the second record, also from Surinam, but new for the Para river system, where it has been secured in the typical habitat of the Hatchet fishes, *Gasteroplecus sternicla* and *Carnegiella strigata*.

FAMILY *Callichthyidae*

The present collection brought in a number of juvenile specimens belonging in this family, which throw a welcome light on the problem of the development of the armature of these fishes.

The description of the small specimens (of 34 and 40 mm standard length) agrees practically in every detail with that of ELLIS' genus *Cascadura* (ELLIS, 1913), and in the key to GOSLINE's revision of the family (1940) these young specimens also run into the genus *Cascadura*.

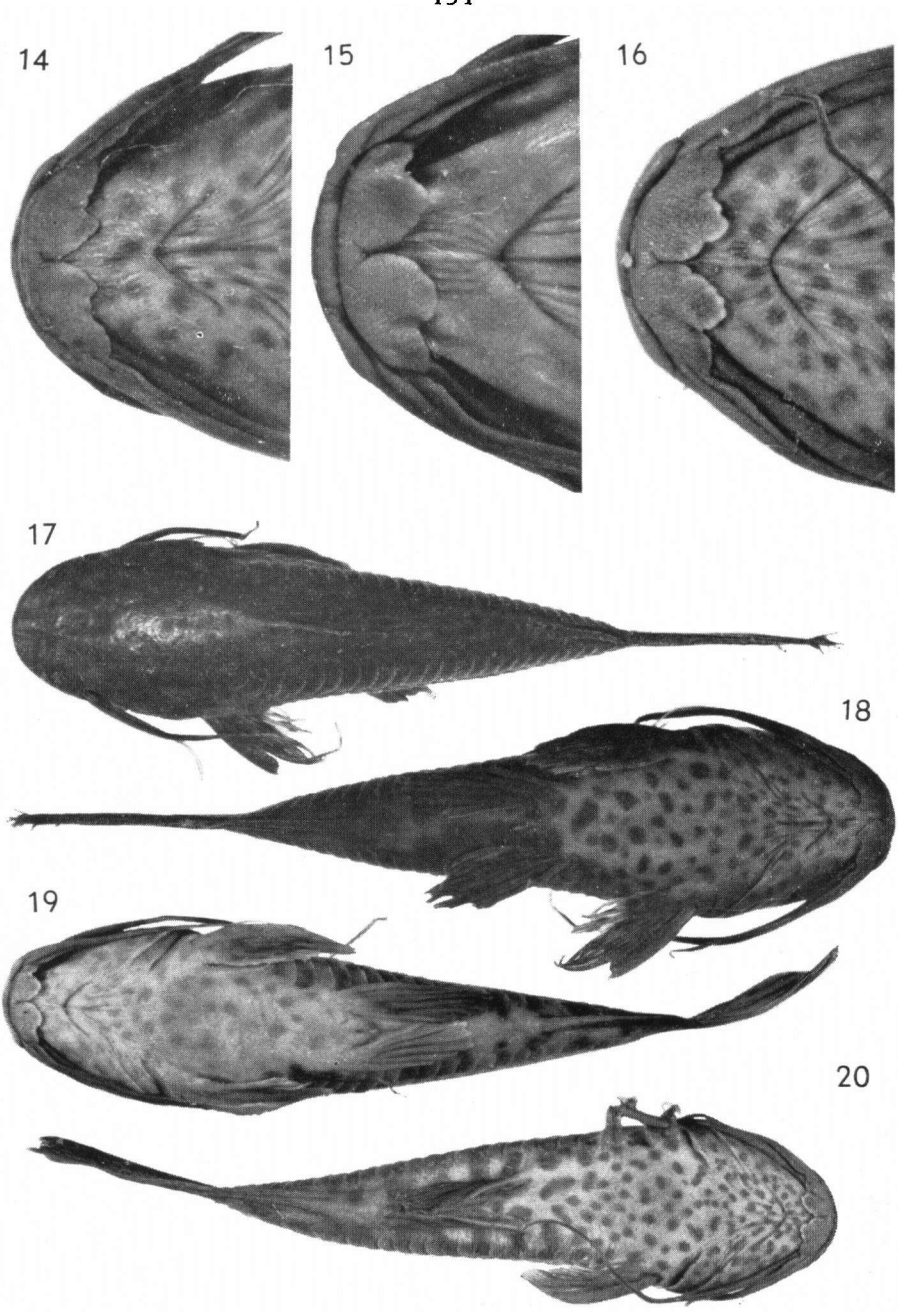
The genus *Cascadura* (ELLIS, 1913 : 387, *Cascadura maculocephala* nov. gen., and nov. spec., from Uruguay, Uruguayana, Rio Uruguay, based on a single specimen of 66 mm total length) is said to differ from *Hoplosternum* and *Callichthys* in the following characters (after ELLIS, l.c., and GOSLINE, l.c.):

