

STUDIES ON THE FAUNA OF SURINAME AND OTHER  
GUYANAS: No. 59

THE WATER BUGS (HETEROPTERA: NEPOMORPHA)  
OF THE GUYANA REGION

by

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## PREFACE

This book is intended for two very different categories of readers: specialists in aquatic Heteroptera and the non-specialist fieldworker or amateur.

The specialist will consider many parts of the text superfluous, e.g. the descriptions of well-known species, data on biology and explanations of even simplest morphological terms. The main reason for including all these items, which in most cases have been treated much better elsewhere, is the difficulty of obtaining scientific papers in Suriname and probably in the other Guyanas too. So, apart from the information intended for specialists, this publication contains also data useful for the non-specialist who tries to identify a Guyanese water bug.

Moreover an attempt is made to arouse interest in these animals in the layman. For that purpose a subjective choice from the most striking and well-known data on biology and ecological physiology is given.

## INTRODUCTION

This study was based initially on several thousands of specimens collected by the author in northern Suriname during a collecting trip from July 1969 to July 1970. This trip, and the first period of the preparation of the publication, was made possible by a grant from the Netherlands Foundation for the Advancement of Tropical Research (WOTRO), 's-Gravenhage for the period 1969–1971.

The purpose was to prepare a survey of the Nepomorpha of Suriname. The transects in Suriname, along which samples have been taken by the author, are indicated in Fig. 2. A few data on the country and short descriptions of the localities may be found in the final part of this volume.

During the work it became clear, however, that the fauna of the entire "Guyana Region" was to be considered, as most species found there may probably occur in Suriname. For the present study the Guyana Region was arbitrarily taken as that section of South America which is bordered by the Rio Amazonas from Belém to Manaus, the Rio Negro from Manaus to the Rio Branco, the Rio Branco upwards; as Western border the 62th meridian was chosen, up to the Río Orinoco (Fig. 1). The fauna of Trinidad was not taken into account.

This extension of area meant the study of a large number of additional specimens including many types and other historical specimens.

In spite of the large number of specimens collected and studied



during the preparation of this publication, it is very likely that in the future additions to the Nepomorpha fauna of the Guyana Region and even to the fauna of Suriname proper will be discovered. Most of these will be as yet undescribed species. Notably in the families Corixidae, Naucoridae and Pleidae I expect new species to be found in the interior of Suriname. Other families may of course also contribute further to the fauna of the Guyanas, especially in view of the fact that such a relatively large species as *Weberiella rhomboides* was only discovered in 1965.

Non-specialists, who have succeeded in identifying a species when using the Keys offered by this publication, are advised to compare their specimens with the description given and to send at least part of the series to a specialist, when the descriptions do not fully agree with the specimens.

Thanks are due to Prof. Dr. C. P. RAVEN (Zool. Lab. Utrecht), Dr. I. LANSBURY (Oxford), Dr. P. WAGENAAR HUMMELINCK (Utrecht) and Dr. D. C. GEIJSKES (Leiden) for critical discussions and corrections of the text.

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Mr. H. VAN KOOTEN and Mr. E. VAN DER VLIST (Utrecht) with their staff prepared the photographs and plates illustrating species.

Miss C. F. M. LIJDSMAN, Miss B. M. H. KOK and Miss E. DE RUITER typed and retyped concepts and parts of the manuscript. Mrs. Drs. H. KONING-VAN POPTA kindly assisted in correcting the English text.

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Furthermore I am grateful to the following persons for the loan of specimens, incidental remarks and suggestions on the whereabouts of historical specimens: Dr. P. ARNAUD (Ca. Ac. Sc., San Francisco), Dr. A. O. BACHMANN (Univ. of Buenos Aires), Dr. G. W. BYERS (KU), Dr. R. H. COBBEN (Lab. Ent. Wageningen), Dr. J. A. DE CARLO (MACN), Dr. P. H. VAN DOESBURG jr. (LM), Dr. W. R. DOLLING (BMNH), Dr. D. C. GEIJSKES (LM), Mr. V. GAPUD (KU), Ing. E. HEISS (Innsbruck, Österreich), Dr. J. HJELLE (Ca. Ac. Sc., San Francisco), Drs. P. LEENTVAAR (R. I. N., Leersum Nederland), Dr. M. MEINANDER (Zool. Mus. Helsinki), Dr. A. S. MENKE (USNM), Dr. P. I. PERSSON (SM), Dr. J. T. POLHEMUS (Englewood, Colorado), Dr. A. POPESCU-GORJ (Mus. Nat. Hist., București), Dr. J. R. RAMSAMMY (Univ. of Guyana, Georgetown), Dr. P. R. SEYMOUR (BMNH), Dr. R. R. SNELLING (Los Angeles Co. Mus.), Dr. A. Soos (Zool. Mus. Budapest), Dr. H. STRÜMPFEL (HM), Dr. F. S. TRUXAL (Los Angeles Co. Mus.), Dr. A. VILLIERS (PM), Dr. G. E. WALLACE (Carnegie Museum, Pittsburg), Dr. H. H. WEBER (Kiel, BRD), Dr. H. WEIDNER (HM), Dr. P. WYGODZINSKY (AMNH).

Dr. I. LA RIVERS (Univ. of Nevada, Reno) helped with the identification of *Ambrysus*.

My wife assisted in the field work and was of great aid in many other ways, one of the most important being the fending off of social commitments during the later phase of the work.

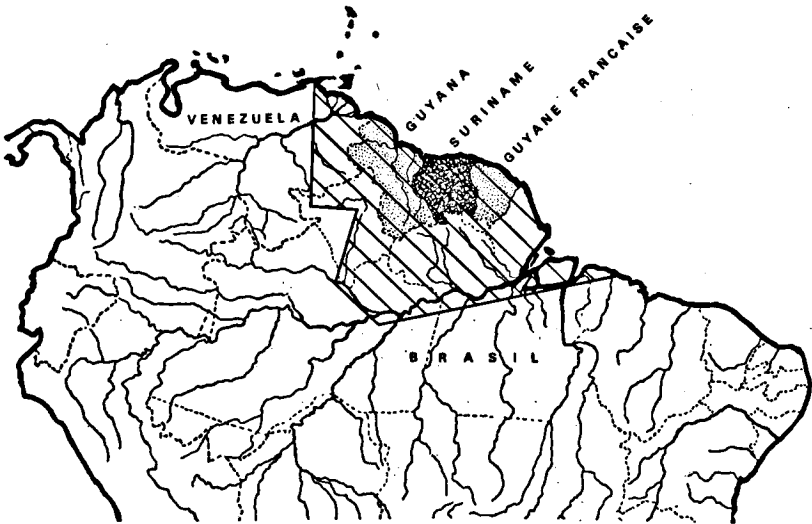


Fig. 1. Northern part of South America illustrating the "Guyana Region" as defined in this paper.

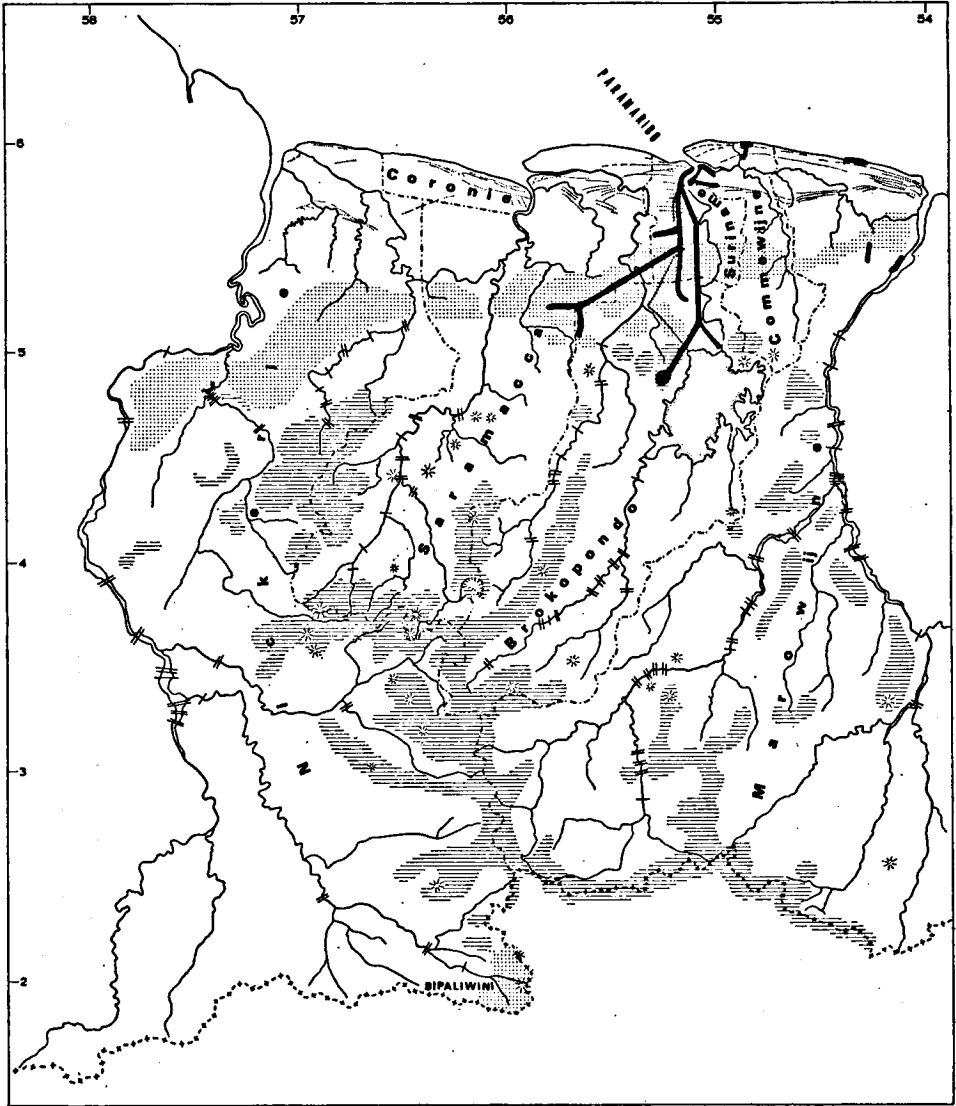


Fig. 2. Northern part of Suriname, showing the transects along which was sampled.

## NEPOMORPHA OF THE GUYANA REGION

### ABSTRACT

The Nepomorpha of the Guyana Region are keyed out and described. In addition distributional, faunistical and comparative notes on the species are given.

New species and subspecies: *Ochterus aeneifrons surinamensis*, *O. tenebrosus*; *Limnocoris fitzkau'i surinamensis*; *Ranatra adelomorpha*; *Neoplea globoidea*; *Buenoa amnigenopsis*; *Tenagobia pseudoromani* from Suriname and *Ranatra ornithia* from Guyana.

New synonyms (junior ones between parenthesis): *Gelastocorus flavus flavus* Guér. (*G. nebulosus nebulosus* Guér.); *Pelocoris impicticollis* Stål (*P. horváthi* Mont.), *P. poeyi* (Guér.) not identical with *P. femoratus* (P.-B.) (*P. convexus* Nieser), *P. procurrens* White (*P. minutus* Mont.); *Belostoma bicavum* Lauck (*B. parvoculum* Lauck); *Ranatra doesburgi* De Carlo (*R. usingeri* De C.), *R. macrophthalma* H.-S. (*R. surinamensis* De C.), *R. mediana* Mont. (*R. williamsi* Kuitert), *R. obscura* Mont. (*R. annulipes* White 1879 not Stål), *R. sarmentoi* De C. (*R. ameghinoi* De C.); *Buenoa amnigenopsis* n. sp. (*B. amnigenus* Nieser 1968, 1970 not White), *B. amnigenus* (White) (*B. amnigenoidea* Nieser 1970), *B. nitida* Truxal (*B. doesburgi* Nieser); *Heterocorixa surinamensis* Nieser (*H. boliviensis* Nieser 1970 not Hungerford); *Tenagobia incerta* Lundbl. (*T. signata* and *T. serrata* in part, Nieser 1970 not White and Deay respectively), *T. socialis* (White) (*T. serrata* in part, Nieser 1970 not Deay).

## NEPOMORPHA Popov, 1971

Many authors consider this group of families (formerly known as HYDROCORISAE) to be heterogeneous. Especially the family Corixidae is (as Sandaliorrhyncha Börner, 1904) often given equal systematic rank to the remaining Nepomorpha. COBBEN 1968, after studying the structure of the egg shell and the gross embryology, concludes that in spite of many differences the Corixidae are better to be retained within the Nepomorpha. His views are supported by POPOV 1971a, who in an extensive palaeontological study concludes that all Nepomorpha descend from Ochterid or proto-Ochterid stock. The great morphological diversity is accounted for by independent development of several groups from the "Protochterids". During the early part of the Triassic the Nepoidea (Belostomatidae, Nepidae) became separated; the Corixoidea (Corixidae) about middle Triassic and the Naucoroidea (Naucoridae) together with the Notonectoidea (Helotrephidae, Pleidae, Notonectidae) shortly after the middle Triassic. The separation between Naucoroidea and Notonectoidea took place during the transition Triassic-Jurassic.

Another name, formerly frequently used, to indicate the same families as Nepomorpha is CRYPTOCERATA. The main objection against this name is that it has as a counterpart Gymnocerata (including all remaining Heteroptera) and these groups are not equivalent.

Regardless of taxonomical problems the term Nepomorpha is useful in practice as all true aquatic bugs (those living *in* the water) plus two small families (Gelastocoridae and Ochteridae) of bugs living in damp situations nearly always close to water are assembled within this group.

Owing to the great morphological variation a descriptive diagnosis is hardly practicable. The NEPOMORPHA can be characterized as: *Heteroptera with compound eyes having the antennae shorter than the head and often concealed under it.*

Nine to eleven families have been recognized but COBBEN 1968 supposes that continuation of his study on evolutionary trends in Heteroptera will have as a consequence the splitting up of some families, notably the Corixidae and Naucoridae. On the other hand,

POPOV 1971a, on morphological and palaeontological evidence, does not seem to see reasons for splitting the recent families of Nepomorpha. In this paper 9 families are considered to occur in South America. Nepidae is used in the broad sense. The well-known Argentinian author DE CARLO splits this family into Nepidae and Ranatridae.

### MORPHOLOGICAL TERMS AND MEASUREMENTS

Explications are restricted to terms which refer to structures typical for Heteroptera, having more than one meaning or being used here in a restricted sense. These explanations only refer to the situation found in Nepomorpha and are restricted to terms used later in the next. It is supposed that the reader is familiar with the commoner general morphological terms as used in entomology.

**aedeagal furrow** — In *Nerthra*, groove in the right paramere, Fig. 38–41.

**aedeagus** — Apical part of phallus.

**allotype** — One explicitly designated specimen of a new species of opposite sex to the holotype.

**anteculus** — Part of head (without rostrum) extending in front of eyes in dorsal view, developed notably in Belostomatidae.

**apical tubercles of head** — In *Nerthra*, the pair of anteromedian tubercles seen in dorsal view, Fig. 33.

**apterous** — See wing polymorphism.

**brachypterous, brachypters** — See wing polymorphism.

**clavus** — See hemielytra.

**clypeus** — Head sclerite between labrum and frons; in Belostomatidae it is marked by two lateral convex lines dorsally on head (Fig. 3).

**connexivum** — Lateral part of abdomen formed by the pleurae of the segments. The individual sclerites can be indicated as laterotergites (dorsally) and laterosternites (ventrally).

**corium** — See hemielytra.

**cotype** — Any specimen of the series used for the description of a species; not used any longer.

**dorsal arms** — See phallus.

**embolar groove, embolium** — See hemielytra.

**epimeron** — The dorsal half of a (thoracal) pleurite (Corixidae).

**femur** — Notably the anterior femur may be modified. Length and width of anterior femur are measured in Naucoridae according to Fig. 6. In *Ranatra* the

anterior femur bears a distinct spine; the ratio length of basal part: length of apical part of anterior femur is taken here according to Fig. 5.

**frons** — Anterior part of head between and under the eyes (Ochteridae).

**genae** — Lateral part of head, posterolateral of eyes to rostrum.

**genital capsule (pygophore)** — Complex structure in males formed by the 9th segment together with rests of the 10th and 11th. For our purposes the most important parts are the parameres, phallus and in some cases the general form of the capsule; Fig. 13–15, 19, 204, 261.

**hemelytra** — The leathery forewings of Heteroptera. Consisting essentially of three parts: **clavus**, **corium** and **membrane** (Fig. 7). The membrane is often softer than the other parts and may be strongly reduced or absent. In some brachypterous Naucoridae clavus and corium cannot be distinguished. The anterolateral part of the corium is often separated from the remainder and is then called **embolium** (Fig. 7c); in Corixidae there is anterolaterally a broad vertical groove: **embolar groove**. At the distal end of embolium or embolar groove we often find a small transverse suture, the **nodal furrow** (Fig. 7d) which may be indistinct.

In some groups reference is made to the **nodal line**, this is the imaginary line connecting the intersections of nodal furrows and margins of hemelytra (in rest). Hemelytra is often written **hemelytra**.

**holotype** — Specimen designated by the author of a new species. A holotype is not necessarily a typical or characteristic representative of its species. The function of a holotype is that of ultimate reference specimen when there is doubt to which taxon the name connected with the holotype refers.

**hypocular suture** — Small suture posterior to the eye in various Corixidae (Fig. 268, 274).

**infra-ocular part of genae** — Part of the head between eyes and posterior margin of head in Corixidae.

**interocular space, interoculus** — Part of the vertex between eyes.

**keel hook** — Part of the genital capsule in *Gelastocoris*, Fig. 19e.

**labrum** — Movable plate at the base of rostrum in Naucoridae; in most other Nepomorpha the labrum is merged in head and/or rostrum.

**laterotergites, laterosternites** — See **connexivum**.

**length** — See **measurements**.

**macropterous** — See **wing polymorphism**.

**measurements** — All measurements are given in mm unless otherwise indicated. If sufficient specimens are available 11 specimens of each sex (and form in polymorphic species) have been measured. Measurements and ratios considered especially important for identification or variability within a species are presented as the mean ( $\bar{x}$ ) of the observed values together with 0.95 confidence limits for the population mean ( $\mu$ ) assuming a normal distribution (e.g. length of male *Ambrysus bifidus*  $\bar{x} = 8.2 \pm 0.3$ , the observed value of the mean is 8.2 mm, the confidence limits for  $\mu$  are 7.9 mm—8.5 mm). If there are less than 4 specimens or the measurement is considered somewhat less important for identification or variability the

results are presented as the observed range with the mean ( $\bar{x}$ ) in italics (e.g. the width of head in *Ambrysus bifidus* 1.9—2.0—2.2). Length without specification refers to the body length in dorsal view. It is measured from anterior margin of head (without rostrum) to apex of abdomen or, in Corixidae, apex of hemielytra. Any respiratory appendages are not counted. Length of a structure is the median length in dorsal view, except in legs where the length is measured in ventral view. The body or structure of which length is measured must be placed horizontally. *Width* is the greatest width of body or structure referred to in dorsal view except for legs where it is measured in ventral view. As in measuring length, the body or structure measured is placed horizontally. The body width is measured over the hemielytra in rest position (except when the pronotum is wider, then width of pronotum and width of body are considered identical). (See also femur).

**membrane** — See hemielytra.

**metaxiphus** — Often arrow-shaped medioposterior extension of the metasternum pointing between the posterior coxae.

**monotypic** — A higher taxon is monotypic when it contains only one subordinate taxon.

**nodal furrow** — See hemielytra.

**nodal line** — See hemielytra.

**ocellocular space** — Distance between ocellus and nearest point of an eye (Gelastocoridae).

**ocular index** — Twice the width of synthlipsis divided by the width of head across eyes minus width of synthlipsis:  $\frac{2S}{D - S}$  in which S = synthlipsis and D = width of head across eyes.

**ocular index (V)** — Twice the anterior width of vertex divided by the width of head across eyes minus anterior width of vertex. In Belostomatidae the anterior interocular width is considered to be "anterior width of vertex". This form of ocular index is used in cases where the synthlipsis is ill-defined or very narrow in order to reduce the variability of the index.

**operculum** — Last visible sternite when it is developed as a moveable lid e.g. Nepidae, Belostomatidae.

**ovipositor** — Movable plates at the apex of female abdomen used in deposition of the eggs (cf. DUPUIS 1955 for formal definition and discussion).

**pala** — Tarsus of fore leg in Corixidae, often spoon-shaped. The ventral side is often flat and more or less oval and is then called *palm*, the ventral bristles around the palm are the *palmar bristles*, Fig. 290, 322.

**pan** — Part of the genital capsule in *Gelastocoris*, see Fig. 19d.

**paramere** — Copulation hooks of male genitalia. According to DUPUIS 1955 they are formed from the same tissues from which the phallus originates and for this reason he disapproves of the widely used term (genital) clasper as in entomology this usually refers to pseudophallic organs.

**parasternites** — Sclerites between the connexiva and sternites in Nepidae and Lethocerinae.



**paratype** — Specimen used in preparing the description of a new species and designated by its author. It is incorrect, even for the author of a species, to designate (further) paratypes in a subsequent paper (e.g. DE CARLO 1966b).

**phallosome** — See phallus.

**phallus** — The male intromittent organ, the apical part of it is called **aedeagus**, the basal part **phallosome**. In Belostomatidae the entire phallus is important in identification. The most characteristic parts here are the dorsal arms (of the phallosome) and the ventral diverticulum which may be fused with the aedeagus proper (in Belostomatinae) or separated from it (in Lethocerinae), Fig. 112.

**pilosity** — "Haircovering". In this paper the pilosity on the abdominal venter of Belostomatidae is used as an important character in identification. In this case there are two types of pilosity, very short and fine hairs with longer and often thicker hairs superposed, the latter type is referred to. There are three main patterns, see Fig. 10-12.

**plesiotype** — Specimen, not belonging to the original series, figured or described in order to correct or extend the original description (rarely used nowadays).

**pleurite** — Lateral sclerite of a thorax segment.

**propleural plate** — In Naucoridae the prosternum may be partly or entirely covered by a pair of plates originating ventrolaterally, the propleural plates.

**raptorial legs** — Legs with strongly thickened femur, nearly always with a groove in which tibia and tarsus fit, with which prey is caught. The term is morphological, e.g. Notonectidae which catch their prey also with their legs have from an ethological aspect "raptorial legs" but these are not implied here.

**rostrum** — The fused mouthparts or "beak".

**strigil** — Male copulatory organ present in most Corixidae, situated on the posterior margin of the sixth tergite. Formerly it was thought to play a role in stridulation (which seems to be the case in *Micronecta*), hence the name.

**synthipsis** — The shortest distance between eyes posteriorly. In this paper also used for the distance between the medioposterior angles of the eyes when the eyes are not convergent posteriorly.

**syntype** — Specimen of the series used for the description of a species in the case that no holotype has been designed (e.g. types of A. L. MONTANDON).

**ventral diverticulum** — See phallus.

**vertex** — The dorsal part of the head, in most cases the same part of head as the interocular space. (Anterior) Width of vertex is the distance between the medio-anterior angles of the eyes in dorsal view when there is no anteculus.

**width** — See measurements.

**wing polymorphism** — In many Heteroptera there occur two or more forms within a species regarding the development of their wings. The **macropterous** form has the wings (including hemelytra) fully developed. **Brachypterous** specimens have the wings about half their full length, **micropters** have vestigial wings and **apter**s have no external rests of the wings. In *Nepomorpha* usually only macropters and brachypters are distinguished; the latter type is usually charac-

terized by slight reduction of the hemielytra, notably the membranes, and variable reduction of the hind wings. In some Naucoridae the hemielytra may be strongly reduced.

### ABBREVIATIONS

A followed by number:	collected by Dr. E. J. FITTKAU of MPI, the specimens are in the WEBER collections.
BMNH	British Museum (Natural History), London.
col. Wag.	collections of the Laboratorium voor Entomologie, Landbouwhogeschool, Wageningen, Nederland.
CN	NIESER collections.
DC	(identified by) Dr. J. A. DE CARLO, MACN, Buenos Aires.
Fk	collected by FITTKAU, see A.
Gij	collected by Dr. D. C. GEIJSKES, LM, the specimens are in LM unless otherwise stated.
H followed by number:	collected by Dr. P. WAGENAAR HUMMELINCK (Zool. Lab. Utrecht), most specimens are in UM.
HM	Zoölogisches Museum, Hamburg (BRD).
KU	SNOW entomological collections, Kansas University, Lawrence.
LM	Rijksmuseum van Natuurlijke Historie, Leiden.
MACN	Museo Argentino de Ciencias Naturales, Buenos Aires.
MPI	Max Planck Institut für Limnologie, Abt. Tropenökologie, Plön (BRD).
OM	University Museum, Oxford.
PM	Muséum National d'Histoire Naturelle, Paris.
S followed by number:	collected by Prof. Dr. H. SIOLI, now director of MPI.
Sa followed by number:	collected by the late Dr. W. SATTLER of MPI.
SM	Naturhistoriska Riksmuseet, Stockholm.
SN followed by number:	collected by N. NIESER, see second part of this volume for habitat descriptions. Most specimens are in UM representative selections in BMNH, CN, KU, MACN and Zool. Mus. Leningrad.
P followed by number:	collected by Dr. P. H. VAN DOESBURG jr. unless otherwise stated, the specimens are in LM. Although these numbers are provisional, they have been quoted as in many cases the specimens do not bear other data.
UM	Zoölogisch Museum der Rijksuniversiteit, Utrecht.
USNM	United States National Museum, Washington.
vD	collected by Dr. P. H. VAN DOESBURG jr., see P.
W	collections of Dr. H. H. WEBER, Kiel, (BRD).

### COLLECTING, PRESERVING AND PREPARATIONS

Most Nepomorpha live in shallow waters with a depth down to 1 m, so a pond net is the main tool for collecting them. In Suriname this must be quite strong. I used

a frame made of iron as used in concrete-construction, diameter about 5 mm. Diameter of the frame about 0.5 m. A straight anterior rim is useful for scratching over the bottom of the habitat. The handle was made from two 0.75 m long pieces of iron tube (inner diameter 10 mm) with a connecting piece welded in one of them which could be fixed by a wing nut into the other. A longer net handle is of little use as one cannot exercise enough strength to pull the net swiftly through the water when the handle is too long. The net frame was fastened with a wing nut as well. The actual net was made from nylon mosquito netting (used in screens) with a mesh of  $\frac{1}{2} \times \frac{1}{2}$  mm. Some of the smallest *Tenagobia* are able to wriggle through this but as they are nearly always collected several at a time enough can be picked from the net before they escape. The depth of the net was about 0.5 m. The rim and edges were strengthened by imitation leather.

For the shallowest edges and very small puddles a small model kitchen sieve with a somewhat finer mesh is a very useful collecting tool.

*Limnocoris* can be sieved from the sand with a sieve with a mesh of about  $3 \times 3$  mm. The sand can also be scooped up with the pond net and spread out on the banks.

*Ochterus* requires an insect net with a wide opening which is slapped over the specimen which will fly up and (if it does not, as usual, escape) will become entangled in the netting.

Many species are attracted to light. Smaller species can be collected in a trap (a funnel with a pot containing alcohol under the lamp). Larger species are to be sought for near relatively bright sources of light. As most species do not fly large distances, light catches from one place are relatively poor in species.

The places where to look for the respective species in the field can be concluded from the faunistical remarks under species. Those living in habitats with much aquatic vegetation can easily be collected by scooping up the vegetation with a net and spreading it out in the sun. After some time the animals will crawl out. As many species with the size of *Limnocoris* or larger can sting quite painfully, it is advisable to handle them with care.

The simplest way to kill *Nepomorpha* is by placing the catch in 80 % alcohol, which should preferably be replaced by fresh 70% alcohol after one or two days. Formalin 4% can be used instead but the specimens become hard and stiff. Some *Buena*, notably those with orange colours, fade in alcohol, so if the colour has to be preserved they must be killed in some kind of vapour. Chloroform gives very good results, but the usual killing agents for insects will do. The hemelytra of many *Corixidae* curl when they dry after having been in alcohol, so they can better be killed in vapour too if they are to be pinned afterwards.

For display purposes a dry collection on pins is the best. The wings are usually not spread and the specimens pinned through the right clavus. Specimens with a length of 6–10 mm can be pinned with a 00, those from 10 to 20 mm with a 1, larger specimens with a 3 or even (*Lethocerus*) 5 insect pin. Small specimens can be pinned with "minute" pins or be glued on a card. In Suriname much care must be taken to dry the specimens thoroughly and to keep the boxes dry in order to prevent mould. One of the advantages of killing specimens in alcohol is the fact that they are somewhat less liable to mould. Insect pest infestations can be averted with paradichloorbenzene, which should be handled with great care. If the specimens are kept for reference only, in my opinion an alcohol collection is preferable. In Suriname it is to be checked and replenished about every 4 months.

In many species it is necessary for a reliable identification to study male genital characters. For preparation of the genitalia, forceps with needle fine points (as used by watch-makers) are the easiest tools. Some insect needles bent at the point and mounted in a handle will do as an alternative. In most cases a preparation microscope is necessary.

The genital capsule is extracted by pushing the forceps or needle gently into the apex of the abdomen at one side of the capsule, and cutting the tissues. Specimens which are dry must first be relaxed in dilute alcohol; the length of time is dependent on the size of the specimen. When the tissues are cut the capsule is gently drawn out. When working with a bent needle this is done by placing the hook anterior to the capsule.

In most cases the capsule can be glued on a card and pinned under the specimen. In alcohol collections the capsule is best put in a small tube with the specimen. If one has the facilities, very small capsules (*Tenagobia*, Pleidae, Helotrephidae) are best preserved as permanent mounts.

In *Ranatra* and *Curicta* in most cases only the parameres are needed. They can be exposed by pulling the operculum downward and the dorsoapical lobe of the abdomen upward. In freshly killed specimens the whole capsule can be pulled out posteriorly and folded over the dorsum.

In *Nerthra* the apex of the right paramere becomes visible when the last two abdominal segments are pulled to the rear and left of the insect. When the paramere is clear of the abdomen the segments are allowed to slip back while the clasper is directed to the venter and remains visible.

In *Pelocoris* and Belostomatidae the capsule must be prepared further in order to expose the phallus. Apically the capsule has a lid through which the phallus can be extracted. The phallus of Belostomatidae is best preserved in a small tube with a drop of glycerin.

Males of Belostomatidae and Nepidae are recognized by the operculum. In Belostomatinae the apex of the operculum is more pointed in males than in females, which have moreover an apical tuft of pilosity lacking on male opercula. In *Lethocerus* the female operculum is incised at the tip. In *Ranatra* the male operculum is flat, the female keel-like. In *Curicta* the male operculum is blunter than in females.

*Pelocoris* males are recognized by a ventromedian swelling at the apex of the abdomen, which is less distinct in females. The apical abdominal sclerites are also somewhat different in males and females.

*Martarega* males have two-segmented fore tarse which are one-segmented in females.

In Pleidae and Helotrephidae there are slight differences in the form of male and female opercula.

In other families the male apex of the abdomen is asymmetrical and the female not or only faintly so (*Nerthra*).

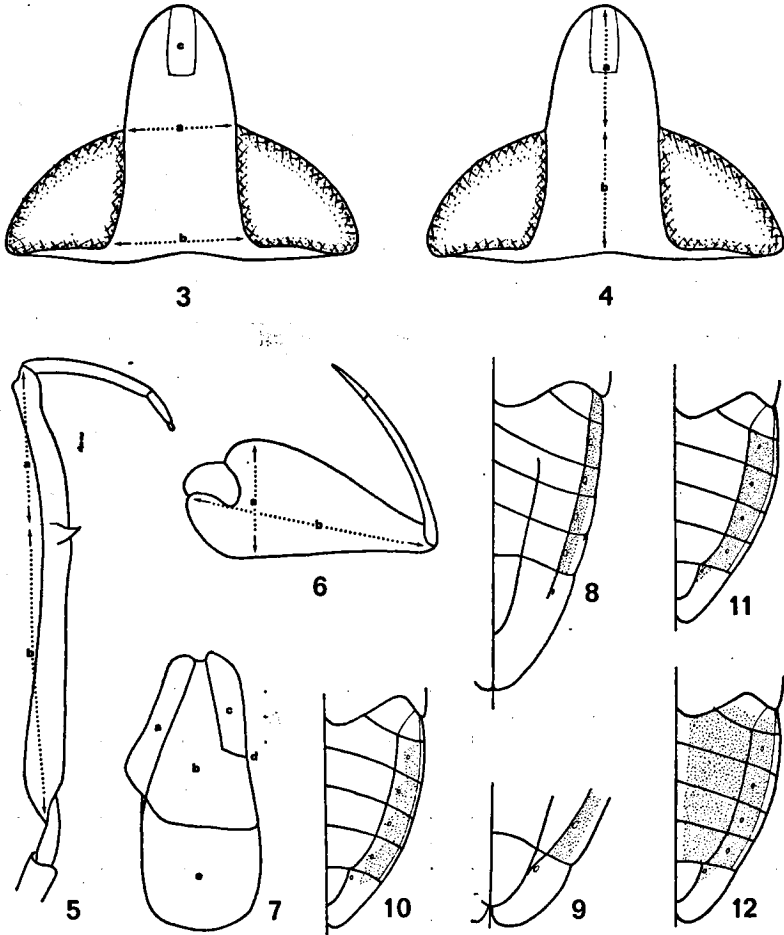


Fig. 3-12. Diagrams illustrating morphological terms: 3 head of *Belostoma*, a anterior interocular width, b posterior interocular width ("synthlipsis"), c clypeus; 4 head of *Belostoma*, a length of anteoculus, b length of interoculus; 5 femur of *Ranatra* illustrating ratio basal part : apical part = b : a; 6 anterior leg of *Pelocoris*, a width of femur, b length of femur; 7 Naucorid hemelytron, a clavus, b corium, c embolium, d nodal furrow, e membrane; 8 venter of abdomen in *Lethocerus* showing additional suture; 9 apex of abdomen, ventral view, in *Horvathinia*; 10-12 venter of abdomen in *Belostoma*, 10 pilosity partly covering connexivum, 11 pilosity covering connexivum entirely, 12 pilosity extending on sternites.

TABLE 1

## DISTRIBUTION OF SPECIES TREATED IN THIS PAPER

(Brasil N = Brasil north of Rio Amazonas, including Belém)

- ⊗ specimen(s) seen  
 + only known by type series from one locality or a few close localities  
 ○ reliable record in literature, no specimens seen  
 ? doubtful record, either identification or label of specimen(s) may be wrong  
 . not recorded

	Central America & Antilles	Colombia	Venezuela & Trinidad	Guyana	Suriname	Guyane Française	Brasil N	Brasil S	Bolivia	Paraguay	Argentina & Uruguay	Perú, Ecuador & Chile
Ochteridae												
<i>Ochterus</i>												
- <i>aeneifrons surinamensis</i>	.	.	.	.	+	.	.	.	.	.	.	.
- <i>perbosci</i>	⊗	.	.	.	⊗	.	.	.	.	○	.	○
- <i>tenebrosus</i>	.	.	.	.	+	.	.	.	.	.	.	.
Gelastocoridae												
<i>Gelastocoris</i>												
- <i>amazonensis</i>	.	.	.	.	.	.	⊗	.	.	.	.	.
- <i>flavus flavus</i>	.	.	⊗	.	⊗	.	⊗	⊗	⊗	⊗	⊗	.
- <i>fuscus</i>	.	.	.	.	⊗	.	⊗	.	?	.	?	⊗
<i>Montandonius</i>												
- <i>angulatus</i>	.	.	.	○	⊗	.	○	○	⊗	○	.	.
<i>Nertha</i>												
- <i>buenoi</i>	.	.	.	.	.	.	.	○	.	.	.	.
- <i>fuscipes</i>	⊗	○	.	.	.	.	.	?	.	.	.	.
- <i>montandoni</i>	.	.	⊗	.	.	.	.	.	.	.	.	.
- <i>rapioria</i>	○	○	○	.	⊗	○	○	⊗	.	.	⊗	.
- <i>borealis</i>	.	.	.	.	.	.	+?	.	.	.	.	.
- <i>terrestris</i>	.	○	○	⊗	⊗	○	○	○	○	○	.	○
- <i>unicornis</i>	.	.	.	.	⊗	○	?	○	.	○	.	.
Naucoridae												
<i>Ambrysus</i>												
- <i>bifidus</i>	.	.	.	.	⊗	.	⊗	⊗	.	.	.	.
- <i>obscuratus</i>	.	.	.	.	.	.	.	+	.	.	.	.
- <i>partridgei</i>	.	.	.	.	.	.	+	.	.	.	.	.

TABLE 1 (Continued)

	Central America & Antilles	Colombia	Venezuela & Trinidad	Guyana	Suriname	Guyane Française	Brasil N	Brasil S	Bolivia	Paraguay	Argentina & Uruguay	Perú, Ecuador & Chile
<i>Ambrysus</i>												
- <i>siolii</i>	.	.	.	.	.	.	⊗	⊗	.	.	.	.
- <i>stali</i>	.	.	○	.	⊗	○	⊗	.	.	.	.	.
- <i>usingeri</i>	.	.	.	○	⊗	○	⊗	⊗	.	.	.	.
<i>Limnocoris</i>												
- <i>bachmanni</i>	.	.	.	.	.	.	+	.	.	.	.	.
- <i>birabeni</i>	.	.	.	.	.	.	.	+	.	.	.	.
- <i>burmeisteri</i>	.	.	.	.	⊗	.	⊗	.	.	.	.	.
- <i>fitzkau fithkau</i>	.	.	.	.	.	.	⊗	.	.	.	.	.
- <i>fitzkaui surinamensis</i>	.	.	.	.	+	.	.	.	.	.	.	.
- <i>illiesi</i>	.	.	.	.	.	.	.	+	.	.	.	.
- <i>pauper</i>	.	.	.	.	.	.	.	+	?	.	.	.
<i>Pelocoris</i>												
- <i>impicticollis</i>	.	.	.	.	⊗	⊗	⊗	⊗	.	.	.	.
- <i>poeyi</i>	⊗	.	.	⊗	⊗	.	⊗	.	.	.	.	.
- <i>politus</i>	.	.	.	.	.	.	⊗	⊗	.	⊗	.	.
- <i>procurrens</i>	.	.	.	.	.	.	⊗	⊗	.	⊗	.	.
Belostomatidae												
<i>Belostoma</i>												
- <i>guianae</i>	.	.	.	⊗	⊗	.	.	.	.	.	.	.
- <i>dentatum</i>	.	.	.	.	.	.	⊗	.	.	⊗	.	.
- <i>foveolatum</i>	.	.	.	.	.	.	⊗	⊗	.	.	.	.
- <i>harrisi</i>	.	.	.	⊗	⊗	.	○	.	.	.	.	.
- <i>malkini</i>	.	.	⊗	?	.	.	.	.	○	.	.	.
- <i>porteri</i>	⊗	.	○	.	.	.	.	.	.	.	.	○
- <i>aurivillianum</i>	.	○	○	.	⊗	.	⊗	⊗	⊗	.	.	.
- <i>stollii</i>	.	.	○	⊗	⊗	⊗	.	.	⊗	.	.	.
- <i>gestroi</i>	.	.	.	.	⊗	.	.	○	⊗	○	○	○
- <i>discretum</i>	.	.	.	.	.	.	⊗	⊗	○	○	○	○
- <i>bicavum</i>	.	.	.	.	.	.	⊗	⊗	○	○	○	○
- <i>bosqi</i>	.	.	○	.	⊗	.	⊗	○	○	○	○	○
- <i>truxali</i>	.	.	.	.	⊗	.	.	○	○	○	○	○
- <i>denticolle</i>	.	.	.	⊗	⊗	○	⊗	.	.	.	.	.
- <i>micantulum</i>	.	.	.	⊗	⊗	.	⊗	⊗	.	⊗	⊗	.
- <i>pygmeum</i>	.	.	.	.	.	.	⊗	.	⊗	⊗	.	.

TABLE 1 (Continued)

	Central America & Antilles	Colombia	Venezuela & Trinidad	Guyana	Suriname	Guyane Française	Brasil N	Brasil S	Bolivia	Paraguay	Argentina & Uruguay	Perú, Ecuador & Chile
<i>Weberiella</i>												
- <i>rhomboides</i>	.	.	.	.	.	⊗	⊗	.	.	.	.	.
<i>Lithocercus</i>												
- <i>annulipes</i>	○	○	⊗	⊗	⊗	○	.	○	.	○	⊗	.
- <i>delpontei</i>	○	.	○	.	⊗	.	.	⊗	.	○	○	.
Nepidae												
<i>Curicta</i>												
- <i>doesburgi</i>	.	.	.	⊗	⊗	.	.	.	.	.	.	.
<i>Ranatra</i>												
- <i>adelomorpha</i>	.	.	.	.	+	.	.	.	.	.	.	.
- <i>brasiliensis</i>	.	.	.	.	.	.	.	+	?	.	.	.
- <i>curtafemorata</i>	.	.	.	.	.	.	.	⊗	⊗	.	.	.
- <i>doesburgi</i>	.	.	.	.	.	⊗	⊗	⊗	.	.	.	.
- <i>macrophthalmalma</i>	.	.	⊗	.	⊗	⊗	⊗	⊗	.	?	.	.
- <i>magna</i>	.	.	.	.	.	⊗	⊗	⊗	?	.	.	.
- <i>mediana</i>	.	.	.	⊗	⊗	⊗	⊗	.	.	.	.	.
- <i>mixta</i>	.	.	.	.	⊗	○	⊗	.	.	.	.	.
- <i>moderata</i>	.	.	.	.	.	⊗	⊗	⊗	.	.	.	.
- <i>obscura</i>	.	.	.	⊗	⊗	⊗	⊗	.	.	.	.	.
- <i>ornitheia</i>	.	.	.	+	.	.	.	.	.	.	.	.
- <i>parvula</i>	.	.	.	.	.	.	⊗	.	.	.	.	.
- <i>rabida</i>	.	.	.	.	.	.	○	.	.	⊗	○	.
- <i>sarmentoi</i>	.	.	○	.	⊗	.	+	.	.	.	.	.
- <i>sattleri</i>	.	.	.	.	.	.	+	.	.	.	.	.
- <i>signoreti</i>	.	.	○	.	.	.	⊗	.	○	.	.	.
- <i>siolii</i>	.	.	.	.	.	.	+	.	.	○	.	.
- <i>subinermis</i>	.	.	.	.	.	+	.	.	.	.	.	.
- <i>tuberculifrons</i>	.	.	.	.	⊗	○	⊗	.	.	.	.	.
- <i>weberi</i>	.	.	.	.	.	.	+	.	.	.	.	.
Helotrephidae												
<i>Paratrephes</i>												
- <i>hintoni</i>	.	.	.	.	⊗	⊗	.	.	.	.	.	.
Pleidae												
<i>Neoplea</i>												
- <i>absona</i>	.	.	.	.	⊗	.	.	.	.	.	○	.



TABLE 1 (Continued)

	Central America & Antilles	Colombia	Venezuela & Trinidad	Guyana	Suriname	Guyane Française	Brasil N	Brasil S	Bolivia	Paraguay	Argentina & Uruguay	Perú, Ecuador & Chile
<i>Neoplea</i>												
- <i>globoidea</i>	.	.	.	.	+	.	.	.	.	.	.	.
- <i>maculosa</i>	.	.	.	.	⊗	.	.	.	○	○	○	○
<i>Paraplea</i>												
- <i>puella</i>	⊗	.	⊗	.	⊗	.	.	.	.	.	.	.
Notonectidae												
<i>Buenoa</i>												
- <i>amnigenopsis</i>	.	.	.	.	⊗	.	⊗	⊗	.	.	.	.
- <i>amnigenus</i>	.	.	.	○	⊗	.	⊗	⊗	⊗	○	.	⊗
- <i>communis</i>	.	.	.	.	⊗	.	○	○	○	.	.	.
- <i>fasciata</i>	.	.	.	.	⊗	.	.	.	.	.	.	.
- <i>incompta</i>	.	.	.	.	⊗	.	○	○	.	.	.	.
- <i>nitida</i>	.	.	⊗	.	⊗	.	○	○	.	.	.	○
- <i>pallens</i>	⊗	○	.	.	.	.	○	.	.	.	.	○
- <i>pallipes</i>	⊗	○	⊗	.	.	.	⊗	.	.	○	.	○
- <i>platycnemis</i>	⊗	○	⊗	.	.	○	⊗	⊗	.	○	.	○
- <i>salutis</i>	.	.	⊗	○	⊗	○	○	⊗	○	○	⊗	.
- <i>tarsalis</i>	.	.	.	.	⊗	.	.	⊗	.	.	.	.
- <i>truxali</i>	.	.	⊗	.	⊗	.	⊗	.	.	.	.	.
- <i>unguis</i>	.	.	.	.	.	.	○	○	○	○	○	○
<i>Martarega</i>												
- <i>brasiliensis</i>	.	.	.	.	⊗	.	⊗	⊗	.	.	.	○
- <i>chinai</i>	.	.	○	.	.	.	⊗	⊗	○	.	⊗	.
- <i>gonostyla</i>	.	.	.	.	⊗	.	⊗	⊗	○	.	.	.
- <i>hungerfordi</i>	.	.	.	○	⊗	.	⊗	⊗	.	.	.	.
- <i>membranacea</i>	.	.	.	○	⊗	.	⊗	⊗	.	.	.	.
- <i>williamsi</i>	○	.	.	.	.	.	⊗	○	.	.	.	○
Corixidae												
<i>Trichocorixa</i>												
- <i>orinocoensis</i>	⊗	.	⊗	.	⊗	.	.	⊗	.	.	.	.
- <i>reticulata</i>	⊗	○	○	.	⊗	.	.	.	.	.	.	○
- <i>verticalis</i>	⊗	.	.	.	⊗	.	.	.	.	.	.	.
<i>Heterocorixa</i>												
- <i>boliviensis</i>	.	.	.	.	.	.	?	○	○	.	.	○
- <i>brasiliensis</i>	.	.	.	.	.	.	?	○	.	.	.	.

TABLE 1 (Continued)

	Central America & Antilles	Colombia	Venezuela & Trinidad	Guyana	Suriname	Guyane Française	Brasil N	Brasil S	Bolivia	Paraguay	Argentina & Uruguay	Perú, Ecuador & Chile
<i>Heterocorixa</i>												
- <i>genupes</i>	.	.	.	.	.	.	.	.	.	.	.	.
- <i>hesperia</i>	.	.	.	.	.	.	+	+	.	.	.	.
- <i>hungerfordi</i>	.	.	.	.	.	.	+	.	.	.	.	.
- <i>longixiphus</i>	.	.	.	.	+	.	.	.	.	.	.	.
- <i>lundbladi</i>	.	.	.	.	.	.	+	.	.	.	.	.
- <i>minuta</i>	.	.	.	.	.	.	+	.	.	.	.	.
- <i>similis</i>	.	.	.	.	+	.	+	.	.	.	.	.
- <i>surinamensis</i>	.	.	.	.	+	.	.	.	.	.	.	.
<i>Tenagobia</i>												
- <i>incerta</i>	○	.	+	.	+	.	+	+	○	+	.	○
- <i>latiocolata</i>	.	.	.	.	+	.	.	.	.	.	.	.
- <i>melini</i>	.	.	.	.	.	.	+	.	.	.	.	.
- <i>pseudoromani</i>	.	.	.	.	+	.	.	.	.	.	.	.
- <i>romani</i>	.	.	.	.	.	.	+	.	.	.	.	.
- <i>schadei</i>	.	.	.	.	+	.	+	+	.	+	.	.
- <i>selecta</i>	.	.	.	.	.	.	+	+	○	+	.	.
- <i>serrata</i>	.	.	.	.	.	.	.	.	+	○	.	.
- <i>signata</i>	.	.	.	.	.	.	.	+	.	.	.	.
- <i>socialis</i>	.	.	+	+	+	+	.	.	.	.	.	.

## KEY TO THE FAMILIES OF NEPOMORPHA

- 1a. Rostrum apparently unsegmented, often with transverse sulcations. Front tarsi often spatulate (Pl. 12) . . . . . CORIXIDAE
- 1b. Rostrum clearly 3- or 4-segmented, front tarsi not spatulate . . . . . 2
- 2a. Head completely fused with prothorax, only a shallow impression at the boundary, small species (Pl. 10a, c) . . . . . HELOTREPHIDAE
- 2b. Head free or at most partially fused with prothorax. . . . . 3
- 3a. Ocelli present . . . . . 4
- 3b. Ocelli absent . . . . . 5
- 4a. Fore legs raptorial, antennae concealed (Pl. 2d-g, 3a-c) . . . . . GELASTOCORIDAE
- 4b. Fore legs normal, antennae free (Pl. 2a-c) . . . . . OCHTERIDAE
- 5a. Fore coxae inserted at front of prosternum, hind tarsi with distinct claws . . . . . 6
- 5b. Fore coxae inserted at back of prosternum, hind tarsi without claws . . . . . 8
- 6a. Membrane without veins, no respiratory funnel (Pl. 3d-g, 4) . . . . . NAUCORIDAE
- 6b. Membrane with reticulate venation, respiratory tube(s) present, although more or less concealed in Belostomatidae (in rare instances the membrane may be reduced so far that no venation is present) . . . . . 7
- 7a. Hind tibiae flattened and fringed, respiratory tubes short, consisting of two separate retractile straps (Pl. 5-7) . . . . . BELOSTOMATIDAE
- 7b. Hind tibiae simple, respiratory tube single, median, usually long (Pl. 8, 9) . . . . . NEPIDAE

- 8a. Rostrum 4-segmented, width of head more than 3 times the width of synthlipsis, generally over  $3\frac{1}{2}$  mm long (Pl. 10d-h, 11)  
..... NOTONECTIDAE
- 8b. Rostrum 3-segmented, with of head less than 2 times the width of synthlipsis, length of specimens not over  $3\frac{1}{2}$  mm (Pl. 10b, i, j)  
..... PLEIDAE

## OCHTERIDAE Kirkaldy, 1906

Rather small, oval, brown to blackish Heteroptera. Eyes large strongly convex, two ocelli present. Antennae four-segmented, shorter than the head but not concealed; the two basal segments shorter than the distal segments. Rostrum long, four-segmented, reaching the hindcoxae when folded over the venter, basal segment stout, apicals long and slender. Fore legs not raptorial; fore and middle tarsi two-segmented, hind tarsi three-segmented, basal segment in all three pairs very short. Membrane of hemielytra with a number of well developed cells.

Within the recent Nepomorpha, apart from the Ochteridae, the Gelastocoridae is the only family which also possesses ocelli (except for the non-American Diaprepocorinae in the Corixidae). The Gelastocoridae have, however, a short rostrum and raptorial legs.

At first sight the Ochteridae strongly resemble the Saldidae. This may very well be due to convergence, as both live in the same type of habitat: wet swampy areas most often near open water. Apart from smaller differences, such as a three-segmented rostrum and all tarsi three-segmented in the Saldidae, there are also differences which are to be considered more fundamental such as different structure of the eggs and genitalia. COBBEN 1968 concludes that Ochteridae and Saldidae are phylogenetically not related.

The Ochteridae are swift runners and can take to the wings instantaneously. They are difficult to collect, which is the most important reason for their scanty representation in collections.

The biology of the Ochteridae is virtually unknown. They seem to be predators. The larvae of *Ochterus perbosci* often carry a crust of sand or mud from their habitat.

There are two genera in South America, one of which, *Ocyochterus* Drake & Gómez-Menor, 1954 is monotypic. Its species *O. victor* (Bolívar, 1879) is up to now only known from Ecuador.

The second genus, *Ochterus* Latr., occurs in the warmer parts of the world. Many species have large distributional areas, e.g., *O. marginatus* (Latr.) is distributed from the Mediterranean over India to Formosa, Japan and Indonesia; *O. perbosci* occurs from México through Central America towards Paraguay in the South.

## KEY TO AMERICAN GENERA OF OCHTERIDAE

- 1a Sides of pronotum strongly explanate, the flat part being as broad as the width of an eye. Membrane of hemielytra with 12 or more cells. (Length of known species exceeding  $6\frac{1}{2}$  mm.) . . . . . *Ocyochterus*
- 1b Sides of pronotum not strongly explanate, the flat part being distinctly less than the width of an eye. Membrane with 7 cells. (Length of known species not exceeding  $6\frac{1}{2}$  mm.) . . . *Ochterus*

**Ochterus** Latreille, 1807

Frontal region of head not horizontally prolonged anteriorly. Explanate margin of pronotum not broad. Membrane of hemielytra with seven cells.

The species mentioned in this paper are the first to be recorded from the Guyana Region and only these species are keyed. The wide distributional range of some *Ochterus* species and the scanty information about them make it rather hazardous to forecast which species could occur in the Guyana Region.

Users of the key are advised to study carefully the male genitalia of their specimens. SCHELL 1943 gives a revision of the American species.

## KEY TO OCHTERUS KNOWN FROM THE GUYANA REGION

- 1a Pronotum with small pointed anterolateral projections (Fig. 16). Male right paramere not hooked at apex, with an enlargement about half-way the shaft (Fig. 14) . . . . . *O. perbosci*
- 1b Pronotum without small pointed anterolateral projections 2
- 2a Length not exceeding  $4\frac{1}{2}$  mm. Male right paramere with a slender shaft and acute hook at apex (Fig. 13) . . . . .  
 . . . . . *O. aeneifrons surinamensis*
- 2b Length exceeding 5 mm. Male right paramere with a broad lobed shaft and a blunt hook at apex (Fig. 15) . *O. tenebrosus*

**Ochterus aeneifrons surinamensis** n. ssp.

Pl. 2b; Fig. 13.

SURINAME: Suriname, *SN097*, 4♂; Hannover, Parakreek, *Pr188*, 1961, 1♂; Zanderijsavanne, Carolinakreek, *P2013*, 29.VIII.1962, 1♀. Marowijne, road Albina-Moengo, 28.VI.1963, 2♀ (vD).

Holotype ♂ from *SN097* in UM; 2 paratype ♂ from *SN097* in CN; 1 paratype ♂ from *SN097* in BMNH; allotype ♀, 1 paratype ♂ and 2 paratypes ♀ collected by P. v. Doesburg jr., in LM.

Length ♂  $\bar{x} = 4.2 \pm 0.1$ , ♀ 4.3 - 4.5 - 4.5; width of pronotum ♂  $\bar{x} = 2.06 \pm 0.04$ , ♀ 2.1 - 2.2 - 2.3; ocular index (V) ♂  $\bar{x} = 0.60 \pm 0.05$ , ♀ 0.62 - 0.66 - 0.71.

Colour, general impression brownish. Dorsal part of head, disc of pronotum anteriorly, scutellum and membrane blackish with bluish-grey markings. Lateral margins of pronotum and embolium yellowish. Anterior margin and posterior half of pronotum and hemielytra except membrane rich brown with bluish-grey markings. Body sparsely covered with short golden hairs. The most prominent greyish markings are situated: on the head behind the eyes, the disk of pronotum, near the lateral margin of pronotum, at base of scutellum, at base of clavus, six patches along the lateral margins of hemielytra and at apex of membrane. Moreover the pronotum, scutellum and hemielytra are punctate, the pits are generally greyish too. Venter of thorax smoky blackish, venter of abdomen blackish with relatively dense light-greyish hairs. Legs and antennae light yellowish.

Frons densely rugulose, shiny bronze, convex centrally before eyes but not carinate.

Anterior angles of pronotum without small pointed projections.

Male genital capsule and right paramere (Fig. 13).

The species was found on a small shaded sandflat in the bed of a streamlet. This may be a difference in ecological demands between *Ochterus aeneifrons surinamensis* and *O. perbosci* as all three samples of the latter were taken in habitats exposed to sunshine.

The series from Suriname has been compared with some specimens from México, San Luís Potosí (ex Polhemus coll.) and Costa Rica (KU). The Surinam specimens differ from the nominate subspecies by the ocular index based on vertex (not exceeding 0.8 in ssp. *surinamensis*, about 0.9–1.0 in ssp. *aeneifrons* (Champion)); the posterior half of pronotum which is blackish with a narrow rich brown margin in ssp. *aeneifrons* and nearly entirely rich brown in ssp. *surinamensis*; finally ssp. *aeneifrons* seems to be a trifle larger (length ♂ ca. 4.5 – 4.6 ♀ ca. 4.8).

On the other hand the general colour patterns of the two forms agree and the male genital capsules and right parameres are identical. For these reasons the new form is given subspecific rank only.

### *Ochterus perbosci* (Guérin-Méneville, 1843)

Pl. 2a; Fig. 14, 16.

*Pelogonus Perboscii* GUÉRIN – MÉNEVILLE, 1844b, p. 113 (México).

*Pelogonus perbosci*; CHAMPION 1901, p. 345, pl. 20 fig. 11 (México, Antilles).

*Ochterus perbosci*; SCHELL 1943, p. 33 fig. 1 (U.S.A., Guatemala, Costa Rica, Antilles, Ecuador, Perú, Paraguay).

U.S.A., TEXAS; MÉXICO; GUATEMALA; NICARAGUA; COSTA RICA; GREATER ANTILLES; LESSER ANTILLES; SURINAME, Nickerie, Saramacca, Suriname; ECUADOR; PERÚ; PARAGUAY.

SURINAME: Nickerie, Sipaliwini, 15.VI.1963, 1♂, 1♀ (vD). Saramacca, SN423, 1♂, 1♀. Suriname, SN160A, 4♂, 7♀; SN165, 4♂, 6♀; Onverdacht, muddy gutter, P2171, 10.III.1963, 2♂, 1♀.

Length ♂  $\bar{x} = 4.9 \pm 0.1$ , ♀  $\bar{x} = 5.2 \pm 0.1$ ; width of pronotum ♂  $\bar{x} = 2.48 \pm 0.04$ , ♀  $\bar{x} = 2.68 \pm 0.04$ ; ocular index ( $\bar{V}$ ) ♂  $\bar{x} = 0.88 \pm 0.07$ , ♀  $\bar{x} = 0.91 \pm 0.03$ .

Colour, general impression dark brown to blackish. Head between eyes blackish, shining anteriorly, posterior part pruinose. Pronotum, scutellum and hemielytra dark brown to blackish with frosty bluish-grey patches and sparse short golden hairs. Lateral margin of pronotum except posterior angle, outer margin of hemielytra



with three broad patches and legs yellowish. Venter dark brown to blackish; on thorax with frosty grey, apex of abdomen paler. Abdominal venter with grey pilosity. Rostrum basally blackish, towards apex brownish.

Frons densely rugulose, shining, carina only faintly indicated.

Anterior angles of pronotum bearing small pointed projections (Fig. 16).

Male genital capsule and right paramere (Fig. 14).

*Ochterus perbosci* was found on wet sand and mud-flats with hardly any to about 60% vegetation. All three habitats were exposed to sunshine. During the early morning, when there were patches of shade from the nearby woods, the animals seemed to avoid shade. (See also under *O. aeneifrons surinamensis*).

The specimens from Suriname have been compared with some specimens from Nicaragua (ex Polhemus coll.). The main difference between the series was that the frons of specimens from Suriname had a shining bronze colour whereas the Nicaraguan specimens showed a metallic green and bronze. This species is at once recognized by the small pointed projections on the anterior angles of the pronotum. One malformed specimen from *SN160A* lacked these projections.

### *Ochterus tenebrosus* n. sp.

Pl. 2c; Fig. 15.

Holotype ♂, allotype ♀ and 1 paratype ♂ from Marowijne in LM; paratype ♂ from Marowijne and paratype ♀ from *SN097* in CN.

**SURINAME:** Suriname, *SN097*, 1♀. Marowijne, road Albina-Moengo, 29.VI.1963, 3♂, 1♀ (vD).

Length ♂ 5.15 - 5.19 - 5.21, ♀ 5.4 - 5.5 - 5.6; with of pronotum ♂ 2.52 - 2.55 - 2.60, ♀ 2.63 - 2.65 - 2.66; ocular index (V) ♂, ♀  $0.75 \pm 0.02$ .

Colour, dorsally very dark brown to blackish except the explanate margins of pronotum and a narrow band along the lateral margins

of the hemielytra which are yellow, a narrow transverse stripe on anterior margin of pronotum, a broader stripe on posterior margin of pronotum and two lateral blotches reddish brown. Bluish grey markings absent or faint, pilosity short, scarce, whitish. Venter dark brown to blackish, legs yellowish.

Frons rugulose, shiny, blackish with a bronze tinge, convex centrally before eyes but not carinate.

Anterior angles of pronotum without small pointed projections.

Male genital capsule and right paramere (Fig. 15). The apex of the clasper has a small hook which is not visible from all sides.

The name *tenebrosus* refers to the dull dark colour of the specimens.

The male genitalia are similar to those of *Ochterus perbosci*, *O. flaviclavus* Barber, *O. banksi* Barber and *O. americanus* (Uhler), but these species lack the small hook at the apex of the paramere. *O. perbosci* has small pointed projections on the anterior angles of the pronotum which are absent in *O. tenebrosus*. *O. perbosci* and *O. americanus* besides the narrow lateral yellowish band on the hemielytra also have broader patches of yellow, these are absent in *O. tenebrosus*; *O. americanus* moreover has a broad and bilobed tip of the genital capsule. *O. flaviclavus* has a lemon yellow clavus which is blackish in *O. tenebrosus*.

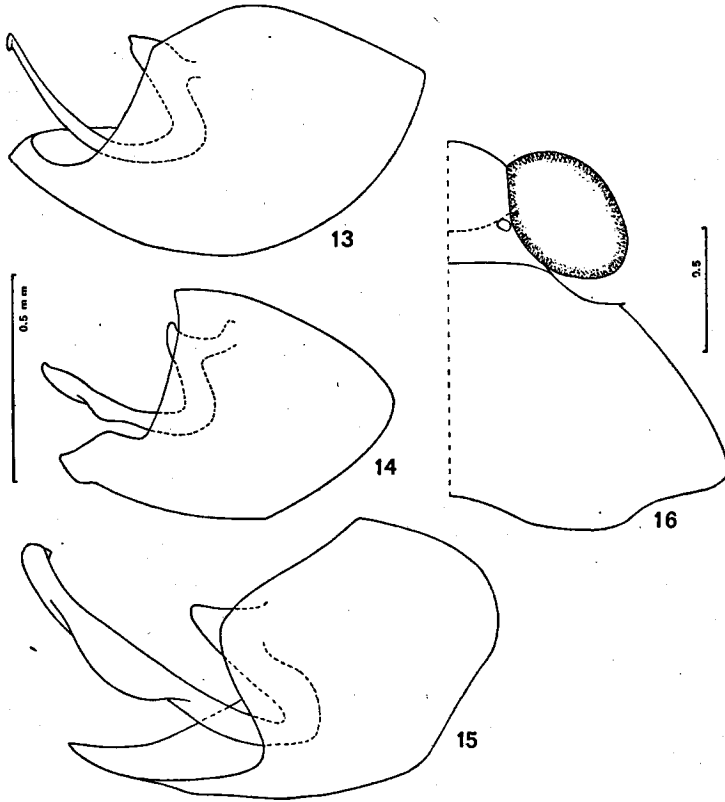


Fig. 13–15. Male genital capsules in *Ochterus* from Suriname: 13 *O. aeneifrons surinamensis*, paratype; 14 *O. perbosci*; 15 *O. tenebrosus*, paratype.

Fig. 16. *Ochterus perbosci* from Suriname: right half of head and pronotum, illustrating the small spine on anterolateral angle of pronotum.

## GELASTOCORIDAE Champion, 1901

Medium sized, relatively stout bugs. Head triangular in front view, antennae shorter than the head, four-segmented, usually concealed beneath the eyes. Eyes large, reniform and projecting dorsolaterad, ocelli usually present (as regards American fauna, absent in two S. Brazilian *Nerthra* spp). Pronotum large, much wider than the head which is more or less enclosed by the antero-lateral angles of pronotum. Anterior legs raptorial.

Data on biology and ecology of this family are very scarce. The following account suggests that their habits are more diverse and interesting than is generally assumed.

Most Gelastocoridae seem to lead a partly burrowing life. Gelastocorinae are most often found in or on mud or sandbanks of streams, ponds etc. but in Suriname they are also found near rainpuddles at some distance from more permanent water bodies. The habitats of Nerthrinae are more diverse, apart from mud or sand they are also found in or on mouldy wood and other plant-debris and some species at places remote from water. KEVAN 1942 noted this for *Nerthra nepaeformis* (F.) and the data on *N. terrestris* suggest the same. *Gelastocoris* is rarely found under water, except when the habitat is flooded, whereas at least *Nerthra martini* Todd seems to enter the water frequently; the same might apply to *N. raptoria* in Suriname, but the data has to be confirmed.

TODD 1955, who studied the entire literature up to that time, does not seem to have found a record of flight in Gelastocoridae, so the catch of 8 specimens of *Gelastocoris flavus* at light in Suriname is noteworthy.

USINGER 1963 reports a find of eggs of *N. martini* in California: "The *Nerthra* eggs were laid in small holes in the mud beneath some stones several feet from the water's edge. Most remarkable was the fact that in both instances when eggs were found, the female *Nerthra* was in a position on top of the egg cluster in the hole. Since the eggs were in an advanced stage of development as indicated by the conspicuous eyespots, it is suggested that females may remain with (guard?) the eggs throughout the incubation period."

## KEY TO GENERA AND SUBFAMILIES OF GELASTOCORIDAE

- 1a Fore tarsus not fused to tibia, adults with two well developed tarsal claws on foreleg (Gelastocorinae) . . . . . 2
- 1b Fore tarsus fused to tibia, adults with one well developed tarsal claw on foreleg (Nerthrinae) . . . . . *Nerthra*

- 2a Posterior part of pronotum with 6–8 short longitudinal carinae  
 . . . . . *Montandonius*  
 2b Posterior part of pronotum without such carinae *Gelastocoris*

GELASTOCORINAE Champion, 1901

Tarsus of anterior leg not fused with tibia, one-segmented, bearing two well-developed tarsal claws. Ninth sternite of male completely invaginated, not visible externally. The male genitalia with posterior process (keel) and right paramere greatly modified, left paramere small, simple. Sternites of female nearly symmetrical.

***Gelastocoris*** Kirkaldy, 1897

Apex of head rounded, head between the eyes with fine granula only. Pronotum posteriorly without carinae; lateral margins of pronotum not broadly explanate. Embolium not strongly dilated.

KEY TO *Gelastocoris* (S. STR.) OF THE GUYANA REGION

- 1a Lateral margin of pronotum deeply notched and with a triangular lateral projection just behind the anterolateral edge (Fig. 25). Male genital capsule with the keel hood at the right side of the keel, pan elongate but not twisted (Fig. 18) . . .  
 . . . . . *G. fuscus*  
 1b Lateral margin of pronotum deeply notched without a triangular lateral projection (Fig. 24). Male genital capsule with a relatively short and broad pan, not twisted (Fig. 19–22) . .  
 . . . . . *G. flavus flavus*  
 1c Lateral margin of pronotum not deeply notched (Fig. 27), often with a small triangular projection. Male genital capsule with an elongate twisted pan (Fig. 17) . . . . . *G. amazonensis*

**Gelastocoris amazonensis** Melin, 1929

Pl. 2g; Fig. 17, 27.

*Gelastocoris amazonensis* MELIN, 1929, p. 158, fig. 1, 3, 12 (Brasil).*Gelastocoris amazonensis*; TODD 1955, p. 325-327, fig. 12, 36 (Brasil).*Gelastocoris amazonensis*; TODD 1957b, p. 148 (Brasil).

BRASIL, Rio Branco, Amazonas.

BRASIL, Amazonas, Rio Negro, 30 Km downstream of Barcelos, *AFr*, 6.II.1962, 2♀; Rio Solimoês, Paraná do Careiro, near Divinópolis, *A223*, 29.VII.1961, 1♀ (det. DC) (W).

Owing to lack of specimens the following description is adapted from TODD 1955.

Length ♂ 7.9 - 8.2, ♀ 7.5 - 8.6; width of pronotum ♂ 4.6 - 4.9, ♀ 4.8 - 5.0; width of abdomen ♂ 4.6 - 4.9, ♀ 5.0 - 5.1.

Colour, general appearance brown to reddish brown, rarely with darker parts. Legs light brown distinctly ringed with darker brown.

Ocelli large, nearly twice the size of the blisterlike granules.

Lateral margin of pronotum only slightly notched (Fig. 27), often a small triangular projection near the anterolateral edge (not present in the specimens studied). Pronotum and abdomen equal in width, general shape relatively elongate.

Hemelytra with well-developed membrane, blisterlike granules small and fairly abundant.

Male paramere with an elongate twisted pan (Fig. 17).

Males can be separated from all other species of *Gelastocoris* by the shape of the pan. This species might occur in the Guyana Region. (See also *G. fuscus*).

**Gelastocoris flavus flavus** (Guérin-Ménéville, 1835)

Pl. 2f; Fig. 19-22, 24.

*Galgulus flavus* GUÉRIN-MÉNEVILLE, 1835, pl. 57, fig. 4.*Galgulus flavus*; GUÉRIN-MÉNEVILLE 1844b, p. 351 (Brasil).*Galgulus nebulosus* GUÉRIN-MÉNEVILLE, 1844b, p. 351-352 (Brasil).

- Galgulus nebulosus*; STÅL 1876, p. 137 (Brasil).  
*Gelastocoris nebulosus*; MONTANDON 1910a, p. 2.  
*Gelastocoris flavus*; MELIN 1929, p. 161-162, fig. 2, 16-20 (Venezuela, Brasil, Argentina).  
*Gelastocoris apurensis* MELIN, 1929, p. 159, fig. 13 (Venezuela).  
*Gelastocoris paraguayensis* DE CARLO, 1954, p. 94-95, fig. 4, 10 (Paraguay).  
*Gelastocoris vianai* DE CARLO, 1954, p. 90, 92, fig. 2, 8 (Brasil, Argentina).  
*Gelastocoris nebulosus*; TODD 1955, p. 331-335, fig. 24, 35 (partim, the specimens from Suriname, Brasil, Venezuela and Paraguay).  
*Gelastocoris nebulosus*; TODD 1957a, p. 1 (Brasil).  
*Gelastocoris nebulosus*; TODD 1957b, p. 148 (Suriname, Uruguay, Argentina).  
*Gelastocoris nebulosus*; DE CARLO 1959, p. 55-59, fig. 1-6 (Brasil, Argentina).  
*Gelastocoris paraguayensis*; DE CARLO 1959, p. 68-70, fig. 20-21 (Bolivia, Paraguay).  
*Gelastocoris nebulosus nebulosus*; NIESER 1972, p. 58-60, fig. 30-35, 40-45, 47 (Venezuela, Suriname, Brasil, Bolivia, Paraguay, Argentina).

Remarks. - Dr. A. S. MENKE (in litt.) drew my attention to the fact that COCHRAN 1971, found that plate 57 of "Iconographie . . ." was printed and distributed as early as 1835. MELIN 1929 seems to have noted this but TODD 1955, 1957 and NIESER 1972 adopted the name *nebulosus*, considering STÅL 1876 as first revisor. Considering the data of publication of the plate, *flavus* has priority.

VENEZUELA, Apure; SURINAME, Nickerie, Saramacca, Marowijne, Brokopondo; BRASIL, Amazonas, Pará, Baía, Goiás, Mato Grosso, Minas Gerais, Rio de Janeiro São Paulo, Paraná, Sta. Catarina, Rio Grande do Sul; BOLIVIA, PARAGUAY; URUGUAY; ARGENTINA, Misiones, Entre Rios.

SURINAME: Nickerie, Sipaliwini, 6.VI.1963, 1♂; same, 15.VI.1963, 2♀ (vD, LM). Saramacca, SN207, 1♂; SN459, 2♂, 1♀, 2lv; SN465, 1♂; Coppename Rivier, Raleigh Falls, 10.VII.1963, 2♂ (vD); Toekoemoetoe, 1903, 3♂, 3♀ (Kok, det. Todd, LM). Suriname, SN033Aa, 1♂; SN079Ba, 1♂, 1♀; SN079Bb, 2♂, 1♀; SN096A, 10♂, 5♀; SN160A, 1♂, 3♀, 1lv; SN160Aa, 1♂; SN161r, 2♂, 2♀, 1lv; SN162, 1♂, in sand under water; SN165, 1♂; Paramaribo, 10.VIII.1957, 3♀; same, 17.I.1958, 4♂, 2♀; Clevia Plantation, at light, P256, V.1959, 6♂, 2♀; Old road to Hannover, streamlet in savannah woodland, P814, 23.IX.1960, 4♀; Zanderijsavanne, pool, 28.IV.1963, 11♂, 4♀; Charlesburg, sandpit, P2195, 29.IV.1963, 1♂, 3♀ Marowijne, Lawa Rivier, Anapaike, 14.II.1963, 6♂, 9♀ (Ligori, LM). Brokopondo, SN229A, 1♂; SN230A, 4♂, 5♀, 2lv; SN422A, 3♂; Sarakreek on mud at margin of streamlet, Pr70, 23.X.1958, 2♂, 7♀; road to Affobakka, on mud at roadside, Pro43, 19.III.1961, 4♂, 5♀; Kabelstation, 25.IX.1938, 1♂, 1♀ (Gij, det. Todd) (LM); Berg en Dal, X.1908, 1♂, 1♀ (Heller, HM).

BRASIL: Pará, Rio Paru, VII.1952, 1♂ (JCMC, det. DC, ex MACN); Santarém, Plage du Tapajoz, 13.VIII.1963, 1♂, 1♀; Santarém, Lac Jua, 15.XII.1963, 3♀ (Marlier, W).

Length ♂  $\bar{x}$  = 6.4 ± 0.2, ♀  $\bar{x}$  = 7.2 ± 0.3; width of pronotum ♂  $\bar{x}$  = 3.7 ± 0.1, ♀  $\bar{x}$  = 4.1 ± 0.1; width of abdomen over embolium ♂  $\bar{x}$  = 4.2 ± 0.1, ♀  $\bar{x}$  = 4.7 ± 0.1.

Colour variable, from slightly reddish or yellowish light brown to blackish.

Pronotum not carinate, with six bulbous elevations anterior and two posterior of a transverse furrow which lies somewhat behind the middle. Lateral margins bent in at nearly a right angle just anterior of the transverse furrow (Fig. 24); posterior part often somewhat pointed and slightly explanate.

Scutellum with four bulbous elevations, two medioposteriorly and a pair more anterolaterally.

Hemelytra, apart from the finer granules which cover the entire dorsum, with some greater "blisterlike" granules of which among others there are two on the corium along the claval suture. Membrane about  $1\frac{1}{2}$  times or more as wide as posterior femur.

Male, posterior margin of 7th abdominal segment not incised. Genitalia, Fig. 19 shows the terminology taken from MARTIN 1929. The most important structures are the shape of the keel hook and the right paramere hook, which is rather variable Fig. 19-22.

*Gelastocoris flavus* has been found predominantly on wet mud- or loam- flats near stagnant water, in a few cases on sand banks near running water. Except in one case (SN229A, 1♂) all habitats were distinctly exposed to sunshine, mostly without vegetation, a few with some open vegetation. In SN162 a specimen was found burrowing in sand under water; as the habitat had not been flooded recently this species may possibly enter the water from time to time.

*G. flavus flavus* belongs to a group of very similar forms treated by DE CARLO 1954, 1959 as several species and by TODD 1955, 1961 as one species. NIESER 1972, after studying most of the specimens seen by TODD, a number of examples of DE CARLO's species and additional series concluded that this complex consists of one species divided into two subspecies: *G. flavus flavus* occurring in the lower regions of S. America and *G. flavus quadrimaculatus* (Guérin) occurring in the Andean region of Perú, Bolivia, Argentina and Chile. If this interpretation is correct, *G. flavus flavus* is the only subspecies to be expected in the Guyana Region. If the variability of *G. flavus* is mainly due to ecological factors specimens from the Guyana uplands may resemble *G.f. quadrimaculatus*, which differs among other things in being distinctly larger on the average (length ♂  $\bar{x} = 7.5 \pm 0.1$ , ♀  $\bar{x} = 8.3 \pm 0.25$ ).



**Gelastocoris fuscus** Martin, 1929

Pl. 2d; Fig. 18, 25, 29.

*Gelastocoris fuscus* MARTIN, 1929, p. 364, pl. 58, fig. 15; pl. 59, fig. 17 (Brasil, Ecuador).*Gelastocoris fuscus*; TODD 1955, p. 336-337, fig. 20, 40 (Ecuador, Perú, Chile).SURINAME<sup>1</sup>, Suriname; BRASIL, Amazonas; ECUADOR; PERÚ; CHILE; BOLIVIA(?).

SURINAME: Suriname, Republiek, on loamy path, P354, 18.IV.1960, 1♂, 2♀.

Owing to the small number of specimens available, the description is adapted from TODD 1955. The drawings have been taken from the male specimen studied.

Length ♂ 7.3 - 8.2, ♀ 8.4 - 9.5; width of pronotum ♂ 4.6 - 5.0, ♀ 5.1 - 5.8; width of abdomen ♂ 4.7 - 5.3, ♀ 5.3 - 6.0.

Colour, pale to dark brown in general appearance.

Ocelli small, less than the width of the largest blisterlike granules in size.

Lateral margins of pronotum subparallel for a distance equal to the ocellocular space; this portion has a small triangular lateral projection, then the margin extends posterolateral to lateral angle; the posterolateral margin straight to slightly concave, forming a right angle with the lateral margin; lateral angle projecting laterally beyond the base of embolium (Fig. 25).

Hemelytra extending to or beyond the apex of abdomen, membrane well developed; basal half of the lateral margin of embolium only slightly expanded laterally. Blisterlike granules of the hemelytra moderate in size, not very numerous.

Male genital capsule, Fig. 18. The keel hood is located to the right side of the keel.

TODD 1955 considers *Gelastocoris martinezi* De Carlo from Bolivia a synonym of *G. fuscus* Martin. The author has studied a male paratype of *G. martinezi*. As DE CARLO 1959 states, the right genital paramere hook in *G. martinezi* is different from that in *G. fuscus* although DE CARLO depicts in his fig. 31, 32 extreme cases.

For the present it seems preferable to consider these forms as separate species. A special study of their variability and ecology might reveal their relations. The status of *Gelastocoris problematicus* Poisson 1954, based on two females from Perú consequently remains uncertain (cf. TODD 1956).

Apart from the Bolivian species *G. martinezi*, *G. fuscus* is similar in general appearance to *G. bufo* (Herrich-Schäffer) and *G. amazonensis*. *G. bufo* is a Central American species, with the lateral margins of the pronotum nearly straight. The triangular projection near the anterolateral angles of the pronotum of *G. amazonensis* is less developed or absent. The male genitalia are also distinctive.

### Montandonius Melin, 1929

Apex of head truncate; head between the eyes with robust granula. Pronotum posteriorly with 6-8 short carinae; lateral margins of pronotum broadly explanate. Embolium distinctly dilated.

TODD 1955 placed *M. angulatus* Melin in the genus *Gelastocoris*. Even if all *Montandonius* species described by DE CARLO are synonyms of *M. angulatus*, the present author agrees with MELIN 1929 and DE CARLO 1959 that the remaining *Gelastocoris* species are distinctly more similar to each other than any of them are to *M. angulatus*.

If, as I think, at least *M. willineri* DE CARLO is a good species, we get two groups in which the variability within the groups is distinctly less than the variability between the groups, which supports the idea of considering them separate taxa.

### Montandonius angulatus Melin, 1929

Pl. 2e; Fig. 23, 26, 28.

*Montandonius angulatus* MELIN, 1929, p. 169, fig. 32, 33 (Brasil).

*Gelastocoris flavus*; MARTIN 1929 (nec Guérin), p. 364, pl. 58 fig. 18, pl. 59 fig. 4-6 (Brasil, Bolivia, Paraguay).

*Gelastocoris angulatus*; TODD 1955, p. 339-342, fig. 14, 25, 29 (Brasil, Bolivia, Paraguay).

*Gelastocoris angulatus*; TODD 1957b, p. 147 (Guyana, Brasil, Bolivia, Paraguay).  
*Montandonius angulatus*; DE CARLO 1959, p. 82, fig. 53, 59, 60.

GUYANA; SURINAME, Nickerie, Saramacca; BRASIL, Amazonas, Pará, Bafá, Mato Grosso; Rio de Janeiro; BOLIVIA, PARAGUAY.

SURINAME: Nickerie, Sipaliwini, 13/24.II.1966, 1♀ (Mees, LM). Saramacca, Wilhelmina Gebergte, XI.1961–II.1962, 1♀ (Beatty, LM).

This seems to be a very scarce species, the largest series collected at one time being 3 specimens. Owing to a lack of material the following description is adapted from TODD 1955. The figure of the male genitalia is based on a specimen from Bolivia (ex Heiss collection).

Length ♂ 7.5–8.8, ♀ 8.1–10.6; with of pronotum ♂ 4.7–5.4, ♀ 5.2–6.2; width of abdomen ♂ 4.8–5.7, ♀ 5.0–6.5.

Colour, yellowish-brown to dark reddish-brown, usually more or less concolourous. Scutellum a little darker than the rest of the body. Ocelli small, width two fifths of largest blisterlike granules of the hemielytra in size, located on small tubercles between the eyes.

Pronotum with lateral margin nearly straight (Fig. 26), usually faintly concave; lateral angle obtuse, projecting laterally beyond base of embolium.

Hemielytra, basal half of lateral margin of embolium greatly expanded, width of expansion equal to one half ocellocular space (distance between an ocellus and the nearest point of an eye), expansion posteriorly not angulate, rounded (Fig. 28), expansion as a whole rectangular.

Male genitalia Fig. 23.

TODD 1955 considers the three species of *Montandonius* described by DE CARLO, as synonyms of *M. angulatus* MELIN. As to *M. mansosotoi* De Carlo and *M. bridarolii* De Carlo, these have been based on a single female each and may be individual variations only. The male right paramere of the third one, *M. willineri* De Carlo, is, however, quite different from the paramere found in *M. angulatus* (see DE CARLO 1959 fig. 49). In my opinion *M. willineri* should constitute a separate species. I was, however, not able to obtain the slide with the genitalia of the type.

## NERTHRINAE Kirkaldy, 1906

Tarsus of anterior leg fused with tibia, not articulate, bearing in adults one well-developed tarsal claw. Ninth sternite of male not completely invaginated, visible externally. The male genitalia with posterior process only slightly modified, right paramere strongly developed, left paramere absent. Sternites of female symmetrical or asymmetrical, depending upon species.

The subfamily contains one genus which is consequently characterized by the subfamily diagnosis.

**Nerthra** Say, 1832KEY TO *Nerthra* FROM THE GUYANA REGION

(adapted from Todd 1955)

- 1a Edge of anterior dilation of fore femur nearly forming a right angle with posterior side of femur (Fig. 30) . . . . . 2
- 1b Edge of anterior dilation of fore femur forming an acute angle with posterior side of femur (Fig. 32) . . . . . 3
  
- 2a Anterior basal angle of anterior dilation of fore femur more or less rounded (Fig. 30); last abdominal segment of female ventrally with a tumescence on either side of the emargination (Fig. 43); male with the aedeagal furrow on the ventral side of the right paramere . . . . . *N. raptoria*
- 2b Anterior basal angles of anterior dilation of fore femur pointed; last abdominal segment of female ventrally without a tumescence on either side of the emargination of posterior margin; male with the aedeagal furrow on the median surface of the right paramere, not visible from a ventral view . . . . . *N. buenoi*
  
- 3a Smaller species, length not exceeding 6.5 mm. *N. montandoni*
- 3b Larger species, length about 7 mm or more . . . . . 4

- 4a With prominent patches of black bristles on the scutellum, apical tubercles of head fused basally (Fig. 36) . *N. unicornis*
- 4b Without prominent patches of black bristles on the scutellum, apical tubercles of head not or hardly fused basally (Fig. 33, 37)  
 . . . . . 5
- 5a Eighth abdominal sternite of male about twice as long as ninth sternite, ovipositor of female small, about as wide as long  
 . . . . . *N. fuscipes*
- 5b Eighth abdominal sternite of male as long as or shorter than ninth sternite, ovipositor of female longer than wide . . . .  
 . . . . . *N. terrestris* & *N. borealis*

### **Nerthra buenoi** Todd, 1955

Fig. 31.

*Nerthra buenoi* TODD, 1955, p. 365–366, fig. 10, 82 (Brasil).

*Nerthra buenoi*; TODD 1957a, p. 2–3, fig. 1 (Brasil).

BRASIL, Pernambuco, Goiás.

This species has not been recorded for the Guyana-Region. It is very similar to *N. raptoria* and may have been confounded with this species. Differences are its slightly smaller size (length 4.1–4.6 mm, but only 5 specimens have been measured); the anterior dilation of the front femur, the angle of which is sharp, not rounded as in *N. raptoria* (Fig. 31). The female lacks the tumescences on the last abdominal sternite. The aedeagal furrow on the distal part of the right paramere lies ventrally in *N. raptoria* and medially in *N. buenoi*.

### **Nerthra fuscipes** (Guérin-Ménéville, 1843)

Fig. 37, 42.

*Mononyx fuscipes* GUÉRIN-MÉNEVILLE, 1844a, p. 114 (Colombia).

*Mononyx fuscipes*; MONTANDON 1899a, p. 392.

*Mononyx fuscipes*; MELIN 1929, p. 181, fig. 58–61.

*Nerthra fuscipes*; TODD 1955, p. 393–396, fig. 52, 63, 76, 89 (Puerto Rico, México, Guatemala, El Salvador, Honduras, Costa Rica, Panamá, Colombia, Brasil).

PUERTO RICO; MÉXICO; GUATEMALA; EL SALVADOR; HONDURAS; COSTA RICA; PANAMÁ; CANAL ZONE; COLOMBIA; BRASIL, Rio de Janeiro.

This species has been included in the KEY as it has been recorded from Colombia and Rio de Janeiro. If the latter locality is not due to mislabeling, the species could be found anywhere in the Northern part of S. America.

*N. fuscipes* belongs to a group of four very similar species; the remaining three are only known from Central America and Southern U.S.A. Fig. 42 shows the distinctive apex of the male right paramere drawn after a specimen from México, Oaxaca, 29 miles W. Tequisitlan, 30.IV.1964 (lgt. & det. Polhemus).

### *Nerthra montandoni* (Melin, 1929)

Fig. 35, 38.

*Mononyx montandoni* MELIN, 1929, p. 191, fig. 95 (Venezuela).

*Mononyx montandoni*; KEVAN 1942, p. 110 (Trinidad).

*Nerthra montandoni*; TODD 1955, p. 380-381, fig. 55, 55a, 85 (Venezuela, Trinidad).

*Nerthra montandoni*; TODD 1957b, p. 150 (Venezuela).

VENEZUELA; TRINIDAD.

As the area of this species may extend into the Guyana Region it has been included in the KEY. The drawings of the apex of head (Fig. 35) and the apex of the male right paramere (Fig. 38) are based on a male specimen from Trinidad, Caroni Swamp, 3.X.1956 (Cobben, det. Todd).

### *Nerthra raptoria* (Fabricius, 1803)

Pl. 3a; Fig. 30, 34, 40, 43, 44.

*Naucoris raptoria* FABRICIUS, 1803, p. 111 (South America).

*Mononyx fusco-conspersus* STÅL, 1860, p. 82 (Brasil).