a. breast as in *Callichthys* (= coracoids not expanded),
b. mouth subterminal as in *Callichthys*,
c. occipital process not meeting the dorsal plate,
d. nuchal plates not meeting along the middle line between the dorsal and occipital process,
e. fontanels very large, the bridge between them over the eyes,
f. differing from *Hoplosternum* in the concealed coracoid processes.

The present young specimens (see sub *Hoplosternum thoracatum*) are typical for their agreeing in detail with the characteristics and diagnosis of *Cascadura*, though there is one marked difference, the coloration of the belly. The ventral surface of *Cascadura* is said to be white, it is distinctly mottled in the present young specimens.

I think there cannot be much doubt about the proper reference of the small (juvenile) specimens to *Hoplosternum* and *Callichthys* respectively (v.et.), and *Cascadura* probably will turn out to be just a young stage of some *Hoplosternum* species. It seems highly improbable that *Cascadura* deserves generic rank, unless it indeed is an evoluated arrested juvenile stage in this family. Further material from the same region (Uruguay), and specimens of various lengths will have to answer that question. At any rate the degrees of development and expansion of the armature in *Hoplosternum* and *Callichthys* has not yet been described and illustrated before. The following note may therefore be of interest.

When in February 1956 Mr. VAN DER KAMP departed for Surinam, I had the opportunity to draw his special attention to some peculiar habitats, where it was supposed some interesting additions to our knowledge of the armoured catfishes could be secured in the form of juvenile specimens. These were expected to be found in the thick muddy bottom layers of more or less stagnant pools, and special attention was paid to those. Though the total number of specimens secured and sifted out of the mud in various occasions brought but a few Callichthyids to light, these few specimens can throw much light on problems of long term. Further details about the biotopes will be laid down in a separate paper dealing with the collecting trip in general.



FIGURES 14 to 20. *Hoplosternum thoracatum surinamense*. 14, 17 and 18 = ZMA. 101986, ♂, 37.4 mm.st.l., 15 and 19, ZMA. 101978, ♀. 40.0 mm. st.l., 16 and 20, ZMA. 101972, ♂ 34.0 mm. st.l. Figures 14 to 16 show the reverted lower lips, 17 is the dorsal view showing the large fontainels and the incompletely developed scutes 18 to 20 show the ventral sides, illustrating the male and female pigmentation the development of the scutes and of the coracoids.

Photographs by the author

4. *Hoplosternum thoracatum surinamense* HOEDEMAN, figs. 9 to 23.

Hoplosternum thoracatum surinamense HOEDEMAN, 1952, Beaufortia, 1 (12): 3, 5—7 (Surinam, typelocality restricted to surroundings of Paramaribo here)

ZMA. 101952, creek at Bosbivak Zanderij, February 12, 1957, ♀, 92.0 mm. st.l.
ZMA. 101972, Coropina creek, May 20, 1956, ♂, 34.0 mm st.l.
ZMA. 101978, creek at Bosbivak Zanderij, April 29, 1956, ♀, 40.0 mm st.l.
ZMA. 101986, same data, ♂, 37.4 mm st.l.