*Mononyx raptorius*; STÅL 1868, p. 134 (Brasil, Suriname).

*Mononyx raptorius*; BERG 1879, p. 186 (Argentina, Colombia, México).

*Mononyx raptorius*; UHLER 1894, p. 223 (Grenada).

*Mononyx raptorius*; CHAMPION 1901, p. 352, pl. 20 fig. 27, 27a (Panamá).

*Mononyx raptorius*; MELIN 1929, p. 191-192, fig. 96-99, 105, 111 (Panamá, Venezuela, Suriname, Guyane Française, Brasil).

*Nerthra raptoria*; TODD 1955, p. 366-368, fig. 7, 46, 64, 88 (Panamá, Brasil).

*Nerthra raptoria*; TODD 1957b, p. 149 (Guatemala, Panamá, Canal Zone, Colombia Venezuela, Suriname, Brasil).

MÉXICO; GUATEMALA; PANAMÁ; CANAL ZONE; LESSER ANTILLES; COLOMBIA; VENEZUELA; SURINAME, Suriname, Commewijne, Brokopondo; GUYANE FRANÇAISE;

BRASIL, Pará, Rio Branco, Amazonas, Mato Grosso, Baía, Minas Gerais, Rio de Janeiro, Rio Grande do Sul; ARGENTINA, Misiones, Buenos Aires, Jujuy.

SURINAME: Suriname, *SN160A*, 1♂, 2lv; *SN176*, 1♀; Paramaribo, Combé, in aanspoelsel (in floating plant-debris), IV.1948, 1♀ (Gij, col. Wag.); same, Fernandes road, 28.VII.1963, 1♀ (v.d. Vecht); same, 17.I.1958, Cultuurtuin, *P2130*, I.1963, 1♀; Onverdacht, in muddy gutter, *P2171*, 10.III.1963, 1♂ (LM). Comme wijne, Tamanredjo, field with tomatoes, sand/loam with shell fragments, VI/VII.1959, 1♀ (v. d. Drift, LM). Brokopondo, *SN229A*, 1♀; Kabel, puddle along railroad 29.IX.1938, 1♀ (Gij, col. Wag.).

BRASIL: Mato Grosso, Rio das Mortes, Chavantina, *A561-4*, 10.VIII.1968, 1♂ (W).

Length ♂  $\bar{x} = 5.2 \pm 0.2$ , ♀  $\bar{x} = 5.9 \pm 0.2$ ; width of pronotum ♂  $\bar{x} = 3.3 \pm 0.2$ , ♀  $\bar{x} = 3.8 \pm 0.2$ ; width across base of hemielytra ♂ 3.1 - 3.3 - 3.4, ♀ 3.5 - 3.6 - 3.8.

Colour brown to dark grey-brown.

Apex of head with two tubercles separated by a rather wide excavation (Fig. 34), lateral tubercles small, forming a convexity between apex and eye. Ratio width of head: width of an eye 4.0 - 4.3 - 4.4.

Margin of pronotum in the specimens from Suriname studied relatively straight, forming two obtuse angles. According to TODD 1955 the lateral margins of pronotum in this species can be rounded, without angles.

Scutellum with a relatively faint median carina and lateral tumescences, covered sparsely with clavate bristles.

Anterior edge of fore femur greatly dilated, almost forming a right angle with the posterior edge (Fig. 30).

Male, abdominal sternites asymmetrical, ninth sternite slightly longer than eighth, wider than long (Fig. 44). Right paramere small, apex faintly hooked, aedeagal furrow visible ventrally on distal half (Fig. 40).

Female, abdominal sternites nearly symmetrical. Last visible sternite deeply emarginate; a rather small tumescence on either side of the emargination near the lateral margins, the one on the left side slightly larger (Fig. 43). Ovipositor lobes nearly as long as last abdominal segment.

The specimens have been compared with some from Argentina

(Misiones, Jujuy) which were structurally identical but somewhat smaller (length 4.8 – 5.4).

For comparative notes, see under *N. buenoi*.

### *Nerthra borealis* (Melin, 1929)

Pl. 3b.

*Mononyx borealis* MELIN, 1929, p. 179, fig. 47–49 (N. Brasil).

*Nerthra borealis*; TODD 1955, p. 375–376, fig. 59.

not *Nerthra borealis*; TODD 1957b, p. 150 (Suriname).

BRASIL: N. Brasil, 1♂ (Boucard, type, Melin, SM).

This species is identical with *N. terrestris* except for two minor characters: 1) the male right paramere is somewhat more slender apically in *N. borealis*, 2) in *N. terrestris* the greatest width of pronotum is greater than the width of abdomen measured over the bases of embolium, whereas in *N. borealis* these widths are subequal.

TODD 1955 remarks that these forms are probably the same species but prefers to maintain *N. borealis* pending biological/ecological studies. Afterwards he identified as *N. borealis* a number of specimens from Suriname in the BMNH (TODD 1957b). I have seen five of these which in my opinion are *N. terrestris*. I fail to see any differences between these "*N. borealis*" and some specimens of *N. terrestris*, also from Suriname and identified by TODD, in the LM.

So if *N. borealis* is to be maintained as a species it is still known only by the type specimen which is in Stockholm.

### *Nerthra terrestris* (Kevan, 1948)

Pl. 3c; Fig. 32, 33, 41, 45.

*Mononyx bipunctatus* MELIN, 1929, p. 177–178, fig. 39–42, 108 (Trinidad, Guyana, Guyane Française, Brasil, Bolivia, Perú).

*Mononyx bipunctatus*; KEVAN 1942, p. 109–110 (Trinidad).

*Mononyx terrestris* KEVAN, 1948, p. 813.

*Mononyx titschacki* POISSON, 1954, p. 72, fig. 14 (Perú).

*Nerthra terrestris*; TODD 1955, p. 373–375, fig. 48, 62, 87 (Colombia, Trinidad, Guyana, Suriname, Guyane Française, Brasil, Bolivia, Perú).

*Nerthra terrestris*; TODD 1957a, p. 2 (Brasil).

*Nerthra terrestris*; TODD 1957b, p. 150 (Ecuador).

*Nerthra borealis*; TODD (nec. Melin) 1957b, p. 150 (Suriname).

*Nerthra terrestris*; TODD 1972, p. 194 (Trinidad, Venezuela, Perú, Brasil).



*Mononyx bipunctatus* Melin, 1929 is a homonym of *Mononyx bipunctatus*, Stål, 1854, which is a synonym of *Nerthra nepaeformis* (Fabricius, 1775).

COLOMBIA; VENEZUELA, Mérida; TRINIDAD; GUYANA; SURINAME, Saramacca, Suriname, Commewijne, Brokopondo; GUYANE FRANÇAISE; BRASIL, Amazonas, Goiás, Mato Grosso, São Paulo; BOLIVIA; ECUADOR; PERÚ.

GUYANA: "B. Guiana", 1♀, 1 lv (Bartlett, BMNH).

SURINAME: Saramacca, Km 92, 6.V.1959, 1♀ (Belle); Raleigh Vallen, 6.VII.1963, 1♀ (vD, LM). Suriname, Paramaribo, 26.VI.1938, 1♀; same, Cultuurtuin, 24.VIII.1938, 1♀; 12.X.1938, 1♂ (det. Todd); 28.X.1938, 1♀; same, Combé, in aanspoelsel, (in floating plant-debris), IV.1948, 2♀ (Gij); same, IX.1946, 1♀ (Menne, det. Todd); same, 10.VIII.1957, 1♂; same, IX.1957, 1♂, Republiek, between grasses on banks of streamlet, P.538, 18.IV.1960, 1♀; Old road to Hannover, streamlet in savannah-woodlands, P814, 23.IX.1960, 1♀ (vD); Clevia plantation, P99, 28.VIII.1958, 1♂, 1♀ (Sagiman) (LM); around roots of coffee, 1932, 3♂, 1♀; in coffee field, 1932, 1♀ (Bünzli, *N. borealis*, det. Todd, BMNH). Commewijne, Potribo, XII, 1954, 1♀, (Radin); Dirkschoop, woods, 29.IV.-20.V.1959, 1♂; same, citrus, X.1959, 1♀; Tamanredjo, field with tomatoes, mouldy sand and loam, VI./VII.1959, 1♂, 1♀; same, woods on shell-ridge, 1959, 3♂ (v. d. Drift) (LM). Brokopondo, Kabel, at base of felled tree, P147A, 20.X.1958, 1♂ (LM).

Length ♂  $\bar{x} = 8.5 \pm 0.3$ , ♀  $\bar{x} = 8.9 \pm 0.3$ ; width of pronotum ♂  $\bar{x} = 5.7 \pm 0.2$ , ♀  $\bar{x} = 6.1 \pm 0.2$ ; width across base of hemielytra ♂  $\bar{x} = 4.5 \pm 0.1$ , ♀  $\bar{x} = 4.9 \pm 0.1$ .

Colour yellowish-brown to slightly reddish-brown, a dark brown to blackish spot at the medial end of the nodal furrow of the hemielytra.

Apex of head ending in two tubercles (in the specimens from Suriname evident, according to TODD 1955 they may be rudimentary), superapical tubercles absent (Fig. 33), lateral tubercles small, four to five on each side. Ratio width of head: width of an eye ♂ 3.8 - 3.9 - 4.1, ♀ 3.9 - 4.2 - 4.3.

Pronotum with lateral angles at the level of the posterior transverse furrow. Anterior part of lateral margin crenulated, slightly convex, not sinuate, posterior part slightly concave.

Scutellum rather large, basal width about half the greatest width of pronotum and about one and a half times median length.

Hemielytra with well developed membrane and characteristic dark brown to blackish spot at the medial end of the nodal furrow.

Male, ninth abdominal sternite very large and broad, nearly

twice as long as the eighth sternite, about two fifths as wide as the fifth sternite. Right paramere Fig. 41.

Female, last visible abdominal sternite with posterior margin medially somewhat pointedly notched, nearly symmetrical, Fig. 45.

*Nerthra terrestris* seems to be quite common in Suriname and not particularly associated with water. As it is rarely seen on the surface but was taken regularly in the soil-fauna pitfalls of v. D. DRIFT it may be partly nocturnal in habits.

For comparative notes, see under *N. borealis* and *N. unicornis*.

### *Nerthra unicornis* (Melin, 1929)

Fig. 36, 39.

*Mononyx unicornis* MELIN, 1929, p. 179-180, fig. 50-53 (Guyane Française, Brasil).

*Nerthra unicornis*; TODD 1955, p. 378, fig. 57, 57a, 77 (Brasil).

*Nerthra unicornis*; TODD 1959, p. 72 (Suriname, Brasil).

*Nerthra unicornis*; TODD 1972, p. 194 (Paraguay).

SURINAME, Suriname; GUYANE FRANÇAISE; BRASIL, Pará, Rio Grande do Sul; PARAGUAY.

SURINAME: Suriname, on path in clearing of savannah-woodland near Zanderij, *Proib*, 18.I.1961, 1♂; Suriname, 12.XI.1901, 1♂ (Meier, det. Todd, HM).

Specimens studied, length 7.2, 7.7; width of pronotum 4.6; width at base of hemielytra 4.2, 4.3. Apex of head Fig. 36, apex of right paramere Fig. 39.

The following description is partly based on data taken from the literature.

Length ♂ 7.1 - 7.7, ♀ 8.1 - 8.2; width of pronotum ♂ 4.5 - 4.7, ♀ 5.0 - 5.3; width of abdomen ♂ 4.5 - 4.8, ♀ 5.4 - 5.7.

Colour, brown to reddish-brown, in the specimens studies variegated light and darker brown; a dark brown spot at the distal end of the embolial suture.

Apex of head with two tubercles which are fused medio-basally

(Fig. 36). Lateral tubercles small, irregular (in one of the specimens studied they are fairly regular and distinct).

Scutellum with a slight median longitudinal carina and weak tumescences beset with clumps of dark clavate setae at the sides.

Hemelytra with clumps of dark clavate setae just laterally of the distal end of the claval suture (in the specimens studied for the greater part rubbed off).

This species is very similar to *N. terrestris*, *N. borealis* and *N. nepaeformis*, not only in general appearance but also in the structure of the male genitalia and genital segments. The three species mentioned, however, have separate apical tubercles and lack the clusters of dark clavate setae. Clavate setae may be present but are not dark or not in clusters.

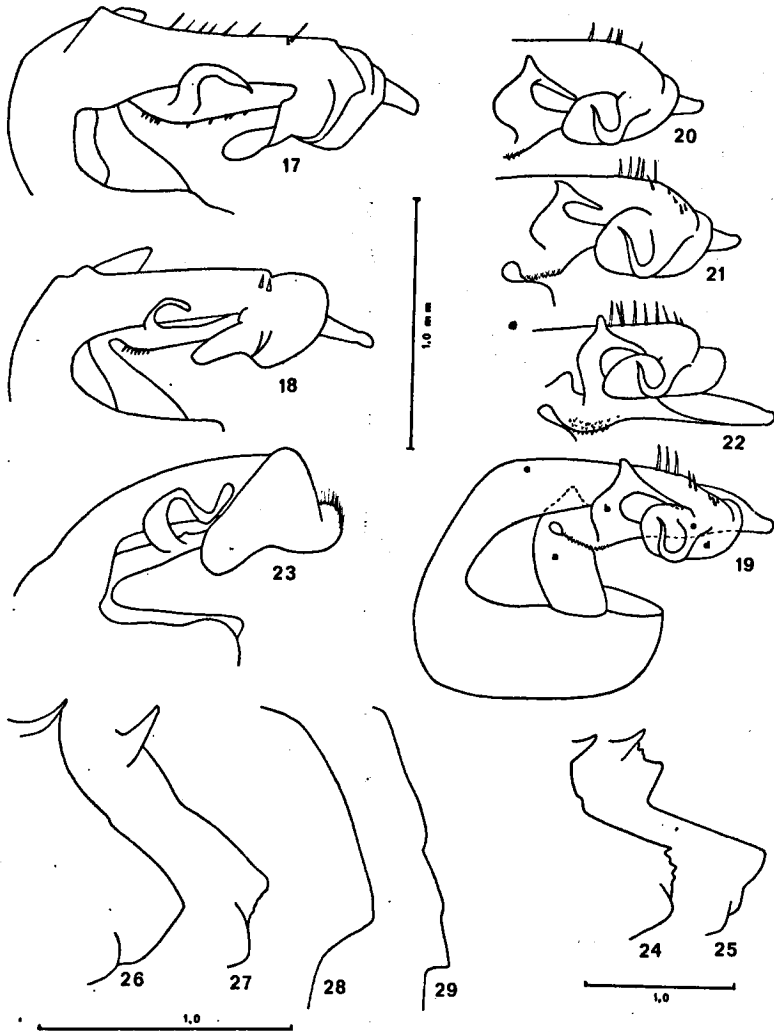


Fig. 17–22. Male genital capsules in *Gelastocoris*: 17 *G. amazonensis* adapted from TODD 1955; 18 *G. fuscus* from Suriname; 19 *G. flavus flavus* from Pará, 20–22 *G. flavus flavus* from Suriname, a right paramere, b right paramere hook, c keel, d pan, e keel hook.

Fig. 23. *Montandonius angulatus* from Bolivia: male genital capsule.

Fig. 24–27. Lateral margin of pronotum in: 24 *Gelastocoris flavus flavus*; 25 *G. fuscus*; 26 *Montandonius angulatus*; 27 *Gelastocoris amazonensis*.

Fig. 28–29. Outline of embolium in: 28 *Montandonius angulatus*; 29 *Gelastocoris fuscus*.

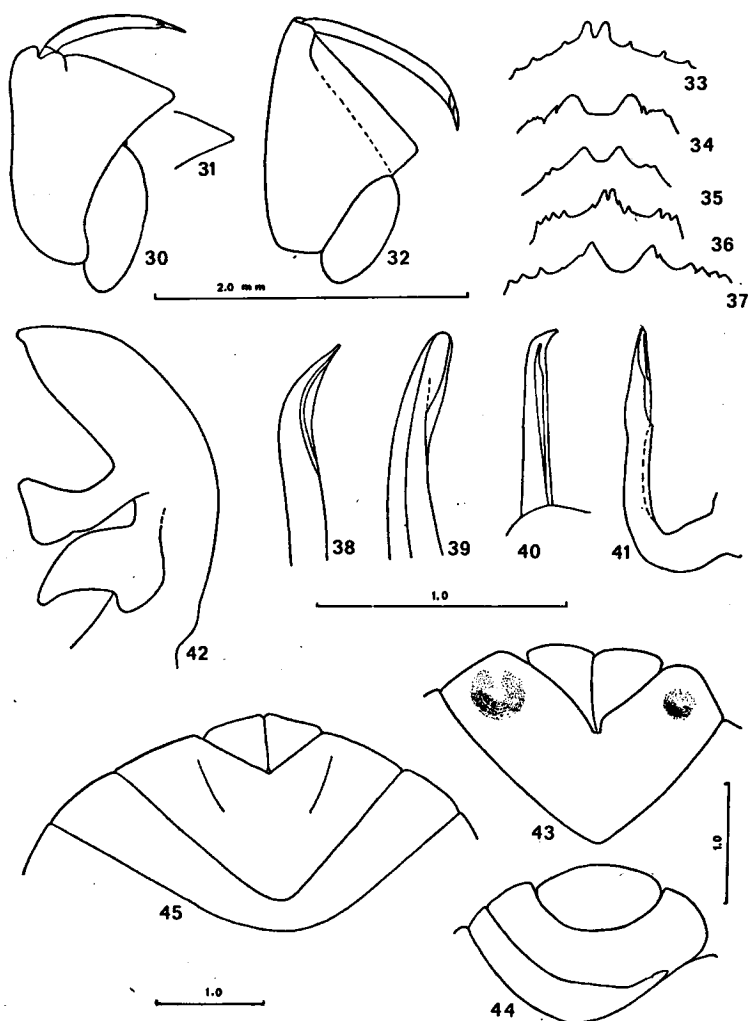


Fig. 30-32. Fore leg in *Nerthra*: 30 *N. raptoria*; 31 *N. buenoi*, pointed angle of anterior dilation of femur; 32 *N. terrestris*.

Fig. 33-37. Outline of apex of head (dorsal view) in *Nerthra*: 33 *N. terrestris*; 34 *N. raptoria*; 35 *N. montandoni*; 36 *N. unicornis*; 37 *N. fuscipes*.

Fig. 38-42. Apex of right paramere in *Nerthra*: 38 *N. montandoni* from Trinidad; 39 *N. unicornis* from Suriname; 40 *N. raptoria* from Suriname; 41 *N. terrestris* from Suriname; 42 *N. fuscipes* from México.

Fig. 43-45. Apex of abdomen, ventral view, in *Nerthra* from Suriname: 43 *N. raptoria* female; 44 *N. raptoria* male; 45 *N. terrestris* female.

## NAUCORIDAE Fallén, 1814

Small to medium sized, dorsoventrally flattened, often broadly oval Hydrocorisae. Head not triangular in front view, eyes in most cases rather large, not or slightly elevated above the dorsal surface of the head, ocelli absent. Rostrum three-segmented, in most cases quite short and stout. Antennae three-segmented, simple. Pronotum large, much wider than the head which is more or less enclosed by the anterolateral angles of pronotum. Anterior legs raptorial. Membrane of hemielytra without nervature. No respiratory appendages.

DE CARLO 1971 after studying the male genitalia (including the soft parts) in representatives of most American genera and a few Old World genera (*Aphelocheirus*, *Asthenocoris*, *Ilyocoris* and *Naucoris*) concludes that there are three families in a superfamily Naucoroidea: Aphelocheiridae, Pelocoridae (the New World Naucoridae) en Naucoridae (the Old World Naucoridae except *Aphelocheirus*). Although his observations on the male genitalia are interesting and deserve further investigations, essentially he proposes this new classification on differences in one structure. Moreover only two related genera (*Ilyocoris* and *Naucoris*) of the over 20 Old World genera of Naucoridae have been studied in some depth. The soft parts of the male genitalia of the aberrant subfamily Potamocorinae have not been studied either. So for the present I consider his propositions premature and do not follow them in this publication.

Many authors distinguish a rather large number of subfamilies in the Naucoridae (e.g. USINGER 1941, LA RIVERS 1971). Recently POPOV 1970, 1971a revised this classification and concluded that there are four subfamilies (including Aphelocheirinae and Potamocorinae) reducing most of the former subfamilies to tribus (groups of associated genera within a subfamily). As in the earlier classification some genera were quite arbitrarily assigned to a subfamily, I consider Popov's scheme the best proposed at present.

The biology of this morphologically rich family is badly known. All species are thought to be predaceous. This is inferred for most species from the possession of raptorial legs rather than from behavioural observations. Some species might be rather specialized, as the European *Aphelocheirus aestivalis* (F), which preys on small freshwater mussels.

The representatives of the tribus Naucorini are predominantly found in stagnant or torpid waters, often with dense vegetation. The habitats of *Pelocoris poeyi* in Suriname are physiognomically strikingly similar to those of *Ilyocoris cimicoides* (L.) in Europe.

Most of the other species live in flowing waters. As a matter of fact, the Naucoridae is the only family of Nepomorpha with a good number of representatives adapted to live in rather strong current.

As far as it is known, the Cryphocricinae live in swiftly flowing streams where they cling to pebbles. USINGER 1947 suggests that they extract their oxygen from the water but the mechanism is not fully understood.

Both species of *Limnocoris* found in Suriname burrow in the sand of streamlets at places with a moderate current. Other species have been found in streams with a stony bottom.

*Ambrysus* are also principally found in streams, although the common N. American *Ambrysus mormon* Montd. on some occasions has been found in the margins of lakes too. Two of the species found in Suriname, *Ambrysus stali* and *A. bifidus* live in strong currents clinging to branches or tree trunks forming barriers in the streamlets. *A. usingeri*, on the other hand, is found predominantly at torpid edges with plant-debris. All three, however, are able to live through the dry season in stagnant ponds in the beds of the streamlets.

Some care must be taken in handling living Naucoridae as several species (notably *Ilyocoris* and *Pelocoris* spp.) are reported to be able to sting very painfully (WESENBERG-LUND 1943).

#### KEY TO AMERICAN SUBFAMILIES AND GENERA OF NAUCORIDAE

- 1a Rostrum long and slender, about as long as anterior femur; small bugs, length about 3 mm (Potamocorinae) . . . . . 2
- 1b Rostrum short and broad at base, much shorter than the anterior femur; length exceeding 4 mm . . . . . 3
  
- 2a Hemelytra entirely chitinized, resembling elytra of beetles . . . . . *Coleoptercoris*
- 2b Hemelytra with membrane, which is less strongly chitinized than remainder. . . . . *Potamocoris*
  
- 3a Head narrow, hardly broader than long, distinctly projecting before the globular eyes. Lateral margins of pronotum roughly crenulate, dorsal surface rough (Cryphocricinae) . . . . . 4
- 3b Head broader than long, not or only slightly projecting before the eyes which are not globular. Lateral margins of pronotum smooth or at most finely crenulate, dorsal surface smooth (Naucorinae) . . . . . 5
  
- 4a Hemelytra predominantly reduced (Pl. 4d), macropterous forms very rare, prosternum completely exposed *Cryphocricos*
- 4b Hemelytra covering the abdomen entirely or nearly so, pro-

- pleurae covering the posterior part of the prosternum . . . .  
. . . . . *Cataractocoris*
- 5a Meso- and metasternum with a broad median longitudinal  
carina which is most often distinctly foveate apically . . . 6
- 5b Meso- and metasternum at most with a thin plate-like carina  
. . . . . 8
- 6a Hemielytra reduced, reaching about halfway the dorsum of  
abdomen, fovea of mesosternal carina indicated, of metasternal  
carina absent . . . . . *Sattleriella*
- 6b Hemielytra at least reaching nearly the apex of abdomen. 7
- 7a Embolium pulled out laterally in a backwardly projecting spine  
. . . . . *Usingerina*
- 7b Embolium not pulled out in a spine . . . . . *Limnocoris*
- 8a Anterior margin of pronotum emarginate behind interocular  
space (Pl. 3d-g) . . . . . 8
- 8b Anterior margin of pronotum at most somewhat concave  
behind interocular space (Pl. 4a-c, e-g) . . . . . 11
- 9a Hemielytra entirely chitinized and punctate, claval suture  
obsolete . . . . . 10
- 9b Hemielytra with membrane distinctly less chitinized than  
corium, claval suture well defined . . . . . *Ambrysus*
- 10a Lateroposterior angles of pronotum obliquely truncate, length  
about 15 mm . . . . . *Melloiella*
- 10b Lateroposterior angles of pronotum rounded, length about  
8 mm . . . . . *Ambrysus siolii*
- 11a Front tarsi two-segmented (Fig. 46), with two claws which may  
be inconspicuous . . . . . 12
- 11b Front tarsi one-segmented, with or without one minute,  
scarcely distinguishable claw . . . . . 13



- 12a Posterior angles of pronotum pointing obtusely but distinctly backward; hemielytra separately pointed (leaving the medio-caudal part of abdomen uncovered) . . . . . *Decarloa*
- 12b Posterior angles of pronotum not pointing backward; hemielytra with fully developed membranes and covering the abdomen (often leaving the extreme tip of abdomen uncovered) . . . . . *Heleocoris*
- 13a Intermediate femur rather wide (Fig. 47) . . . . . *Placomerus*
- 13b Intermediate femur not wide . . . . . *Pelocoris*

POTAMOCORINAE Usinger, 1941

Small Naucoridae with the head embraced by the pronotum only posteriorly, eyes relatively small. Rostrum about as long as anterior femur.

The two genera described in this subfamily, *Potamocoris* Hungerford, 1941 and *Coleopterocoris* Hungerford, 1942 are known from SE Brasil, Paraguay and Perú. *Coleopterocoris* might, as the name indicates, at first sight be considered a beetle.

CRYPHOCRICINAE Montandon, 1897

Medium sized, rather elongate Naucoridae. Pronotum deeply incised behind the interocular space; lateral margins rather roughly crenulate. Prosternum in most species not covered by the propleural plates. Hemielytra usually reduced, without clavus and membrane, leaving the greater part of the abdomen uncovered. Dorsal surface rough owing to granulation.

This family is restricted to the tropical parts of America. The largest genus, *Cryphocricos* Signoret 1850 (Pl. 4d), principally has a Sonoran-Andean distribution; some species occur in NE Argentina and SE Brasil. Of the second genus, *Cataractocoris* Usinger, 1941 two species occur in México.

NAUCORINAE Fallen, 1814

Medium sized, predominantly oval to broadly oval Naucoridae. Pronotum either not incised behind the interocular space or if

incised prosternum at least partly covered by propleural plates; lateral margins of pronotum smooth or at most very finely crenulate. Hemielytra only very rarely with clavus and membrane absent, nearly always covering the greater part of abdomen. Dorsal surface smooth.

As this subfamily is considerably varied morphologically and most authors give subfamily rank to the taxa treated as tribus in this publication, the tribus having representatives in South America will be dealt with in this subfamily.

### Laccocorini Stål, 1876

Medium sized Naucorinae with the head only embraced by the pronotum posteriorly. Pronotum not incised behind the interocular space. Anterior tarsi two-segmented and with two claws which may be inconspicuous.

This is principally an Old World tribus, represented in America by two genera. *Decarloa* La Rivers 1969 is a monotypic genus known from Haïti. Some five species from South America have been described in *Heleocoris* Stål, 1876 but according to LA RIVERS 1969 they do not belong in this genus which has also about 15 representatives in the Old World. *Heleocoris spinipes* Montandon, 1897 (Pl. 4a), occurs in N. Brasil so this genus might occur in the Guyana Region.

### Ambrysini Usinger, 1941

Small to medium sized Naucorinae. Pronotum deeply incised behind the interocular space. Hemielytra rarely reduced, always covering almost all the abdomen (except in *Ambrysus sioli*). Prosternum partly covered by the propleural plates.

Apart from the genera mentioned below, according to DE CARLO 1963b there is a third genus *Carvalhoiella*, see under Naucorini.

*Melloiella* De Carlo, 1935 contains one species, *M. truncaticollis* De Carlo, 1935 from S. Brasil. Apart from the reduced hemielytra and its rather large size (length about 15 mm) it is very similar to *Picrops* La Rivers, 1952, a subgenus of *Ambrysus* with one species, *A. usingeri*.

*Ambrysus* Stål, 1862 is a large genus with over 60 described species. It ranges from the Western U.S.A. over Central America to N. Argentina and seems to be richest in species in the arid regions of México and SW U.S.A.

**Ambrysus** Stål, 1862

Eyes subtriangular, flat, hardly elevated above the surface of the head, anterior part of head forming a smooth curve with eyes. Hemielytra with claval suture (except in *A. siolii*) and membrane distinct. Venter of abdomen densely pubescent, almost or quite to lateral margins.

KEY TO *Ambrysus* OF THE GUYANA REGION

- 1a Hemielytra without clavus, reduced, leaving a broad part of connexiva and apex of abdomen uncovered (Pl. 3f) . *A. siolii*  
 1b Hemielytra with clavus, leaving at most a narrow part of connexiva and apex of abdomen uncovered . . . . . 2
- 2a Hind tibia ventrally with more than 3 distal transverse rows of spines (Fig. 49), terminal row longest, male with a short lateral process on sixth tergite (Fig. 56) . . . . . *A. usingeri*  
 2b Hind tibia ventrally with 3 or less such rows of spines (Fig. 48). Male with a (not lateral) process on seventh tergite (Fig. 57, 63) . . . . . 3
- 3a Prosternum fused to propleurae (Fig. 53), a slender species (length: width about  $2\frac{1}{2}$ ) (not seen). . . . . *A. partridgei*  
 3b Prosternum posteriorly covered by propleurae, not fused to them . . . . . 4
- 4a Lateroposterior angles of laterotergites obtuse *A. obscuratus*  
 4b Lateroposterior angles of laterotergites 3 and 4 spinose . . . . . 5
- 5a Male, process on seventh tergite laterally expanded (Fig. 57-59); female, apex of subgenital plate as in Fig. 62 . . . . . *A. bifidus*  
 5b Male, process on seventh tergite not laterally expanded (Fig. 63); female, apex of subgenital plate as in Fig. 66. . . . . *A. stáli*

**Ambrysus bifidus** La Rivers & Nieser, 1972

Pl. 3d; Fig. 57-62.

*Ambrysus bifidus* LA RIVERS & NIESER, 1972, p. 4-8 fig. 3 (Suriname, Brasil).

SURINAME, Nickerie, Suriname; BRASIL, Pará, Amazonas, Mato Grosso.

SURINAME: Nickerie, Coeroeni Island, waterside, 2 ♀ (Ligori, LM).  
 Suriname, *SN082* 8 ♂, 4 ♀ (1 ♀ holotype 1 ♂ allotype); *SN092*, 1 ♂, 1 ♀;  
 Carolinakreek 18.XI.1962, 2 ♂, 1 ♀ (Malkin, LM).

BRASIL: Pará, Rio Paru do Oeste, Komadaveni; *Sa378*, 25.I.1967, 1 ♂, 2 ♀.  
 Amazonas, Rio Branquinho (near Manaus), *A166*, 21.V.1961, 1 ♀. Mato  
 Grosso, Serra do Roncador, 18.VIII.1965, 1 ♀ (Fk).  
 (All specimens quoted belong to type series).

Length ♂  $\bar{x}$  =  $8.2 \pm 0.3$ , ♀  $\bar{x}$  =  $8.3 \pm 0.3$ ; width pronotum ♂  $\bar{x}$  =  $3.9 \pm 0.2$ , ♀  $\bar{x}$  =  $3.9 \pm 0.2$ ; ocular index (V) ♂  $\bar{x}$  =  $1.27 \pm 0.11$ , ♀  $\bar{x}$  =  $1.27 \pm 0.07$ .

Colour brown, head and pronotum yellowish brown with extensive dark markings. Scutellum and hemielytra (if folded over the back) of about the same colour, hardly with markings and distinctly darker than head and pronotum. Dorsum of abdomen light brown, often with a slight orange tinge. Laterotergites dark at latero-posterior angles. Venter light brown, legs yellowish, fore femur dorsally especially marked with brown.

Head deeply set into pronotum, posterolateral margin distinctly sinuate. Eyes triangular to semioval, blackish. Width of head 1.9 - 2.0 - 2.2, median length of head 1.0 - 1.2 - 1.4, ratio posterior distance between eyes: anterior distance ♂  $\bar{x}$  =  $1.53 \pm 0.05$ , ♀  $\bar{x}$  =  $1.55 \pm 0.08$ .

Pronotum, lateral margins slightly convex, posterior angles rounded. Ratio greatest width: median length of pronotum ♂  $\bar{x}$  =  $3.2 \pm 0.1$ , ♀  $\bar{x}$  =  $3.2 \pm 0.2$ .

Scutellum, width at base 2.5 - 2.7 - 3.0, median length 1.2 - 1.3 - 1.5.

Hemielytra, sutures distinct. Ratio greatest length of embolium: its greatest width somewhat more than 4 (4.2 - 4.4).

Abdomen, margins of connexiva not appreciably serrate; postero-

lateral angles of laterotergites 1 and 2 rounded, of 3 and 4 ending in a distinct spine.

Fore leg, length of femur 1.8 – 1.9 – 2.0, width of femur 1.2 – 1.3 – 1.4, length of tibia and tarsus 1.5 – 1.7 – 1.8.

Male, genital process on the 7th tergum “bird-headed” (Fig. 57–59).

Female, subgenital plate medio-apically obtusely pointed, two obtuse apicolateral teeth (Fig. 61–62).

This widely distributed but mostly scarce species was collected by the author in the Carolinacreek only. At *SNogz* there was hardly any current but at *SNobz* the specimens were clinging to branches of a barrier in the stream at current velocities of about 50 m/min. Malkin's specimens have been collected during the dry season in a pool in the bed of the Carolinacreek.

This species is very similar to *A. stáli* which is, however, distinctly larger on the average, its pronotum is more uniformly coloured and it differs in the form of the male genital process and the female subgenital plate.

### **Ambrysus obscuratus** Montandon, 1898

Fig. 68.

*Ambrysus obscuratus* MONTANDON, 1898a, p. 282–284, (Brasil).

*Ambrysus obscuratus*; MONTANDON 1908, p. 318–319 (key).

*Ambrysus obscuratus*; DE CARLO 1950, p. 8.

*Ambrysus obscuratus*; LA RIVERS 1971, p. 68 (catalogue).

BRASIL, Pernambuco, 5.I(18)94, 1♂ (*A. obscuratus* Montandon 1898, type, HM). This type is the only specimen known of this species.

Length 9.4; width of pronotum 4.7; ocular index (V) 1.17.

Colour and markings identical with *Ambrysus stáli*.

Head rather long, deeply set into pronotum, posterolateral margins sinuate. Eyes triangular, dark. Width of head 2.3; length of head 1.4; ratio posterior distance between eyes: anterior distance 1.7.

Pronotum, lateral margins slightly convex, posterior angles rounded. Ratio width : length of pronotum 3.0.

Scutellum, width 3.2; length 1.6.

Hemelytra, sutures distinct. Ratio length of embolium: its greatest width about 4.

Abdomen, margins of connexiva not appreciably serrate; latero-posterior angles of laterotergites 1 – 3 rounded, 4 bluntly spinose.

Fore leg, length of femur 2.4; width of femur 1.6; length of tibia and tarsus 2.1.

Male, genital process on the 7th tergum relatively small and narrow.

This species is at first sight identical with *A. stali*. Closer examination reveals two small differences: 1) the lateroposterior angle of laterotergite 3 is spinose in *A. stali* and blunt in *A. obscuratus*; 2) the male genital process is in *A. stali* slightly larger and more clavate than in *A. obscuratus* (Fig. 63, 68).

Taking into account the publications of LA RIVERS 1953a, 1967a, on subspeciation in *Ambrysus*, *A. obscuratus* and *A. stali* are probably only subspecifically different.

### ***Ambrysus partridgei* De Carlo, 1968**

*Ambrysus partridgei* DE CARLO, 1968, p. 99–100, fig. 1 (Brasil).

*Ambrysus partridgei*; LA RIVERS 1971, p. 65 (catalogue).

BRASIL, Amazonas.

The male holotype, which unfortunately I have not seen, is the only specimen known from this species.

Length 11; width of pronotum 4.2; ocular index (V) 1.72. Colour castaneous, shiny, membrane and two narrow longitudinal lines between eyes dark. Venter dark yellowish.

Head deeply set into pronotum, posterolateral margin sinuate. Width of head 2.3, length of head 1.8, ratio posterior distance between eyes: anterior distance 1.27.

Lateral margins of pronotum not evenly curved, curvature stronger anteriorly, posterior angles closing to anterior angles of

hemelytra. Ratio width : length of pronotum 2.4. Prosternum posteriorly fused with propleurae.

Scutellum, width 3, length 1.9.

Hemelytra with distinct sutures but embolium absent.

Abdomen, margins of connexiva not appreciably serrate; posterolateral angles of laterotergites not spinose.

This species is known by the holotype male collected near Manaus, so the species might occur in the Guyana Region. It differs from other species in this region by the fusion of prosternum and propleurae and the absence of embolium. The latter is probably a specific (not a group) character as its near relative, *A. teutoni* from Sta. Catarina has a well developed embolium.

### **Ambrysus siolii** De Carlo, 1966

Pl. 3f.

*Ambrysus siolii* DE CARLO, 1966b, p. 115-116, fig. 6 (Brasil).

*Ambrysus siolii*; LA RIVERS 1971, p. 69 (catalogue).

BRASIL, Pará.

BRASIL: Pará, Rio Tapajoz, Pindobal, *Sr98*, 28.X.1947, 1♂, 2♀ (♂ holo-, ♀ allo-, ♀ paratype DC); R. Tapajoz, Santarém, *r6r*, 10.XII.1963, 1♀ (Marlier) (W).

Length, ♂, ♀ 8.0-8.4-8.6; width of pronotum ♂, ♀ 4.3; ocular index (V) ♂ 1.29, ♀ 1.30-1.32-1.36.

Colour yellowish to light brown, variegated with dark brown.

Hemelytra reduced, claval suture absent, apex of abdomen and a broad band of the spinose connexiva exposed.

This aberrant species is at once recognized by the hemelytral characters mentioned above; *Meloiella* which also lacks a claval suture is much larger.

As R. Tapajoz is South of the R. Amazonas, specimens from the Guyana region agreeing with these characters are to be compared with *A. siolii* specimens from the type locality, as they very well may constitute a separate species.

**Ambrysus stáli** La Rivers, 1962

Pl. 3g; Fig. 48, 50, 52, 63-67.

*Ambrysus stáli* LA RIVERS, 1962, p. 185-187, fig. 1 (Trinidad, Suriname, Guyane Française, Brasil).

*Ambrysus bourquini* DE CARLO, 1968, p. 100 fig. 3 (Suriname).

*Ambrysus stáli*; LA RIVERS 1971, p. 69 (catalogue).

*Ambrysus stáli*; LA RIVERS & NIESER 1972, p. 3-4, fig. 2 (Suriname, Brasil).

TRINIDAD; SURINAME, Saramacca, Suriname, Marowijne, Brokopondo; GUYANE FRANÇAISE; BRASIL, Pará, Amazonas.

SURINAME: Saramacca, SN238, 2♂; SN280, 1♀; SN335, 2♂; SN340, 1♂, 1♀; SN356, 1♂; SN367, 1♂; SN383, 1♀. Suriname, SNO34, 2♂; SNO44, 1♀; SNO57, 3♂; SNO57A, 2♂, 1♀; SNO58, 7♂, 1♀; SNO59, 1♂, 1♀; SNO61, 7♂, 3♀; SNO64, 2♂; SNO65, 1♂; SNO67, 3♂, 2♀; SNO81, 3♂, 2♀; SN147, 1♂; SN150, 3♂, 2♀; SN175, 1♂; Carolina Creek, 10 Km S. Zanderij, waterholes, drying up forest stream, gravelly bottom, 18.XI.1962, 11♂, 13♀ (Malkin, LM). Marowijne, Nassaugebergte, kreek Km 0.6, 18.II.1949, 1♂ (holotype of *A. bourquini* De Carlo); same, Km 16.4, III.1949, 1♂ (Gij). Brokopondo, SN303, 1♂, 1♀.

BRASIL: Pará, Rio Paru do Oeste, Igarapé Akahé, A354-1, 15.III.1962, 1♂; Monte Alegre, Mulata, Igarapé Assaisal, S303-a, 23.IX.1954, 1♂; same, S303-c, 4♂, 1♀; Belém, Igarapé Bentica, Sa333, 23.VIII.1960, 1♂. Amazonas, Manaus, Igarapé da Acara, A195-3, 26.VI.1961, 1♂.

Length, ♂  $\bar{x}$  =  $9.2 \pm 0.1$ , ♀  $\bar{x}$  =  $9.6 \pm 0.2$ ; width of pronotum, ♂  $\bar{x}$  =  $4.4 \pm 0.1$ , ♀  $\bar{x}$  =  $4.5 \pm 0.1$ ; ocular index (V) ♂  $\bar{x}$  =  $1.24 \pm 0.05$ , ♀  $\bar{x}$  =  $1.24 \pm 0.06$ .

Colour brown, head, pronotum, scutellum and embolium mottled with yellowish, hemielytra somewhat darker than remainder.

Head rather long, deeply set into pronotum, posterolateral margins distinctly sinuate. Eyes triangular, blackish. Width of head 2.1 - 2.2 - 2.4, length of head 1.30 - 1.45 - 1.50, ratio posterior distance between eyes : anterior distance ♂  $\bar{x}$  =  $1.52 \pm 0.04$ , ♀  $\bar{x}$  =  $1.49 \pm 0.03$ .

Pronotum, lateral margins slightly convex, posterior angles rounded (Fig. 50). Ratio width : length of pronotum ♂, ♀  $\bar{x}$  =  $3.1 \pm 0.1$ .



Scutellum most often somewhat lighter in colour than hemielytra, width 2.9 – 3.1 – 3.4, length 1.5 – 1.6 – 1.7.

Hemielytra, sutures distinct. Ratio length of embolium : its greatest width about 4.

Abdomen, dorsum yellowish to orange-brown, lateroposterior edges of laterotergites with a somewhat diffuse brown patch. Margins of connexiva not appreciably serrate; posterolateral angles of laterotergites 1 and 2 rounded, of 3 and 4 ending in a distinct spine.

Fore leg, length of femur 2.2 – 2.3 – 2.4, width of femur 1.45 – 1.50 – 1.60, length of tibia and tarsus 2.00 – 2.06 – 2.10.

Male, genital process on the 7th tergum clavate (Fig. 63).

Female, subgenital plate with a convex tip and two lateral dents (Fig. 65–67).

In Suriname this species is common, sometimes occurring in fair numbers, in shaded streamlets where it prefers to cling to barriers of branches and trees in moderate to quite strong currents (3–over 10 m/min.). Less often and in low numbers it is found at torpid edges clinging to vegetation, plant roots or debris.

This species is similar to *A. bifidus*, see under that species in addition to the characters given in the key.

### *Ambrysus usingeri* La Rivers, 1952

Pl. 3e; Fig. 49, 51, 54–56, 69–70.

*Ambrysus usingeri* LA RIVERS, 1952, p. 33–39, 1 fig. (Guyana, Suriname, Guyane Française, Brasil).

*Ambrysus fitthausi* DE CARLO, 1966b, p. 116–117, fig. 4 (Suriname, Brasil).

*Ambrysus usingeri*; LA RIVERS 1971, p. 65 (catalogue).

*Ambrysus usingeri*; LA RIVERS & NIESER 1972, p. 2–3, fig. 1 (Suriname, Brasil).

GUYANA; SURINAME, Nickerie, Saramacca, Suriname, Marowijne, Brokopondo; GUYANE FRANÇAISE; BRASIL, Pará, Amazonas, Mato Grosso.

SURINAME: Nickerie, upper Maratakka Rivier, 5/6.III.1971, 1♂ (Gij). Saramacca, SN237, 2♀; SN252, 1♂; SN339, 1♀. Suriname, SN070, 1 lv. IV; SN080, 1♀; SN081, 1♀, 1 lv. V; SN092, 1♂, 1♀; SN095, 1♂; SN099, 1♀; SN144, 1 lv. V; SN434, 1♀; Carolinakreek, waterholes in drying up forest stream, gravelly bottom, 18.XI.1962, 5♂ (Malkin, one ♂ paratype of *A.*

*fitikau* DC, LM). Marowijne, SN272, 1♂. Brokopondo, SN246, 1♂; SN408, 1♀; Kassikreek, near Pokigron, 20.III.1964, 1♂ (Gij.).

BRASIL: Pará, Rio Paru do Oeste, Igarapé Komadeveni, Sa891, 10.1.1961, 1♂. Amazonas, near Manaus, Reserva Duke, Igarapé Barro Branco, A584, 6.XI.1965, 4♂, 2♀; Upper Rio Negro, Rio Marauia, Missão S. Antonio, A474, 10.I.1963, 1♂. Mato Grosso, Source Region of Rio Xingu, Igarapé Garapu, A565-2, 24.VIII.1965, 1♂; same, Rio Sete de Setembro, shallow edge with sand bottom, A568-2, 28/29.VIII.1965, 1♂.

Length, ♂  $\bar{x} = 9.5 \pm 0.2$ , ♀  $\bar{x} = 9.9 \pm 0.3$ ; width of pronotum, ♂  $\bar{x} = 5.2 \pm 0.1$ , ♀  $\bar{x} = 5.2 \pm 0.2$ ; ocular index (V), ♂  $\bar{x} = 0.89 \pm 0.03$ , ♀  $\bar{x} = 0.93 \pm 0.04$ .

Colour, dorsally variegated brown and reddish on a yellowish background (in the larvae the markings are all reddish). Venter light yellowish brown.

Head, more or less lozenge-shaped; posterolateral margins only slightly sinuate, this causes the posterior part of the head which is inserted in the pronotum to be less distinctly defined than in other species. Eyes triangular, dark reddish brown, posterior margins of eyes bordered by a chitinous bar which protrudes as a prominent angle at the posterolateral corner of the eye (this structure is common in *Limnocois* but according to LA RIVERS 1952 unique in *Ambrysus*). Width of head 2.4 - 2.6 - 2.7, length of head 1.3 - 1.4 - 1.5, ratio posterior distance between eyes : anterior distance ♂, ♀  $\bar{x} = 1.67 \pm 0.05$ .

Pronotum angulate, lateral margins only very slightly convex, posterior angles distinctly truncate (Fig. 51). Ratio width : length of pronotum ♂  $\bar{x} = 4.3 \pm 0.1$ , ♀  $\bar{x} = 4.2 \pm 0.1$ .

Scutellum most often slightly lighter in general colour than hemelytra, width at base 3.0 - 3.2 - 3.8, median length 1.6 - 1.7 - 2.1.

Hemelytra, sutures distinct. Ratio length of embolium : its greatest width about 3.5.

Abdomen, dorsum yellowish to light orange-brown, latero-posterior edges of laterotergites marked with dark brown. Margins of connexiva finely serrate, posterolateral angles of laterotergites 2-5 ending in a strong spine.

Fore leg, length of femur, 2.3 - 2.4 - 2.6, width of femur 1.05 - 1.10 - 1.15, length of tibia and tarsus 2.2 - 2.3 - 2.4.

Male, lacking the genital process on the 7th tergum but possessing a similar structure on the 6th tergum (Fig. 55, 56).

Female, subgenital plate apically excavated (Fig. 69, 70).

In Suriname this species is rather common, but scarce, in shaded streamlets where it prefers torpid places with plantdebris. Owing to the low population density it is quite difficult to find (except in dry years when they are concentrated in pools.)

This species differs in several respects from the remaining known species of *Ambrysus*, which caused LA RIVERS 1952 to erect it into the subgenus *Picrops*. Up to now *Picrops* has remained monotypic.

#### Limnocorini STÅL, 1876

Small to medium sized, broadly oval to nearly circular Naucorinae. Head embraced by the pronotum up to the anterolateral angles of the eyes, which are bordered by a strip of chitin. Pronotum not incised behind the interocular space. Anterior tarsi one-segmented and fused with the tibia, an annulation between tarsus and tibia is visible. Propleurae separated by a prominent double-tipped keel. Meso- and meta-sternal keels prominent, widened apically, nearly always with a broad groove or cavity. Hemielytra only rarely reduced.

*Usingerina* La Rivers 1950 is a monotypic genus; its species, *U. moapensis*, occurs in warm springs in Nevada. *Sattleriella* De Carlo 1966 is equally monotypic; its species, *S. siolii*, has been found in São Paulo. DE CARLO 1951 does not consider *Usingerina* a distinct genus. Following his 1951 argument I doubt whether *Sattleriella* is more distinct than *Usingerina*. *Limnocoris* contains about 50 described species, most of them South American. S. Brasil is especially rich in species of this genus.

#### Limnocoris Stål, 1876

*Limnocorini* with the embolium not pulled out laterally into a backward pointing spine. At least the mesosternal keel with a distinct groove. Hemielytra not reduced.

KEY to *Limnocoris* OF THE GUYANA REGION

- 1a Length about 5 mm . . . . . *L. illiesi*  
 1b Length at least 6½ mm . . . . . 2
- 2a Lateroposterior angles of laterotergites 4 ending in a small but distinct spine, length about 7 mm. . . . . 3  
 2b Lateroposterior angles of laterotergites 4 not ending in a distinct, small spine. . . . . 5
- 3a Ratio length of specimen : width of pronotum about 1.7 . . . . .  
 . . . . . *L. birabeni*  
 3b Ratio length of specimen : width of pronotum about 1.5 (Pl. 4b)  
 . . . . . 4
- 4a Length about 7 mm . . . . . *L. fittkawi fittkawi*  
 4b Length about 8 mm . . . . . *L. fittkawi surinamensis*
- 5a Length about 9 mm . . . . . *L. pauper*  
 5b Length about 7 mm . . . . . 6
- 6a Male, toothlike process on right lobe of fifth tergite rather narrow at base (Fig. 74, Pl. 1) . . . . . *L. burmeisteri*  
 6b Male, toothlike process on right lobe of fifth tergite rather broad at base (Fig. 77) . . . . . *L. bachmanni*

***Limnocoris bachmanni* De Carlo, 1967**

Fig. 77-81.

*Limnocoris bachmanni* DE CARLO, 1967a, p. 198-199, fig. 11 (Brasil).*Limnocoris bachmanni*; LA RIVERS 1971, p. 75 (catalogue).

BRASIL, Pará.

BRASIL, Pará, Belém, Igarapé near Benfica, Sa875, 13.XIII.1960, 3♂, 1♀ (holotype, allotype and 2 paratypes. DC, W).

Length ♂ 6.2 – 6.4 – 6.5, ♀ 6.4; width of pronotum ♂ 3.93 – 4.02 – 4.05, ♀ 4.02; width over embolium ♂ 4.5 – 4.6 – 4.7, ♀ 4.7; ocular index ♂ 1.70 – 1.73 – 1.77, ♀ 1.80.

Colour, dorsally dull brown, sides of head, pronotum and embolium yellowish brown. Scutellum nearly concolourous with the adjacent part of hemielytra. Dorsum of abdomen velvety light orange-brown. Connexiva yellowish with rather faint and diffuse brownish markings at anterior edges. Venter yellowish to light brownish.

Length and width of labrum subequal, pilosity short, rather dense. Mouthparts light brown, not or hardly darkening towards apex. Head ratios, width across eyes : length of head 3.4 – 3.8 – 4.4; vertex : synthlipsis 1.27 – 1.30 – 1.32.

Pronotum, sides very slightly convex, finely serrate, about 37 teeth/mm, best visible in ventral view; ratio greatest width : width between the anterior angles 1.75 – 1.77 – 1.78. The two tips of the prosternal keel about equally elevated.

Embolium with the posterior suture partly developed, width 0.52 – 0.53 – 0.55, lateral margin finely serrate, about 26 teeth/mm, inner suture distinct. Claval suture present but indistinct. Hemielytra covering the apex of abdomen.

Connexiva serrate, at the 4th segment with about 20 teeth/mm. Lateroposterior angles of laterotergites 1–3 without spinose projection, the 4th with a faintly developed spine slightly more distinct in males than in females.

Hind wings reaching to about the middle of the 3rd tergite.

Keels of 1st and 2nd abdominal sternite about equally elevated.

Fore leg, length of femur 1.4 – 1.5 – 1.6; ratio length : width of femur 1.8 – 1.9 – 2.1.

Middle leg, length of femur 1.5 – 1.6 – 1.7; ratio length : width of femur 5.2 – 5.8 – 6.3; ratio length femur : length tibia 1.4 – 1.5 – 1.6.

Male, right lobe of fifth tergite with a blunt process (Fig. 77); secondary claspers as Fig. 78, 79; aedeagus and parameres Fig. 80.

Female, apex of subgenital plate Fig. 81.

Very similar to *L. burmeisteri*. The process of the right lobe of

fifth tergite in males is much broader in *L. bachmanni*; other morphological details show additional smaller differences (Fig. 71–81).

### *Limnocoris birabeni* De Carlo, 1967

*Limnocoris birabeni* DE CARLO, 1967a, p. 193–194, fig. 16 (Amazonas).

*Limnocoris birabeni*; LA RIVERS 1971, p. 75 (catalogue).

BRASIL, Pará.

BRASIL: Pará, Rio Arapiuns, Igarapé Curí, A297-b, 20.XI.1952, 1♂, 2♀ (holotype ♂, allotype and paratype).

This species might occur in the Guyana Region.

Length ♂ 6.2, ♀ 6.6–6.8; width of pronotum ♂ 3.8, ♀ 4.0; width over embolium ♂ 4.7, ♀ 4.8–5.0; ocular index ♂ 1.6, ♀ 1.3–1.6.

Colour, dorsally mottled brown; lateral part of pronotum, embolium and connexiva predominantly yellowish. Connexiva with dark brown markings. Scutellum and membrane dark.

Width across eyes: length of head 2.4–2.5–2.6; vertex: synthlipsis 1.2–1.2–1.3.

Sides of pronotum in ventral view indistinctly serrate, 40–44 teeth/mm; ratio greatest width: width between anterior angles 1.7–1.8–1.9.

Embolium, posterior suture absent, inner suture distinct, pointing, compared with other *Limnocoris*, distinctly towards the median; width 0.7; lateral margin finely serrate, 20–25 teeth/mm. Claval suture distinct. Hemielytra just not reaching the apex of abdomen, exposed part of connexiva rather broad (0.3 mm). Hind wings reduced.

Connexiva distinctly serrate, about 15 teeth/mm at fourth segment. Lateroposterior angles of laterotergites 2–4 with small but distinct spines.

Meso- and meta-sternal keels with shallow but distinct grooves.

Fore leg, length of femur 1.6–1.6–1.7; ratio length: width of femur 1.7–1.8–1.9.

Middle leg, length of femur 1.6–1.7–1.7; ratio length: width femur 5.2–5.4–5.7; length femur: length tibia 1.53–1.56–1.58.

For comparative notes, see KEY p. 64; in addition the embolium and exposed part of connexiva are rather broad.

### *Limnocoris burmeisteri* De Carlo, 1967

Pl. 1; Fig. 71-76.

*Limnocoris burmeisteri* DE CARLO, 1967a, p. 197-198, fig. 13 (Amazonas).

*Limnocoris burmeisteri*; LA RIVERS 1971, p. 75 (catalogue).

SURINAME, Saramacca, Suriname, Marowijne, Brokopondo; BRASIL, Amazonas.

SURINAME: Saramacca, SN221, 5♂, 4♀; SN236, 4♀ SN257, 22♂, 17♀; SN280, 1♂, 2♀; SN376, 1♂; SN428, 1♂, 2♀; Wilhelmina Mountains, line 1, Km 6, 2nd kamp, sandcreek, 19.VII.1943, 5♂, 2♀ (Gij, KU). Suriname, SNo29, 1♀; SNo94, 8♂, 14♀; SNo98, 1♂, 1♀; SN127, 1♂, 2♀; SN162, 1♂, 1♀; SN162a, 20♂, 30♀; SN162b, 1♂, 1♀; SN168, 1♂; SN172, 34♂, 25♀; SN174, 1♂; Carolinakreek, foreststream, 18.XI.1962, 4♂, 2♀ (Malkin, LM). Marowijne, SN261, 21♂, 13♀; SN267, 23♂, 37♀; SN268, 1♀; SN271, 11♂, 14♀; SN272, 1♀; Nassau Gebergte, kreek, Km 11,2, 15.III.1949, 1♂ (Gij). Brokopondo, SN214, 1♂, 1♀; H830A, 2♀.

Length ♂  $\bar{x} = 7.4 \pm 0.4$ , ♀  $\bar{x} = 7.3 \pm 0.7$ ; width of pronotum ♂  $\bar{x} = 4.4 \pm 0.2$ , ♀  $\bar{x} = 4.5 \pm 0.1$ ; width of abdomen over embolium ♂  $\bar{x} = 5.1 \pm 0.3$ , ♀  $\bar{x} = 5.1 \pm 0.2$ ; ocular index ♂  $\bar{x} = 1.7 \pm 0.2$ , ♀  $\bar{x} = 1.9 \pm 0.4$ .

Colour brown, often with a greyish waxy layer on hemielytra and pronotum, head, pronotum and embolium with darker spotting which may be vague. Dorsum of abdomen velvety orange-brown.

Posterior margin of head slightly convex. Length and width of labrum subequal, covered with whitish pilosity, parallel-sided for basal half and merging into a point at the apex. Mouthparts darkening towards apex. Head ratios; width across eyes : median length of head 3.0 - 3.2 - 3.3; vertex : synthlipsis 1.25 - 1.27 - 1.31.

Pronotum, sides finely serrate, about 30 teeth/mm, best visible in ventral view, sides slightly convex, anterolateral angle bluntly angulate, lateroposterior angle rounded; ratio greatest width : width between the anterior angles ♂, ♀  $1.87 \pm 0.02$ . The anterior tip of prosternal keel less elevated than the posterior.

Hemielytra, embolium inflated, posteriorly not delimited,

greatest width of embolium 0.53 – 0.58 – 0.65, lateral margin finely serrate 23–25 teeth/mm, inner suture anteriorly distinct. Claval suture very indistinct, becoming visible when the hemielytron is spread out. Hemielytra almost reaching the apex of abdomen, leaving uncovered a narrow strip of the connexiva posterior of the inflation of embolium.

Connexiva serrate, at the fourth segment with about 20–25 teeth/mm. Lateroposterior angles of laterotergites 1–4, not spinose.

Hind wings reaching to the posterior margin of the second tergite.

Meso- and meta- sternal keels with an apical groove, not hollow.

Fore leg, length of femur 1.5 – 1.7 – 1.8; ratio length : width of femur 1.9 – 2.0 – 2.2.

Middle leg, length of femur 1.66 – 1.71 – 1.78; ratio length : width of femur 5.5 – 5.7 – 5.9; length femur : length tibia 1.3 – 1.4 – 1.5.

Male, right lobe of fifth tergite with a tooth-like process (Fig. 74). Lobes of seventh tergite medianly at base with secondary claspers (Fig. 72, 73), which are of about the same form; the left one is about horizontally oriented, the right one nearly vertically, giving different views in drawing. Aedeagus and parameres Fig. 75.

Female, apex of genital operculum rounded.

In Suriname this species is common and abundant in savannah streamlets at places without vegetation, a current velocity over 10m/min and a loose sand bottom in which the animals burrow. It occurs in both shaded and exposed places but the population densities in shaded places are higher. A few specimens have been collected in forest streamlets.

For comparative notes see KEY p. 64, and under *L. bachmanni*.

### ***Limnocris fittkai fittkai* De Carlo, 1967**

Fig. 82–86.

*Limnocris fittkai* DE CARLO, 1967a, p. 195–196, fig. 14 (Amazonas).  
*Limnocris fittkai*; LA RIVERS 1971, p. 75 (catalogue).

BRASIL, Amazonas.



BRASIL: Amazonas, Rio Cuieiras, Igarapé Cachoeira (near Manaus), *A425-1*, 26.XI.1962, 5♂, 1♀ (1♀ paratype); same, *A161*, 19.IV.1961, 1♂, 2♀ same, *A553-1*, 28.VII.1965, 1♂; same, *A553-2*, 1♂, 4♀; same, *A553-4*, 3♂, 7♀; same, without number, 4.XI.1965, 1♂ (W).

Length ♂  $\bar{x} = 7.1 \pm 0.1$ , ♀  $\bar{x} = 7.1 \pm 0.2$ ; width of pronotum ♂  $\bar{x} = 4.45 \pm 0.05$ , ♀  $\bar{x} = 4.50 \pm 0.05$ ; width of abdomen over embolium ♂  $\bar{x} = 5.17 \pm 0.06$ . ♀  $\bar{x} = 5.27 \pm 0.06$ ; ocular index ♂  $\bar{x} = 1.41 \pm 0.07$ , ♀  $\bar{x} = 1.39 \pm 0.06$ .

Colour, dorsally light yellowish brown with darker markings. Dark markings on vertex, lateral parts of pronotum and embolium less intense, these areas appearing lighter. Membrane somewhat darker than remainder of hemielytra. Dorsum of abdomen yellowish to orange. Laterotergites yellowish with a dark spot on anterolateral angles. Venter light brown, legs yellow.

Posterior margin of head very slightly convex. Labrum somewhat longer than broad, pilosity short, sparse, parallel-sided for basal half and merging into a point at the apex. Mouthparts darkening towards apex. Head ratios; width across eyes : median length of head 2.8 - 3.5 - 4.7; vertex : synthlipsis 1.2 - 1.3 - 1.4.

Pronotum, sides finely serrate, about 25 teeth/mm, best visible in ventral view, sides nearly straight, anterolateral angle bluntly angulate, lateroposterior angle rounded; ratios greatest width : width between the anterior angles ♂  $\bar{x} = 1.89 \pm 0.03$ , ♀  $\bar{x} = 1.92 \pm 0.02$ . Prosternal keel with the anterior tip not or hardly less elevated than the posterior.

Hemielytra, embolium inflated, posterior suture very faint, width of embolium 0.75 - 0.80 - 0.86, lateral margin finely serrate, about 25 teeth/mm, inner suture anteriorly distinct; claval suture distinct. Hemielytra in most specimens just covering the apex of abdomen, leaving exposed a narrow strip of the connexiva posterior to the inflation of the embolium.

Connexiva serrate, on the fourth segment with about 17 teeth/mm; lateroposterior angles of laterotergites 4-5 with distinct spines.

Hind wings reaching the posterior margin of the second tergite.

Meso- and meta- sternal keels with an apical groove, not hollow.

Median keel on abdominal venter distinct on sternite 1 and 2, fading out on the more posterior sternites. The keel on sternite 1

is thin, knifelike and stands between the trochanters of the hind-leg, on sternite 2 the keel is broader and as much or slightly more strongly elevated.

Fore leg, length of femur 1.4 – 1.6 – 1.7; ratio length : width of femur 1.7 – 1.9 – 2.4.

Middle leg, length of femur 1.60 – 1.68 – 1.72; ratio length : width of femur 5.0 – 5.6 – 6.1; with rows of small spines along the inner margins. Ratio length of femur : length of tibia 1.5 – 1.6 – 1.7.

Male, right lobe of fifth tergite with a flap-like process (Fig. 82); lobes of seventh tergite medially at base with secondary claspers (Fig. 84, 85), which are of about the same form; aedeagus and parameres Fig. 83.

Female, apex of subgenital plate medianly with a broad rounded projection (Fig. 86).

For comparative notes, see KEY p. 64, and under *L. fittkai surinamensis*.

### ***Limnocois fittkai surinamensis* n. ssp.**

Pl. 4b; Fig. 87–91.

SURINAME: Saramacca, SN221, 10♂, 15♀; SN235, 1♂; SN236, 4♂, 3♀; SN237, 1♂, 1♀; SN280, 1♂. Marowijne, SN261, 3♂, 4♀.

Holotype ♂, allotype ♀ from SN221 and 5♂, 4♀ paratypes in UM; other paratypes in: AMNH 1♀; BMNH 2♂, 1♀; CN 4♂, 7♀; KU 2♂, 1♀; La Rivers collections 1♂, 1♀; LM 1♂, 1♀; MACN 1♂, 1♀; OM 1♀; SM 1♂, 1♀; USNM 1♀; W 1♂, 1♀; Zool. Mus. Leningrad 1♂, 1♀.

Length ♂  $\bar{x}$  = 8.0 ± 0.2, ♀  $\bar{x}$  = 8.3 ± 0.2; width of pronotum ♂  $\bar{x}$  = 4.8 ± 0.1, ♀  $\bar{x}$  = 4.9 ± 0.1; width of abdomen over embolium ♂  $\bar{x}$  = 5.7 ± 0.1, ♀  $\bar{x}$  = 5.9 ± 0.1; ocular index ♂  $\bar{x}$  = 1.52 ± 0.04, ♀  $\bar{x}$  = 1.52 ± 0.07.

Colour, dorsally brown. Head, pronotum and embolium yellowish brown variegated with darker brown. Sides of head and pronotum, and embolium appearing lighter than the remainder. Scutellum most often somewhat lighter than the bordering parts of the

hemelytra, especially laterally. Membrane appearing somewhat darker than remainder of hemelytra. Dorsum of abdomen yellowish to yellowish orange, laterotergites marked with brown, especially at anterior edges. Venter sordid yellow to light brown.

Posterior margin of head slightly convex. Length and width of labrum subequal, covered with whitish pilosity, parallel-sided for basal half and merging into a point at the apex. Mouthparts darkening towards apex. Head ratios, width across eyes : median length of head 2.9 - 3.2 - 3.7; vertex : synthlipsis 1.16 - 1.22 - 1.28.

Pronotum, sides finely serrate, about 35 teeth/mm, best visible in ventral view, more distinct posteriorly than anteriorly. Sides convex, anterolateral angle bluntly angulate, lateroposterior angle rounded; ratio greatest width : width between the anterior angles  $\bar{\sigma} \bar{x} = 1.87 \pm 0.01$ ,  $\bar{\varphi} \bar{x} = 1.88 \pm 0.02$ . Double-tipped prosternal keel, tips about equally elevated.

Hemelytra, embolium inflated, posteriorly not delimited, width of embolium 0.81 - 0.86 - 0.91, lateral margin of embolium finely serrate, about 24 teeth/mm, inner suture distinct anteriorly. Claval suture very indistinct, even when the hemelytron is spread out. Hemelytra almost reaching the apex of abdomen, leaving uncovered a narrow strip of the connexiva posterior of the inflation of embolium.

Connexiva serrate, at the fourth segment with about 13 teeth/mm, lateroposterior angles of laterotergites 4-5 with distinct spines.

Hind wings reaching the posterior margin of the second tergite.

Meso- and meta-sternal keels with an apical groove, not hollow.

Fore leg, length of femur 1.7 - 1.8 - 1.9; ratio length : width of femur 1.9 - 2.0 - 2.2.

Middle leg, length of femur, 1.80 - 1.86 - 1.92; ratio length : width of femur 5.6 - 6.2 - 6.6; length of femur : length of tibia 1.38 - 1.45 - 1.50.

Male, right lobe of fifth tergite with a short and broad process (Fig. 88); lobes of seventh tergite medially at base with secondary claspers (Fig. 89-90); aedeagus and parameres Fig. 87.

Female, apex of subgenital plate, Fig. 91.

This species was mostly collected together with *Limnocoris burmeisteri*, which in Suriname is much more common. *L. f. surinamensis* has not been found in sunny places. Its habitat preferences seem to be in most respects identical with those of *L. burmeisteri*. There are some indications that *L. f. surinamensis* prefers coarser sands than *L. burmeisteri*, but this has to be verified on more extensive collections.

Differs from ssp. *fittkawi* De Carlo by its larger size and, consequently, a greater value of various measurements (the various ratios, however, show agreement), the more roughly serrate connexiva and the more pronounced spines on posterolateral angles of laterotergites 4–5. Especially the spine on the fourth in ssp. *fittkawi* is only slightly bigger than the serrations, whereas in ssp. *surinamensis* this spine is twice to three times the size of the serrations.

### *Limnocoris illiesi* De Carlo, 1967

*Limnocoris illiesi* DE CARLO, 1967a, p. 192–193, fig. 7 (Amazonas).

*Limnocoris illiesi*; LA RIVERS 1971, p. 75 (catalogue).

BRASIL, Amazonas.

BRASIL: Amazonas, Rio Marauá, A501, 28.I.1963, 1♀ (allotype); same, A508, 3.II.1963, 1♂ (holotype).

The species might occur in the Guyana Region.

Length ♂ 4.7, ♀ 5.4; width of pronotum ♂ 2.9, ♀ 3.3; width over embolium ♂ 3.4, ♀ 3.9; ocular index ♂ 2.3, ♀ 2.2.

Colour, dorsally light and medium brown, scutellum and membrane not or hardly darker. Dorsum of abdomen orange-yellow. Venter light grey-brown, legs pale. Laterotergites light brown with dark patches anteriorly.

Head ratios, width across eyes : median length 2.1 – 2.3; vertex : synthlipsis 1.1 – 1.2.

Sides of pronotum convex, finely serrate, about 40 teeth/mm, lateroposterior edge rounded; ratio greatest width : width between anterior angles 1.7. Prosternal and mesosternal keels damaged in both specimens.

Embolium, posterior suture very indistinct, width 0.4; lateral margin indistinctly serrate, about 35–40 teeth/mm. Inner suture of

embolium present, claval suture not visible. Hemelytra covering the apex of abdomen in ♂, just not reaching it in the ♀. Hind wings reduced.

Connexiva indistinctly serrate, on fourth segment 40–44 teeth/mm, lateroposterior angles of laterotergites 1–3 not, of the fourth somewhat, pointed.

Fore leg, length of femur 1.2; ratio length : width of femur 1.5 – 1.7.

Middle leg, length of femur 1.2 – 1.3; ratio length : width of femur 4.3 – 4.4; ratio length femur : length tibia 1.2 – 1.3.

This species is the smallest one known. *L. vianai* De Carlo which is not much bigger has more room between the posterior angles of pronotum and the anterior angles of hemelytra.

### ***Limnocoris pauper* Montandon, 1897**

*Limnocoris pauper* MONTANDON, 1897c, p. 5 (Brasil).

*Limnocoris pauper*; MONTANDON 1898, p. 415–416 (key).

*Limnocoris pauper*; LA RIVERS 1971, p. 76 (catalogue).

“Brésil du Nord” Cumbase, 1♀ type (BMNH).

I have not been able to locate Cumbase; if it is Cumbaabas or Cumbe, both in Piauí, the occurrence of this species in the Guyana Region is not too likely. The following description is taken from the female holotype.

Length 9.3; width of pronotum 5.6; width of abdomen over embolium 6.2; ocular index 2.4.

Head ratios, width across eyes: median length 2.1; vertex : synthipsis 1.2.

Sides of pronotum somewhat irregularly serrate, about 30 teeth/mm, lateroposterior edges rather distinct, projecting laterally (disjunct with the base of hemelytra); ratio greatest width : width between anterior angles 2.0.

Sutures of embolium indistinct owing to encrustation, lateral margin serrate, about 30 teeth/mm. Hemelytra just not reaching the apex of abdomen, leaving a narrow strip of connexiva uncovered posteriorly of embolium. Connexiva finely serrate, about 30 teeth/mm at fourth segment.

Fore leg, length of femur 2.3; ratio length : width of femur 1.8.

Middle leg, length of femur 2.3; ratio length : width of femur 4.6; ratio length femur : length tibia 1.3.

Nearly identical with *Limnocoris nigropunctatus* Montandon, of which I studied the type (Mus. Helsinki). *L. nigropunctatus* seems to originate from S. Brasil; I have seen additional specimens from São Paulo. For the present, because of the great distance between the known localities, I did not synonymize these species,

### Naucorini Fallén, 1814

Medium sized Naucorinae. Pronotum not incised behind the interocular space, anterolaterally reaching to the lateral angles of the eyes which lack a distinct strip of chitin. Anterior tarsi one-segmented, not fused to the tibia. Meso- and meta-sternal keels, if present, thin and plate-like without apical grooves. Hemielytra only rarely reduced.

Apart from four Old World genera this tribus contains *Placomerus* La Rivers, 1956, a monotypic genus, its species *P. micans* LaR. occurring in Paraguay, and *Pelocoris* Stål with about 20 described species occurring from the U.S.A. through Central America to Paraguay and NE Argentina. It seems to be richest in species in SE Brasil and rather poor in Central America. The genus *Carvalhoiella* De Carlo 1963, which was originally placed in the Ambrysinae, in my opinion belongs here and moreover falls within the limits of *Pelocoris* as conceived here. *Carvalhoiella* was based on a single female. I have seen three specimens of *Pelocoris procurrens* to which was attached a label in De Carlo's handwriting saying that by their characters they are very similar to *Carvalhoiella*. Now *Carvalhoiella* may be a good genus, but pending a revision of *Pelocoris*, which is badly needed, I will not consider it as such in this publication.

### Pelocoris Stål, 1876

Medium sized Naucorini with intermediate femur not broadened. Male genitalia with parameres small, symmetrical on nearly so.

#### KEY TO *Pelocoris* OF THE GUYANA REGION

- 1a Lateroposterior angles of laterotergites 2-4 not distinctly spinose (Fig. 92); aedeagus (Fig. 101) subapically widened . . . . . *P. poeyi*
- 1b Lateroposterior angles of laterotergite 4 at least distinctly spinose . . . . . 2
  
- 2a Length about 6 mm, rarely exceeding 6½ mm; aedeagus (Fig. 100) rather slender, lateral chitinous bars indistinct . . . . . *P. procurrens*
- 2b Length exceeding 7 mm . . . . . 3

- 3a Lateroposterior angles of laterotergite 2 sharply spinose (Fig. 94); aedeagus (Fig. 99) broad, lateral chitinous bars indistinct; female subgenital plate narrowed at apex, not sharply incised (Fig. 106) . . . . . *P. impicticollis*
- 3b Lateroposterior angles of laterotergite 2 bluntly spinose; aedeagus (Fig. 97, 98) rather slender, lateral chitinous bars distinct; female, subgenital plate not distinctly narrowed at apex, sharply incised (Fig. 110) . . . . . *P. politus*

### *Pelocoris impicticollis* Stål, 1876

Pl. 4g; Fig. 94, 99, 106, 107.

*Pelocoris impicticollis* STÅL, 1876, p. 144 (Brasil).

*Pelocoris impicticollis*; WHITE 1879a, p. 269 (Brasil).

*Pelocoris horváthi* MONTANDON, 1905a, p. 405-406 (Brasil).

GUYANE FRANÇAISE; SURINAME, Suriname; BRASIL, Pará, Amazonas, Mato Grosso.

GUYANE FRANÇAISE: Cayenne, 1♀ (Prudhomme, det. Montandon, BMNH).

SURINAME: Suriname, SNo71, 3♂, 5♀.

BRASIL: Brasilia borealis, 1♂, 1♀ (Boucard, SM, types). Pará, Zona Bragantina, Rio Quatipurú, S298, 14.XI.1953, 1♀; Igarapé Marituba, S313-a, 30.VIII.1959, 1♂; Curuai, Lago Grande, S131, 7.VI.1946, 1♂; Rio Tapajós, Itaituba, Igarapé bom Jardim, S172, 13.VIII.1946, 1♂; Belterra, S342, 2.XII.1947, 1♀; Fordlândia, Paraná do Cassepá, S346, 17.XII.1956, 1♂, 6♀; Quatipurú, Campo Bem Bem, A514-I,4, 4.IV.1968, 2♂; Rio Tapajós, Lago Mureta, B14, 2.XII.1947, 1♂ (Braun). Amazonas, Rio Maués-assú, Igapo, S10, 31.XII.1940, 1♂; Lago Maica, 17.VIII.1963, 1♀ (Marlier) (W); Rio Purus, Castanha Region, X.1935, 5♂, 3♀ (Olalla, KU). Mato Grosso, Urucu, Corumbá, 1♀ (Silvestri, holotype of *P. horváthi* Montd., Mus. Budapest).

Length ♂  $\bar{x} = 9.1 \pm 0.5$ , ♀  $\bar{x} = 9.4 \pm 0.6$ ; width of pronotum ♂  $\bar{x} = 4.6 \pm 0.3$ , ♀  $\bar{x} = 4.7 \pm 0.3$ ; ocular index ♂  $\bar{x} = 2.1 \pm 0.1$ , ♀  $\bar{x} = 2.2 \pm 0.1$ .

Colour, dorsally brown, some specimens rather light. Head and pronotum yellowish brown, hemielytra darker, in most specimens with a distinct lighter vermiculate pattern, left membrane hyaline. Dorsum of abdomen yellowish brown with darker markings at posterior angles of laterotergites. Venter yellowish-brownish.

Width of head including eyes ♂ 2.6 - 2.9 - 3.2, ♀ 2.7 - 3.0 - 3.3; anterior width of vertex ♂ 1.5 - 1.6 - 1.8, ♀ 1.6 - 1.8 - 2.0; synthlipsis ♂ 1.4 - 1.5 - 1.6, ♀ 1.4 - 1.5 - 1.7. Eyes dark, vertex smooth to slightly rugulose, occasionally with faint darker mottling.

Pronotum rugulose, sometimes only slightly, shiny, dark dots few or absent.

Ratio posterior width : median length ♂, ♀  $\bar{x} = 2.6 \pm 0.1$ . Lateral margins of pronotum convex.

Scutellum concolourous with hemielytra or slightly darker, both very finely and densely punctate. Median length of scutellum ♂ 1.4 - 1.5 - 1.7, ♀ 1.6 - 1.7 - 1.9; basal width of scutellum ♂ 2.6 - 2.8 - 3.2, ♀ 2.9 - 3.1 - 3.3.

Abdomen, laterotergites 2-5 with the posterolateral angles with spinelike apices (Fig. 94).

Foreleg, length of femur ♂, ♀ 2.0 - 2.2 - 2.5; width of femur ♂ 0.9 - 1.0 - 1.2; ♀ 1.1 - 1.1 - 1.2 length of tibia and tarsus ♂ 1.4 - 1.6 - 1.8, ♀ 1.6 - 1.8 - 1.9.

Male, aedeagus and parameres Fig. 99.

Female, apex of abdomen, dorsal view, Fig. 107, ventral view, Fig. 106.

This species is rather variable in size. As no structural differences between large and small specimens could be found and both large and small specimens may be found in the same habitat (e.g. *SN071*) the larger and smaller specimens are regarded as belonging to a single taxon.

*Pelocoris impicticollis* seems to be rare in N. Suriname. The locality where I collected was a shallow open patch in an *Eleocharis*-swamp.

This species (especially larger specimens) is similar to *P. bipunctulus* (H.-S.) from S. Brasil. The species can easily be separated by the connexiva which have in *P. bipunctulus* no distinctly pointed posterior angles on laterotergites 2 and 3 (Fig. 93, 94).



**Pelocoris poeyi** (Guérin Méneville, 1835)

Pl. 4f; Fig. 92, 101, 108, 109.

*Naucoris Poeyi* GUÉRIN MÉNEVILLE, 1835, pl. 57, fig. 5.*Naucoris Poeyi*; GUÉRIN MÉNEVILLE 1844, p. 352, pl. 57, fig. 5 (Cuba).*Naucoris Poeyi*; GUÉRIN MÉNEVILLE 1857, p. 418 (Cuba).*Pelocoris Poeyi*; STÅL 1876, p. 144 (Cuba).*Pelocoris convexus* NIESER, 1969, p. 63-66, fig. 147-151 (Antilles).

MONTANDON 1898a p. 284 states that *Naucoris poeyi* Guér. is not a distinct species but the same as *Pelocoris femoratus* (P.-B.). Subsequent authors followed this view GUÉRIN very likely described his species from specimens of more than one species. Notably those from New Orleans are very probably not *P. poeyi* considered here. As GUÉRIN 1844 and 1857 both quote Cuba as first locality the present author restricts the name *Naucoris Poeyi* Guérin to the Cuban specimens of which he studied a male in the SM (from the Stål collection).

GUYANA!; SURINAME!, Nickerie, Saramacca, Suriname, Commewijne, Marowijne; BRASIL, Pará; GREATER ANTILLES; LESSER ANTILLES.

GUYANA: Georgetown, ponds & trenches, 14.IV.1932, 1♂, 2♀; Plantation Ogle, East Coast Demerara, 14.IV.1932, 3♀; same, 6.V.1932, 3♂, 3♀; Lamaha Conservancy, E. Coast Demerara, 2.VIII. 1932, 5♂, 3♀; Honey Camp Creek, 24.X.1937, 7♂, 5♀; Two Mouth, right bank of Potaro tributary of Essequibo River, 11.I.1938, 12♂, 8♀; Kangarooma, r. bank of Potaro, 20.I.1938, 1♂, 1♀ (Harris, KU).

SURINAME: Nickerie, Bigi Pan, II.1943, 2♀ (Gij). Saramacca, *SN016*, 3♀; *SN020*, 3♂; *SN020b*, 3♂, 4♀; *SN028*, 10♂, 12♀; *SN030*, 1♂, 1♀; *SN031*, 3♂; *SN032*, 1♂, 2♀; *SN206*, 1♂; *SN343*, 1♂. Suriname, *SN022Aa*, 1♀; *SN045*, 1♀; *SN047*, 3♂, 6♀; *SN158*, 3♂; *SN169*, 3♂; *SN177*, 5♂, 2♀; Paramaribo, XI.1928, 4♂, 2♀ (Reijne); "Amanuensis SA", Dutch Guiana, 5♂, 5♀ (Verschuur) (KU); Livorno, near Paramaribo, rushswamp, pH 5.9, *L297*, 27.II.1967, 1♂ (v.d. Land, LM). Commewijne, *SN074*, 2♂, 4♀; *SN112*, 2♂, 4♀. Marowijne, Wia-Wia Conservancy, *Avicennia* & *Eleocharis*, 26.IV. 1972, 1♂, 1♀ (Leentvaar & Panday).

BRASIL: Pará, Itapissuma, 25.X.1946, 1♂ (Barbosa, KU).

Length ♂  $\bar{x}$  = 8.5 ± 0.2, ♀  $\bar{x}$  = 9.3 ± 0.4; width of pronotum ♂  $\bar{x}$  = 4.3 ± 0.1, ♀  $\bar{x}$  = 4.6 ± 0.1; ocular index ♂  $\bar{x}$  = 2.12 ± 0.06, ♀  $\bar{x}$  = 2.13 ± 0.08.

Colour, dorsally brown, sometimes more or less olivaceous. Head and pronotum yellowish brown with dark brown punctures which

vary considerably in number and intensity. Hemelytra (when folded over body) nearly always darker than head and pronotum, vermiculate pattern obscure. Scutellum most often darker than hemelytra. Dorsum of abdomen dark brown, connexiva yellowish with brown bands along the posterior edges of the laterotergites. Venter predominantly yellowish on thorax, predominantly brown on abdomen, legs yellowish.

Width of head including eyes ♂ 2.7 - 2.7 - 2.9, ♀ 2.7 - 2.9 - 3.0; anterior width of vertex ♂ 1.2 - 1.3 - 1.5, ♀ 1.3 - 1.4 - 1.6; synthlipsis ♂ 1.4 - 1.4 - 1.5, ♀ 1.4 - 1.5 - 1.6. Eyes most often reddish brown. Vertex smooth to slightly rugulose, often with some punctures.

Pronotum rugulose, shiny. Ratio posterior width : median length ♂  $\bar{x} = 2.29 \pm 0.07$ , ♀  $\bar{x} = 2.34 \pm 0.07$ . Lateral margins of pronotum convex.

Scutellum and hemelytra finely and densely punctate. Median length of scutellum, ♂ 1.2 - 1.4 - 1.5, ♀ 1.4 - 1.5 - 1.7; basal width of scutellum, ♂ 2.7 - 2.7 - 2.8, ♀ 2.7 - 3.0 - 3.2.

Laterotergites 2-4 with posterolateral angles not or hardly produced, 5 with a blunt spinelike apex (Fig. 92).

Fore leg, length of femur ♂ 1.9 - 2.0 - 2.1, ♀ 2.0 - 2.1 - 2.3; width of femur ♂ 1.0 - 1.2 - 1.3, ♀ 1.2 - 1.3 - 1.4.

Male, aedeagus and parameres Fig. 101.

Female, apex of abdomen, dorsal view Fig. 109, ventral view Fig. 108.

Although not very variable in size, this species is very variable in colour.

In N. Suriname this species is common and abundant in stagnant ditches with dense true aquatic vegetation. It may occur in stagnant waters with dense helophyta too. The species has been found at salinities up to 980 mg Cl/l.

Very similar to *P. binotulatus* Stål from Rio de Janeiro. Two specimens of this species preserved in SM have both a distinct reddish-brown patch on the dorsal side of the forefemur. Such a patch was not observed in the specimens of *P. poeyi*. So *P. binotulatus* and *P. poeyi* are for the present not considered identical. *P. impicticollis* and *P. poeyi* are easily separated by the differences in connexiva (Fig. 92, 94).

**Pelocoris politus** Montandon, 1895

Pl. 4e; Fig. 96-98, 102, 110, 111.

*Pelocoris politus* MONTANDON, 1895, p. 8-9 (Paraguay).  
*Pelocoris politus*; LA RIVERS 1971, p. 71 (catalogue).

BRASIL, Pará, Amazonas; PARAGUAY.

BRASIL: Pará, near Santarém, Rio Tapajoz, Igarapé, *Si/Saz*, 14.I.1960, 1♀ (W). Amazonas, Manacapurú, III.1928, 2♂, 1♀ (Klages); Rio Amazonas (Norte), Region of Itacoatiara, I-IV.1936, 2♂; R. Amazonas (Sul), Region of Lago Tapauina, I-IV.1936, 1♀; Rio Juruá, near João Pessoa (São Phelipe), 10.VII.-20.IX.1936, 3♂, 2♀ (Ollala) (KU); Rio Solimões, Ilha Careiro (near Manaus), *Az26*, 14.III.1961, 1♂; Rio Cumina, Lago Salgado, Cabo do Molha, *B30*, 21.IV.1948, 1♀ (Braun); Rio Madeira, Igarapé das Tres Casas, *S72*, 12.XI.1941, 1♀; R. Madeira, Tres Casas, Igarapé Grande, *S77*, 20.XI.1941, 1♀; Lago do Xiborena, *P74*, 14.I.1968, 1♂ (Junk) (W).

PARAGUAY: Río Apa, Alto Paraguay, 1♀ (Borelli, type Montandon, BMNH).

Length ♀  $\bar{x} = 8.3 \pm 0.4$ , ♀  $\bar{x} = 8.5 \pm 0.2$ ; width of pronotum ♀  $\bar{x} = 4.4 \pm 0.2$ , ♀  $\bar{x} = 4.4 \pm 0.1$ ; ocular index ♂  $\bar{x} = 2.0 \pm 0.1$ , ♀  $\bar{x} = 2.1 \pm 0.1$ .

Colour yellowish brown, head and pronotum shining with a few faint darker markings. Hemelytra and scutellum except membrane not or only slightly darker than head and pronotum, with a, most often rather indistinct, vermiculate pattern, membrane darker. Dorsum of abdomen light brown, laterotergites with dark patches on posterolateral angles. Venter, including legs, yellowish brown. Fore femur dorsally unicoloured light brownish.