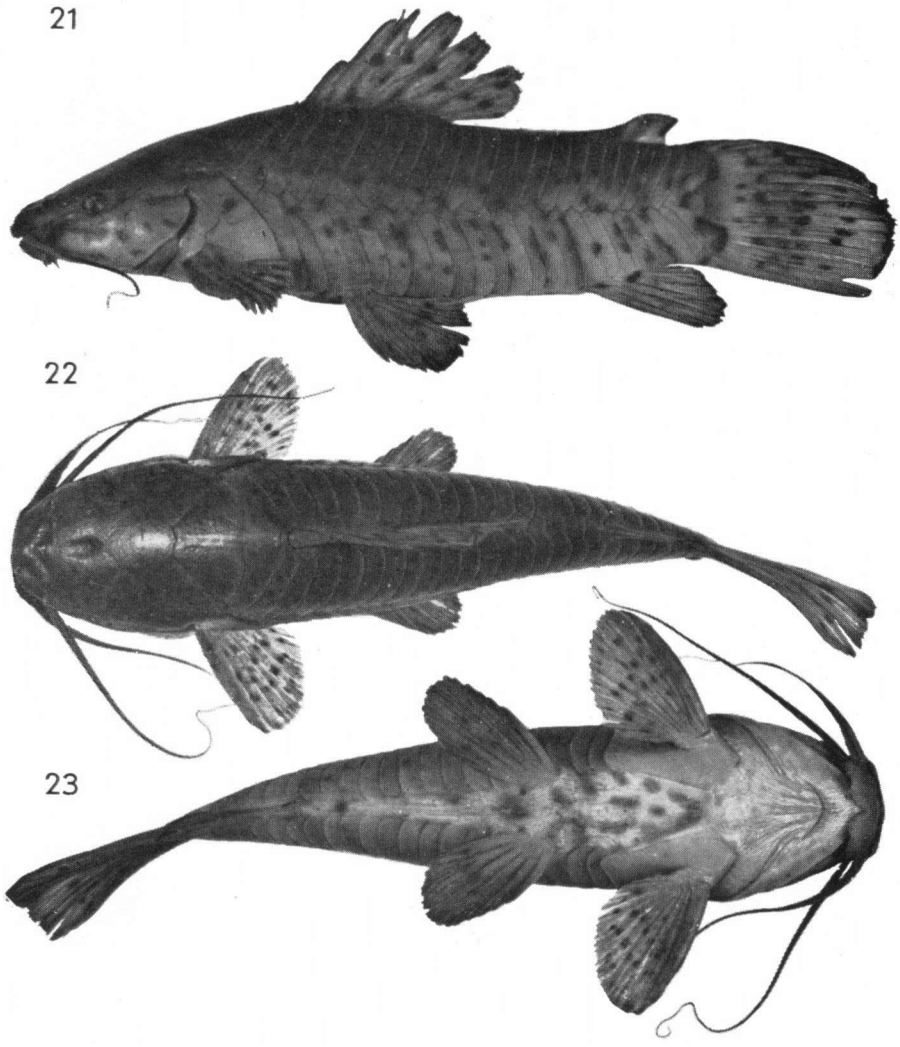
The above localities can be added to my 1952 records. The three small specimens differ most strikingly from the adults in the naked areas of the occipital, the dorsal/adipose, and the anal regions (cf. figs. 12 and 13), whereas the coracoids have not yet expanded beyond the ventral bases (cf. figs. 18 to 20), thus leaving these regions unarmed.

The normal, fully developed armature in the Callichthyids in general, and in *Hoplosternum thoracatum surinamense* in particular, consists of calcified skinfolds, the development of which is perfectly clear form the photographs (figs. 12, 13, and 17 to 23), and ventrally it consists of an expanded pair of coracoids, leaving only a narrow naked area in females, and meeting in the mid-anterior in males. The fully developed scutes and coracoids of an adult male have been illustrated (figs. 21 to 23). From the present specimens, including those referable to *Callichthys* (v.et.), we can preliminarily conclude that specimens up to a length of about 20 mm standard length (cf. the 18 mm *Callichthys* specimen) are completely naked; the development of the skinfolds (the future scutes) has started with a length of about 30 mm, reaching its maximum extension not before a length of about 75 mm.

In some of the specimens in the collection, reported on before, I found the armature more or less behind, compared with the development in evenly large specimens, but not to such an extend that we might speak of an arrested juvenile stage. This may be caused by environmental circumstances, and can therefore never be the base for generic or even specific destinction, if only a single or few specimens are available.

Generic distinction within the family is based, however, on apparently non-adaptive characters, of which the expansion of the skin armature, as has been worked out by GOSLINE (1940), should be used with caution, bearing the preceding in mind.

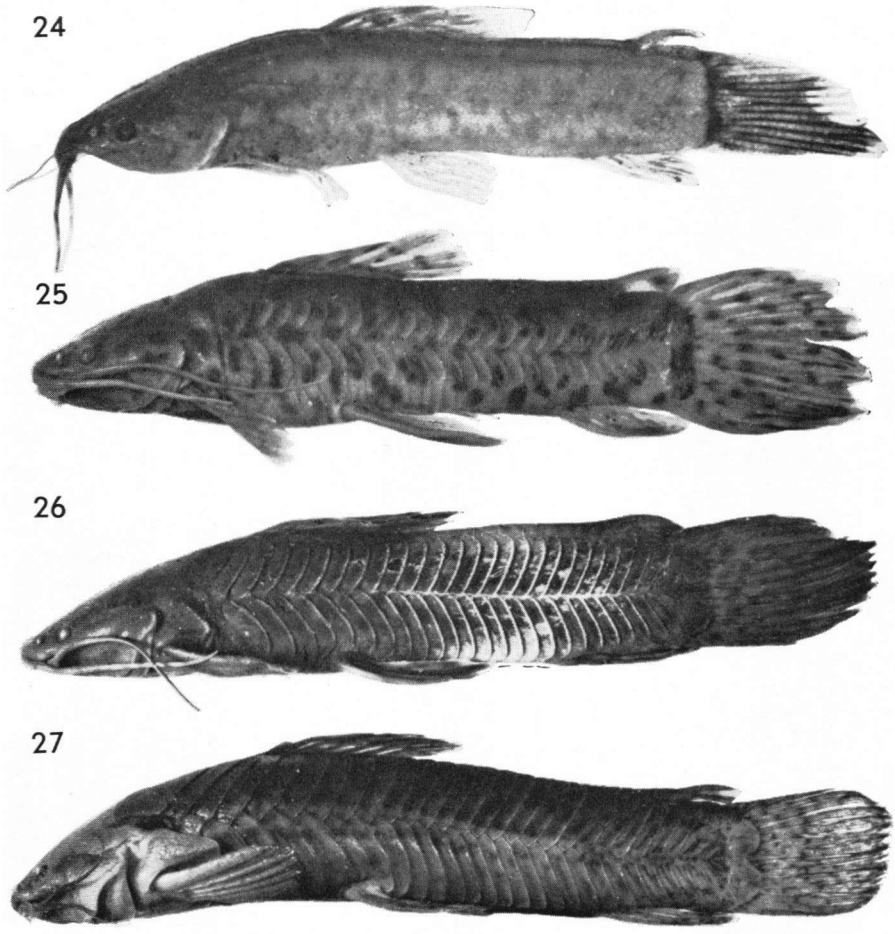
Another morphological character of systematic importance, and also worked out by GOSLINE (l.c.), the reverted lower-lip, could not be used by him in his key, because it was yet unknown for *Cataphractops* and *Cascadura*. Though it is not known for these generic names now either, the *Hoplosternum thoracatum* form under discussion shows a noteworthy variation in this respect. In figs. 14 tot 16 the lips of the three juvenile specimens are given, showing the two reverted flaps, each with a scalloped posterior margin, more so in the males than in the female. This situation thus is much like as described for *Dianema* (cf. GOSLINE, l.c.: fig. 2), and somewhat intermediate between that genus and the *Callichthyidi*, though trenchantly differing in the unequal lengths of the barbels. In all available