Width of head including eyes ♂ 2.8 - 3.0 - 3.1, ♀ 2.9 - 3.0 - 3.1; anterior width of vertex ♂ 1.4 - 1.6 - 1.8, ♀ 1.4 - 1.6 - 1.7; synthlipsis ♂ 1.4 - 1.5 - 1.6, ♀ 1.4 - 1.5 - 1.6. Eyes reddish, vertex very sparsely punctate.

Pronotum anteromedianly softly rugulose, laterally nearly smooth. Ratio posterior width : median length ♂, ♀  $\bar{x} = 2.2 \pm 0.1$ . Lateral margins of pronotum convex.

Scutellum and hemelytra faintly vermiculate-rugulose. Median length of scutellum ♂ 1.2 - 1.4 - 1.5, ♀ 1.3 - 1.4 - 1.5; basal width of scutellum ♂ 2.3 - 2.7 - 3.0, ♂ 2.4 - 2.6 - 2.8.

Abdomen, posterolateral angles of laterotergites 1 and 2 not pointed, 3 and 4 pointed (Fig. 96).

Fore leg, length of femur ♂ 1.9 – 2.2 – 2.4, ♀ 2.0 – 2.1 – 2.3; width of femur ♂, ♀ 0.9 – 1.1 – 1.2.

Male, aedeagus and parameres Fig. 97, 98.

Female apex of abdomen, dorsal view Fig. 111; ventral view Fig. 110.

This species is rather variable in size and colour.

At first sight this species is similar to small light specimens of *P. impicticollis* in which scutellum and hemielytra are only slightly darker than head and pronotum. Apart from the angles of laterotergites 2 being pointed in *P. impicticollis* and not so in *P. politus*, the female subgenital plate and the aedeagus of the two species differ. The aedeagus of *P. politus* is especially distinctive as there are two strongly chitinized canals which show contrast with the lightly chitinized remainder; in other *Pelocoris* studied the aedeagus is homogenously and rather strongly chitinized. The aedeagus of more Northern specimens of *P. politus* seems to be a trifle more slender than of more Southern specimens (Fig. 97, 98). *P. politus* differs from *P. poeyi* by the light hemielytra, form of aedeagus and female subgenital plate. *P. procurrens* is distinctly smaller.

### *Pelocoris procurrens* White, 1897

Pl. 4c; Fig. 95, 100, 103–105.

*Pelocoris procurrens* WHITE, 1879a, p. 269 (Brasil).

*Pelocoris procurrens*; WHITE 1879b, p. 489 (Brasil).

*Pelocoris minutus* MONTANDON, 1895, p. 9–10 (Paraguay).

*Pelocoris procurrens*; LA RIVERS 1971, p. 71 (catalogue).

BRASIL, Pará, Amazonas; PARAGUAY.

BRASIL: Pará, Monte Alegre, XI.1873, 1♂ (Trail, type, BMNH, except for the name and "type" labels there are no data labels on the pin). Amazonas, Rio Amazonas, Parana da Eva (near Manaos), between *Paspalum*, Si/Sar, 10.XII.1959, 1♀; Rio Solimões, Parana do Barroso (near Manacapuru),

between *Panicum*, *Si/Sazr*, 26.XII.1959, 2♂; Lac Redondo, *Rr6-67*, 30.VIII.1963, 3♂, 4♀ (Marlier) (W).

PARAGUAY, Río Apa alto, 1♀ (Borelli, type of *P. minutus* Montandon BMNH).

Length ♂  $\bar{x} = 5.7 \pm 0.3$ , ♀  $\bar{x} = 6.1 \pm 0.3$ ; width of pronotum ♂  $\bar{x} = 3.1 \pm 0.1$ , ♀  $\bar{x} = 3.2 \pm 0.1$ ; ocular index ♂  $\bar{x} = 2.8 \pm 0.3$ , ♀  $\bar{x} = 2.7 \pm 0.3$ .

Colour, dorsally light to medium brown. Head and pronotum yellowish brown with dark brown markings which vary considerably in number and intensity. Hemelytra in basal part most often as dark as head, pronotum and scutellum, apical part darker; vermiculate pattern obscure. Dorsum of abdomen brown, laterotergites anteriorly yellowish, posteriorly brown. Venter light to medium brown, legs yellowish. Fore femur dorsally with a dark brown patch.

Width of head, including eyes, ♂ 1.9 - 2.0 - 2.1, ♀ 2.0 - 2.1 - 2.2; anterior width of vertex, ♂, ♀ 1.0 - 1.1 - 1.2; synthlipsis, ♂ 1.1 - 1.2 - 1.2, ♀ 1.1 - 1.2 - 1.3. Eyes dark brown, often with a reddish tinge. Vertex finely punctate, shiny.

Pronotum medially rugulose, laterally finely punctate. Ratio posterior width : length ♂, ♀  $\bar{x} = 2.3 \pm 0.3$ . Lateral margins of pronotum slightly convex.

Scutellum and hemelytra finely and densely punctate, dull. Median length of scutellum ♂ 0.80 - 0.86 - 0.90, ♀ 0.75 - 0.83 - 0.90; basal width of scutellum ♂ 1.77 - 1.79 - 1.81, ♀ 1.7 - 1.9 - 2.0.

Laterotergites 1 with posterolateral angles not produced, 2 with a small spine, 3 and 4 distinct spines (Fig. 95).

Fore leg, length of femur, ♂ 1.45 - 1.48 - 1.51, ♀ 1.52 - 1.54 - 1.56; width of femur, ♂ 1.02 - 1.04 - 1.06, ♀ 1.03 - 1.10 - 1.18; length of tibia and tarsus, ♂ 1.04 - 1.10 - 1.12, ♀ 1.00 - 1.12 - 1.23.

Male, aedeagus and parameres Fig. 100.

Female, apex of abdomen, dorsal view Fig. 104; ventral view Fig. 103.

The dark brown patch on the dorsal side of the fore femur reminds *P. binotulatus* Stål from SE Brasil, which is, however, more than one and a half times as large. The small size of *P. procurrens* separates it from all *Pelocoris* known to me.

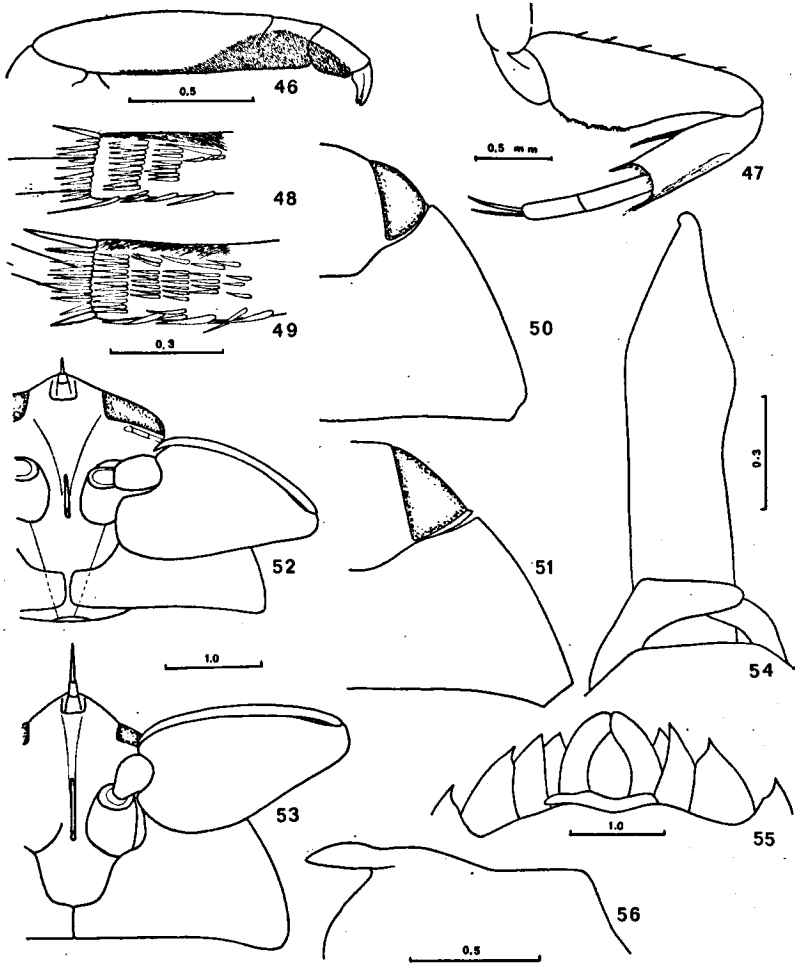


Fig. 46. Anterior femur and tarsus in *Heleocoris*.

Fig. 47. Intermediate leg in *Placomereus*.

Fig. 48–49. Apex of hind tibia in *Ambrysus*: 48 *A. stáli*; 49 *A. usingeri* from Suriname.

Fig. 50–51. Right half of head and pronotum in *Ambrysus*: 50 *A. stáli*; 51 *A. usingeri*.  
 Fig. 52–53. Left part of head and prosternum in *Ambrysus*: 52 *A. stáli*; 53 *A. teutonius* La Rivers, illustrating fused propleural plates.

Fig. 54–56. Male characters in *Ambrysus usingeri* from Suriname: 54 aedeagus and parameres; 55 apex of abdomen in dorsal view; 56 lateral process on sixth tergite.

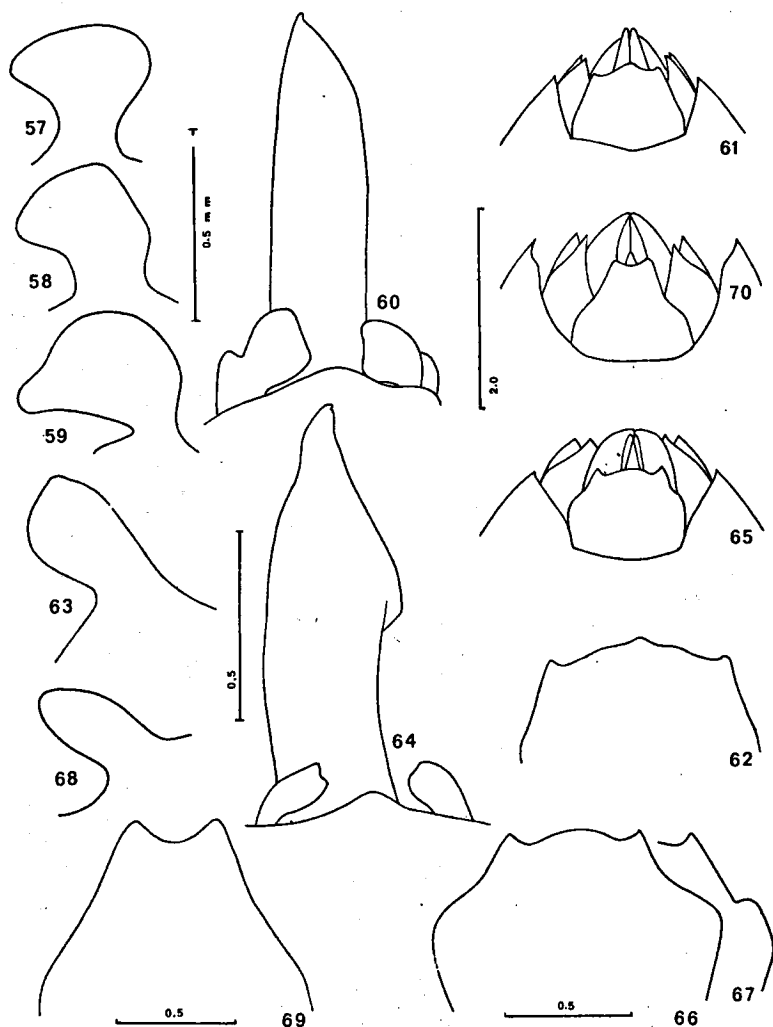


Fig. 57-62. *Ambrysus bifidus*, paratypes, from Suriname: 57-59 variability of process on seventh tergite in male; 60 aedeagus and parameres; 61 apex of abdomen in female, ventral view; 62 female subgenital plate.

Fig. 63-67. *Ambrysus stali* from Suriname: 63 process on seventh tergite in male; 64 aedeagus and parameres; 65 apex of abdomen in female, ventral view; 66-67 variability in female subgenital plate.

Fig. 68. *Ambrysus obscuratus*, holotype male, from Brasil: process of seventh tergite.

Fig. 69-70. *Ambrysus usingeri* female from Suriname: 69 subgenital plate; 70 apex of abdomen in ventral view.

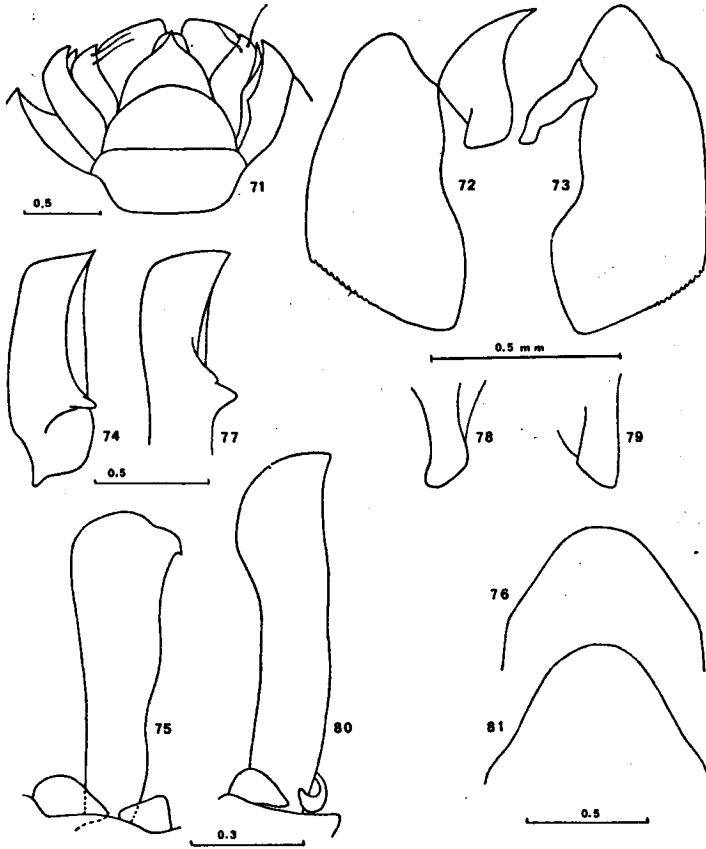


Fig. 71-76. *Limnocoris burmeisteri* from Suriname: 71 male, apex of abdomen in ventral view; 72-73 male, lobes of seventh tergite with "secondary claspers"; 74 male, right lobe of fifth tergite; 75 aedeagus and parameres; 76 female subgenital plate.

Fig. 77-80. *Limnocoris bachmanni*, paratype male from Pará: 77 right lobe of fifth tergite; 78-79 "secondary claspers" of lobes of seventh tergite; 80 aedeagus and parameres.

Fig. 81. *Limnocoris bachmanni*, allotype female: subgenital plate.



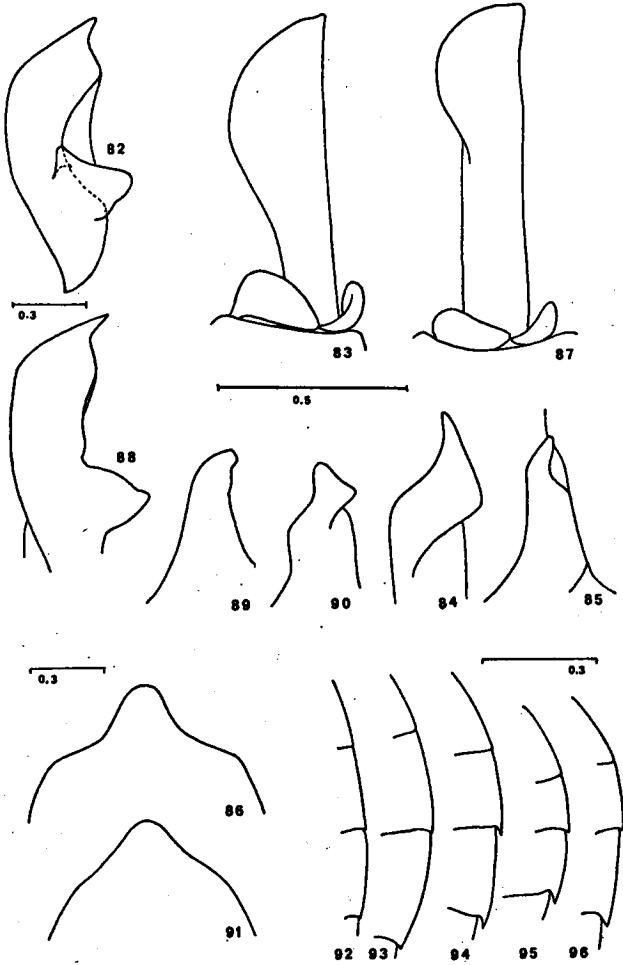


Fig. 82-86. *Limnocoris fitzkai fitzkai* from Amazonas: 82 male right lobe of fifth tergite; 83 aedeagus and parameres; 84-85 male "secondary claspers" of lobes of seventh tergite; 86 female subgenital plate.

Fig. 87-91. *Limnocoris fitzkai surinamensis* paratypes from Suriname: 87 aedeagus and parameres; 88 male right lobe of fifth tergite; 89-90 male "secondary claspers" of lobes of seventh tergite; 91 female subgenital plate.

Fig. 92-96. *Pelocoris*, diagrams of connexival margin at segments II-IV: 92 *P. poeyi*; 93 *P. bipunctulus*; 94 *P. impicticollis*; 95 *P. procurrens*; 96 *P. politus*.

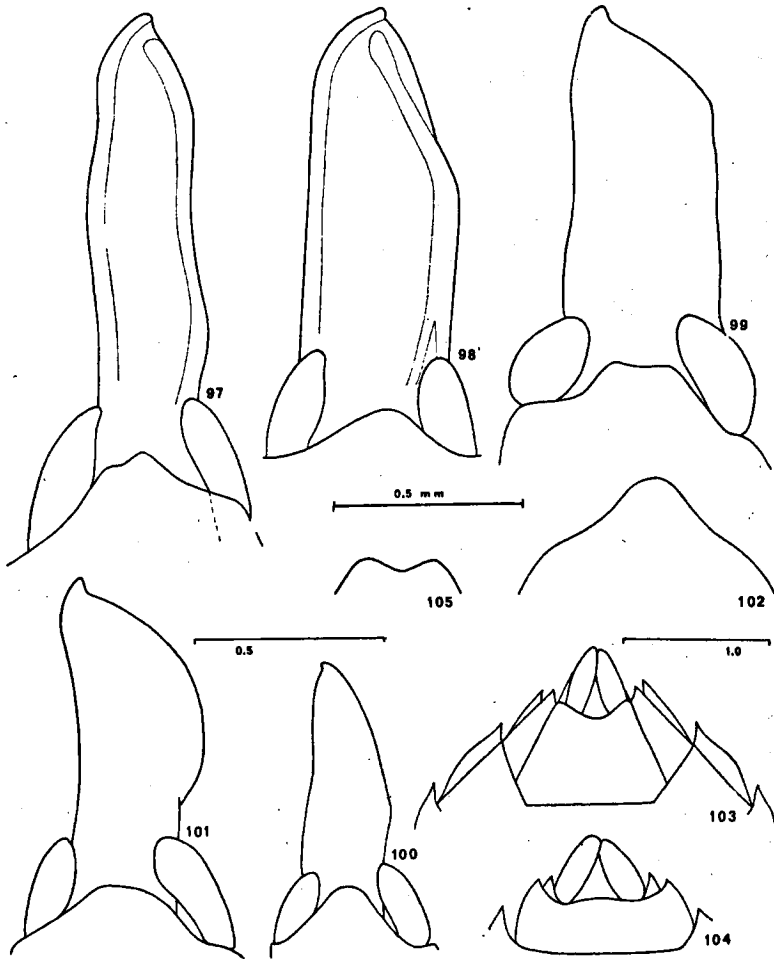


Fig. 97-101. Aedeagus and parameres in *Pelocoris*: 97-98 *P. politus* from Amazonas; 99 *P. impicticollis* from Suriname; 100 *P. procurrrens* from Amazonas; 101 *P. poeyi* from Suriname.

Fig. 102. *Pelocoris politus* from Amazonas: outline of phallosome at base of aedeagus.

Fig. 103-105. *Pelocoris procurrrens* female: 103 apex of abdomen in ventral view, specimen from Amazonas; 104 same, dorsal view; 105 apex of subgenital plate in type of *P. minutus* from Paraguay.

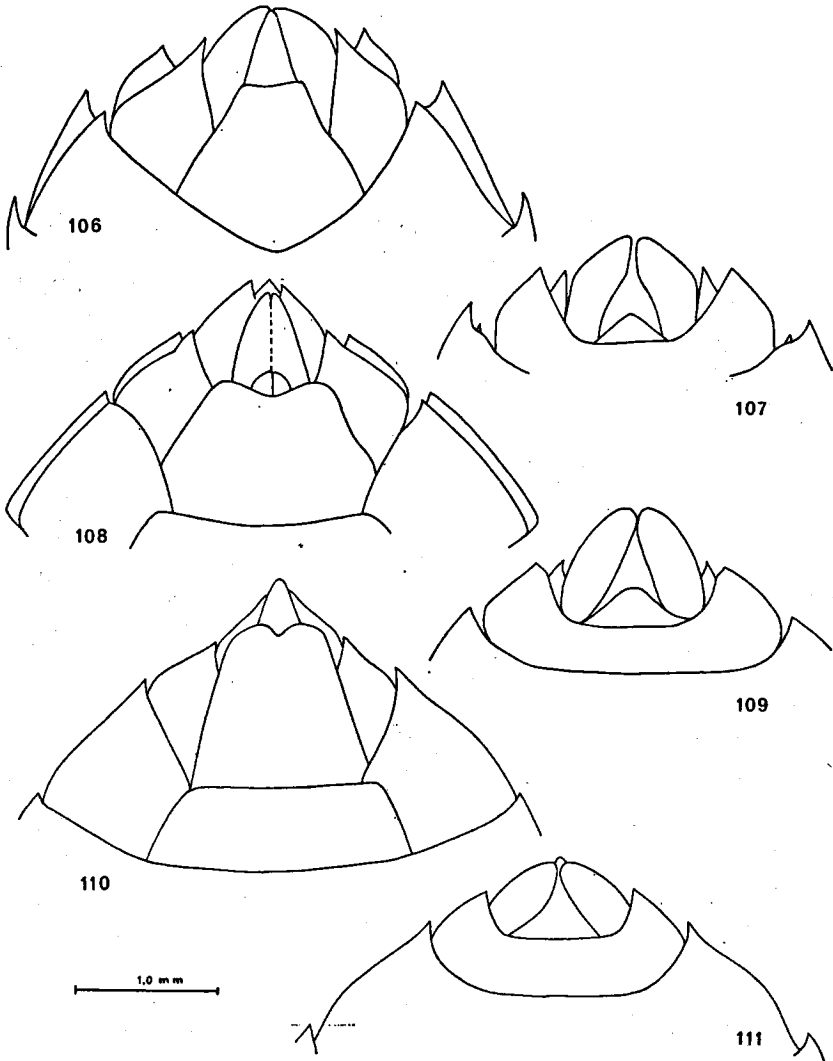


Fig. 106–111. *Pelocoris*, females, apex of abdomen: 106–107 *P. impicticollis* from Suriname; 106 ventral view, 107 dorsal view; 108–109 *P. poeyi* from Suriname: 108 ventral view, 109 dorsal view; 110–111 *P. politus* from Amazonas: 110 ventral view, 111 dorsal view.

## BELOSTOMATIDAE Leach, 1815

Medium sized to large, dorsoventrally flattened, brownish Nepomorpha. Head extended in front of eyes, forming a triangular anteculus, eyes usually not continuous with lateral margins of pronotum and anteculus, ocelli absent, rostrum three-segmented. Anterior legs raptorial, femur thickened. Eighth abdominal segment bearing a pair of retractile respiratory straps.

This family of about 150 described species has speciated prolifically in the Western Hemisphere. The American genera are *Belostoma*, with about 70 described species throughout most of the Americas but most richly represented in tropical S. America; *Abedus* Stål 1862 with about 10 species in Central and the southern part of N. America; *Horvathinia* Montandon 1911, also with about 10 species occurring in the central and southern part of S. America; *Weberiella*, a monotypic genus occurring in the Guyana Region; finally *Lethocerus*, essentially tropicopolitan with nearly 20 of the about 25 species occurring throughout the Western Hemisphere.

*Lethocerus maximus* De Carlo and *L. grandis* (L.) are among the largest recent insects, having a length of up to 110 mm. In spite of the large size of various species their biology is poorly known in detail. They seem to be predacious, their prey often being as large as themselves, so it is not surprising that they are quite harmful in fishponds. The prey is killed by poisonous saliva which contains enzymes pre-digesting the internal content of the prey. The sting of the larger species is quite painful to man and may cause temporary paralysis of an arm or leg. Many species are attracted by light, often in considerable numbers, hence their American vernacular name "electric light bugs". BOWDEN 1864 found a relation between flight intensity, lunar period and rainfall in two Ghanian species. In Suriname *Belostoma harrissi* seems to reach its highest flight activity about 2 days after full moon, during wet periods the flight intensity is generally higher than during dry periods, and heavy rains may induce great flight activity regardless of lunar periodicity. The egg-laying habits of the subfamily Belostomatinae attracted early attention. The female glues the eggs on the back of the male. Apart from protection, the main function of this seems to be oxygen supply by the movements of the male.

LAUCK and MENKE 1961 treated the higher classification of the family. The following key to subfamilies and American genera, with minor alterations, was taken from their paper.

KEY TO SUBFAMILIES AND AMERICAN GENERA  
OF BELOSTOMATIDAE

- 1a Sternites 5–6 subdivided laterally by a suture-like fold; spiracles located on or adjacent to mesal margins of ventral laterotergites (Fig. 8) . . . . . 2
- 1b Sternites not subdivided by a suture; spiracles located near centre of ventral laterotergites (Fig. 10–12) (Belostomatinae) . . . . . 3
- 2a Mesal margins of laterotergites meeting genital plate near its apex (Fig. 8); antennal segments 2–3 with long, sometimes angular, fingerlike projections; tibia and tarsus of hind leg thinly compressed, much more dilated than middle tibia and tarsus; fore tarsus appearing two-segmented with one well-developed claw (Lethocerinae) . . . . . *Lethocerus*
- 2b Mesal margins of laterotergites ending at basal angles of genital plate (Fig. 9); antennal segment 3 with a large expanded and flattened dorsal lobe; tibia and tarsus of middle and hind legs similar, narrow, flattened but not broadly dilated; fore tarsus appearing one-segmented, both its claws vestigial (Horvathiniinae) . . . . . *Horvathinia*
- 3a Fore tarsus one-segmented, lateral margins of abdomen not smooth but interrupted at the borders between the segments (Pl. 7f) . . . . . *Weberiella*
- 3b Fore tarsus two-segmented, lateral margins of abdomen smooth . . . . . 4
- 4a Membrane well developed, its greatest width more than that of clavus, most of its cells equal in length, in the form of long, narrow rectangles (Pl. 5, 6, 7c–e) . . . . . *Belostoma*
- 4b Membrane much reduced, its greatest width equal to, or more commonly less than the greatest width of clavus, its cells usually small, feebly developed, or short rectangles of various length . . . . . *Abedus*

As many Belostomatidae are large and striking the following key for identification in the field is given. This key is restricted to the species actually known to occur in the Guyanas. Measurements are to be taken with a scale and not by approximation. No optics other than a good hand lens are required.

#### FIELD KEY TO BELOSTOMATIDAE OF THE GUYANA'S

- 1a Length exceeding 50 mm, hind tibia and tarsus thin and broad . . . . . 2
- 1b Length not exceeding 47 mm, hind tibia and tarsus not thin and broad . . . . . 3
- 2a Sternites yellowish with brown markings, notably a pair of distinct dark brown to blackish longitudinal bands (rather common, regularly at lights, Pl. 7b) . *Lethocerus annulipes*
- 2b Sternites without distinct longitudinal bands, often with a reddish tinge (apparently rare, Pl. 7a) . *Lethocerus delpontei*
- 3a Length nearly 30 mm or more . . . . . 4
- 3b Length not exceeding 25 mm . . . . . 9
- 4a Elongate, nearly parallel-sided species, length 32–38 mm; pronotum and hemielytra covered with brownish golden hairs; pronotum and scutellum bumpy (apparently rare, southern, Pl. 6a) . . . . . *Belostoma aurivillianum*
- 4b Distinctly elliptical or oval species; pronotum and scutellum sometimes carinate but not distinctly bumpy . . . . . 5
- 5a Vertex and posterior lobe of pronotum with a, sometimes thin but distinct, median carina; pronotum covered with a dense mat of small scalelike hairs; veins of corium very prominent; general shape usually broadly oval but rather slender specimens may occur, length 35–40 mm (quite common in the interior, Pl. 6b) . . . . . *Belostoma stollii*
- 5b Vertex and posterior lobe of pronotum not simultaneously carinate, pronotum not covered with scalelike hairs . . . . . 6

- 6a Large (length 39–47 mm) broadly oval species, ratio length : width pronotum about 1.9; vertex with a longitudinal carina which may be quite indistinct (apparently rare, Pl. 5a) . . . . . *Belostoma gestroi*
- 6b More elongate species, ratio width : length pronotum exceeding 2; vertex without longitudinal carina . . . . . 7
- 7a Length 28–35 mm (not common, Pl. 5b) . *Belostoma guianae*
- 7b Length 38–45 mm . . . . . 8
- 8a Anteculus about  $1\frac{1}{2}$  times longer than interoculus (rare, Pl. 5d) . . . . . *Belostoma malkini*
- 8b Anteculus about  $1\frac{1}{2}$  times longer than interoculus (common in cultivated areas, Pl. 5c) . . . . . *Belostoma harrisi*
- 9a Fore tarsi one-segmented; margins of abdomen serrate; general form rhomboideal, length 20–23 mm (apparently rare, Pl. 7f) . . . . . *Weberella rhomboides*
- 9b Fore tarsi two-segmented; margins of abdomen forming a smooth curve; general form elliptical or oval . . . . . 10
- 10a Ventral pilosity completely covering the connexiva and extending onto the sternites, length about 20 mm or more (apparently rare, Pl. 6e) . . . . . *Belostoma truxali*
- 10b Ventral pilosity covering about half the connexiva and not extending onto sternites . . . . . 11
- 11a Length about 20 mm or more, eyes distinctly elongate triangular (scarce but widespread, Pl. 6d) . . *Belostoma bosqi*
- 11b Length rarely exceeding 15 mm, eyes not distinctly triangular . . . . . 12
- 12a Prosternal keel relatively elevated (0.4 mm), elongate, apex rather sharply rounded, pointing cephalad Fig. 136, 137; length usually about 14 mm, ratio width : length pronotum 1.9 (common, in Suriname especially in and at the borders of the savannah regions, Pl. 7e) . . . . . *Belostoma denticolle*

- 12b Prosternal keel less elevated (0.3 mm), not elongate, apex most often less distinct Fig. 138, 139; length in most cases about 11–12 mm, ratio width:length pronotum 2.0 – 2.1 (common and abundant, Pl. 7d) . . . *Belostoma micantulum*

#### BELOSTOMATINAE Lauck & Menke, 1961

Relatively small to large Belostomatidae; antennal segments 2 and 3 similar, each with a long fingerlike dorsal process, 4 long and fingerlike (in *Abedus* the antennae may be reduced). Tibia and tarsus of middle and hind legs similar, flattened, angular, not broadly dilated. Mesal margins of air straps usually remote. Male, ventral diverticulum and aedeagus fused.

#### **Belostoma** Latreille, 1807

Small to large Belostomatinae (ranging in length from 9 to 50 mm). Anteoculus about as long as or longer than interoculus. Anterior tarsus two-segmented, segments subequal. Membrane of hemielytra large, with few, mostly unbranched, veins and without cross veins. Phallobase bifurcate dorsally, arms extending nearly to apex of ventral diverticulum.

The classification and species concept in *Belostoma* has been based on the, unfortunately unfinished, monograph of the genus by LAUCK (1962, 63, 64).

The following KEY (adapted from LAUCK 1962) is valid for S. American specimens only as several groups restricted to N. and Central America have been excluded. Moreover LAUCK's *dentatum* group and *subspinosum* group have here been united into the *dentatum* group (s.l.)

#### KEY TO SPECIES GROUPS IN BELOSTOMA

- |    |   |   |
|----|---|---|
| 1a | Pilosity covering entire margin of connexivum (Fig. 11, 12) . . . . . | 2 |
| 1b | Pilosity not covering entire margin of connexivum (Fig. 10) . . . . . | 5 |
| 2a | Pilosity covering part or all of sternites (Fig. 12) . . . . .        | 3 |
| 2b | Pilosity not on sternites (Fig. 11) . . . . .                         | 4 |



- 3a Eyes triangular (Pl. 6d, e) . . . . . *bergi* group  
 3b Eyes globular (at present only known from southern South America) . . .  
 . . . . . *testaceopallidum* group
- 4a Large dilated species, more than 30 mm long (Pl. 5a) . . *dilatatum* group  
 4b Less than 30 mm long (at present only known from western and southern  
 South America) . . . . . *bifoveolatum* group
- 5a Pronotum and hemielytra covered with fine brownish-golden scale-like hairs,  
 pronotum and scutellum with a distinct yellowish median carina, general  
 shape elongate (Pl. 6a). . . . . *aurivillianum* group  
 5b Pronotum and hemielytra without brownish-golden hairs, pronotum and  
 scutellum without distinct median carina, species with there a faint carina,  
 have general shape oval to broadly oval . . . . . 6
- 6a Outer margin of eye straight, eye triangular (Fig. 135; Pl. 6c-e) . . . . 7  
 6b Outer margin of eye rounded, more globose . . . . . 8
- 7a Segment 1 of rostrum longer than segment 2 (Pl. 6d-e) . . . *bergi* group  
 7b Segment 1 of rostrum shorter than segment 2 (Pl. 6c) . . *discretum* group
- 8a Small species, less than 24 mm long; segment 1 of rostrum usually shorter  
 than segment 2 . . . . . 9  
 8b Larger species, more than 28 mm long; segment 1 of rostrum longer than or  
 equal to segment 2 . . . . . 13
- 9a Ventral diverticulum of male genitalia with prominent thickenings along  
 laterodorsal margins (Fig. 142, 147) . . . . . *pygmeum* group  
 9b Ventral diverticulum of male genitalia without thickenings on laterodorsal  
 margins . . . . . 10
- 10a Ventral diverticulum flat, spatulate or disk-shaped (Fig. 131, 140, 143) . 11  
 10b Ventral diverticulum not flattened . . . . . 12
- 11a Anterior anteocular space about  $1\frac{1}{2}$  times the width of an eye, ventral diver-  
 ticulum spatulate (Pl. 7e) . . . . . *denticolle* group  
 11b Anterior anteocular space about  $1\frac{1}{2}$  times the width of an eye, ventral diver-  
 ticulum more circular (at present only known from southern South America)  
 . . . . . *oxyurum* group
- 12a Interocular space nearly twice the width of an eye; prosternal keel triangular  
 with pointed apex . . . . . *triangulum* group  
 12b Interocular space  $1\frac{1}{2}$  times or less the width of an eye, prosternal keel semi-  
 circular . . . . . *plebejum* group
- 13a Vertex with prominent carina; scutellum not reaching nodal line . . . 14  
 13b Vertex without a median carina; scutellum reaching nodal line . . . . .  
 . . . . . *dentatum* group (s.l.)
- 14a Clypeus reaching the ocular line . . . . . *stollii* group  
 14b Clypeus not reaching the ocular line . . . . . *dilatatum* group

*Belostoma dentatum* group (s.l.)

Moderately large to large elliptical, elongate or ovate species ranging from 26 to 50 mm long. All species nearly uniform brown occasionally suffused with creamy yellow. Each femur with broad, sometimes coalescing dark bands; each fore and middle femur with three regular bands. Anteculus from slightly less to considerably longer than interoculus; mesal margins of eyes parallel; eyes about as long as wide; segment 1 of rostrum usually distinctly longer than segment 2, sometimes subequal. Prosternal keel prominent, scutellum reaching the nodal line. Pilosity covering about one third to one half the connexivum, extending only slightly beyond the penultimate segment (except *B. cummingsi* De Carlo from S. Brasil and Argentina); distinctly constricted between spiracles. Ventral diverticulum of genitalia with caudal and ventroapical protuberance.

KEY TO SPECIES OF *B. dentatum* GROUP (S.L.)  
IN THE GUYANA REGION

- 1a Length up to 35 mm, segment 1 of rostrum subequal to segment 2 (Pl. 5b) . . . . . *B. guianae*
- 1b Length exceeding 35 mm, mostly about 40 mm or more, segment 1 of rostrum distinctly longer than segment 2 in most cases . . . . . 2
- 2a Length of segment 1 of rostrum about 1.3 times or more the length of segment 2 . . . . . 3
- 2b First rostral segment only slightly longer than second (known from Brasil, South of Rio Amazonas) . . . . . *B. foveolatum*
- 3a Length of anteculus less than 1.3 times the length of interoculus . . . . . 4
- 3b Length of anteculus 1.3 times or more the length of interoculus . . . . . 5

- 4a Ocular index (V) less than 1.3, length of anteoculus about 1.1 times the length of interoculus (known from Panamá, Venezuela, Perú) . . . . . *B. porteri*
- 4b Ocular index (V) 1.35 or more, length of anteoculus 1.2 times or more the length of interoculus (known from Guyanas and Pará) . . . . . *B. harrisi*
- 5a Length most often 45 mm or more, length of anteoculus 1.35 times or more the length of interoculus. Dorsal arms of male genitalia relatively broad (Fig. 121) (known from Perú, Brasil, Paraguay, Argentina) . . . . . *B. dentatum*
- 5b Length nearly always less than 45 mm, length of anteoculus 1.4 times or less the interoculus. Dorsal arms of male genitalia relatively slender (Fig. 122, 123):
- 1) (known from Guyanas and Pará) . . . . . *B. harrisi*
- 2) (known from Bolivia, Venezuela, Trinidad, Guyana) . . . . . *B. malkini*
- (These latter species are to be identified by comparison of the specimens at hand with the descriptions).

### *Belostoma guianae* Lauck, 1962

Pl. 5; Fig. 115, 124.

*Belostoma guianae* LAUCK, 1962, p. 74–76, fig. 28, 46, 52 (Guyana).

GUYANA; SURINAME, Suriname.

GUYANA: Vreedon Hoop, West Bank Demerara, 29.III.1932, 1♂; Plantation Eccles, E. Bank Demerara, 4.IV.1932, 1♂; Georgetown, Botanical Gardens, 25.XI.1937, 2♀ (det. Lauck, paratypes); Vreedon Hoop, 28.II.1932, 1♀; same, 29.III.1932, 1♂; aback of Plantation Ogle, E. Coast, 18.XI.1937, 1♂ (Harris, KU); Guyana, 2♂, 4♀ (Bartlett); Karanambo, 3.V.1958, 1♂ (McConnel) (BMNH).

SURINAME: Suriname, Republiek, V–VII.1965, 2♀ (Mees); Vierkinderen kreek, 5.IX.1948, 1♂ (Suriname Exp. 1948–1949); Zanderij, *Prooo* 26.XII.1960, 2♂, 1♀ (Gij) (LM).

Length ♂  $\bar{x}$  =  $30 \pm 1$ , ♀  $\bar{x}$  =  $32 \pm 2$ ; width of abdomen ♂  $\bar{x}$  =  $14.7 \pm 0.5$ , ♀  $\bar{x}$  =  $14.8 \pm 0.7$ ; width of pronotum ♂  $\bar{x}$  =  $10.3 \pm$

0.4, ♀  $\bar{x} = 10.6 \pm 0.4$ ; ocular index (V) ♂  $\bar{x} = 1.26 \pm 0.09$ , ♀  $\bar{x} = 1.26 \pm 0.08$ ; width of head ♂ 6.1 – 6.3 – 6.5, ♀ 6.0 – 6.2 – 6.4; length of pronotum ♂ 4.9 – 5.1 – 5.3, ♀ 5.0 – 5.2 – 5.4.

Colour, dorsally, rather dark brown; abdominal venter orange yellow to somewhat reddish brown most often with a pair of longitudinal dark stripes.

Interocular space 1.4 – 1.5 times the width of an eye; anteculus and interoculus of subequal length; clypeus not reaching the ocular line (0.3–0.4 mm); width of interocular space : length of anteculus 1.5 – 1.6; eyes somewhat triangular. Rostrum, segment 1 and 2 of subequal length.

Prosternal keel prominent, apex rather acutely rounded, directed slightly cephalad.

Phallus as in Fig. 115, 124.

*B. guianae* belongs to the *subspinosum* group of LAUCK 1962 who states that the differences between the two groups are in the male genitalia and that perhaps they should actually be considered a single group. As *B. guianae* is the only species of the *subspinosum* group known to occur in the Guyana Region I have here fused both groups into the *dentatum* group (s.l.). Other species from the northern part of S. America which may run to *B. guianae* with the keys presented here are *B. venezuelae* Lauck, occurring from Venezuela and Curaçao westward to Ecuador and Perú, which is very similar but smaller, its greatest width not exceeding 14 mm and *B. anurum* (H.-S.) from Eastern Brasil, differing in having anteculus longer than interoculus and segment 1 of rostrum about 1.2 times length segment 2.

### ***Belostoma dentatum* (Mayr, 1863)**

Fig. 112, 121.

*Zaitia dentata* MAYR, 1863, p. 356–357 (Brasil).

*Belostoma dentatum*; DE CARLO 1938, p. 212, fig. 48 (Brasil, Paraguay, Argentina).

*Belostoma dentatum*; LAUCK 1962, p. 49–51, fig. 10, 14, 18 (Brasil, Perú).

BRASIL, Amazonas!, Rondônia!, Mato Grosso!, Rio de Janeiro, Minas Gerais, Rio Grande do Sul; PERÚ; PARAGUAY; ARGENTINA, Entre Ríos, Santa Fé, Chaco, Salta.

BRASIL: Pará, Santarém, Rio Tapajós, Sr3, 27.II.1941, 1♂ (det. DC, W). Amazonas, Manacapuru, IV.1928, 1♂ (Klages, KU); Manacapuru, Lago Calado, 10.VI.1967, 1♀ (Junk, W). Rondônia, Rio Madeira, Porto Velho, 1954, 2♂, 1♀ (Mann, USNM). Mato Grosso, Corumba, 1♂, 1♀ (ex. Bueno col., KU). Rio Grande do Sul, Sta. Cruz, X.1970, 1♂, 1♀ (Walter, col. Eckerlein).

PARAGUAY: Villa Rica, at light, 29.X.1931, 1♂ (R. F. Hussey, det. *B. malkini* Lauck 1961, KU).

Length ♂ 43 – 46 – 49, ♀ 42 – 45; width of abdomen ♂ 18 – 20 – 22, ♀ 19 – 20; width of pronotum ♂ 13 – 14 – 15, ♀ 14 – 15; ocular index (V) ♂ 1.2 – 1.3 – 1.4, ♀ 1.3 – 1.4; width of head, ♂ 8.0 – 8.5 – 9.0, ♀ 8.2 – 8.5; length of pronotum ♂ 7.3 – 7.8 – 8.4, ♀ 8.1 – 8.2.

Colour as described for the species-group.

Interocular space 1.2 – 1.5 times the width of an eye; length of anteculus 1.3 – 1.5 times the length of interoculus; clypeus remote from ocular line (0.7 – 1.2 mm); width of interocular space : length of anteculus about unity; eyes somewhat triangular. Rostrum, length of segment 1 : length of segment 2 about 1.4 – 1.5.

Prosternal keel bluntly rounded (although the prosternal keel is slightly more acute than in *B. harrisi* and *B. malkini* the differences are too slight to be of much use).

The records from Manacapuru considerably extend the known distribution of the species towards the North-east.

The specimens from Manacapuru and Rondônia are the typical dilated *B. dentatum* which at first sight seems identical with *B. dilatatum*. The specimens from Paraguay and Mato Grosso are smaller and less dilated and at first sight are identical with *B. malkini*. The male genitalia of the specimens under consideration are identical and agree with *B. dentatum* (Fig. 112, 121).

This species may be similar to *B. dilatatum* and *B. martini* (Montd.) which have, however, a distinct carina on vertex and connexival margins entirely pilose. Small specimens may be similar to large ones of *B. malkini* and *B. porteri*. The latter has a distinctly shorter

anteoculus (about 1.1 times interocular length). Reliable differences between *B. malkini* and *B. dentatum* are found only in the phallus, especially the broad dorsal arms (in dorsal view) are characteristic of the latter (Fig. 121).

### ***Belostoma foveolatum* (Mayr, 1863)**

*Zaitia foveolata* MAYR, 1863, p. 355–356.

*Belostoma foveolatum*; DE CARLO 1938, p. 213, fig. 49 (Brasil).

*Belostoma foveolatum*; LAUCK 1962, p. 55–56, fig. 22 (Brasil).

BRASIL: Pará, São Paulo, Minas Gerais, Rio de Janeiro.

BRASIL: Pará, Lago Grande (near Manaus), II.1939, 2♀ (Olalla, det. Lauck).  
São Paulo, 1♀ (det. Montandon 1914, det. Lauck 1959) (KU). This species  
might occur in the Guyana Region.

Length 38 – 39; width of abdomen 16 – 17; width of pronotum 11 – 13; width of head 7.2 – 7.5; length of pronotum 6.4 – 7.3.

Colour as described for the species-group.

Interocular space 1.3 – 1.4 times the width of an eye; length of anteoculus subequal to the length of interoculus; clypeus reaching or nearly reaching the ocular line (0–0.1); interocular space distinctly wider than the length of anteoculus; eyes globose, slightly triangular. Rostrum, segment 1 only slightly longer than segment 2.

Prosternal keel somewhat pointed apically.

Differs from *B. dentatum*, *B. malkini* and *B. harrisi* in relatively shorter anteoculus; moreover the length of 1st rostral segment of the remaining species of the *B. dentatum* group is at least about 1.3 times the length of 2nd. Finally *B. foveolatum* is relatively narrower than other species in the group except *B. malkini*.

**Belostoma harrisi** Lauck, 1962

Pl. 5c; Fig. 114, 122, 134.

*Belostoma harrisi* LAUCK, 1962, p. 53–54, fig. 12, 16, 19 (Guyana, Suriname, Brasil).  
*Belostoma doesburgi* DE CARLO, 1966, p. 104–105, fig. 24, 29 (Suriname).

GUYANA; SURINAME, Nickerie, Saramacca, Suriname, Commewijne, Marowijne;  
 BRASIL, Pará.

GUYANA: E. Coast Demerara, Mon Repos, Fresh water Canal, 15.I.1971, 3♂ (Ramsammy, GU); aback of Plantation Ogle, 18.XI.1937, 1♂ (type locality); Plantation Ogle, 14.IV.1932, 1♂ (Harris) (KU); Demerara, 1♂ (Sharp); Guyana, 3♀ (Bartlett) (BMNH); Georgetown, at light, 23.IX.1918, 1♂, 1♀ (Morrison, *A622*, det. *B. malkini* by Lauck, USNM).

SURINAME: Nickerie, Wageningen, 16.IV.1959, 2♀ (v. Hoof, LM). Saramacca, *SNozob*, 1♂, 3♀, 3lv; *SNozoc*, 1♂, 1♀, 3lv. Coppenamepunt, fragments of 1♀, vomit of juv. Tricoloured Heron?, 31.V.1971; 3 larvae III, stomach of juv. Little blue Heron, 12.VI.1971 (Spaans, CN). Suriname, *SNo77*, 1♀; *SN109*, 1♂; *SN158*, 1♀; Paramaribo, l'Hermitage, at light, 30.VIII.1969, 65♂, 117♀; same, 14/20.IX.1969, 74♂, 49♀; same, 6/9. I.1970, 74♂, 83♀; same, 11.I.1970, 99♂, 139♀; same, 9.II.1970, 7♂, 5♀; same, 14.IV.1970, 21♂, 25♀; same, 3.V.1970, 8♂, 10♀; same, 26.V.1970, 1♂; Paramaribo, 9.IX.1958, 1♂; same, 3.I.1959, 1♀; same, 27.II.1960, 1♀; same, 26.IV.1962, 3♂, 2♀; same, 15.IX.1962, 1♂, 5♀ (holo-, allo- and paratypes of *B. doesburgi* DE CARLO); same, X.1962, 1♀; Para Rivier near Hannover, *P1188*, 1961, 1♀ (vD); Paramaribo, 26.II.1960, 1♀; Paramaribo, Santo Boma, 24.X.1960, 1♂, 1♀ (v. Hoof); Paramaribo, 20.I.1949, 1♂; same, 2.VI.1961, 1♀; Paramaribo, Cultuurtuin, 18.II.1938, 1♂; same, 24.IV.1940, 2♀; Paramaribo, Charlesburg, 7.V.1960, 1♀; Lelydorp, in marsh, 1♂ (Gij) (LM). Commewijne, Plantage Leliëndaal, ditch, *P2154*, 17.III.1963, 2♀. Marowijne, Wia-Wia Nature Conservancy, 29.XI.1948, 1♂ (Sur. Exp. 1948/9, LM); same, near Bigisantie, dead *Avicennia* and *Sesuvium*, 3230 mgCl<sup>-1</sup>, IV.1972, 2lv.; same, pool, *Avicennia*, *Eleocharis*, *Nymphaea* and *Ruppia*, 2960 mgCl<sup>-1</sup>, IV.1972, 1♂ (Panday). Dutch Guianas, 27.IV.1916, 1♂ (Samuel, USNM, labeled *B. guianae* det. Lauck, probably a case of mislabelling).

Length ♂  $\bar{x} = 41 \pm 1$ , ♀  $\bar{x} = 42 \pm 1$ ; width of abdomen ♂  $\bar{x} = 18.0 \pm 0.4$ , ♀  $\bar{x} = 18.2 \pm 0.3$ ; width of pronotum ♂  $\bar{x} = 13.1 \pm 0.3$ , ♀  $\bar{x} = 13.3 \pm 0.2$ ; ocular index (V) ♂  $\bar{x} = 1.43 \pm 0.04$ , ♀  $\bar{x} = 1.38 \pm 0.04$ ; width of head ♂, ♀ 7.0–7.6–7.9; length of pronotum ♂, ♀ 6.3–6.7–7.2.

Ratio length: width 2.1 – 2.2 in most specimens; interocular space 1.3 – 1.5 times the width of an eye; length of anteculus 1.2 – 1.3 times the length of interoculus; clypeus not reaching the ocular line (0.3 – 0.6 mm); interocular space greater than the length of the anteculus; eye somewhat triangular; segment 1 of rostrum about 1.3 times the length of segment 2.

Prosternal keel bluntly rounded.

Phallus as shown in Fig. 114, 122.

Although this is a common and abundant species in the coastal region of Suriname as is proved by the light captures at Paramaribo, it is only occasionally taken in the field in small numbers. It seems to prefer shallow stagnant waters with rich vegetation and a soft substrate and has been found at salinities up to 3200 mgCl'/l. This species is frequently attracted to light. BOWDEN 1964 found a relation between lunar periodicity and/or rainfall and flight activity in two African Belostomatidae. *B. harrisi* seems to show its highest flight activity about two days after full moon, the numbers of flying specimens being higher during wet periods. Strong rains initiate greater flight activity regardless of the lunar period.

*B. harrisi* is very similar to *B. porteri* which has, however, length of anteculus subequal to or slightly longer than length of interoculus, the clypeus reaching or nearly reaching the ocular line. *B. harrisi* differs from *B. foveolatum* in the ratio of the first two segments of the rostrum, of which the first is only slightly longer than the second in *B. foveolatum*. Finally the length of anteculus in *B. dentatum* and *B. malkini* is 1.3 to about 1.5 times the length of interoculus; *B. malkini* is moreover, more slender whereas *B. dentatum* is nearly always bigger. (See also *B. malkini*).

### **Belostoma malkini** Lauck, 1962

Pl. 5; Fig. 117, 123, 134.

*Belostoma malkini* LAUCK, 1962, p. 52, fig. 11, 15, 20 (Venezuela, Trinidad, Guyana, Bolivia).

VENEZUELA, Zulia, Portuguesa, Monagas, Bolivar; TRINIDAD; (GUYANA ?); BOLIVIA, Sta. Cruz.

VENEZUELA: Portuguesa, Guanare, 10/13.IX.1957, 7♂, 7♀, Malkin, paratypes Lauck, Calif. Acad. Sc.).



Length ♂ 39 – 42, ♀ 39 – 41; width ♂ 17 – 18, ♀ 17; width of pronotum 13 – 14; ocular index (V) 1.2 – 1.4; with of head 7.4 – 8.0; length of pronotum 6.8 – 7.7.

Colour as described for species group.

Ratio length : width 2.3 – 2.4 (2.2 in one male); interocular space 1.4 – 1.5 times the width of an eye; length of anteoculus 1.4 – 1.5 (1.3 in one female) times the length of interoculus; clypeus remote from ocular line (0.6 – 0.8 mm); width of interocular space : length of anteoculus 0.96 – 1.03 (according to LAUCK 1962 the interoculus is distinctly narrower than the length of anteoculus); eyes not distinctly globose. Rostrum, length of segment 1 : length of segment 2 1.4 – 1.5 (1.3 in one male).

Prosternal keel prominent, bluntly rounded.

Phallus as in Fig. 117, 123.

LAUCK 1962 did not explicitly compare *B. malkini* with *B. harrisi*, although the male genitalia are almost identical and it is quite difficult to decide in which species specimens of *B. harrisi* with a relatively long anteoculus are to be placed, when one is not acquainted with both species. The reason was probably that the general appearance of these two species differs more than the descriptions suggest. *B. malkini* has a rather elongate elliptical shape with ratio length : width nearly always 2.3 – 2.4, whereas *B. harrisi* is broader and more ovoid with ratio length : width mostly 2.1 – 2.2 but individual specimens may be rather slender. The anteoculus and first rostral segment are relatively longer in *B. malkini* but here too, the species overlap. I saw a male and a female from Guyana in the USNM identified *B. malkini* by Lauck, but although being intermediate in some respects they agree better with *B. harrisi*, especially regarding the structure of anteoculus and rostrum. As these are probably the specimens on which LAUCK 1962 included Guyana in the range of *B. malkini* it is doubtful whether this species really occurs in the Guyanas. (See also *B. dentatum*).

**Belostoma porteri** De Carlo 1942

*Belostoma porteri* DE CARLO, 1942, p. 212-213, fig. 1-3 (Panamá, Canal Zone, Perú, Venezuela).

*Belostoma porteri*; LAUCK 1962, p. 54-55 (Panamá, Venezuela).

PANAMÁ; CANAL ZONE; PERÚ; VENEZUELA, Mérida.

PANAMÁ: Panamá City, 4.VI.1914, 1♂, 1♀ (Zetek, det. Lauck, USNM).

CANAL ZONE: 2♂ (Bueno col., det. Lattin, KU).

This species, which probably does not occur in the Guyana Region, is in general form and size very similar to *B. harrisi*. Closer examination reveals that the ante-oculus is distinctly shorter and relatively stouter. *B. foveolatum*, the second species in this group with a relatively short anteoculus, differs from all other species in general shape, being much more elongate oval.

*Belostoma aurivillianum* group

So far this group contains only one species and may be characterized by the description of its species. Possible distinguishing group characters are the hairy pronotum, scutellum and hemielytra, and the carinate pronotum and scutellum.

**Belostoma aurivillianum** (Montandon, 1899)

Pl. 6a; Fig. 116, 125.

*Zaitha aurivilliana* MONTANDON, 1899b, p. 171-172 (Venezuela, Colombia, Brasil).

*Belostoma aurivillianum*; DE CARLO, p. 220-221 (Brasil).

*Belostoma aurivillianum*; LAUCK 1963, p. 82-83, fig. 57, 63 (Brasil).

VENEZUELA; SURINAME (?), Nickerie; BRASIL, Territorio Rio Branco, Pará, Goiás, São Paulo; COLOMBIA; BOLIVIA.

SURINAME: Nickerie, Sipaliwini, 14.VI.1963, 1♂ (vD, LM).

BRASIL: Terr. Rio Branco, Boa Vista, 3.IX.1941, 1♀ (Sioli, det. DC).  
Pará, 1♀ (Bueno col., KU). São Paulo, 1♀ (det. Lauck, KU).

BOLIVIA: Sta. Cruz, Buenavista, 21.IX.1921, 1♂ (Steinbach; det. Lauck, plesiotype ♂, KU).

The description is based on the specimen from Suriname.

Length 35; width of abdomen 15.5; width of pronotum 12.5; ocular index (V) 1.14; width of head 7.3; length of pronotum 6.6.

Colour, dark brown, carina on posterior lobe of pronotum and scutellum yellowish, inner margins of clavi yellowish. Markings on anterior femur not arranged in bands; fore tibia, middle and hind femur with three little contrasting, dark bands.

Interocular space about 1.7 times the width of an eye; length of anteoculus about 1.2 times the length of interoculus; clypeus clearly reaching the ocular line; anterior interocular space about 1.3 times the length of anteoculus. Vertex with a faint median carina. Segment 2 of rostrum about 1.3 times the length of segment 1.

Posterior lobe of pronotum and scutellum with a distinct median carina. Pronotum, scutellum and hemielytra with brownish golden hairs. Prosternal keel prominent, elongate, apex acutely rounded, not or hardly directed cephalad.

Phallus as in Fig. 116, 125.

The specimen from Suriname agrees with the specimens studied by Lauck. Unfortunately the ♂ plesiotype quoted lacks its phallus and the phallus of the specimen from Suriname differs in several respects from the drawings by LAUCK 1963; it is possible that the specimen from Suriname represents an undescribed species. Until more specimens of this form become available I will refrain from describing it as such. *B. aurivillianum* can be separated from all other *Belostoma* by the presence of the brownish golden hairs on pronotum, scutellum and hemielytra. Moreover its median carinae are distinctive. Species from the *B. stollii* group, which also possess these carinae (slightly less developed), have a better developed carina on vertex and their general form is oval to broadly oval, whereas in *B. aurivillianum* the carina on vertex is poorly developed and the general form is elongate.

#### *Belostoma stollii* group

Large elliptical rather broad and flat species, length varying from 36 to 39 mm. Anteoculus about 1.3 – 1.4 times the length of inter-

oculus; clypeus reaching or nearly reaching the ocular line; interoculus about twice the width of an eye; eyes small, not especially globular; vertex with a prominent median carina; dense pilosity along the mesal margin of eyes; segments 1 and 2 of rostrum of subequal length. Prosternal keel rather prominent, apex projecting slightly cephalad; pronotal pits very distinct, a faint median carina on the posterior  $\frac{1}{4}$  of the pronotum. Scutellum clearly not reaching the nodal line, with a rather distinct median carina on posterior half, two distinct sublateral carinae on anterior part. Pilosity of venter covering about half of the connexiva, not on hardly reaching the last segment.

***Belostoma stollii* (Amyot et Serville, 1843)**

Pl. 6b; Fig. 118, 127.

*Zaitia stollii* AMYOT et SERVILLE, 1843, p. 430 (Guyane Française).

*Belostoma stollii*; DE CARLO 1938, p. 240 (Guyanas, Brasil).

*Belostoma stollii*; LAUCK 1963, p. 86-88, fig. 59, 65 (Venezuela, Suriname, Guyane Française, Brasil).

VENEZUELA, Amazonaz; GUYANA; SURINAME, Nickerie, Marowijne, Brokopondo; GUYANE FRANÇAISE.

GUYANA: Supuruni Creek, 23.VIII.1937, 1♀ (Harris, det. Lauck, KU).  
SURINAME: Nickerie, Kabalebo River, Avanavero Falls, 5/12.VI.1971, 2♂; Avanavero, source, 7.IV. 1971, 1♂, 1♀ (Gij). Marowijne, Litani River, Fetikreek, 10.VIII.1939, 2♀ (Gij). Brokopondo, Brokopondo, 26.III.1965, 1♂; same, 28.IV.1965, 1♂; between Kabel and Brownsweg, 30.III.1965, 1♂ (Mees) (LM).

GUYANE FRANÇAISE: Pariacabo, Rivière de Kourou, Janvier, Le Mout, 1♂ (USNM, bearing labels *B. stollii* Am. & Serv. det. MONTANDON 1909 and *B. stollii* (A. & S.) det. LAUCK 1959; not the specimen designated neotype LAUCK 1963 p. 88).

Length ♂  $\bar{x}$  =  $37 \pm 2$ , ♀  $\bar{x}$  =  $39 \pm 3$ ; width of abdomen ♂  $\bar{x}$  =  $18 \pm 1$ , ♀  $\bar{x}$  =  $19 \pm 2$ ; width of pronotum ♂  $\bar{x}$  =  $12 \pm 1$ , ♀  $\bar{x}$  =  $13 \pm 1$ ; ocular index (V) ♂, ♀  $\bar{x}$  =  $1.6 \pm 0.1$ ; width of head ♂ 7.3 - 7.5 - 8.0, ♀ 7.3 - 7.8 - 8.2; length of pronotum ♂ 5.8 - 6.0 - 6.3, ♀ 5.8 - 6.1 - 6.5.

Colour, dorsally dark brown, head and pronotum lighter; ventrally dark brown, outer margin of connexiva yellowish, legs predominantly dark with light transverse bands.

Interocular space 1.7 – 2.0 times the width of an eye; length of anteculus 1.3 – 1.5 times the length of interoculus; clypeus reaching or nearly reaching the ocular line (0 – 0.4 mm); width of interocular space : length of anteculus 1.4 – 1.7; eyes rather small, not distinctly globose. Rostrum, length of segment 1 : length of segment 2 0.99 – 1.07.

Disc of pronotum with a dense mat of short scale-like hairs (which may be rubbed-off for a considerable part). Prosternal keel with apex smoothly rounded, directed slightly cephalad.

Phallus as in Fig. 118, 127.

A distinct species by its flat and broad general appearance, it has some similarity to species of the *B. dilatatum* group but the latter are larger. Structural characters to separate *B. stollii* from other species are the distinct median carina on vertex, segments 1 and 2 of rostrum of subequal length, body length 35 to 40 mm, ratio length : width 2.1 or less and the dense covering of short scalelike hairs on pronotum. A Peruvian species *B. planum* Lauck is virtually identical with *B. stollii* but lacks the scalelike hairs on pronotum. (See also under *testaceopallidum* group).

#### *Belostoma testaceopallidum* group

This group consists of three rare species apparently confined to the southern half of Brasil and N. Argentina. At first sight they are very similar to *B. stollii* but differ in that segment 1 of rostrum is distinctly shorter than segment 2 and in that the ventral pilosity covers the connexiva and all or nearly all the abdominal venter.

*B. testaceopallidum* Latreille is the type-species of *Belostoma*.

#### *Belostoma dilatatum* group

Large, broadly ovate rather flat species, length varying from 35 to 50 mm. Anteculus distinctly longer than interoculus (about  $1\frac{1}{2}$ ), clypeus not reaching the ocular line; interoculus about  $1\frac{1}{2}$  times

the width of an eye; eyes more or less triangular. Scutellum not reaching the nodal line. Prosternal keel prominent, apex rounded. Pilosity of venter covering the connexiva either about half or entirely.

### ***Belostoma gestroi* Montandon, 1900**

Pl. 5a; Fig. 119, 126.

*Belostoma gestroi* MONTANDON, 1900, p. 537-539 (Argentina, Paraguay).

*Belostoma gestroi*; DE CARLO 1938, p. 218-219, fig. 54 (Bolivia, Argentina).

*Belostoma gestroi* BACHMANN 1961, p. 25 (Argentina).

*Belostoma gestroi*; LAUCK 1963, p. 94-96, fig. 69, 72 (Brasil, Perú Bolivia, Paraguay, Argentina).

SURINAME!, Brokopondo; BRASIL, Amazonas, Mato Grosso; PERÚ, Loreto, Junín; BOLIVIA; PARAGUAY, ARGENTINA, Chaco, Corrientes, Entre Ríos, Buenos Aires, Tucumán.

SURINAME: Brokopondo, Kassikreek, 20.III.1964, 1♂ (Gij, LM).

BOLIVIA: Beni, Reyes, Beni River, XII.1956, 1♀ (Pena, det. Menke).

Description of the specimen from Suriname.

Length 47; width of abdomen 24; width of pronotum 15.1; ocular index (V) 1.72; width of head 8.3; length of pronotum 7.1.

Colour dull brown, venter dark, legs dark with rather narrow yellowish transverse bands.

Interocular space 1.7 times the width of an eye; length of anteculus 1.75 times the length of interoculus; clypeus quite remote from ocular line (0.6 mm); width of interocular space : length of anteculus 1.0. Vertex with a faintly developed median carina; eyes nearly triangular. Rostrum, segment 1 and segment 2 of subequal length.

Posterior part of pronotum without median carina; carinae on scutellum rather indistinct.

Pilosity of venter covering about half the connexiva, just reaching the last segment.

Phallus as in Fig. 119, 126 (adapted from LAUCK 1963).

The specimens have been compared with some examples from S. Brasil identified by LAUCK (KU). *B. gestroi* can be separated from most other species of approximately the same size by the ratio length : width which is about 2 or less; *B. stollii* which is smaller differs in sharper and more distinct carinae on vertex and scutellum; *B. dilatatum* (Dufour) and *B. martini* (Mont.) differ in having the pilosity of venter covering the entire connexiva. Finally *B. brasiliensis* De Carlo does not seem to be different from *B. gestroi* but a definitive conclusion has to await study of specimens of *B. brasiliensis*.

*Belostoma discretum* group

This group contains only one species and is characterized by its description.

***Belostoma discretum* Montandon, 1903**

Pl. 6c; Fig. 120, 129, 135.

*Belostoma discretum* MONTANDON, 1903, p. 22–23 (Brasil, Paraguay, Argentina).

*Belostoma discretum*; DE CARLO 1938, p. 221, fig. 58 (Brasil, Argentina).

*Belostoma discretum*; MENKE & LAUCK 1962, p. 4 (Brasil).

*Belostoma discretum*; LAUCK 1963, p. 99–101, fig. 71, 74 (Perú, Bolivia, Brasil, Argentina).

BRASIL, Pará, Amazonas, Goiás, Mato Grosso, São Paulo; PERÚ, BOLIVIA, PARAGUAY; ARGENTINA, Chaco. Corrientes, Sta. Fé.

BRASIL: Pará, Zona Bragantina, Quatipuru, *A513-I*, 3.IV.1963, 1♀; same, *A514-I*, 4.IV.1963, 1♀; Santarém, *S193*, 20.VI.1947, 1♀ (det. DC, W). Amazonas, Rio Solimões, Manacapuru, 26.VI. 3♂, 2♀ (Klages); Manaus, 30.X.1919, 1♂, 1♀ (Parish) (det. Lauck, USNM); Manaus, Ilha do Careiro, *Si/Sa 9-10*, 29.XI.1959, 1♂, 2♀; same, *Si/Sar11*, 29.IX.1959, 1♀; Lago do Catalão, *Si/Sar5*, 7.XII.1959, 1♀ (det. DC); Lago dos Passarinhos *P56*, 17.XI.1967, 2♂, 2♀; Costa do Baixio, *P65*, 5.VII.1967, 1♂, 1♀; Manacapuru, Lago Calado, *P71*, 8.I.1968, 1♀; Lago Manacapuru, *Pr45A*, 1♂, 2♀ (Junk, W).

Description based on the specimens from Manacapuru and Manaus, det. LAUCK.

Length ♂, ♀ 23–25–26; width ♂, ♀ 11–12–12; width of pronotum ♂ 8.1–8.5–9.2, ♀ 8.3–8.4–8.4; ocular index (V) ♂ 1.29–1.33–1.38, ♀ 1.35–1.39–1.45; width of head ♂, ♀ 4.8–5.0–5.2; length of pronotum ♂, ♀ 4.1–4.3–4.5.

Colour, dorsally light brown, clavus and parts of scutellum somewhat darker. Venter light yellowish brown, legs light brown with rather indistinct dark transverse bands.

Interocular space 1.2–1.4 times the width of an eye; length of anteculus 0.9–1.0 times the length of interoculus; clypeus not reaching the ocular line (0.3–0.4 mm); width of interocular space : length of anteculus about 1.3; eyes triangular, outer margins rather straight (Fig. 135). Rostrum, length of segment 1 : length of segment 2 about 0.9.

Prosternal keel prominent, tapering towards a narrowly rounded apex.

Scutellum nearly reaching the nodal line in females (0–0.2 mm), not reaching it in males (0.4–0.6 mm).

Phallus Fig. 120, 129.

This species has at first sight some similarity to the species of the *B. dentatum* group (s.l.) which are larger except for *B. asiaticum* (Mayr) and small specimens of *B. anurum* (H.-S.) and *B. venezuelae* Lauck. Of these *B. anurum* has segment 1 of rostrum : segment 2 about 1.2, in the other two the eyes are more globose and the scutellum reaches or surpasses the nodal line.

### *Belostoma bifoveolatum* group

Medium sized elliptical to ovoid *Belostoma*, length varying from 19 to 26 mm. Anteculus subequal or shorter than interoculus, clypeus reaching or nearly reaching the ocular line. Eyes about as long as broad, globose. Ventral pilosity covering the connexiva completely, extending along the genital operculum but absent on abdominal venter.

The species of this group have some superficial similarity to *B. discretum* and small species of the *B. subspinosum* group. They differ in the extension of the ventral pilosity and from *B. discretum* moreover by the form of the eyes.

There are three species known, occurring in the southern part of South America and along the Andes up to Perú. *B. bifoveolatum* Spinola is one of the very few Nepomorpha occurring both in Argentina and Chile.



*Belostoma triangulum* group

Flat, broadly ovoid to elliptical species, length ranging from 19 to 23 mm. General colour dorsally brown, sometimes mottled with yellowish, venter brownish, lateral margins of connexiva dark brown with sharply contrasting yellow patches. Eyes globose, about as long as broad. Segment 1 of rostrum equal to or slightly shorter than segment 2. Prosternal keel with acute angular apex, triangular in general shape. Pilosity covering about one third of connexivum, distinctly constricted between spiracles, extending only slightly beyond penultimate segment.

The species of this group have the same general shape and structure of genitalia as several species of the *bergi* group. Both groups differ in structure of eyes, rostrum, prosternal keel and connexival pilosity.

Only one species is likely to occur in the Guyana Region.

***Belostoma bicavum* Lauck, 1964**

Pl. 7c; Fig. 113, 128.

*Belostoma bicavum* LAUCK, 1964, p. 103, fig. 75, 81 (Brasil).

*Belostoma parvoculum* LAUCK, 1964, p. 103–105, fig. 76, 82 (Brasil).

BRASIL, Amazonas.

BRASIL: Amazonas, Rio Purus, Lago Berury Region, IX.1935, 3♂, 1♀ (Olalla, paratypes of *B. bicavum*, KU); Rio Solimões, Manacapuru, 26.IV., 1♂ (Klages, holotype *B. parvoculum*, KU).

Length ♂, ♀ 19–19–20; width ♂, ♀ 9.5–10.0–10.2; width of pronotum ♂, ♀ 5.8–6.0–6.3; ocular index (V) ♂ 1.72–1.77–1.79, ♀ 1.87; width of head ♂, ♀ 3.7–3.9–4.0; length pronotum ♂, ♀ 2.7–2.8–2.8.

Colour, light to medium brown, often mottled with yellowish, legs castaneous with yellowish bands and patches.

Interocular space 1.9–2.0 times the width of an eye, anteculus about  $1\frac{1}{4}$  the length of interoculus, clypeus not reaching the ocular line (0.1–0.3 mm), eye about as long as wide to slightly wider than

long with a hollowed fovea mesad of each anterolateral margin of the eyes; segment 1 of rostrum shorter than 2.

Embolium in most specimens covered with silky hairs, long anteriorly, short posteriorly, hemielytra with short hairs especially dense in female.

Phallus Fig. 113, 128.

The differences between *B. bicavum* and *B. parvoculum*, according to LAUCK 1964, are the pilosity of embolium and hemielytra which is absent in *B. parvoculum*. It is, however, very variable in the type series of *B. bicavum*. The eyes of *B. parvoculum* are reported to be smaller but the difference is very small. Moreover LAUCK gives quite different drawings of the male genitalia of the two. Now those of the unique holotype of *B. parvoculum* are damaged and twisted. I compared them with those of a paratype *B. bicavum* but could not find specific differences. Finally the foveae anterolateral of the eyes are less deep in the holotype *B. parvoculum* than in the *B. bicavum* specimens. I consider the differences between the specimen of *B. parvoculum* and the series of *B. bicavum* differences between populations rather than between species. In this group there is only one further species, *B. triangulum* Lauck, known from Perú and Mato Grosso. It differs from *B. bicavum*, e.g., in that rostral segment 1 and 2 and length of anteoculus and interoculus are subequal.

### *Belostoma bergi* group

Medium sized, flat elliptical species, length varying from 20 to 26 mm. Light brown to dark brown, hemielytra and outer margin of connexiva frequently variegated with specks of yellow. Anteoculus subequal or slightly shorter than interoculus, clypeus reaching or nearly reaching the ocular line (except *B. martinezi* De Carlo); segment 1 of rostrum distinctly longer than segment 2. Eye acutely triangular, outer margin nearly straight, length clearly greater than width. Prosternal keel prominent, elongate, apically rounded.

In several respects this group is similar to the *triangulum* group, see for differences under the latter.

KEY TO SPECIES OF *B. bergi* GROUP IN THE GUYANA REGION

- 1a Ventral pilosity covering about half the connexiva . *B. bosqi*  
 1b Ventral pilosity completely covering the connexiva *B. truxali*

***Belostoma bosqi* De Carlo, 1930**

Pl. 6d; Fig. 130, 148.

*Belostoma bosqi* DE CARLO, 1930, p. 117, fig. 4 (Argentina, Brasil, Paraguay).*Belostoma bosqi*; DE CARLO 1938, p. 220, fig. 56 (Argentina, Brasil, Paraguay).*Belostoma bosqi*; MENKE & LAUCK 1962, p. 6 (Brasil).*Belostoma bosqi*; LAUCK, 1964, p. 108-109, fig. 78, 84 (Venezuela, Suriname, Perú, Bolivia, Brasil, Paraguay, Argentina).

VENEZUELA, Portuguesa; SURINAME, Marowijne; BRASIL, Amazonas, Goiás, Mato Grosso; PERÚ; BOLIVIA; PARAGUAY; ARGENTINA, Chaco, Misiones, Corrientes.

SURINAME: Marowijne, Moengo, Boven Cottica, 23.V.1927, 2♂ (Cornell Univ., det. Lauck, KU).

BRASIL: Amazonas, Manacapuru, Lago Calado, 1969, 1♂ (Junk, W).

Description after the two males from Suriname.

Length 21; width 10; width of pronotum 6.4 - 6.7; ocular index (V) 1.15 - 1.18; width of head 3.7 - 3.9; median length pronotum 2.7 - 2.8.

Colour, dorsally light to medium brown, median stripe on scutellum, pronotum and vertex yellowish. Venter light to medium brown, on connexiva alternating with yellow. Legs about the same colour as venter, not noticeably banded.

Interoculus 1.5 - 1.6 times the width of an eye; anteoculus slightly shorter than interoculus; clypeus reaching the ocular line; elongate foveae mesad of eyes distinct; rostrum rather long, segment 1 one-fifth to one fourth longer than segment 2.

Embolium with a few scattered hairs.

Ventral pilosity covering about the connexiva, distinctly constricted between spiracles.

Phallus Fig. 130, 148.

I have seen three females from Argentina (KU, NC) identified by DE CARLO. They are identical with the specimens from Suriname.

***Belostoma truxali* De Carlo, 1960**

Pl. 6e.

*Belostoma truxali* DE CARLO, 1960, p. 47 (Suriname).

SURINAME: Marowijne, Brokopondo.

SURINAME: Marowijne, Langatabbitje, 11.XII.1965, 1♀ (Mees, LM).

Description of the female from Suriname.

Length 23.5; width of abdomen 11.5; width of pronotum 7.7; ocular index (V) 1.31; width of head 4.5; length of pronotum 3.4.

Colour, dark brown, head, except eyes, patches on pronotum and posterior part of scutellum, yellowish. Venter dark, margins of connexiva with yellowish dots, legs dark with yellowish transverse bands.

Interocular space 1.6 times the width of an eye; length of anteculus 0.9 times the length of interoculus; clypeus just reaching the ocular line, width of interocular space : length of anteculus 1.3. Vertex without a median carina, eyes triangular. Rostrum, length of segment 1 : length of segment 2 about 1.2.

Prosternal keel prominent, elongate, apex rounded, not projecting anteriorly.

Ventral pilosity completely covering the connexiva, just reaching the last segment; genital operculum bare, part of sternites also pilose.

Within the *B. bergi* group there are two species with pilosity completely covering the connexiva, *B. costalimai* De Carlo and *B. truxali*. Apart from the specimen quoted here, only one other *B. truxali* specimen is known, the female holotype from Kabelstation (Suriname). The holotype is smaller than the known specimens of *B. costalimai*, its length is 19 mm, according to DE CARLO 1960 it differs from *B. costalimai* in lacking connexival pilosity on the apical

abdominal lobes. The size of the specimen from Langatabbetje falls within the range of *B. costalimai* and it does not differ structurally, including pilosity, from a male *B. costalimai* specimen from São Paulo identified by Lauck (KU). The known localities of *B. costalimai* are all in S. Brasil so for the present I consider the specimens from Suriname as separate. A good series, including males, from Suriname will be necessary to establish the status of this species more definitely.

### *Belostoma denticolle* group

Small *Belostoma* measuring about 20 mm or less with anterior antecular space about  $1\frac{1}{2}$  times the width of an eye and ventral diverticulum of phallus rather flat.

The similar *oxyurum* group of Lauck 1959 differs notably in the anterior interocular space being about  $1\frac{1}{2}$  times the width of an eye and the general shape of the ventral diverticulum which is relatively broader in the *oxyurum* group. LAUCK's 1962 terminology – ventral diverticulum spatulate in the *denticolle*-group versus more circular in the *oxyurum* group – is at first rather confusing.

### *Belostoma denticolle* Montandon 1903

Pl. 7e; Fig. 131–133. 136, 137, 143–145.

*Belostoma denticolle* MONTANDON, 1903, p. 362 (Guyane Française).

*Belostoma denticolle*; DE CARLO 1938, p. 226 (Brasil).

*Belostoma denticolle*; DE CARLO 1957, p. 56 (studied types).

GUYANA; SURINAME, Saramacca, Suriname; GUYANE FRANÇAISE; BRASIL, Amazonas.

GUYANA: Supuruni Creek, 20.VIII.1937, 4♂, 2♀ (Harris, det. Lauck, KU); Georgetown, Vlissingen Road, VII.1935, 1♀; same, 1.VIII.1935, 1♀ (Williams, BMNH).

SURINAME: Saramacca, SN300, 1♂, 1♀; SN425, 1♂; SN446, 1♂; SN456, 1♂; SN464, 1♂, 1♀; SN465, 1♂. Suriname, SN007, 1♀; SN008, 1♀; SN013, 1♀; SN022, 1♂, 1♀; SN022Aa, 3♂, 1♀; SN023, 1♀; SN071a, 3♀; SN090, 1♀; SN096a, 1♂; SN123, 2♂, 1♀; SN152, 2♂, 1♀; SN153A, 2♀; SN153B, 6♂, 4♀; SN156B/C, 4♀; SN178, 1♂; SN179, 4♂, 4♀; Paramaribo,

III.1960, 1♀; Zanderij, 26.XII.1962, 1♂; same, in pool, *Prota*, 18.I.1961, 1♂, 5♀; small pool in clearing, pH 6.4, 13.III.1967, *L322*, 1♀ (v. d. Land) (LM).

BRASIL: Amazonas, Region de Itacoatiara, I-IV.1936, 3♂, 1♀ (Harris, *B. amazonum* det. Lauck, KU); Manacapuru, Lago Calado, 14.VIII.1941, *S48*, 1♂; R. Solimões, Lago do Rei, 29.IX.1959, *Si/Sara*, 1♂ (W).

Length ♂  $\bar{x} = 13.8 \pm 0.4$ , ♀  $\bar{x} = 14.2 \pm 0.2$ ; width ♂, ♀  $\bar{x} = 6.0 \pm 0.2$ ; width of pronotum ♂  $\bar{x} = 4.5 \pm 0.1$ , ♀  $\bar{x} = 4.6 \pm 0.1$ ; ocular index (V) ♂  $\bar{x} = 1.28 \pm 0.06$ , ♀  $\bar{x} = 1.30 \pm 0.04$ ; width of head ♂, ♀ 3.1 - 3.3 - 3.4; length of pronotum ♂, ♀ 2.2 - 2.4 - 2.5.

Colour brown with brownish yellow; legs yellowish with darker markings which form, mostly indistinct, bands. Regularly with a median longitudinal lighter band on pronotum and scutellum.

Interocular space 1.5 - 1.8 times the width of an eye; length of anteculus : length of interoculus 0.8 - 0.9; clypeus reaching or nearly reaching the ocular line; length anteculus : interocular space 0.5 - 0.6; eyes broader than long, giving a somewhat triangular impression although the outer margin is convex; mesal margins of eyes divergent posteriorly; length of segment 1 of rostrum : segment 2 0.8 - 0.9.

Ratio greatest width : length of pronotum ♂  $\bar{x} = 1.87 \pm 0.04$ , ♀  $\bar{x} = 1.89 \pm 0.06$ . Prosternal keel prominent, bluntly pointed, apex pointing cephalad, Fig. 136, 137.

Scutellum not or hardly reaching the nodal line.

Ventral pilosity covering about half the connexiva, extending only slightly beyond the penultimate segment.

Phallus as shown in Fig. 131-133, 143-145.

*B. denticolle* has been found almost exclusively in ponds in the savannah woodlands between marginal ponds and in the *Eleocharis* marshes at places exposed to the sun. It seems to be a very characteristic inhabitant of the latter habitat as it is represented in nearly all samples.

LAUCK about 1959 distinguished a nearly identical species which he labelled *B. amazonum* Lauck but the description was apparently never published. I have seen four specimens of it and in my opinion they are not specifically different from *B. denticolle*.

The *B. amazonum* specimens studied differ from most *B. denticolle* in the following respects: the prosternal keel is not distinctly

pointing cephalad; ratio median length : greatest width of pronotum is about 1.9 to nearly 2; the eyes are about as broad as long. I regard these characters as variable within *B. denticolle*. A final solution of this problem has to await a complete revision of the smaller South American *Belostoma*.

In *B. micantulum* which may have a similar appearance, the prosternal keel is distinctly less prominent and the ventral diverticulum of the male genitalia strongly arcuate.

### *Belostoma oxyurum* group

Rather small, elongate oval *Belostoma*. Length varying from about 15 to about 20 mm. Anterior interocular width about  $1\frac{1}{2}$  times the width of an eye. Phallus (Fig. 140) with ventral diverticulum flattened and relatively broad.

This group is very similar and probably closely related to the *B. denticolle* group but differs in having a relatively broader anterior interocular width and ventral diverticulum.

A number of species have been described from Central and South America, but so far none have been found in the Guyana Region.

### *Belostoma plebejum* group

Small *Belostoma*, length less than 20 mm, anterior interocular space only slightly wider than an eye. Ventral diverticulum of male genitalia strongly arched.

## ***Belostoma micantulum* (Stål, 1858)**

Pl. 7d; Fig. 138, 139, 141, 146.

*Zaitia micantula*, Stål, 1858, p. 84 (Brasil).

*Zaitia zelotypus* WHITE, 1879a, p. 270 (Brasil).

*Belostoma micantulum*; DE CARLO, 1938, p. 228 (partim, Argentina, Paraguay, Brasil).

*Belostoma micantulum*; MENKE & LAUCK 1962, p. 7 (Brasil).

GUYANA!; SURINAME!, Coronie, Saramacca, Suriname, Commewijne, Marowijne, Brokopondo; BRASIL, Amapá, Pará, Amazonas, Goiás, Rio de Janeiro; PARAGUAY; ARGENTINA, Salta, Chaco, Corrientes, Entre Rios, Sta. Fé.

GUYANA: W. Bank Demerara, Canal Polder No 2, 18.VI.1932, 4♂, 2♀; Alexander Village, 9.VII.1932, 1♂, 1♀ (Harris, det. Lauck, KU); Georgetown, Botanical Gardens, 4.I.1932, 1♂; same, Vlissingen Road, 7/9.VII.1935, 2♂, 3♀ (Squire); Karanambo, 22.IX.1957, 1♂ (Mc Connell) (BMNH).

SURINAME: Coronie, Coronieweg, 216 km O, 20.XII.1948, 5♂, 3♀ (Gij, LM). Saramacca, *SN017*, 1♀; *SN020b*, 2♂; *SN025*, 1♀; *SN027*, 1♀; *SN030*, 1♂; *SN133*, 2♂. 1♀; *SN207*, 1♀; *SN256*, 1♀; *SN289*, 1♀; *SN333*, 1♂; *SN446*, 2♂, 1♀; Coppenamepunt, 1♂, stomach of juv. Tricoloured Heron, 31.V.1971; 1♀, stomach of juv. Little Blue Heron, 12.VI.1971 (Spaans, CN). Suriname, *SN015*, 1♂; *SN036*, 1♂; *SN038*, 1♂; *SN046*, 1♀; *SN047*, 1♀; *SN050*, 1♀; *SN076*, 1♂, 1♀; *SN077*, 1♂, 1♀; *SN080*, 1♀; *SN081*, 3♀; *SN090*, 1♀; *SN110*, 7♂, 4♀; *SN119*, 1♂; *SN121*, 1♀; *SN152*, 1♂; *SN176*, 1♂; *SN177*, 1♀; Paramaribo, l'Hermitage, at light, 1/5.IX.1969, 1♂, 2♀; same, 18.I.1970, 1♀; Ditch at Domburg, *H923*, 15.X.1968, 1♂; Paramaribo, 24.IV.1960, 1♂; *P812*, 1♀; Plantage Dirkshoop, at light, *P2033*, 6♂, 7♀; Zanderij, pool, *PR167*, 8.IV.1962, 1♂, 1♀; Republiek, V/VII.1965, 1♀ (Mees); Zanderij, 8.I.1961, 1♂ (Gij); Carolinakreek, waterholes in drying up forest stream, gravelly bottom, 18.XI.1962, 1♂ (Malkin) (LM). Commewijne, *SN088*, 11♂, 5♀; *SN111*, 1♂; *SN112*, 3♂; Plantage Leliëndaal, *P2156*, 17.III.1963, 1♂. Marowijne, *SN223*, 1♂. Brokopondo, *SN199*, 1♂; *SN201*, 1♀; *SN245*, 2♂, 4♀; *SN246*, 1♀; *SN314*, 2♂; *SN321*, 1♂; *SN396*, 1♂; Brokopondo, IV.1964, 5♂, 2♀; same, 16.III.1965, 1♂; same, 21/31.XII.1966, 2♀; ca. 4 km E of Afo-bakka, 23.VII.1964, 1♂; between Kabel and Aboetjieme, 12.IV.1965, 4♂, 3♀ (Mees); Kabelstation, 22.VII.1964, 2♂ (Gij) (LM).