FIGURES 21 tot 23. *Hoplosternum thoracatum surinamense*, ZMA. 101952, ♀, 92.0 mm. st.l. 21 = lateral view, 22 = dorsal view, showing fontanel and closed armature, 23 = ventral view, showing expansion of scutes and coracoids, and shape of the reverted lower lip.

Photographs by the author

specimens of Surinam *Callichthyidi* I have been unable to find any traces of a third pair of barbels. The reverted lips in adults are either a small and narrow flap, devided in the middle (most males and females studied), or in some larger females the reverted flaps are rather well developed (fig. 23). This may have something to do with the breeding season and parental care, though these fish are known to be bubblenest builders. The use of GOSLINE's lower-lip charecter in a key, his first type, the



FIGURES 24 to 27. Development of the scutes in *Callichthys callichthys bolteni*. 24 = juvenil specimen ZMA. 101953, 18 mm st.l., the body is fully naked, and no skin foldings have yet been produced; 25 = ZMA. 101978a, ♂, 35.4 mm st.l., skinfolding, yet weak, and not calcified, have started their development; 26 = ZMA. 101989, ♂ 46.0 mm st.l.; and 27 = ZMA. 101992, ♀, 89.0 mm st.l., the scutes are formed and reach their maximum development for this form.

Photographs by the author

Hoplosternum type should have a little greater variation to include the juveniles. The lip does not produce barbel-like outgrowths as in *Dianema* indeed.

The coloration of the young specimens is especially striking on the ventral surface (figs. 18 to 20), being more distinct in the males than in the female specimen of our three examined. The flecks disappear gradually with age, but remain, and become even more conspicuous on the fins (fig. 23).

TABLE 1. Proportion rates in 1000ths of the standard length, and finrays and scutes in Surinam specimens of *Hoplosternum thoracatum*.[1])

ZMA coll.	mm st.l.	sex	D	A	V	P	prdl	pral	prad	head	dpth	dcp	snt	eye	iob	scutes	
																lateral	azygous
101952	92.0	♀	Ii7	Ii5	I5	I9	400	842	884	272	284	174	120	33	100	25/23	7
101972	34.0	♂	Ii7	Ii5	I5	I8	424	810	876	302	254	200	127	62	218	25/23	8
101978	40.0	♀	Ii7	Ii5	I5	I8	425	810	875	289	278	190	135	57	200	24/22	8
101986	37.4	♂	Ii7	Ii5	I5	I8	412	814	896	278	276	203	128	48	200	25/23	7

5. *Callichthys callichthys* (LINNÉ)

This species is rather widely spread in South-American waters, and is represented in Surinam by one of the three subspecies recognized (cf. HOEDEMAN, 1952 : 9, 10). The present material, though including a juvenile specimen in which the scuters have not yet been developed is referred to the Surinam subspecies, *Callichthys callichthys bolteni*.

Callichthys callichthys bolteni HOEDEMAN, figs. 24 to 31.

Callichthys callichthys bolteni HOEDEMAN, 1952, Beaufortia, 1 (12) : 9—10 (Surinam, type locality restricted to surroundings of Paramaribo here).

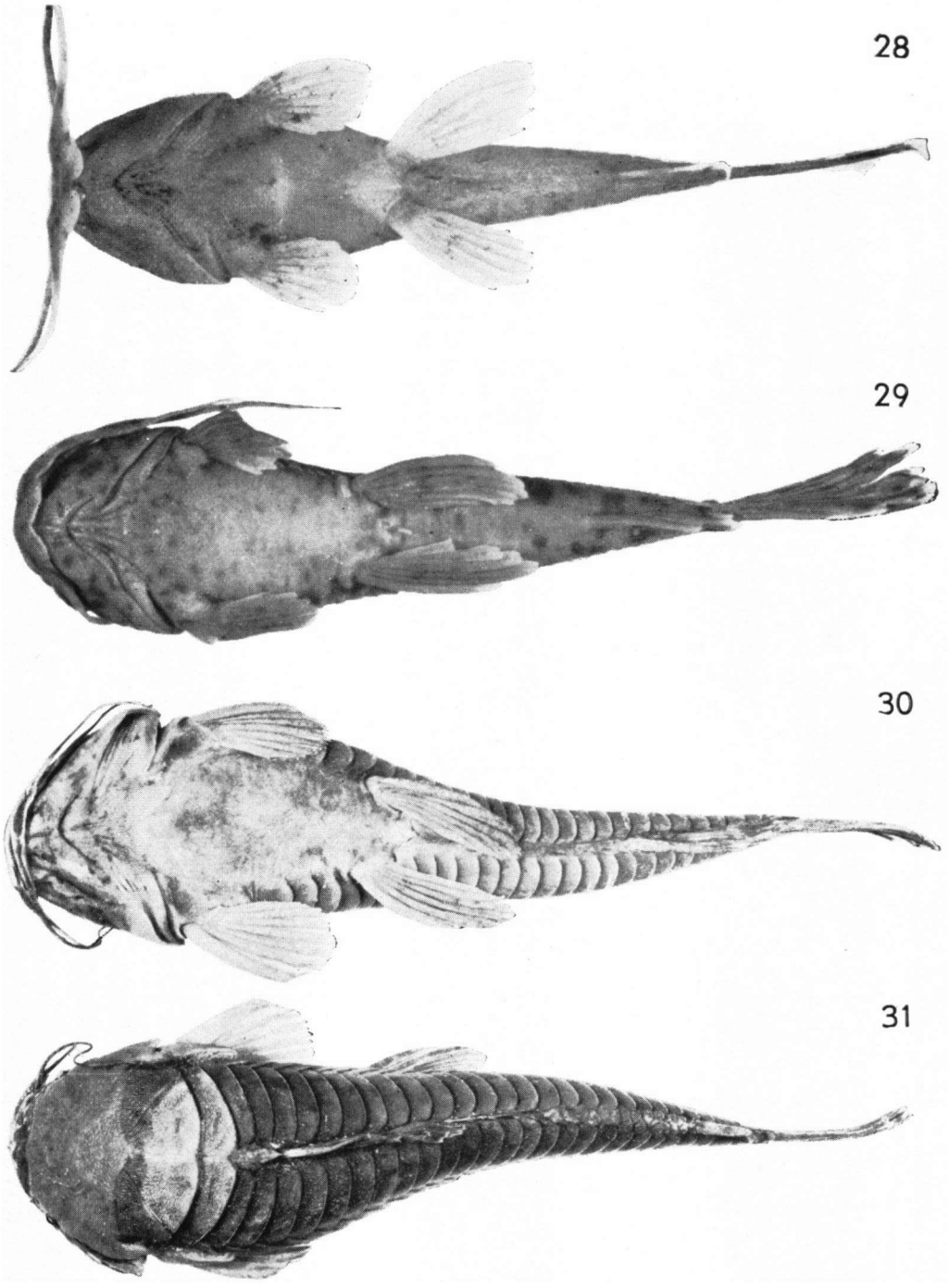
Distinguished from the typical subspecies and those from British Guiana (*callichthys* and *demararae*, cf. HOEDEMAN, 1952: 10) by the more complete armature of the preadipose/dorsal region, which is covered for more than 75% here by mostly a zigzag series of azygous plates (fig. 31).