BRASIL: Amapá, Porto Santana, (ICONI), II/VI.1961, 1♂ (Carvalho, det. De Carlo). Pará, Fordlândia, Igarapé Villa Nova, *S250*, 18.IX.1950, 1♂, 1♀; Tumucumaque, *Sa858*, 16.II.1961, 1♀; Igarapé Uaiba, *Sa868*, 19.I.1961, 1♀ (W). Amazonas, Rio Cupari, Lago Silvestre, Flechal, *S210*, 29.XII.1947, 1♂; R. Amazonas, Paraná dos Ramos, *Si/Sa13*, 17.XI.1959, 1♀; R. Solimões, Paraná Terra Nova, *A134*, 15.III.1961, 2♂, 3♀; Rio Cuieiras, Igarapé Incarnada, *A416*, 24.XI.1962, 1♂ (det. DC); Manaus, Lago Calado, *Pro4*, 13.IV.1968, 1♂; Lago do Xiborena, *PR77*, 24.VII.1968, 1♂ (Junk) (W). Rio de Janeiro, "Rio Jan.", Type, Lectotype *Belostoma micantulum* (Stål), Est.: D. R. Lauck 1959, 1♂ (SM).

Length ♂, ♀  $\bar{x} = 11.3 \pm 0.4$ ; width ♂, ♀  $\bar{x} = 5.2 \pm 0.2$ ; width of pronotum ♂  $\bar{x} = 3.7 \pm 0.2$ , ♀  $\bar{x} = 3.9 \pm 0.1$ ; ocular index (V) ♂  $\bar{x} = 1.19 \pm 0.08$ , ♀  $\bar{x} = 1.26 \pm 0.07$ ; width of head ♂, ♀ 2.5 – 2.7 – 3.1; length of pronotum 1.7 – 1.9 – 2.2.

Colour brown with brownish yellow; legs light brown with darker markings which form indistinct bands. Few specimens with a median longitudinal yellowish band on pronotum and scutellum.

Interocular space 1.2 – 1.6 times the width of an eye; length of anteculus 0.6 – 0.8 times the length of interoculus; clypeus reaching



slightly beyond the ocular line; interocular space about twice the length of anteculus; eyes distinctly globular about as long as broad; mesal margins of eyes divergent posteriorly; segment 1 of the beak about 0.9 – 1.0 times the length of segment 2.

Ratio width : length of pronotum ♂, ♀  $2.08 \pm 0.06$ . Prosternal keel truncate, apex nearly straight, Fig. 138, 139.

Scutellum almost reaching the nodal line.

Pilosity of connexiva extending slightly beyond the penultimate segment.

Phallus as shown in Fig. 141, 146.

*Belostoma micantulum* is a common and eurytopic species. It was most often collected at the edges of various stagnant waters with vegetation or plant debris between which it hides. Occasionally it was found in current waters or at places with little or no vegetation or plant-debris. It does not seem to prefer shade to exposure.

I studied some specimens from Guyana identified by LAUCK as *B. micantulum*. The very similar *B. plebejum* Stål, which is a trifle larger on the average, has nearly the same male genitalia but it seems to be restricted to the central and southern part of S. America (MENKE & LAUCK 1962). *B. pygmeum* and *B. denticolle*, which may be similar in general shape, have different male genitalia (Fig. 143–147).

I have seen a type specimen of *B. zelotypus* White from Monte Alegre (BMNH). It is to be placed in *B. micantulum*. (See also *B. denticolle*).

Several authors apply the name *B. micantulum* to a complex of species including *B. pygmeum* and sometimes *B. denticolle* too.

### *Belostoma pygmeum* group

LAUCK 1962 recognizes a *B. pygmeum* group which differs from the *B. plebejum* group by "ventral diverticulum of male genitalia with prominent thickenings along laterodorsal margins".

In my opinion the genitalia of *B. pygmeum* represent an extreme case of the developmental trend in the *B. plebejum*-group. So far as the groups are used for practical purposes the *pygmeum*-group may be useful, but when the groups are to express approximately the same degree of similarity I should prefer to place *B. pygmeum* in the *plebejum*-group.

**Belostoma pygmeum** (Dufour, 1863)

Fig. 142, 147.

*Zaitia pygmea* DUFOUR, 1863, p. 391-392 (Pondicherry, mislabelled).*Zaitia pygmea*; MAYR 1871, p. 421-422.*Belostoma micantulum*; De Carlo 1938, p. 228 (partim).

BRASIL!, Amazonas; BOLIVIA!; PARAGUAY!

BRASIL: Amazonas, Rio Solimões, Paraná Terra Nova, *Arj* 34, 15.III.1961, 1♂ (det. *B. micantulum* by De Carlo).

BOLIVIA: Sta. Cruz, 1♂ (Steinbach, det. Lauck, KU).

PARAGUAY: Molinasque, 20.VI.1935, 2♂, 3♀ (Schade, det. Lauck, KU).

LAUCK seems to be the first who recognized this species since MAYR 1871. As he did not publish on it, all records are new. There is a possibility that this species occurs in the Guyana Region.

Length ♂, ♀ 10-12-13; width ♂ 4.5-5.1-6.0, ♀ 5.2-5.7-5.9; width of pronotum ♂ 3.3-3.8-4.4, ♀ 4.0-4.3-4.5; ocular index (V) ♂ 1.09-1.15-1.22, ♀ 1.06-1.08-1.09; width of head ♂, ♀ 2.5-2.8-3.0; length of pronotum ♂ 1.7-1.9-2.1, ♀ 2.0-2.1-2.2.

Colour yellowish brown to light brown, dark markings on legs not forming distinct bands except often on fore tibia.

Interocular space 1.5-1.7 times the width of an eye; length of anteculus: length of interoculus 0.6-0.8 (in one male from Molinasque 0.9); length anteculus: interocular space 0.4-0.6; clypeus clearly reaching the ocular line; eyes broader than long, globose, mesal margins divergent posteriorly; length of segment 1 of rostrum: segment 2 about 0.8.

Ratio width: length pronotum 1.9-2.1; prosternal keel intermediate between those of *B. denticolle* and *B. micantulum*.

Scutellum not reaching the nodal line (0.2-0.4 mm).

Ventral pilosity covering  $\frac{1}{3}$  to  $\frac{1}{2}$  of the connexiva, extending only slightly beyond the penultimate segment, constricted between spiracles.

Phallus Fig. 142, 147.

This species is similar to *B. denticolle* and *B. micantulum*. Apart from the distinctive phallus the ocular index is lower in *B. pygmeum*. The median length of pronotum of *B. denticolle* is more than half its width.

### **Weberiella** De Carlo, 1966

Medium sized Belostomatidae; antennae 4-segmented, segments 2 and 3 bearing fingerlike projections; anterior tarsi one-segmented; membranes of hemielytra somewhat reduced, its greatest width subequal to that of clavus, cells well developed, distinct, rather broad; lateral margins of abdomen not forming smooth curves but interrupted at the borders between the segments; sternites not subdivided by a suture-like fold, spiracles situated in outer half of connexiva; dorsal arms of male genitalia vestigial.

Only one species has been described.

### **Weberiella rhomboides** (Menke, 1965)

Pl. 7f; Fig. 149, 150.

*Belostoma rhomboides* MENKE, 1965, p. 2-4, fig. 1-2 (Guyane Française).

*Weberiella rhomboides*; DE CARLO 1966, p. 98-110, fig. 1, 4, 7 (Brasil).

GUYANE FRANÇAISE; BRASIL, Amazonas.

GUYANE FRANÇAISE: 1899, 1♀ (Oberthür, holotype Menke, LACM).

BRASIL: Amazonas, Rio Branquinho, 23.VII.1963, 1♂ (Fittkau, allotype De Carlo, W).

Length ♂, ♀ 21; width ♂, ♀ 11.2; width of pronotum 6.7 - 7.0; ocular index (V) 2.2 - 2.5; width of head 4.1 - 3.3; length pronotum 2.9 - 3.1.

Colour dorsally light brown, variegated with yellowish, notably a pair of rather distinct, light, curved bands running from the lateroposterior angles of pronotum to the nodal furrows. Scutellum

dark, pronotal pits blackish. Ventrally darker than dorsally, a distinct dark brown lateral band at margins of abdomen. Legs dark with light bands on fore tibia and tarsus.

Interocular space nearly  $2\frac{1}{2}$  times the width of an eye; length of anteculus about 1.3 times the length of interoculus; clypeus not reaching the ocular line (0.2 mm); width interoculus : length anteculus about 2; eyes somewhat broader than long, globular, rather small, mesal margins subparallel. Rostrum, length segment 1 : length segment 2 about 0.6.

Prosternal keel not prominent, broad and low.

Scutellum not reaching the nodal line (about 1 mm).

Phallus Fig. 149, 150, without dorsal arms.

This species differs from other Belostomatidae by its generic characters. The antennal structure is as in *Belostoma*, the membrane as in *Abedus*. The remaining characters are rather peculiar. The vestigial dorsal arms of the phallus are especially interesting as LAUCK and MENKE 1961 consider this the evolutionary original condition compared to well-developed dorsal arms.

#### LETHOCERINAE Lauck & Menke, 1961

Large to very large Belostomatidae, antennal segments 2–3 with fingerlike process, 3 often irregular, 4 with two small processes. Tibia and tarsus of hind legs flat, broadly dilated, much broader than intermediate tibia and tarsus. Mesal margins of air straps nearly continuous. Phallus, ventral diverticulum and aedeagus separate.

#### **Lethocerus** Mayr, 1853

Large to very large Belostomatidae (ranging in length from 40 to 110 mm). Anteculus distinctly shorter than interoculus. Anterior tarsus three-segmented, segment 1 rather concealed, 2 shorter than

3. Membrane of hemielytra large, with numerous anastomosing and branching veins, forming narrow elongate cells.

Two species are known to occur in the Guyana Region.

#### KEY TO *Lethocerus* FROM THE GUYANA REGION

- 1a Parasternites with distinct dark brown to blackish longitudinal bands; outer margin of hind tibia nearly straight; width of first segment of hind tarsus not larger than interocular distance . . . . . *L. annulipes*
- 1b Parasternites without distinct dark longitudinal bands, often with a light reddish tinge, outer margin of hind tibia broadly curved; width of first segment of hind tarsus greater than least interocular distance . . . . . *L. delpontei*

#### *Lethocerus annulipes* (Herrich Schäfer, 1848)

Pl. 7b; Fig. 151.

*Belostoma annulipes* HERRICH SCHÄFFER, 1848, p. 28, fig. 803-804 ("South America").

*Lethocerus annulipes*; DE CARLO 1930, p. 107, fig. 21-22 (Argentina, Brasil).

*Lethocerus annulipes*; CUMMINGS 1934, p. 203-204, pl. 19 fig. 3 (Florida; Puerto Rico; Colombia; Venezuela, Guyana, Guyane Française, Brasil, Paraguay, Argentina).

*Lethocerus annulipes*; MENKE 1962, p. 63-64.

*Lethocerus annulipes*; MENKE & LAUCK 1962, p. 4, fig. 4 (Brasil).

*Lethocerus annulipes*; MENKE 1963, p. 264, fig. 1, 12, map 1 (Hispaniola, Puerto Rico, Trinidad).

*Lethocerus annulipes*; DE CARLO 1964b, p. 349, fig. 16, 20 (Venezuela, Brasil, Paraguay, Argentina).

U.S.A., Florida; GREATER ANTILLES; LESSER ANTILLES; COLOMBIA; VENEZUELA; Caracas, Guárico; GUYANA; SURINAME, Suriname; GUYANE FRANÇAISE; BRASIL, Goiás, Rio de Janeiro, São Paulo, Santa Catarina, Rio Grande do Sul, PARAGUAY; ARGENTINA, Corrientes, Formosa, Chaco, Stgo del Estero, Santa Fé, Entre Rios, Buenos Aires.

The record for Florida, Palm Beach by CUMMINGS 1933, according to MENKE 1963, probably represents a chance introduction or mislabeling.

GUYANA: British Guiana, 1♀ (det. Lansbury); same, 2♂, 2♀ (Bartlett); Demerara, 1♀ (Sharp) (BMNH).

SURINAME, Suriname, Paramaribo, l'Hermitage, at light, 6/8.I.1970, 9♂, 3♀; same, 9.I.1970, 1♀; same, 11.I.1970, 1♂, 1♀; same, 3.V.1970, 1♀; Malasie Kreek, Zanderij, drying small pool, *H830A*, 25.II.1964, 1♀; Paramaribo, 8.VII.1949, 1♂ (Gij); Paramaribo, 21.IV.1963, 1♂ (v.d. Vecht); Paramaribo 1958, 1♂; same, 20.IV.1959, 1♂; same, 1962, 4♂, 2♀ (det. Menke); same, XII.1962, 9♂, 4♀ (det. DC); Paramaribo 5♂, 2♀ (vD); Zanderij, 26.XII.1962, 1♂, 1♀ (vD); Republiek, Coropinakreek, pH 3.3, VII.1964, 1♂ (Leentvaar) (LM).

Length ♂  $\bar{x} = 59 \pm 1$ , ♀  $\bar{x} = 64 \pm 2$ ; width ♂  $\bar{x} = 22.3 \pm 0.8$ , ♀  $\bar{x} = 23.7 \pm 0.9$ ; width of pronotum ♂  $\bar{x} = 19.1 \pm 0.4$ , ♀  $\bar{x} = 19.9 \pm 0.7$ ; ocular index (V) ♂  $\bar{x} = 0.70 \pm 0.02$ , ♀  $\bar{x} = 0.66 \pm 0.04$ .

Colour, dorsally light and dark brown, eyes dark. Venter light brown with dark brown to blackish bands on the median part of the parasternites. Fore femur dorsally with three dark bands, ventrally nearly unicoloured light brown; middle and hind femur and tibia ventrally banded, dorsally nearly unicoloured light brown.

Disc of mesosternum laterally with two parallel bulges, disk covered with minute spinules (not with short hairs). Metaxiphus with a pointed apex.

Closing face of fore femur with a pair of grooves for reception of tibia. Inner ventral projection at apex of hind tibia rounded, outer margin of tibia nearly straight. Width of first segment of hind tarsi equal to or less than the interocular distance.

Phallus Fig. 151.

This species is easily recognized by the blackish stripes on the abdominal venter.

### ***Lethocerus delpontei* De Carlo, 1930**

Pl. 7a; Fig. 152.

*Lethocerus delpontei* DE CARLO, 1930, p. 108, fig. 24 (Argentina).

*Lethocerus delpontei*; CUMMINGS 1934, p. 206–207 (partim, those from Paraguay and Brasil).

*Lethocerus delpontei*; MENKE & LAUCK 1962, p. 4, fig. 2 (Brasil).

*Lethocerus delpontei*; MENKE 1963, p. 265, fig. 9, map 2 (Nicaragua, Costa Rica, Panamá).

*Lethocerus delpontei*; DE CARLO 1964b, p. 349, fig. 22, 46 (Venezuela, Brasil, Paraguay, Argentina).

NICARAGUA; COSTA RICA; PANAMÁ; VENEZUELA; SURINAME!, Saramacca; BRASIL, Goiás, Espirito Santo; São Paulo; PARAGUAY; ARGENTINA, Misiones, Salta, Jujuy.

MENKE 1962 and 1963 points out that the records of *L. delpontei* in Central America and the extreme South of the U.S.A. prior to his 1963 publication actually refer to *L. medius* (Guér).

SURINAME: Saramacca, SN446, 1♀. Suriname, Paramaribo, Cultuur-tuin, 24.XI.1940, 1♀ (Gij, LM). Marowijne, Palocmeu, IV/VI.1961, 1♀ (Mohmin, LM).

Owing to lack of specimens the description is partly based on literature.

Length 51 – 72 (61–72); width 20 – 28 (23–28); width of pronotum 19.5 – 21.5, ocular index (V) 0.5 – 0.7.

Colour, dorsally light and dark brown; ventrally yellowish and brown, the abdominal venter has a reddish tinge. Darker pattern on fore femur not showing distinct bands, fore tibia dorsally and ventrally, middle and hind tibiae ventrally with three dark bands which may be indistinct or absent.

Disc of mesosternum laterally with two parallel bulges, these posteriorly covered with short hairs, the disc beset with minute spinules. Metaxiphus with a pointed apex.

Closing face of fore femur with a pair of grooves for the reception of tibia. Inner ventral projection at apex of hind tibia rounded, outer margin of tibia broadly curved. Width of first segment of hind tarsi greater than the least interocular distance.

Phallus Fig. 152.

This species is very similar to *L. medius* (Guér.) which is, however, not known from S. America. The phalli are distinctive.

The specimens from Suriname have been compared with three specimens (from Costa Rica, Ecuador and Paraguay) identified by A. S. MENKE. Although one of the Surinam specimens is larger than was recorded for *L. delpontei* (DE CARLO 1964) it agrees in structural details with the three identified specimens.

The character used by MENKE 1963 "Outer margin of hind tibia broadly curved (fig. 2) . . ." is, in spite of the figures, difficult to evaluate without specimens for comparison. Much better is MENKE l.c. "width of hind tarsal segment 1 greater than least interocular distance."

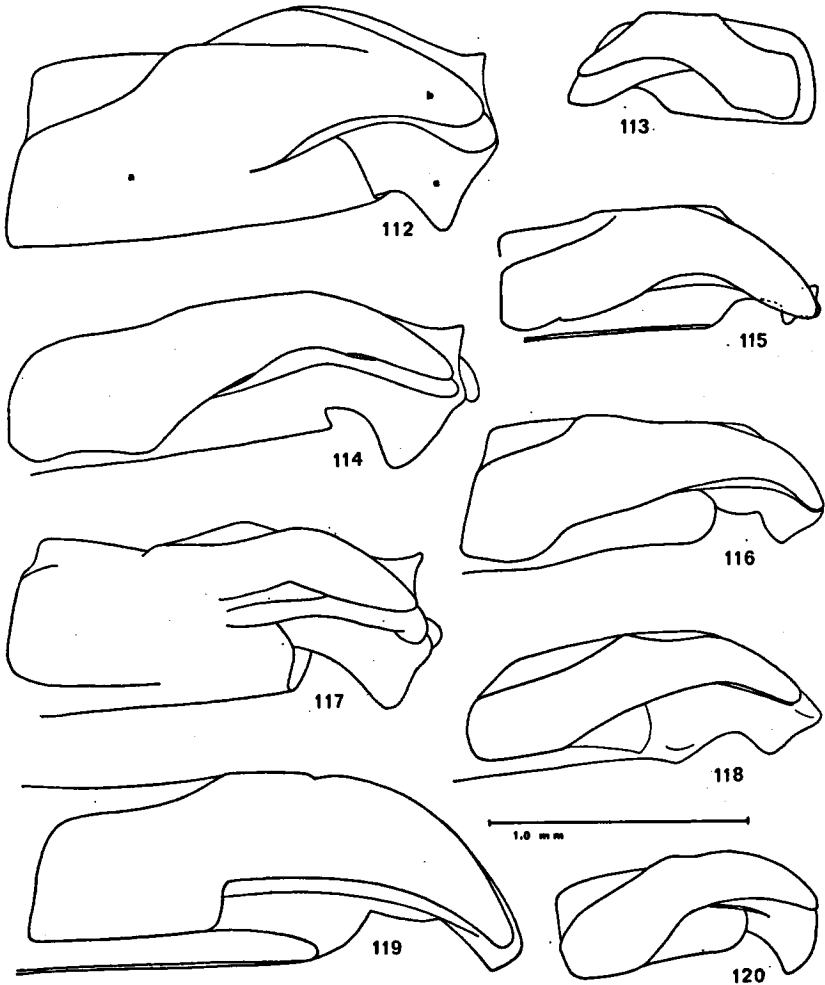


Fig. 112-120. *Belostoma*, phallus, lateral view: 112 *B. dentatum* from Brasil, a main body, b dorsal arm, c ventral diverticulum; 113 *B. bicavum*, paratype, from Amazonas; 114 *B. harrisi* from Suriname; 115 *B. guianae* from Suriname; 116 *B. aurivillianum* from Suriname; 117 *B. malhini*, paratype, from Venezuela; 118 *B. stollii* from Suriname; 119 *B. gestroi*, adapted from LAUCK 1963; 120 *B. discretum* from Amazonas.



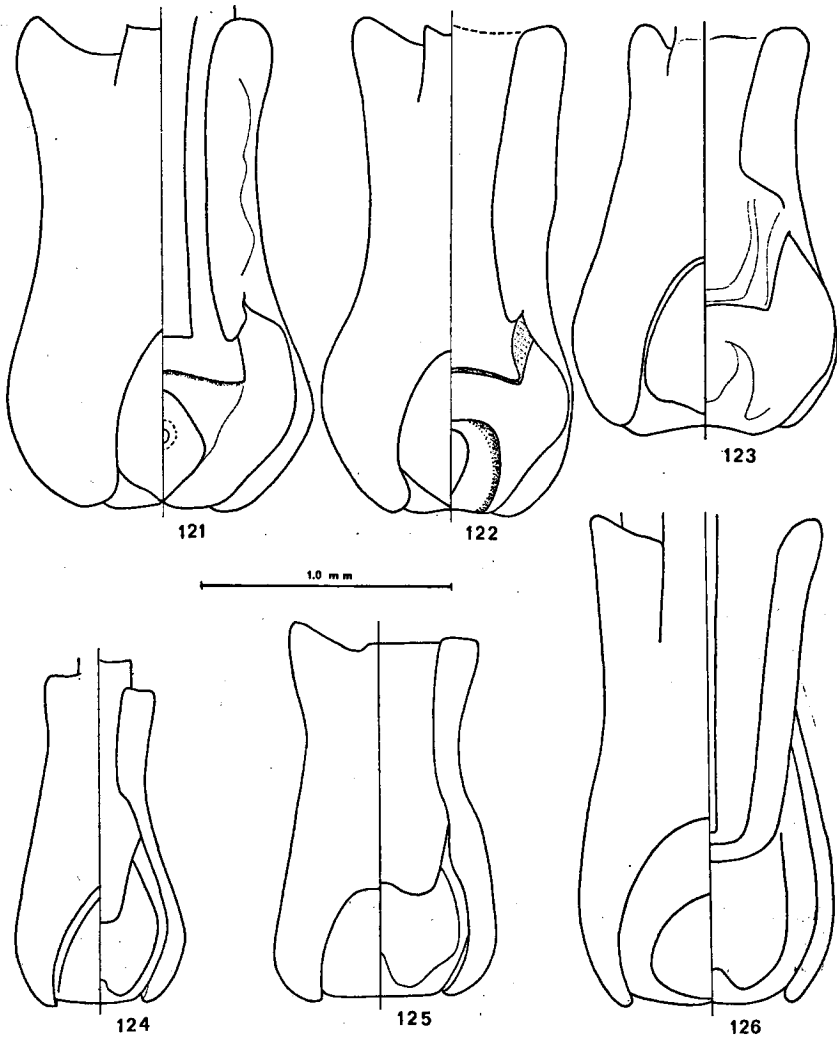


Fig. 121-126. *Belostoma*, phallus, left dorsal, right ventral view: 121 *B. dentatum* from Brasil; 122 *B. harrisi* from Suriname; 123 *B. malkini*, paratype, from Venezuela; 124 *B. guianae* from Suriname; 125 *B. aurivillianum* from Suriname; 126 *B. gestroi* adapted from LAUCK 1963.

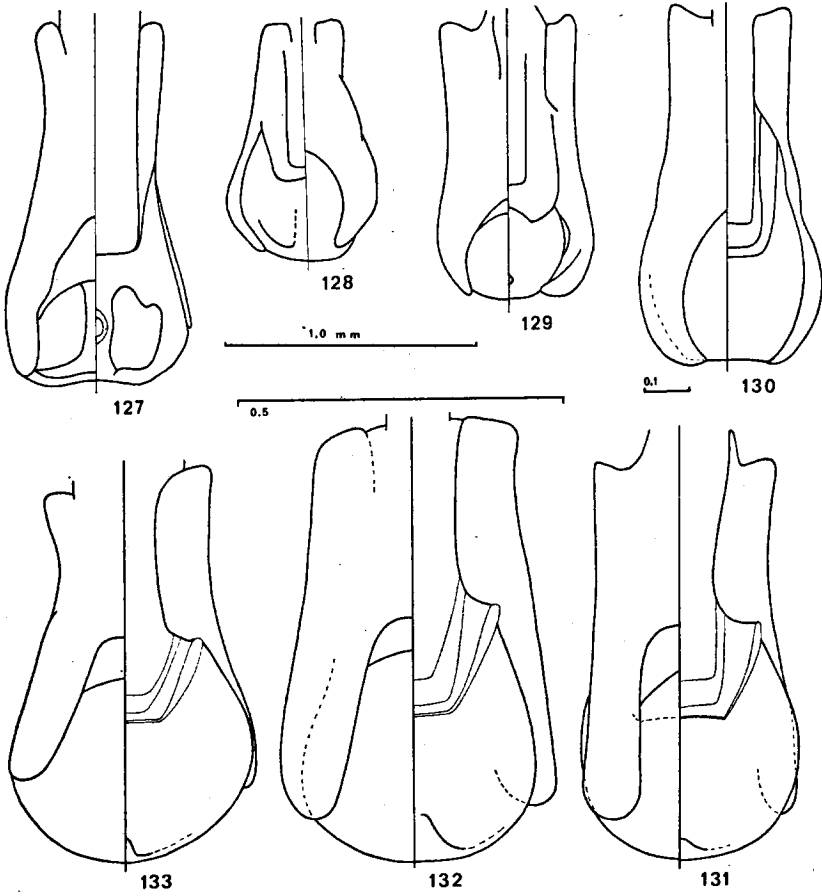


Fig. 127-133. *Belostoma*, phallus, left dorsal, right ventral view: 127 *B. stollii* from Suriname; 128 *B. bicavum*, paratype, from Amazonas; 129 *B. discretum* from Amazonas; 130 *B. bosqi* from Suriname; 131 *B. denticolle*, det. LAUCK, from Guyana; 132 *B. denticolle*, identified as *B. amazonum* by LAUCK, from Amazonas; 133 *B. denticolle* from Suriname.

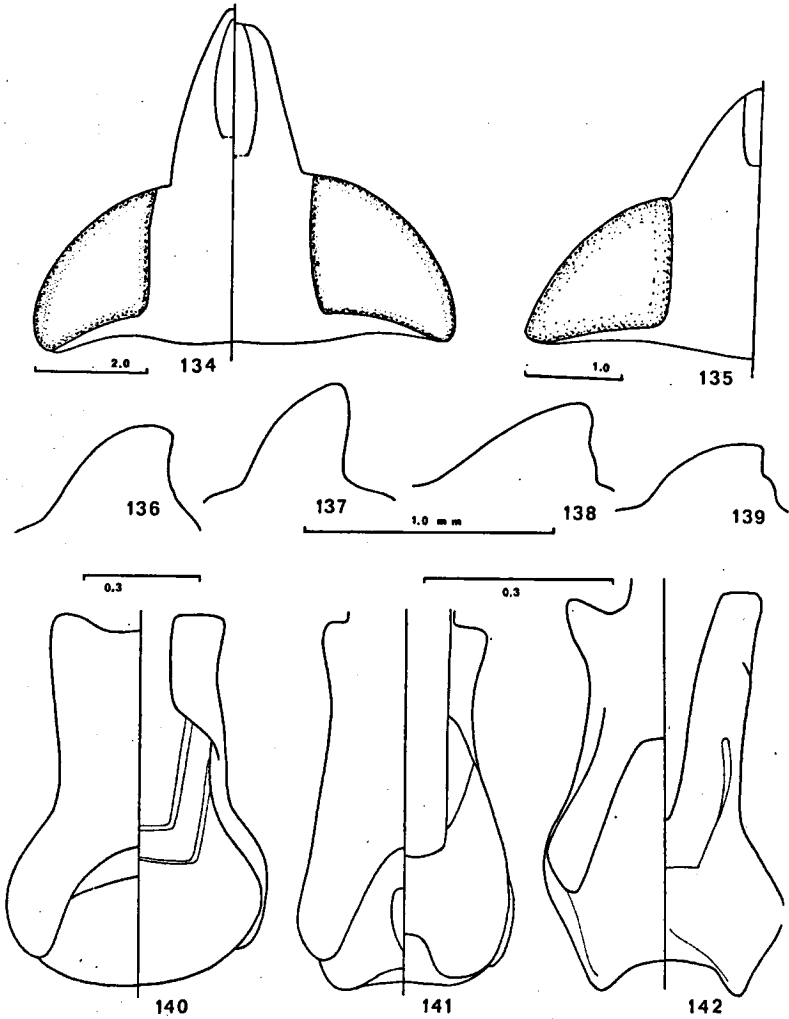


Fig. 134–135. Head of *Belostoma*: 134 left *B. malkini*, right *B. harrisi* to show differences in structure; 135 *B. discretum*.

Fig. 136–139. *Belostoma* from Suriname, prosternal keel: 136–137 *B. denticolle*; 138–139 *B. micantulum*.

Fig. 140–142. *Belostoma*, phallus, left dorsal, right ventral view: 140 *B. oxyurum*, det. LAUCK, from Argentina; 141 *B. micantulum* from Suriname; 142 *B. pygmeum* from Amazonas.

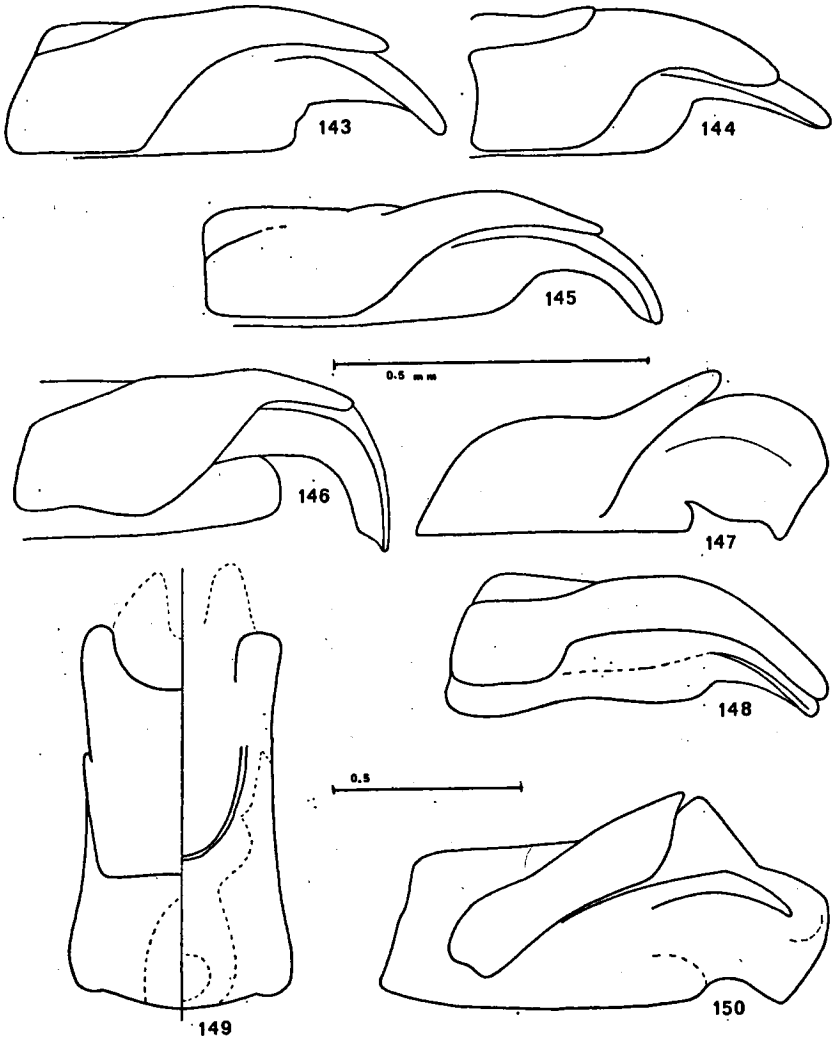


Fig. 143-148. *Belostoma*, phallus, lateral view: 143 *B. denticolle*, det. LAUCK, from Guyana; 144 *B. denticolle* from Suriname; 145 *B. denticolle*, identified *B. amazonum* by LAUCK, from Amazonas; 146 *B. micantulum* from Suriname; 147 *B. pygmeum* from Suriname; 148 *B. bosqi* from Suriname.

Fig. 149-150. *Weberiella rhomboides*, phallus: 149 left dorsal, right ventral view; 150 lateral view.

## NEPIDAE Latreille, 1802

Medium sized to rather large (length 10 – over 50 mm) elongate or, more rarely, ovoid, flattened or subcylindrical brownish Nepomorpha. Head small, extended in front of the markedly globular, laterally extending eyes, ocelli absent, rostrum short, three-segmented. Anterior legs raptorial, femur thickened. A single median non retractile respiratory tube at apex of abdomen. (The tube consists of two elongate sections which are not fused, so they may be loose in killed specimens suggesting the presence of two filaments).

This family contains about 300 species divided over some 10 genera of which the cosmopolitan genus *Ranatra* with some 150 described species is by far the most important. There are two subfamilies, Nepinae and Ranatrinae, but their exact delimitation is still more or less in discussion. DE CARLO 1967b, who gives these subfamilies family rank, placed *Curicta* in his Ranatridae. Most other authors place *Curicta* in the Nepinae (e.g. MENKE & STANGE 1964, POPOV 1971a).

The biology and physiology of *Nepa* L. 1758 and *Ranatra* have been subject of several studies. *Nepa* and probably *Curicta* too, most often hides in mud or plant debris at the shallowest edges of torpid and stagnant waters with the apex of the respiratory tube pointing in the air. When their prey comes within reach it is caught with the anterior legs. A thorough, but rather lengthy, analysis of behavioral components in prey-catching of *Nepa* is given by RICHARD 1962. *Ranatra* also awaits its prey; most species seem to hide between aquatic plants in a more vertical position with head downwards (if the depth of the water allows), but LANSBURY (in litt.) informed me that some species may burrow in mud too and may even catch prey through the surface film. The legs of Nepidae are thin and in most cases without well-developed swimming hairs; the animals cannot swim fast but row slowly through the water.

RADINOVSKY 1964 gives a good popular account of the life-history of *Ranatra fusca* P.-B. There are five larval instars as usual in Nepomorpha. The younger larvae need support near the surface otherwise they are drowned. One of the most remarkable observations by RADINOVSKY l.c. is: "On one occasion I introduced a dytiscid beetle (3/4 inch long) into an observation tank. Within 5 minutes an adult nepid caught it, but could not penetrate the exoskeleton. The nepid held the active, struggling dytiscid under water for about 3/4 of an hour and drowned it, then pierced a leg (between coxa and trochanter) and began to feed. Two hours later, two nepids were sharing the meal which lasted another hour".

The eggs of Nepidae have attracted early attention, being provided with a varying number of long apical respiratory horns, 2 in Ranatrinae and 4 to 26 in Nepinae (COBBEN 1968, HINTON 1961, 1962).

Up to now 5 genera are known to occur in the Americas. *Nepa* L. is an arctic genus with only one representative in the New World, *N. apiculata* Uhler which is restricted to S. Canada and N. U.S.A. *Telmatotrepes* Stål, 1854 is represented by four rare species in the Andes and Rio de Janeiro, the two other *Telmatotrepes* species occur in Borneo and China (LANSBURY 1973). *Curicta* with about 30 species is restricted to the Americas occurring from SW. U.S.A. to Paraguay. The monotypic genus *Amphischizops*, wick, according to LANSBURY (in lit.) is not generically different from *Ranatra*, has been recorded from Venezuela. Finally *Ranatra*, is a very important genus with over 70 described species in the Western Hemisphere, the majority occurring in South America.

#### KEY TO AMERICAN SUBFAMILIES AND GENERA OF NEPIDAE

- 1a Flattened species, parasternites of abdomen visible, head distinctly narrower than the pronotum and partly enclosed by its anterolateral angles (Nepinae) . . . . . 2
- 1b Subcylindrical species, parasternites not visible, head free from pronotum and both of subequal width (Ranatrinae) . . . . . 4
- 2a Body elongate, ratio length of body : greatest width 5 – 6 . . . . . *Curicta*
- 2b Body ovoid, ratio length of body : greatest width about 3 or less . . . . . 3
- 3a Respiratory tube broad and strap-like, South American . . . . . *Telmatotrepes*
- 3b Respiratory tube thin and longer, about half the length of abdomen, North American . . . . . *Nepa*
- 4a Eyes placed on lateral extensions of the head (so far only known from Venezuela) . . . . . *Amphischizops*
- 4b Eyes not placed on lateral extensions of the head . . . . . *Ranatra*

#### NEPINA E Latreille, 1802

Flattened Nepidae with anterior lobe of pronotum broader than head, parasternites of abdomen visible and female operculum broad and flat.

**Curicta** Stål, 1861

Medium sized to relatively small, elongate, flat-bodied Nepinae varying from about 20 to 30 mm in length (without respiratory tube); ratio length : width of body 5–6. Pronotum distinctly longer than broad. Anterior coxae long and cylindrical.

There are about 30 described species occurring principally in Central and South America. The Guyana Region seems to be poor in species but in spite of the survey by DE CARLO 1951 the genus is still imperfectly known.

KEY TO *Curicta* OF THE GUYANA REGION

- 1a Anterior tibia whitish with base and median band dark; pronotum with small granules . . . . . *C. granulosa*  
 1b Anterior tibia whitish with dark base but lacking a median dark band; pronotum without small granules . . . . . *C. doesburgi*

**Curicta doesburgi** De Carlo, 1967

Pl. 9g; Fig. 153–158.

*Curicta doesburgi* DE CARLO, 1967c, p. 33, fig. 13, 16, 18 (Suriname).

GUYANA; SURINAME, Saramacca, Suriname, Commewijne.

GUYANA: "Brit. Guiana" 2♀ (Bartlett); Demerara 1♂ (BMNH).

SURINAME: Saramacca, *SNo19*, 2♀; *SNo20*, 2♀, 3 lv; *SNo20c*, 3 lv; *SNo27*, 1 lv; *SNo28*, 1♀. Suriname, *SNo45*, 1♀; *SNo47*, 2 lv; *SN119*, 1♂; *SN157*, 1♂, 3 lv; *SN158*, 1♂, 1♀; Zanderij, pool, *Pro14*, 18.I.1961, 1♂, 1♀ (holo- and allotype DC, LM). Commewijne, *SN112*, 1♂.

Length ♂ 20–21–22, ♀  $\bar{x}$  = 23 ± 1; width of pronotum ♂ 3.5–3.7–3.9, ♀  $\bar{x}$  = 4.1 ± 0.2; ocular index ♂ 1.8–2.0–2.1, ♀  $\bar{x}$  = 2.1 ± 0.1.

Colour, dark brown, apical  $\frac{2}{3}$  of anterior tibia light yellowish.

Head anteriorly without carina, posteriorly somewhat convex suggesting a broad, faint carina. Antennae Fig. 157.

Pronotum, ratio length : width ♂ 1.06 – 1.11 – 1.14, ♀ 1.02 – 1.06 – 1.09. Dorsally with three longitudinal grooves of which the median is distinctly the narrowest, the laterals with deep broad pits just anterior of the humeral extension. Prosternum medio-anteriorly convex with a very thin median groove. Posterolateral points of metasternum long (Fig. 155).

Scutellum anteriorly nearly flat, posteriorly with a faint carina formed by two lateral impressions.

Anterior femur 6 – 6.5 mm long; ratio total length : length of apical part of femur 2.2 – 2.5.

Length of respiratory tube 15 – 17 mm.

Male, paramere Fig. 158.

This species is quite common but apparently scarce in stagnant ditches with rich vegetation in the coastal plain. It was occasionally found in the savannah-region. Most specimens were collected in or on the mud between plant-roots or plant-debris (notably *Typha*) at the edges of the habitat; this suggests a prey-catching similar to the European *Nepa*.

*C. doesburgi* is similar to *C. intermedia* (Martín), *C. granulosa* and *C. venezolana* De Carlo from the northern part of South America which all three possess a more or less distinct median dark band on the fore tibia (in *C. venezolana* present in males only). *C. intermedia* (known only by the type from Colombia) has a less sinuate posterior margin of pronotum (Fig. 154) and the posterolateral points of the metasternum are less pronounced (Fig. 156). *C. granulosa* has pronotum and hemelytra beset with fine granulae. The "body" of the second antennal segment in *C. venezolana* (known only from the state of Guaricó) tapers more gradually into its process.

### **Curicta granulosa** De Carlo, 1951

*Curicta granulosa* DE CARLO, 1951a, p. 411–412, fig. 35–38 (Brasil).

BRASIL: Amazonas.

Unfortunately I have not seen this species which was described on 5 specimens from Manaus.



Judging from the description by DE CARLO it is structurally very similar to *C. doesburgi* but differs in the characters given in the key and moreover in the length of the respiratory tube which is about 15 mm in *C. granulosa* and about 17 mm in most specimens of *C. doesburgi*.

#### RANATRINAE Douglas et Scott, 1865

Predominantly subcylindrical Nepidae with anterior lobe of pronotum not broader than head; parasternites concealed by the ventral laterotergites and female operculum laterally compressed, keel-like.

#### **Amphischizops** Montandon, 1903

As *Ranatra*, but eyes placed on lateral extensions of the head, metaxiphus very large, covering the greater part of the first sternite, and respiratory tube short and broader than half the width of abdomen.

This genus is monotypic, its species *A. compressicollis* (Montandon, 1898) seems to be very rare and is up to now only known from Venezuela.

#### **Ranatra** Fabricius, 1790

Rather small to large, elongate, subcylindrical Nepidae varying from about 15 to 50 mm in length (without respiratory tube); ratio length : width of body 8 – 10. Pronotum clearly longer than broad, anterior lobe rarely broader than head; eyes free from pronotum. Anterior coxae long and cylindrical. Respiratory tube in most species long, narrower than half the abdominal width.

This is a large cosmopolitan genus with more than 150 described species of which about one half occur in the Western Hemisphere, predominantly in South America. Distinctive characters are few, so this is a difficult genus and the status of several species is doubtful. As a consequence the range of many species is ill-defined. The following key is preliminary. Owing to lack of specimens, males of *R. mixta* and *R. signoreti* and females of *R. brasiliensis*, *R. ornitheia* and *R. sattleri* have not been keyed out.

## KEY TO THE RANATRA FROM THE GUYANA REGION

- 1a Interocular space with a tubercle, length of respiratory tube clearly shorter than length of abdomen (not known for *R. subinermis*) . . . . . 2
- 1b Interocular space without tubercle, length of respiratory tube nearly always exceeding length of abdomen . . . . . 4
- 2a Length about 25 mm (Rio Negro) . . . . . *R. weberi*
- 2b Length over 40 mm . . . . . 3
- 3a Interocular tubercle relatively indistinct, hind femur not quite reaching the base of the operculum in ♀ (Guyane) . . . . . *R. subinermis*
- 3b Interocular tubercle prominent, hind femur in ♀ reaching at least halfway along the genital operculum (Guyanas, Amazonas) . . . . . *R. tuberculifrons*
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- 12b Body length about 45 mm (Pará) . . . . . *R. sattleri*
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- 15b Subapical tooth of paramere relatively small and rounded (Fig. 179, 180) Guyanas) . . . . . *R. ornitheia*
- 16a Subapical tooth of paramere rather small and narrow (Fig. 162), length about 35 mm (Brasil) . . . . . *R. brasiliensis*
- 16b Subapical tooth of paramere broad (Fig. 165, 166), length nearly always exceeding 35 mm (Guyanas, Brasil, Bolivia) . . . . . *R. macrophthalma*
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- 17b Respiratory tube longer than body length . . . . . 18

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- 20a Apex of operculum reaching more than 0.1 mm beyond the apex of abdomen . . . . . 21
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- 22a About 10 of the dorsal teeth of operculum visible posterior to apex of abdomen (Fig. 174) (Guyanas, Pará) . . . . . *R. mixta*
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- 24a About 3 of the dorsal teeth of operculum visible posterior to apex of abdomen (Fig. 171), body length about 32 mm (Guyanas, Pará) . . . . . *R. obscura*
- 24b About 6 of the dorsal teeth of operculum visible posterior to apex of abdomen (Fig. 172) body length about 35 mm (Guyanas, Brasil) . . . . . *R. doesburgi*
- 25a Respiratory tube distinctly shorter than length of body (Guyanas) . . . . . *R. adelomorpha*
- 25b Respiratory tube longer than body . . . . . 26

- 26a Width of an eye about  $1\frac{1}{2}$  times interocular space (Amazonas, Paraguay, Argentina) . . . . . *R. rabida*
- 26b Width of an eye only slightly more (1.0–1.1) than width of interocular space (Venezuela, Brasil, Bolivia, Paraguay, Argentina) . . . . . *R. signoreti*
- 27a Apex of operculum not more than 0.1 mm beyond apex of abdomen. . . . . 28
- 27b Apex of operculum more than 0.1 mm beyond apex of abdomen. . . . . 30
- 28a Respiratory tube longer than body (Pará, Amazonas) . . . . . *R. parvula*
- 28b Respiratory tube shorter than body . . . . . 29
- 29a Width of an eye about 1.4 times the interocular space, body length about 30 mm (Guyanas, Pará) . . . . . *R. mediana*
- 29b Width of an eye about 1.2 times the interocular space, body length about 25 mm (Guyanas, Venezuela) . . . . . *R. sarmentoi*
- 30a Body length about 50 mm (Amazonas). . . . . *R. magna*
- 30b Body length about 40 mm . . . . . 31
- 31a Hind femur just reaching the base of operculum (Guyanas, Pará) . . . . . *R. mixta*
- 31b Hind femur reaching about halfway along operculum (Guyanas, Brasil, Bolivia) . . . . . *R. macrophthalma*

### **Ranatra adelomorpha n. sp.**

Pl. 9c; Fig. 160, 161.

Holotype ♂, allotype ♀ in LM, paratype ♂ in CN. – The name *adelomorpha* means “lacking obvious structures”.

SURINAME: Nickerie, Sipaliwini, 8.VI.1963, 2♂, 1♀ (vD).

Length ♂ 27–28, ♀ 33; width of pronotum ♂ 2.5–2.6, ♀ 2.9; ocular index ♂ 0.86–0.87, ♀ 0.83.

Colour medium brown, legs lighter, not appreciably banded.

Eyes 1.2 – 1.3 times wider than the interocular space which does not bear a tubercle.

Anterior border of pronotum without tubercles, pronotum without clavate bristles; ratio body length : length pronotum 3.8 – 4.1.

Scutellum with elevated anterior part nearly flat, impressions rather deep, separated by an ill-defined carina.

Fore femur length basal part : length apical part 1.8.

Respiratory tube (21–23½ mm), when folded back over dorsum, reaching the pronotal pits in males and the posterior border of pronotum in female.

Hind femur not reaching beyond basal ¼ of operculum in males and not reaching its base in female.

Female operculum not reaching beyond the apex of abdomen.

Male, paramere with a rather blunt subapical tooth (Fig. 160, 161).

The paramere of the male with its rather small and blunt subapical tooth is distinctive. Most South American species of the same size have, moreover, a relatively longer respiratory tube.

### **Ranatra brasiliensis** De Carlo, 1946

Fig. 162.

*Ranatra brasiliensis* DE CARLO, 1946, p. 23–24, fig. 20, 40, 54, 74 (Brasil).

*Ranata brasiliensis*; DE CARLO 1964a, p. 204–205, fig. 56, 90, 110 (Brasil).

BRASIL, Amazonas (?).

BRASIL: Maná, XI.1902, 1♂ (Monira, holotype DC, MACN) (possibly Lago Maná in Amazonas).

Length 35, width of pronotum 3.4, ocular index 0.64.

Colour medium brown, legs hardly lighter than body, not banded.

Eyes 1.3 times wider than the interocular space which does not bear a tubercle.

Anterior border of pronotum with an indication of tubercles, pro-

notum with a few scattered clavate bristles; ratio body length : length of pronotum 3.9.

Scutellum with elevated anterior portion slightly convex, posterior impressions and carina indistinct.

Fore femur, length basal part : length apical part 1.9.

Respiratory tube (29 mm) when folded back over dorsum reaching over the pronotal pits.

Hind femur reaching about halfway along the operculum.

Female, operculum according to DE CARLO 1964 reaching distinctly beyond the apex of abdomen.

Male, paramere Fig. 162 (redrawn after DE CARLO, 1964). The holotype lacks the operculum and parameres.

This species is nearly identical with *R. mediana* which differs only in a somewhat smaller size and a slightly different paramere.

### **Ranatra curtafemorata** Kuitert, 1949

Fig. 163.

*Ranatra curtafemorata* KUITERT, 1949, p. 25–26 (Brasil).

*Ranatra curtafemorata*; DE CARLO 1964a, p. 164–165, fig. 67, 82, 125.

BRASIL, Amazonas.

BRASIL: Amazonas, Rio Purus, Lago Berury Region, IX.1935, 1♂ (Olalla, paratype Kuitert); Rio Jurua, João Pessoa, São Felipe, 10.VII/20.IX.1936, 2♀ (Olalla, det. Kuitert) (KU).

This species might occur in the Guyana Region.

Length ♂ 31, ♀ 36; width of pronotum ♂ 2.8, ♀ 3.3–3.4; ocular index ♂ 0.83, ♀ 0.64–0.70.

Colour dark brown, legs yellowish variegated with brown mostly not in distinct bands.

Eyes wider (1.2–1.4) than the interocular space which is strongly convex but without tubercle (one of the females has the faintest indication of a tubercle).

Anterior border of pronotum with indications of a pair of tubercles, ratio body length : length of pronotum 3.7–4.0.

Scutellum with elevated, distinctly convex, anterior part, posterior carina and impressions moderately distinct.

Fore femur, ratio length basal part : apical part 1.6 – 1.7; ratio length of pronotum : length of femur 1.05 – 1.09.

Respiratory tube reaching or almost reaching the apex of scutellum (20–22 mm).

Hind femur clearly not reaching the base of operculum in both sexes.

Female, about 5 of the dorsal teeth on operculum visible posterior to the apex of abdomen (0.5 – 0.6 mm).

Male, parameres with a small subapical tooth which is, contrary to other species, placed on the mesal side (Fig. 163).

This species can at once be recognized by the ratio median length of pronotum : length of anterior femur slightly exceeding unity; in other South American species studied this ratio is less than unity (0.8 – 0.9); except in *R. tuberculifrons* (and *R. subinermis*) where this ratio is 1.1 and in *R. weberi* where it is about unity. These latter species are characterized by an interocular tubercle. Moreover *R. tuberculifrons* is larger and *R. weberi* distinctly smaller than *R. curtafemorata*.

KUITERT 1949, p. 25 says; "Clasper without any indication of a subapical tooth". This is rather confusing as there is a small subapical tooth which is, contrary to the situation in other species, placed on the mesal side of the paramere as is stated by KUITERT l.c. on p. 26.

### **Ranatra doesburgi** De Carlo, 1963

Pl. 8a; Fig. 164, 172.

*Ranatra doesburgi* DE CARLO, 1963a, p. 93–95, fig. 7, 15, 19 (Suriname).

*Ranatra doesburgi*; DE CARLO 1964a, p. 196–197, fig. 22, 60, 77.

*Ranatra usingeri* DE CARLO, 1970, p. 311–312, fig. 1–3 (Brasil).

SURINAME, Saramacca, Suriname, Brokopondo; BRASIL, Pará, Amazonas.

SURINAME: Saramacca, SN235, 1♂, 1♀; SN280, 2♂; SN283, 3♂, 1♀; SN284, 1♂, 1♀; SN386, 1♂, 1♀; SN390, 1♂; SN464, 1♂, 1♀. Suriname,



*SNor2a*, 3♂, 5♀; *SN117B*, 1♂; *SN241*, 11♂, 26♀; *SN242*, 7♂, 3♀; *SN243*, 1♂, 7♀; Republiek, *P1042*, 29.III.1961, 3♀ (2 paratypes *R. doesburgi* DC, LM). Brokopondo, Sarakreek, 16.XII.1963, 1♂ (Gij, det. DC, W).

BRASIL: Pará, Rio Xingu, Igarapé Garapú, *A565-2*, 23.VIII.1965, 1♀ (paratype *R. usingeri* DC, W). Amazonas, Rio Negro, Igarapé Castanha, 22.X.1965, 1♀ (paratype *R. usingeri* DC); Rio Negro, Igarapé Aduja, *A343*, 10.II.1962, 1♂; Rio Negro, Igarapé Cachoeira, *A416*, 24.XI.1962, 1♂ (det. DC, W).

Length ♂  $\bar{x} = 32.5 \pm 0.5$ , ♀  $\bar{x} = 36 \pm 1$ ; width of pronotum ♂  $\bar{x} = 3.1 \pm 0.1$ , ♀  $\bar{x} = 3.4 \pm 0.1$ ; ocular index ♂  $\bar{x} = 0.65 \pm 0.02$ , ♀  $\bar{x} = 0.64 \pm 0.01$ .

Colour dark brown, legs light with darker bands.

Eyes distinctly wider than the interocular space which does not bear a tubercle.

Anterior border of pronotum without tubercles, ratio body length: length of pronotum ♂  $\bar{x} = 3.9 \pm 0.1$ , ♀  $\bar{x} = 4.0 \pm 0.1$ .

Scutellum with elevated slightly convex anterior part, posterior part with indistinct impressions, separated by an indistinct blunt carina.

Fore femur, ratio length basal part: length apical part 1.6 – 1.8.

Respiratory tube, when folded back over dorsum, reaching to the pronotal pits.

Hind femur, if stretched alongside of abdomen, just reaching the base of the operculum in males and just not reaching it in females.

Female, 5 to 6 of the dorsal teeth of the operculum visible posterior to the apex of abdomen Fig. 172.

Male, parameres lacking a subapical tooth, Fig. 164.

*Ranatra doesburgi* is a quite common species occurring in savannah-streamlets and -ponds. Judging from the Brazilian finds it should occur in the rain-forest region too, but in Suriname it was collected there only once at Sarakreek. (See also *R. obscura*).

Very similar to *R. obscura*, see under that species; differences with *R. macrophthalma* and *R. mediana* are also discussed under the respective species. The paramere of *R. sarmentoi* is also without a subapical tooth, but males of *R. sarmentoi* are at least 5 mm shor-

ter than the smallest *R. doesburgi* males; females of *R. sarmentoi* differ, apart from their smaller size, in the operculum not reaching beyond the apex of abdomen and the hind femur reaching the base of the operculum.

### *Ranatra macrophthalma* Herrich-Schäffer, 1853

Pl. 8b; Fig. 165, 166.

*Ranatra macrophthalma* HERRICH-SCHÄFFER, 1853, p. 31, pl. 290k ("Ostindien?").

*Ranatra macrophthalma*; MONTANDON 1905b, p. 395-396 (Bolivia).

*Ranata surinamensis* DE CARLO, 1963a, p. 19-20, fig. 1-3 (Suriname).

*Ranatra surinamensis*; DE CARLO 1964a, p. 195-196, fig. 24, 61, 101 (Suriname).

? *Ranatra macrophthalma*; DE CARLO 1964a, p. 193-195, fig. 57, 86, 130 (Paraguay).

TRINIDAD; SURINAME, Saramacca, Suriname, Commewijne, Marowijne, Brokopondo; GUYANE FRANÇAISE; BRASIL, Pará; BOLIVIA; PARAGUAY (?).

TRINIDAD: 8.II.1939, 1♀ (Marshall); Mt. Harris, Central Range, 22.VII.1924, 1♀ (CLN) (BMNH).

SURINAME: Saramacca, *SN217*, 2♂; *SN218*, 1♂, 2♀; *SN235*, 5♀; *SN237*, 1♀; *SN278*, 1♀; Matta, waterpit, 11.I.1963, 4♂, 1♀ (Ligori, LM). Suriname, *SN010a*, 1♂; *SN012a*, 1♂; *SN167*, 1♂; *SN241*, 24♂, 13♀; *SN242*, 1♂, 5♀; *SN243*, 10♂, 9♀; *SN386*, 1♀; Zanderijsavanne, Malasiékreek, small pool, *H830*, 25.II.1964, 3♂, 1♀; Paramaribo, 1♀ (Spitz); Paramaribo, Cultuurtuin, 29.II.1939, 3♂, 4♀ (Cossee); Paramaribo, 27.VI.1960, 1♀; Republiek, Coropinakreek, on branches at edges, *Pro42*, 29.III.1961, 2♂, 3♀ (2♀ paratypes *R. surinamensis* DC); Zanderij, 4.V.1961, 1♂; Parakreek near Hannover, *P1188*, 1961, 5♂, 2♀ (1♂ *R. surinamensis* det. DC) (vD); Carolinakreek, *P2116*, 18.XI.1962, 1♂ (Malkin); Republiek, *P385*, 1♂ (vHoof) (LM); Suriname, 1932, 1♀ (Bünzli, det. China, BMNH). Commewijne, *SN063a*, 1♂. Marowijne, *SN260*, 1♀; Marowijne Rivier, Apoema, 16.IV.1960, 1♀ (Sexton); Paloemeu, airstrip, V/VII.1961, 6♀ (Mohmin) (LM). Brokopondo, *SN211*, 1♀; *SN246*, 1♂; *SN248*, 2♂, 1♀; *SN249*, 1♂; proeftuin at Brokobakka, 1961, 1♀ (vHoof); Sarakreek, Adjamakondre, 16.XII.1963, 4♂, 7♀ (Gij, partly det. *R. surinamensis* by DC) (LM).

GUYANE FRANÇAISE: Rivière de Kourou, 1♀ (Le Moul, det. Montandon, BMNH).

BRASIL: Pará, Rio Paru do Oeste, *A375-2*, 17/18.IV.1962, 1♂ (det. *R. surinamensis* DC, W).

Length ♂  $\bar{x} = 39 \pm 1$ , ♀  $\bar{x} = 42 \pm 1$ ; width of pronotum ♂  $\bar{x} = 3.9 \pm 0.1$ , ♀  $\bar{x} = 4.2 \pm 0.2$ ; ocular index ♂  $\bar{x} = 0.61 \pm 0.05$ , ♀  $\bar{x} = 0.62 \pm 0.01$ .

Colour dark brown, legs light brown with well contrasting darker bands.

Eyes distinctly wider than the interocular space which does not bear a tubercle.

Anterior border of pronotum medially with two indistinct tubercles. Ratio body length : length of pronotum ♂, ♀  $\bar{x} = 3.8 \pm 0.1$ .

Scutellum with elevated, slightly convex anterior part, posterior impressions and carina indistinct.

Fore femur ratio length basal part : length apical part 1.6 - 1.7 - 1.9.

Respiratory tube, when folded back over dorsum, reaching at least the anterior border of the pronotum.

Hind femur, if stretched alongside of abdomen, reaching nearly to the apex of the operculum in males and about halfway along the operculum in females.

Female, operculum clearly reaching beyond the apex of abdomen.

Male, paramere Fig. 165, 166.

This species seems to be restricted mainly to the savannah-region and the interior. From the catches it seems that the species has a preference for relatively small stagnant shaded pools; however, nearly all such catches were done in beds of streamlets during the dry period. During the wet periods specimens are found occasionally in pools in the woods, but most seem to be dispersed throughout the streamlets, where they are difficult to find. Consequently no preference for a certain microhabitat within the streamlets was observed.

I have seen a ♀ of this species from Guyane Française identified *R. macrophthalma* H.S. by Montandon (BMNH). As I was not able to trace one of the original specimens of Herrich-Schäffer I follow Montandon's interpretation of this species. This means that *R. surinamensis* of De Carlo becomes a synonym of *R. macrophthalma* whereas *R. macrophthalma* De Carlo 1964 from Paraguay probably refers to another species.

*R. macrophthalma* is, apart from the aberrant *R. tuberculifrons*, the largest species found so far in the Guyanas in restricted sense. Species such as *R. doesburgi* and *R. mixta*, which may sometimes

reach the size of small *R. macrophthalma*, have a relatively distinctly shorter respiratory tube.

From the Manaus and Manacapuru region two similar species with the same type of paramere are known. *R. magna* is larger, on an average, and the length of basal part of anterior femur is slightly more than twice the length of apical part; in *R. macrophthalma* this ratio is slightly less than 2. Finally *R. sattleri*, known only by the male holotype, seems to be slightly bigger, has a somewhat larger and more blunt subapical tooth of the paramere and the hind femur reaches only halfway along operculum.

### **Ranatra magna** Kuitert, 1949

Fig. 167.

*Ranatra magna* KUITERT, 1949, p. 29-30 (Brasil).

*Ranatra magna*; DE CARLO 1964a, p. 188, fig. 26, 35, 105.

BRASIL, Amazonas.

BRASIL: Amazonas, Region de Lago Tapaiuna, I/IV.1936, 1♂, 1♀ (Olalla, paratypes Kuitert, KU); Rio Negro, Igarapé Castanha, 22.X.1965, 1♀ (Fittkau, det. DC, W).

As this species has been found in the Region of Manacapuru (KUITERT, 1949) it probably occurs in the Guyana Region.

Length ♂ 49, ♀ 51 - 52; width of pronotum ♂ 4.8, ♀ 4.9 - 5.0; ocular index ♂ 0.66, ♀ 0.66 - 0.69.

Colour rather dark brown, legs indistinctly banded.

Eyes wider (about 1.4 times) than the strongly convex interocular space which does not bear a tubercle.

Anterior margin of pronotum with two indistinct tubercles. Ratio body length : length of pronotum 3.8 - 3.9.

Scutellum with distinctly elevated, dorsally rather flat, anterior part, posterior part with quite well developed carina and impressions.

Fore femur, ratio length of basal part : length of apical part 1.9.

Respiratory tube as long as or longer than body (50 - 54 mm).

Hind femur reaching at least halfway along the operculum in both sexes.

Female, about 7 of the dorsal teeth on operculum visible posterior to the apex of abdomen (0.6 – 0.8 mm).

Male, parameres with a distinct subapical tooth (Fig. 167).

This species is very similar to *R. sattleri*, including the shape of the parameres. *R. sattleri* is, however, 5 mm shorter than the smallest *R. magna* specimens and the ratio length of basal part : length of apical part of fore femur is 1.7, so until more specimens become available I prefer to treat *R. sattleri* as distinct from *R. magna*. The only species which almost reaches the same size as *R. magna* is the aberrant *R. tuberculifrons*, see under that species.

### **Ranatra mediana** Montandon, 1910

Pl. 8e; Fig. 168–170, 173.

*Ranatra mediana* MONTANDON, 1910b, p. 169–170 (Guyane Française, Suriname).

*Ranatra williamsi* KUITERT, 1949, p. 33–34 (Guyana).

*Ranatra mediana*; DE CARLO 1964a, p. 163–164.

*Ranatra williamsi*; DE CARLO 1964a, p. 155–156, fig. 46, 73, 135.

GUYANA; SURINAME, Saramacca, Suriname, Commewijne, Brokopondo; GUYANE FRANÇAISE; BRASIL, Pará.

GUYANA: Georgetown, Botanic Gardens, 1.IV.1932, 1♂, same, 2.IV.1932, 1♀ (Harris, paratypes *R. williamsi* Kuitert, KU); B. Guiana, 1♂ (Bartlett); Rupununi savannas, pool, 13.XII.1957, 1♂ (McConnel) (BMNH).

SURINAME: Saramacca, *SN016*, 1♀; *SN019*, 1♂; *SN207*, 1♀; *SN217*, 6♂, 5♀; *SN235*, 1♂, 5♀; *SN237*, 2♂, 2♀; *SN252*, 1♂, 1♀; *SN278*, 2♀; *SN280*, 2♂, 1♀; *SN283*, 1♂, 2♀; *SN284*, 1♀; *SN300*, 3♂, 2♀; *SN333*, 1♀; *SN448a*, 1♂. Suriname, *SN012a*, 1♀; *SN110*, 2♂, 1♀; *SN120*, 1♂; *SN123*, 1♀; *SN169*, 1♀; *SN176*, 1♂, 1♀; *SN241*, 3♂, 10♀; *SN242*, 2♂, 1♀; *SN243*, 2♀; Paramaribo, Cultuurtuin, 29.II.1939, 3♂, 3♀ (Cossee); Paranam, in streamlet near Blauwe Meertjes, *P445*, 6.III.1960, 1♂, 1♀; Zanderij, during collecting at light, in puddle, *P2056*, 31.XI.1962, 2♂, 2♀ (LM). Commewijne, *SN088*, 1♂; *SN112*, 1♀. Marowijne, *SN260*, 3♂, 3♀; *SN272*, 1♀. Brokopondo, *SN202*, 3♂, 1♀; *SN211*, 1♂.

GUYANE FRANÇAISE: Rivière de Kourou, 2♀ (Le Moul, det. Montandon, cotype?, BMNH).

BRASIL: Pará, Rio Paru do Oeste, *Sa892*, 8.I.1961, 1♂ (det. DC, W).

Length ♂  $\bar{x} = 29 \pm 1$ , ♀  $\bar{x} = 32 \pm 1$ ; width of pronotum ♂  $\bar{x} = 2.9 \pm 0.1$ , ♀  $\bar{x} = 3.1 \pm 0.1$ ; ocular index ♂  $\bar{x} = 0.66 \pm 0.02$ , ♀  $\bar{x} = 0.67 \pm 0.01$ .

Colour dark brown, venter often lighter than dorsum. Legs mostly light brown with very faint darker annulations.

Eyes distinctly wider than the interocular space which does not bear a tubercle.

Anterior border of pronotum medially without or with slightly indicated tubercles. Ratio body length : length of pronotum ♂  $\bar{x} = 3.7 \pm 0.1$ , ♀  $\bar{x} = 3.8 \pm 0.1$ .

Scutellum with elevated, slightly convex anterior part, posterior part with relatively indistinct impressions, separated by a blunt median carina.

Fore femur length basal part : length apical part 1.8 – 1.9.

Respiratory tube, when folded back over dorsum, reaching half-way the transverse pits and the anterior border of pronotum (in males sometimes nearly reaching the anterior border).

Hind femur if stretched alongside of abdomen reaching halfway along the operculum in males, and reaching slightly over the base of the operculum in females.

Female, operculum not or hardly surpassing the apex of abdomen (Fig. 173).

Male, paramere Fig. 168–170.

This common and widely distributed species is the only one common in ditches with rich vegetation in the coastal region. The highest salinity at which it was found was 650 mgCl-/l. Moreover, it was collected regularly, though in relatively low numbers, especially in the drought-refugia (e.g. SN241, 242, 243), in savannah-streamlets (both at torpid places and at places with current up to about 12 m/min) and in savannah-ponds. The range seems to extend into the rain forest region. (See also under *R. obscura*).

*R. mediana* is of about the same size as *R. doesburgi* and *R. obscura*; males can be recognized by the parameres, females by the operculum not reaching beyond the apex of abdomen in *R. mediana*. *R. signoreti* and similar species, which also have a short operculum in females, are relatively more slender (ratio length : width of pronotum exceeding 10).

**Ranatra mixta** Montandon, 1907

Pl. 8f; Fig. 174.

*Ranatra mixta* MONTANDON 1907, p. 78 (Guyane Française).  
*Ranatra mixta*; DE CARLO 1964a, p. 197–198.

SURINAME, Brokopondo; GUYANE FRANÇAISE; BRASIL, Pará.

SURINAME: Brokopondo, SN273, 1♀ (det. DC).

BRASIL: Pará, Rio Paru do Oeste, Sa392, 8.I.1961, 1♀ (det. *R. moderata* by DC, W).

Length 37 – 38; width of pronotum 3.5 – 3.6; ocular index 0.83 – 0.84.

Colour dark brown, legs, except for the dark anterior coxae, lighter with indistinct darker bands.

Eyes slightly (1.1 – 1.2 times) wider than the distinctly convex interocular space which does not bear a tubercle.

Anterior border of pronotum without tubercles, ratio body length : length of pronotum 3.4 – 3.8.

Scutellum with strongly elevated slightly convex anterior part, posterior part with ill-defined impressions and carina.

Fore femur, ratio length basal part : length apical part 1.9.

Respiratory tube, when folded back over dorsum, almost reaching the apex of scutellum (22 mm).

Hind femur reaching or almost reaching the base of the operculum (in ♀♀).

Female, 10 – 11 of the dorsal teeth of the operculum visible posterior to the apex of abdomen (1.2 mm), Fig. 174.

Although I have not seen original specimens of *R. mixta* the agreement with Montandon's description is good, so the identification is probably correct. This species is similar to *R. doesburgi* and *R. moderata*; the female differs notably from these by the operculum reaching more than 1 mm beyond the apex of abdomen and the relatively shorter respiratory tube.

**Ranatra moderata** Kuitert, 1949

Fig. 175.

*Ranatra moderata* KUITERT, 1949, p. 30 (Brasil).*Ranatra moderata*; DE CARLO 1964a, p. 165-166, fig. 42, 100, 116.

BRASIL, Pará, Amazonas.

BRASIL: Pará, Rio Parú do Oeste, *Sa8gz*, 8.I.1961, 1♀ (det. DC, W).  
 Amazonas, Rio Juruá, João Pessoa, São Felipe, 10.VII/20.IX.1936, 1♂,  
 1♀ (Olalla, paratypes Kuitert, KU).

Length ♂ 37, ♀ 38 - 40; width of pronotum ♂ 3.6, ♀ 3.5 - 3.7;  
 ocular index ♂ 0.66, ♀ 0.76 - 0.78.

Colour dark brown, legs lighter with indistinct darker bands.

Eyes wider (1.2 - 1.3 times) than the interocular space which does not bear a tubercle.

Anterior border of pronotum without or with faintly indicated tubercles, ratio body length : length of pronotum 3.8 - 4.3.

Scutellum with elevated, slightly convex anterior part, posterior part with very indistinct impressions and carina.

Fore femur, ratio length basal part : apical part 1.4 - 1.6.

Respiratory tube, when folded back over dorsum, reaching almost halfway along scutellum (24 - 26 mm).

Hind femur not reaching the base of the operculum in both sexes.

Female, 5 of the dorsal teeth of operculum visible posterior to the apex of abdomen (0.5 mm).

Male, parameres without or with an indication of a subapical tooth (Fig. 175).

The male lacks a subapical tooth on the genital clasper as in *R. sarmentoi* which is much smaller and in *R. doesburgi* which is very similar though somewhat smaller. *R. doesburgi* males have longer respiratory tubes and the hind femur reaches the base of the operculum, moreover some ratios seem to be slightly different. The female of *R. moderata* is notably similar to *R. doesburgi* and *R. mixta*. *R. doesburgi* females have relatively longer respiratory tubes and are



slightly smaller. *R. mixta* females have only slightly shorter respiratory tubes but the genital operculum extends more distinctly beyond the apex of abdomen and the hind femur is relatively longer.

### *Ranatra obscura* Montandon, 1907

Pl. 8g, Fig. 171, 176–178.

*Ranatra annulipes*; WHITE 1879a, p. 207 (Brasil).

*Ranatra obscura* MONTANDON, 1907 p. 60–61 (Guyane Française).

*Ranatra obscura*; DE CARLO 1964a, p. 151–152, fig. 18, 106 (Suriname).

GUYANA; SURINAME; Saramacca, Suriname, Marowijne; GUYANE FRANÇAISE; BRASIL, Pará.

GUYANA: Georgetown, Botanic Gardens, II.1916, 1♂ (Bokin, BMNH).

SURINAME: Saramacca, SN217, 7♂, 4♀; SN218, 1♀; SN235, 1♂, 1♀; SN278, 1♀; SN283, 3♂, 5♀; SN284, 1♂, 2♀; SN290, 1♂, 2♀; SN386, 2♂, 1♀; SN390, 1♂; SN425, 1♂, 1♀. Suriname, SN008a, 1♂; SN010a, 1♂, 2♀; SN012a, 18♂, 30♀; SN070, 1♂; SN113, 1♂; SN117B, 1♂; SN124, 1♀; SN126, 2♀; SN145a, 1♀; SN147, 1♀; SN241, 30♂, 24♀; SN242, 3♂, 4♀; SN243, 3♂, 5♀; Suriname, 11♂, 8♀ (ten Kate); Paramaribo, 28.VII.1961, 1♀; Parakreek near Hannover, P1188, 1961, 1♂, 1♀; Republiek, P1042, 29.III.1961, 1♂, 2♀; Republiek, P385, 1959, 1♀ (vHoof) (LM). Marowijne, SN224, 2♂; SN272, 1♂, 2♀.

GUYANE FRANÇAISE: Ouanary, 1900, 1♂ (Geay, cotype Montandon, HM); Oyapock, environs de St. Georges, 1900, 1♂, 1♀ (Geay, cotypes Montandon, KU).

BRASIL: Pará, Rio Paru do Oeste, Sa892, 8.I.1961, 1♂ (W); Pará, 25.II.1875, 1♂ (Trail, det. *R. annulipes* White, BMNH).

Length ♂  $\bar{x}$  =  $30 \pm 1$ , ♀  $\bar{x}$  =  $32 \pm 1$ ; width of pronotum ♂  $\bar{x}$  =  $3.1 \pm 0.1$ , ♀  $\bar{x}$  =  $3.2 \pm 0.1$ ; ocular index ♂  $\bar{x}$  =  $0.68 \pm 0.01$ , ♀  $\bar{x}$  =  $0.71 \pm 0.02$ .

Colour dark brown, legs light brown with darker bands.

Eyes distinctly wider than the interocular space which does not bear a tubercle.

Anterior border of pronotum without tubercles, ratio body length : length of pronotum ♂, ♀  $\bar{x}$  =  $3.9 \pm 0.1$ .

Scutellum with elevated, slightly convex anterior part, posterior part with indistinct impressions, separated by an indistinct blunt carina.

Fore femur, ratio length basal part : length apical part 1.5 – 1.7.

Respiratory tube, when folded back over dorsum, reaching to the pronotal pits.

Hind femur, if stretched alongside of abdomen just reaching the base of the operculum in males and just not reaching it in females.

Female, 2 to 3 of the teeth on dorsal margin of operculum lying beyond abdominal apex, Fig. 171.

Male, parameres with a low, blunt, subapical tooth (Fig. 176–178).

*Ranatra obscura* seems to be mainly a species from the savannah-region, extending its range somewhat into the coastal plain. So far only one record (Sarakreek) from the rain-forests is available. Most often it was found in virtually stagnant bays and edges of streamlets, moreover quite regularly in savannah-pools and -ponds too.

In 15 of the 25 samples it was accompanied by one or more other species of *Ranatra*. However, about 10 of these multiple *Ranatra* samples were from drought-refugia. There seems to be no correlation in occurrence between *R. obscura* and one of the other *Ranatra* during the wet periods; the same applies to the other species.

Very similar to *R. doesburgi* which is slightly larger on the average and in females has 5–6 teeth on the dorsal margin of the operculum reaching beyond apex of abdomen and lacks a subapical tooth on the male parameres. For differences with *R. macrophthalma* see under that species. In *R. mediana*, which is also about the same size, the operculum in females not or hardly reaches beyond the apex of abdomen and the subapical tooth on the male parameres is well developed.

### *Ranatra ornitheia* n. sp.

Fig. 179, 180.

GUYANA: Brit. Guiana, 1♂ (Bailey, BMNH), holotype.

“ornitheia” refers to the bird-headed genital claspers.

Length 29; width of pronotum 2.8; ocular index 0.74.

Colour medium brown, legs lighter, not banded.

Eyes distinctly (1.4) wider than the convex interocular space which does not bear a tubercle. Anterior border of pronotum without tubercles, ratio body length : length of pronotum 3.8.

Scutellum with elevated, distinctly convex anterior part, posterior impression and carina indistinct.

Fore femur, ratio length basal part : apical part 1.8 – 1.9.

Respiratory tube reaching the anterior border of pronotum (27 mm).

Hind femur reaching halfway along operculum.

Male, paramere Fig. 179, 180.

Similar to *R. rabida* which has different parameres. Differing from other S. American species of the same size by the wide eyes and shape of the parameres *R. brasiliensis*, which has similar parameres is clearly longer (35 mm) and has a relatively shorter respiratory tube.

### **Ranatra parvula** Kuitert, 1949

Pl. 9f; Fig. 181, 182.

*Ranatra parvula* KUITERT, 1949, p. 31–32 (Brasil).

*Ranatra parvula*; DE CARLO 1964a, p. 154–155, fig. 44, 75, 107.

BRASIL, Pará, Amazonas.

BRASIL: Pará, Lago Grande, II.1939, 1♂ (Olalla, KU). Amazonas, Itacoatiara, I/IV.1936, 1♂; Manacapuru, 26.IV., 1♀ (paratype Kuitert) (Olalla, KU); Lago Salgado, S343, 21.IV.1948, 1♂ (det. DC); Manaus, Lago do Xiborena, P73, 14.I.1968, 1♂; Manacapuru, Lago Calado, P704, 13.IV. 1968, 1♂ (Junk, W).

Length ♂ 24 – 25 – 26, ♀ 30; width of pronotum ♂ 2.2 – 2.2 – 2.3, ♀ 2.7; ocular index ♂ 0.99 – 1.01, ♀ 0.96.

Colour light to medium brown, legs about the same colour as body, indistinctly banded.

Width of eyes subequal to the interocular space which does not bear a tubercle.

Anterior border of pronotum without tubercles, ratio body length : length of pronotum 3.9 – 4.1.

Scutellum with anterior part flat and slightly elevated, impressions relatively deep, separated by a faint carina.

Fore femur, length basal part : length apical part 1.7 – 1.8.

Respiratory tube longer than body, 26 – 32 mm.

Hind femur reaching basal  $\frac{1}{4}$  –  $\frac{1}{3}$  of genital operculum in both sexes.

Female, operculum not reaching beyond the apex abdomen.

Male, parameres with an acute and relatively large subapical tooth, Fig. 181, 182.

### **Ranatra rabida** White, 1879

Fig. 183

*Ranatra rabida* WHITE, 1879a, p. 207 (Brasil).

*Ranatra rabida*; DE CARLO 1964a, p. 147–148, fig. 31, 66, 89 (Paraguay, Argentina).

BRASIL, Amazonas; PARAGUAY; ARGENTINA, Corientes, Formosa, Chaco, Sta. Fé.

PARAGUAY: Puerto Vallemi, VI.1952, 1♂, 1♀ (Bachmann, det. DC, KU).

This species might occur in the Guyana Region as WHITE's specimen was from Rio Negro.

Length ♂ 28, ♀ 29½; width of pronotum ♂, ♀ 2.6; ocular index ♂, ♀ 0.66.

Colour, medium to dark brown, legs lighter, indistinctly banded.

Eyes distinctly (1.5) wider than the convex interocular space which does not bear a tubercle.

Anterior border of pronotum without tubercles, ratio body length : length of pronotum 3.8 – 3.9.

Scutellum with elevated moderately convex anterior part, posterior carina and impressions indistinct to rather distinct.

Fore femur, ratio length basal part : length apical part 1.8.

Respiratory tube longer than body (29.5 – 33 mm).

Hind femur reaching basal  $\frac{1}{4}$  of operculum in males, not reaching it in females.

Female operculum just reaching beyond apex of abdomen (almost 0.1 mm).

Male, paramere Fig. 183.

I have not been able to trace the original specimen of this species, so I follow the interpretation of DE CARLO 1964a. *R. rabida* differs from *R. sarmentoi* by the longer respiratory tube and from *R. signoreti*, *R. adelomorpha* and *R. parvula* by a somewhat stouter body and the eyes 1.5 times wider than the interocular space. *R. ornitheia* differs principally in the shape of the male parameres.

### **Ranatra sarmentoi De Carlo, 1967**

Pl. 9a; Fig. 184.

*Ranatra sarmentoi* DE CARLO, 1967c, p. 31–32, fig. 8–10 (Suriname).

*Ranatra ameghinoi* DE CARLO, 1970, p. 314–315, fig. 10–12 (Venezuela, Suriname).

VENEZUELA, Monagas; SURINAME, Suriname, Marowijne.

SURINAME: Suriname, SN152, 1♂, 1♀. Marowijne, Nassaubeerge, Km 11.2, 15.III.1949, 1♀ (Suriname-exp, allotype DC, LM).

Length ♂ 23, ♀ 24–25; width of pronotum ♂ 2.3, ♀ 2.4–2.6; ocular index ♂ 0.76, ♀ 0.82–0.83.

Colour medium to dark brown, legs lighter without dark bands.

Eyes about 1.2 times wider than the interocular space which does not bear a tubercle.

Anterior border of pronotum without tubercles. Ratio body length : length of pronotum ♂ 3.8, ♀ 3.9–4.1.

Scutellum with elevated, slightly convex anterior part, posterior part with indistinct impressions separated by a blunt carina.

Fore femur, ratio length basal part : length apical part 1.6–1.8.

Respiratory tube, when folded back over dorsum, not reaching the pronotal pits.

Hind femur, if stretched alongside of abdomen, just reaching the base of the operculum in females, reaching well over the base of operculum in male.

Female, operculum not reaching beyond the apex of abdomen.  
Male, parameres without a subapical tooth (Fig. 184).

DE CARLO (in litt.) confirmed my opinion that *R. ameghinoi* is a synonym of *R. sarmentoi*. General shape like *R. mediana*, which is clearly larger, see under that species. *R. weberi*, which is of about the same size, has a distinct tubercle on the interocular space. Finally *R. signoreti* and similar species are relatively narrow (ratio length : pronotal width exceeding 10) and have nearly always relatively longer respiratory tubes.

### *Ranatra sattleri* De Carlo, 1967

Pl. 8c; Fig. 186, 187.

*Ranatra sattleri* DE CARLO, 1967a, p. 189–190, fig. 2–3 (Brasil).

BRASIL: PARÁ, Rio Paru do Oeste, 4379, 1♂ (holotype DC, W).

The locality and collector cited by DE CARLO 1967 differ from the label on the holotype studied.

Length 44; width of pronotum 4.3; width of head 4.0; ocular index 0.67; length of pronotum 11.3; ratio length anterior : length posterior part of pronotum 2.1, length of anterior coxae 9.8; length of fore femur 9.3 + 5.4.

Colour brown, legs not banded.

Head about as wide as pronotum, vertex rather convex but not bearing a tubercle, eyes distinctly wider than interocular space.

Anterior border of pronotum without tubercles, ratio length of body : length of pronotum 3.9; pronotum quite densely clothed with somewhat clavate bristles.

Scutellum with rather flat anterior part, an indistinct median carina and impressions on posterior part. Scutellum and mesopleurae with a few clavate bristles which are distinctly shorter than those on pronotum.

Hind femur reaching halfway the operculum (Length 24 mm).

Respiratory tube exceeding 28 mm (DE CARLO 1967 cites 28 mm but does not state that they are distinctly broken off).

Male, paramere Fig. 186, 187.

This species has a rather thick clothing of clavate bristles on pronotum, a character which is stressed by DE CARLO 1967; many species of *Ranatra*, however, possess these bristles and the thickness seems to be rather variable (perhaps secondary, owing to rubbing off). *R. sattleri* is similar to *R. magna*, which is larger (width of pronotum exceeding 4.6 mm) and has slightly different parameres, and to *R. macrophthalma*, see under that species.

### ***Ranatra signoreti* Montandon, 1905**

Fig. 188.

*Ranatra signoreti* MONTANDON, 1905b, p. 392-393 (Brasil, Venezuela).

*Ranatra signoreti*; DE CARLO 1964a, p. 145-146, fig. 17, 92, 118 (Bolivia, Paraguay, Argentina).

VENEZUELA; BRASIL, Amazonas, Rio Grande (do Norte?); BOLIVIA; PARAGUAY; ARGENTINA, Corrientes, Entre Rios, Buenos Aires.

BRASIL: Amazonas, Rio Solimões, Ilha Careiro, *Arz*, 15.III.1961, 1♀; Sto. Antônio do Içá, *Szrbb*, 9.X.1959, 1♀ (det. DC. W).

This species might occur in the Guyana Region.

Length 28; width of pronotum 2.5; ocular index 0.87 - 0.93.

Colour medium to dark brown, legs lighter with rather distinct darker bands.

Eyes slightly (1.03 - 1.1) wider than the convex interocular space which does not bear a tubercle.

Anterior border of pronotum without tubercles, ratio body length: length of pronotum 4.0 - 4.1.

Scutellum with elevated nearly flat anterior part, posterior carina and impressions indistinct.

Fore femur, ratio length basal part : length apical part about 1.8.

Respiratory tube longer than body (29-31 mm).

Hind femur not reaching the operculum (in ♀♀).

Female operculum just reaching the apex of abdomen.

Male, paramere Fig. 188 (adapted from DE CARLO 1964).

Similar to *R. rabida* and *R. ornitheia* which are stouter and have relatively wider eyes; to *R. parvula* which has eyes subequal in width to the interocular space and the hind femur reaching the operculum; to *R. adelomorpha* which has relatively distinctly shorter respiratory filaments and different parameres in males. I have not been able to trace an original specimen of this species and follow the interpretation of DE CARLO 1964a.

### *Ranatra siolii* De Carlo, 1970

Pl. 9e; Fig. 185.

*Ranatra siolii* DE CARLO, 1970, p. 312-313, fig. 4, 5, 9 (Brasil).

BRASIL: Pará, Amazonas.

BRASIL: Pará, Jatobá, 29.I.1965, 1♂ (Lenz/Sioli, holotype DC). Amazonas, Lago Jurucui, Igarapé do Tendo, 6.XII.1963, 1♀ (Marlier, allotype DC), (W).

Length ♂ 28, ♀ 27; width of pronotum 2.0 - 2.1; width of head 2.5; ocular index ♂ 0.92, ♀ 0.94; ratio body length : length of pronotum 4.0 - 4.1; fore femur ♂ 5.2 + 2.9, ♀ 4.8 + 2.6.

Colour light yellowish brown to grey-brown, legs not annulate. Eyes broader than the, distinctly convex, interocular space; broader than long.

Anterior border of pronotum without tubercles.

Scutellum nearly flat anteriorly, posteriorly apparently with two very indistinct impressions (damaged in both specimens).

Hind femur just not reaching halfway operculum in male, apparently not reaching the operculum in female (leg glued to specimen).

Respiratory filaments not reaching the pronotum when folded back, length ♂ 16, ♀ 18.



Female operculum reaching 0.3 mm beyond apex of abdomen.  
Male parameres with a blunt subapical tooth (Fig. 185).

The male parameres are similar to that of *R. doesburgi* but the latter species is somewhat longer, distinctly (1.5 – 1.7 times) broader and has a relatively longer respiratory tube. Species of about the same size (*R. signoreti*, *R. rabida*, *R. parvula*, *R. sarmentoi*, *R. weberi* etc.) all have different male parameres and relatively longer respiratory tubes, *R. weberi* of which the length of the filaments is not known has a distinct pointed tubercle on the vertex.

### **Ranatra subinermis** Montandon, 1907

*Ranatra subinermis* MONTANDON, 1907, p. 66 (Guyane Française).  
*Ranatra subinermis*; DE CARLO 1964a, p. 199–200.

GUYANE FRANÇAISE: 1899, 1♀ (Oberthür, holotype, PM).

Length 44; width of pronotum 3.5; width of head 3.8; ocular index 0.72; ratio body length : length of pronotum 3.9; fore femur 7.9 + 4.1.

Colour light brown, legs not annulate.

Eyes distinctly wider than the interocular space which is strongly convex with an indication of a tubercle.

Anterior border of pronotum with two poorly-developed tubercles.

Scutellum with slightly elevated, flat anterior part; posterior part with two shallow impressions separated by an indistinct median carina.

Hind femur just not reaching the operculum; respiratory tubes missing.

Female operculum reaching distinctly beyond the apex of abdomen (1.1 mm), dorsal teeth indistinct.

MONTANDON 1907 already had doubts whether this specimen belonged to a separate species or was a malformed *R. tuberculifrons*. In spite of having more specimens of *R. tuberculifrons* available than MONTANDON I cannot solve this problem either. The holotype

of *R. subinermis* is virtually identical with *R. tuberculifrons*-specimens except for two characters which seem to be quite important, the hind femur does not reach the genital operculum in *R. subinermis* and the interocular tubercle is only indicated.

### **Ranatra tuberculifrons** Montandon, 1907

Pl 8d; Fig. 189.

*Ranatra tuberculifrons* MONTANDON, 1907, p. 65–66 (Guyane Française).

*Ranatra tuberculifrons*; De CARLO 1964a, p. 198–199, fig. 115.

*Ranatra tuberculifrons*; DE CARLO 1967, p. 32 (Suriname, Brasil).

SURINAME, Saramacca, Suriname, Marowijne; GUYANE FRANÇAISE; BRASIL, Amazonas.

SURINAME: Saramacca, SN237, 1♂, 1♀. Suriname, SN117B, 1 lv; SN126, 2♀; SN127, 1♂; SN143, 1♀; SN175, 1♂; Carolinakreek, 22.VII.1969, 1 lv; Malasiekreek, small pool, H830, 25. II.1964, 1♀; Carolinakreek, P2116, 18.XI.1962, 1♀ (Malkin); Zanderij, in puddle, P1167, 8.IV.1962, 1♀ (vD) (LM). Marowijne, SN263, 1♂; SN272, 1♀.

BRASIL: Amazonas, Rio Negro, Igarapé Patauí, A555, 29.VII.1965, 1♂ (Fk); Upper Rio Negro, Içana, S333, 16.XII.1959, 1♂ (Sioli) (W).

Length ♂  $\bar{x}$  =  $39 \pm 2$ , ♀  $\bar{x}$  =  $45 \pm 3$ ; width of pronotum ♂  $\bar{x}$  =  $3.4 \pm 0.1$ , ♀  $\bar{x}$  =  $3.8 \pm 0.4$ ; ocular index ♂  $\bar{x}$  =  $0.72 \pm 0.02$ , ♀  $\bar{x}$  =  $0.74 \pm 0.02$ .

Colour light to warm medium brown, legs not annulate.

Eyes distinctly wider than the interocular space, which bears a conical tubercle.

Anterior border of pronotum with two small tubercles, ratio body length : length of pronotum ♂  $\bar{x}$  =  $3.8 \pm 0.1$ , ♀  $\bar{x}$  =  $3.9 \pm 0.1$ .

Scutellum with slightly elevated, rather flat anterior part, posterior part with impressions and median carina distinct.

Fore femur, ratio length of basal part : length of apical part 1.9–2.0; ratio length of pronotum : length of femur 1.1.

Hind femur reaching to apex of operculum in males and about halfway operculum in females.

Respiratory tube about half the length of body or less.

Female operculum clearly reaching beyond apex of abdomen (about 1 mm).

Male, paramere Fig. 189.

Although only 5 specimens of this species have been recorded formerly, *R. tuberculifrons* is not uncommon in the streamlets of the savannahs in Suriname. Contrary to most *Ranatra* it is quite solitary even in the dry periods.

Except for the very similar *R. subinermis*, *R. tuberculifrons* can at once be recognized by the prominent tubercle on the head in connection with its size. *R. subinermis* differs in having a less distinct tubercle on the head and posterior femur not reaching the operculum in females.

### ***Ranatra weberi* De Carlo, 1970**

Pl. 9b; Fig. 159, 190.

*Ranatra weberi* DE CARLO, 1970, p. 313-314, fig. 6-8 (Brasil).

BRASIL: Amazonas, Rio Negro, Igarapé Patauá, A555, 1♂ (holotype DC, W).

Length 24; width of pronotum 2.6; width of head 2.4; ocular index 0.97; ratio body length : length of pronotum 3.9; fore femur 4.1 + 2.4.

Colour medium brown to light brown, legs not annulate.

Eyes broader than long, width of eyes subequal to width of interocular space which bears a prominent, pointed tubercle (Fig. 159).

Anterior border of pronotum with, rather ill-defined, tubercles; posterior half of anterior lobe flattened dorsally, anterior half bumpy.

Scutellum flat anteriorly, posterior impressions and carina indicated only.

Fore femur ratio length basal part : apical part 1.8, ratio length pronotum : length femur about unity.

Hind femur reaching nearly halfway the operculum; length of respiratory tube exceeding 10 mm (broken).

Male, paramere Fig. 190.

This species, which is so far only known by the holotype, can at once be recognized by the prominent pointed tubercle on the head in connection with its size.

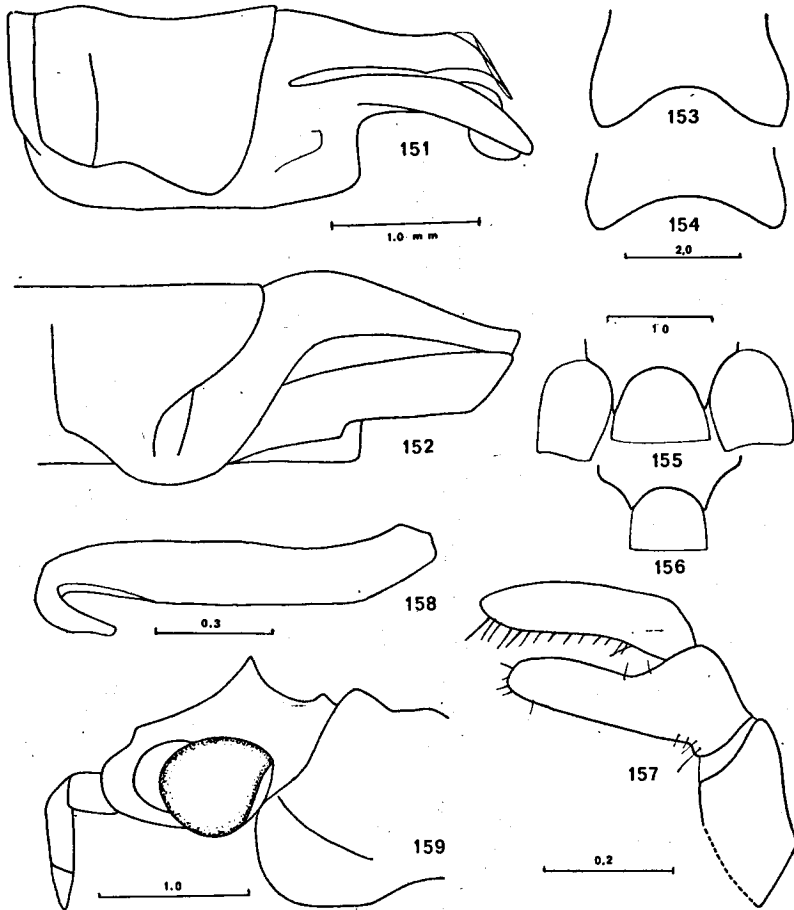


Fig. 151–152. *Lethocerus*, phallus, lateral view: 151 *L. annulipes* from Suriname; 152 *L. delpontei* adapted from MENKE 1963.

Fig. 153–154. Posterior margin of pronotum in *Curicta*: 153 *C. doesburgi*; 154 *C. intermedia*, holotype, from Colombia.

Fig. 155–156. Posterior margin of metasternum in *Curicta*: 155 *C. doesburgi*; 156 *C. intermedia*.

Fig. 157–158. *Curicta doesburgi* from Suriname: 157 antenna; 158 paramere.

Fig. 159. *Ranatra weberi*, holotype: head in lateral view.

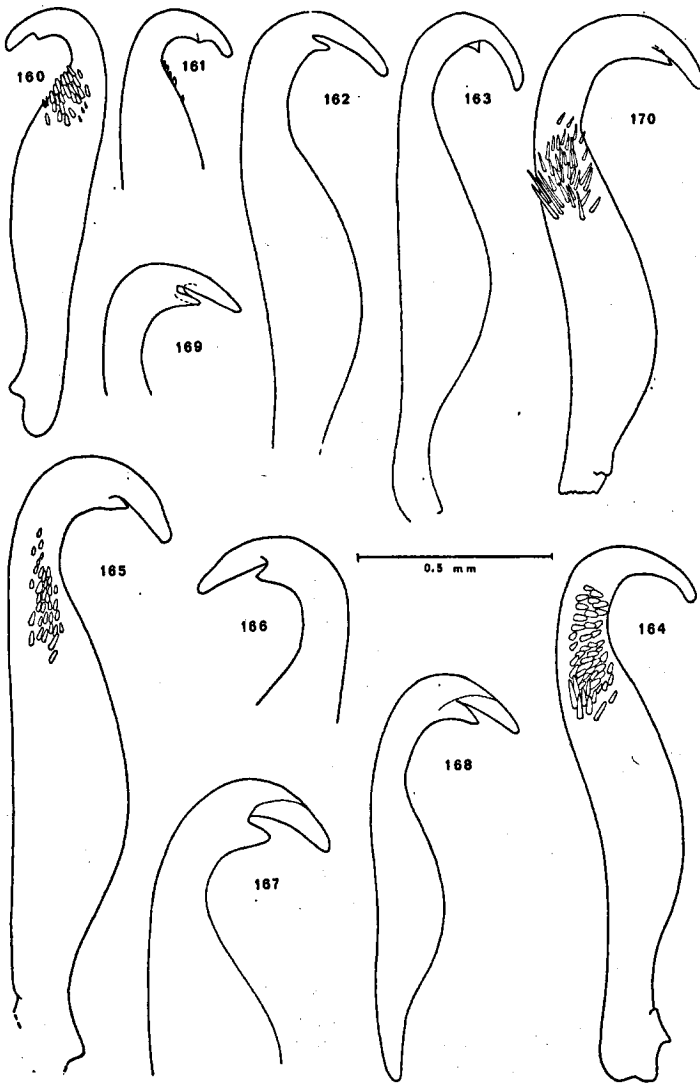


Fig. 160–170. Parameres in *Ranatra*: 160–161 *R. adelomorpha*, paratype, from Suriname; 162 *R. brasiliensis*, adapted from DE CARLO 1964; 163 *R. curtafemorata*, paratype, from Amazonas; 164 *R. doesburgi* from Suriname; 165–166 *R. macrophialma* from Suriname; 167 *R. magna*, paratype, from Amazonas; 168 *R. mediana*, paratype of *R. williamsi* Kuitert, from Guyana; 169–170 *R. mediana* from Suriname.

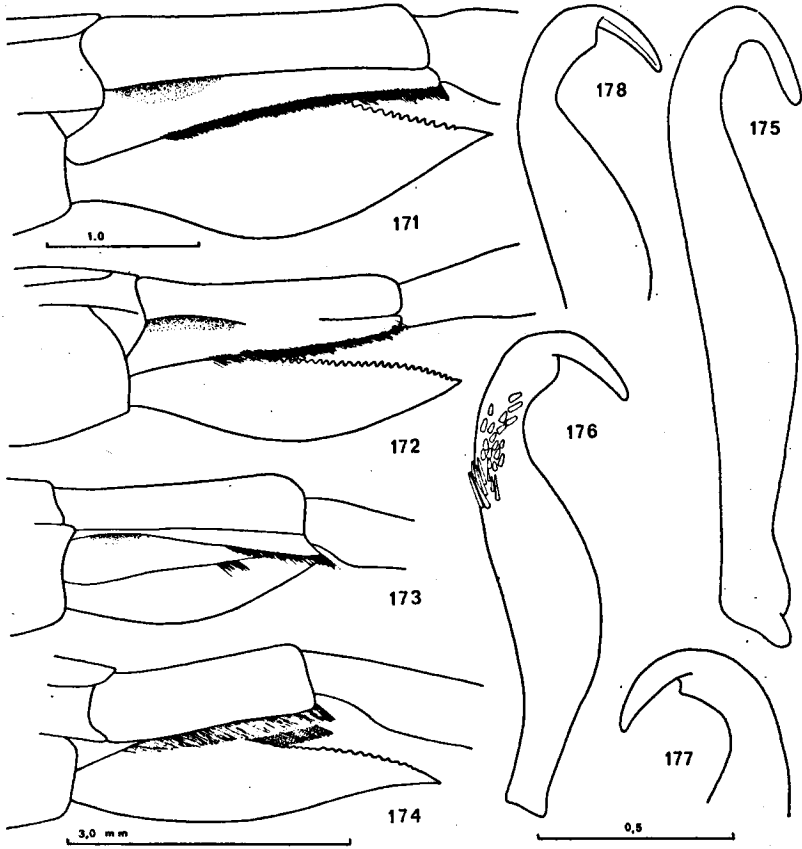


Fig. 171-174. *Ranatra* from Suriname, female apex of abdomen, lateral view: 171 *R. obscura*; 172 *R. doesburgi*; 173 *R. mediana*; 174 *R. mixta*, det. DE CARLO.  
 Fig. 175-178. *Ranatra*, parameres: 175 *R. moderata*, paratype, from Amazonas; 176-177 *R. obscura* from Suriname; 178 *R. obscura*, cotype from Guyane Française.

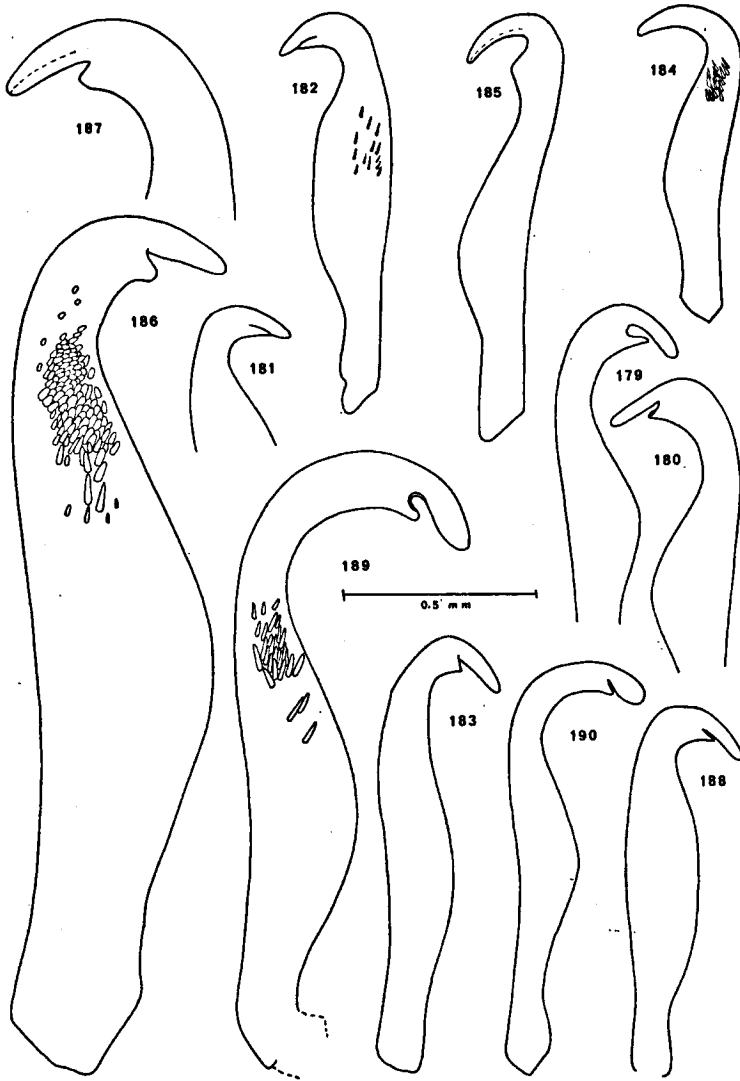


Fig. 179-190. *Ranatra*, parameres: 179-180 *R. ornitheia*, holotype, from Guyana; 181-182 *R. parvula* from Amazonas; 183 *R. rabida*, det. DE CARLO, from Paraguay; 184 *R. sarmentoi* from Suriname; 185 *R. siolii*, holotype, from Pará; 186-187 *R. satleri*, holotype, from Pará; 188 *R. signoreti*, adapted from DE CARLO 1964; 189 *R. tuberculifrons* from Suriname; 190 *R. weberi*, holotype, from Amazonas.



## HELOTREPHIDAE Esaki &amp; China, 1927

Small semiglobular Nepomorpha, length mostly 2–3 mm; head and prothorax fused; antennae 1- or 2-segmented; rostrum 4-segmented.

The Helotrephidae are more or less of the same shape and size as the Pleidae, although in general somewhat more globular. They can be recognized by the fusion of head and pronotum which are separated by a shallow suture only.

This tropicopolitan family contains about 20 described species. It is morphologically much more varied than the Pleidae; 3–4 subfamilies can be recognized. In the Western Hemisphere there are two genera, *Neotrepbes* China with four species occurring in South Brasil and *Paratrepbes* with one species, so far only known from the Guyanas.

Most Helotrephidae seem to have the same habitat preferences as the Pleidae: still waters with abundant vegetation. *Paratrepbes* seems to be associated with streamlets where, in the wet periods, it clings to vegetation or barriers.

Little is known about the biology of this family except for some notes by USINGER (1937) on *Hydrotrepbes* which is reported to swim equally easily either with venter or dorsum uppermost. Helotrephidae are supposed to be predatory on small Crustacea and the like.

## KEY TO AMERICAN GENERA OF HELOTREPHIDAE

- 1a Lateral margins of head and pronotum distinctly sinuate, eyes globose (Fig. 191); cephalonotal suture sinuate. Hemielytra with a longitudinal lateral ("horizontal") ridge near costal margin. Rostrum relatively short, at most reaching the middle coxae . . . . . *Neotrepbes*
- 1b Lateral margins of head and pronotum hardly sinuate, eyes not globose (Fig. 192); cephalonotal suture straight. Hemielytra lacking the ridge near costal margin. Rostrum long, reaching the middle of the hind coxae . . . . . *Paratrepbes*

**Paratrephes** China, 1940

Body strongly convex dorsally, laterally somewhat compressed; suture between head and pronotum rather straight, rostrum long and slender, reaching the hind coxae, antennae (at least in the brachypterous form, which is the only one known so far) consisting of one segment; all tarsi three-segmented.

**Paratrephes hintoni** China, 1940

Pl. 10a; Fig. 192-194.

*Paratrephes hintoni* CHINA, 1940, p. 117-120, fig. 8-11 (Guyane Française).

SURINAME, Saramacca, Suriname, GUYANE FRANÇAISE.

SURINAME: Saramacca, SN236, 1♂; SN238, 1♀. Suriname, SN179, 1lv; SN243A, 3♂, 4♀; Zanderij, Malasiekreek, drying small pool, H830A, 25.II.1964, 1♀.

GUYANE FRANÇAISE: St. Laurent, X.1937, 2♂ paratypes (Hinton, BMNH).

Length ♂  $\bar{x} = 1.88 \pm 0.01$ , ♀  $\bar{x} = 1.88 \pm 0.02$ ; width of pronotum ♂  $\bar{x} = 1.15 \pm 0.02$ , ♀  $\bar{x} = 1.18 \pm 0.02$ ; ocular index ♂  $\bar{x} = 6.3 \pm 0.8$ , ♀  $\bar{x} = 5.5 \pm 1.3$ .

Colour dark brown to blackish, apical third of head, rostrum and legs yellowish. Cephalonotal suture rather straight, rostrum long and slender, extending to the hind coxae, 4-segmented, apical segment about twice as long as the remaining ones together.

Anterior lateral angles of pronotum very acutely extending to the surface of the eyes (Fig. 194).

Scutellum more faintly punctate than the remainder of the body, basal width somewhat less than twice its median length.

All tarsi three-segmented, the basal segment short.

Male, ventral paramere Fig. 193.

## PLEIDAE Fieber, 1851

Small semiglobular Nepomorpha, length rarely exceeding 3 mm; head and prothorax not fused; antennae 3-segmented; rostrum 4-segmented.

The Pleidae are more or less of the same shape and size as the Helotrephidae, although most Pleidae are somewhat more elongate. They can be recognized by the head and pronotum being separate.

This cosmopolitan family contains about 40 described species, 14 of which occur in the Americas. The family is morphologically quite monotonous in contrast to the Helotrephidae. The genera only differ in relatively superficial characters, such as the number of tarsal segments.

In the Western Hemisphere there are two genera. *Paraplea* with two species and *Neoplea* with 12 species; both have representatives in the Guyanas.

The Pleidae prefer still waters with abundant vegetation, but they may occur in currents, clinging to some support. Taking into account their small size they swim very well. As far as known they are predatory on small Crustacea and the like.

KEY TO GENERA AND SPECIES OF PLEIDAE FROM THE  
GUYANA REGION

- 1a Anterior tarsi with two segments (Fig. 196) (*Paraplea*) . . . . . :  
 . . . . . *P. puella*
- 1b Anterior tarsi with three segments (Fig. 195) (*Neoplea*) . . . . . 2
- 2a Length about 1.6 mm, ratio length of body : width of pronotum  
 about 1.6 . . . . . *N. globoidea*
- 2b Length about 1.5–1.8 mm, ratio length of body : width of  
 pronotum 1.9–2.0 . . . . . 3
- 3a Length of pronotum about  $\frac{1}{4}$  of body length, punctures on  
 pronotum and hemielytra not dark, honeycomb structure on  
 hemielytra well developed . . . . . *N. absona*
- 3b Length of pronotum about  $\frac{1}{3}$  of body length, punctures on  
 pronotum and hemielytra dark, honeycomb structure on  
 hemielytra not very apparent. . . . . *N. maculosa*

## Neoplea Esaki & China, 1928

Pleidae with tarsal formula 3, 2, 3; sternite VI in most species without carina.

### Neoplea absona (Drake & Chapman, 1953)

Pl. 10i; Fig. 198, 200, 204, 205, 208, 212, 213.

*Plea absona* DRAKE & CHAPMAN, 1953, p. 58 (Argentina).

*Neoplea absona*; BACHMANN 1962, p. 24 (Argentina).

*Neoplea absona*; BACHMANN 1968, p. 128-129, fig. 30-36 (Argentina).

SURINAME<sup>1</sup>, Saramacca, Suriname; ARGENTINA, Buenos Aires.

SURINAME: Saramacca, *SNo20*, 9♂, 15♀; *SNo20b*, 12♂, 18♀; *SNo28*, 2♂, 1♀; *SNo30*, 1♂, 4♀; *SNo31*, 1♀; *SNo32*, 1♂, 2♀; *SNr33*, 18♂, 19♀; *SN206*, 6♂, 3♀; *SN207*, 1♂, 1♀. Suriname, *SNo45*, 1♂, 1♀; *SNo46*, 5♂, 2♀; *SNo47*, 3♂, 2♀; *SNo78*, 4♂, 4♀; *SNr09*, 1♀; *SNr19*, 1♂; *SNr23*, 2♂, 3♀; *SNr57*, 5♂, 6♀; *SNr58*, 8♂, 10♀; *SNr69*, 12♂, 13♀.

Length ♂  $\bar{x} = 1.54 \pm 0.02$ , ♀  $\bar{x} = 1.69 \pm 0.03$ ; width of pronotum ♂  $\bar{x} = 0.72 \pm 0.02$ , ♀  $\bar{x} = 0.84 \pm 0.02$ ; ocular index ♂  $\bar{x} = 2.17 \pm 0.09$ , ♀  $\bar{x} = 2.11 \pm 0.19$ .

Colour dorsally yellowish with brownish markings, punctures not dark. Venter dark brown, legs yellowish.

Head, porecanal brownish, vertex loosely punctate, shiny.

Pronotum and hemielytra punctate, on pronotum about 8 punctures in 1/10 of a mm<sup>2</sup>. Honeycomb structure on hemielytra well developed.

Scutellum with hardly any punctures, smooth, shiney. Basal width of scutellum ♂  $\bar{x} = 0.41 \pm 0.02$ , ♀  $\bar{x} = 0.48 \pm 0.02$ , ratio width : length of scutellum about 1.1-1.3.

Fore and hind tarsi 3-, middle tarsi 2-segmented.

Median keel on abdominal venter developed on sternites 2-5. Male, genital capsule and parameres Fig. 204, 212, 213. Female, apical teeth on ovipositor not short and stout (Fig. 198).

This species has been found exclusively in stagnant waters with rich vegetation; predominantly in the ditches of the coastal region but occasionally in marshes associated with savannah streamlets too.

*N. absona* differs from other species of *Neoplea* occurring in S. America by the relatively short pronotum and small scutellum, in addition to the genital characters.

### ***Neoplea globoidea* n. sp.**

Fig. 201, 210, 214, 215.

SURINAME: Saramacca, Sipari kreek, tributary of Tibiti, (about 60 km W of Zanderij, H929, 18.X.1968, 1♂ (holotype, CN).

When more specimens of this species are obtained, the holotype will be transferred to the Zoological Museum at Utrecht.

*globoidea* refers to the broad shape of the species.

Length 1.60; width of pronotum 1.00; ocular index 2.00.

Colour, dorsally light brown with whitish bands along eyes on vertex, whitish patches along anterior and posterior border of pronotum and on base of clavus. Venter dark brown, legs yellowish.

Head, porecanal brownish, vertex rather densely punctate, only slightly shiny.

Pronotum and hemielytra punctate, on pronotum about 12 punctures on 1/10 of a mm<sup>2</sup>. Honeycomb structure on hemielytra well developed.

Scutellum only slightly less densely punctate than pronotum. Basal width of scutellum 0.53, ratio width : length scutellum 1.33.

Fore and hind tarsi 3-, middle tarsi 2-segmented.

Median keel on abdominal venter developed on sternites 2-5.

Male parameres rather plump, subequal, Fig. 214, 215.

Apart for its short and broad stature and different colour pattern this species differs from the *Neoplea* known to occur in the Guyana-region by the more densely punctate vertex and scutellum and the male parameres.

**Neoplea maculosa** (Berg, 1879)

Pl. 10j; Fig. 199, 202, 206, 209, 216, 217.

*Plea maculosa* BORG, 1879, p. 199-200 (Argentina).*Plea maculosa*; KIRKALDY 1899, p. 1 (Bolivia).*Plea maculosa*; DRAKE & CHAPMAN 1953, p. 56 (Argentina, Perú).*Plea maculosa*; BACHMANN 1962, p. 24 (Argentina).*Neoplea maculosa*; BACHMANN 1968, p. 125, fig. 9-15 (Argentina, Paraguay, Bolivia).

SURINAME, Suriname; PERÚ; BOLIVIA; PARAGUAY; ARGENTINA, Corrientes, Entre Rios, Buenos Aires, Sta Fé, Chaco, Formosa, Salta.

SURINAME: Suriname, *SNo22Aa*, 3♂, 2♀; *SNo7r*, 4♀; Swamp Berseba, Republiek, *H642*, 3.IX.1955, 1♀.Length ♂ 1.6 - 1.7 - 1.8, ♀  $\bar{x} = 1.9 \pm 0.1$ ; width of pronotum ♂ 0.83 - 0.86 - 0.88, ♀  $\bar{x} = 1.0 \pm 0.1$ ; ocular index ♂ 2.2 - 2.9 - 3.3, ♀  $\bar{x} = 2.5 \pm 0.4$ .

Colour dorsally, yellowish with brown markings, punctures dark. Venter dark brown, legs yellowish.

Vertex distinctly punctuate, not very shiny.

Pronotum and hemielytra punctate, on pronotum about 7 punctures in 1/10 of a mm<sup>2</sup>. Honeycomb structure on hemielytra not very apparent.Scutellum distinctly punctate, somewhat shiny. Basal width of scutellum ♂ 0.41 - 0.47 - 0.50 ♀  $\bar{x} = 0.56 \pm 0.08$ , ratio width : length of scutellum about 1.0-1.2.

Fore and hind tarsi 3-, middle tarsi 2-segmented.

Median keel on abdominal venter developed on sternites 2-5.

Male parameres Fig. 216, 217.

Female, apical teeth on ovipositor rather long Fig. 199.

*Neoplea maculosa* was collected in *Eleocharis*-marshes only.Differs from *N. globoidea* which has also a relatively strongly punctate vertex by its much more slender general outline, higher value of the ocular index and details of the genitalia.

**Paraplea** Esaki & China, 1928

Pleidae with tarsal formula 2, 2, 3; sternite VI carinate.

**Paraplea puella** (Barber, 1923)

Pl. 10b; Fig. 197, 203, 207, 211.

*Plea puella* BARBER, 1923, p. 11 (Puerto Rico, Guadeloupe).

*Plea puella*; DRAKE & CHAPMAN 1953, p. 54 (Trinidad).

*Paraplea puella*; DRAKE & MALDONADO CAPRILES 1956, p. 53 (Hispaniola).

*Plea puella*; WILSON 1958, p. 146 (U.S.A.).

*Plea puella*; NIESER 1969a, p. 61-62, fig. 145-146 (Antilles, Venezuela, Suriname).

U.S.A., Florida, Mississippi, Louisiana, Texas; MÉXICO; CANAL ZONE; GREATER ANTILLES; LESSER ANTILLES; VENEZUELA; SURINAME, Saramacca, Suriname, Commewijne.

SURINAME: Saramacca, *SNozob*, 2♀; *SNr33*, 2♀. Suriname, *SNo46*, 14♀; *SNo48A*, 2♀; *SNr09*, 9♀; *SNr19*, 1♀; Paramaribo, l'Hermitage, at light, 13/31.VII.1969, 90♀; same, VIII.1969, 89♀. Commewijne, *SNo74*, 2♀. - Only females have been studied.

Length  $\bar{x} = 1.60 \pm 0.05$ ; width of pronotum  $\bar{x} = 0.84 \pm 0.02$ ; ocular index  $\bar{x} = 2.54 \pm 0.11$ .

Colour dorsally yellowish with brownish patches, punctures brownish. Venter dark brown, legs yellowish.

Head, porecanal brownish, vertex rather smooth.

Pronotum and hemielytra with deep, rather big punctures, on pronotum about 30 in 1/10 of a mm<sup>2</sup>. Honeycomb structure on hemielytra absent.

Scutellum less deeply punctured than pronotum and hemielytra shiny. Basal width of scutellum  $\bar{x} = 0.44 \pm 0.01$ , ratio width: length scutellum about 1.0-1.2.

Fore and middle tarsi 2-, hind tarsi 3-segmented.

Median keel developed on sternites 2-6.

Apical teeth on ovipositor relatively short and stout.

*Paraplea puella* is quite common in stagnant waters with rich vegetation in the coastal region. Contrary to *N. absona*, with which it is often found together, it turns up regularly in light-traps. Males seem to be very rare; I have not found a male in over 400 specimens from the Antilles (NIESER, 1969a) nor in the present series from Suriname.

As far as the South American fauna is concerned, this species can be recognized at once by its 2-segmented anterior tarsi.



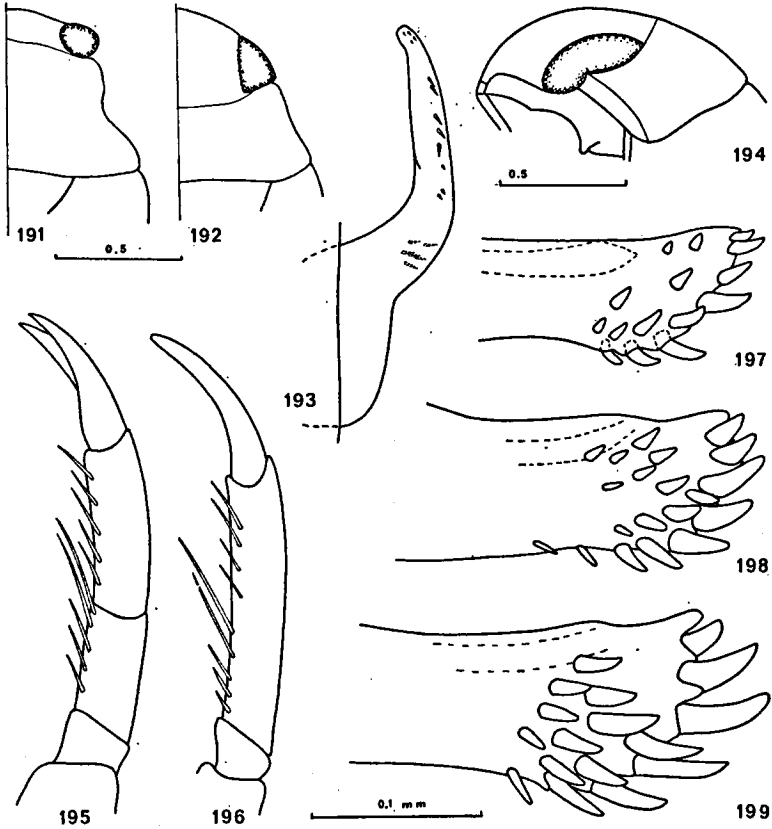


Fig. 191-192. Right half of head and pronotum in: 191 *Neotrepthes*; 192 *Paratrepthes*.

Fig. 193-194. *Paratrepthes hintoni* from Suriname: 193 paramere; 194 head and prothorax in lateral view.

Fig. 195-196. Fore leg in: 195 *Neoplea*; 196 *Paraplea*.

Fig. 197-199. Ovipositor in Pleidae from Suriname: 197 *Paraplea puella*; 198 *Neoplea absona*; 199 *N. maculosa*.

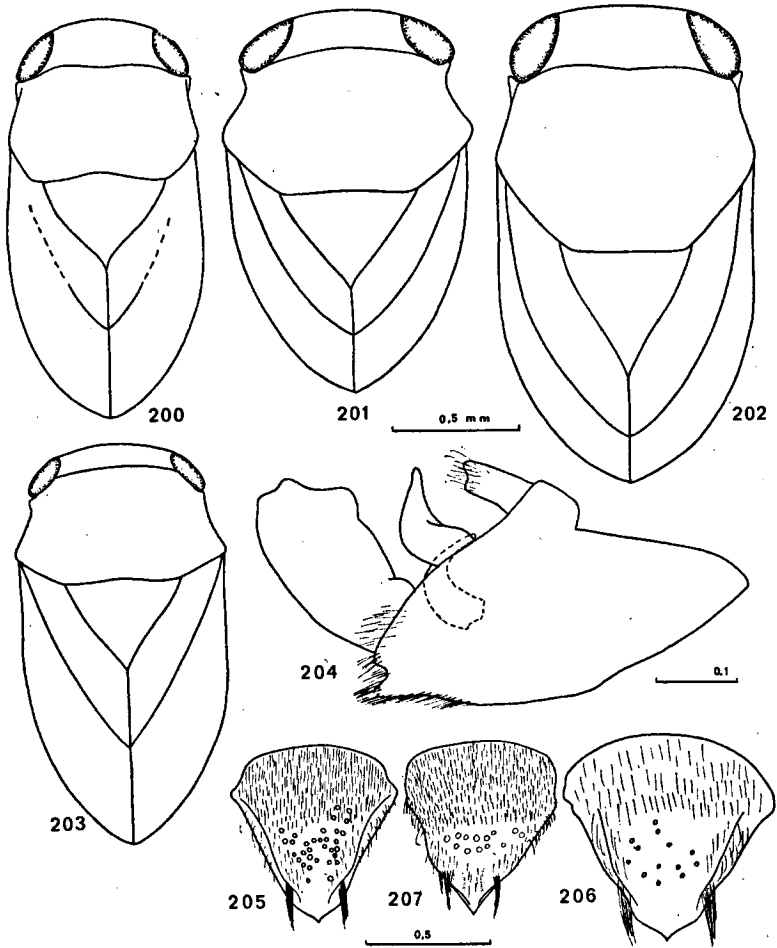


Fig. 200–203. Pleidae from Suriname in dorsal view: 200 *Neoplea absona*; 201 *N. globoidea*, holotype; 202 *N. maculosa*; 203 *Paraplea puella*.

Fig. 204. *Neoplea absona* from Suriname: genital capsule in male,

Fig. 205–207. Operculum in female Pleidae from Suriname: 205 *Neoplea absona*; 206 *N. maculosa*; 207 *Paraplea puella*.

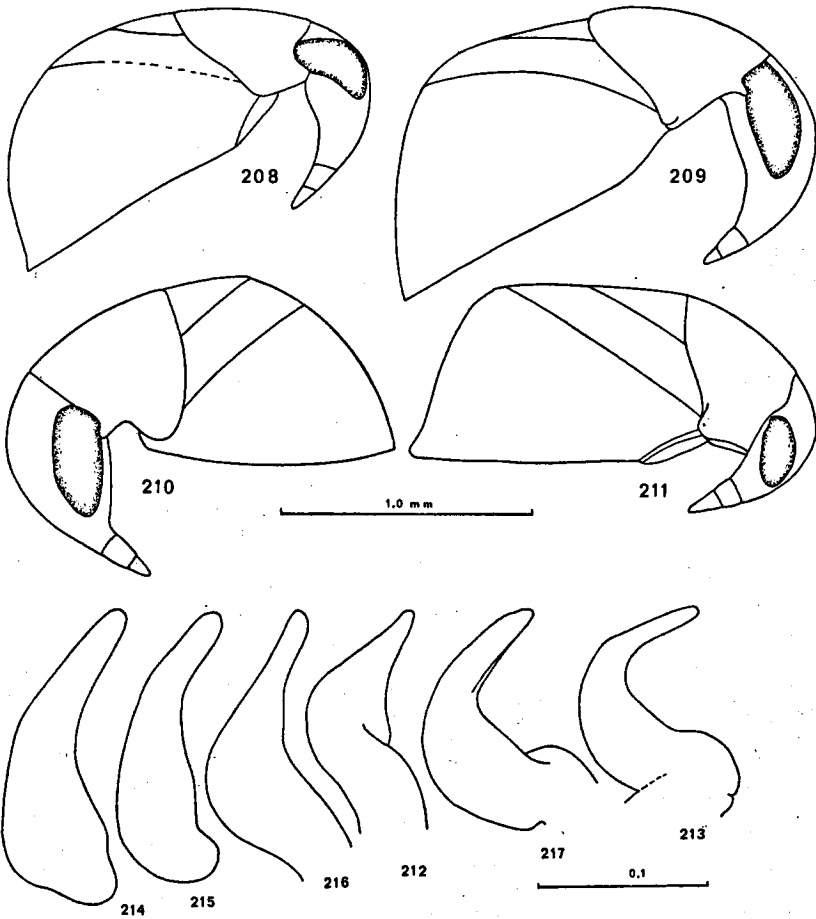


Fig. 208-211. Pleidae from Suriname in lateral view: 208 *Neoplea absona*; 209 *N. maculosa*; 210 *N. globoidea*; 211 *Paraplea puella*.  
 Fig. 212-217. *Neoplea* from Suriname, parameres: 212-213 *N. absona*; 214-215 *N. globoidea*; 216-217 *N. maculosa*.

## NOTONECTIDAE Leach, 1815

Small to medium sized (length 4 to 20 mm), boat-shaped Nepomorpha with head not fused to pronotum, 4-segmented antennae and 3- or 4-segmented rostrum.

Notonectidae, Pleidae and Helotrephidae have in common the habit of swimming on their back and seem to be phylogenetically related. Notonectidae are more slender and larger than the representatives of the other two families.

This is one of the largest families of Nepomorpha with between 400 and 500 described species. There are nine genera, four of which occur in the Western Hemisphere. *Enithares* Spinola, 1837 is mainly a palaeotropical genus. There are two rather aberrant species in South America (Brasil, Venezuela, Brooks 1953) which perhaps can better be placed in a separate genus. *Notonecta* Linnaeus, 1758 has a world-wide distribution, but only few species occur in the tropics in restricted sense and none in the Guyana Region. *Martarega* is a relatively small genus with 11 species which are, with the exception of two, South American in distribution. Of the two Central American species one reaches Arizona (POLHEMUS 1966, MENKE & TRUXAL 1966); except for Trinidad they have not been reported from the Antilles. Finally *Buena* with about 45 described species is restricted to the Western Hemisphere ranging from S. Canada to N. Argentina, with the greatest diversity of species in South America.

All Notonectidae seem to be predacious and as they often reach rather high population densities they can be rather harmful in fish ponds by preying on the small fish or by competing for food with the fish (JULKA 1964). On the other hand they can be beneficial preying on mosquito larvae (HUNGERFORD 1933, LAIRD 1956, ZAMAN e.a. 1963, TOTH & CHEW 1972a, b). There are two subfamilies, Notonectinae and Anisopinae, showing some interesting differences. The Notonectinae commonly rest against the surface of the water, quickly diving for prey swimming under them, but they are also able to detect small wriggling animals, which have fallen on the water (BAERENDS 1940). The Anisopinae are peculiar in possessing haemoglobin-containing cells (HUNGERFORD 1922, BARE 1928, POISSON 1926). More recently MILLER 1964 did some experimental work to elucidate the function of these structures. His results support the hypothesis that the external airstore on the venter of the animals is used principally as a means to maintain neutral buoyancy during the greater part of a dive, the oxygen necessary for respiration being derived from the haemoglobin.

## KEY TO AMERICAN SUBFAMILIES AND GENERA OF NOTONECTIDAE

- 1a Hemielytral commissure without a definite hair-lined pit at the anterior end (Notonectinae) . . . . . 2

- 1b Hemielytral commissure with a definite hair-lined pit at anterior end (Anisopinae) . . . . . *Buenoa*
- 2a Anterolateral margins of pronotum not foveate . . . . . *Notonecta*
- 2b Anterolateral margins of pronotum foveate . . . . . 3
- 3a Intermediate femur with a subapical spur . . . . . *Enithares*
- 3b Intermediate femur without a subapical spur . . . . . *Martarega*

## ANISOPINAE Hutchinson, 1929

Rather small (length rarely exceeding 10 mm) elongate Notonectidae with a definite hair-lined pit at the anterior end of the hemielytral commissure. Nearly always possessing haemoglobin-cells; males nearly always with a stridulatory protuberance on anterior tibia.

**Buenoa** Kirkaldy, 1904

Anisopinae with anterior tarsi in males 2-segmented and ventral abdominal keel extending onto last abdominal segment.

The male tarsal character is the only morphological difference between all species of the Eastern Hemisphere genus *Anisops* Spinola, 1840 and the Western Hemisphere genus *Buenoa*. In addition most *Buenoa* males have a glandlike structure on first abdominal segment and a stridulatory area on anterior femur which is lacking in *Anisops* (TRUXAL 1953). It is a matter of opinion whether these differences observed only in males are sufficient from a purely taxonomic aspect to separate genera.

KEY TO MALES OF *Buenoa* PROBABLY OCCURRING  
IN THE GUYANA REGION

- 1a Femoral stridulatory area present . . . . . 2
- 1b Femoral stridulatory area absent . . . . . 6
- 2a Intermediate leg with first tarsal segment deeply emarginate on inner margin (Fig. 240). . . . . *B. tarsalis*

- 2b Intermediate leg with first tarsal segment not deeply emarginate . . . . . 3
- 3a Femoral stridulatory area with less than 10 ridges . *B. nitida*  
 3b Femoral stridulatory area with about 30 ridges *B. communis*  
 3c Femoral stridulatory area with 11 to 23 ridges . . . . . 4
- 4a Pronotum not or faintly tricarinate. Fore femur gradually tapering towards apex, length of femur more than three times its width at apex. Rostral prong originating about halfway the third rostral segment (Fig. 237) . . . . . *B. pallens*  
 4b Pronotum distinctly tricarinate. Fore femur not gradually tapering towards apex, length of femur less than three times its width at apex. Rostral prong originating near distal end of third rostral segment (Fig. 238, 239) . . . . . 5
- 5a Rostral prong in side view projecting before the anterior border of third rostral segment (Fig. 239). Posterior margin of pronotum not or very slightly excavated. Ratio length of pronotum : length of head about 2.5 . . . . . *B. platynemis*  
 5b Rostral prong in side view not projecting before the anterior margin of third rostral segment (Fig. 238). Posterior margin of pronotum distinctly excavated. Ratio length of pronotum : length of head about 3 . . . . . *B. pallipes*
- 6a Anterior apex of fore tibia (seen from outer side) projecting (Fig. 229, 254) . . . . . 7  
 6b Anterior apex of fore femur not projecting . . . . . 8
- 7a Apex of fore tibia bluntly projecting (Fig. 229) . . *B. fasciata*  
 7b Apex of fore tibia sharply projecting (Fig. 254) . *B. truxali*
- 8a Anterior tarsi, notably basal segment, swollen, claws hooked (Fig. 250), length 6–7 mm . . . . . *B. unguis*  
 8b Anterior tarsi not swollen, claws not hooked, length 4.7–5.5 mm . . . . . 9

- 9a Vertex in dorsal view convex anteriorly, protruding before eyes (Fig. 241, 242) . . . . . 10
- 9b Vertex in dorsal view nearly straight anteriorly, not protruding before eyes (Fig. 245) . . . . . *B. incompta*
- 10a Length not exceeding 4 mm . . . . . *B. salutis*
- 10b Length exceeding 4½ mm . . . . . 11
- 11a Apex of fore femur notched (Fig. 219, 220), posterior margin of hind femur with 12–14 spine-like setae in ventral row . . . . . *B. amnigenopsis*
- 11b Apex of fore femur not notched (Fig. 223), posterior margin of hind femur with 18–25 spine-like setae in ventral row . . . . . *B. amnigenus*

***Buenoa amnigenopsis* n. sp.**

Pl. 11c, d; Fig. 218–221, 241.

*Buenoa amnigenus*; TRUXAL 1953, p. 1462–1465 (partim, the specimens from Brasil: Rio Jurúá).

*Buenoa amnigenus*; NIESER 1968, p. 122, fig. 120–121 (Suriname).

*Buenoa amnigenus*; NIESER 1970b, p. 80 (Brasil).

SURINAME, Nickerie, Coronie, Saramacca, Suriname, Commewijne, Brokopondo; BRASIL, Amazonas.

SURINAME: Nickerie, Kaboerikreek, streamlet near Fajastik, 2.IV.1971, 1♀ (Gij). Suriname *SN002* 1♀ macr; *SN004* 1♀ brach; *SN008* 3♂ brach; *SN012* 1♂ brach; *SN015a* 1♂ brach; 2♂, 3♀ macr; *SN022a* 6♂, 9♀ brach, 6♂, 5♀ macr; *SN086* 6♂, 6♀ brach; *SN087* 1♂ brach; *SN096B* 1♀ macr; *SN113* 1♂, 2♀ macr; *SN152* 1♂ brach; *SN159* 3♀ macr; *SN160* 1♀ macr; *SN167* 4♂, 1♀ macr; *SN173* 1♂, 1♀ macr. Commewijne *SN062* 1♀ brach, 2♂, 5♀ macr. Brokopondo *SN202* 2♂ macr; *SN314* 3♂ macr.

BRASIL: Amazonas, Rio Jurúá, João Pessoa (São Felipe), 10.VII/20. IX.1936, 1♂ (Olalla, det. *B. amnigenus* by Truxal, KU).

The type series consists of the specimens from Suriname quoted above except the specimen from Nickerie and has been distributed as follows. Holotype ♂, allotype ♀ macropterous 1♂, 1♀ paratype brachypterous from *SN022a* and 8♂, 22♀ other paratypes in UM. Further paratypes in: AMNH 1♂; coll. Bachmann (Buenos Aires) 2♂; BMNH 2♂, 2♀; CN 11♂, 15♀; KU 1♂; LACM 1♂, 1♀; MACN 2♂; Mus. Lenin-grad 3♂, 1♀; OM 2♂; SM 1♂; coll. Streams (Connecticut Univ.) 1♂.

## Macropterous specimens

Length ♂  $\bar{x} = 5.0 \pm 0.1$ , ♀  $\bar{x} = 5.1 \pm 0.1$ ; width of pronotum ♂  $\bar{x} = 1.28 \pm 0.03$ , ♀  $\bar{x} = 1.29 \pm 0.02$ ; ocular index (V) ♂  $\bar{x} = 0.60 \pm 0.04$ , ♀  $\bar{x} = 0.66 \pm 0.03$ .

Colour, dorsally sordid white to light brown, eyes reddish brown; ventrally thorax and legs predominantly yellowish to light brown, abdomen for the greater part blackish. Hemelytra hyaline, often not or hardly whitish opaque, without blackish markings.

Head, rounded in dorsal view (Fig. 241), vertex slightly protruding before eyes, inner margins of eyes nearly straight. Most males with eyes holotypic, some males and all females with a very narrow synthlipsis without carina. Tylus hardly inflated, nearly flat, not excavated. Labrum medium brown, slightly more than twice as broad as long, in males with lateral tufts of bristles which at first sight often look like peg-like structures.

Width of head: vertex ♂  $\bar{x} = 4.4 \pm 0.2$ , ♀  $\bar{x} = 4.1 \pm 0.2$ ; vertex: synthlipsis ♂, two values observed: 9.33 and 26, ♀ 26 - 27.6 - 29.

Pronotum not carinate. Lateral margins nearly straight, divergent posteriorly. Posterior margin nearly straight.

Width of pronotum: width of head ♂  $\bar{x} = 1.13 \pm 0.01$ , ♀  $\bar{x} = 1.21 \pm 0.01$ ; length of pronotum: length of head ♂ 1.3 - 1.5 - 1.6, ♀ 1.5 - 1.7 - 1.8; pronotum width: length ♂ 1.7 - 1.7 - 1.8, ♀ 1.8 - 1.9 - 2.0; length of scutellum: length of pronotum ♂ 1.0 - 1.1 - 1.2, ♀ 1.1 - 1.2 - 1.3.

Posterior margin of hind femur with 12 - 14 spine-like setae in ventral row.

Male, fore femur without stridulatory area, apically notched suggesting a blunt dent dorso-apically (Fig. 219). Fore tibia except at base rather parallel-sided, tibial comb with 28-30 teeth. Rostral prong (Fig. 218) longer than third rostral segment originating laterally about midway on this segment; apex acutely rounded.

## Brachypterous specimens

Length ♂  $\bar{x} = 4.8 \pm 0.1$ , ♀  $\bar{x} = 4.9 \pm 0.1$ ; width of pronotum ♂, ♀  $\bar{x} = 1.10 \pm 0.02$ ; ocular index (V) ♂  $\bar{x} = 0.62 \pm 0.02$ , ♀  $\bar{x} = 0.69 \pm 0.04$ .

Except for non-functional fore wings and reduced membranes of



hemelytra brachypters differ from macropters in: Width of pronotum : width of head ♂  $\bar{x} = 0.97 \pm 0.00$  ( $0.966 \pm 0.0047$ ), ♀  $\bar{x} = 1.06 \pm 0.01$ ; pronotum width : length ♂ 1.4 - 1.5 - 1.6, ♀ 1.6 - 1.8 - 1.8; length of scutellum : length of pronotum ♂ 0.8 - 0.9 - 0.9, ♀ 1.0 - 1.1 - 1.3. Lateral margins of pronotum less divergent posteriorly.

In Suriname *B. amnigenopsis* is distinctly more common than *B. amnigenus*. The latter is in most cases found on the coastal plain; the former notably in the transition region coastal plain/savannah but also on the savannahs proper. *B. amnigenopsis* seems to have a slight preference for habitats with very slow currents such as bays of streamlets and pools with a slight in- and out-flow. It is apparently rather indifferent to shade and vegetation.

*B. amnigenopsis* is in colour, size and structure of head very similar to *B. amnigenus* which has, however, 20-25 spine-like setae in posteroventral row of hind femur, moreover males of *B. amnigenus* lack the notch in the apex of fore femur. *B. salutis* too is similar in structure but much smaller whereas *B. incompta* has a different head structure with vertex slightly indented.

### *Buenoa amnigenus* (White, 1879)

Fig. 222-224, 242.

*Anisops amnigenus* WHITE, 1879a, p. 271 (Amazonas).

*Buenoa amnigenus*; TRUXAL 1953, p. 1462-1465, fig. 36, 70 (Guyana, Brasil, Perú, Bolivia, Paraguay, partim).

*Buenoa amnigenus*; TRUXAL 1957, p. 17 (Brasil).

not *Buenoa amnigenus*; NIESER 1968, p. 122, fig. 120-121 (Suriname).

not *Buenoa amnigenus*; NIESER 1970b, p. 80 (Amazonas).

*Buenoa amnigenoidea* NIESER, 1970b, p. 80-81, fig. 117-119 (Brasil).

*Buenoa amnigenus*; BACHMANN 1971, p. 602 (Argentina, Paraguay).

GUYANA; SURINAME, Saramacca, Suriname, Commewijne; BRASIL, Amazonas, Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Goiás, Mato Grosso, Paraná; PERÚ; BOLIVIA; PARAGUAY; ARGENTINA.

SURINAME: Saramacca, SN350, 1♂, 1♀ brach. Suriname, SN015a, 2♂ macr; SN078, 1♂ brach; SN328, 1♂, 1♀ brach; Paramaribo, l'Hermitage, VIII.1969, at light, 1♂ macr; Domburg, ditch, H923, 15.X.1968, 14♂, 7♀ macr. Commewijne, SN088, 2♂ brach, 1♀ macr.

BRASIL: Ceará, Artificial Lake near Russas, 22.VII.1937, 1♂; Acude Piripau, Pacatuba, VIII.1937, 1♂ (Wright). Rio Grande do Norte, Caico, No 327, 1♂ (Wright). Paraíba, Alagoa do Monteiro, Lat. 8, Long 37, No 5418, 1♂ (Wright). Pernambuco, Villa Bela, Lat. 8, No 5467, 1♂ (Wright). Amazonas, Rio Negro, Manaus Region, X.1935, 2♂ (Olalla); Manacapuru, III.1928, 2♂ (1 of which homotype) (Klages); Rio Purus, Castanha Region, IX.1933, 1♂ (Olalla) (KU); Manaus, VIII.1875, 1♂ (Trail, type White, BMNH).

PERÚ: Huánuco, Loc. Shapajilla, jungle 630 m, VII.1938, 2♂ (Woytkowski, No 3849).

BOLIVIA: Río Beni, Victoria (junction of R. Beni and R. Madre de Dios), X.1937, 1♂; Sta. Ana del Yacuma, II.1938, 2♂; R. Beni, Las Palmas, Mojos, V.1938, 1♂ (Olalla) (KU).

#### Macropterous specimens

Length ♂  $\bar{x} = 5.3 \pm 0.1$ , ♀  $\bar{x} = 5.6 \pm 0.2$ ; width of pronotum ♂  $\bar{x} = 1.28 \pm 0.04$ , ♀  $\bar{x} = 1.36 \pm 0.05$ ; ocular index (V) ♂  $\bar{x} = 0.63 \pm 0.02$ , ♀  $\bar{x} = 0.69 \pm 0.05$ .

Colour, dorsally sordid white to light brown; ventrally, thorax predominantly yellowish to light brown, rostrum dark, abdomen ventrally blackish with median keel most often medium brown; legs yellowish to light brown. Hemelytra hyaline with whitish opaque, sometimes partly light brownish, no blackish markings.

Head, rounded in dorsal view (Fig. 242), vertex slightly protruding before eyes, inner margins of eyes nearly straight. Synthlipsis very narrow, without carina. Tylus hardly inflated, nearly flat, not excavated. Labrum medium brown, slightly more than twice as broad as long, in males with lateral tufts of bristles which at first sight often look like peg-like structures.

Width of head: vertex ♂  $\bar{x} = 4.2 \pm 0.1$ , ♀  $\bar{x} = 4.0 \pm 0.3$ ; vertex: synthlipsis ♂ 8.7 - 9.9 - 13.0, ♀ 5.0 - 7.5 - 10.3.

Pronotum without carinae or with a faint median carina, not tricarinate. Lateral margins nearly straight, distinctly divergent posteriorly. Posterior margin slightly sinuate.

Width of pronotum: width of head ♂  $\bar{x} = 1.16 \pm 0.03$ , ♀  $\bar{x} = 1.19 \pm 0.04$ ; length of pronotum: length of head ♂ 1.1 - 1.4 - 1.6, ♀ 1.3 - 1.5 - 1.9; pronotum width: length ♂ 1.8 - 1.9 - 2.0, ♀ 1.7 - 1.7 - 1.8; length of scutellum: length of pronotum ♂ 1.1 - 1.2 - 1.4,

♀ 1.1 – 1.2 – 1.3. Posterior margin of hind femur with 18–25 spine-like setae in ventral row.

Male, anterior femur without stridulatory ridges, tibia, except at base, rather parallel sided, tibial comb with (21)–24–27 teeth (Fig. 223, 224). Rostral prong, longer than third rostral segment, originating distolaterally on this segment, apex sharply rounded (Fig. 222).

#### Brachypterous specimens

Length ♂ 5.0 – 5.1 – 5.2, ♀ 5.3 – 5.6 – 5.9; width of pronotum ♂ 1.13 – 1.18 – 1.20, ♀ 1.20 – 1.24 – 1.31; ocular index based on vertex ♂ 0.52 – 0.61 – 0.69, ♀ 0.67 – 0.70 – 0.75.

Except for non-functional fore wings and reduced membranes of hemielytra brachypters differ from macropters in:

Pronotum, lateral margins nearly straight, hardly divergent posteriorly. Posterior margin nearly straight to slightly sinuate.

Width of pronotum : width of head ♂ 1.04 – 1.06 – 1.08, ♀ 1.07 – 1.09 – 1.10; length of pronotum : length of head ♂ 1.1 – 1.1 – 1.2, ♀ 1.2 – 1.3 – 1.5; pronotum width : length ♂ 1.7 – 1.8 – 1.9, ♀ 1.7 – 2.0 – 2.2.

Owing to the low number of brachypters available, some of the apparent differences in ratios may be due to chance.

Most habitats where *B. amnigenus* was collected were stagnant, with aquatic vegetation and/or helophyta, exposed to sunshine in the coastal plain. One of them (SNo88) was slightly brackish, 650 mg Cl/l, and shaded.

*B. amnigenus* is in colour, size and structure of head very similar to *B. amnigenopsis*, males of which, however, have a notched apex of fore femur. *B. amnigenopsis* has moreover only 12–14 spine-like setae in the posteroventral row of hind femur. *B. salutis* is also similar in structure but much smaller; whereas *B. incompta* has a different head structure with vertex slightly indented.

**Buenoa communis** Truxal, 1953

Pl. 11a; Fig. 225-227, 243.

*Buenoa communis* TRUXAL, 1953, p. 1442-1444, fig. 65 (Brasil, Bolivia).*Buenoa communis*; NIESER 1968, p. 122-124, fig. 122-123 (Suriname).SURINAME, Saramacca, Suriname, Brokopondo; BRASIL, Amazonas, Pará, Paraíba;  
BOLIVIA.SURINAME: Saramacca, SN300, 1♀; SN425, 2♀; SN464, 7♀; SN465, 2♀.  
Suriname, SN043, 1♀. Brokopondo, SN201, 17♂, 7♀; SN202, 1♂;  
SN245/9, 1♂, 1♀; SN273, 1♂, 1♀; SN276, 2♂, 1♀; SN411, 1♂. - All specimens  
macropterous.Length ♂  $\bar{x}$  = 6.0 ± 0.2, ♀  $\bar{x}$  = 6.5 ± 0.2; width of pronotum  
♂  $\bar{x}$  = 1.55 ± 0.04, ♀  $\bar{x}$  = 1.70 ± 0.07; ocular index (V) ♂  $\bar{x}$  =  
0.39 ± 0.01, ♀  $\bar{x}$  = 0.41 ± 0.02.Colour, dorsally, head between eyes sordid white to yellowish,  
eyes brown-grey to dark grey; pronotum yellowish to brown-grey;  
scutellum most often orange (this colour tends to fade in specimens  
stored in alcohol) with a pair of dark patches at base; thorax yellow-  
ish to blackish, abdomen brown to blackish often with a basal (proxi-  
mal) orange-brown band. Ventrally, thorax and legs yellowish to light  
brown, abdomen blackish except for parts of keel and apex. Hemie-  
lytra most often reddish at humeral angle; apex of corium near  
costal margin regularly infuscated brown-black.Head in males rather square, slightly divergent posteriorly, in  
females trapezoidal, diverging posteriorly; anteriorly truncate,  
vertex slightly indented to continuous with outline of eyes (in both  
sexes), synthlipsis with a median keel which is often faint in females.  
Tylus slightly inflated, smoothly rounded in most males, rather flat  
in most females. Labrum blackish with some long pale bristles  
(especially in males), basal width more than twice its median length.Width of head: vertex ♂  $\bar{x}$  = 6.2 ± 0.2, ♀  $\bar{x}$  = 5.9 ± 0.2; ver-  
tex: synthlipsis ♂ 2.6 - 3.1 - 3.6, ♀ 2.4 - 2.9 - 3.6.Pronotum tricarinate, carinae rather blunt to indistinct in females.  
Lateral margins concave to nearly straight, divergent posteriorly.  
Posterior margin slightly sinuate.

Width of pronotum : width of head ♂  $\bar{x} = 1.10 \pm 0.01$ , ♀  $\bar{x} = 1.14 \pm 0.01$ ; length of pronotum : length of head ♂ 1.4 - 1.8 - 2.1, ♀ 1.5 - 1.8 - 2.0; pronotum width : length ♂ 1.4 - 1.6 - 1.8, ♀ 1.6 - 1.8 - 1.9; length of scutellum : length of pronotum ♂ 0.8 - 0.9 - 1.1, ♀ 1.1 - 1.1 - 1.2.

Male, anterior femur not widened at apex with 25 - 35 stridulatory ridges; tibial comb with 27 - 33 teeth (Fig. 226, 227). Rostral prong (Fig. 225) longer than third rostral segment, originating laterally about midway this segment.

In spite of its name this seems to be a relatively rare species, which, in Suriname, prefers the true rain-forest region.

In the Guyana Region there are no very similar species except possibly *B. platycnemis* which so far has not been recorded from the area. The latter does not have an orange scutellum, is, on an average, distinctly smaller and has a relatively broader synthlipsis. Males of *B. platycnemis* have a relatively longer rostral prong (Fig. 225, 239) and distinctly less sclerotized ridges on anterior femur. Females of the light form of *B. nitida* differ, e.g., in a relatively broader head and synthlipsis, scutellum not orange, etc.

### ***Buenoa fasciata* Nieser, 1970**

Pl. 11g; Fig. 228-230, 244.

*Buenoa fasciata* NIESER, 1970b, p. 82-83, fig. 120-123 (Suriname).

SURINAME, Saramacca, Brokopondo.

SURINAME: Saramacca, Kappelsavanne, 21.III.1958, 4♂, 1♀ (Gij, type series, coll. Wag.). Brokopondo, SN183a, 1♂; SN196, 4♂, 1♀. All specimens macropterous.

Length ♂  $\bar{x} = 5.0 \pm 0.1$ , ♀ 5.0 - 5.5; width of pronotum ♂  $\bar{x} = 1.41 \pm 0.04$ , ♀ 1.27 - 1.34; ocular index (V) ♂  $\bar{x} = 0.30 \pm 0.01$ , ♀ 0.25 - 0.29.

Colour, dorsally, dark brown to blackish, head between eyes and anterior part of pronotum light yellowish, eyes brown to black,

beyond the scutellum a transverse orange band (tending to fade in alcohol specimens) which broadens laterally. Ventrally thorax predominantly yellowish, sometimes with an orange tinge, abdomen dark brown to blackish. Legs light to medium brown. Hemielytra hyaline with a blackish streak basally along coastal margin and a large triangular blackish patch (which may be somewhat reduced in some specimens) apically along coastal margin, these black markings connected by an orange stripe; a dark streak at basal margin of clavus may be present.

Outline of head (Fig. 244) rounded laterally, truncate anteriorly, vertex slightly indented. Synthlipsis narrow, without carina. Tylus inflated, flat dorsally, curved towards the base of labrum which is blackish with a few light coloured hairs and the basal width is slightly more than twice the median length.

Width of head: vertex ♂  $\bar{x} = 7.8 \pm 0.3$ , ♀ 7.8–8.9; vertex: synthlipsis ♂ 2.3–3.9–5.9, ♀ 2.5–5.2.

Pronotum not carinate, lateral margins nearly straight, diverging posteriorly. Posterior margin nearly straight.

Width of pronotum: width of head ♂  $\bar{x} = 1.09 \pm 0.02$ , ♀ 1.10–1.13; length of pronotum: length of head ♂ 1.0–1.2–1.4, ♀ 1.0–1.2; pronotum width: length ♂ 1.9–2.1–2.2, ♀ 2.1–2.3; length of scutellum: length of pronotum ♂ 1.3–1.4–1.5, ♀ 1.4–1.5.

Male, anterior femur not widened apically without stridulatory area, anterior femur rather broad and parallel-sided, tibial comb with about 18 teeth of nearly equal thickness, apical outer angle bluntly produced (Fig. 229, 230). Rostral prong slightly longer than third rostral segment, originating lateroproximally on this segment (Fig. 228).

This species is somewhat similar to *B. truxali*, especially when the transverse orange band has faded, see under that species.

**Buenoa incompta** Truxal, 1953

Pl. 11f; Fig. 231–233, 245.

*Buenoa incompta* TRUXAL, 1953, p. 1466–1467, fig. 73 (Brasil, Bolivia).*Buenoa incompta*; NIESER 1968, p. 126, fig. 119, 127–128 (Suriname).*Buena incompta*; NIESER 1970b, p. 85 (Suriname, Brasil).

SURINAME, Coronie, Saramacca, Suriname, Commewijne. Brokopondo; BRASIL, Amazonas, Paraiba, Goiás; BOLIVIA.

SURINAME: Saramacca, SN203, 3♂, 9♀; SN205, 1♂, 1♀; SN298, 1♀; SN300, 5♂, 2♀; SN343, 5♀; SN425, 4♂, 11♀; SN446, 1♂; SN447, 1♀; SN448, 5♂, 2♀; SN448a, 18♂, 11♀; SN455, 1♀; SN456, 2♂, 2♀; SN464, 13♂, 17♀; SN465, 4♂, 12♀. Suriname; SNo22a, 2♂, 2♀; SNo24, 3♂, 40♀; SNo77, 1♀; SN113, 1♂; SN116, 1♀; SN159, 1♂, 1♀; SN167, 1♂; SN348B, 1♀. Commewijne, SNo62, 1♂; SNo88, 43♂, 29♀. Brokopondo, SN201, 7♂, 1♀; SN202, 7♂, 6♀; SN248, 1♀; SN245/9, 1♂, 1♀; SN273, 2♂, 2♀; SN275, 2♂, 2♀; SN276, 3♂, 1♀; SN321, 1♂, 3♀; SN398, 1♂. – All specimens macropterous.

Length ♂  $\bar{x} = 5.2 \pm 0.1$ , ♀  $\bar{x} = 5.4 \pm 0.1$ ; width of pronotum ♂  $\bar{x} = 1.28 \pm 0.02$ , ♀  $\bar{x} = 1.39 \pm 0.03$ ; ocular index (V) ♂  $\bar{x} = 0.49 \pm 0.01$ , ♀  $\bar{x} = 0.45 \pm 0.01$ .

Colour, dorsally sordid white to light brown, eyes reddish brown to dark, abdomen dark brown to blackish. Ventrally, sordid white to light brown, rostrum for the greater part dark brown, abdomen black except for median keel and greater part of connexiva. Legs yellowish with brownish longitudinal stripes. Hemelytra hyaline, without blackish markings.

Head rounded, hardly divergent posteriorly, anteriorly slightly truncate (Fig. 245), vertex continuous with eyes, synthlipsis most often carinate in males, not carinate in females. Tylus slightly inflated, labrum blackish, covered by long whitish hairs, basal width slightly less than twice its median length.

Width of head: vertex ♂  $\bar{x} = 5.2 \pm 0.2$ , ♀  $\bar{x} = 5.5 \pm 0.10$ ; vertex synthlipsis ♂ 5.3–6.1–7.7, ♀ 5.5–6.0–7.3.

Pronotum tricarinate in males, median carina often less distinct than lateral ones, in females carinae absent or weak. Lateral margins nearly straight, divergent posteriorly, posterior margin distinctly sinuate.

Width of pronotum : width of head ♂  $\bar{x} = 1.14 \pm 0.02$ , ♀  $\bar{x} = 1.14 \pm 0.01$ ; length of pronotum : length of head ♂ 1.6 – 1.7 – 1.8, ♀ 1.7 – 1.9 – 2.0; pronotum width : length ♂ 1.5 – 1.6 – 1.7, ♀ 1.6 – 1.7 – 1.8; length of scutellum : length of pronotum ♂ 0.9 – 0.9 – 1.0, ♀ 1.0 – 1.1 – 1.2.

Male, anterior femur not widened at apex, without stridulatory ridges, tibial comb with (21) 24 – 30 teeth, tibia distinctly expanded somewhat distally from base, not parallel-sided (Fig. 232, 233). Rostral prong (Fig. 231) equal to or slightly longer than third rostral segment, with base originating laterally about midway on this segment, apex bluntly rounded.

*Buenoa incompta* is common and widespread in Suriname, occurring predominantly in rather small stagnant waters without vegetation or with helophyta only. The species was found at salinities up to 650 mg Cl/l (SNo88).

Owing to its pale colours, slender body and narrow synthlipsis this species might at first sight be confused with *B. amnigenus*, *B. amnigenopsis* and *B. salutis*. The latter is distinctly smaller; from the other two *B. incompta* can be separated by the non-protuberant vertex and the sinuate posterior margin of pronotum. The fore tibia of the males is not parallel-sided and the synthlipsis carinate apart from differences in structure of rostral prong and anterior legs.

### **Buenoa nitida** Truxal, 1953

Pl. 11b; Fig. 234–236, 246.

*Buenoa nitida* TRUXAL, 1953, p. 1430–1432, fig. 60 (Brasil, Perú).

*Buenoa nitida*; NIESER, 1968, p. 132, fig. 139, 140 (Venezuela).

*Buenoa doesburgi* NIESER, 1968, p. 124–125, fig. 124–126 (Suriname).

*Buenoa doesburgi*; NIESER, 1970b, p. 82 (Suriname).

VENEZUELA, Aragua; SURINAME, Nickerie, Saramacca, Marowijne, Brokopondo; PERÚ, Amazonas; BRASIL, Espirito Santo.

#### Dark form:

SURINAME: Nickerie, Maratakka savannah, pool on path in woods, 28.II.1971, 1♂; Kabalebo, near Avanavero falls, pool on path in woods,



5.IV.1971, 1♀ (Gij). Saramacca, *SN394* 4♂, 4♀; *SN425* 2♀; *SN446* 12♂, 18♀; *SN447* 1♂, 1♀; *SN458* 3♂, 3♀. Brokopondo, *SN134* 4♂, 2♀; *SN180* 9♂, 14♀; *SN181* 11♂, 13♀; *SN183* 5♂, 11♀; *SN183a* 17♂, 35♀; *SN184C* 4♂, 10♀; *SN188* 1♂; *SN190* 3♀; *SN196* 8♂, 9♀; *SN197* 3♂, 19♀; *SN198* 3♂, 5♀; *SN199* 17♂, 13♀; *SN200* 7♂, 8♀; *SN201* 8♂, 7♀; *SN202* 3♂, 5♀; *SN246* 1♂, 1♀; *SN245/9* 1♀; *SN314* 1♀; *SN399* 1♀; *SN405* 3♂, 2♀; *SN412* 1♂.

Light form:

SURINAME: Saramacca, *SN394* 1♂, 1♀; *SN425* 5♂, 1♀; *SN446* 14♂, 22♀; *SN448a* 1♂; *SN458* 8♂, 14♀. Brokopondo, *SN196* 1♀. — All specimens macropterous.

Dark form

Length ♂  $\bar{x} = 5.9 \pm 0.1$ , ♀  $\bar{x} = 6.0 \pm 0.1$ ; width of pronotum ♂  $\bar{x} = 1.62 \pm 0.03$ , ♀  $\bar{x} = 1.69 \pm 0.04$ ; ocular index (V) ♂  $\bar{x} = 0.36 \pm 0.03$ , ♀  $\bar{x} = 0.37 \pm 0.02$ .

Colour, dorsally black, head between eyes, anterior band on pronotum, basal and apical bands on abdomen yellowish to light brownish; apex of scutellum often lighter than base. Ventrally, yellowish to light brown, abdomen, except for connexiva and median keel, black. Legs yellowish to light brown. Hemielytra hyaline with a black band at base of membrane.

Head somewhat rounded laterally, slightly divergent posteriorly, anteriorly truncate with vertex slightly indented (Fig. 246); synthlipsis without median keel. Tylus not or hardly inflated. Labrum blackish, in males covered with long pale hairs; females with a few such hairs, basal width less than twice median length.

Width of head: vertex ♂  $\bar{x} = 6.8 \pm 0.4$ , ♀  $\bar{x} = 6.5 \pm 0.3$ ; vertex: synthlipsis ♂ 2.1 – 2.3 – 2.3, ♀ 2.0 – 2.1 – 2.2.

Pronotum with a weak median carina which may be absent in females, not tricarinate. Lateral margins nearly straight to slightly concave, somewhat divergent posteriorly. Posterior margin slightly sinuate.

Width of pronotum: width of head ♂  $\bar{x} = 1.09 \pm 0.02$ , ♀  $\bar{x} = 1.12 \pm 0.01$ ; length of pronotum: length of head ♂ 1.4 – 1.7 – 2.3, ♀ 1.7 – 1.9 – 2.1; pronotum width: length ♂ 1.6 – 1.7 – 1.7, ♀ 1.7 – 1.8 – 2.0; length of scutellum: length of pronotum ♂ 1.0 – 1.1 – 1.2, ♀ 1.1 – 1.2 – 1.4.

Male, fore femur with length somewhat less than three times its width at apex, with 7 – 11 widely spaced stridulatory ridges; tibial

comb with 22 – 28 teeth (Fig. 235, 236). Rostral prong (Fig. 234) somewhat longer than third rostral segment, originating in the apical third of this segment.

#### Light form

Length ♂  $\bar{x} = 5.5 \pm 0.2$ , ♀  $\bar{x} = 5.7 \pm 0.2$ ; width of pronotum ♂  $\bar{x} = 1.44 \pm 0.04$ , ♀  $\bar{x} = 1.53 \pm 0.06$ ; ocular index (V) ♂  $\bar{x} = 0.36 \pm 0.02$ , ♀  $\bar{x} = 0.40 \pm 0.02$ .

Colour, dorsally yellowish, eyes and dorsum of abdomen grey-black. Ventrally yellowish to brownish, venter of abdomen black except greater part of connexiva and median keel. Legs yellowish to brownish. Hemielytra hyaline with a blackish band at base of membrane and thin dark lines on most sutures.

Structurally as dark form except: Width of pronotum : width of head ♂  $\bar{x} = 1.02 \pm 0.01$ , ♀  $\bar{x} = 1.08 \pm 0.02$ . The light form is shorter and more slender than the dark form. Scutellum and pronotum are proportionally not very different in the two forms.

*B. nitida* is a common species in the rain forest region occurring in well-developed savannah woods. It was predominantly found in very small shaded stagnant waters, mostly without vegetation.

There are in Suriname no very similar species except for the probably occurring *B. platycnemis*. This species differs in having a tricarinate pronotum (sometimes indistinct in females) and more sclerotized ridges on the fore femur in males. Females of *B. communis* are quite different, see under that species.

### ***Buenoa pallens* (Champion, 1901)**

Fig. 237.

*Anisops pallens* CHAMPION, 1901, p. 374 (Guatemala).

*Buenoa pallens*; TRUXAL 1953, p. 1414–1418, fig. 5, 11, 55 (Antilles, Central America, Colombia, Ecuador, Brasil, Perú, Chile).

*Buenoa pallens*; NIESER 1969b, p. 94, fig. 179–180 (Antilles).

ANTILLES; MÉXICO; GUATEMALA; COSTA RICA; PANAMÁ; COLOMBIA; BRASIL, Amazonas, Minas Gerais; ECUADOR; PERÚ; CHILE.

The record for Amazonas is based on one male "Ireng R. to Roraima, 13.VII. 1911" in the AMNH (TRUXAL 1953). This is close to or within the Guyana Region. As no further specimens from this species have been found in Amazonas I consider it quite probable that the specimen has been mislabelled.

*B. pallens* is at first sight very similar to *B. pallipes* and *B. platycnemis*. Males differ in the structure of the rostral prong (Fig. 237) and the carination of pronotum, see KEY. Females of these species are not identifiable except by comparing with series of correctly identified specimens.

### ***Buenoa pallipes* (Fabricius, 1803)**

Fig. 238, 249.

*Notonecta pallipes* FABRICIUS, 1803, p. 103 (America).

*Buenoa pallipes*; TRUXAL 1953, p. 1418-1421, fig. 56 (Antilles, Central America, Colombia, Perú, Paraguay).

*Buenoa pallipes*; NIESER 1967, p. 182-184, fig. 55, 65, 72, 77 (Antilles).

*Buenoa pallipes*; NIESER 1970b, p. 85 (Brasil).

GREATER and LESSER ANTILLES; MÉXICO; HONDURAS; COSTA RICA; COLOMBIA; BRASIL, Amazonas, Pará; PERÚ; PARAGUAY. - HAWAII.

This species has been recorded from Pará, Sra. Tumucumaque (NIESER 1970b) which forms the border between Suriname and Brasil.

Owing to lack of South American specimens the description is based on macropterous Antillean specimens (NIESER 1967).

Length ♂  $\bar{x} = 5.4 \pm 0.2$ , ♀  $\bar{x} = 5.7 \pm 0.2$ ; width of pronotum ♂  $\bar{x} = 1.56 \pm 0.04$ , ♀  $\bar{x} = 1.67 \pm 0.04$ ; ocular index ♂  $\bar{x} = 0.20 \pm 0.01$ , ♀  $\bar{x} = 0.19 \pm 0.01$ .

Colour variable, from sordid white to blackish in dorsal view, abdominal venter usually black.

Head rounded, anteriorly truncate, venter slightly indented, synthlipsis not or faintly carinate; tylus inflated, labrum about as long as wide, dark, covered with light hairs. Width of head : vertex ♂  $\bar{x} = 5.9 \pm 0.2$ , ♀  $\bar{x} = 5.7 \pm 0.2$ ; vertex : synthlipsis ♂ 1.6 - 1.8 - 2.1, ♀ 1.9 - 2.1 - 2.5.

Pronotum distinctly tricarinate in males, carinae faint or absent in females. Lateral margins nearly straight to somewhat concave, divergent posteriorly; posterior margin distinctly sinuate. Width of

pronotum : width of head ♂  $\bar{x} = 1.11 \pm 0.04$ , ♀  $\bar{x} = 1.17 \pm 0.02$ ;  
 length of pronotum : length of head ♂ 1.8 – 2.1 – 2.4; ♀ 1.8 – 1.9 –  
 2.1; pronotum width : length ♂ 1.3 – 1.5 – 1.7, ♀ 1.5 – 1.8 – 1.9;  
 length scutellum : length pronotum ♂ 0.7 – 0.8 – 1.0, ♀ 1.0 – 1.1 –  
 1.2.

Male, anterior femur (Fig. 249) widened at apex with a stridulatory area consisting of 16 – 20 ridges, tibial comb with 34 – 38 teeth, apical teeth thicker than basal ones; tibia distinctly expanded in basal part, not parallel-sided. Rostral prong distinctly longer than third rostral segment, with base originating laterally near distal end of third rostral segment (Fig. 238).

This species is similar to *B. pallens* and *B. platycnemis*, differences are given in the KEY.

### **Buenoa platycnemis** (Fieber, 1851)

Fig. 239, 253.

*Anisops platycnemis* FIEBER, 1851a, p. 485 (St. Thomas).

*Buenoa platycnemis*; TRUXAL 1953, p. 1421–1426, fig. 57 (Antilles, U.S.A., Central and S. America).

*Buenoa platycnemis*; NIESER 1970b, p. 85–86 (Venezuela, Brasil).

ANTILLES; U.S.A., Florida, Texas; MÉXICO; COSTA RICA; CANAL ZONE; PANAMÁ; COLOMBIA; VENEZUELA, Carabobo, Aragua, Caracas, Miranda; BRASIL, Amazonas, Maranhão, Goiás, Mato Grosso; PERÚ.

This species is not recorded for the Guyana Region but might very well occur there. At first sight it is similar to *B. pallens* and *B. pallipes* but these species can be separated by the characters given in the KEY.

### **Buenoa salutis** Kirkaldy, 1904

Pl. 11e, i; Fig. 247, 251, 252, 256.

*Buenoa salutis* KIRKALDY, 1904, p. 124 (Guyane Française).

*Buenoa mallochi* JACZEWSKI, 1928, p. 129–130 (Brasil).

*Buenoa salutis*; TRUXAL, 1953, p. 1469–1472, fig. 39, 74 (Venezuela, Guyana, Guyane Française, Brasil, Bolivia, Paraguay).

*Buenoa salutis*; TRUXAL 1957, p. 17 (Goiás).

*Buenoa salutis*; BACHMANN 1961, p. 24 (Argentina).

*Buenoa salutis*; NIESER 1968, p. 127-128, fig. 129-130 (Suriname, Venezuela, Argentina).

*Buenoa salutis*; NIESER 1970b, p. 86-87 (Venezuela, Brasil).

*Buenoa salutis*; BACHMANN 1971, p. 606 (Argentina).

VENEZUELA, Aragua, Zulia; GUYANA; SURINAME, Saramacca, Suriname, Commewijne, Marowijne, Brokopondo; GUYANE FRANÇAISE; BRASIL, Amazonas, Pará, Ceará, Paraíba, Pernambuco, Goiás, São Paulo, Paraná, Rio Grande do Sul; BOLIVIA, PARAGUAY, ARGENTINA, Salta, Formosa, Chaco, Entre Rios, Buenos Aires.

SURINAME: Saramacca, *SN130* 2♂, 8♀ macr; *SN131* 1♀; macr; *SN132* 1♂ brach, 2♂ macr; *SN207* 1♀; macr; *SN350* 1♀ brach; *SN446* 1♀ macr; *SN456* 1♀ brach; *SN465* 2♀ brach, 1♂ macr. Suriname, *SN015a* 1♂, 1♀ macr; *SN022a* 1♀ brach, 1♀ macr; *SN024* 1♂ brach; *SN077* 4♂ brach, 1♂, 5♀ macr; *SN152* 1♀ macr; *SN155* 2♀ brach, 3♀ macr; *SN164* 1♂, 1♀ macr; *SN178* 6♂, 5♀ brach, 1♂, 1♀ macr; *SN328* 3♂, 2♀ brach, 2♀ macr; Paramaribo, l'Hermitage, at light, 31.VII.1969, 1♀ macr; same, 1.VIII-1.IX.1969, 2♀ macr. Commewijne, *SN062* 2♂ macr; *SN073* 1♂, 1♀ macr; *SN111* 1♂ brach, 2♂, 8♀ macr; *SN112* 2♂, 3♀ brach. Marowijne, *SN223* 1♂, 1♀ brach, 1♂, 1♀ macr; *SN224* 1♀ macr. Brokopondo, *SN321* 1♂, 1♀ brach.

#### Macropterous specimens

Length ♂  $\bar{x} = 3.8 \pm 0.1$ , ♀  $\bar{x} = 4.2 \pm 0.1$ ; width of pronotum ♂  $\bar{x} = 1.01 \pm 0.03$ , ♀  $\bar{x} = 1.09 \pm 0.04$ ; ocular index (V) ♂  $\bar{x} = 0.81 \pm 0.03$ , ♀  $\bar{x} = 0.81 \pm 0.05$ .

Colour, dorsally sordid white to light yellowish brown, eyes reddish brown. Ventrally light yellowish, abdomen dark brown to blackish except for apex, median keel and parts of connexiva. Legs yellowish. Hemielytra hyaline, often with a dark brown to blackish area at apex of corium.

Head rounded, vertex anteriorly protruding (Fig. 247) (in females sometimes nearly continuous with eyes), inner margins of eyes rather strongly convergent posteriorly, synthlipsis narrow, not carinate. Tylus flat. Labrum pale, with pale hairs, basal width somewhat more than twice its median length.

Width of head: vertex ♂  $\bar{x} = 3.5 \pm 0.1$ , ♀  $\bar{x} = 3.5 \pm 0.2$ ; vertex: synthlipsis ♂ 5.6-8.1-10.0, ♀ 3.9-4.9-6.2;

Pronotum not or faintly tricarinate, lateral margins concave, divergent posteriorly. Posterior margin slightly sinuate.

Width of pronotum: width of head ♂  $\bar{x} = 1.20 \pm 0.02$ , ♀  $\bar{x} =$

1.20  $\pm$  0.04; length of pronotum : length of head ♂ 1.3 - 1.3 - 1.6, ♀ 1.1 - 1.4 - 1.5; pronotum width : length ♂ 1.9 - 2.1 - 2.2, ♀ 1.9 - 2.1 - 2.3; length of scutellum : length of pronotum ♂ 1.2 - 1.3 - 1.4, ♀ 1.1 - 1.3 - 1.5.

Male, anterior femur narrow apically, without sclerotized ridges, tibial comb with about 18-20 teeth (Fig. 251, 252). Rostral prong equal to or slightly longer than third rostral segment, originating latero-proximally on this segment, somewhat variable in form (Fig. 256).

#### Brachypterous specimens

Length ♂  $\bar{x}$  = 3.5  $\pm$  0.1, ♀  $\bar{x}$  = 4.0  $\pm$  0.1; width of pronotum ♂  $\bar{x}$  = 0.82  $\pm$  0.02, ♀  $\bar{x}$  = 0.96  $\pm$  0.03; ocular index (V) ♂  $\bar{x}$  = 0.89  $\pm$  0.04, ♀  $\bar{x}$  = 0.86  $\pm$  0.07.

Apart from reduced fore-wings and membrane of hemielytra brachypters differ from macropters in the following ratios; width of pronotum : width of head ♂  $\bar{x}$  = 1.03  $\pm$  0.01, ♀  $\bar{x}$  = 1.07  $\pm$  0.02; length of pronotum : length of head ♂ 1.0 - 1.2 - 1.5, ♀ 1.0 - 1.1 - 1.3.

This widespread species is quite common in Suriname but has not yet been recorded from the rain-forest. Near the coast it was found in brackish waters at salinities up to 1760 mgCl/l. *B. salutis* was predominantly found in stagnant waters with helophyta and/or aquatic vegetation.

TRUXAL 1957 states that macropters are seldom found. This does not hold for Surinam populations (39 brachypters and 55 macropters of which only 3 have been taken at light, in the present collections).

*Buenoa salutis* can be recognized by its small size.

### **Buenoa tarsalis** Truxal, 1953

Fig. 240.

*Buenoa tarsalis* TRUXAL, 1953, p. 1392-1395, fig. 49 (Brasil).

*Buenoa tarsalis*; NIESER 1970b, p. 87, fig. 127-129 (Brasil).

BRASIL, Amazonas, Pará, Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Rio de Janeiro.

This species has its main distribution in the arid and semi-arid regions of N and E. Brasil and probably does not occur in the Guyana Region although it was found near its borders.

*B. tarsalis* can be easily recognized by its length, exceeding 6 mm, and the emarginate first tarsal segment of the intermediate legs (Fig. 240).

### **Buenoa truxali** Nieser, 1968

Pl. 11h; Fig. 248, 254, 255, 257.

*Buenoa truxali* NIESER, 1968, p. 128–130, fig. 131–134 (Suriname).

*Buenoa truxali*; NIESER 1969b, p. 97 (Trinidad).

*Buenoa truxali*; NIESER 1970b, p. 87–88 (Brasil).