ZMA. 101953, creek at Bosbivak Zanderij, February 18, 1957, juv., 18.0 mm. st.l.
ZMA. 101978a, same locality, April 29, 1956, ♂, 35.4 mm. st.l.
ZMA. 101989, same locality, April 29, 1956, ♂, 45.0 mm. st.l.
ZMA. 101992, same locality, April 28, 1956, ♀ 89.0 mm. st.l.

A similar situation, as just described for *Hoplosternum*, is even more convincing in the present specimens of *Callichthys*, showing a nearly complete series of the development of the armature, (figs. 24 to 31).

The smallest specimen of 18 mm is still completely naked, not even showing the least traces of scutes or skinfolds (fig. 24); the second specimen of 35 mm is developing skinfolds which are weak as the skin in other regions (normally not developing any armature), and they start from the lateral axis. In the third specimen of 46 mm the skinfolds have become a little calcified, producing weak bristlets or spines along the outer posterior

[1]) prdl = predorsal length; pral = preanal length; prad = preadipose length; head = length of head from tip of snout to lateral end of bony opercle; dpth = greatest depth of body; dcp = least depth of caudal depuncle; snt = length of snout; eye = diameter of eye; iob = interorbital width between bony margins of orbits. Lateral scutes = upper/lower series between the end of the opercle and the base of the caudal fin, and azygous scutes = the single series of platelets on the back between the dorsal and adipose fins.



FIGURES 28 to 31. Development of the armature in *Callichthys callichthys bolteni*. 28 = ZMA. 101953, ventral view, showing the strongly developed barbels and reverted lower lip flaps; 29 = ZMA. 101978a, ventral view: 30 and 31 = ZMA. 101992, ventral and dorsal view respectively, showing almost closed armature.

Photographs by the author

TABLE 2. Proportion rates in 1000ths of the standard length, and scutes and finrays in Surinam specimens of *Callichthys callichthys*[1])

ZMA coll.	mm. st.l.	sex	D	A	V	P	prdl	pral	prad	head	dpth	dcp	snt	eye	iob	scutes	
																lateral	azygous
101953	18.0	juv.	Ii6	Ii5	I5	I7	399	806	871	278	234	178	106	46	226	not yet developed	
101978a	35.4	♂	Ii6	Ii5	I5	I7	371	820	909	274	242	182	101	28	212	28/25	15*
101989	46.0	♂	Ii6	Ii5	I5	I7	363	769	870	246	204	176	87	24	179	28/26	18
101992	89.0	♀	Ii6	Ii5	I5	I7	398	821	915	208	210	155	79	22	182	28/26	19

[1]) see note table 1.

margins, the foldings are, however, still so weak that a dissecting needle passes through them without any noticeable resistance. The scutes have started to get to their normal shape, but at the lateral line separating the upper and lower series, they meet like foldings rather than like scutes, and do not yet overlap (fig. 26). The final stage in the development (fig. 27) shows a complete, fully expanded armature of the lateral series of scutes, overlapping like distinct elements. These elements (the scutes) are, however, quite different from scales in fishes as they ever remain parts of the skin, and even in large, full-grown specimens (at least in some I have dissected) are always connected with it anteriorly. It should be studied how these two skin products, the normal scales of other fishes, and the scutes in *Callichthys* (and *Loricariidae*) differ anatomically and physiologically.

The development and expansion of the occipital plates and of the coracoids in *Callichthys* is as in *Hoplosternum*, that is the coracoids normally do hardly show any noticeable expansion in the ventral region, but chiefly laterally in the present genus, as will be clear from the photographs (cf. figs. 28 to 31).

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