TRINIDAD; SURINAME, Saramacca, Suriname, Marowijne, Brokopondo; BRASIL, Amazonas.

SURINAME: Saramacca, SN204 1♀; SN204a 2♂; SN205 1♂; SN218 1♂. Suriname, SNo41 19♂, 10♀; SNo42 3♂, 1♀; SNo43 3♂; SNo54 1♂; SNo55 1♂; SNo69 9♂, 8♀; SN113 2♀; SN124 12♂, 20♀; SN144 28♂, 25♀; SN159 5♂, 6♀; SN167 6♂, 6♀; SN173 13♂, 12♀. Brokopondo, SN184B 1♀; SN184C 3♂; SN188 1♂; SN196 8♂, 9♀; SN201 1♂, 1♀; SN211 1♀; SN215 2♀; SN216 1♂; SN246 2♂; SN248 5♂, 1♀; SN249 1♂, 2♀; SN245/9 2♂, 1♀; SN410 1♀; SN412 2♂.

Length ♂  $\bar{x} = 5.1 \pm 0.1$ , ♀  $\bar{x} = 5.5 \pm 0.2$ ; width of pronotum ♂  $\bar{x} = 1.32 \pm 0.03$ . ♀  $\bar{x} = 1.41 \pm 0.02$ ; ocular index (V) ♂  $\bar{x} = 0.40 \pm 0.02$ , ♀  $\bar{x} = 0.38 \pm 0.02$ .

Colour, dorsally pale yellowish to light brown with a shade of orange; transverse band posteriorly on pronotum and greater part of abdomen dark brown to black. Ventrally thorax and apex of abdomen pale yellowish to light brown, remainder dark brown to blackish. Legs yellowish with dark markings. Hemelytra hyaline with a blackish V-shaped mark at apex of corium and base of membrane.

Head divergent posteriorly, subtruncate anteriorly, vertex slightly indented to continuous with eyes (Fig. 248). Inner margins of eyes slightly concave, not noticeably sinuous. Synthlipsis not carinate. Tylus slightly inflated to rather flat; labrum blackish with a few long pale hairs, its basal width more than twice its median length.

Width of head : vertex ♂  $\bar{x} = 6.1 \pm 0.3$ , ♀  $\bar{x} = 6.2 \pm 0.3$ ; vertex : synthlipsis ♂ 3.3 - 3.7 - 4.1, ♀ 3.3 - 3.8 - 4.2.

Pronotum not carinate; lateral margins slightly concave to nearly straight, divergent posteriorly. Posterior margin faintly sinuate.

Width of pronotum : width of head ♂  $\bar{x} = 1.07 \pm 0.02$ , ♀  $\bar{x} = 1.09 \pm 0.03$ ; length of pronotum : length of head ♂ 1.3 - 1.6 - 1.7, ♀ 1.5 - 1.7 - 1.8; pronotum width : length ♂ 1.7 - 2.0 - 2.1, ♀ 1.97 - 1.99 - 2.03; length of scutellum : pronotal length ♂ 1.2 - 1.4 - 1.6, ♀ 1.2 - 1.4 - 1.5.

Male, length of anterior femur about three times the width at apex: without sclerotized ridges; tibial comb with 21-26 teeth, tibia distinctly broadened in basal part. Outer apex of tibia produced into a sharp point, inner surface apically with a group of one larger and four or five small pegs (Fig. 254, 255).

Rostral prong about as long as third rostral segment, originating about midway on this segment (Fig. 257).

This is the dominant species of aquatic bug in shaded stagnant waters in the savannah woodlands; it is common in the rain-forests too but there *B. nitida* is more abundant.

Habitat preferences seem to be shade (in this respect *B. truxali* and *Martarega membranacea* are complementary), absence of vegetation (which is strongly correlated to shade) and virtually stagnant water. The size (and depth) of the habitat does not seem to be important as the species was found in the smallest puddles as well as in the larger habitats fulfilling the conditions.

Males of this species can at once be recognized by the pointed fore tibia, females are distinctly smaller than *B. communis* females, and have the ratio vertex : synthlipsis larger than *B. nitida* females (about 3.5 and 2.2, respectively).

### **Buenoa unguis** Truxal, 1953

Fig. 250.

*Buenoa unguis* TRUXAL, 1953, p. 1476-1478, fig. 78 (Brasil, Perú, Bolivia, Paraguay, Argentina).

BRASIL; Pará, Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Minas Gerais, Rio de Janeiro; PERÚ; BOLIVIA; PARAGUAY; ARGENTINA; Chaco.



I have not seen examples of this species which is reported to occur just within the limits of the Guyana Region (Pará, Lago Grande, TRUXAL 1953).

Males can be recognized at once by the swollen anterior tarsi and hooked claws (Fig. 250).

#### NOTONECTINAE Leach, 1815

Small to medium sized Notonectidae without a hair-lined pit at the anterior end of the hemielytral commissure; without haemoglobin cells; males without stridulatory protuberance on anterior tibia.

#### Martarega White, 1879

Rather small (length not exceeding about 8 mm) Notonectinae with eyes fused posteriodorsally as to form an ocular commissure, antennae 4-segmented, basal segment inconspicuous; anterolateral angles of pronotum foveate; intermediate tarsi with one well-developed segment.

#### KEY TO *Martarega* OF THE GUYANA REGION

(brachypterous males)

- 1a Small species, males not longer than 4.3 mm; opaque median longitudinal stripe on hemielytra bifurcate at apex . . . 2
- 1b Larger species, males at least 4.9 mm long; opaque median longitudinal stripe not bifurcate when present . . . . . 3
- 2a Ventral surface of mesotrochanter smooth . . . *M. membranacea*
- 2b Ventral surface of mesotrochanter with a median nodule . . .  
 . . . . . *M. chinai*
- 3a Lateral margin of metatrochanter with a sharp concavity at distal end (Fig. 265) . . . . . *M. hungerfordi*
- 3b Lateral margin of metatrochanter normal . . . . . 4
- 4a Hemielytra largely hyaline with a single longitudinal opaque

- stripe which is not median, left paramere three times as long as wide . . . . . *M. gonostyla*
- 4b Hemielytra not as above, left paramere distinctly shorter . . . . . 5
- 5a Mesotrochanter with one or two groups of short bristles located ventrally near outer lateral margin; hemielytra with a short median stripe at base . . . . . *M. williamsi*
- 5b Mesotrochanter without such groups of bristles but with a patch of yellow hairs on ventral surface; hemielytra with a narrow median longitudinal stripe and a second short shining stripe at base of hemielytral process . . . . . *M. brasiliensis*

### **Martarega brasiliensis** Truxal, 1949

Pl. 10f; Fig. 258-260.

*Martarega brasiliensis* TRUXAL, 1949, p.16, pl. 4 fig. 3, 4 (Brasil, Perú).

*Martarega brasiliensis*; NIESER 1968, p. 120-121, fig. 117 (Suriname).

*Martarega brasiliensis*; NIESER 1970b, p. 77 (Brasil).

SURINAME, Suriname; BRASIL, Pará, Ceará, Pernambuco; PERÚ.

SURINAME: Suriname, *SN079* 12♂, 11♀ macr; *SN079a* 10♂, 4♀ macr; *SN090* 1♀ macr; *SN096B* 1♂, 2♀ macr; *SN435* 1♂, 2♀ brach; Coropina kreek, *H642A*, 3.IX.1955, 9♂, 8♀.

#### Brachypterous specimens

Length ♂  $\bar{x} = 5.12 \pm 0.11$ , ♀  $\bar{x} = 5.55 \pm 0.14$ ; width of pronotum ♂  $\bar{x} = 1.28 \pm 0.03$ , ♀  $\bar{x} = 1.37 \pm 0.03$ ; ocular index (V) ♂, ♀  $\bar{x} = 0.57 \pm 0.03$ .

Colour light yellowish to whitish dorsally, eyes reddish brown to dark brown, hemielytra white opaque, near costal margin often brownish infuscated; male with a narrow median longitudinal hyaline stripe, and a second short one, running from the base of claval process anteriorly approximately  $\frac{1}{3}$  distance of hemielytron; female with median longitudinal stripe, wide in anterior  $\frac{2}{3}$ , narrowing posteriorly, second stripe as in male, a third hyaline stripe runs anteriorly from near base of claval process almost entire length of wing. Scutellum opaque whitish or slightly greyish, except for an

elliptical to lozenge-shaped hyaline area at apex. Venter yellowish with blackish hairs, legs and rostrum light brown with darker markings.

Anterior outline of head rounded in dorsal view, anterior width of vertex about as wide as its median length in males, wider than long in females, convex in both sexes. Eyes becoming holoptic at a point about midway the length of the head. Ocular commissure equal to the length of vertex and  $\frac{1}{2}$  width of an eye.

Posterior margins of pronotum concave, lateral margins divergent.

Scutellum small, its length slightly more than length of pronotum, and less than its anterior width.

Claval process stout, about  $\frac{1}{2}$  as long as the ill-defined membrane. Ventral abdominal keel with hair on lateral margins only.

Male, mesotrochanter and mesofemur without nodules, mesotrochanter rounded, somewhat inflated and with a patch of yellow to brownish hairs basally near point of articulation with coxa. Genitalia as in Fig. 258-260.

#### Macropterous specimens

Length  $\delta \bar{x} = 5.49 \pm 0.05$ ,  $\text{♀} \bar{x} = 5.99 \pm 0.05$ ; width of pronotum  $\delta \bar{x} = 1.45 \pm 0.02$ ,  $\text{♀} \bar{x} = 1.57 \pm 0.01$ , ocular index (V)  $\delta \bar{x} = 0.58 \pm 0.02$ ,  $\text{♀} \bar{x} = 0.55 \pm 0.03$ .

Except for larger size and a broader appearance the macropterous form differs from the brachypterous also in the following respects.

Costal margin of hemielytra more distinctly infuscated, dark brown to blackish, hyaline stripes the same in both sexes and consisting of a narrow longitudinal submedian stripe and a short narrow stripe with few scattered long whitish hairs at apex of clavus.

Scutellum large, length of scutellum about twice the length of pronotum, somewhat less than anterior width.

Claval process relatively small and stout, membrane distinctly delimited.

This species has been found in torpid bays and ponds associated with savannah streamlets of the Para River system.

Males can be recognized by the yellowish hairs on mesotrochanter, hemielytral pattern and genital claspers; females are to be identified by the hemielytral pattern and association with males.

### **Martarega chinai** Hynes, 1948

Fig. 264.

*Martarega chinai* HYNES, 1948, p. 358–359, fig. 1 (Trinidad).

*Martarega chinai*; TRUXAL 1949, p. 9, pl. 1, fig. 1, pl. 2 fig. 9, pl. 3 fig. 3, 4 (Brasil, Bolivia).

*Martarega chinai*; NIESER 1970b, p. 75–76, fig. 108–109 (Brasil).

TRINIDAD; VENEZUELA; BOLIVIA; BRASIL, Amazonas, Pará; ARGENTINA, Salta.

This species occurs just within the limits of the Guyana Region (Manaos, Manacapuru, NIESER 1970b). It is very similar to *M. membranacea* even in the form of the parameres of the male. The only reliable character is the presence of a sharp nodule on the trochanter of the intermediate legs in *M. chinai* (Fig. 264) which is lacking in *M. membranacea*.

### **Martarega gonostyla** Truxal, 1949

Pl. 10e, g; Fig. 261.

*Martarega gonostyla* TRUXAL, 1949, p. 12–13, pl. 1 fig. 5, 7 pl. 2, fig. 1, 5 (Brasil, Bolivia).

*Martarega gonostyla*; NIESER 1968, p. 120, fig. 116 (Suriname).

*Martarega gonostyla*; NIESER 1970b, p. 77 (Suriname, Brasil).

SURINAME, Saramacca, Suriname, Marowijne, Brokopondo; BRASIL, Amazonas, Pará, Mato Grosso; BOLIVIA.

SURINAME: Saramacca SN202 3♂, 2♀ brach; SN205 1♂ brach; SN283 1♂ brach; SN394 1♀ brach; SN451 1♂, 1♀ brach; SN452 1♀ brach. Suriname SN029 8♂, 5♀ brach; SN033 6♂, 5♀ brach, 2♂ macr; SN034 2♂, 1♀ brach; SN035 2♀ brach; SN040 1♂, 1♀ brach; SN041 5♂, 4♀ brach, 2♀ macr; SN042 4♂, 1♀ brach, 1♀ macr; SN043 7♂, 8♀ brach, 1♂, 4♀ macr; SN054 1♂ brach, 1♀ macr; SN054a 4♀ brach, 6♂, 5♀ macr; SN101 1♀ brach; SN113 15♂, 14♀ brach, 2♂, 1♀ macr; SN124 1♂, 1♀ brach; SN173 2♂, 1♀ brach; SN241 1♀ brach; SN242 1♀ brach. Marowijne SN260 11♂, 18♀ brach. Brokopondo SN246 5♂, 10♀ brach, 4♂, 10♀ macr; SN247 7♂, 7♀ brach, 7♂, 2♀ macr; SN248 11♂, 10♀ brach, 9♂, 2♀ macr; SN249 8♂, 6♀ brach, 13♂, 16♀ macr; SN275 2♂, 4♀ brach, 3♂ macr; SN276 9♂, 5♀ brach, 2♀ macr; SN294 3♂, 3♀ brach, 1♂, 3♀ macr; SN402 4♀ brach; SN417 1♀ macr.

### Brachypterous specimens

Length ♂  $\bar{x} = 5.9 \pm 0.1$ , ♀  $\bar{x} = 6.4 \pm 0.1$ ; width of pronotum ♂  $\bar{x} = 1.53 \pm 0.02$ , ♀  $\bar{x} = 1.64 \pm 0.02$ ; ocular index (V) ♂  $\bar{x} = 0.51 \pm 0.04$ , ♀  $\bar{x} = 0.53 \pm 0.05$ .

Colour, pale yellowish, eyes bluish-brownish, hemielytra hyaline with an opaque longitudinal stripe along costal margin, opaque stripe and membrane infuscated.

Vertex about as long as its anterior width, anterior margin hardly produced. Eyes becoming holoptic at a point approximately midway the length of the head, ocular commissure shorter than  $\frac{1}{2}$  the width of an eye.

Claval spine extending nearly to the tip of the membrane, which is not distinct. Mesotrochanter ventrally without nodule, in the male there are three or four small groups of short bristles ventrally near outer margin; in the female there are several scattered hairs near outer lateral margin.

Male, left paramere more than 3 times as long as broad (Fig. 261).

### Macropterous specimens

Length ♂  $\bar{x} = 6.2 \pm 0.1$ , ♀  $\bar{x} = 6.7 \pm 0.1$ ; width of pronotum ♂  $\bar{x} = 1.77 \pm 0.02$ , ♀  $\bar{x} = 1.87 \pm 0.03$ ; ocular index (V) ♂  $\bar{x} = 0.53 \pm 0.04$ , ♀  $\bar{x} = 0.55 \pm 0.03$ .

Colour, hemielytra velvety brown to black with a longitudinal median hyaline stripe and a short narrow stripe apico-laterally on clavus beset with a row of thin long whitish hairs. Scutellum relatively large, light brown to blackish.

Relatively broader; claval spines relatively small; membranes fully developed. Remaining structural characteristics as in brachypterous specimens.

*Martarega gonostyla* is a common species in streamlets with brown acid water in the savannah and rain-forest regions. It prefers the open, slowly flowing (v.c. from less than 1 m/min to not over 3 m/min) parts of such streamlets e.g. bays or the deeper broader parts near culverts or bridges, where it can be seen hanging against the surface film. It does not seem to prefer shaded habitats. (In the dry season when it is restricted to pools in the stream beds it is found nearly always in the shade, but this is probably an indirect correlation, as most of such pools are in the shade).

The brachypterous form can easily be recognized by the hemielytra

which are for the greater part hyaline. The macropterous form is similar to *M. williamsi* and perhaps to *M. hungerfordi* of which the macropterous form has not yet been found; the male genitalia of *M. gonostyla* are distinctive.

### *Martarega hungerfordi*, Truxal, 1949

Pl. 10d; Fig. 263, 265.

*Martarega hungerfordi* TRUXAL, 1949, p. 12, pl. 1 fig. 4, pl. 2, fig. 1, 2 (Guyana).

*Martarega hungerfordi*; NIESER 1968, p. 119-120, fig. 114 (Suriname).

*Martarega hungerfordi*; NIESER 1970b, p. 78, fig. 113 (Brasil).

GUYANA; SURINAME, Nickerie, Saramacca, Suriname; BRASIL, Amazonas, Pará.

SURINAME: Nickerie, Coeroeni, airstrip, VIII.1959, 1♂, 1♀ (Ligori).

BRASIL: Pará, Rio Arapiuns, Lago da Boca, S275-b, 13.XI.1952, 3♂, 2♀.

All specimens brachypterous.

Length ♂ 5.1 - 5.1 - 5.2, ♀ 5.8 - 6.0 - 6.1; width of pronotum ♂ 1.5 - 1.5 - 1.6, ♀ 1.6 - 1.6 - 1.7.

Colour dorsally opaque whitish, eyes reddish, legs light yellowish, Hemielytra opaque with a median longitudinal hyaline stripe which is narrow in males and broad and somewhat irregular in females.

Vertex about  $1\frac{1}{2}$  times longer than its anterior width, projecting before eyes in both sexes. Length of ocular commissure subequal to length of vertex, somewhat more than half the width of an eye.

Claval spine long, about three fourth the length of the membrane; costal margin of hemielytra emarginate, in females bearing 16 or more strong spines on emargination (Fig. 263).

Mesotrochanter smooth and rounded, without nodules or distinct patches of hairs on its surface; metatrochanter apically emarginate in males.

Male, left paramere short.

This species which seems to have its main distribution in the Guyana Region occurs rather locally in streams in rain-forests.

The hemielytral pattern is somewhat like *M. brasiliensis* which has, however, an additional rather long hyaline stripe near the claval suture, lacks the costal dents in females and the emarginate metatrochanter in males.

### *Martarega membranacea* White, 1879

Pl. 10h; Fig. 266, 267.

*Martarega membranacea* WHITE, 1879a, p. 271 (Amazonas).

*Martarega membranacea*; TRUXAL 1949, p. 7-8, pl. 1 fig. 4, pl. 2 fig. 10, pl. 3 fig. 1, 2 (Guyana, Brasil, Bolivia).

*Martarega membranacea*; TRUXAL 1957, p. 14 (Brasil).

*Martarega membranacea*; NIESER 1968, p. 119, fig. 115 (Suriname).

*Martarega membranacea*; NIESER 1970b, p. 76, fig. 110, 112 (Brasil).

GUYANA; SURINAME, Saramacca, Suriname, Brokopondo; BRASIL, Amazonas, Pará, Goiás; ECUADOR, BOLIVIA.

SURINAME: Saramacca, SN351 3♂, 1♀ brach; SN352 1♂, 1♀ brach; near Saramacca brigde, W of Zanderij, recently dug forest pool, H927, 18.X.1968, 100♂, 139♀ brach, 3♀ macr. Suriname, SN002 13♂, 15♀ brach; SN004 1♂ brach; SN008 17♂, 10♀ brach, 1♂, 1♀ macr; SN008a 7♂ brach; SN009 2♀ brach; SN010 25♂, 19♀ brach, 5♂, 5♀ macr; SN011 1♂ brach; SN012 10♂, 10♀ brach, 1♂, 1♀ macr; SN015 4♂, 3♀ brach; SN022 15♂, 13♀ brach, 1♀ macr; SN023 1♂ macr; SN024 1♂, 7♀ brach, 8♂, 2♀ macr; SN051 14♂, 8♀ brach; SN086 19♂, 26♀ brach; SN087 8♂, 18♀ brach; SN096B 5♂, 2♀ brach; SN152B 1♂, 3♀ brach; SN154 3♂, 3♀ brach; SN155 6♂, 20♀ brach; SN160 105♂, 81♀ brach, 5♂, 5♀ macr; SN328 2♀ macr; SN345 1♂, 6♀ brach; SN348A 23♂, 13♀ brach, 4♂, 1♀ macr; SN348B 8♂, 9♀ brach, 8♂ macr; SN348C 1♂, 2♀ brach, 1♂, 1♀ macr; SN350 1♀ brach. Brokopondo SN104 1♂ brach; SN105 2♂, 1♀ brach, 3♂, 2♀ macr; SN230 2♂, 19♀ brach., 3♂, 7♀ macr; Brokopondo barrage Lake, near Locus Kreek (muddy, palmleaves, dead trees), H925, 15.X.1968, 1♂, 2♀ brach.

#### Brachypterous specimens

Length ♂  $\bar{x}$  =  $4.3 \pm 0.1$ , ♀  $\bar{x}$  =  $4.7 \pm 0.1$ ; width of pronotum ♂  $\bar{x}$  =  $1.10 \pm 0.02$ , ♀  $\bar{x}$  =  $1.24 \pm 0.05$ ; ocular index (V) ♂  $\bar{x}$  =  $0.62 \pm 0.04$ , ♀  $\bar{x}$  =  $0.65 \pm 0.06$ .

Colour whitish to light yellowish, eyes bluish-brown. Hemielytra hyaline with a broad lateral and a median opaque stripe, the latter being apically forked in males and contains apically a narrow hyaline stripe in females.

Vertex longer than its anterior width, anterior margin distinctly convex in males, less so in females. Eyes becoming holoptic at a point midway the length of the head, ocular commissure longer than one-half the width of an eye.

Claval spine most often extending to the tip of the membrane, membrane not distinct. Mesotrochanter ventrally without a nodule; there is, however, a patch of hairs near the coxa which may sometimes give the impression that a nodule is present.

Male left paramere (Fig. 266, 267).

Macropterous specimens.

Length ♂  $\bar{x} = 4.60 \pm 0.07$ , ♀  $\bar{x} = 5.02 \pm 0.09$ ; width of pronotum ♂  $\bar{x} = 1.25 \pm 0.02$ , ♀  $\bar{x} = 1.39 \pm 0.02$ ; ocular index (V) ♂, ♀  $\bar{x} = 0.70 \pm 0.04$ .

Hemelytra predominantly opaque with hyaline stripes along median margin from apex of scutellum to claval spine, a short narrow stripe apicolaterally on clavus beset with a row of thin long hairs, a small stripe apically at border of membrane and corium and a longitudinal band across corium.

Scutellum large, whitish to light brownish.

Pronotum and body relatively broader, claval spines relatively small; remaining structural characteristics as in brachypterous specimens.

This is a common and abundant species in the savannah region where it is often the dominant aquatic bug in various stagnant waters without true aquatic vegetation and exposed to sunshine (in this respect it is complementary to *Buena truxali* which occupies the same type of habitat when shaded). In the rain-forest region *B. membranacea* may be numerous in recent artificial ponds (e.g. near roads) exposed to sunshine. The series SN348A/C gives an indication that some external factor correlated with the size of the habitat has an influence on the fraction of macropters in a population.

This species, notably when the population density is rather high, tries to escape by hopping on the water's surface when disturbed (e.g. by a net) under water. The same behaviour was, more rarely, observed in *M. gonostyla* and is mentioned for several *Martarega* species by MENKE & TRUXAL 1966. On some occasions, around noon, the animals were found to assemble in a row in the shade of a branch lying over the water.



This species is very similar to *M. chinai*. The only reliable difference is the presence of a nodule on the mesotrochanters of males in *M. chinai* which is lacking in *M. membranacea*.

**Martarega williamsi** Truxal, 1949

Fig. 262.

*Martarega williamsi* TRUXAL, 1949, p. 13-14, pl. 2 fig. 6, pl. 3 fig. 5, 6 (Canal Zone, Ecuador, Perú, Brasil).

*Martarega williamsi*; NIESER 1970b, p. 79, fig. 111 (Brasil).

CANAL ZONE; ECUADOR; PERÚ; BRASIL, Amazonas.

This species has not been recorded from the Guyana Region but might occur there. It is similar to *M. gonostyla* in having for the greater part hyaline hemielytra but differs in having an additional thin opaque longitudinal stripe reaching from the base of the hemielytron to about 1/3 of its length and the male left paramere (Fig. 262) being shorter and relatively much thicker.

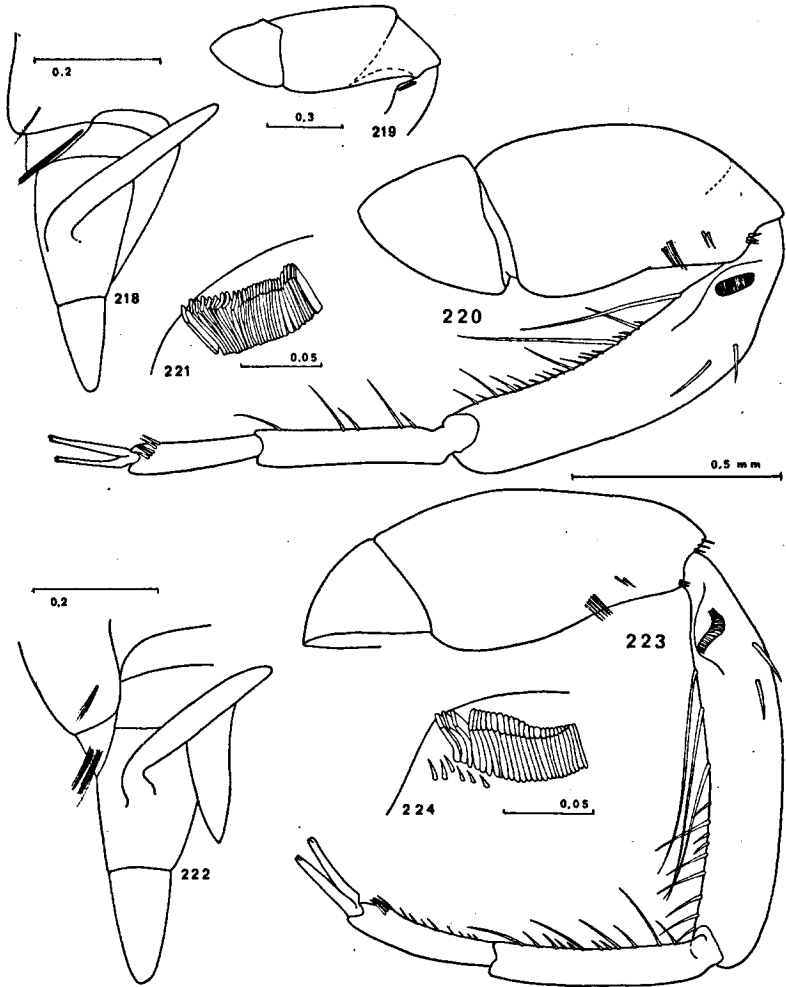


Fig. 218-221. *Buenoa amnigenopsis*, male paratype, from Suriname: 218 rostrum, lateral view; 219 anterior femur; 220 fore leg; 221 tibial comb.

Fig. 222-224. *Buenoa amnigenus*, male, from Suriname: 222 rostrum; 223 fore leg; 224 tibial comb.

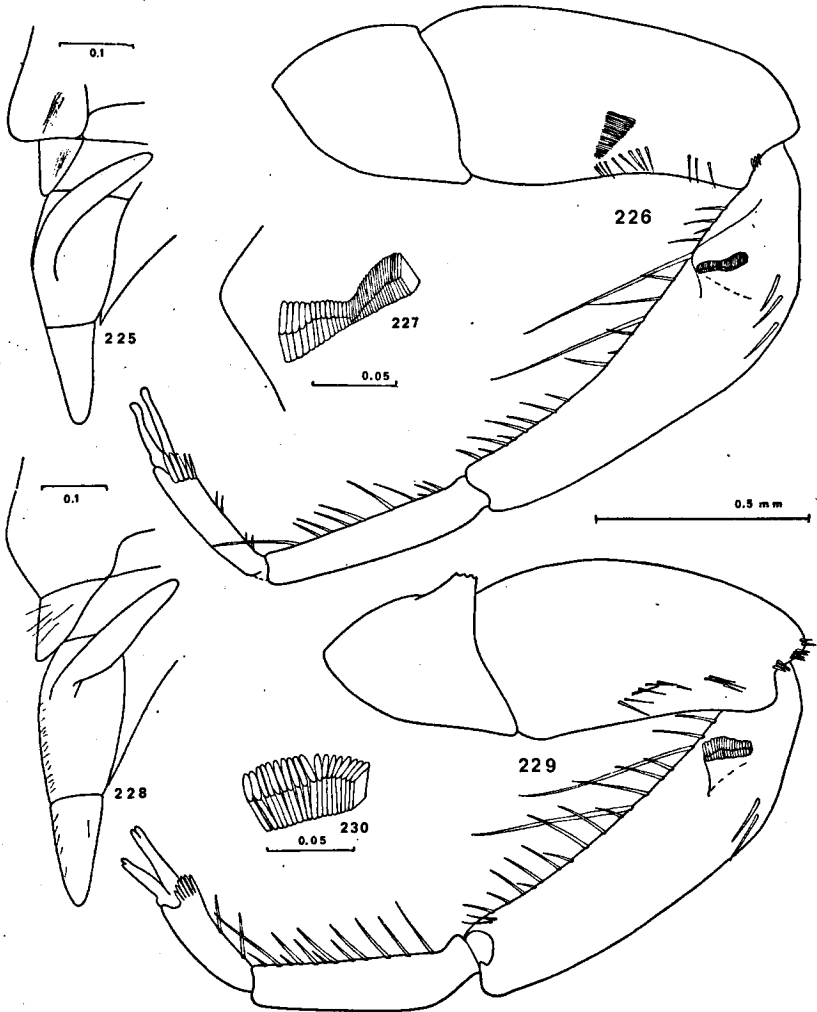


Fig. 225–227. *Buenoa communis*, male from Suriname: 225 rostrum; 226 fore leg; 227 tibial comb.

Fig. 228–230. *Buenoa fasciata*, male from Suriname: 228 rostrum; 229 fore leg; 230 tibial comb.

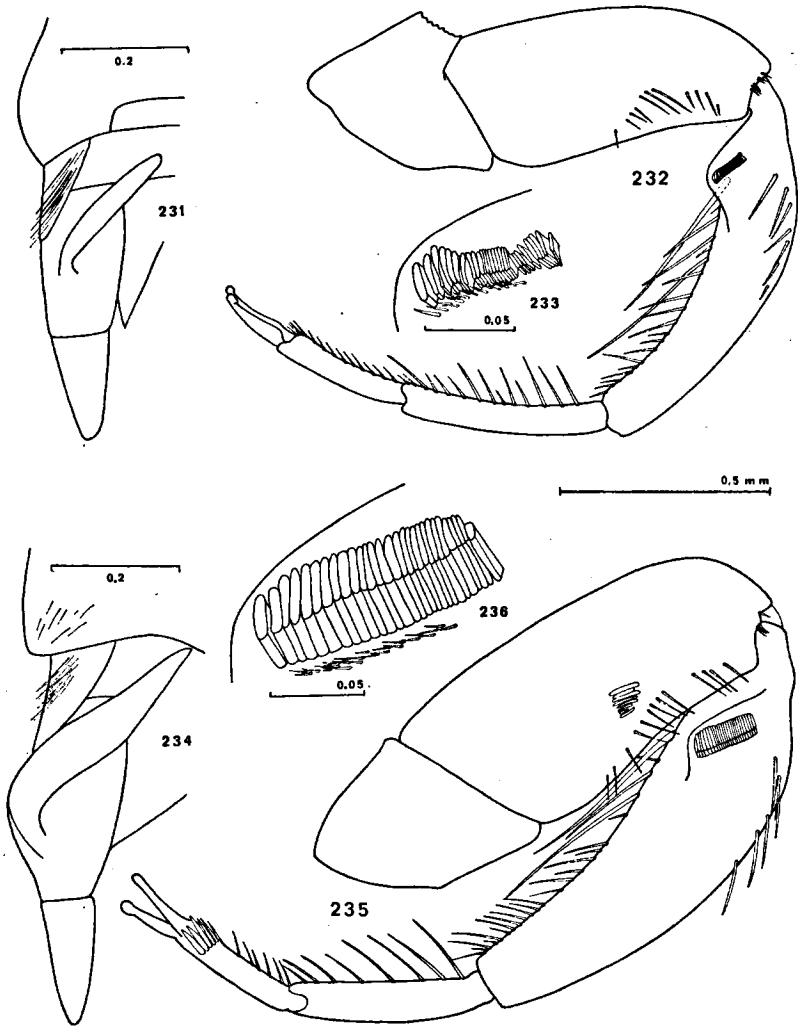


Fig. 231-233. *Buenoa incompta*, male from Suriname: 231 rostrum; 232 fore leg; 233 tibial comb.

Fig. 234-236. *Buenoa nitida*, male from Suriname: 234 rostrum; 235 fore leg; 236 tibial comb.

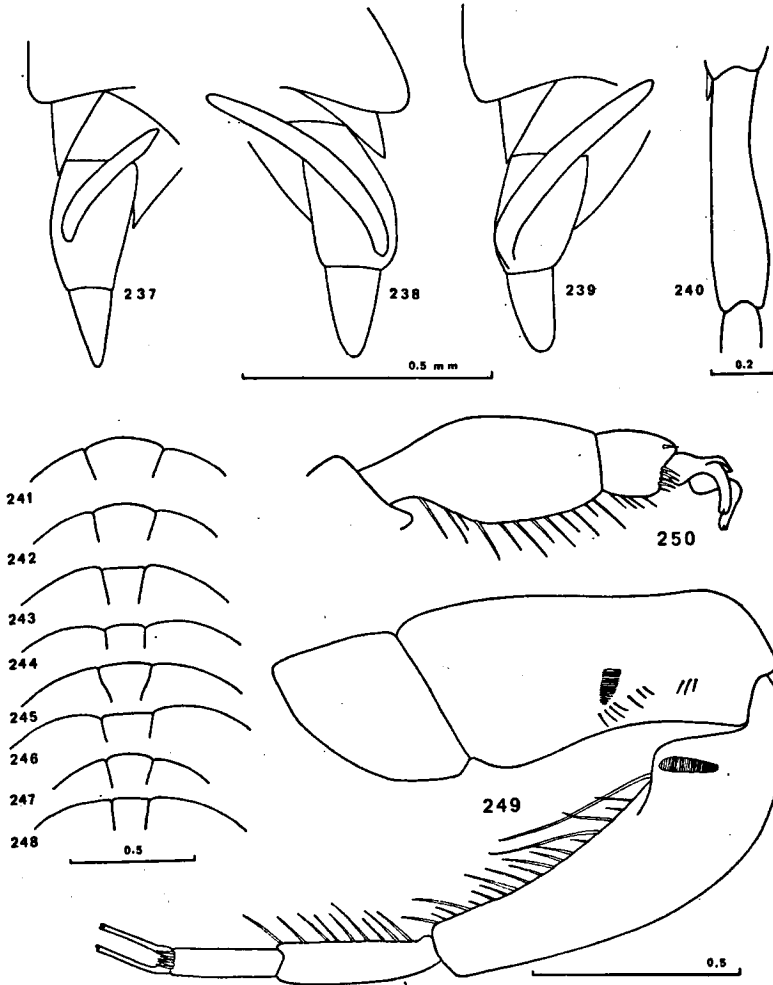


Fig. 237-239. Rostrum of *Buenoa* males from Lesser Antilles: 237 *B. pallens*; 238 *B. pallipes*; 239 *B. platycnemis*.

Fig. 240. *Buenoa tarsalis*: basal segment of intermediate leg.

Fig. 241-248. *Buenoa* from Suriname, anterior outline of head in dorsal view; 241 *B. amnigenopsis*, paratype; 242 *B. amnigenus*; 243 *B. communis*; 244 *B. fasciata*; 245 *B. incompta*; 246 *B. nitida*; 247 *B. salutis*; 248 *B. truxali*.

Fig. 249. *Buenoa pallipes*, male from Lesser Antilles: fore leg.

Fig. 250. *Buenoa unguis*: anterior tarsus of male, adapted from TRUXAL 1953.

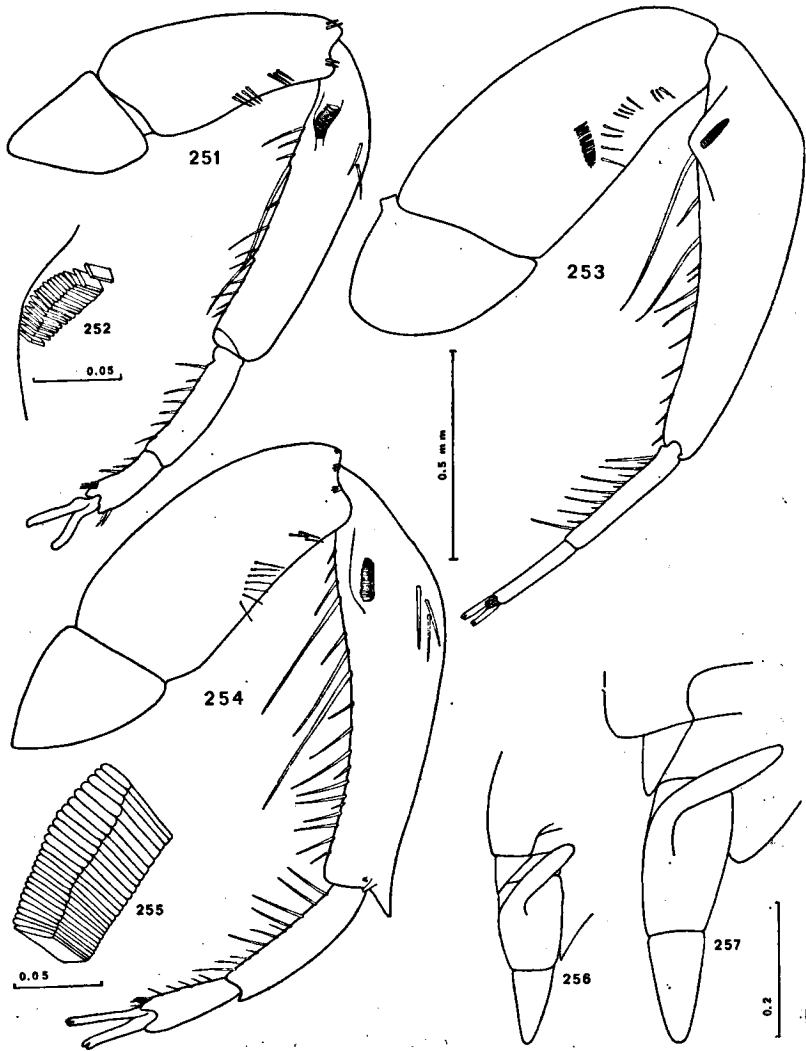


Fig. 251-252. *Buenoa salutis*, male from Suriname: 251 fore leg; 252 tibial comb.

Fig. 253. *Buenoa platycnemis*, male from Lesser Antilles: fore leg.

Fig. 254-255. *Buenoa truxali*, male from Suriname: 254 fore leg; 255 tibial comb.

Fig. 256-257. Rostrum of male *Buenoa* from Suriname: 256 *B. salutis*; 257 *B. truxali*.

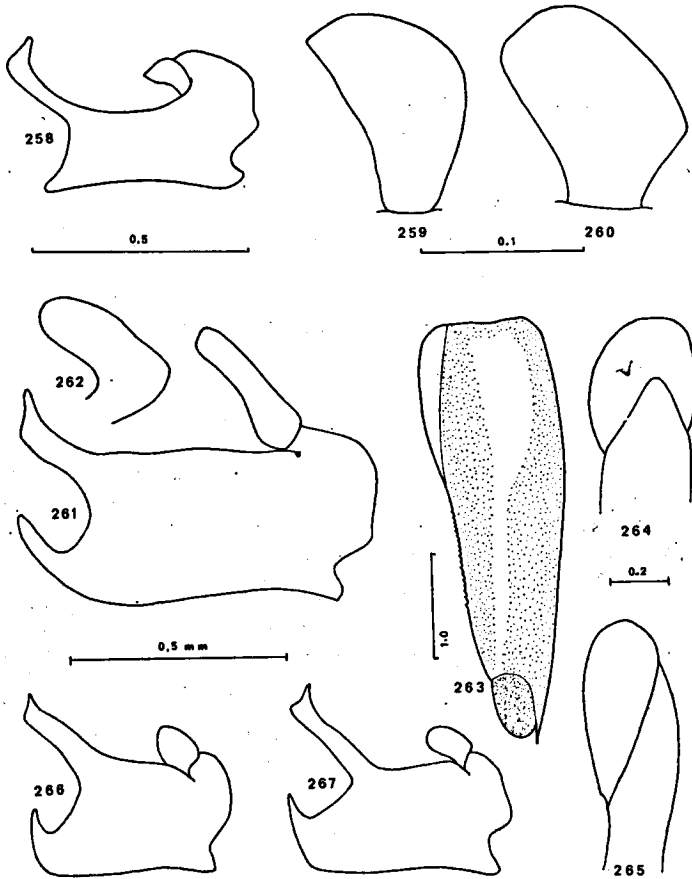


Fig. 258-260. *Martarega brasiliensis*, males from Suriname: 258 genital capsule; 259 left paramere of brachypterous specimen; 260 left paramere of macropterous specimen.

Fig. 261. *Martarega gonostyla*, male from Suriname: genital capsule.

Fig. 262. *Martarega williamsi* from Brasil: left paramere.

Fig. 263. *Martarega hungerfordi* from Suriname: hemielytron of brachypterous female.

Fig. 264. *Martarega chinai* from Amazonas: mesotrochanter of male.

Fig. 265. *Martarega hungerfordi* from Suriname: metatrochanter of male.

Fig. 266-267. *Martarega membranacea*, genital capsules of males from Suriname: 266 brachypterous specimen; 267 macropterous specimen.

## CORIXIDAE Leach, 1815

Medium sized to small Heteroptera. Head broad, triangular in front view, concave posteriorly and overlapping the anterior part of the prothorax. Rostrum short, subconate, apparently unsegmented (although transverse sulcations are most often present) and broadly attached to the head. Eyes large, triangular in outline. Male abdominal segments, most often distinctly, asymmetrical; genital capsule asymmetrical with two strongly different parameres.

The Corixidae can be distinguished from all Hemiptera by the apparently unsegmented rostrum.

Most biological data on Corixidae are based on observations of Corixinae which are predominant in N. America and Europe where most of this work has been done. No specific data on the biology of Heterocorixinae or *Tenagobia* are available.

The general habitats of Corixidae are shallow, stagnant or torpid waters where they spend most of their time at the bottom; few species live in deep or fast-flowing waters. The main factors determining the occurrence of individual species seem to be absence or presence (and density) of vegetation, accumulation of plant debris and, especially in warm climates, exposure to sunshine. Some species are confined to streamlets but most of these are nearly always found at those places where the current is low. Some (notably *Trichocorixa*) species are adapted to saline waters where they may be extremely abundant and consequently form an important factor in the ecology of the habitat. High population densities in fresh waters have in Suriname only been observed for *Tenagobia incerta* and *T. socialis*.

Most species possess well-developed flight wings although in Micronectinae and some genera of Corixinae brachypterism is frequent. The reduction of the hemielytra in brachypterous specimens is virtually confined to the membranes. Corixidae are often found in light traps, regularly in large numbers.

Atmospheric air is taken up between head and pronotum and stored on the venter and under the hemielytra.

Many Corixidae seem to be omnivorous. A method of feeding frequently found is sieving edible particles from the bottom debris. This is whirled up with the palae while the animal is anchored by means of the long middle legs. HUNGERFORD 1920 noted a *Sigara* (Corixinae) sucking out threads of *Spirogyra* and has ever since stressed this method of feeding. JANSSON & SCUDDER 1972, after rearing a number of Corixinae from different genera on living and dead Arthropods and Annelids conclude: "that the Corixidae should no longer be regarded as mainly algae and detritus feeders".

The ability of Corixidae to make chirping noises (stridulate) has attracted attention early. In Corixinae the sound is produced by rubbing fields of small pegs on the base of the front femur, present in males of many species, against the sharp edge of the rostrum. Formerly the strigil and the palae peg row (often indicated as



stridulatory pegs) were supposed to be organs of sound production. The paler peg row seems never to be involved (its function is to give the male a good grip on the female in copulation), the strigil is, according to VON MIRRIS 1935, involved in *Micronecta* but not in Corixinae. It would be interesting to check whether the Heterocorixinae are able to stridulate.

HUNGERFORD 1948 cites six subfamilies of Corixidae, three of which are represented in South America. These can be separated by the following key.

#### KEY TO SOUTH AMERICAN SUBFAMILIES OF CORIXIDAE

- 1a Scutellum exposed for the greater part (ocelli absent) (Pl. 12e-h) . . . . . *Micronectinae*
- 1b Scutellum covered by pronotum (apex rarely visible) (Pl. 12a-d) . . . . . 2
- 2a The infraocular portion of the genae very broad and the hypocular suture arising near the subacute projection of the inferior angle of the eye (Fig. 268) . . . . . *Heterocorixinae*
- 2b The infraocular portion of the genae not broad or, if broad, the hypocular suture (if present) arising about midway along ventral margin of eye (Fig. 273, 274) . . . . . *Corixinae*

#### CORIXINAE Jaczewski, 1924

Scutellum hidden by pronotum or only the tip exposed. Rostrum with transverse sulcations, hypocular suture, when visible, arising about midway along ventral margin of eye, antennae four-segmented. Hemelytra with embolar groove and well-developed nodal furrow. Pala with well-developed palm, in males with paler peg row, claw distinct but not obviously modified.

Although this is the largest subfamily with several hundred species in twenty five genera, only three species of the genus *Trichocorixa* are known to occur in the Guyana Region. Four other genera may possibly be represented in this region. They can be separated with the following key adapted from HUNGERFORD 1948.

KEY TO GENERA OF CORIXINAE POSSIBLY OCCURRING IN  
THE GUYANA REGION

- 1a Less than 5.6 mm long; males with sinistral asymmetry and with pala short and triangular, the tibia produced apically over it; females with the apices of clavi not exceeding a line drawn through the costal margin of the hemielytra at the nodal furrows (Pl. 12c, Fig. 286) . . . . . *Trichocorixa*
- 1b Not as above . . . . . 2
- 2a Smooth and shining, never more than faintly rugulose, ranging in size from 4 to 8.4 mm long; lateral lobe of prothorax typically with sides tapering to a narrowly rounded apex; all but two small species with hind femur pubescent ventrally only at base; male pala triangular, about equal in length to tibia, with a row of pegs near dorsal margin and another in or near the upper palmar row of bristles . . . . . *Corisella* Lundblad
- 2b Combination of characters not as above . . . . . 3
- 3a Rather large, stout species (length nearly 7 mm or more, width across head over 2 mm), males without strigil, fore femur in males apicodorsally distinctly acuminate . . . . .  
. . . . . *Centrocorisa* Lundblad
- 3b More slender species, males with a strigil (except *Sigara jensenhaarupi*), fore femur of males not acuminate apicodorsally . . . . . 4
- 4a Upper surface of male pala deeply incised, vertex of male acuminate; hemielytral pattern usually indistinct or obsolete . . . . .  
. . . . . *Ramphocorixa* Abbott
- 4b Upper surface of male pala not incised, vertex of male not acuminate; hemielytral pattern nearly always distinct, vermiculate (subgenus *Tropocorixa* Hutchinson) . . . . . *Sigara* Fabricius

**Trichocorixa** Kirkaldy, 1908

Rather small Corixinae, length not exceeding  $5\frac{1}{2}$  mm, appearing somewhat elongate. Pronotum usually with well-developed transverse lines. Markings on hemielytra distinct, on corium reticulate to transverse. Hemielytra with scattered short, spinose setae and a varying number of long hair-like setae. Legs and venter yellow.

Males with distinct fovea on frons without much hair on surface, anterior tibia produced apically over the base of the pala; the latter short, about as long as tibia, thick, roughly triangular with an oblique row of 13 to 20 pegs on the inner surface. Abdominal asymmetry sinistral, strigil present. A line drawn through costal margins at nodal suture barely exceeded by the apices of the clavi.

Females, apices of clavi not reaching a line through costal margins at nodal furrows, the latter being situated at or near the end of the embolar groove.

KEY TO *Trichocorixa* FROM THE GUYANA REGION

- |    |   |                        |
|----|---|------------------------|
| 1a | Males . . . . .   | 2                      |
| 1b | Females . . . . .   | 4                      |
| 2a | Left posterior lobe of abdomen with a convex, not sinuate, outer margin (Fig. 280) . . . . .  | <i>T. reticulata</i>   |
| 2b | Left posterior lobe of abdomen with a sinuate outer margin . . . . .  | 3                      |
| 3a | Left posterior lobe of abdomen truncate at apex (Fig. 277) . . . . .  | <i>T. orinocoensis</i> |
| 3b | Left posterior lobe of abdomen not truncate at apex (Fig. 281) . . . . .  | <i>T. verticalis</i>   |
| 4a | Apex of clavus with a group of (mostly 3-5) erect bristles. Pruinoso area of embolium apically of nodal furrow reduced to a small spot (Fig. 276) . . . . . | <i>T. reticulata</i>   |
| 4b | Apex of clavus without a group of erect bristles. Pruinoso area of embolium apically of nodal furrow well developed (Fig. 275) . . . . .                    | 5                      |

- 5a Vertex not protruding before eyes. Lateroposterior angles of second abdominal segment close to body . . . *T. orinocoensis*
- 5b Vertex protruding before eyes. Second abdominal segment with acutely pointed lateroposterior angles, these standing out, most often pointing out at sides of hemielytra as seen from above . . .  
 . . . . . *T. verticalis*

***Trichocorixa orinocoensis* Sailer, 1948**

Fig. 275; 277-279.

*Trichocorixa orinocoensis* SAILER in HUNGERFORD 1948, p. 339-341, fig. 33-36, 162, 184, 209 (Colombia, Venezuela, Trinidad, Suriname, Brasil).

*Trichocorixa orinocoensis*; NIESER 1969c, p. 149-152, fig. 72-76, 92, 95, 97-98 (Leeward Group of Lesser Antilles).

*Trichocorixa orinocoensis* (!); NIESER 1970a, p. 65-66, fig. 90-91 (Suriname, Brasil).

COLOMBIA; VENEZUELA, Falcón; SURINAME, Nickerie, Suriname, Commewijne, Marowijne; BRASIL, Paraíba, Pará; Leeward Group of LESSER ANTILLES.

SURINAME: Nickerie, Cupidokondre, at light, 26.II.1971, 1♀ (Gij).  
 Suriname, *SN036*, 1♂; Paramaribo, l'Hermitage, at light, 15.VII.1970, 1♂. Commewijne, *SN467*, 2♂, 4♀; *SN468*, 11♂, 5♀; *SN469*, 149♂, 120♀, Marowijne; *SN470*, 34♂, 25♀; *SN471*, about 1000 specimens; *SN472*, 2♂, 1♀; *SN473*, 1♂; *SN475*, 12♂, 8♀; *SN476* about 25 specimens; *SN481* about 40 specimens; *SN484*, 1000-2500 specimens; Wia-Wia Conservancy, *Avicennia* and *Eleocharis*, 26.IV.1972 1♀ (Panday & Leentvaar).

Length ♂  $\bar{x} = 4.1 \pm 0.1$ , ♀  $\bar{x} = 4.3 \pm 0.1$ ; width of head ♂  $\bar{x} = 1.25 \pm 0.02$ , ♀  $\bar{x} = 1.36 \pm 0.03$ ; ocular index ♂  $\bar{x} = 1.23 \pm 0.05$ , ♀  $\bar{x} = 1.25 \pm 0.03$ .

Pronotum not carinate, very slightly rastrate, yellow transverse bands rather regular and most often narrower than the alternating dark bands. Hemielytra non-rastrate, shiny.

Hindlegs, femur dorsally with 4-8, ventrally with 11-19, tibia dorsally with 4-7, laterally with 9-11 spines.

Male, vertex very slightly protruding before eyes. Strigil rather large and somewhat curved. Left posterior lobe of abdomen with a sinuate outer margin and a truncate apex (Fig. 277). Parameres Fig. 278, 279.

Female, vertex not or hardly produced. Hemelytra with border of shiny margin along embolium anterior to nodal furrow thickened as to suggest a groove, obliquely ascending posteriorly (not always obviously); pruinose area of embolar groove apically of nodal furrow well developed (Fig. 275); apical angle of clavus without a group of 3–5 bristles. Second abdominal segment with lateroposterior angles contiguous, not pointing out at sides of hemelytra as seen from above.

*Trichocorixa orinocoensis* prefers shallow saline waters and is consequently found near the coast, nearly always together with *T. reticulata*. Table 2 suggests that the highest population densities occur at salinities of about 10‰ Cl'; especially as the sample points SN471 and SN484 are quite different regarding vegetation and bottom. Dominance of one species over the other ones correlated with salinity is not apparent for the *Trichocorixa* species found in Suriname in the present collections.

For comparative notes, see KEY p. 215.

### **Trichocorixa reticulata (Guérin-Méneville, 1857)**

Fig. 273, 276, 280, 282, 283, 286.

*Corisa reticulata* GUÉRIN-MÉNEVILLE, 1857, p. 432 (Cuba).

*Trichocorixa reticulata*; SAILER in HUNGERFORD 1948, p. 343–348, fig. 44–57, 94, 134–150, 172–178, 196–199, 209 (China, Hawaii, North, Central and South America).

*Trichocorixa reticulata*; LINSLEY & USINGER 1966, p. 136 (Galápagos).

*Trichocorixa reticulata*; NIESER 1969c, p. 153–156, fig. 77–86, 93, 99–100 (Lesser Antilles).

*Trichocorixa reticulata*; NIESER 1970a, p. 66, fig. 92, 93 (Suriname).

HAWAIIAN ISLANDS; U.S.A.; MÉXICO; COLOMBIA; ECUADOR; GALÁPAGOS; PERÚ; VENEZUELA; SURINAME, Nickerie, Suriname, Commewijne, Marowijne; LESSER ANTILLES; GREATER ANTILLES; BAHAMAS.

There is one record from CHINA, Shanghai by LUNDBLAD 1929. As the species has not been rediscovered in Eastern Asia it is very probable that the original specimens were imported on an American vessel. Until new collections of *T. reticulata* are made in E. Asia, it is considered unlikely that China is part of the range of this species.

SURINAME: Suriname, Paramaribo, l'Hermitage, at light, 1–3.XII.1969, 1♂. Commewijne, SN467, 10♂, 6♀; SN469, 44♂, 29♀. Marowijne, SN470,

7♂, 7♀; *SN471*, about 1000 specimens; *SN472*, 7♂, 10♀; *SN475*, 32♂, 43♀; *SN476*, about 500 specimens; *SN481*, about 200 specimens; *SN482*, 1♂; *SN484*, 4000–8000 specimens; Wia-Wia Conservancy, *Avicennia* and *Eleocharis*, 26.IV.1972, 1♀; same, *Batis* marsh, 26.IV.1972, 3♀ (Panday & Lèentvaar).

Length ♂  $\bar{x} = 3.9 \pm 0.2$ , ♀  $\bar{x} = 4.2 \pm 0.2$ ; width of head ♂  $\bar{x} = 1.24 \pm 0.05$ , ♀  $\bar{x} = 1.30 \pm 0.06$ ; ocular index ♂  $\bar{x} = 1.41 \pm 0.06$ , ♀  $\bar{x} = 1.45 \pm 0.06$ .

Pronotum not carinate, slightly rastrate, shiny; yellow transverse bands irregular and most often broader than the alternating dark bands. Hemielytra, clavus slightly rastrate; remainder non-rastrate, shiny.

Hindlegs, femur dorsally with 3–10, ventrally with 12–27; tibia dorsally with 4–7, laterally with 8–13 spines.

Male, vertex protruding before eyes. Strigil not large and only very slightly curved, left posterior lobe of abdomen with a convex, not sinuate, outer margin (Fig. 280). Parameres Fig. 282, 283.

Female, vertex not or hardly produced. Hemielytra with pruinose area of embolar groove apically of nodal furrow reduced to a small spot (Fig. 276); apical angle of clavus with a group of (mostly 3–5) bristles. Posterior angles of second abdominal segment protruded, most often not very acutely, with points contiguous; not pointing out at sides of hemielytra as seen from above.

In Suriname *T. reticulata* has very similar habitat preferences to *T. orinocoensis*, see under that species and Table 2.

For comparative notes, see KEY p. 215.

### *Trichocorixa verticalis verticalis* (Fieber, 1851)

Pl. 12c; Fig. 281, 284, 285.

*Corisa verticalis* FIEBER, 1851b, p. 24 (Pennsylvania).

*Trichocorixa verticalis verticalis*; SAILER, in HUNGERFORD 1948, p. 358–361, fig. 64–67, 86, 95–98, 106–111, 165–166, 179, 200, 204, 210 (U.S.A., México, Antilles).

*Trichocorixa verticalis verticalis*; NIESER 1969c, p. 156–159, fig. 87–91, 94, 101–102 (Lesser Antilles).

*Trichocorixa verticalis verticalis*; NIESER 1970a, p. 68, fig. 94–96 (Suriname).

CANADA, Ontario; EASTERN U.S.A.; MÉXICO; BRITISH HONDURAS; SURINAME, Suriname, Commewijne, Marowijne; LESSER ANTILLES; GREATER ANTILLES; BAHAMAS; BERMUDA.

SURINAME: Commewijne, SN467, 2♂; SN468, 3♂, 1♀; SN469, 1♂, 1♀. Marowijne, SN471, about 300 specimens; SN472, 4♂, 2♀; SN475, 3♂, 2♀; SN476, about 5 specimens; SN481, about 150 specimens; SN482, 1♂, 1♀; Wia-Wia Conservancy, Batis-marsh, 26.IV.1972, 2♂, 4♀ (Panday & Leentvaar).

Length ♂  $\bar{x} = 4.1 \pm 0.1$ , ♀  $\bar{x} = 4.3 \pm 0.2$ ; width of head ♂  $\bar{x} = 1.22 \pm 0.02$ , ♀  $\bar{x} = 1.30 \pm 0.04$ ; ocular index ♂  $\bar{x} = 1.15 \pm 0.04$ , ♀  $\bar{x} = 1.15 \pm 0.08$ .

Pronotum not carinate, very slightly rastrate, shiny; yellow transverse bands rather regular, width of yellowish and alternating dark bands about equal. Hemelytra non-rastrate, shiny.

Hindlegs, femur dorsally with 3–5, ventrally with 11–16; tibia dorsally with 5–7, laterally with 9–12 spines.

Male, vertex generally strongly protruding before eyes. Strigil not big, rather straight, left posterior lobe of abdomen with a sinuate outer margin, apex rounded, not truncate (Fig. 281). Parameres Fig. 284, 285.

Female, vertex most often distinctly produced before eyes. Hemelytra with the pruinose area of the embolar groove apically of nodal furrow well developed; apical angle of clavus without a group of 3–5 bristles. Posteriolateral angle of second abdominal segment sharply acuminate, points standing out, most often visible at sides of hemelytra as seen from above.

*Trichocorixa verticalis*, because of its preference for saline habitats, is found near the coast only. It was taken together with the other *Trichocorixa* species but in much lower numbers. From the present collections no preference for a definite salinity range can be inferred; see Table 2.

For comparative notes, see KEY p. 215.

TABLE 2

SALINITIES OF HABITATS WHERE 20 OR MORE SPECIMENS OF  
TRICHCORIXA WERE COLLECTED.

Sample No	Cl' ‰	fraction of <i>Trichocorixa</i> represented by			totals
		<i>T. orinocoensis</i>	<i>T. reticulata</i>	<i>T. verticalis</i>	
472	5.3	0.12	0.64	0.24	26
470	7.9	0.81	0.19		73
471	8.3	0.45	0.45	0.10	3000-5000
484	12.1	0.25	0.75		5000-10,000
475	13.3	0.20	0.75	0.05	100
476	13.6	0.05	0.94	0.01	500
469	14.7	0.75	0.24	0.01	344
468	18.7	0.80		0.20	20
481	18.9	0.10	0.50	0.40	400
467	31.2	0.25	0.67	0.08	24

#### HETEROCORIXINAE Hungerford, 1948

Medium sized Corixidae with scutellum covered by pronotum. Rostrum with transverse sulcations. Infraocular portion of genae very broad, hypocular suture arising near the inferior angle of the eye, antennae three-segmented. Hemelytra with embolar groove and complete nodal furrow. Pala with well-developed palm, fore tibia and pala of subequal length.

This subfamily contains only one genus, restricted to South America, which is characterized by the subfamily diagnosis.

#### *Heterocorixa* White, 1879

#### KEY TO *Heterocorixa* OF THE GUYANA REGION

- 1a Middle leg with claws longer than tarsus; hemelytra with both slender hairs and short spines on corium; metasternal xiphus usually shorter than the inner line of the hind coxae; the hind



- femur with basal two-fifths pilose and many spines on its ventral side; male with median lobe of the seventh tergite triangular (Fig. 294) . . . . . 2
- 1b Middle leg with claws equal to or shorter than tarsus; hemielytra lacking the short spines on corium; metaxiphus as long as or longer than the inner line of the hind coxae; hind femur with little more than basal end pilose and not more than 10 or 12 spines on its ventral side; male with the lobe of the seventh tergite not produced into a pointed triangle . . . . . 4
- 2a Hemielytral pattern very fine (Pl. 23b) . . . . . 3
- 2b Hemielytral pattern coarser (Pl. 23a) . . . . . *H. lundbladi*
- 3a Metasternal xiphus (Fig. 287) at least two thirds the length of inner line of hind coxae . . . . . *H. brasiliensis*
- 3b Metasternal xiphus (Fig. 288) half the length of inner line of hind coxae . . . . . *H. hesperia*
- 4a Body length 3.2 mm or less, dorsal lateroposterior margin of head excavated (Fig. 272) . . . . . *H. minuta*
- 4b Body length over 3.5 mm . . . . . 5
- 5a Metasternal xiphus reaching or surpassing the level of the tips of the metacoxal projections . . . . . 6
- 5b Metasternal xiphus not reaching the level of the tips of the metacoxal projections . . . . . 8
- 6a Pronotum distinctly rugulose with transverse grooves, male pala geniculate (Fig. 290) . . . . . *H. genuipes*
- 6b Pronotum at most rugulose, no transverse grooves, male pala not geniculate . . . . . 7
- 7a Metasternal xiphus distinctly surpassing the level of the tips of the coxal projections. Lateroposterior margin of head less sinuate than in *H. similis* (Fig. 270) . . . . . *H. longixiphus*
- 7b Metasternal xiphus not surpassing the level of the tips of the metacoxal projections. Lateroposterior margin of head more strongly sinuate than in *H. longixiphus* (Fig. 271).. *H. similis*

- 8a Male, spinose dorsal flap of left apical lobe of abdomen with a fingerlike projection at apex (Fig. 304) . . . *H. surinamensis*  
 8b Male, spinose dorsal flap of left apical lobe of abdomen with an apical projection which is far less pronounced than in *H. surinamensis* . . . . . *H. boliviensis*

### **Heterocorixa boliviensis** Hungerford, 1928

*Heterocorixa boliviensis* HUNGERFORD, 1928, p. 100–101, pl. 3, fig. 5–7 (Bolivia).  
*Heterocorixa boliviensis*; HUNGERFORD 1948, p. 121–123, pl. 18, fig. 5 (Bolivia, Ecuador, Perú, Brasil).  
 not *Heterocorixa boliviensis*; NIESER 1970a.

ECUADOR; PERÚ; BOLIVIA; BRASIL, Amazonas.

After studying specimens of *H. boliviensis* named by HUNGERFORD from Perú and Brasil and additional specimens of *H. surinamensis*, it turned out that the specimen of *H. boliviensis* recorded from Suriname by NIESER 1970a is a misidentification of *H. surinamensis*. For comparative notes of these species see under *H. surinamensis*. It is not likely that *H. boliviensis* occurs in the Guyana Region.

### **Heterocorixa brasiliensis** Hunderford, 1928

Fig. 287.

*Heterocorixa brasiliensis* HUNGERFORD, 1928, p. 101, pl. 3, fig. 13–15 (Brasil).  
*Heterocorixa brasiliensis*; HUNGERFORD 1948, p. 107–108, pl. 16, fig. 4 (Brasil).

BRASIL, Amazonas?, Paraíba?, Pernambuco?, Goiás?, Mato Grosso.

HUNGERFORD 1948 stated that this species was only known from Mato Grosso. In his plate 20 he depicts localities from the states cited above with the exception of Mato Grosso. The species is cited here just in case the Amazonian locality is correct.

Apart from the metaxiphus (Fig. 287) this species is nearly identical with *H. hesperia*, see under that species. I studied two paratypes from Mato Grosso (KU).

**Heterocorixa genupes** Nieser, 1970

Fig. 268, 290–293.

*Heterocorixa genupes* NIESER, 1970a, p. 54–56, fig. 62–65 (Brasil).

BRASIL: Amazonas, Manaus, Rio Cuieiras, Igarapé Agua Encarnada, A551-5, 27.VIII.1965, 1♂, 1♀ (paratypes, CN). – This species is only known by the type series.

Length ♂ 4.3 – 4.5, ♀ 4.3 – 4.8; width of head ♂ 1.35 – 1.37, ♀ 1.38 – 1.50; ocular index ♂ 0.41 – 0.51, ♀ 0.46 – 0.54.

Colour, brown mottled with yellowish; pronotal pattern indistinct. Head except eyes yellowish, sometimes infuscated to partly dark brown. A broad black transverse band in the middle of hemielytra in males, in females often smaller black spots. Pruinose area of embolium dark brown to blackish.

Median length of head 0.50 – 0.72, length of pronotum 0.48 – 0.55. Synthlipsis ♂ 0.23 – 0.28, ♀ 0.27 – 0.30; greatest length of postocular area 0.23 – 0.26; width of an eye along posterior margin 0.58 – 0.69; length of hypocular suture 0.27 – 0.38. Vertex between eyes with a broad indistinct carina, in females sometimes nearly indistinguishable. Lateroposterior margin of head dorsally of hypocular suture (Fig. 268) slightly sinuate.

Pronotum rugulose, with distinct quite regular transverse grooves.

Hemielytra smooth, shining, with white and thicker black hairs in about equal numbers. Length of apical part of pruinose area of embolar groove 0.62 – 0.70; length of pruinose area along claval suture 0.65 – 0.71.

Mesoepimeron broader than prothoracic lobe except for part apically of hair tuft.

Metasternal xiphus long, just reaching the tips of the coxal process.

Length of tarsus of middle leg 0.50 – 0.61, claws 0.35 – 0.40.

Male, pala and fore tibia very characteristic Fig. 290; dorsum of abdomen Fig. 291; parameres Fig. 292, 293.

For comparative notes, see KEY p. 220.

**Heterocorixa hesperia** White 1879

Pl. 12b; Fig. 288.

*Corixa Heterocorixa hesperia* WHITE, 1879a, p. 273 (Brasil).*Heterocorixa hesperia*; LUNDBLAD 1928b, p. 81–83, fig. 13–15.*Heterocorixa hesperia*; HUNGERFORD 1948, p. 110–111, pl. 19, fig. 6, pl. 20 (Brasil, Bolivia).

BRASIL, Pará, Rio Grande do Norte, Goiás; BOLIVIA.

As no male specimens are known it is doubtful whether the specimens from the four widely separated localities cited by HUNGERFORD 1948 really belong to the same species. I have seen 2 syntypes (from Prainha near Monte Alegre, in BMNH).

Apart from the length of the metasternal xiphus (Fig. 287, 288) *H. hesperia* and *H. brasiliensis* are nearly identical. Judging from the figures given by HUNGERFORD 1948 (pl. 16 fig. 4, pl. 17 fig. 1) the male sexual characteristics of *H. hesperia venezuela* and *H. brasiliensis* hardly differ.

**Heterocorixa hungerfordi** Nieser, 1970

Fig. 296, 297.

*Heterocorixa hungerfordi* NIESER, 1970a, p. 56–57, fig. 66–68 (partim, not the specimen from Suriname).

BRASIL, Amazonas.

The known localities of this species are confined to the Upper Rio Negro Region.

When I prepared my 1970 paper I had one female specimen from Suriname which was provisionally identified as *H. hungerfordi*. Additional specimens from Suriname have proved to be *H. similis*.

*H. hungerfordi* and *H. similis* are very similar, see under *H. similis* for comparative notes.

**Heterocorixa longixiphus** Nieser, 1970

Fig. 270.

*Heterocorixa longixiphus* Nieser, 1970a, p. 57–58, fig. 86 (Suriname).

SURINAME: Sectie O, small pool in dry creek, 23.III.1959, 1♀ (Gij, holotype, LM). – The holotype is the only specimen known.

Length 4.05, width of head 0.15, ocular index 0.68.

Colour, brown mottled with yellowish. Head except eyes yellow, pronotum uniform brown. Yellowish markings on hemielytra much more expanded than brown markings on basal half, apical part nearly uniform brown.

Length of head 0.75, length of pronotum 0.38. Synthlipsis 0.38; length of postocular area 0.27; width of an eye along posterior margin 0.54; length of hypocular suture 0.38. Vertex between eyes without carina. Lateroposterior margin of head dorsally of hypocular suture (Fig. 270), slightly sinuate.

Pronotum only faintly rugulose, shining, no transverse grooves.

Hemielytra smooth, shining, with many white hairs especially on corium, no black hairs. Length of apical part of pruinose area of embolar groove 0.58, length of pruinose area along claval suture 0.54.

Metasternal xiphus long, rather stout, surpassing the level of the tips of the coxal processes by 0.12.

Length of tarsus of middle leg 0.51, claws 0.48.

For comparative notes, see KEY p. 220.

### ***Heterocorixa lundbladi* Hungerford, 1948**

Pl. 12a; Fig. 289, 294.

*Heterocorixa lundbladi* HUNGERFORD, 1948, p. 114–115, pl. 16, fig. 2, pl. 20 (Brasil).

BRASIL, Amazonas.

BRASIL: Amazonas, Manacapuru, III.1928, 3♂, 3♀ (Klages, paratypes Hungerford, KU). – This species may occur in the Guyana Region.

Length 5.3 – 5.9; width of head 1.8 – 1.9.

Colour, general facies medium to light; head yellow, its caudal margin with a narrow line; pronotum with three or four indefinite brown bands; hemielytra brown with small yellow vermiculate figures; inner basal angle of the clavus with lighter areas larger; the right membrane with pattern continuous with corium; the left

membrane white to transparent without pattern. Legs and venter yellow.

Head longer than the short pronotal disk which is roughened, rugulose. Hemielytra smooth, shining, with slender contiguous hairs and corium with numerous short spines. Metasternal xiphus variable, usually broadly or unevenly rounded at tip (Fig. 289).

Male, apex of abdomen Fig. 294.

This species is nearly identical with *H. westermanni* Lundblad from "Brasil". Males of *H. westermanni* differ in having emarginate right margin of the seventh abdominal segment (Fig. 295).

### **Heterocorixa minuta** Nieser, 1970

Fig. 272, 298.

*Heterocorixa minuta* NIESER, 1970a, p. 58-59, fig. 69 (Brasil).

BRASIL: Amazonas, Manaus, Rio Cuieiras, Igarapé Encarnada, A551-I, 27.VII.1965, 1♀ (paratype, CN). - This species is only known by the type series.

Length, ♂ 3.15, ♀ 3.01-3.20; width of head, ♂ 1.15, ♀ 1.12-1.20. Ocular index ♂ 0.74, ♀ 0.73-0.81.

Colour, brown mottled with yellowish, pronotum uniform brown. Head except darker eyes yellowish. Apex and base of pruinose area of embolar groove dark brown or black; apical part of hemielytra darker brown.

Length of head 0.55-0.60, length of pronotum 0.30-0.32. Synthlipsis, ♂ 0.31, ♀ 0.30-0.35; length of postocular area 0.20-0.21; width of an eye along posterior margin 0.40-0.46; length of hypocular suture 0.23-0.28. Vertex between eyes with a broad flat indication of a carina. Lateroposterior margin of head dorsally of hypocular suture (Fig. 272) produced caudad in its lower part.

Pronotum only faintly rugulose, without transverse grooves.

Hemielytra smooth and shining, with many white and distinctly fewer black hairs. Length of apical part of pruinose area of embolar

groove 0.38–0.42, length of pruinose area along claval suture 0.41–0.50.

Metasternal xiphus long but not reaching the tips of the coxal processes.

Length of tarsus of middle leg 0.39–0.40, and claws 0.33–0.38.

Male, dorsum of abdomen Fig. 298.

Apart from its small size this species can be recognized by the strongly excavated lateroposterior margin of head.

### **Heterocorixa similis** Nieser, 1970

Fig. 271, 299–302.

*Heterocorixa similis* NIESER, 1970a, p. 59–61, fig. 70–73 (Brasil).

*Heterocorixa hungerfordi*; NIESER 1970a, p. 56–57 (only the specimen from Suriname).

SURINAMEI, Saramacca, Suriname, Marowijne, Brokopondo; BRASIL, Amazonas.

SURINAME: Saramacca SN204, 1♂, 2♀; SN218, 6♂, 2♀. Suriname, SN065, 1♂. Marowijne, Nassaugebergte Lijn km 0.7, 16.II.1949, 1♀ (Suriname Exp. 1948/1949, *H. hungerfordi* det Nieser 1970 LM). Brokopondo, SN408, 1♀ (1 lv).

Length ♂  $\bar{x} = 3.7 \pm 0.1$ , ♀  $\bar{x} = 4.1 \pm 0.1$ ; width of head ♂  $\bar{x} = 1.35 \pm 0.02$ , ♀  $\bar{x} = 1.41 \pm 0.04$ ; ocular index ♂  $\bar{x} = 0.71 \pm 0.04$ , ♀  $\bar{x} = 0.73 \pm 0.04$ .

Colour, dorsally brown, head yellowish, hemielytra mottled with yellowish, corium with a distal darker brown band. Venter velvety black, brown and yellowish, legs yellowish. Pruinose area of embolium, apically yellowish, basally dark brown.

Length of postocular area 0.18–0.22–0.25. Hypocular suture originating at median edge of eye. Lateroposterior margin of head dorsally of hypocular suture (Fig. 271) sinuate.

Pronotum slightly rugulose, shiny, no transverse grooves.

Hemielytra without spines, with white hairs and an occasional thicker black hair. Length of apical part of pruinose area of embolar groove 0.47–0.52–0.58, length of pruinose area along claval suture 0.49–0.55–0.58; in males the latter is mostly slightly longer than the apical embolar pruinose area whereas in females they are of subequal length.

Metasternal xiphus long, reaching the level of the tips of the coxal processes.

Middle leg, ratio tarsus : claw ♂ 1.00 – 1.06 – 1.11, ♀ 1.08 – 1.15 – 1.30.

Hind femur ventrally with basal end pilose and 2 – 5 small spines on the glabrous part of the ventral surface.

Male, pala Fig. 302, dorsum of abdomen Fig. 299, parameres Fig. 300, 301.

Except for *SN408* the localities where this species was collected were associated with streamlets in the savannah-woodland. In the wet season the species probably dwells in pools and puddles near the streamlets, migrating in the dry season to the stagnant pools etc. in the beds of the streamlets. All habitats were well in the woods at distinctly to strongly shaded places, and had a bottom with plant-debris.

This species is very similar to *H. hungerfordi*.

Males show some differences in the dorsum of abdomen. The parameres offer good characteristics for specific identification (Fig. 296, 297; 300, 301).

### **Heterocorixa surinamensis** Nieser, 1970

Pl. 12d; Fig. 269, 303–306.

*Heterocorixa surinamensis* NIESER, 1970a, p. 61–62, fig. 74–77 (Suriname).

*Heterocorixa boliviensis*, NIESER 1970a, p. 53, fig. 58–61 (Suriname, misidentification).

**SURINAME**, Suriname, Brokopondo.

**SURINAME:** Brokopondo, *SN201*, 1♂, 9♀; *SN211*, 1♂; *SN214*, 1♂, 2♀; *SN412*, 2♀; *SN414*, 1♀; Suriname Rivier, N. of Kabel, pool, *H644A*, 1.IX. 1955, 2♂, 3♀.

Length ♂  $\bar{x}$  = 4.9 ± 0.1, ♀  $\bar{x}$  = 5.2 ± 0.1; width of head ♂  $\bar{x}$  = 1.46 ± 0.04, ♀  $\bar{x}$  = 1.60 ± 0.02; ocular index ♂  $\bar{x}$  = 0.50 ± 0.06, ♀  $\bar{x}$  = 0.55 ± 0.02.

Colour, brown mottled with yellow dorsally, pattern on pronotum nearly as distinct as on hemielytra. Head except eyes yellowish. Embolium dark brown to blackish apically of pruinose area.



Head, length of postocular area 0.13 – 0.20, length of hypocular suture 0.19 – 0.26. Vertex between eyes with only a faint indication of a carina. Hypocular suture originating very close to the ventral angle of the eye. Lateroposterior margin of head dorsally of hypocular suture very faintly sinuate (Fig. 269).

Pronotum rugulose, transverse grooves not distinct and irregular.

Hemelytra smooth, shining, with few white and an occasional thicker black hair, apparently without spines. Length of apical part of pruinose area of embolar groove 0.71 – 0.82, length of pruinose area along claval suture 0.59 – 0.75.

Metasternal xiphus almost reaching the bases of the coxal processes.

Middle leg, length of tarsus 0.58 – 0.62, length of claws 0.40 – 0.57.

Hind leg, coxae with a lateral fringe of long hairs.

Male, fore tibia with an apical pad Fig. 303; dorsum of abdomen Fig. 304, parameres Fig. 305, 306.

*Heterocorixa surinamensis* has been found in the rain forest region; during the dry season in the pools in the beds of streamlets, in the wet season in small pools and puddles on the forest floor.

The male from Suriname identified by NIESER 1970 as *H. boliviensis* comes well within the range of variability of *H. surinamensis*. The author studied some specimens of *H. boliviensis* identified by HUNGERFORD from the collections of Kansas University. The males of this similar species differ in the form of the spinose dorsal flap of the left posterior lobe of the abdomen, which in *H. surinamensis* has a distinct fingerlike projection which is not pronounced in *H. boliviensis*. Females are nearly identical, the hypocular suture, however, originates in *H. surinamensis* at the lower angle of the eye whereas its origin in *H. boliviensis* is more dorsally.

#### MICRONECTINAE Jaczewski, 1924

Scutellum exposed. Rostrum with transverse sulcations, hypocular suture in a lateral position, antennae three-segmented.

Hemelytra with a shallow embolar groove. Pala with well-developed palm, in males without palar peg row and with a large, highly modified, tarsal claw, in females pala and tibia fused. Claw of metatarsi trifid. In the Western Hemisphere one genus:

**Tenagobia** Bergroth, 1899

Posterior margin of the pronotum concave, consequently the exposed part of the scutellum relatively large. Males without a strigil. Virtually confined to the Neotropical Region.

KEY TO MALE *Tenagobia* OF SURINAME AND ADJACENT REGIONS

- 1a Length exceeding 4 mm. Male with a long fingerlike projection at the tip of the dorsal lobe of the left part of 8th tergite (Fig. 317) . . . . . *T. selecta*
- 1b Length not exceeding 4 mm . . . . . 2
- 2a Middle and hind legs yellowish with distinct brown bands and blotches, ocular index about 1 or less . . . . . 3
- 2b Middle and hind legs unicoloured, ocular index distinctly more than 1 . . . . . 5
- 3a Left paramere with long apical projections (Fig. 331) . . . . . *T. latioculata*
- 3b Left paramere with short or without apical projections . . . . . 4
- 4a Left paramere without apical projections (Fig. 332). . . . . *T. pseudoromani*
- 4b Left paramere with short apical projections (Fig. 333) . . . . . *T. romani*
- 5a Length not exceeding 3 mm, colour light greyish brown; fore femur (males) with a ventral papilla which bears a small peg (Fig. 322) . . . . . 6

- 5b Length exceeding 3 mm, colour castaneous; fore femur without ventral papilla and peg . . . . . 7
- 6a Left paramere about 0.2 mm long, with a well-developed "heel and toe" (Fig. 311) . . . . . *T. socialis*
- 6b Left paramere about 0.15 mm long, heel nor toe well developed (Fig. 307-310) . . . . . *T. incerta*
- 7a Fore femur with 6 spines in subventral row, left genital clasper as in Fig. 337 . . . . . *T. melini*
- 7b Fore femur with 4-5 spines in subventral row, left genital clasper as in Fig. 334, 335. . . . . *T. schadei*

### **Tenagobia incerta** Lundblad, 1928

Fig. 307-310, 313, 318, 322.

*Tenagobia signata* var. *incerta* LUNDBLAD, 1928a, p. 16-18, fig. 10-12 (Paraguay).

*Tenagobia incerta*; DEAY 1935, p. 446-448, pl. 41 fig. 10, 11 (Grenada, Trinidad, Brasil, Perú, Bolivia, Paraguay).

*Tenagobia serrata*; NIESER 1970a, p. 48-49 (partim the specimens from Venezuela and Suriname: Kabelstation).

*Tenagobia signata*; NIESER 1970a, p. 49, fig. 48-50 (Suriname, Venezuela).

LESSER ANTILLES; VENEZUELA, Falcón; SURINAME, Saramacca, Suriname, Commewijne, Marowijne, Brokopondo; BRASIL, Pernambuco, Pará, Amazonas, Mato Grosso, Minas Gerais; PERÚ; BOLIVIA; PARAGUAY.

SURINAME: Saramacca, *SN018*, 1♂, 3♀; *SN300*, 6♂, 8♀; *SN333*, 11♂, 20♀; *SN349*, 2♂, 8♀; *SN350*, 4♂, 17♀; *SN351*, 1♀; *SN352*, 1♀; *SN354A*, 2♂, 3♀; *SN425*, 4♂, 12♀; *SN448a*, 6♂, 8♀; *SN464*, 21♂, 14♀; *SN465*, 24♂, 8♀; near Saramacca Bridge, W of Zanderij, recently dug forest pool, *H927*, 18.X.1968, 3♂, 8♀. Suriname, Paramaribo, l'Hermitage, 10.VII.1969-25.VI.1970, at light, many thousands; *SN015*, 1♀; *SN015a*, 2♂, 3♀; *SN048*, 8♂, 5♀; *SN096B*, 1♂, 1♀; *SN114*, 1♀; *SN152B*, 1♀; *SN178*, 1♂, 1♀; ditch at Domburg, *H923*, 15.X.1968, 2♂, 1♀; near Paramaribo, Houttuin, pool, *L299*, 27.II.1967, 10♂, 24♀; just S of Paramaribo, small pond, *L317*, 2♂; Onverwacht, virtually stagnant streamlet in marsh, *L325*, 16.III.1967, 4♂, 4♀ (v.d. Land, LM). Commewijne, *SN112*, 2♀. Marowijne, *SN228*, 2♂, 3♀. Brokopondo, *SN104*, 16♂, 22♀; *SN105*, 10♂, 10♀; *SN209*, 24♂, 25♀; *SN212*, 2♂, 5♀; *SN230*, 4♂, 11♀; *SN324*, 1♀; *SN325*, 4♂, 8♀; Brokopondo barrage Lake,

near Locus Kreek (muddy, palmleaves, dead trees), *H925*, 15.X.1968, 14♂, 12♀; same, (floating trees), *H925A*, 15.X.1968, 1♂, 3♀.

BRASIL: Amazonas, Lago Grande (near Manaus), II.1939, 2♂, 3♀ (A. M. Olalla, KU). – All specimens macropterous.

Length ♂  $\bar{x} = 2.43 \pm 0.06$ , ♀  $\bar{x} = 2.62 \pm 0.09$ ; width of head ♂  $\bar{x} = 0.92 \pm 0.01$ , ♀  $\bar{x} = 0.98 \pm 0.03$ ; ocular index ♂  $\bar{x} = 1.32 \pm 0.05$ , ♀  $\bar{x} = 1.42 \pm 0.04$ .

Colour brownish, variable. Hemielytral pattern with a reticulate darker design, longitudinal stripes relatively indistinct (Fig. 318). Legs unicoloured, light yellowish.

Eyes distinctly less wide than the synthlipsis.

Prothorax without moustache-like bristles, ratio width of head : width of pronotum 1.03 – 1.09 – 1.14. Fore leg, male, paler claw broad, femur with an isolated ventral peg (Fig. 322); female, femur without the isolated ventral peg.

Hemielytra with small spines, especially on the apical half.

Male, right paramere Fig. 313, not twice serrate ventrally; left paramere Fig. 307–310, relatively small.

*Tenagobia incerta* is a common species in Suriname. It seems to prefer the shallow parts of stagnant waters exposed to sunshine with the exception of the smallest puddles (category A11). Within this group of habitats it apparently avoids those with true aquatic vegetation. Although it is regularly accompanied by *T. socialis*, the distributions of *T. incerta* and *T. socialis* over their habitats seem to be independent from each other. Near the coast *T. incerta* is scarce compared with *T. socialis*, whereas inland the reverse is true, see Table 3.

The species probably avoids brackish waters. It was found in two samples in which the Cl' content of the habitat was measured viz. *SNo48 Cl'*, 63 mg/l, 2 specimens and *SN112*, Cl', 158 mg/l, 2 specimens.

I have studied a male from Paraguay (Molinasque, 22.X.1925, F. Schade) which was seen by LUNDBLAD. Dr. M. MEINANDER (Zoological Museum, Helsinki, in lit.) informed me that male specimens from the original type series as mentioned by LUNDBLAD (Paraguay, Villa Rica, V.1925, F. Schade) no longer exist.

The most distinctive structure in this species, the left paramere, occurs in two main forms (Fig. 307, 308). The figure of LUNDBLAD (1928a: 18, fig. 12B) is clearly of that shown in my Fig. 307. The

male from Molinasque has the paramere of the second form (Fig. 308).

Although in my opinion there is a gradual variation in the parameres and both forms belong to the same species, apart from the consideration that this is not a formal revision of the genus *Tenagobia*, I did not think it advisable to designate a neotype with a paramere obviously differing from the original specimens.

TABLE 3

SAMPLES WITH BOTH *Tenagobia incerta* AND *T. socialis* ARRANGED AFTER THE DISTANCE OF THE LOCALITY TO THE COAST.

Sample	Distance in km	numbers of specimens	
		<i>T. incerta</i>	<i>T. socialis</i>
SN112	0	2	30
SN048	4	13	7
SN018	14	4	32
H923	22	3	47
SN015	35	6	29
SN178	35	2	18
SN096B	60	2	2
SN333	70	31	1
SN209	85	49	1
SN230	85	15	7
SN105	105	20	1
SN104	110	38	3
H925	120	26	6

This species is strikingly similar to *Tenagobia socialis*, *serrata* and *signata*. In males, the left paramere, which apart from differences in shape, is distinctly smaller in *T. incerta*, is distinctive. In separating females of *T. incerta* from *socialis* (*serrata* and *signata* are not known to occur in the Guyana Region) the hemielytral pattern can be used. In both species this is variable in intensity of pigmentation. In *T. incerta* the pattern on the corium is reticulate, in *T. socialis* it can be reticulate too but there are (mostly four) longitudinal stripes which are more prominent than the remainder of the pattern. In *T. incerta* longitudinal stripes may be present but are then merged in the reticulation, therefore *incerta* can be distinguished from

*socialis* by the lesser prominence of the longitudinal stripes compared with the intensity of the pigmentation. Moreover the hemielytra have faint longitudinal impressions (on which the stripes, if any, are formed) which are in *T. socialis* somewhat more evident than in *T. incerta*.

The interpretation of the corial pattern requires some experience. The best way to proceed is by training on a long series of males, using the left paramere as a guide. When the number of doubtful specimens becomes low enough one can turn to the females.

DEAY 1935 states that the right paramere in this species: "is not noticeably serrate ventrally". This remark is rather misleading as the serration is quite obvious at a magnification of about 400x, which is to be used in studying the parameres of most *Tenagobia*. NIESER 1970a subsequently misidentified specimens of *T. incerta* as *T. signata*.

After studying a paratype of *T. signata* from BMNH and the male of *T. incerta* from the Zool. Museum, Helsinki mentioned above, this misidentification was discovered. Males of the two species can be separated by the left paramere, which is about 0.20 mm long for *T. signata* and about 0.15 mm for *T. incerta* (Fig. 307-310, 312). Differences between the females will be very slight.

### **Tenagobia latioculata** Nieser, 1970

Pl. 12g; Fig. 320, 325, 328, 329, 331.

*Tenagobia latioculata* NIESER, 1970a, p. 46, fig. 39-41 (Suriname).

SURINAME: Suriname, *SNo29*, 2♀; *SNo33*, 1♀; *SNo35*, 1♂; *SN167*, 1♂; *SN173*, 6♂, 8♀; Zanderij, Malasie Kreek, small pool, *H830*, 25.II.1964, 1♂, 1♀ (holo- and allotype); brachypterous. - The holo- and allotype have been transferred to the collection of the Zoologisch Museum at Utrecht.

Length ♂  $\bar{x}$  =  $2.67 \pm 0.06$ , ♀  $\bar{x}$  =  $2.76 \pm 0.05$ ; width of head ♂  $\bar{x}$  =  $0.94 \pm 0.01$ , ♀  $\bar{x}$  =  $0.97 \pm 0.01$ ; ocular index ♂  $\bar{x}$  =  $0.57 \pm 0.04$ , ♀  $\bar{x}$  =  $0.58 \pm 0.03$ .

Colour, light brownish and yellowish, hemielytral pattern guttulate. Hyaline patch at inner basal angle of clavus v-shaped but the

posterior part strongly enlarged so as to obscure the v-shape. Legs light yellowish with brown rings and blotches on the middle and hind legs.

Eyes twice as wide as the synthlipsis.

Prothorax (Fig. 325) with a distinct tuft of moustache-like bristles. Ratio width of head : width of pronotum 1.08 – 1.12 – 1.15.

Hemelytra with very small spines, not or hardly visible, at the apex sparse fine hairs.

Male, fore leg with palar claw relatively narrow, femur without an isolated ventral peg (Fig. 323). Right paramere with a somewhat variable apex (Fig. 328, 329), left paramere with well-developed apical projections (Fig. 331).

This species is up to now only known from two streamlet-systems on the Zanderij-savanne viz. the Carolinakreek-system (Malasiekreek and *SNo33*) and the Colakreek-system which flows into the Coropinakreek (the remaining sample-points). Both are ultimately tributaries of the Para Rivier.

The species has been found at torpid, shaded places in streamlets where there is some plant-debris on the bottom but no aquatic vegetation. The only station where more than two specimens have been collected had a bottom with a good layer of dead leaves and some fine mud. It is possible that it prefers such places, which are quite rare in the savannah-streamlets.

In the rain-forest its relative *Tenagobia pseudoromani* was found in the same type of habitat.

This species can be separated from its relatives *T. romani* and *T. pseudoromani* by the low value of the ocular index; the male, moreover, by the strong development of the apical projections on the left paramere.

### *Tenagobia melini* Lundblad, 1928

Fig. 337.

*Tenagobia melini* LUNDBLAD, 1928a, p. 18–23, fig. 13–17 (Amazonas).

*Tenagobia melini*; DEAY 1935, p. 432–435, pl. 39 fig. 16; pl. 40 fig. 12, 13; pl. 42 fig. 4 (Amazonas).

Only one male of this species collected near Manaus is known. It is very similar to *T. schadei* but the left genital claspers of the males differ (Fig. 334, 337).

**Tenagobia pseudoromani n. sp.**

Pl. 12f; Fig. 321, 326, 330, 332.

Holotype ♂, allotype ♀ from SN408 in UM; remaining specimens mentioned labelled paratype in: BMNH 1♂, 1♀; KU 1♂, 1♀; IZP 1♂; OM 1♀; SM 1♂; NC 3♂, 1♀.

SURINAME: Brokopondo, SN408 5♂, 3♀; SN409 1♀; SN417 1♂, 1♀; SN419 2♂; macropterous.

Length ♂  $\bar{x} = 2.77 \pm 0.06$ , ♀  $\bar{x} = 2.88 \pm 0.15$ ; width of head ♂  $\bar{x} = 1.00 \pm 0.02$ , ♀  $\bar{x} = 1.03 \pm 0.03$ ; ocular index ♂  $\bar{x} = 0.73 \pm 0.01$ , ♀  $\bar{x} = 0.73 \pm 0.02$ .

Colour, light brownish and yellowish, hemielytral pattern guttulate. Hyaline v-shaped patch at inner basal angle of clavus with posterior branch enlarged though not as strong as in *T. latioculata* (Fig. 321). Legs yellowish with brown rings and blotches on the middle and hind legs.

Eyes about 1.4 times as wide as synthlipsis.

Prothorax (Fig. 326) with a distinct tuft of moustache-like bristles. Ratio width of head : width of pronotum 1.03 – 1.07 – 1.10.

Hemielytra with very small spines, slightly more prominent than in *T. latioculata*, at the apex sparse fine hairs.

Male, fore leg as in *T. latioculata*. Right paramere Fig. 330, left paramere without apical projections, apical face with papilla-like structures (Fig. 332).

The species has been found in torpid parts of streamlets in rain-forest, at relatively exposed places with some plant-debris and/or loam.

At first sight this species is similar to *T. romani* and *T. latioculata* but the left parameres are distinctive (Fig. 331–333). (See also *T. latioculata*).



**Tenagobia romani** Lundblad, 1928

Fig. 333.

*Tenagobia romani* LUNDBLAD, 1928a, p. 25–28 fig. 20–22 (Amazonas).*Tenagobia romani*; DEAY 1935, p. 427–429, pl. 39 fig. 10, pl. 40 fig. 4, 5, pl. 53 fig. 6 (Amazonas).

Known only by the type series from Manaus, it may occur in the Guyana Region. *Tenagobia romani* is nearly identical with *T. pseudo-romani* and *T. latioculata*; the left parameres are distinctive in these species (Fig. 331–333); *T. latioculata* has, moreover, relatively broader eyes. I studied the slides after which LUNDBLAD 1928a made his drawings (SM).

**Tenagobia schadei** Lundblad, 1928

Pl. 12e; Fig. 324, 327, 334–336.

*Tenagobia schadei* LUNDBLAD, 1928a, p. 23–25, fig. 18, 19 (Paraguay).*Tenagobia schadei*; JACZEWSKI 1933, p. 3 (Pernambuco).*Tenagobia schadei*; DEAY 1935, p. 435–437, pl. 39 fig. 14, pl. 40 fig. 1, 3.

SURINAME!, Saramacca, Suriname, Commewijne, Brokopondo; BRASIL, Pernambuco, Amazonas!, Goiás!, Mato Grosso!; PARAGUAY.

SURINAME: Saramacca, *SN130*, 1♂, Suriname, *SNo14*, 1♂; *SNo15*, 1♂; *SNo15a*, 10♂, 10♀; *SN71*, 1♀; *SN153A*, 1♀; *SN178*, 1♂, 1♀; Paramaribo, l'Hermitage, at light, 24.VIII./10.IX.1969, 2♂, 1♀. Commewijne, *SN112*, 1♀. Brokopondo, *SN201*, 3♂, 1♀; *SN211*, 3♂, 4♀; *SN216*, 1♀; *SN273*, 1♂.

BRASIL: Amazonas, R. Juruá, -Vic. João Pessoa (São Felipe), 10.VII/20.IX.1936, 4♂, 9♀; R. Eiru, Vic. São Antonio, 25.IX/17.X.1936, 11♂, 12♀ (Olalla, KU). Goiás, Sta. Isabel, at light, 27.X/4.XI., 3♀ (KU). Mato Grosso, Tapirapé, at light, 15.XI., 5♂, 13♀; same, 1/11.XII., 1♂, 1♀; same, 5.XII., 1♀ (KU).

Length ♂  $\bar{x}$  =  $3.29 \pm 0.05$ , ♀  $\bar{x}$  =  $3.53 \pm 0.05$ ; width of head ♂  $\bar{x}$  =  $1.30 \pm 0.025$ , ♀  $\bar{x}$  =  $1.36 \pm 0.03$ ; ocular index ♂  $\bar{x}$  =  $1.01 \pm 0.05$ , ♀  $\bar{x}$  =  $0.99 \pm 0.04$ .

Colour castaneous, yellowish brown ventrally, legs unicoloured, light brown. Hemielytral pattern guttulate.

Eyes about as wide as the synthlipsis.

Prothorax with few moustache-like bristles (Fig. 324), ratio width of head : width of pronotum 1.05 – 1.09 – 1.13.

Hemelytra with numerous very small spines and a few, scattered, long hairs at the apex.

Male, foreleg Fig. 327, femur proximally with a row of 4–5 spines, palmar claw clavate, of medium width. Parameres Fig. 334–336.

This species seems to be rather local although it occurs both near the coast (SN130) and more inland (SN201, 211 etc.). Taking into account the few samples in which more than 2 specimens were taken, it seems to have preference for torpid parts of streamlets with brown, acid water where there is accumulation of plant-debris but none or little aquatic vegetation.

I have studied one of the syntypes, which, in spite of the explicit statement by LUNDBLAD 1928a that there are no spines on the hemelytra, does bear numerous small spines on its hemelytra. These become visible at magnifications of 100× or more. (See also *T. melini*).

### **Tenagobia selecta** (White, 1879)

Fig. 317.

*Sigara selecta* WHITE, 1879a, p. 273 (Amazonas).

*Tenagobia selecta*; HUNGERFORD 1927, p. 189, pl. 10 fig. 2, 4, 7, 9 (Bolivia).

*Tenagobia selecta*; LUNDBLAD 1928a, p. 9–13, fig. 4–7 (Amazonas).

*Tenagobia selecta*; DEAY 1935, p. 452–454, pl. 38 fig. 1, 3, 6, 9, 11, 12; pl. 39 fig. 9, 17–22; pl. 40 fig. 11, 14; pl. 42 fig. 10 (Amazonas, Bolivia, Paraguay).

BRASIL, Amazonas; BOLIVIA; PARAGUAY.

This species which may occur in the Guyana-Region is easily recognized by its large size (over 4 mm) and the very characteristic shape of the dorsal flap of the left lobe of the 8th tergite (Fig. 317). I have studied some specimens from Manaus which will be reported elsewhere.

**Tenagobia serrata** Deay, 1930

Fig. 315.

*Tenagobia serrata* DEAY, 1930, p. 175–176 (Bolivia).  
*Tenagobia serrata*; DEAY 1935, p. 450, pl. 41 fig. 7, 15 (Bolivia).  
 not *Tenagobia serrata*; NIESER 1970a.

Through the kindness of Dr. G. E. WALLACE (Carnegie Museum, Pittsburg) I have been able to study the unique holotype of this species. This proved that the specimens named *T. serrata* by NIESER 1970a were wrongly identified.

*Tenagobia socialis* and also some specimens of *T. incerta* have a tendency to a double serrature in the margin of the right clasper of the males. In *T. serrata* (Fig. 315) this feature is, however, very distinct and easily seen at a magnification of 50–100×, which is not the case in *T. incerta* and *T. socialis*.

The ocular index of the holotype *T. serrata* is 1.22, the hemielytral pattern is more like *T. socialis* than like *T. incerta*.

The specimens mentioned under *T. serrata* in NIESER 1970a are mixture of *T. incerta* and *T. socialis*, see under those species.

**Tenagobia signata** (White, 1897)

Fig. 312, 316.

*Sigara signata* WHITE, 1879a, p. 274 (Amazonas).  
*Sigara socialis* var. *sobrina* WHITE, 1879a, p. 275 (Amazonas).  
*Sigara seducta* WHITE, 1879a, p. 275 (Amazonas).  
*Sigara simulans* WHITE, 1879a, p. 275 (Amazonas).  
*Tenagobia signata*; LUNDBLAD 1928a, p. 13–16, fig. 8, 9 (describes lectotype).  
*Tenagobia signata*; DEAY 1935, p. 443–446, pl. 39, fig. 7, pl. 41, fig. 8, 12 (Amazonas).  
 not *Tenagobia signata*; JACZEWSKI 1930, 1931; NIESER 1970a.

I have studied a male and a female paratype from the BMNH. This proved that the specimens named *T. signata* by NIESER 1970a were incorrectly identified. *T. signata* is almost identical with *T. incerta*. The only reliable differences seem to be in the parameres; the right paramere is more distinctly serrate in *T. signata* and the left paramere is, apart from differences in shape, distinctly larger than in *T. incerta*. The true *T. signata* seems to be restricted to SW Brasil.

**Tenagobia socialis** (White, 1897)

Pl. 12h; Fig. 311, 314, 319.

*Sigara socialis* WHITE, 1879a, p. 274–275 (Amazonas).*Tenagobia signata* var. *socialis*; LUNDBLAD 1928a, p. 16 (selects type, Amazonas).*Tenagobia signata*; JACZEWSKI 1930, p. 143–144, fig. 1 (partim, the specimen from Paramaribo).*Tenagobia socialis*; DEAY 1935, p. 451–452, pl. 41 fig. 9, 14, pl. 42 fig. 2 (Suriname, Guyana, Brasil).*Tenagobia socialis*; NIESER 1969c, p. 141–142, fig. 58–59 (Trinidad).*Tenagobia serrata*; NIESER 1970a, p. 48, fig. 45–47 (partim not the specimens from Venezuela and Suriname: Kabelstation).not *Tenagobia socialis*; CHAMPION 1901, JACZEWSKI 1931.

TRINIDAD; GUYANA; SURINAME, Saramacca, Suriname, Commewijne, Marowijne, Brokopondo; GUYANE FRANÇAISE; BRASIL, Amapá, Amazonas.

SURINAME: Saramacca, *SN018*, 10♂, 22♀; *SN019*, 1♀; *SN021*, 39♂, 27♀; *SN025*, 1♂; *SN027*, 1♂; *SN028*, 1♀; *SN030*, 1♂, 3♀; *SN130*, 2♀; *SN132*, 1♂; *SN207*, 13♂, 14♀; *SN333*, 1♂, 1♀. Suriname, Paramaribo, l'Hermitage, at light, 10.VII.1969/25.VI.1970, many thousands; *SN015*, 1♂; *SN015a*, 6♂, 22♀; *SN023*, 1♀; *SN038*, 1♂, 1♀; *SN048*, 5♂, 2♀; *SN048A*, 1♀; *SN049*, 1♀; *SN076*, 2♂, 3♀; *SN077*, 4♂, 13♀; *SN078*, 3♀; *SN096B*, 1♂, 1♀; *SN110*, 16♂, 21♀; *SN120*, 4♀; *SN122*, 2♂, 6♀; *SN152*, 1♂, 2♀; *SN152A*, 1♀; *SN152B*, 1♀; *SN155*, 1♂, 6♀; *SN178*, 10♂, 9♀; *SN240*, 1♀; ditch at Domburg, *H923*, 15.X.1968, 8♂, 39♀. Paramaribo, Botanical Gardens, in pool, 31.X.1942, 1♂ (Gij, KU); near Paramaribo, Weg naar Zee ("Road to Sea"), pond close to the coast, *L290*, 20.II.1967, 2♂, 6♀; small pond just S. of Paramaribo, *L317*, 1♂, (V. d. Land, LM). Commewijne, *SN062*, 9♂, 11♀; *SN073*, 1♂, 1♀; *SN074*, 1♀; *SN088*, 1♀; *SN111*, 2♂, 2♀; *SN112*, 6♂, 24♀. Marowijne, *SN222*, 1♀; *SN223*, 2♀; *SN224*, 5♀. Brokopondo, *SN104*, 2♂, 1♀; *SN105*, 1♀; *SN209*, 1♀; *SN229*, 4♂, 3♀; *SN230*, 3♂, 4♀; Brokopondo barrage Lake, near Locus Kreek, (muddy, palmleaves, dead trees), *H925*, 15.X.1968, 4♂, 2♀; same, (floating trees), *H925A*, 15.X.1968, 4♀.

GUYANE FRANÇAISE: Nouveau Chantier, Septembre, coll. le Moul, ex H.I. Parker coll. 1♀ (KU).

BRASIL: Amazonas, Lago Grande, (near Manaus), II.1939, 33♂, 35♀; R. Amazonas Nrte, Region de Itacoatiara, I–IV.1936, 6♂, 9♀ (Ollala, KU). – All specimens macropterous.

Length ♂  $\bar{x}$  = 2.53 ± 0.08, ♀  $\bar{x}$  = 2.79 ± 0.05; width of head ♂  $\bar{x}$  = 0.94 ± 0.03, ♀  $\bar{x}$  = 1.04 ± 0.02; ocular index ♂  $\bar{x}$  = 1.42 ± 0.04, ♀  $\bar{x}$  = 1.46 ± 0.04.

Colour brownish, variable. Hemielytral pattern with a reticulate darker design of variable intensity with, usually four, more distinct longitudinal stripes (Fig. 319). Legs unicolored light yellowish.

Eyes distinctly less wide than the synthlipsis.

Prothorax without moustache-like bristles, ratio width of head : width of pronotum, 1.05 - 1.09 - 1.17.

Hemielytra with many small pegs, especially on the apical part.

Male, foreleg as in *T. incerta*. Right paramere Fig. 314, not twice serrate ventrally, left paramere Fig. 311.

Near the coast *T. socialis* is a very common species; in the interior it is quite scarce (Table 3). It seems to prefer stagnant waters exposed to sunshine with the exception of the smallest puddles (A11). Contrary to *T. incerta* it does not seem to avoid habitats with true aquatic vegetation.

TABLE 4  
HABITATS OF *Tenagobia socialis* OF WHICH THE  
SALINITY WAS MEASURED.

Sample	Cl' mg/l	numbers of specimens
<i>SNo48</i>	63	8
<i>SN112</i>	158	30
<i>SN111</i>	425	4
<i>SNo88</i>	650	1
<i>SNo74</i>	980	1
<i>SNo73</i>	1760	1

From Table 4 it is clear that it occurs only incidentally at salinities over 250-300 mgCl'/l. So *T. socialis* is not really a species from brackish waters, although it may have some tolerance against salinity. See also under *T. incerta*.

I studied two slides with male parameres and a male specimen from British Guyana, Georgetown, Middlestreet, at light, 27.I.1927 (Cleare, BMNH), which has been studied by DEAY 1935. For males the left paramere is characteristic, most females can with some experience be differentiated from *T. incerta* by the hemielytral pattern. (See also under *T. incerta*).

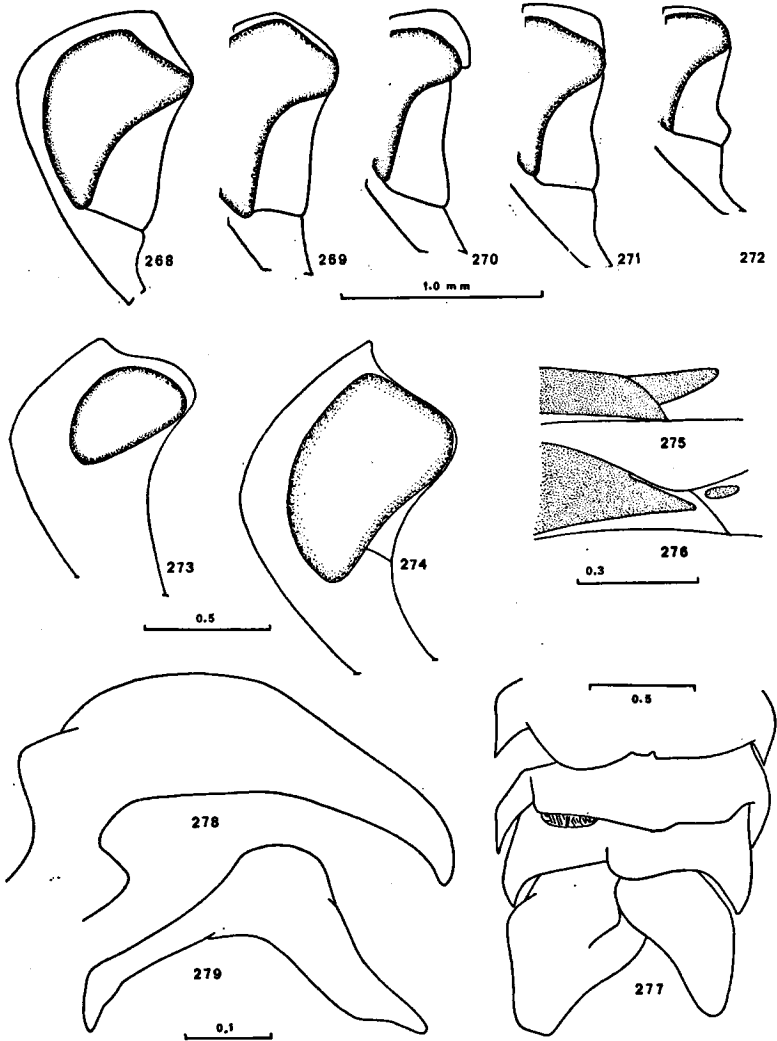


Fig. 268–272. *Heterocorixa*, posterior part of head in lateral view: 268 *H. genupes*; 269 *H. surinamensis*; 270 *H. longixiphus*; 271 *H. similis*; 272 *H. minuta*.

Fig. 273–274. Head in lateral view: 273 *Trichocorixa reticulata*, infraocular part of gena broad, no hypocular suture; 274 *Sigara (Tropocorixa) chrostowskii*, infraocular part of gena narrow, hypocular suture not originating at inferior angle of eye.

Fig. 275–276. *Trichocorixa*, distal part of embolar groove in females: 275 *T. orinocoensis*; 276 *T. reticulata*.

Fig. 277–279. *Trichocorixa orinocoensis*, male from Suriname: 277 dorsum of abdomen; 278–279 parameters.

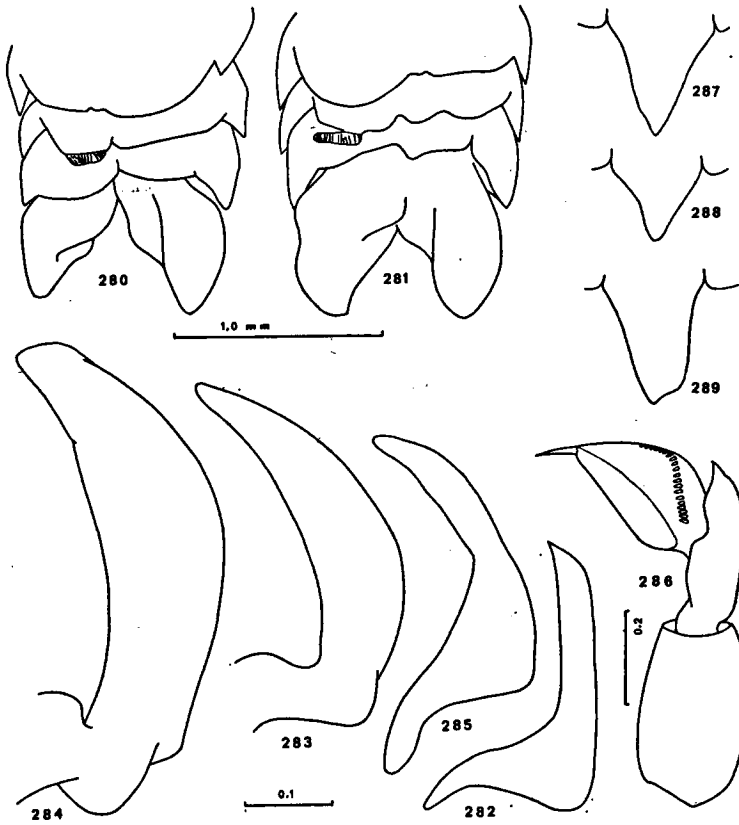


Fig. 280–281. Dorsum of abdomen in male *Trichocorixa* from Suriname: 280 *T. reticulata*; 281 *T. orinocoensis*.

Fig. 282–285. *Trichocorixa* from Suriname, parameres: 282–283 *T. reticulata*; 284–285 *T. verticalis*.

Fig. 286. *Trichocorixa reticulata* from Suriname: fore leg of male.

Fig. 287–289. Metasternal xiphus in *Heterocorixa*: 287 *H. brasiliensis*, paratype; 288 *H. hesperia*, syntype; 289 *H. lundbladi*, paratype.

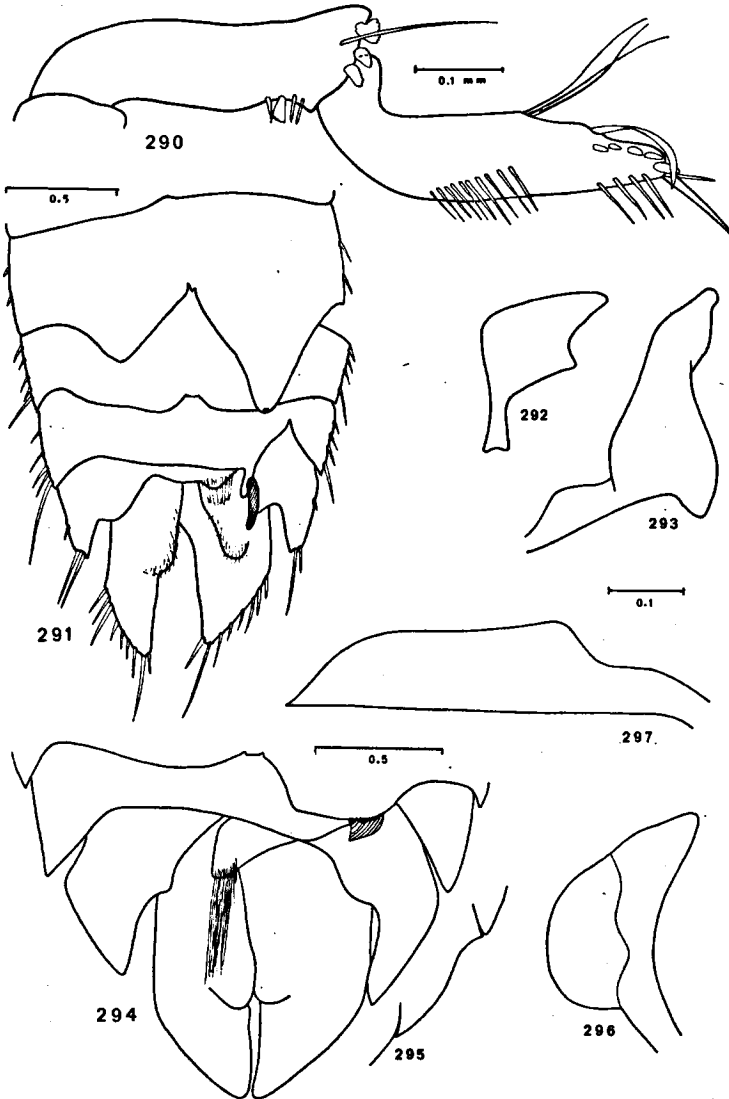


Fig. 290–293. *Heterocorixa genupes*, male paratype from Amazonas: 290 fore tibia and pala; 291 dorsum of abdomen; 292–293 parameres.

Fig. 294. *Heterocorixa lundbladi*, male paratype from Amazonas; apex of dorsum of abdomen.

Fig. 295. *Heterocorixa westermanni*: emarginate border of 7th abdominal segment in males as compared to *H. lundbladi*.

Fig. 296–297. *Heterocorixa hungerfordi*, male paratype from Amazonas: parameres.



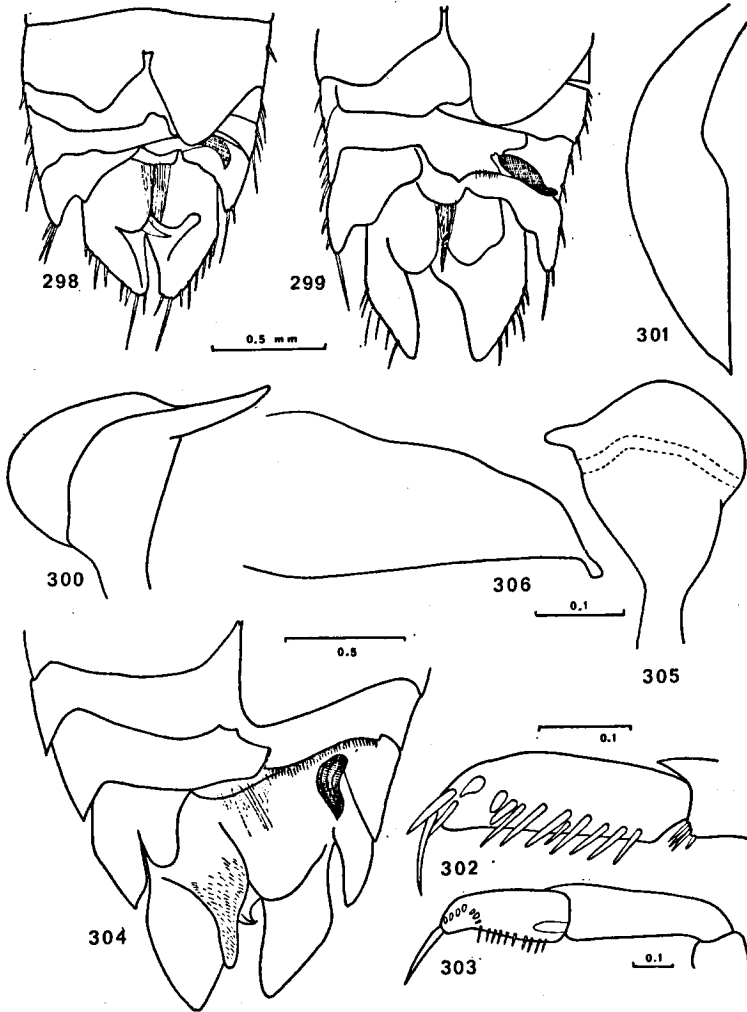


Fig. 298. *Heterocorixa minuta*, holotype male from Amazonas: dorsum of abdomen.  
 Fig. 299–302. *Heterocorixa similis*, male paratype from Amazonas: 299 dorsum of abdomen; 300 right paramere; 301 left paramere; 302 pala.  
 Fig. 303–306. *Heterocorixa surinamensis*, male holotype from Suriname: 303 fore tibia and pala; 304 dorsum of abdomen; 305 right paramere; 306 left paramere.

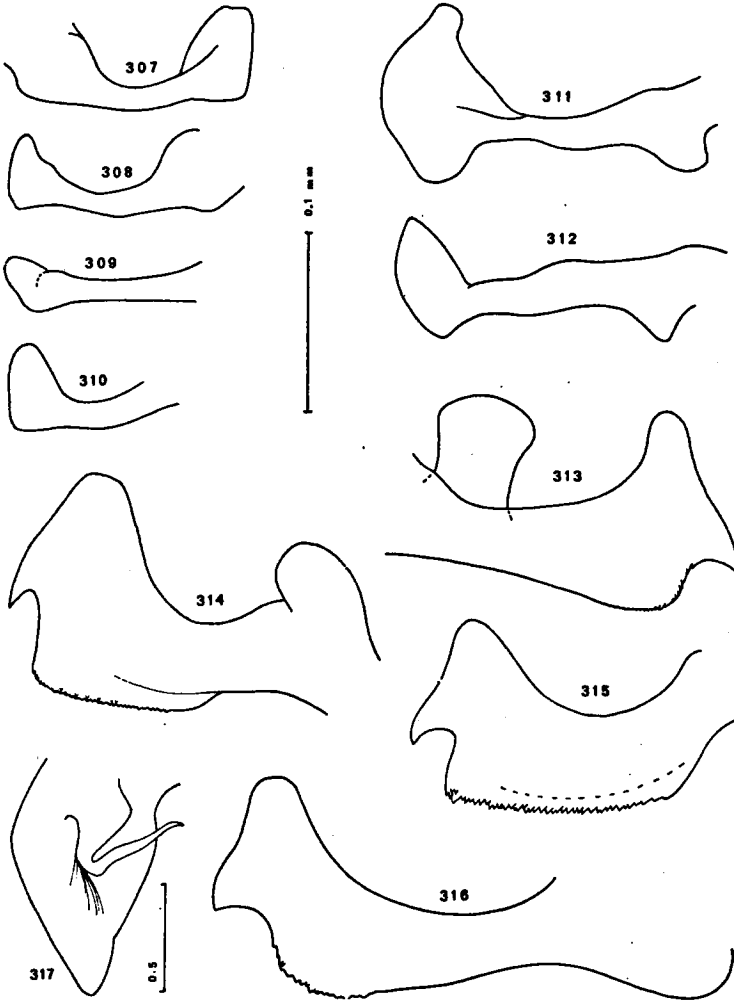


Fig. 307-310. *Tenagobia incerta* from Suriname: variability of left paramere.  
 Fig. 311-312. Left paramere in *Tenagobia*: 311 *T. socialis* from Suriname; 312 *T. signata* from Amazonas.  
 Fig. 313-316. Right paramere in *Tenagobia*: 313 *T. incerta* from Suriname; 314 *T. socialis* from Suriname; 315 *T. serrata*, holotype, from Bolivia; 316 *T. signata* from Amazonas.  
 Fig. 317. *Tenagobia selecta* from Brasil: dorsal lobe of left part of 8th tergite.

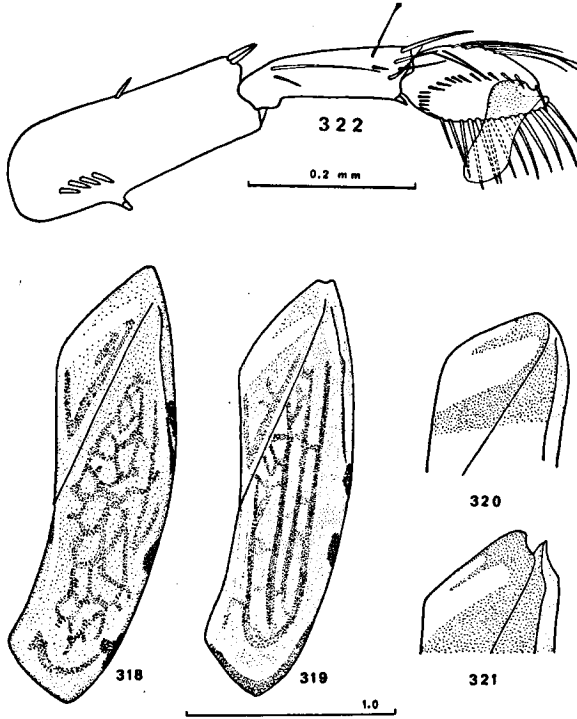


Fig. 318–321. Hemelytra in *Tenagobia* from Suriname: 318 *T. incerta*; 319 *T. socialis*; 320 *T. latioculata*, proximal part; 321 *T. pseudoromani* paratype.  
 Fig. 322. *Tenagobia incerta* from Suriname, male: fore leg.

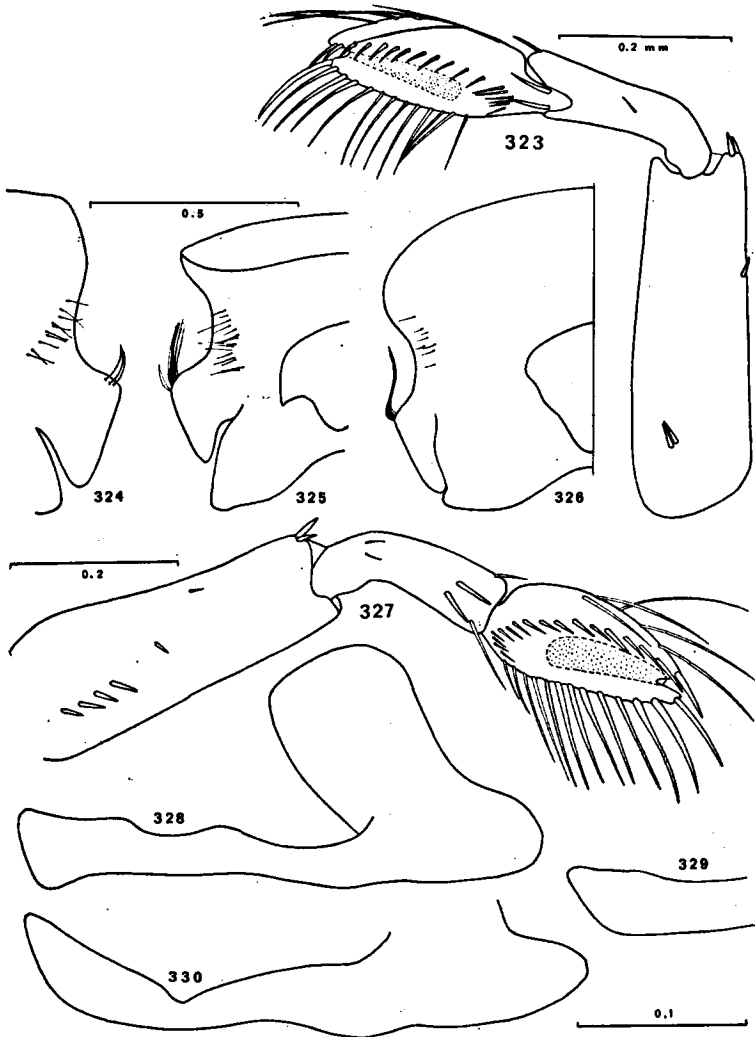


Fig. 323. *Tenagobia latioculata* from Suriname, male: fore leg.

Fig. 324–326. *Tenagobia* from Suriname, prothorax in frontal view: 324 *T. schadei*, right part; 325 *T. latioculata*, left part; 326 *T. pseudoromani*, left part.

Fig. 327. *Tenagobia schadei* from Suriname, male: fore leg.

Fig. 328–330. *Tenagobia* from Suriname, right parameres: 328–329 *T. latioculata*; 330 *T. pseudoromani*, paratype.

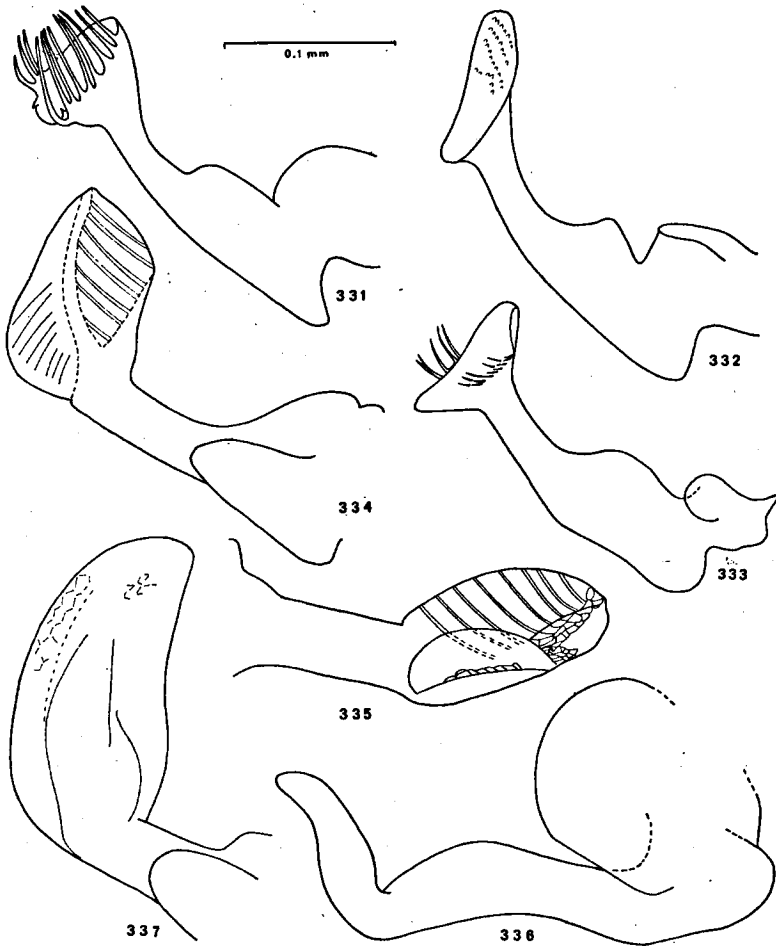


Fig. 331–333. *Tenagobia*, left paramere: 331 *T. latioculata*, holotype, from Suriname; 332 *T. pseudoromani*, paratype from Suriname; 333 *T. romani*, cotype, from Amazonas.

Fig. 334–336. *Tenagobia schadei*, male from Suriname: 334–335 left parameres; 336 right paramere.

Fig. 337. *Tenagobia melini*, holotype, from Amazonas: left paramere.

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## DESCRIPTION OF THE LOCALITIES

## GENERAL REMARKS AND TERMINOLOGY

Suriname is situated on the Northern coast of South America, roughly between 54° to 58° Western longitude and 2° to 6° Northern latitude. Its area is about 150,000 km<sup>2</sup>. From North to South three main regions can be distinguished: 1) the coastal plain, subdivided into the younger and the older coastal plain, 2) the savannah-belt, and 3) the tropical rain-forest region. See Fig. 1 and 2 on page 6 and 7.

About 90% of the population (ca 350,000 people) lives on the coastal plain. As a consequence, most meteorological observations have been made in the coastal region, notably near the capital, Paramaribo. The following data were taken from HEINEMANN 1971 and STERRINGA 1971.

The temperature shows little seasonal variation. The annual mean for Paramaribo is 27.1 °C with Januari (26.1 °C) as the coldest and October (28.3 °C) as the warmest month. The mean maximum is 31.1 °C and the mean minimum 23.1 °C.

The annual rainfall in Northern Suriname is about 2000 to 2400 mm, except for a narrow strip along the coast with about 1800 mm.

There are four "seasons", the so-called

- long wet period (medio April to medio August)
- long dry period (medio August to medio December)
- short wet period (medio December to medio February)
- short dry period (medio February to medio April).

Of these, the short dry period is often absent (e.g. in 1970 during the sampling period). There occur also, but fewer, years in which the short wet period is absent (see BUBBERMAN 1973).

In KÖPPEN's well-known climate classification nearly the whole of Suriname has the Af climate (tropical rain-forest climate); a narrow coastal belt (and some regions in the interior which were not visited by me) have the An climate (monsoon variant), whereas the mouth of the Matapica canal and the Wia-Wia Conservancy probably have the Aw climate (tropical savannah climate).

The sea shore of the coastal plain for a considerable part consists of mangrove-marshes (*Avicennia*) on mud and clay; these are rather inaccessible and consequently were not visited. At various places the shore is formed by a sand ridge with salt marshes behind. This type of terrain is found at the mouth of the Matapica canal (Samples SN467/9) and the Wia-Wia Conservancy (samples SN470/87; pl. 24a). Most salt marshes visited have a vegetation with *Batis maritima* as only or dominating plant (SN468, 470, 475/7). Sometimes in these *Batis* marshes *Avicennia* is to be observed, whereas slight elevations are often overgrown with *Sporobolus virginicus* (SN471, pl. 24b). A single large marsh was characterized by *Ruppia maritima* and *Sporobolus* (SN484/6).

Near Paramaribo the region originally occupied by salt-marshes is now cultivated land; in this region dykes and ditches were sampled.

At various distances from the coast there are, generally narrow, sand and/or shell ridges. On the ridges there is little free water except in sand pits or ditches.

The sand ridges are ecologically important as they contain groundwater which has a distinctly lower salinity than the surroundings and form an effective barrier against salinity. Consequently there may be considerable differences in Cl<sup>-</sup>-content of the free water North and South of such ridges (ΓΕΙJSΚΕS, 1954).

Nearly fresh, eutrophic swamps were studied along the Garnizoenspad (e.g. samples *SN016/21*, *025/7*, *030/2*, Pl. 19, 21). In places with "open" water, we often find *Lemna*, *Azolla*, *Salvinia*, *Nymphoides* and *Eichhornia* (Pl. 19-21); the dominant marsh-plant was *Typha angustifolia* (Pl. 19, 21b).

Along the larger rivers near the mouth there is an *Avicennia/Rhizophora* vegetation; this seems to be poor in aquatic bugs and is also rather inaccessible (*SN088*; Pl. 22b).

The older coastal plain, in the region studied, is occupied by cultivated land. A number of ditches were sampled (Pl. 17).

Along the Northern border of the savannah region, near Onverwacht, there are oligotrophic, acid marshes. These seem to drain on nearby streams (ΓΕΙJSΚΕS 1948). Those visited (samples *SN022*, *071*, *090*, *153/6*, *179*; Pl. 23) had *Eleocharis* as dominant plant. Places with flowing water (mostly in the centre) may be bordered by *Montrichardia*; finally, there are often open patches in the *Eleocharis*-vegetation which form "ponds" with *Nymphaea* (Pl. 18a, 22a).

In the savannahs mainly two types of habitats for aquatic bugs are found. First, ponds and pools in sand-pits, with a variable or no vegetation, often exposed and predominantly with colourless or very light brown water (e.g. samples *SN051/3*, *160*, *164*; Pl. 18b). Secondly, the streams and streamlets (with associated pools and ponds) which flow under savannahwoods (the "creek forest" of HEYLIERS 1963, who describes the vegetation of a Surinam savannah). These are nearly always without true aquatic vegetation, except where they pass clearings in the woods. The water is dark brown and acid. Examples of this type of habitat are the Carolina, Sabakoe. Cola and Mooi Wanna-kreek systems (e.g. samples *SN033/5*, *079/84*, *170/5*, *260/72*; Pl. 15b, 16).

In the Northern part of the rain-forest region the habitats for aquatic bugs are of the same type as in the savannah region, but the surroundings are true rain-forest. SCHULZ 1960 gives data about the vegetation and a number of climatic factors of the source-region of the Coesewijne Rivier. There a number of samples were taken (e.g. *SN333/43*, *349/57*, *366/430*).

Along the larger roads (road to Affobakka and road to Brownsweg) an additional type of habitat for aquatic bugs was found: "microbarrage lakes". These are ponds caused by the road which blocks small streamlets (e.g. *SN230*; Pl. 15a). The water of the streamlets in the road to Affobakka and road to Brownsweg regions is generally distinctly less dark brown than in the Coesewijne and savannah streamlets.

Finally on the Brownsberg, a hill of igneous rock, we find rapidly flowing streamlets with occasional small waterfalls. In the dry season, the smaller streamlets are broken up in pools and puddles (samples *SN134/40*, *180/200*; Pl. 13).

The aquatic habitats were classified according to the outline given in SOUTHWOOD 1966. The habitats transitional between stagnant and running waters (i.e. with a velocity of current less than 1m/min) are, however, described in greater detail. This was done because several species are nearly always found in streamlets, but living in microhabitats with hardly any current, therefore the statement "in streamlets" is in such cases rather misleading.

The velocity of the current is given in metres/minute (m/min) and not in centimetres/second (cm/sec), as m/min was the accuracy with which this parameter was measured.

Edge is used for the shallowest marginal part from the water's side, the extreme border from the land-side has been indicated with margin.

The following abbreviations have been used:

h = hour(s)	km = kilometre(s)
m = metre	(Km if road marking)
v.c. = velocity of the current	temp. = temperature

With the description of the vegetation, the types of water-plants as given by HARROG & SEGAL 1964 are used. The descriptions of the types found literally taken from the publication mentioned are:

**Elodeids:** Caulescent rhizophytes with undivided, submerged leaves and without specialized floating leaves; generative parts rising above the water surface or not, e.g. many species of *Potamogeton*, *Elodea*, *Najas*, *Zannichellia*.

**Batrachiids:** Caulescent rhizophytes with specialized floating leaves and spatulate or finely dissected submerged leaves; generative organs rising above the water surface or not. Tendency to develop terrestrial forms; e.g. several species of *Ranunculus* subgen. *Batrachium* and of *Callitriche*.

**Nymphaeids:** Rhizophytes with a little or not branched stem and longly petiolated floating leaves, in some cases also with submerged leaves, e.g. *Nuphar*, *Nymphaea*, *Nymphoides* and *Potamogeton natans*.

**Ceratophyllids:** submerged pleustophytes with finely divided leaves and without floating leaves; (in the summer near the surface of the water, but in the autumn sinking to the bottom, hibernation by turions), e.g. *Ceratophyllum*, *Utricularia*, *Aldrovanda*.

**Lemnids:** Small pleustophytes, floating freely on the water surface, with reduced fronds, of which the upper side is adjusted to air metabolism and the under side to life in the water, e.g. *Spirodela*, *Wolffia*, *Lemna minor*, *Ricciocarpus natans*, *Azolla*.

A difficulty arises in the placing of *Salvinia*; in Europe it belongs to a type not mentioned here, hydrocharids, but this is mainly because of the method of hibernating. SEGAL 1965, points out that *Salvinia* might also be considered to be a lemnid, and in the present work this was done.

Several types of plants, more or less associated with water but not considered true aquatic plants, are also of importance in the descriptions. These are:

**Pleustohelophytes:** Plants drifting freely on the surface with submerged root systems, but with all other vegetative parts and inflorescences rising above the water, owing to their aerenchymatic structure, e.g. *Eichhornia crassipes*, *Calla palustris*.

**Helophytes:** Plants which root in the bottom and of which the basal parts are submerged almost continually, but whose leaves and inflorescences rise above the water surface, e.g. *Typha*, *Phragmites*, *Scirpus* subgen. *Schoenoplectus*, *Butomus*.

The present author divided this category in: **Poids:** helophytes with narrow undivided leaves, e.g. Poaceae, Cyperaceae. **Weedy helophytes:** helophytes which are not grass-like, weeds. **Shrubs:** mostly rather tall helophytes with a more or less woody stem (including *Montrichardia*).

Chloride was determined by the Mohr-Winkler titration (HÖLL 1968). For higher salinities this is not the most accurate method. For these incidental data, however, it does not matter too much if a given salinity was 13,700 mg/l or 14,000 mg/l.

All samples, including the terrestrial ones, have been numbered – with the exception of the catches in a light-trap from 1.VII.1969 to 25.VI.1970 at Paramaribo, l'Hermitage. This is a former plantation now being developed for housing. The surroundings were ruderal vegetations and gardens.

The bulk of the collection will be placed in the Zoölogisch Museum of the State University at Utrecht, Plompetorengracht 9.

Specialists who would like to study insect material from this collection, should apply to the author, and to the Museum mentioned for other groups.

The station numbers are preceded by SN (Suriname Nieser). These letters have been omitted in the descriptions of the stations and the classification of habitats, but are used on labels and when quoting stations where a species was found. After the station numbers a character can be added. A capital (A, B e.g. SN022A) refers either to a restricted part of the locality with special features, or to a bordering habitat such as a mudflat adjacent to a water-body or, in a few cases, to topographically the same locality but with the habitat strongly changed, e.g. due to a change in water level. A small character (a, b, etc.) refers to the same habitat sampled on another date.

After the number, the coordinates of the locality are given in parentheses. First W longitude and N latitude respectively, in minutes; followed by the grid-numbers taken from the maps of Suriname issued by the Centraal Bureau Luchtkartering, scale 1 : 100,000.

For political reasons the former district of Suriname has been split into three small regions: Para, Paramaribo and Suriname and a larger one, Brokopondo district. The three smaller regions are indicated here as Suriname; Brokopondo is mentioned separately, this is the part of the former district of Suriname roughly S of 5°15' N latitude.



## DESCRIPTION OF HABITATS

Stations SN001 – SN487

- 001 SURINAME, Paramaribo, Zorg en Hoop, Surinaams Museum, 26/30.VI.1969. Guest house of Museum, at light.
- 002 SURINAME, Coropinakreek at bridge in road to Zanderij, Km. 37–38, 2.VII.1969 (55°11′/5°31′ – 355.7/930.2).  
Torpид bay of streamlet, v.c. less than 1 m/min, bay about 20 m<sup>2</sup>, depth 1 m; water dark brown, clear, at 9h 26–27°C. No aquatic vegetation; shaded by shrubs. Bottom loamy with a few dead leaves.
- 003 SURINAME, pool in marsh flooded by Coropinakreek, along road to Zanderij Km 37–38, 2.VII.1969 (55°11′/5°31′ – 355.7/930.0).  
Stagnant, 9 m<sup>2</sup>, depth 1 m; dark brown, clear. Some lemniids (*Salvinia*) and floating plant-debris; shrubs. Bottom loamy with dead leaves.
- 004 SURINAME, Coropinakreek, 200 m N of 002, 2.VII.1969 (55°11′/5°31′ – 355.7/930.5).  
Torpид part of streamlet, v.c. less than 1 m/min, about 24 m<sup>2</sup>, depth 0.7 m; dark brown, clear, at 11.30h 28°C. No aquatic vegetation, decaying palm-trunk; shaded by shrubs. Bottom loamy with plant-debris.
- 005 SURINAME, ditch along road to Zanderij, Km 36–37, 4.VII.1969 (55°11′/5°32′ – 355.2/931.2).  
Stagnant, width about 5 m, depth 1 m; dark brown, clear, at 8.30h 26°C. Ceratophyllids (*Utricularia*) about 1% coverage, margins with poids, about 10%, some floating plant-debris.
- 006 SURINAME, pool along road to Zanderij, Km 36, 4.VII.1969 (55°11′/5°32′ – 355.2/931.2).  
Stagnant, 15 m<sup>2</sup>, depth 0.2 m; very turbid light brown, at 9.30h 29.5°C. Broad margin of poids, no true aquatic vegetation. Bottom loamy, little plant-debris.
- 006A – Marshy edge.
- 007 SURINAME, pool along road to Zanderij, Km 35–36, 4.VII.1969 (55°11′/5°32′ – 355.1/931.8).  
Stagnant, about 18 m<sup>2</sup>, depth 1.5 m; turbid, light brown; at 11h 28°C. Some tufts of ceratophyllids (*Utricularia*), a broad margin of poids. Bottom loamy, plant-debris vestigial.
- 008 SURINAME, ditch at right angles to road to Zanderij, Km 34–35, 4.VII.1969 (55°11′/5°33′–355.2/932.4). [Pl. 17]  
Stagnant, width 6 m, length about 30 m, depth 1.5 m; turbid light

- brown, at 12h 27°C. Nymphaeids 25–50% coverage, border of poids at an edge. Bottom loamy with plant-debris, especially in zone with poids.
- 008a Same, 5.VII.1969.
- 009 SURINAME, pool in marsh along road to Zanderij, Km 34–35, 5.VII.1969 (55°11'/5°32' – 355.0/931.9).  
Stagnant, 4 m<sup>2</sup>, depth 1 m; dark brown, clear, at 8h 25°C. No vegetation; marsh with shrubs and poids. Bottom loamy with plant-debris.
- 010 SURINAME, torpid bay of tributary of Coropinakreek along road to Zanderij, Km 34–35, 5.VII.1969 (55°11'/5°33' – 355.6/932.6).  
V.c. 3 m/min, 16 m<sup>2</sup>, depth in bay 0.2 m, of main current 3 m or more (connected with 012 by culvert under road); dark brown, clear, at 9h 25°C. No aquatic vegetation; shrubs partially shading locality. Bottom loamy with some plant-debris.
- 010a Same, transformed into small pond, 26.IX.1969.  
Stagnant, 70 m<sup>2</sup>, depth 1 m; turbid beige, at 11.15 h 26.5°C (considerable part exposed to sunshine, unlike 012a). Elodeids 50% nymphaeids 10%. Bottom loamy with plant-debris.
- 011 SURINAME, ditch along road to Zanderij, Km 34, 5.VII.1969 (55°11'/5°33' – 355.7/932.8).  
Stagnant, width 4 m, depth 2 m; brown, clear, at 10h 27°C.  
Batrachiids 75%, nymphaeids 25%, some poids at edges. Bottom loamy, no plant-debris.
- 012 SURINAME, tributary of Coropinakreek along road to Zanderij, Km 34–35, 5.VII.1969 (co.as 010).  
V.c. 4 m/min, sampled area 30 m<sup>2</sup>, depth 3 m; dark brown, clear, at 11.30h 26°C. No aquatic vegetation; shrubs, locality shaded by large tree. Bottom loamy with little plant-debris, some floating debris at an edge.
- 012a Same, transformed into small pond, 26.IX.1969.  
Stagnant, 70 m<sup>2</sup>, depth 1 m; turbid beige, at 11.15h 25°C. Occasional shoots of elodeids. Bottom loamy with plant-debris.
- 013/4 SURINAME, ditch along road to Zanderij, Km 33–34, 9.VII.1969 (55°11'/5°33' – 255.7/933.2).
- 013 – Stagnant, width 4 m, depth over 1 m. Poids. Bottom loamy with plant-debris.
- 014 – Stagnant, width 4 m, depth 1–2 m; brown, clear, at 8.30h 25°C. Some poids along edges, batrachiids 75%, nymphaeids 25%. Bottom loamy, little plant-debris.
- 015 SURINAME, streamlet, just S of Onverwacht, at bridge on road to Zanderij, tributary to Pararivier, 9.VII.1969 (55°12'/5°35'–354.2/937.3).  
V.c. 12 m/min, width 5 m, depth over 2 m; dark brown, clear, at 11h 26.5°C. No aquatic vegetation. Bottom loamy, no plant-debris.

- 015a Same, 13.X.1969.  
Water-level about 0.5 m lower than at 9.VII. V.c. 10–15 m/min.  
Occasional patches of nymphaeids and batrachiids. Bottom with much humus.
- 015A – Torpid bay just downstream of bridge; virtually stagnant, 2 m<sup>2</sup>, depth 0.7 m. Nymphaeid, some lemnids (*Salvinia*), poids, much plant-debris both floating and on the bottom.
- 015Aa Same, now 1 m<sup>2</sup>, 13.X.1969.
- 016 SARAMACCA, Garnizoenspad, ditch, Km 22, 11.VII.1969 (55°22′/5°51′–335.5/967.2).  
Stagnant, 9 m<sup>2</sup>, depth 0.5 m; nearly colourless, slightly turbid, at 9h 26 °C, at 10h 27 °C, at 11.15h 28 °C. Lemnids 10%, nymphaeids 15%, pleustohelophytes 50%, along the edges poids and weeds. Bottom dark brown mud, decaying plant-debris and shell fragments.
- 017 SARAMACCA, Garnizoenspad, ditch, Km 22, 11.VII.1969 (co. as 016).  
Stagnant, width 2.5 m, depth 0.3 m; nearly colourless, slightly turbid, at 11.15h 28.5 °C. Dense mat of 80% lemnids (*Lemna*) and 20% pleustohelophytes, poids along edges. Bottom dark brown mud, decaying plant-debris and shell fragments.
- 018/21 SARAMACCA, Garnizoenspad, ditches, Km 27, 14.VII.1969 (55°24′/5°51′–330.4/966.0).
- 018 – V.c. less than 1 m/min, width 5 m, length of station 25 m, depth 0.3 m; brown, clear, temperature at 8h 26.5 °C at 0.05 m depth, at 9h 29.5 °C and 27 °C at 0.05 and 0.15 m depth resp., at 10h 31.0 °C and 27.5 °C. No aquatic vegetation; N. margin bare, S. margin with shrubs (N. edge sampled). Bottom loamy, some shell fragments and a little plant-debris.
- 019 – Stagnant, 4 m<sup>2</sup>, depth 0.15 m; brown, clear. Poids 60%, between these and the shore a stretch of water with lemnids (*Salvinia*) 4% and pleustohelophytes 15%. Bottom loamy, plant-debris and some shell fragments.
- 020 – Stagnant, 6 m<sup>2</sup>, depth 0.5 m; brown, clear, at 9.30 h 27°C. Poids (*Typha*) 50%, lemnids (*Lemna*) 35%. Bottom loamy, shell fragments and much plant-debris, mainly *Typha*. [Cf. VAN DER LAND 1970, No. 289]. [Pl. 21B]
- 020a Same, 17.VII.1969.  
Sampled especially in the lemnids.
- 020b Same, 23.IX.1969.  
Water level about 0.3 m lower, lemnids slightly more extended; remaining conditions identical with those on 14.VII.
- 020c Same, 5.V.1970.  
Habitat considerably changed by development of a mat of Poaceae and Commelinaceae.
- 021 – Stagnant, 1.5 m<sup>2</sup>, depth 0.5 m; brown, clear, at 9.30 h 26 °C, 10.30 h 26.5 °C, 11 h 27 °C. No aquatic vegetation, edge and margin bare. Bottom loamy with a few shell fragments, no plant-debris. (Edge distinctly steeper than in 018).

- 022 SURINAME, marshy pond along road to Zanderij, near Onverwacht, Km 29-30, 15.VII.1969 (55°12'/5°36'-353.8/938.1). [Cf. VAN DER LAND 1970 No. 324].  
Stagnant, 4 m<sup>2</sup>, depth 1 m; brown, clear, at 7.30h 25 °C. No aquatic vegetation. Bottom loamy, little plant-debris.
- 022a Same, 26.IX.1969.  
Water level and other conditions not appreciably changed.
- 022A - Border of marsh, depth 0.3 m, filled with poids. Bottom loamy with decay of poids.
- 022Aa Same, 26.IX.1969.
- 023/4 SURINAME, savannah ponds along road to Hannover, 15.VII.1969 (55°11'/5°29'-355.0/925.2).
- 023 - Stagnant, temporary, 30 m<sup>2</sup>, depth 0.5 m; light brown, clear, at 11h 30.5 °C. Small shrubs and (dead) poids in water. Bottom sandy with a layer of plant-debris (predominantly grasses).
- 024 - Stagnant, recently dug, 800 m<sup>2</sup>, depth probably over 2 m; brown, clear, at 11h 30.5 °C (at depth of 0.5 m). No aquatic vegetation. Bottom loamy with plant-debris. (Edges rather steep).
- 025 SARAMACCA, Garnizoenspad, ditch, Km 26, 17.VII.1969 (55°24'/5°51'-331.2/966.1).  
Stagnant, width 4 m, depth 2 m; brown, clear; at 8h 26 °C. Pleustohelophytes 70%, nymphaeids 1%, poids along edge 10% (5% *Typha*, 5% Poaceae). Bottom loamy with plant-debris.
- 026/7 SARAMACCA, Garnizoenspad, ditch, Km 24-25, 17.VII.1969 (55°24'/5°51'-331.9/966.2).
- 026 - Stagnant, width 4 m, depth 0.5 m; brown clear. Weedy helophytes 95%. Bottom loamy, grey, with much plant-debris.
- 027 - Stagnant, width 4 m, depth 0.5-1 m; light brown, clear, at 9.30h 25.5 °C. Lemnids (*Lemna*) 94%, poids (*Typha*) 5%, nymphaeids 1%. Bottom black mud with shell fragments and much plant-debris, mainly *Typha*.
- 028 SARAMACCA, Garnizoenspad, Jarikabakreek, Km 24-25, 17.VII.1969 (co. as 026/7). [Pl. 21A]  
No perceptible current, width 15 m, depth 2 m; brown, clear, at 11.30h 27 °C, Cl' 735 mg/l. Dense mat of lemnids (*Salvinia*) 70% and pleustohelophytes 30%; under this mat shoots of poids. Bottom loamy with shell fragments and some plant-debris.
- 029 SURINAME, Colakreek, swimming-pool, 18.VII.1969 (55°14'/5°28'-350.1/923.9).  
Slowly flowing streamlet, depth 0.5-3.5 m; dark brown, clear, at 10h 25 °C. No aquatic vegetation. Bottom sand with some plant-debris.
- 030/1 SARAMACCA, Garnizoenspad, ditch, Km 24-25, 21.VII.1969 (55°23'/5°51'-333.7/967.1).

- 030 - Stagnant, width 2-4 m, depth 1 m; light brown, clear. Lemnids (*Lemna*) 80%, pleustohelophytes 10%, edges with poids. Bottom muddy with plant-debris.
- 031 - As 030, except vegetation, lemnids 100% (*Salvinia* 95%, *Lemna* 5%).
- 032 SARAMACCA, Ganizoenspad, ditch, Km 22-23, next to small wooden bridge, 21.VII.1969 (55°22'/5°51'-334.7/967.2).  
Stagnant, width 4 m, depth 0.7 m; light brown, clear, at 9.45h 26°C. Lemnids (*Salvinia*) 95%, pleustohelophytes 3% and weedy helophytes 2%. Bottom muddy with plant-debris.
- 033/35 SURINAME, Zanderijsavanne, Sabakoekreek, near bridge, 22.VII.1969 (55°11'/5°26'-354.3/919.3). [Cf. VAN DER LAND 1970, No. 319]
- 033 - Torpid bay at bridge; v.c. less than 1 m/min, 4 m<sup>2</sup>, depth 1 m, dark brown, clear, at 8.15h 24°C. No vegetation. Bottom, sand with few dead leaves.
- 033a Same, 25.VII.1969.
- 033Aa - Sandy margin, 25.VII.1969.
- 034 - Tributary; v.c. (mean) 12 m/min, width 0.5-1.5 m, depth 0.1-0.5 m; dark brown, clear, at 11h 24.5°C. No aquatic vegetation; savannah-woodland. Bottom sandy with some patches of loam. In places with low current some plant-debris. Some palm leaves holding floating plant-debris.
- 035 - Torpid bay; v.c. less than 1 m/min, 2 m<sup>2</sup>, depth 1 m; colour dark brown, clear. No aquatic vegetation; savannah-woodland. Bottom, sand and loam with plant-debris.
- 036/38 SURINAME, road to Leonsberg, ditches at Clevia plantation, 24.VII.1969 (55°6'/5°51'-364.4/968.3).
- 036 - V.c. less than 1 m/min, 20 m<sup>2</sup>, depth 0.2 m (low tide); turbid brown-grey, at 8.30h 26°C, Cl' 1130 mg/l. Some tufts of poids. Bottom, heavy grey clay with plant-debris, some shell fragments.
- 037 - V.c. less than 1 m/min, 9 m<sup>2</sup>, depth 0.5 m; turbid brown. Nymphaeids 75%. Bottom, grey clay with plant-debris and shell fragments.
- 038 - Near culvert; v.c. less than 1 m/min, 20 m<sup>2</sup>, depth 0.7 m; slightly turbid brown, at 10.30h 28°C. Weedy helophytes 70%, poids 2%, lemnids (*Salvinia*) 2%. Bottom, grey clay with plant-debris and shell fragments.
- 039/41 SURINAME, Zanderijsavanne, Sabakoekreek, in Savannah-woodland 25.VII.1969 (55°11'/5°26'-354.0/919.3).
- 039 - Small wet sandflat at margin of streamlet; some dead leaves.
- 040 - Streamlet; v.c. 10 m/min, width 3 m, depth over 1 m; dark brown, clear at 9.30h 24°C. No aquatic vegetation. Bottom, sand with plant-debris.
- 041 - Temporary pool; stagnant, 20 m<sup>2</sup>, depth 0.2 m, light brown, clear, at 13h 25°C. No aquatic vegetation, two Araceae in water. Bottom, sand with a layer of plant-debris.

- 042/43 SURINAME, Temporary pools in savannah-woodland near Sabakoekreek, 28.VII.1969 (co. as 039/41).
- 042 – Stagnant, 12 m<sup>2</sup>, depth 0.2 m; clear, at 8.30h 23 °C. No aquatic vegetation, 6 m<sup>2</sup> with Liliaceae giving 60% coverage. Bottom, sand with plant-debris.
- 043 – Stagnant, 3–4 m<sup>2</sup>, depth 0.1 m; brown, clear, at 9h 23.5 °C. – No vegetation. Bottom, sand with plant-debris.
- 044 SURINAME, Sabakoekreek, downstream of the bridge, 28.VII.1969 (55°11'/5°26'–354.6/919.6).  
Streamlet; v.c. (mean) 3–4 m/min, width 3–5 m, depth 1 m, dark brown, clear, at 12.30h 24.5 °C, at 15h 24.5 °C. No aquatic vegetation, locally Araceae at edges. Bottom sand and plant-debris. Some tree roots and branches holding floating plant-debris.
- 045/46 SURINAME, Paramaribo, Munderpark, ditch, 29.VII.1969 (55°11'/5°51'–355.5/966.3).
- 045 – Stagnant, width 5 m, depth (sampled area) 0.4 m, very slightly turbid grey, at 8.30h 28 °C, Cl' 86 mg/l. Lemnids (*Salvinia*) 100%, pleustohelophytes less than 1%. Bottom sandy with shell fragments, no plant-debris. Many dead fishes.
- 046 – Stagnant, width 5 m, depth 0.5 m; slightly turbid grey, at 10 h 28.5 °C, Cl' 82 mg/l. Lemnids (*Salvinia*) 30%, pleustohelophytes 70%. Bottom, a layer of black mud on sand with shell fragments.
- 047 SURINAME, pond at Wilhelmina's Brug, 29.VII.1969 (55°11'/5°52'–355.0/967.0). [Pl. 20B]  
Stagnant, 1000 m<sup>2</sup> (sampled area 30 m<sup>2</sup>), depth (sampled area) 0.6 m; colourless, clear at 11.15 h 30.5 °C. Lemnids (*Salvinia*) 60%, Convolvulaceae 20%. Bottom, mud with plant-debris.
- 048/49 SURINAME, Charlesburg, 31.VII.1969 (55°10'/5°52'–356.8/968.3).
- 048 – Sandpit. Stagnant, 1200 m<sup>2</sup>, depth (sampled area) 0.5 m; slightly turbid brown, at 8.30 h 29 °C, Cl' 63 mg/l. No aquatic vegetation; some weeds from the margin lying and hanging in the water. Bottom, sand with shell fragments, very little plant-debris.
- 048A – Edge with Convolvulaceae growing into the water.
- 048B – Margin, on wet sand.
- 049 – Small polluted pond. Stagnant, 80 m<sup>2</sup>, depth 0.4 m, slightly turbid brown, at 9.30 h 30 °C. Aquatic Bryophyta 90%, some floating tufts of a Spirogyra-like alga. Bottom sandy with plant-debris.
- 050 SURINAME, Nieuwe Weg naar Charlesburg, ditch, 31.VII.1969 (55°10'/5°51'–356.8/966.8).  
Stagnant, width 3 m, depth over 1 m; colourless, clear, at 11 h 32 °C. Lemnids (*Salvinia*) 100%. Bottom, sand and mud with shell fragments and plant-debris.

- 051/53 SURINAME, northern part of Zanderijsavanne, pond and pools, 1.VIII.1969 (55°11'/5°28'-353'8/924.5).
- 051 - Pond. Stagnant, 700 m<sup>2</sup>, depth over 1m; light brown, clear, at 8.30 h 29°C. No aquatic vegetation, some tufts of poids in water near edges. Bottom, sand, near the tufts of poids some plant-debris.
- 052 - Pool. Stagnant, 15 m<sup>2</sup>, depth 0.15 m; light brown, clear, at 9 h 28.5°C. No vegetation. Bottom, sand with thin layer of plant-debris.
- 053 - Pool. Stagnant, 0.5 m<sup>2</sup>, depth 0.1 m; light brown, clear at 9.30 h 30°C. No aquatic vegetation. Bottom, sand with a thin layer of plant-debris.
- 054/56 SURINAME, first streamlet crossing the road to Hannover 1.VIII.1969 (55°11'/5°29'-355.3/925.2). [cf. VAN DER LAND 1970, No. 309].
- 054 - At culvert; v.c. 1-2 m/min, width 2.5 m, depth 1.25 m; dark brown, clear, at 12 h 25°C. No aquatic vegetation, some Araceae and poids at edges. Bottom sand, some plant-debris near the edges.
- 054a Same, 7.VIII.1969.
- 055 - Small pool in savannah-woodland near streamlet; stagnant, 4 m<sup>2</sup>, depth 0.15 m; slightly turbid brown. Vegetation, poids 30%. Bottom loamy with some plant-debris.
- 056 - Streamlet downstream of culvert; v.c. variable according to obstacles, depth 0.2-0.7 m, width 2-4 m; dark brown, clear. Vegetation, *Montrichardia*, Liliaceae and Araceae. Bottom sand, dead leaves in the deeper and more torpid zones.
- 056a Same, 23.III.1970. Water level 0.05-1 m, higher than at 1.VIII.1969.
- 057/61 SURINAME, first streamlet crossing the road to Hannover, 10-500 m downstream of culvert, 4.VIII.1969 (co. appr. as 054/6).
- Water dark brown, clear, no aquatic vegetation; savannah-woodland.
- 057 - Downstream of a tree-trunk lying in the water; v.c. 15 m/min, depth 0.3 m, at 8.30 h 24°C. Bottom, sand.
- 057A - Upstream of same tree-trunk.
- 058 - At base of tree; v.c. 10 m/min, depth 0.4 m, at 11.30 h 24.5°C. Bottom, sand.
- 059 - Torpid bay, v.c. less than 1 m/min. Some Araceae. Bottom, sand with dead leaves.
- 060 - Streamlet; v.c. 15 m/min, depth 0.3 m. Araceae at edges. Bottom, sand with plant-debris and plant-roots.
- 060A - Trichoptera dancing over Araceae at 15 h on a cloudy day.
- 061 - Small barrier of branches and leaves; v.c. 10 m/min, depth 0.3 m, at 14 h 25°C. Some Araceae. Bottom sand with plant-debris.
- 062/63 COMMEWIJNE, Orleanakreek at bridge on road to Moengo, 5.VIII.1969 (54°58'/5°47'-379.0/959.7).
- No aquatic vegetation.
- 062 - Torpid bay; stagnant, 30 m<sup>2</sup>, depth 0.15 m, light brown, clear, at 9.30 h 25.5°C. For the greater part shaded. Bottom soft mud with a thick layer of dead leaves.
- 063 - Pothole; v.c. in streamlet 20 m/min, in pothole 5 m/min, 15 m<sup>2</sup>, depth over 1 m; dark brown, clear, at 10 h 25°C. Bottom somewhat loamy sand.

- 063a - Same, 7.X.1969. Water level about 0.7 m lower; v.c. 5 m/min; turbid grey-brown, water stinking. Bottom sand and mud, rotting plant-debris.
- 064/68 SURINAME, first streamlet crossing the road to Hannover, 500-1000 m downstream of culvert, 7.VIII.1969 (co. appr. as 054/6).  
Water dark brown, clear. No aquatic vegetation; savannah-woodland.
- 064 - Barrier of branches and leaves; v.c. 10 m/min, width 2.5 m, depth 0.1 m, at 9.30 h 24.5°C. Bottom sand with plant-debris, some mud at the edges.
- 065 - Wet mud at edge of 064; no current, 0.1 m<sup>2</sup>, depth 0.02 m, at 9.30 h 24.5°C.
- 066 - Stretch of streamlet with Araceae; v.c. 4-6 m/min, width 3 m, depth 0.1-0.3 m. Bottom sand with plant-debris.
- 067 - Barrier of branches and leaves; v.c. 10-12 m/min, depth 0.4 m. Bottom sand with plant-debris.
- 068 - Downstream of a tree-trunk lying on the water; v.c. 5 m/min, no floating plant-debris, depth 0.2 m. Bottom sand with plant-debris.
- 069/70 SURINAME, near culvert in first streamlet crossing road to Hannover, 7.VIII.1969 (co. as 054/61).  
No aquatic vegetation; savannah-woodland.
- 069 - Pool near road; stagnant, 4 m<sup>2</sup>, depth 0.2 m; light brown, clear, at 13 h 25.5°C. Bottom muddy with plant-debris.
- 070 - Edges of streamlet; hardly any current, depth 0-0.1 m, under Araceae and Maranthaceae. Bottom muddy with dead leaves.
- 070a Same, 11.VIII.1969.
- 071 SURINAME, marshes along Pararivier in front of Hannover, 11.VIII. 1969 (55°09'/5°29'-358.5/926.3). [cf. VAN DER LAND 1970, No. 307].  
V.c. (at edges) 5 m/min, over 1 km<sup>2</sup>, sampled area 30 m<sup>2</sup>, depth 0.7 m; light brown, at 10.15 h 26°C. Nymphaeids 5%, batrachiids 40% poids (*Eleocharis*) 40%.
- 071a Same, 23.III.1970.  
Water-level distinctly higher than at 11.VIII.1969; remaining conditions identical.
- 072 SURINAME, first streamlet crossing the road to Hannover, 11.VIII.1969 (co as 054/61).  
Downstream of a barrier of branches and leaves.
- 073 COMMEWIJNE, Nieuw Amsterdam plantation, dyke, 14.VIII.1969 (55°05'/5°53'-366.0/969.9).  
Stagnant during high tide, v.c. 3-4 m/min during low tide (sluice), width 5 m, depth over 1 m (high tide); very turbid brown, at 8.45h 27°C, Cl' 1760 mg/l. No aquatic vegetation, edges with weedy helophytes (Asteraceae) and few poids; some small groups of shrubs. Bottom, dark grey clay with little plant-debris.



- 074 COMMEWIJNE, Voorburg plantation, ditch, 14.VIII.1969 (55°05'/5°52'-366.0/968.7).  
Stagnant (no connection with the Suriname river), width 3 m, depth about 0.7 m; colourless, clear, at 11.15 h 28 °C, Cl' 980 mg/l. Dense layer of lemnids (*Lemna* 100%, *Azolla* less than 1%), ceratophyllids 10% (*Ceratophyllum*); some poids and weedy helophytes at edges. Bottom black mud with plant-debris.
- 075/77 SURINAME, road to Domburg, Km 12-14, 15.VIII.1969 (55°06'/5°43'-365/951).  
075 - Suriname Rivier; bay, flooded during high tide only, 15 m<sup>2</sup>, depth 0.5 m; very turbid brown. Weedy helophytes 50%. lemnids (*Lemna*) 1%, much floating wood. Bottom light brown clay.  
076 - Dyke crossing the road at Km 14; stagnant (but provided with a sluice), width about 10 m, depth over 1.5 m; turbid brown, at 8 h 27 °C. Poids with about 70% coverage in a 1 m wide zone at edges. Bottom black mud with plant-debris. (Sample taken between the poids).  
077 - Ditch at Km 12-13; stagnant (no connection with Suriname Rivier), width 2-3 m, depth 0.6 m; slightly turbid brown, at 10.15 h 28.5 °C. Poids 20%, nymphaeids 15%. Bottom, light brown clay with some plant-debris.
- 078 SURINAME, pool along road to Domburg, Km 9-10, 15.VII.1969 (55°07'/5°44'-358.5/953.3).  
Stagnant, 8 m<sup>2</sup>, depth 0.5 m; slightly turbid brown, at 11.30 h 30 °C. Lemnids (*Salvinia*) 60%, poids (*Juncus*) 3%, small shrubs (Mimosaceae) lying on the water 10%. Bottom, black mud with plant-debris.
- 079/84 SURINAME, Zanderijsavanne, Carolinakreek, 18.VIII.1969 (55°09'/5°24'-358.1/916.2).  
V.c. variable, main current 5-50 m/min, width 5-10 m, depth 1.7 m (in some gullies) mainly 1 m; dark brown, clear, at 9.15 h 24.5 °C, 15.30 h 25 °C. No aquatic vegetation; savannah-woodland.  
079 - Torpid bay at bridge; v.c. less than 1 m/min, depth 0.5 m. Some poids at edges. Bottom partly muddy with plant-debris, partly sandy.  
079a Same, 25.VIII.1969.  
079A - Between poids; depth 0.2 m, bottom muddy with plant-debris.  
079Ba - Small wet mud-bank, 22.VIII.1969.  
079Bb Same, 25.VIII.1969.  
080 - Patch of floating plant-debris at torpid edge; v.c. less than 1 m/min.  
081 - Floating plant-debris and scum, upstream of a barrier of tree-trunks and branches; v.c. upstream 5 m/min, downstream 50 m/min, depth 0.7-1 m. [Pl. 16]  
082 - Edge of small bay downstream of barrier; v.c. 7 m/min.  
083 - Edge of streamlet; v.c. less than 1 m/min.  
084 - Rapid current; v.c. 50 m/min, width 2-3 m, depth alongside of small island, 0.4 m, heavily shaded.

- 085 SURINAME, road to Republiek, ditch, 19.VIII.1969 (55°11'/5°30'–356.0/927.0).  
Poids and gelatinous Chlorophyta.
- 086/87 SURINAME, ponds at Republiek, 19.VIII.1969 (55°12'/5°30'–353.0/927.4).  
Stagnant; slightly turbid brown; shrubs.
- 086 – Bay, 6 m<sup>2</sup>, depth 0.8 m; at 10 h 27 °C. No vegetation; shaded. Bottom loamy.
- 087 – Bay, 5 m<sup>2</sup>, depth 0.6 m, at 11 h 28 °C. Nymphaeids 10%, ceratophyllids (*Utricularia*) 20%; exposed. Bottom loamy.
- 088/89 COMMEWIJNE, Suriname Rivier at Belwaarde plantation, 21.VIII.1969 (55°05'/5°51'–365.7/966.4).
- 088 – Mangrove swamp; v.c. less than 1 m/min (stagnant except for tides), sampled area 100 m<sup>2</sup>, depth 0.5 m, variable; turbid brown-grey, at 9h 25 °C, Cl'650 mg/l. Occasional nymphaeids; *Avicennia* giving 90–100% shadow. Bottom, dark grey mud with plant-debris and aerial roots. [Pl. 22B]
- 089 – Torpid bay of river near small sluice; v.c. less than 1 m/min (sluice closed); very turbid brown.
- 090 SURINAME, Zanderijsavanne, marsh at banks of the Parakreek, 22.VIII.1969 (55°10'/5°25'–356.6/917.2). [Pl. 18A]  
Stagnant, about 3000 m<sup>2</sup>, open patch 50 m<sup>2</sup>, depth 0.8 m; light brown, clear, at 9 h 26 °C. Poids 100%, except open patch, nymphaeids 50% and some poids at borders. Bottom sandy and loamy, plant-debris under poids.
- 091/95 SURINAME, Zanderijsavanne, Carolinakreek, 22.VIII.1969 (co. as 079/84).  
As general description 0.79/84, but water level distinctly lower; v.c. still up to 50 m/min, at 15 h 26 °C, depth 1.4–1.5 m in gullies.
- 091 – Sandy margin.
- 092 – Small patch of floating plant-debris at torpid edge.
- 093 – Floating plant-debris and scum upstream of a large barrier.
- 094 – Shallow sandy edge; v.c. 20 m/min, depth 0.3 m.
- 095 – Downstream of a large barrier, shallow quiet edge, many dead leaves.
- 096 SURINAME, Zanderijsavanne, marsh (2000 m<sup>2</sup>) at N bank of Carolinakreek. 25.VIII.1969 (co. as 079/84). [Pl. 14B]
- 096a Same, 21.IV.1970. Now completely inundated, depth of former dry part 0.3 m.
- 096A – Mudflat; poids 25%, mostly withered.
- 096B – Pond and gutter draining the marsh.  
Pond; v.c. 2 m/min, 100 m<sup>2</sup>, depth 0.3 m; dark brown, clear, at 11.15 h 30 °C. Weedy helophytes and Chlorophyta forming a thick mass, leaving a central portion of about 30 m<sup>2</sup> open. Bottom soft brown mud. Gutter; v.c. 10 m/min, width 1 m, depth 0.2 m, otherwise as pond, width of central area without vegetation about 0.5 m.

- 097/101 SURINAME, Carolinakreek, upstream of bridge, 25.VIII.1969 (co. appr. as 079/84).  
As general description 079/84, except for depth on average 0.4 m, deepest point 0.8 m; v.c. up to 50 m/min, at 15 h 25.3°C.
- 097 - Wet sandflat in bed of streamlet, about 25 m<sup>2</sup>.
- 098 - Sandy bottom aside of sandflat; v.c. 30 m/min, depth 0.4.
- 099 - Barrier of branches and leaves.
- 100 - Torpid bay; v.c. 4 m/min, 20 m<sup>2</sup>, depth 0.4 m, open water.
- 101 - Pool in bed of streamlet; stagnant, 15 m<sup>2</sup>, depth 0.3 m. No vegetation. Bottom, sand with a layer of dead leaves.
- 102 SURINAME, road to Paranam, Pararivier, 26.VIII.1969 (55°08'/5°44'-360.6/953.2).
- 103 BROKOPONDO, rain-gully E of road to Afobakka, at Suralco hightension mast 78, 28.VIII.1969 (55°06'/5°16'-363.5/902).  
Sluggish at time of sampling.
- 104 BROKOPONDO, NE edge of storage-lake at Afobakka, small shallow bay, 28.VIII.1969 (54°59'/4°59'-377.6/870.2).  
Stagnant, 200 m<sup>2</sup>, depth 1 m; clear, temp. at 9h 31°C. No aquatic vegetation, some poids at an edge, mostly withered. Bottom for the greater part gravel with fine loam; near edge remnants of poids.
- 105/8 BROKOPONDO, road to Afobakka, between Suralco-masts 146 & 147, 28.VIII.1969 (55°00'/5°00'-376.00/872.6).  
No aquatic vegetation. Bottom loamy with plant-debris.
- 105 - Pond. Stagnant, 30 m<sup>2</sup>, depth 0.4 m; turbid light brown, at 11.30 h 29°C. Poids and small shrubs.
- 106 - Rain-gully or very small streamlet. Torpid zone; v.c. about 1 m/min, width 0.5-0.8 m, depth 0.2-0.3 m; turbid, slightly reddish light brown, at 12 h 27°C. Poids and low shrubs.
- 107 - Virtually stagnant branch. No perceptible current, width 0.5 m, depth 0.1 m; turbid, slightly reddish light brown, at 12.30 h 28.5°C. Thin forest.
- 108 - Branch of streamlet with current. V.c. 1-35 m/min, width 0.5-1 m, depth up to 0.5 m, mostly 0.05 m to 0.3 m; turbid, slightly reddish light brown, at 13 h 28.5°C. Thin forest. (At 106 the streamlet has a "gully character", at 108 a "streamlet character").
- 109/10 SURINAME, Uitkijk, ditch, 1.IX.1969 (55°20'/5°46'-337.5/957.4).
- 109 - Stagnant, width 4 m, depth 0.5 m; turbid greyish, at 9.30 h 27°C.  
Pleustohelophytes 97%. Bottom black mud with a layer of plant-debris, some shell fragments.
- 110 - Stagnant, width 4 m, depth 0.7 m; light brown, clear, at 11.30 h 27°C.  
Poids (Poaceae) 80%, shrubs 2%. Bottom, clay with plant-debris.

- 111 COMMEWIJNE, dyke at Mariënborg-plantation, 2.IX.1969 (55°03'/5°53'-370.6/969.9).  
Stagnant (sluice opening into Commewijne Rivier closed), width 7 m, depth over 1 m; very turbid light brown, at 9.30 h 28.5 °C. No aquatic vegetation, sample taken between poids and floating plant-debris at an edge. Bottom brown-grey clay, Cl' 425 mg/l.
- 112 COMMEWIJNE, edge of marsh (over 2000 m<sup>2</sup>) at Belwaarde plantation, 2.IX. 1969 (55°05'/5°51'-365.7/965.9).  
Stagnant, sampled area 10 m<sup>2</sup>, depth 1 m; slightly turbid light brown, at 11.30 h 28 °C, Cl' 158 mg/l. Sampled area with lemnids (*Salvinia*) 5%, poids (*Typha*) 40%. Bottom, brown mud with a layer of plant-debris.
- 113/8 SURINAME, Zanderijsavanne, 1st tributary of Colakreek (Coropinakreek system) crossing the road to Matta, 4.IX.1969 (55°14'/5°27'-350.4/922.6).  
Water dark brown, clear, at 10 h 25 °C, 14 h 25.5 °C.
- 113 - At bridge; v.c. less than 1 m/min, with 3-5 m, depth 0.9 m.  
No aquatic vegetation, patches of poids and weedy helophytes (Araceae); exposed to sunshine. Bottom, sand, some loam and plant-debris.
- 114 - Patch of wet *Utricularia* on wet plant-debris. Area 0.6 m<sup>2</sup>, about 0.03 m thick; at 10 h 29 °C; exposed to sunshine.
- 115 - Wet shaded margin, 0.1 m<sup>2</sup>, mud and dead leaves.
- 116 - Upstream of bridge, in savannah woodland; v.c. 10-60 m/min, width 1-2.5 m, depth 0.2-0.6 m; shaded.
- 116A - Barrier of branches and leaves; v.c. 40 m/min.
- 117 - Torpid part of streamlet; v.c. 10-15 m/min.
- 117A - Central part, open water.
- 117B - Edges, some poids, much plant-debris.
- 118 - Patch of scum and some floating plant-debris upstream of a branch, 0.01 m<sup>2</sup>.
- 118a Same, 8.IX.1969.
- 119/21 SURINAME, road to Domburg, Km 9-10, ditch, 5.IX. 1969 (55°07'/5°44'-362.5/953.9).
- 119 - Ditch at Het Vertrouwen plantation. Stagnant, width 5 m, depth 1 m; slightly turbid blackish, at 8.30 h 25.5 °C. Pleustohelophytes 80%. At the edges much dying off poids (Poaceae) under the pleustohelophytes; shrubs shadowing the sampled area. Bottom, black mud with a layer of rotting plant-debris.
- 120 - Open patch in a ditch overgrown with poids (Poaceae). Stagnant, 3 m<sup>2</sup>, depth 0.6 m; slightly turbid blackish, at 9 h 26 °C. Nymphaeids 60%. Bottom black mud with plant-debris.
- 121 - Ditch. Stagnant, width 6 m, depth 0.3 m; slightly turbid light brown, at 9.30 h 27 °C. Lemnids (*Salvinia*) 25%, nymphaeids 1%, poids 60%. Bottom, brown mud clay with plant-debris.

- 122 SURINAME, road to Domburg, Km 7-8, ditch, 5.IX.1969 (55°08'/5°45'-361.1/954.6).  
Stagnant, width 2.5 m, depth 0.4 m; slightly turbid brown. No aquatic vegetation, poids (*Typha*) 40%. Bottom, brown mud with a layer of *Typha*-fragments.
- 123 SURINAME, road to Domburg, Km 5-6, ditch, 5.IX.1969 (55°09'/5°45'-359.2/956.2).  
Stagnant, width 4 m, depth 0.5 m; light brown, very slightly turbid, at 12 h bottom 32°C. surface 34°C. Lemnids (*Salvinia*) 100%. Bottom, bluish-black clay with plant-debris.
- 124/9 SURINAME, 1st tributary of Colakreek, 8.IX.1969 (co. appr. as. 113/8).  
About 400 m to about 1000 m upstream of bridge.  
V.c. from nearly 0 to 60 m/min; dark brown, clear, at 11 h 25°C, 13 h 25.5°C, 15.30 h 26°C. No aquatic vegetation; savannah-woodland.
- 124 - Part of streamlet without perceptible current; width 7 m, depth 1.5 m.  
Edges with Araceae and floating plant-debris. Bottom loamy with plant-debris, and small plant-roots.
- 125 - Patch of scum, vestigial plant-debris, upstream of a tree-root; 0.5 m<sup>2</sup>.
- 126 - Part of streamlet behind a tree-root; v.c. 15 m/min, depth 0.4 m.  
Bottom plant-debris and fine plant-roots.
- 127 - Part of streamlet; v.c. 40 m/min, width 1.5 m, depth 0.1 m.  
Bottom, patches of bare sand, remainder with fine tree-roots, at edges with plant-debris, and a very small barrier of branches and leaves.
- 128 - Barrier of branches and leaves.
- 129 - Stretch of streamlet with Chlorophyta; v.c. 20-30 m/min, width 2.5 m, depth 0.2 m, tangles of Chlorophyta on solid substrates.
- 130 SARAMACCA, Jameskreek, 9.IX.1969 (55°29'/5°50'-322.8/965.4). V.c. 12 m/min, width 8 m (low tide), depth of sampled area 0.2 m; turbid light brown, at 8.30 h 28°C. No aquatic vegetation. Bottom fine light brown mud and plant-debris on bluish-grey clay.
- 131/2 SARAMACCA, road on right bank of Saramacca Rivier at end of Garnizoenspad, ditches, 9.IX.1969.  
Stagnant; turbid light brown. Bottom, light brown clayish, with plant-debris.
- 131 - Km 8-9 (55°32'/5°51'-316.5/966.8). Width 5 m, depth 1 m. No aquatic vegetation.
- 132 - Km 5-6 (55°31'/5°51'-319.3/966.1). Width 6 m; at 10.15 h 29.5°C. Lemnids (*Salvinia*) 99%, poids (at edges) 1%.
- 133 SARAMACCA, Garnizoenspad, Km 32, ditch, 9.IX.1969 (55°27'/5°50'-325.2/965.3).  
Stagnant, width 5 m, depth 0.7 m; light brown, clear, at 12 h 27.5°C. Pleustohelophytes 100%, *Typha* at an edge. Bottom, black mud with plant-debris and some shell fragments.

- 134/40 BROKOPONDO, Brownsberg National Park, Brownskreek, from Ireneval to 100 m downstream of base of fall, 12.IX.1969 (55°13'/4°56'-352.3/866.4). [Pl. 13]  
 V.c. from nearly stagnant to 60 m/min, width 1-3 m, depth up to 0.4 m; hyaline, clear, at 11 h and 15 h 24.5°C (in streamlet). No aquatic vegetation, bottom stony.
- 134 - Puddle at base of fall, beside bed of streamlet (dry season); stagnant, 0.5 m<sup>2</sup>, depth 0.25 m; at 11 h 26.5°C (air temp. at 11 h 26°C), exposed to sunshine during the morning; some dead leaves.
- 135 - Streamlet, 20 m downstream; v.c. 25 m/min, width 1-1.5 m, depth 0.2 m; exposed to sunshine during the morning.
- 136 - Somewhat wider part, 30 m downstream; v.c. at edges less than 1 m/min, in the centre about 10 m/min, width 2.5 m, depth 0.3 m; permanently shaded.
- 137 - Streamlet 60-70 m downstream, somewhat deeper holes beside boulders; v.c. about 5 m/min, depth 0.4 m; permanently shaded.
- 138 - Cracks in the rock at base of fall, containing water received from the spray; stagnant, some dead leaves; exposed to sunshine in the morning.
- 139 - Moist Bryophyta at base of fall, not sprayed; exposed to sunshine during the morning.
- 140 - Wet Bryophyta on the slope of the fall, sprayed; exposed to sunshine during some hours in the morning.
- 141/6 SURINAME, Zanderijsavanne, 1st tributary of Colakreek, crossing road to Matta, 15.IX.1969 (co. appr. as 113/8).  
 Water dark brown, clear. No aquatic vegetation; savannah-woodland.
- 141 - Patch of scum upstream of tree-trunk, 0.3 m<sup>2</sup>, vestigial plant-debris.
- 142 - Relatively quiet part of streamlet behind tree-trunk; v.c. 2-3 m/min, width 1.5 m, depth 1 m. Bottom with tree-roots.
- 143 - Rapid current; v.c. 20-50 m/min, width 1 m, depth 0.6 m. Bottom partly bare sand, partly tree roots.
- 144 - Side-branch; stagnant, 100 m<sup>2</sup>, depth 0.6 m. Bottom plant-debris.
- 145 - Very small marsh; draining on 144, 3 m<sup>2</sup>, some small puddles (0.01-0.02 m<sup>2</sup>, depth 0.05 m), wet plant roots, muddy sand and some dead leaves.
- 145a Same, transformed into small pool, 19.IX.1969. Water level slightly higher, depth 0.07 m; with some small very wet islands (0.01-0.03 m<sup>2</sup>).
- 146 - Edge of streamlet; virtually stagnant, depth 0.02 m. Bottom muddy sand and tree-roots.
- 147/51 SURINAME, Zanderijsavanne, 1st tributary of Colakreek crossing road to Matta, 19.IX.1969 (co. appr. as 113/8).  
 Water dark brown, clear. No aquatic vegetation; savannah-woodland.
- 147 - Stretch of streamlet with sandy bottom in centre and plant-debris at edges.
- 147A - Deeper, broader part behind small rapid; v.c. 5 m/min, width 3 m, depth 0.3 m.

- 147B - Small rapid.
- 147C - Less deep, narrower parts, v.c. 15-20 m/min, depth 0.15-0.20 m.
- 148 - Wet bank of streamlet, 20 m<sup>2</sup>.
- 148A - Puddle 0.2 m<sup>2</sup>, depth 0.1 m.
- 148B - Wet muddy plant-debris, some dead leaves.
- 148C - Puddle, 0.01 m<sup>2</sup>, depth 0.02 m, bottom sandy with small tree-roots.
- 149 - Nearly stagnant part of streamlet; width 5 m, depth 0.6 m, behind and under a tree-trunk lying over the water.
- 150 - Barrier of branches and leaves in narrow part of streamlet; v.c. 40 m/min, width 1 m, depth 0.2 m.
- 151 - Puddle, 10 m from streamlet; stagnant, 0.4 m<sup>2</sup>, depth 0.05 m filled with dead leaves, slightly muddy, some small tree-roots.
- 152/3 SURINAME, Coropinakreek, downstream bridge, 22.IX.1969 (co. as 002).  
Water level 1.5-2 m lower than at 2.VII. 1969, the locality then sampled (002) was entirely dry. Water brown.
- 152 - V.c. 20 m/min in centre but nearly stagnant in sampled zone, width of streamlet about 10 m, depth of sampled zone 0.5 m; dark brown. Nymphaeids 50%, on nymphaeids gelatinous Chlorophyta. Bottom loamy with layer of plant-debris. (Sampled area, 1 m wide zone at edges).
- 152A - Edge with Chlorophyta, depth 0.05 m.
- 152B - Small torpid bay; v.c. less than 1 m/min, 1 m<sup>2</sup>, depth 0.2 m, at 12 h 31 °C. Nymphaeids 30%. Bottom loamy, with a layer of plant-debris on which Chlorophyta.
- 153 - Marsh at S. banks of Coropinakreek, area 10,000-20,000 m<sup>2</sup>.
- 153A - Pond in marsh; stagnant, 150 m<sup>2</sup>, depth over 1 m. Nymphaeids 10%, batrachiids 5%, ceratophyllids (*Utricularia*) 5%, poids less than 1%.
- 153B - Marsh proper, thick vegetation; depth of water when one walks through vegetation 0.3-0.6 m, at 12 h 32 °C. Poids (mainly *Eleocharis*) 80%, weedy helophytes 10%, ceratophyllids (*Utricularia*) 1%, batrachiids 1%, lemnids (*Salvinia*) less than 1%, the last three occurring in patches.
- 154 SURINAME, puddle near Coropinakreek at 004 which was now entirely dry, 22.IX.1969.  
Stagnant, 0.25 m<sup>2</sup>, depth 0.1 m; slightly turbid light brown, at 12 h 23 °C. No vegetation; shaded by some shrubs.
- 155/6 SURINAME, marsh on N banks of Coropinakreek, 25.IX.1969 (appr. as 002).  
Several km<sup>2</sup>. Water light brown.
- 155 - Part of marsh under shrubs, giving shadow over about 60% of the area. Stagnant, about 10,000 m<sup>2</sup>, depth 0.4 m, clear, at 12 h 32 °C. Nymphaeids 40%, ceratophyllids (*Utricularia*) 40%. Bottom loamy with a layer of plant-debris. [Pl. 22A]
- 156 - Part of marsh exposed to sunshine, no shrubs. [Pl. 23A]
- 156A - Shallowest edge; depth 0.05 m. Poids (*Eleocharis*) 10%. Bottom, loamy mud with some plant-debris.

- 156B - 5-8 m off shore; depth 0.15 m; at 12 h 35 °C. Poids (*Eleocharis*) 100%, ceratophyllids (*Utricularia*) less than 1%.
- 156C - 100 m off shore; depth 0.6 m; clear, at 12 h 34.5 °C. Poids (*Eleocharis*) 100%.
- 157/8 SURINAME, Oost-West Verbindig, 7-8 km E of Meerzorg, ditches, 2.X.1969 (55°06'/5°45'-364.2/959.6).  
Water light brown, clear.
- 157 - Stagnant, width 6 m, depth 0.6 m; at 9 h 26.5 °C, 11 h 28.5 °C. Poids (Poaceae) 2%, lemnids (*Salvinia*, few *Azolla*) 40%, nymphaeids (*Nymphoides*) 10%, pleustohelophytes 20%. Bottom, plant-debris, mainly of poids.
- 158 - Stagnant, width 6 m, depth 0.6 m at 11 h 28 °C. Poids (of which *Typha* 95%, Poaceae 5%) 20%, lemnids (*Salvinia*) 10%, nymphaeids (*Nymphoides*) 5%, pleustohelophytes 50%. Bottom, clay with a thick layer of plant-debris, mostly of *Typha* .[Pl. 19, 20A]
- 159 SURINAME, road to Matta, Km 3-4, 2nd tributary of Colakreek, at bridge, 3.X.1969 (55°14'/5°27'-349.3/922.7).  
V.c. less than 1 m/min, width 6 m, depth 1 m; dark brown, clear, at 9 h 25 °C. No aquatic vegetation except at 159A, some small shrubs standing in the water. Bottom, sand and stones, little or no plant-debris.
- 159A - Shallow edge; stagnant, depth 0.05 m. Poids, some small tufts of *Utricularia*. Bottom, with plant-debris.
- 160 SURINAME, road to Matta, Km 4-5, pond, 3.X.1969 (55°15'/5°27'-348.7/922.5).  
Stagnant, 300 m<sup>2</sup>, depth 0.4 m; very slightly turbid, greenish brown, at 12 h 34 °C. Poids 2%. Bottom, a thin layer (0.02 m) of loamy mud with some plant-debris on sand.
- 160A - Wet mudflat, with some poids.
- 160Aa Same, 6.X.1969.
- 161/3 SURINAME, road to Matta, Km 4-5, 3rd tributary of Colakreek, 3.X.1969. (55°15'/5°27'-348.0/922.5).  
Water dark brown, clear. No vegetation.
- 161 - Bare sandy bank; some plant-debris.
- 162 - Part of streamlet with bare sandy bottom; v.c. 20 m/min, width 1.5-2 m, depth 0.1 m, at 15 h 26 °C; exposed to sunshine. [Pl. 15B]
- 162a Same, 6.X.1969.
- 162b Same, 9.X.1969.
- 163 - Somewhat deeper part of streamlet; v.c. 12 m/min, width 1.5-2 m, depth 0.2 m, at 15 h 26 °C. Bottom sandy with some pieces of wood.
- 164 SURINAME, road to Matta, Km 4-5, pond, 6.X.1969 (55°15'/5°27'/348.3-922.5).  
Stagnant, 1000 m<sup>2</sup>, depth 0.4 m; dark brown, clear. *Utricularia* 5%, floating *Spirogyra*-like Chlorophyta 70%, some poids. Bottom sandy.



- 165/8 SURINAME, road to Matta, Km 4-5, third tributary of Colakreek, 6.X.1969 (co. appr. as 161/3).  
Water brown, clear. No aquatic vegetation.
- 165 - Small marsh watering on streamlet; wet sandflat, 600 m<sup>2</sup>. [Pl. 14A.]  
Poids 60%, on the slightly higher and drier part, mostly dying off.
- 166 - Mouth of a tricklet flowing into streamlet; v.c. 1-10 m/min, width 0.1 m, depth 0.01-0.03 m. Shrubs and tall weedy helophytes. Bottom muddy in the sluggish parts, plant-roots on sand at places with more rapid current.
- 167 - Stagnant bay, separated from the streamlet by tree trunk; stagnant, 10 m<sup>2</sup>, depth 0.3 m, shaded. Bottom sand with some plant-debris.
- 168 - Barrier of branches and leaves; v.c. 20 m/min.
- 169 SURINAME, Oost-West Verbindig, 8-9 km E of Meerzorg, ditch, 7.X.1969 (55°06'/5°47'-364.8/958.8).  
Stagnant, width 6 m, depth 0.7 m, turbid slightly greenish brown, at 9 h 28 °C. Lemnids (*Salvinia*) 90%, poids (Poaceae) 1% at an edge. Bottom, clay with plant-debris.
- 170/5 SURINAME, 3rd tributary of Colakreek, 9.X.1969 (co. appr. as 161/3).  
Water dark brown, clear. No aquatic vegetation; savannah-woodland.
- 170 - Bay; v.c. 5 m/min, depth 0.2 m. Bottom, sand.
- 171 - Patch of floating plant-debris upstream of barrier, hardly any scum; v.c. 10-15 m/min, 1 m<sup>2</sup>.
- 172 - Part of streamlet with sandy bottom, shaded; v.c. 25 m/min, depth 0.05-0.2 m.
- 173 - Torpid zone of streamlet; v.c. 0-1 m/min, width 6-10 m, depth 0.8 m. Bottom, sand with little plant-debris except one small stagnant bay (area 0.5 m<sup>2</sup>) with layer of dead leaves.
- 174 - Barrier of branches and leaves; v.c. 40 m/min, depth 0,05 m.
- 175 - Under an overhanging wall; v.c. less than 1 m/min, 2 m<sup>2</sup>, depth 0.2 m. Bottom, sand with plant-debris.
- 176/7 SURINAME, Paramaribo, Fernandesweg at Polderweg naar Zee, ditches, 10.X.1969 (55°14'/5°53'-350.3/970.8).  
Bottom, clay with black mud and plant-debris.
- 176 - V.c. less than 1 m/min, width 5 m, depth 0.6 m; very slightly turbid, brown, at 10 h 29 °C. Some shoots of ceratophyllids (*Ceratophyllum*), sparse poids at edges, banks with *Avicennia* shrubs.
- 177 - Edge with poids 30% and lemnids (*Lemna*) 10%.
- 178 SURINAME, pool on banks of tributary of Pararivier, 13.X.1969 (co. as 015).  
Stagnant, 15 m<sup>2</sup>, depth 0.5 m; dark brown, at 11 h 29 °C. Nymphaeids 20%, lemnids (*Salvinia*) 1%, poids along edges. Bottom with much humus.
- 179 SURINAME, marsh just N of Onverwacht, 13.X.1969 (co. as 022). [Pl. 23B]  
Stagnant, over 1 km<sup>2</sup>, depth 1 m; light brown, at 11.30 h 26.5 °C. In sampled area, *Eleocharis* 50%, other Cyperaceae 40%, Poaceae 10%. Bottom, plant-debris.

- 180/3 BROKOPONDO, National Park Brownsberg. Puddles and pool in steep part of dry bed of streamlet running from Mazaronitop towards Brokopondo Lake, 20.X.1969 (55°11'4"56'-355.5/865.9).  
Water colourless, clear, no aquatic vegetation.
- 180 - Stagnant, 0.6 m<sup>2</sup>, depth 0.1 m; at 12 h 24 °C. Bottom, pebbles overlaid with dead leaves and some fine mud.
- 181 - V.c. less than 0.5 m/min, 0.6 m<sup>2</sup>, depth 0.3 m; at 14 h 23 °C. Bottom, dead leaves on rock.
- 182 - Stagnant, 0.2 m<sup>2</sup>, depth 0.05-0.1 m. Bottom, rock with dead leaves.
- 183 - Pool at the base of a steep rock wall, about 4 m high; stagnant, 2.5 m<sup>2</sup>, depth 0.35 m. Bottom, stones, a few dead leaves.
- 183a - Same, 23.X.1969.
- 184/190 BROKOPONDO, National Park Brownsberg, Brownskreek, upstream of Ireneval, 21.X.1969. (55°13'4"56'-352.3/866.4). [Pl. 13]  
Water colourless, clear. No aquatic vegetation.
- 184 - Pools on rock at top of Ireneval.
- 184A - V.c. 8.5 m/min, 2 m<sup>2</sup>, depth 0.15 m. Bottom, pebbles and dead leaves on rock.
- 184B - V.c. less than 1 m/min, 1.5 m<sup>2</sup>, depth 0.1 m. Bottom, pebbles, dead leaves and some fine mud on rock.
- 184C - V.c. 2 m/min, 1.5 m<sup>2</sup>, depth 0.3 m. Bottom, pebbles and dead leaves on rock.
- 185 - Barrier of stones and leaves, at top of Ireneval; v.c. 40 m/min.
- 186 - Rock with Bryophyta through which water seeps, at top of Ireneval.
- 187 - About 50 m upstream of Ireneval; v.c. 20 m/min, width 2-2.5 m, depth 0.1 m. Bottom, pebbles.
- 188 - Strongly shaded part of streamlet; v.c. 4-5 m/min, 5 m<sup>2</sup>, depth 0.25 m. Bottom, pebbles and some dead leaves.
- 189 - Deeper part of streamlet; v.c. 12 m/min, width 3 m, depth 0.5 m. Bottom, pebbles.
- 190 - Puddle at the side of 189; stagnant, 0.1 m<sup>2</sup>, depth 0.05 m. Bottom, pebbles with dead leaves.
- 191/6 BROKOPONDO, National Park Brownskreek, about 1 Km upstream of Ireneval, 22.X.1969 (co. appr. as 184/90).
- 191 - Under tree trunk holding plant-debris; v.c. 10 m/min.
- 192 - Torpid part of streamlet; stagnant along edges, v.c. in centre 5 m/min, width 3 m, depth 0.4 m. Bottom with stones, dead leaves along edges.
- 192A - Wet Bryophyta on small boulder.
- 192B - Small bay; stagnant, 0.1 m<sup>2</sup>, depth 0.05 m. Bottom with dead leaves.
- 193 - Edge of streamlet; stagnant, depth 0.03 m. Bottom pebbles with dead leaves.
- 194 - Part of streamlet with a sandy bottom; v.c. 7 m/min, depth 0.2 m. Bottom, sand with some pebbles and plant-debris. Some floating plant-debris.
- 195 - Trickle; v.c. 0.2 m/min, width 0.5 m, depth 0.01 m. Bottom, mud and plant-debris.
- 196 - Pothole; v.c. less than 1 m/min, 3.5 m<sup>2</sup>, depth 0.4 m. Bottom, stones with some plant-debris and mud.

- 197/9 BROKOPONDO, National Park Brownsberg. Pools in streamlet 180/3, further downstream, bed distinctly less steep, 23.X.1969 (55°10'/4°56'-356.7/864.9).  
Water colourless, clear. No aquatic vegetation.
- 197 - Stagnant, 1.5 m<sup>2</sup>, depth 0.2 m. Bottom, stones and dead leaves. Shaded.
- 198 - Stagnant (except at entrance, v.c. 16 m/min), 4 m<sup>2</sup>, depth 0.3 m.  
Bottom, stones and dead leaves, especially at exit. Receiving direct sunlight about 1 hour/day.
- 199 - Pothole at the foot of a small water-fall; stagnant, 8 m<sup>2</sup>, depth 1 m.  
Bottom, rock with stones and some plant-debris.
- 200 BROKOPONDO, National Park Brownsberg. Puddle in steep part of bed streamlet 180/3, 23.X.1969 (co. as 180/3).  
Stagnant, 1 m<sup>2</sup>, depth 0.1 m. Bottom, layer of dead leaves on stones. Shaded.
- 201/2 BROKOPONDO, Verjarikreek system, pool and pond in bed of streamlet at first bridge in road from Brownsberg to Brownsweg, 24.X.1969 (55°10'/4°59'-357.4/870.8).  
Stagnant; brown, turbid beige. No aquatic vegetation. Bottom loamy with plant-debris.
- 201 - For the greater part not shaded; 12 m<sup>2</sup>, depth 0.4 m.
- 202 - Pond under bridge, for the greater part shaded; 70 m<sup>2</sup>, depth 0.6 m.
- 203 SARAMACCA, road to Saramacca-brug, 8 Km W of junction with road to Matta, pond in savannah-woodland, 28.X.1969 (55°19'/5°25'-340.5/918.0).  
Stagnant, 200 m<sup>2</sup>, depth 0.7 m; turbid slightly reddish brown. No aquatic vegetation. Bottom, soft loam.
- 203A - Wet loamflat bordering pond; dead poids on soft loam.
- 204/5 SARAMACCA, 1 st tributary of Troelikreek system along road to Saramacca-brug, 28.X.1969 (55°20'/5°24'-339.2/917.3).
- 204 - Water in wooden canoe; stagnant, 0.3 m<sup>2</sup>, depth 0.1 m. Bottom, dead leaves and sand on wood.
- 204a Same, 4.XI.1969.
- 205 - Torpid bay of streamlet at bridge; virtually stagnant, 3 m<sup>2</sup>, depth 0.6 m, dark brown, clear. No aquatic vegetation. Bottom, sand, some plant-debris.
- 206/8 SARAMACCA, Verlengde Garnizoenspad, ditch, 4 km W of Saramacca Rivier, 30.X.1969 (55°30'/5°50'-320.9/963.5).  
Stagnant, width 3-4 m, depth 0.7 m; brown, clear.
- 206 - Poids (Poaceae) at edge 5%, lemnids (*Lemna*) 90%, pleustohelophytes 5%. Bottom, plant-debris.
- 206A - Shore with poids.
- 207 - Zone without aquatic vegetation, depth 0.3 m. Much plant-debris; sample taken between poids at edge.
- 208 - Lemnids 98% (*Lemna*), poids (*Typha*) 2%. Bottom, remains of *Typha*.
- 209/16 BROKOPONDO, Kakaterekreek, 3.XI.1969 (55°04'/5°08'-367.4/887.7).

- 209 - About 50 m downstream of bridge; v.c. 6 m/min, width 0.5 m, depth 0.1 m; brown, clear. Much gelatinous Chlorophyta; exposed to sunshine. Bottom light brick-red, loamy with pebbles.
- 210 - About 60 m downstream of bridge; v.c. 17 m/min, width 0.3 m, depth 0.05 m; brown, clear, shaded. No aquatic vegetation, some branches and dead leaves lying in the water. Bottom stony.
- 211 - Pond; virtually stagnant 27 m<sup>2</sup>, depth 0.4 m; turbid, light brick-reddish brown. No aquatic vegetation; partly shaded. Bottom loamy with pebbles and plant-debris.
- 212 - Streamlet at bridge, virtually stagnant, width 4 m, depth 0.7 m; brown, slightly turbid. No aquatic vegetation, fully exposed to sunshine. Bottom loam with pebbles and pieces of wood.
- 213 - About 100 m downstream of bridge, in forest; v.c. 5 m/min, 1.5 m<sup>2</sup>, depth 0.25 m; turbid brick-reddish. No aquatic vegetation. Bottom loamy with some pebbles and plant-debris.
- 214 - Zone in forest with v.c. 5-15 m/min, 5 m<sup>2</sup>, depth 0.05-0.1 m; brownish, clear.
- 215 - Polluted puddle in bed of streamlet in forest; stagnant, 0.25 m<sup>2</sup>, depth 0.2 m, surface with a brick-red oily film. No aquatic vegetation. Bottom sand and pebbles.
- 216 - Virtually stagnant part of streamlet in forest; 20 m<sup>2</sup>, depth 0.5 m; turbid light brick-reddish brown. No aquatic vegetation, much dead branches along edges. Bottom loamy with plant-debris.
- 217/21 SARAMACCA, first tributary of Troelikreek system along road to Saramaccabrug, 4.XI.1969 (co. as 204/5).  
Water-level about 0.4 m lower than at 28.X.1969; dark brown, clear. No aquatic vegetation; savannah-woodland.
- 217 - Small stagnant bay; 1 m<sup>2</sup>, depth 0.3 m. Bottom, loam and sand with plant-debris.
- 218 - Pool in dry of tributary of streamlet; stagnant, 10 m<sup>2</sup>, depth 0.15 m. Bottom soft mud and plant-debris.
- 219 - Wet forest floor near 218; wet mud and plant-debris.
- 220 - Relatively torpid zone of streamlet; v.c. 8 m/min, depth 0.6 m. Bottom, loam and sand.
- 221 - Zone of streamlet with bare sandy bottom; v.c. 15 m/min, depth 0.4 m. Bottom, sand with some plant-debris.
- 222 MAROWIJNE, Oost-West Verbinding, 54 km E of Meerzorg (just E of Botelskreek), loampits, 10.XI.1969 (54°40'/5°43'-412.4/950.9).  
Stagnant, 1000 m<sup>2</sup>, depth of sampled area 0.2 m; turbid light brown. Sampled area with poids along edge, Chlorophyta (*Chara*) 80%. Bottom, soft loam.
- 223 MAROWIJNE, Oost-West Verbinding, 60 km E, ditch. 10.XI.1969 (54°36'/5°41'-417.6/948.0).  
Stagnant, width 10 m, depth of sampled area 0.4 m; dark brown, clear. Poids 10%, nymphaeids 70%. Bottom, loamy with a layer of plant-debris.

- 224 MAROWIJNE, Ingitoetokreek, few km E of Moengo, 10.XI.1969 (54°22'/5°36'-440.2/938.0).  
V.c. 1-2 m/min, width 15 m, depth over 2 m, brown, somewhat turbid. Patches of batrachids, elodeids and nymphaeids at edges; sample taken in the patches of vegetation. Bottom loamy with some plant-debris.
- 225/7 MAROWIJNE, Albina, near Anjoemarakreek, 11.XI.1969 (54°02'/5°30'-480.5/928.6).
- 225 - Mouth of Anjoemarakreek; v.c. variable (tides), about 20 m/min, width 6 m, depth over 1 m; very turbid, slightly greyish light brown. No aquatic vegetation, edges with some shrubs and poids. Bottom, soft light brown clay.
- 226 - Ditch about 200 m N of bridge over Anjoemarakreek.  
V.c. about 1 m/min, width 1.5 m, depth 0.2 m; slightly turbid greyish. Nymphaeids 80%, poids (Cyperaceae) 10%. Bottom, fine light brown clay.
- 227 - Same as 226 except: depth 0.1 m, nymphaeids 40%, no poids.
- 228 MAROWIJNE, puddle at culvert in dry streamlet 2 km N of Albina, 11.XI.1969 (54°02'/5°31'-481.3/930.8).  
Stagnant, 0.5 m<sup>2</sup>, depth 0.05 m; slightly turbid light brown. No aquatic vegetation. Bottom, soft clay with plant-debris.
- 229/30 BROKOPONDO, road to Brownsweg, Km 4, ponds, 17.XI.1969 (55°05'/5°07'-365.3/884.0).
- 229 - In rain-forest; stagnant, 70 m<sup>2</sup>, depth 0.2 m; turbid light brick-reddish. No aquatic vegetation. Bottom heavy loam with some plant-debris.
- 229A - Adjoining loamflat.
- 230 - Stagnant, 2000 m<sup>2</sup>, depth probably over 1 m; greenish turbid. No aquatic vegetation. Bottom brick-reddish loam. [Pl. 15A]
- 230A - Adjacent loamflat.
- 231/2 BROKOPONDO, road to Brownsweg, Km 5, 17.XI.1969 (55°05'/5°06'-364.9/883.4).
- 231 - Tributary of Toetajakreek system, pool in dry bed of streamlet, 10 m<sup>2</sup>, depth 0.4 m; light brown, turbid. No aquatic vegetation; in rain-forest. Bottom loamy with plant-debris.
- 232 - Trench alongside of road; v.c. 5-10 m/min, width 1 m, depth 0.1 m; colourless, clear. No aquatic vegetation. Bottom, loam with plant-debris.
- 233/4 SARAMACCA, road to Saramacca-bridge, 10 km W of junction with road to Matta, 18.XI.1969 (55°20'/5°24'-338.7/916.5).  
Water turbid whitish grey. No aquatic vegetation.
- 233 - Pond on open patch in savannah-woodland; stagnant, 60 m<sup>2</sup>, depth 0.3 m. Bottom, thin layer of loam on sand, hardly any plant-debris.
- 234 - Pool at border of woods, shaded; stagnant, 5 m<sup>2</sup>, depth 0.1 m. Bottom, loam and sand, many dead leaves.

- 235/9 SARAMACCA, second tributary of Troelikreek system along road to Saracca-bridge, 18.XI.1969 (55°20'/5°24'-338.3/916.2).  
Streamlet in savannah-woodland; dark brown, clear. No aquatic vegetation.
- 235 - Stagnant bay; 50 m<sup>2</sup>, depth 0.6 m. Bottom, sand with some plant-debris.
- 236 - Part of streamlet with overhanging shrubs; v.c. 12 m/min, width 1.5 m (overhanging shrubs 0.5 m), depth 0.1 m; at 11 h 25 °C. Bottom, sand with some plant-debris and tree-roots.
- 237 - Open part of streamlet; v.c. 12 m/min, width 1 m, depth 0.5 m; at 11 h 25 °C. Bottom, sand with some plant-debris.
- 238 - Barrier of branches and leaves; v.c. 15 m/min, width 3 m, depth 0.2 m. Bottom sand.
- 239 - Patch of floating and submerged plant-debris at exit of culvert.
- 240/3 SURINAME, Zanderijsavanne, Parakreek, 20.XI.1969 (co. as 090).
- 240 - Pool in marsh on banks of streamlet; stagnant, 65 m<sup>2</sup>, depth 0.5 m; very turbid light brown. Nymphaeids 10%. Bottom loamy.
- 240A - Adjacent loamflat.
- 241 - Pool in dry bed of streamlet, 100 m upstream of bridge; stagnant, 20 m<sup>2</sup>, depth 0.3 m; dark brown, clear. No vegetation, shaded. Bottom, sand with plant-debris and some mud.
- 242 - Pool in bed of streamlet, 150 m upstream bridge; stagnant, 80 m<sup>2</sup>, depth 0.6 m; dark brown, clear. No vegetation; shaded. Bottom, sand and plant-debris, some mud.
- 243 - Near bridge; stagnant, width 2 m, depth 0.6 m; dark brown, clear. No aquatic vegetation; during some hours around noon exposed to full sunshine. Bottom, sand, mud and plant-debris.
- 243A - Shallowest edge; depth 0.05 m. Muddy sand and dead leaves.
- 243B - Margin. Wet mud and plant-debris.
- 244 BROKOPONDO, road to Brownsweg, Km 6, pool 24.XI.1969 (55°05'/5°06'-364.8/882.4).  
Stagnant, 20 m<sup>2</sup>, depth 0.15 m; turbid slightly greenish light brown. Poids (*Typha*) 5%. Bottom, soft loam.
- 244A - Adjacent loamflat.
- 245/9 BROKOPONDO, road to Brownsweg, Km 8, tributary of Toetajakreek, 24.XI.1969 (55°06'/5°05'-364.0/881.5).  
Pools in dry bed of streamlet. No aquatic vegetation, shaded by surrounding rain-forest.
- 245 - At bridge; stagnant, 15 m<sup>2</sup>, depth 0.4 m; brown with reddish brown turbidity. Many dead branches and tree-trunks. Bottom, sand and plant-debris.
- 245A - Wet margin. Slightly muddy sand.
- 246 - About 100 m upstream of bridge; stagnant, 10 m<sup>2</sup>, depth 0.4 m; brown with light brown turbidity. Bottom, sand.
- 247 - Pool, for the greater part under overhanging wall, about 100 m upstream of bridge; stagnant, 4 m<sup>2</sup>, depth 0.3 m; brown with beige turbidity. Bottom, sand.

- 248 - About 120 m upstream of bridge; stagnant, 60 m<sup>2</sup>, depth 0.5 m; brown with a beige turbidity. Several tree trunks. Bottom, sand with some plant-debris.
- 249 - About 200 m upstream of bridge, pool with overhanging wall; stagnant, 20 m<sup>2</sup>, depth 0.6 m; brown with a dark grey-brown turbidity. Bottom, sand with plant-debris.
- 250/7 **SARAMACCA**, road to Saramacca-bridge, 10 km W of junction with road to Matta, second tributary of Troelikreek system 25.XI.1969 (co. appr. as 235/9).  
Water dark brown, clear. No aquatic vegetation.
- 250 - Wet sandy margin; little plant-debris.
- 251 - Open part of streamlet; v.c. 15 m/min, depth 0.2 m. Bottom, sand with plant-debris.
- 252 - Patch of plant-debris alongside of edge; v.c. 12-15 m/min, depth 0.2 m. Bottom, sand with plant-debris.
- 253 - Edge of streamlet; stagnant, depth 0.01-0.05 m. Bottom, mud with much plant-debris.
- 254 - Wet margin; mud with much plant-debris.
- 255 - Wet forest floor; plant-debris with mud.
- 256 - Virtually stagnant bay; 0.25 m<sup>2</sup>. Closed layer of floating plant-debris, no scum.
- 257 - Shaded part of streamlet; v.c. 25 m/min, width 2.5 m, depth 0.1 m. Bottom, rather coarse sand.
- 258/9 **MAROWIJNE**, road to Albina, about 18 km E of Moengo, Bigie Bosoe Kreek, 30.XI.1969 (54°11'/5°34'-463.7/936.3).
- 258 - Streamlet; v.c. about 1 m/min, width 3 m, depth 0.6 m; light brown, faintly turbid. Nymphaeids 60%. Bottom, soft muddy loam.
- 259 - Mudflat; wet, soft, muddy loam. Some plant-debris and nymphaeids.
- 260/6 **MAROWIJNE**, Mooi Wanna-kreek, 1.XII.1969 (54°06'/5°30'-473.4/930.5).  
Water dark brown. No aquatic vegetation.
- 260 - At bridge; v.c. 5 m/min, width 2-3 m, depth 1 m, at 10 h 24-25 °C. Edges with poids and Pteridophyta; sunny. Bottom, plant-debris.
- 261 - About 50 m upstream of bridge; v.c. 15-20 m/min, width 3-3.5 m, depth 0.6 m, at 11.30 h 24.5 °C. Cleared woods, providing light shade. Bottom, sand partly rather coarse.
- 262 - About 100 m upstream of bridge; v.c. 25 m/min, width 3-4 m, depth 0.5 m. Cleared woods. Bottom, sand with some plant-debris.
- 263 - Barrier of branches and leaves, 50 m upstream of bridge.
- 264 - Shallowest edge, 50 m upstream of bridge; stagnant, depth 0.05 m. Bottom, muddy with plant-debris.
- 265 - Wet margin; muddy plant-debris.
- 266 - Puddle on banks of streamlet; stagnant, 0.03 m<sup>2</sup>, depth 0.04 m. Bottom, muddy plant-debris.
- 267/72 **MAROWIJNE**, Mooi Wanna-kreek, 2.XII.1969 (co. appr. as 260/6).  
Water-level 0.1 m lower than previous day.

- 267 - About 200 m upstream of bridge; v.c. 40–50 m/min, width 3 m, depth 0.3 m, at 8.45 h 24 °C. Cleared woods providing light shade. Bottom, coarse sand with very little plant-debris.
- 268 - About 220 m upstream of bridge, edge with tree-trunks, branches and dead leaves; v.c. 10–40 m/min, 8 m<sup>2</sup>, depth 0.3 m. Sunny. Bottom, plant-debris.
- 269 - Small marsh on banks of streamlet, 250 m upstream of bridge; 3 m<sup>2</sup>. Some mud, wet plant-debris.
- 270 - Puddle in 269; 0.01 m<sup>2</sup>, depth 0.03 m. Pant-debris and mud.
- 271 - About 300 m upstream of bridge; v.c. 40 m/min, width 2.5 m, depth 0.25 m. Shaded. Bottom, coarse sand with little plant-debris.
- 272 - About 300 m upstream of bridge, under and alongside tree-trunks at edge of streamlet; v.c. 10–40 m/min, depth 0.2 m. Bottom, sand and much plant-debris.
- 273/7 BROKOPONDO, road to Brownsweg, Km 13, 15.XII, 1969 (55°08'/5°02'–360.6/876.8).  
Streamlet, stagnant; brown, slightly reddish turbid. No aquatic vegetation; thin rain-forest.
- 273 - 50 m upstream of culvert; width 1–3 m, depth 0.4 m; at 9 h 24 °C. Some Liliaceae standing in the water. Bottom, loamy sand with dead leaves.
- 274 - Edge; depth 0.1 m. Bottom, loamy sand with dead leaves and piece of wood.
- 275 - 100 m upstream of culvert; width 3 m, depth 0.8 m. Bottom, loamy sand with dead leaves.
- 276 - 150 m upstream of culvert, more exposed than 273/5; width 3.5 m, depth 0.6 m, at 16 h 25 °C. Some Liliaceae standing in the water. Bottom, loamy sand with plant-debris.
- 277 - 140 m upstream of culvert, narrow part; width 0.5–0.7 m, depth 0.3 m. Overhanging Liliaceae. Bottom, with sand and much plant-debris.
- 278/9 SARAMACCA, road to Saramacca-brug, 10 km W of junction with road to Matta, pools, 18.XII.1969 (55°21'/5°23'–337.3/915.7).  
Stagnant; slightly greyish turbid. In savannah-woodland. Bottom, sand with a layer of dead leaves and mud.
- 278 - 15 m<sup>2</sup>, depth 0.4 m, at 8 h 24.5 °C, at 11.30 h 29 °C. Some patches of gelatinous Chlorophyta. Exposed to sunshine around noon.
- 278A - Wet margin.
- 279 - 5 m<sup>2</sup>, depth 0.2 m; at 8 h 24.5 °C, at 11.30 h 27 °C. No aquatic vegetation, more shade.
- 280/4 SARAMACCA, road to Saramacca-brug 10 km W of junction with road to Matta, third tributary of Troelikreek system, 18.XII.1969 (co. as 278/9).  
Water dark brown, clear. No aquatic vegetation; savannah-woodland.
- 280 - Just upstream of culvert; v.c. 12–15 m/min, width 0.5 m, depth 0.25 m; at 9 h 24.5 °C. Edge with poids. Bottom, fine sand with little plant-debris.
- 281 - Puddle in vegetation of poids on banks; stagnant, 0.5 m<sup>2</sup>, depth 0.05 m. Bottom, sand with dead leaves.



- 282 - Stagnant branch of streamlet; 50 m<sup>2</sup>, depth 0.5 m; brown with greyish turbidity. Bottom, sand with much plant-debris.
- 283 - Floating plant-debris upstream of a barrier, no scum; v.c. 1 m/min, 1 m<sup>2</sup>.
- 284 - Edge; stagnant, depth 0.1 m, much plant-debris.
- 285/8 SURINAME, Paramaribo, l'Hermitage, ants'-nests in neglected garden, 27.XII.1969.
- 289/90 SARAMACCA, road to Saramacca-brug, 12 km W of junction with road to Matta, fourth tributary of the Troelikeek system, 12.I.1970 (55°21'/5°23'-336.4/915.5).  
Water dark brown, clear. Bottom, sand with little plant-debris. Surroundings rather open.
- 289 - Just upstream of culvert; v.c. 1-15 m/min, width 1.5 m, depth 0.4 m; at 9 h 26 °C. Nymphaeids 45%, elodeids 45%.
- 290 - Downstream of culvert; v.c. 15 m/min at exit of culvert to less than 1 m/min 15 m downstream, width 4 m, depth 1 m. Central open patch, marginal zone with nymphaeids and elodeids.
- 291/2 SARAMACCA, termites'-nests, near 289/90, 12.I.1970.
- 293 BROKOPONDO, road to Brownsweg, Km 13, on Poaceae at roadside 22.I.1970.
- 294/7 BROKOPONDO, road to Brownsweg, Km 13, streamlet 273/7, 22.I.1970. (co. as 273/7).  
Due to the rains now a continuous streamlet; brown, slightly turbid. No vegetation; thin rain-forest.
- 294 - Stagnant part, 100 m downstream of culvert; width 3 m, depth 0.7 m; at 9.30 h 24 °C. Bottom sand, little or no plant-debris.
- 295 - About 120 m downstream of culvert; v.c. 12 m/min, width 3 m, depth 0.15 m. Bottom, sand; some branches holding dead leaves.
- 296 - Ephemeroptera dancing over a small patch of wet sand (0.01 m<sup>2</sup>); observed from 10 to 12 h, cloudy sky air at 10.30 h 25.5 °C.
- 297 - Pool aside of bed of streamlet; stagnant, 3 m<sup>2</sup>, depth 0.20 m. From layer of dead leaves, depth 0.1 m.
- 298/9 SARAMACCA, road to Saramacca-brug, 12 km W of junction with road to Matta, 26.I.1970 (co. as 289/90).
- 298 - Pool in small clearing in savannah-woodland; stagnant, 10 m<sup>2</sup>, depth 0.1 m; slightly turbid light brown. Emergent poidis 80%. Bottom with a thin layer of brown loam on blackish-brown sands.
- 299 - Same streamlet as 289/90, 100 m downstream of culvert; v.c. 20 m/min, width 1 m, depth 0.1 m; dark brown, clear.  
No aquatic vegetation; surroundings rather open. Bottom, sand.
- 300/1 SARAMACCA, road to Saramacca-brug, 0.5 km E of bridge, 26.I.1970 (55°22'/5°24'-355.3/916.0).

- 300 - Pond in small clearing in savannah-woodland; stagnant 50 m<sup>2</sup>, depth 0.2 m, brown, clear. Open central patch, fringe of low submerged poids and, for the greater part, emergent poids.
- 301 - Small ants'-nests.
- 302/7 BROKOPONDO, 3.5 km W of Brownsveg, same streamlet as 201/2 but now continuous, 29.I.1970 (co. as 201/2).  
Water dark brown, clear. No aquatic vegetation; rain-forest.
- 302 - Torpid bay; v.c. 1-2 m/min, 1 m<sup>2</sup>, depth 0.1 m. Bottom, loamy sand.
- 303 - Barrier of branches and leaves with floating plant-debris; v.c. 12-15 m/min, width 2 m, depth 0.1 m, at 10.15 h 24 °C. Bottom, sand with plant-debris.
- 304 - Edge with floating and submerged plant-debris. Stagnant, depth 0.05 m. Bottom loamy sand.
- 305 - Layer of floating plant-debris on virtually stagnant part of streamlet; 3 m<sup>2</sup>.
- 306/7 - Sieve-samples from bank of streamlet.
- 308/10 BROKOPONDO, Mama- and Borjessi kreek, at the road to Afobaka, 2.II.1970 (55°04'/5°10'-366/889.5).  
Water dark brown, somewhat turbid. No aquatic vegetation. Bottom, loamy sand.
- 308 - Pool on banks of Mamakreek, just downstream of bridge; stagnant, 20 m<sup>2</sup>, depth 0.1 m; slightly reddish brown, somewhat turbid; for the greater part covered with an oily film. No aquatic vegetation, some poids. Bottom brick-red loam.
- 309 - Borjessikreek, just upstream of its mouth in Mamakreek; at edge v.c. 12 m/min; turbid brown.
- 310 - Borjessikreek, 20 m upstream, flat edge with dead leaves; virtually stagnant, depth 0.1 m.
- 311/3 BROKOPONDO, forest floor and rotting tree-trunks on banks of Borjessi-kreek, 2.II.1970.
- 314/20 BROKOPONDO, road to Afobaka, 200 m N of the bridge over Mamakreek, 5.II.1970 (co. appr. as SN308/10).
- 314 - Pond; stagnant, 200 m<sup>2</sup>, depth 1 m; dark brown, clear. No aquatic vegetation, margin with poids; shaded during greater part of day. Bottom, brick-red loam.
- 314A - Shallowest edge.
- 315 - Adjacent loamflat; quite wet. Some poids.
- 316 - Decaying palm-trunk, at edge in water; top relatively dry, 0.15 m high.
- 317 - Decaying palm-trunk near water.
- 318 - Small ants'-nest.
- 319 - Decaying tree-trunk.
- 320 - Sieve-sample from secondary rain-forest.
- 321/6 BROKOPONDO, Klaaskreek, 9.II.1970 (55°05'/5°11'-365.5/892.6).
- 321 - Pond just S of streamlet at the road to Afobaka; stagnant 200 m<sup>2</sup>, depth over 1 m; turbid reddish brown. No aquatic vegetation, edges with poids. Bottom, brick-red loam with gravel.

- 321A - On emergent poids.
- 322 - Small quiet bay of streamlet just downstream of bridge (width about 10 m); virtually stagnant, 1 m<sup>2</sup>, depth 0.3 m; turbid brown. No aquatic vegetation, some poids at edges. Bottom, soft somewhat reddish loam.
- 323 - Larger bay, 20 m downstream of bridge; virtually stagnant, 6 m<sup>2</sup>, depth 0.4 m, turbid brown. Partly marsh, poids 100%, partly open without vegetation. Bottom, brick-red loam.
- 324 - Edge of streamlet just upstream of bridge; v.c. 1-2 m/min, depth 0.2 m. No aquatic vegetation, some helophytes. Bottom loamy.
- 325 - Small bay upstream of bridge; virtually stagnant, 2 m<sup>2</sup>, depth 0.3 m. No aquatic vegetation, some poids at edges. Bottom, brick-red and whitish loam with decaying poids.
- 326 - Ants'-nest.
- 327/32 SURINAME, road to Afobaka, at high voltage mast 48, 2.III.1970 (55°05'/5°24'-364.3/916.0).
- 327 - Small termite nest.
- 328 - Pond; stagnant, 400 m<sup>2</sup>, depth 0.4 m, dark brown. Vegetation, sparse submerged and emerging poids. Bottom, white sand with little plant-debris.
- 329 - Large ants'-nest.
- 330 - Small termites'-nest.
- 331 - Small ants'-nest.
- 332 - Small streamlet, just upstream of culvert; v.c. 1-20 m/min, width 0.5-1 m, depth 0.2-0.5 m; dark brown. No aquatic vegetation, surroundings some poids; savannah-woodland. Bottom sand.
- 333 SARAMACCA, Coesewijneproject, 5 km W of Saramacca-brug, 3.III.1970, pond in flooded, cleared forest (55°24'/5°22'-330.5/914.2).  
Stagnant, 300 m<sup>2</sup>, depth 0.7 m; dirty greenish brown, somewhat turbid. No aquatic vegetation, some poids and shrubs in the water. Bottom, brick-red loamy sand with a layer of dead leaves.
- 334/6 SARAMACCA, Coesewijneproject, 8 km W of Saramacca-brug 3.III.1970 (55°25'/5°20'-328.2/910.4).  
Streamlet, probably tributary of Costerikreek; dark brown, clear. No aquatic vegetation; cleared forest.
- 334 - Just downstream of culvert, rather open; virtually stagnant, width 2 m, depth 0.5 m. Bottom, sand with some mud and plant-debris.
- 335 - Barrier of branches and leaves; v.c. 4 m/min, width 1 m, depth 0.2 m. Bottom, sand.
- 336 - Trichoptera flying over the streamlet.
- 337/43 SARAMACCA, Coesewijneproject, 8 km W of Saramacca-brug, 3.III.1970 (co. appr. as 334/6).
- 337 - Open field with Poaceae.
- 338 - Decaying tree-trunk.
- 339 - Edge of streamlet 334/6 with tree-trunk lying alongside; v.c. 0-10 m/min. Bottom, sand with dead leaves.

- 340 - Barrier of branches and leaves in streamlet; v.c. 0.5 m/min, with 1.5 m, depth 0.3 m, some scum.
- 341 - Wet forest floor.
- 342 - Wider part of streamlet; v.c. 10 m/min, width 4 m, depth 0.2 m. Bottom, sand some dead leaves at edges.
- 343 - Pond in clearing in savannah-woodland; stagnant, 40 m<sup>2</sup>, depth 0.5 m, turbid brick-reddish brown. Some poids at edges. Bottom, sand with some plant-debris.
- 344/8 SURINAME, road to Afobaka, at high-tension masts 35-37, 10.III.1970 (55°06'/5°27'-364.3/921).
- 344 - Pond at mast 37; stagnant, 75 m<sup>2</sup>, depth 0.5 m, edges rather steep; light brown. Sparse poids. Bottom, white sands with layer of brick-red dust.
- 345 - Pond at mast 37; stagnant, 70 m<sup>2</sup>, depth 0.7 m. Remaining characteristics as 344.
- 347 - Streamlet between masts 36 and 37, just upstream of culvert; v.c. 1 m/min, width 4 m, depth 0.5 m; dark brown, clear. Some ceratophyllids (*Utricularia*), Chlorophyta. Araceae standing at edges. Bottom, sand with layer of brick-red dust.
- 348 - Rain-pools in sand-pits at mast 35; stagnant, colourless. Floating *Spirogyra*-like Chlorophyta. Bottom, white sand with very little plant-debris.
- 348A - Area 60 m<sup>2</sup>, depth 0.6 m, average 0.4 m; at 10 h 28.3 °C.
- 348B - Area 50 m<sup>2</sup>, depth 0.4 m, average 0.2 m; at 10 h 28.3 °C.
- 348C - Area 10 m<sup>2</sup>, depth 0.3 m, average 0.25 m; at 10 h 28.3 °C.
- 348D - Sands between ponds.
- 349/50 SARAMACCA, ponds on W banks of Saramacca-rivier at Saramacca-brug, 12.III.1970 (55°22'/5°23'-334.4/915.0).
- 349 - Ponds and pool consisting in furrows between narrow strips of land; stagnant, 400 m<sup>2</sup>, depth 0.4 m; slightly turbid brownish. No aquatic vegetation, on the strips mainly Poaceae. Bottom, brick-red mud.
- 350 - More continuous pond; stagnant, 150 m<sup>2</sup>, depth 0.3 m; brown, clear. Chlorophyta, poids at edges and on central strip. [Pl. 18B]
- 351/2 SARAMACCA, Coesewijneproject, ponds 3 km W of Saramacca-brug, 12.III.1970 (55°23'/5°23'-332.3/914.5).
- 351 - On banks of Franskreek; stagnant, 50 m<sup>2</sup>, depth 0.3 m turbid beige. Chlorophyta, some emergent poids. Bottom, beige loam with little plant-debris.
- 351A - Rather dry loamflat, high tufts of Poaceae.
- 352 - Stagnant, 100 m<sup>2</sup>, depth 0.2 m; colourless, clear. No aquatic vegetation; subdivided by narrow strips of loam with some Poaceae. Bottom, beige loam with little plant-debris.
- 352A - Roadside.
- 353 SARAMACCA, Coesewijneproject, 2 km W of Saramacca-brug, pond, 12.III.1970 (55°23'/5°23'-333.1/914.5).

- Stagnant, 50 m<sup>2</sup>, depth 0.3 m; turbid beige. No aquatic vegetation; clearing in savannah-woodland. Bottom loamy with some dead leaves.
- 354 SARAMACCA, Coesewijneproject, pond 9 km W of Saramacca-brug, 19.III.1970 (55°26'/5°20'-328.5/910.5).  
Stagnant, 200 m<sup>2</sup>, depth 0.5 m; dark brown, clear.
- 354A - Field of *Chara* (about 90%) with gelatinous Desmidiaceae (?), 4 m<sup>2</sup>, depth 0.2 m. Bottom, sand, little plant-debris.
- 355/7 SARAMACCA, Coesewijneproject tributary of Costerikreek 10 km W of Saramacca-brug, 19.III.1970 (55°26'/5°20'-328.0/910.4).  
Water dark brown. No aquatic vegetation; savannah-woodland.
- 355 - Just upstream of bridge; v.c. about 1 m/min, width 1.5 m, depth 0.4 m. Bottom, loamy sand with plant-debris.
- 356 - Streamlet 60 m upstream of bridge; v.c. 1 m/min, width 1-1.5 m, depth 0.3 m. From edge with dead leaves and some floating plant-debris.
- 357 - Barrier of branches and leaves 60 m upstream of bridge; v.c. 1 m/min, width 0.6 m.
- 358/9 SURINAME, road to Hannover, roadside 23.III.1970.
- 360/4 SURINAME, road to Hannover, near streamlet, 23.III.1970.  
Wet forest floor and tree-trunks.
- 365 SARAMACCA, roadside at Saramacca-brug, 24.III.1970.
- 366/75 SARAMACCA, Coesewijneproject, 12 km W of Saramacca-brug, 24.III.1970 (55°26'/5°20'-326.8/910.0).
- 366 - Wet shore at stagnant branch of Costerikreek, thin layer of leaves on sand.
- 367 - Pool in tributary; virtually stagnant, 2 m<sup>2</sup>, depth 0.2 m; dark brown, clear. No aquatic vegetation, some poids; much plant-debris.
- 368 - In the flow of the tributary, just downstream of and under tree-trunk; v.c. 2 m/min, width 1 m, depth 0.2 m. No aquatic vegetation; much plant-debris.
- 369 - On stem of tree.
- 370 - Termites'-nest.
- 371 - Upstream of tree-trunk in tributary; v.c. 0.5 m/min, width 1-3 m, depth 0.2 m, dark brown, clear. No aquatic vegetation, much plant-debris.
- 372 - Edge of Costerikreek, 20 km upstream of bridge; v.c. 15 m/min, width of streamlet 6-10 m, (sampled area 1 m), depth probably over 1 m; dark brown, clear. Some nymphaeids and poids. Bottom, plant-debris.
- 373 - Termites'-nest.
- 374 - Palm-trunk.
- 375 - Tree-trunk.
- 376/85 SARAMACCA, Coesewijneproject, tributary of Costerikreek 10 km W of Saramacca-brug, 26.III.1970 (co. appr. as 355/7).  
Water dark brown, clear, cleared savannah-woodland.

- 376 — Just downstream of bridge; v.c. 20 m/min, width 0.7 m; depth 0.3 m. Edges with *Elodea*, central bottom with small tufts of Chlorophyta. Bottom, reddish sand and gravel.
- 377 — Virtually stagnant part of streamlet, 5–15 m downstream of bridge, width 8 m, depth 0.5 m. Nymphaeids 50%. Bottom, with a soft layer of plant-debris.
- 378 — Barrier of branches and leaves, 20 m downstream of bridge; v.c. 25 m/min, width 0.7 m, depth 0.3 m.
- 379 — Relatively torpid part of streamlet, 30 m downstream of bridge; v.c. 4–5 m/min, width 1 m, depth 0.4 m. No aquatic vegetation. Bottom sand and plant-debris.
- 380 — Relatively torpid part just downstream of small rapid, 80 m downstream of bridge; v.c. 4–5 m/min, width 1.5–2 m, depth 0.25 m. No aquatic vegetation. Bottom sand with some plant-debris.
- 381 — Barrier of branches and leaves, 85 m downstream of bridge; v.c. 20 m/min, width 1 m, depth 0.15 m. Bottom, sand with plant-debris.
- 382 — Upstream of a tree-trunk, 100 m downstream of bridge; v.c. 2 m/min, some floating plant-debris and scum.
- 383 — Barrier of branches and leaves, 60 m downstream of bridge; v.c. 10 m/min, width 1 m, depth 0.3 m. Bottom, sand with plant-debris.
- 384/5 — Tree-trunks.
- 386/93 SARAMACCA, Coesewijneproject, 10 km W of Saramacca-brug, 31.III.1970 (co. appr. as SN355/7).
- 386 — Pond; stagnant, 150 m<sup>2</sup>, depth 0.9 m, high water-level due to recent heavy rains; dark brown, clear. Some *Elodea*, edges with Pteridophyta and some poids; savannah-woodland. Bottom with plant-debris.
- 387 — Ants'-nest.
- 388/9 — Tree-trunks, with termite nests.
- 390 — Pond, stagnant, 500 m<sup>2</sup>, depth 1 m; dark brown, clear. No aquatic vegetation; savannah-woodland. Bottom with plant-debris.
- 391 — Ants'-nest.
- 392/3 — Forest floor, sieve-samples.
- 394/5 SARAMACCA, Coesewijneproject, 12–13 km along road to the South (eastern branch) 2.IV.1970 (55°29'/5°14'—321.4/899.0).
- 394 — Rain-pool on path; stagnant, 3 m<sup>2</sup>, depth 0.15 m; light whitish turbid. Bottom, sand with a few dead leaves.
- 395 — Streamlet, just upstream culvert; v.c. 15–20 m/min in centre but nearly stagnant near edges, width 0.7–1.2 m, depth 0.2 m, dark brown, clear. Tufts of gelatinous Chlorophyta, edges with poids. Bottom, sand with some plant-debris.
- 395A — Edges; stagnant, 0.25 m<sup>2</sup>, depth 0.03 m. Bottom, sand with a few dead leaves.
- 396/8 BROKOPONDO, Coesewijneproject, 10 km along road to the South (eastern branch) 7.IV.1970 (55°29'/5°15'—321.9/900.5).
- 396 — Pond, stagnant, 250 m<sup>2</sup> depth over 1 m, (water-level distinctly higher than normal), dark brown, clear. No aquatic vegetation, edges with poids, forest. Bottom, white sands with dead leaves.

- 396A - Edge; 1 m<sup>2</sup>, depth 0.05 m. Some submerged and emerging poids. Bottom, sand with some plant-debris.
- 396B - Wet sand-flat.
- 397 - Ants'-nest.
- 398 - Inundated border of forest, rather open; stagnant, 100 m<sup>2</sup>, depth 0.4 m, dark brown, clear. No aquatic vegetation, some poids. Bottom, sand with some plant-debris.
- 399/401 BROKOPONDO, Coesewijneproject, 9 km along road to the South (eastern branch), 7.IV.1970 (55°29'/5°15'-322.5/900.8).
- 399 - Rain-pool; stagnant, 4 m<sup>2</sup>, depth 0.15 m, dark brown, clear. No aquatic vegetation, some poids; forest. Bottom, sand with plant-debris.
- 400 - Small ants'-nest.
- 401 - Pond; stagnant, 350 m<sup>2</sup> depth over 1 m; waterlevel distinctly higher than normal, dark brown, clear. No aquatic vegetation, poids on the normally dry part; only the inundated part sampled. Bottom, sand with plant-debris.
- 402 BROKOPONDO, Coesewijneproject, streamlet 4-5 km along road to the South, 7.IV.1970 (55°28'/5°18'-324.5/904.3).  
Just upstream of culvert; v.c. 2 m/min, width 3-5 m, depth 0.6 m; dark brown clear. No aquatic vegetation except some Chlorophyta at edges; rather open. Bottom, soft sand.
- 403 BROKOPONDO, Coesewijneproject, 1 km along road to the South, road-side 9.IV.1970.
- 404/9 BROKOPONDO, Coesewijneproject, 20-24 km along road to the South (western branch), 9.IV.1970 (co. appr. 55°32'/5°15').
- 404 - Rain-puddle on road; stagnant, 1 m<sup>2</sup>, depth 0.05 m, colourless, clear. No vegetation. Bottom grey sand with some humus and dead leaves.
- 405 - Rain-pool on road; stagnant, 4 m<sup>2</sup>, depth 0.3 m; colourless, clear. Rain-forest, shaded.
- 405A - Wet loamy sand.
- 406 - Rotting wood.
- 407 - Palm-leaves.
- 408 - Streamlet in cleared rain-forest at a rather open spot; v.c. 4-5 m/min, width 2-3 m, depth 0.3 m; light brown, clear. No aquatic vegetation. Bottom sand with a thin layer of mud and plant-debris.
- 408A - Wet, muddy margin.
- 409 - Distinctly shaded part of streamlet; v.c. 5-6 m/min, width 1-1.5 m, depth 0.2 m; light brown, clear.
- 410/4 BROKOPONDO, Coesewijneproject, 24 km along road to the South (western branch), 9.IV.1970 (co. as 404/9).  
Pools and puddles on wet forest floor. Stagnant; dark brown, clear. No vegetation.
- 410 - Area 0.3 m<sup>2</sup>, depth 0.07 m. Bottom, dead leaves and humus.
- 411 - Area 1.5 m<sup>2</sup>, depth 0.15 m. Bottom, dead leaves on loamy soil.
- 412 - Area 1.5 m<sup>2</sup>, depth 0.15 m. Bottom, dead leaves on loamy sand.

- 413 - Area 0.75 m<sup>2</sup>, depth 0.1 m. Bottom, dead leaves on loamy sand.
- 414 - Area 0.75 m<sup>2</sup>, depth 0.1 m. Bottom, dead leaves on sand.
- 415/21 **BROKOPONDO**, Coesewijneproject, tributary of Goliathkreek, 25 km along road to the South (eastern branch), 16.IV.1970 (55°30'/5°13'-319.9/896.0).  
Water dark brown, clear. No aquatic vegetation, rain-forest.
- 415 - 20 m downstream of culvert; v.c. 0-5 m/min, width 1 m, depth 0.4 m. Bottom, sand with pebbles.
- 416 - 15 m downstream of culvert, just behind a small rapid (v.c. of rapid 60 m/min); v.c. 5 m/min, depth 0.2 m. Bottom, sand with pebbles.
- 417 - Pothole, 0-8 downstream of culvert; v.c. 0 (in centre) to 60 (at entrance and exit) m/min, 70 m<sup>2</sup>, depth 0.8 m. Bottom, loamy sand with pebbles.
- 418 - Sandflat with pebbles in bed of streamlet.
- 419 - Tributary, 50 m downstream of culvert; virtually stagnant from mouth to 40 m upstream, width 0.7 m, depth 0.2 m. Bottom, sand with some dead leaves.
- 420 - Pool on banks of streamlet; stagnant, 1.75 m<sup>2</sup>, depth 0.25 m. Bottom, loamy sand with dead leaves.
- 421 - Just behind small rapid, 50 m downstream of culvert; v.c. 15 m/min, width 1.5 m, depth 0.1 m. Bottom, sand with pebbles.
- 422 **BROKOPONDO**, Coesewijneproject, 25 km along road to the South, rain-puddles on road, 16.IV.1970 (co. as 415/21).  
Stagnant, 1 m<sup>2</sup>, depth 0.02 m; colourless, clear. No vegetation. Bottom beige loam.
- 422A - Wet loam.
- 423/5 **SARAMACCA**, Coesewijneproject, source-region of Coesewijne Rivier, abandoned camp 17 km W of Saramacca-brug, 20.IV.1970 (55°28'/5°20'-323.0/908.6).
- 423 - Wet sandflat with red dust; various weeds.
- 424 - Puddle; stagnant, 0.75 m<sup>2</sup>, depth 0.1 m, brown, clear. No vegetation. Bottom a thin layer of mud on sands, some plant-debris.
- 425 - Pool; stagnant, 6 m<sup>2</sup>, depth 0.3 m, turbid brown. No aquatic vegetation, edges with pooids. Bottom, sand with plant-debris, some loam.
- 426/30 **SARAMACCA**, Coesewijneproject, source-region of Coesewijne Rivier, streamlet, 17 km W of Saramacca-brug, 20.IV.1970 (co. as 423/5).  
Water dark brown, clear; rain-forest.
- 426 - Torpid bay, 5 m downstream of bridge, exposed to sunshine; virtually stagnant, 5 m<sup>2</sup>, depth 0.25 m. Some elodeids at edges. Bottom, sand.
- 427 - 15 m downstream of bridge, rather open, shaded by the edge of the forest; v.c. 5-20 m/min, width 2.5 m depth 0.6 m. No aquatic vegetation. Bottom, sand with pebbles.
- 428 - 25 m downstream of bridge, in the forest; v.c. 30 m/min, width 2.5 m, depth 0.3 m. No aquatic vegetation. Bottom, sand and pebbles.
- 429 - Patch of floating scum and some plant-debris upstream of a buttress, 30 m downstream of bridge.



- 429a Same, 23.IV.1970.  
 430 - 50 m downstream of bridge, patch of floating plant-debris and scum upstream of a tree-trunk.
- 431/8 SURINAME, Zanderijsavanna, Carolinakreek, 21.IV.1970 (co. as 079/84).  
 Water-level about 0.5 m higher than at former visit.  
 431/3 - Banks of streamlet.  
 434 - Patch of floating plant-debris at edge of streamlet.  
 435 - Torpid edge of streamlet; v.c. about 0-1 m/min, some poids hanging in the water. Bottom, sand.  
 436/8 - Banks of streamlet, tree-trunks.
- 439/45 SARAMACCA, Coesewijneproject, source-region of the Coesewijne Rivier, streamlet 17 km W of Saramacca-brug, 23.IV.1970 (co. as 423/30).  
 Water-level 0.05 m lower than at 20.IV.1970. Water dark brown, clear, no aquatic vegetation; rain-forest.  
 439 - 100 m downstream of bridge, behind a buttress; slight recurrent flow.  
 440 - 200 m downstream of bridge v.c. less than 1-12 m/min, width 3 m, depth 0.35 m. Bottom sand with some plant-debris.  
 441 - 200 m downstream of bridge, as 440; tree-trunk lying in the water.  
 442 - Tree-trunk.  
 443 - Edges of streamlet; virtually stagnant. Bottom, much plant-debris on muddy sand.  
 444 - Small bare sand-flat (0.75 m<sup>2</sup>) in bed of streamlet.  
 445 - Banks of streamlet, sieve-samples.
- 446/7 SARAMACCA, Coesewijneproject, source-region of the Coesewijne Rivier, ponds at border of rain-forest 18 km W of Saramacca-brug, 27.V.1970 (55°29'/5°20'-322.5/908.5).  
 No aquatic vegetation.  
 446 - Stagnant, 150 m<sup>2</sup>, depth 0.6 m, slightly turbid, brown. Some weeds standing in the water at edges. Bottom sand with thick layer of dead leaves.  
 447 - Stagnant, 70 m<sup>2</sup>, depth 0.5 m, colour brown, nearly clearly. Bottom, sand with a thin layer of dead leaves.
- 448 SARAMACCA, Coesewijneproject, source-region of the Coesewijne Rivier, pond 20 km W of Saramacca-brug, 27.V.1970 (55°30'/5°20'-321.9/908.5).  
 Stagnant, 400 m<sup>2</sup>, depth 0.7 m; brown slightly turbid. No aquatic vegetation; at border of rain-forest. Bottom, sand with dead leaves.  
 448a Same, 4.V.1970.
- 449/53 SARAMACCA, Coesewijneproject, 20 km W of Saramacca-brug, main tributary of Coesewijne Rivier, upstream of bridge, at recreation centre, 27.V.1970 (co. as 448).  
 Width 4 m; dark brown, clear. No aquatic vegetation; clearing in rain-forest.  
 449 - Under foot-bridge; v.c. 25 m/min in centre, 5 m/min at edges.  
 450 - Patch of floating plant-debris without scum; virtually stagnant bay, 2 m<sup>2</sup>; plant-debris 0.2 m<sup>2</sup>.

- 451 - Small tributary; v.c. 0.5 m/min, width 1-2 m, depth 0.15-0.6 m.
- 452 - About 50 m upstream of bridge, virtually stagnant bay, 5 m<sup>2</sup>, depth 0.6 m.
- 453 - Tree-trunk on bank.
- 454/6 SARAMACCA, 1 km E of Saramacca-brug, ponds in large clearing in savannah-woodland, 7.V.1970 (55°22'/5°24'-335.5/916.0).  
No aquatic vegetation.
- 454 - Stagnant, 25 m<sup>2</sup>, depth 0.15 m; colourless, clear. Some poids at edge. Bottom, sand with a thin layer of mud, very little plant-debris.
- 455 - Stagnant, 30 m<sup>2</sup>, depth 0.25 m; slightly whitish turbid. Band of poids across the pond. Bottom, sand with thin layer of mud, very little plant-debris.
- 456 - Stagnant, 80 m<sup>2</sup>, depth 0.3 m, colourless, clear. Some poids at edges. Bottom, sand with some loam, for the greater part a 0.02-0.07 m thick layer of plant-debris.
- 457 SARAMACCA, Coesewijneproject, source-region of the Coesewijne Rivier, pond 21 km W of Saramacca-brug 11.V.1970 (55°31'/5°19'-318.2/907.3).  
Stagnant, 200 m<sup>2</sup>, depth 0.5 m, colour light greyish brown, turbid. No aquatic vegetation, weeds at edges, border of rain-forest. Bottom, loamy with some plant-debris.
- 458/63 SARAMACCA, Coesewijneproject, source-region of the Coesewijne Rivier, 22 km W of Saramacca-brug, 11.V.1970 (55°31'/5°19'-317.6/907.4).  
No aquatic vegetation.
- 458 - Shaded pond; stagnant, 60 m<sup>2</sup>, depth 0.4 m, slightly turbid, light brown. Some poids at an edge; border of rain-forest. Bottom, sand with much plant-debris.
- 459 - Bank of streamlet. Wet loamy sand with poids and other herbs; exposed to sunshine.
- 460 - Bank of streamlet. Wet sand with a layer of mud and dead leaves; shaded.
- 461 - Rain-gully watering into streamlet.
- 462 - Pond; stagnant 150 m<sup>2</sup>, depth 0.6 m; somewhat turbid brown. Poids, shrubs; border of rain-forest. Bottom, loamy sand with plant-debris.
- 463 - Pond; stagnant, 120 m<sup>2</sup>, depth 0.9 m; brown with a light turbidity. A field (40 m<sup>2</sup>) of poids (*Eleocharis*) at an edge; border of rain-forest. Bottom, loamy sand.
- 464/5 SARAMACCA, Coesewijneproject, ponds along road, 35 km W of Saramacca-brug, 14.V.1970 (55°36'/5°15'-308.8/901.3).  
No vegetation except some poids at an edge.
- 464 - Stagnant, 170 m<sup>2</sup>, depth 0.9 m; brown, clear. Bottom, loamy sand with plant-debris.
- 465 - Stagnant, 500 m<sup>2</sup>, depth 0.5 m; turbid brown. Bottom, loamy sand with gravel, little plant-debris.

- 466 COMMEWIJNE, dyke draining on Matappica-kanaal, 29.V.1970 (54°51'/5°59'-391.3/980.9).  
Virtually stagnant (sluice closed), width 2 m, depth 0.3 m; dark brown, slightly turbid, Cl' 5160 mg/l. No aquatic vegetation; poids and some succulent halophyta. Bottom, soft grey mud.
- 467/9 COMMEWIJNE, at mouth of Matappica-kanaal, 29.V.1970 (54°51'/6°00'-391.3/982.2).  
No aquatic vegetation.
- 467 - Pool at small settlement; stagnant, 15 m<sup>2</sup>, depth 0.07 m; turbid grey-brown, Cl' 31,200 mg/l. Bottom, black mud.
- 468 - Ditch near 467; stagnant, width 2-2.5 m, depth 0.2 m; turbid brown, Cl' 18,700 mg/l. Surroundings succulent halophyta. Bottom, black mud.
- 469 - About 1 km E of the mouth of the canal, ditch in coastal mud-flat, about 500 m inland; virtually stagnant, width 2.5-3 m, depth 0.2 m; turbid light grey-brown, Cl' 14,700 mg/l. Bottom soft grey-black mud with a thin layer of brown mud.
- 470/2 MAROWIJNE, Nature-Conservancy "Wia-Wia Bank" SE of post "Bigiesantie", 9.VI.1970 (co. appr. 54°20'/5°53'): [Pl. 24A]
- 470 - About 500 m SE of post, large water-flat in salt-swamp; stagnant, depth of sampled area up to 0.05 m; slightly turbid light brown, at 12.30 h 35-40°C, Cl' 7,940 mg/l. No aquatic vegetation; surroundings succulent halophyta. Bottom, soft brown mud.
- 471 - About 750 m SE of post, slightly deeper pool in water-flat; stagnant, 3 m<sup>2</sup>, depth 0.1 m; turbid, slightly greenish, light brown, at 14 h 33-36°C, Cl' 8,330 mg/l. No aquatic vegetation; *Avicennia*, succulent halophyta and poids (*Sporobolus*). Bottom, thin layer of soft brown mud on soft grey-black mud. [Pl. 24B]
- 472 - Ditch, about 750 m E of post and about 500 m land-inward; stagnant, width 6 m, depth 0.7 m; turbid brown, Cl' 5,320 mg/l. No aquatic vegetation; shrubs and some succulent halophyta. Bottom, soft brown and blackish mud.
- 472A - Muddy shore.
- 473/9 MAROWIJNE, Wia-Wia Bank, E of post Bigiesanti, 10.VI.1970 (co. as 470/2).
- 473 - Large water-flat in swamp behind second sand/shell ridge, under *Avicennia*, 1-2 km E of post; stagnant, depth of sampled area 0.4 m; turbid brown, Cl' 7,470 mg/l. No aquatic vegetation. Bottom, black mud with dead leaves and aerial roots.
- 474 - Mollusc shells from strand-ridge, 1.2 km E of post.
- 475 - Water-flat in swamp behind first sand/shell ridge, 1-2 km E of post; about 400 m inland; stagnant, depth 0.3 m; turbid light brown; Cl' 13,300 mg/l. Floating mat of scummy Chlorophyta; succulent halophyta at edges, and some patches in water-flat. Bottom, soft brown and black mud.
- 476 - As 475; open water without Chlorophyta, Cl' 13,600 mg/l.

- 476A - On first shell/sand ridge (Odonata).
- 477 - 2-3 km E of post; behind strandridge, mud-flat with succulent halophyta. Black mud with shell fragments, covered by thin layer of drying Chlorophyta.
- 478 - 2-3 km of post. Mollusc shells on (sea-side of) strand-ridge. (Probably mostly subfossil from clay-banks off the coast).
- 479 - 300 m E of post. Mollusc shells sieved from (land-side of) strandridge.
- 480/2 MAROWIJNE, Wia-Wia Bank, E of post Bigiesanti. 11.VI.1970 (co. as 470/2).
- 480 - 400 m E of post, from Cactaceae flower.
- 481 - Pool, 600 m E of post, just inland of strand-ridge; stagnant, 15 m<sup>2</sup> depth 0.05 m; somewhat turbid greyish Cl' 19,000 mg/l. Sample from 3 m<sup>2</sup> without vegetation. Bottom, brown, soft grey-black mud.
- 482 - As 481, part with vegetation of poids (Poaceae), 10 m<sup>2</sup>.
- 483/7 MAROWIJNE, Wia-Wia Bank, of post Bigiesanti, 11.VI.1970 (co. as 470/2).
- 483 - 1 km W of post, (sea-side of) strandridge. Small Gastropod shells.
- 484 - 2 km W of post, large open swamp (1 km<sup>2</sup> or more), behind the strand ridge which is here quite broad; stagnant, depth 0.1 m; turbid light brown, Cl' 12,100 mg/l. Bottom, rather solid brown mud. *Ruppia* 50-90%.
- 485 - Edge of swamp 484. Floating Chlorophyta between poids.
- 486 - Edge of swamp 484. Wet black mud with dense vegetation of *Sporobolus*.
- 487 - 1½ km W of post. Mollusc shells on (sea-side of) strand ridge.

## CLASSIFICATION OF SAMPLED HABITATS

On labels etc. each station number is preceded by SN (= Suriname Nieser).

## A AQUATIC HABITATS

## A1 STAGNANT

A11 Puddles (area up to 1 m<sup>2</sup>), all without vegetation.

Exposed: 053 134 138 228 404 422  
 Shaded: 148A 148C 151 154 180 182 190 204  
           215 266 270 410 413 414 424

A12 Pools (area 1–20 m<sup>2</sup>).

## A121 Without visible vegetation.

Exposed: 052 201 394 467 481  
 Shaded: 043 069 101 183 197 198 199 200  
           218 231 234 241 245 246 247 249 279  
           279A 297 405 411 412 420

## A122 With Chlorophyta only.

Exposed: 278 348C

## A123 With helophyta.

Exposed: 006 006A 244 298 399 425 482  
 Shaded: 041 042 055 308

## A124 With higher, true aquatic, vegetation.

Exposed: 007 078 178

A13 Small ponds (area 20–400 m<sup>2</sup>).

## A131 Without visible vegetation.

Exposed: 105 233 243 352 353 462  
 Shaded: 144 202 203 229 242 243A 248 282 447

## A132 With Chlorophyta (except Characeae) only.

Exposed: 348A 348B

## A133 With helophyta.

Exposed: 023 160 300 321 333 343 344 345 349 350  
           351 396 396A 398 401 446 454 455 456 457  
           463

Shaded: 314 314A 458 464

## A134 With higher (incl. Characeae), true aquatic vegetation.

Exposed: 010a 049 354 354A

Shaded: 012a 386

A14 Large ponds (area 400–4000 m<sup>2</sup>).

## A141 Without visible vegetation.

Exposed: 024 230 448

Shaded: 086 390

## A143 With helophyta.

Exposed: 048 048A 328 465

- A144 With higher, true aquatic, vegetation.  
Exposed: 047 051 087 164 222
- A15 Lakes (area over 4000 m<sup>2</sup>).  
Exposed: 104
- A16 Stagnant streamlet (in dry season), continuous over considerable stretches.  
Exposed: 276  
Shaded: 273 274 275 277
- A17 Ditches (width 10 m or less).  
A171 Without vegetation.  
Exposed: 018 021 131 468 469
- A172 With Chlorophyta only.  
Exposed: 085
- A173 With helophyta.  
Exposed: 013 026 110 122 207 472
- A174 With higher, true aquatic, vegetation.  
Exposed: 005 011 014 016 017 019 020 025 027 030  
031 032 045 046 050 074 077 109 120 121  
123 132 133 157 158 169 176 177 206 208  
223  
Shaded: 008 119
- A18 Canals (width over 10 m).  
Exposed: 028
- A19 Marshes.
- A191 No vegetation.  
Shaded: 145 269
- A192 With helophyta (no true aquatic plants).  
Exposed: 009 022 156A 156B 156C 179  
Shaded: 281
- A193 Helophyta predominant, some true aquatic plants.  
Exposed: 003 090 112 153A 153B 155 240
- A194 Salt-marshes.  
Exposed: 470 471 475 476 484 485  
Shaded: 473
- A2 INTERMEDIATE BETWEEN STAGNANT AND RUNNING WATERS
- A21 Edges and very small bays (surface 1 m<sup>2</sup> or less) of streamlets, v.c. less than 1 m/min.  
A211 Without vegetation.  
Exposed: 253 395A  
Shaded: 079 080 083 092 095 146 173 192B 193  
196 217 256 264 284 304 310 434 439 443
- A212 With Chlorophyta only.  
Exposed: 152A

- A213 With helophyta.  
Exposed: 322  
Shaded: 070 079A 435
- A214 With true aquatic vegetation.  
Exposed: 152B 159A
- A22 Larger bays, area over 1 m<sup>2</sup>, v.c. less than 1 m/min.
- A221 Without vegetation.  
Exposed: 062 089 205 235  
Shaded: 002 004 033 035 039 107 167 419 450 452
- A222 With helophyta.  
Exposed: 323 325  
Shaded: 059 075
- A223 With true aquatic vegetation.  
Exposed: 015A 426
- A224 Under an overhanging wall.  
Shaded: 175
- A23 Stretches of streamlets with v.c. 1 m/min or less (e.g. the deeper and wider parts at bridges and culverts).
- A231 No vegetation.  
Exposed: 159 212 334  
Shaded: 149 173 181 184B 211 216 294 305 367 417
- A232 With helophyta.  
Exposed: 113  
Shaded: 124
- A233 With true aquatic vegetation.  
Exposed: 377
- A24 Mangrove-swamp bordering the Suriname Rivier.  
Shaded: 088
- A25 Ditches with slow current.
- A252 With helophyta.  
Exposed: 036
- A253 With true aquatic vegetation.  
Exposed: 037 038 226 227
- A26 Dykes (width up to 10 m, periodical current, due to opening of sluices).  
No vegetation except marginal helophyta.  
Exposed: 073 076 111 466
- A3 RUNNING WATERS
- A31 Tricklelets (width up to 0.5 m, depth up to 0.1 m), no vegetation.  
Exposed: 103 461  
Shaded: 166 195
- A32 Streamlets (width up to 10 m), v.c. 1-3 m/min.

- A321 Free current, no vegetation.  
 Exposed: 010 054 106 355 402  
 Shaded: 029 184C 302 356 379 380 402 415 451
- A322 Free current, helophyta.  
 Exposed: 324
- A323 Free current, true aquatic vegetation  
 Exposed: 258 347 (224) -
- A324 Barriers  
 Shaded: 141 142 283 340 357 368 371 382
- A33 Streamlets, v.c. 3-10 m/min.
- A331 Free current, no vegetation  
 Exposed: 232  
 Shaded: 012 040 044 058 063 100 108 136 137 147A  
 170 184A 188 192 194 213 214 220 332 339  
 342 408 409 416 440 449
- A332 Free current, helophyta.  
 Exposed: 096B 260  
 Shaded: 056 066
- A333 Free current, true aquatic vegetation.  
 Exposed: 289 290
- A334 Barriers.  
 Exposed: 093  
 Shaded: 061 064 068 072 081 082 099 118 125 128  
 191 335 429 430 441
- A335 Free current, Chlorophyta.  
 Exposed: 209
- A34 Streamlets, v.c. over 10 m/min.
- A341 Free current, no vegetation.  
 Exposed: 015 130 135 162 163 237 299  
 Shaded: 034 060 084 094 098 117A 127 143 147B 147C  
 172 187 189 210 221 225 236 251 257 261  
 262 267 271 280 295 309 421 427 428
- A342 Free current, helophyta.  
 Shaded: 117B
- A343 Free current, true aquatic vegetation.  
 Exposed: 376  
 Shaded: 372
- A344 Barriers.  
 Exposed: 239 268  
 Shaded: 057 057A 067 116 126 150 168 171 174 185  
 238 252 263 272 295 303 378 381 383
- A345 Free current, Chlorophyta.  
 Exposed: 129 395



## B TRANSITIONAL AQUATIC/TERRESTRIAL HABITATS

## B1 MARGINS OF OPEN WATERS

## B11 Margins of stagnant waters.

Exposed: 472A 486

Shaded: 203A 243B 245A 278A

## B12 Margins of current waters.

Exposed: 033Aa 091 254 459

Shaded: 065 079Ba 115 148B 250 265 408A 432 460

## B2 MARGINS OF MARSHY LOCALITIES

Exposed: 022A 114

## B3 WET ROCK WITH BRYOPHYTA

Exposed: 139 (140)

Shaded: 186 192A

## B4 WET LOCALITIES AT OR NEAR WATER

## B41 Mud-flats.

Exposed: 096A 160A 259 477

## B42 Loam-flats.

Exposed: 230A 240A 244A 315 351A 422A

Shaded: 299A

## B43 Sandflats.

Exposed: 161 165 396B 423

Shaded: 097 366 405A 418

## B5 WET FOREST-FLOOR

Shaded: 219 255 341 360 393

## C TERRESTRIAL LOCALITIES

## C1 DRY BANKS AND MARGINS OF WATERS

048B 206A 306 307 474 467A 478 479 483 487

## C2 INSECTS FLYING OVER WATER

060A 296 336 444

C3	INSECTS' NESTS									
C31	Formicidae									
	285	286	287	288	301	318	326	329	331	387
	391	397	400							
C32	Isoptera.									
	291	292	327	330	370	373				
C4	MOULDY TREE-TRUNKS									
	311	312	316	317	319	338	361	362	363	364
	374	375	384	385	388	389	406	433	436	437
	438	442	453							
C5	DRY FOREST-FLOOR									
	313	320	346	392	445					
C6	OPEN FIELDS ETC.									
	020Ac	337	348D	352A	359					
C7	ON PLANTS									
	293	321A	358	365	369	403	407	431	468	480

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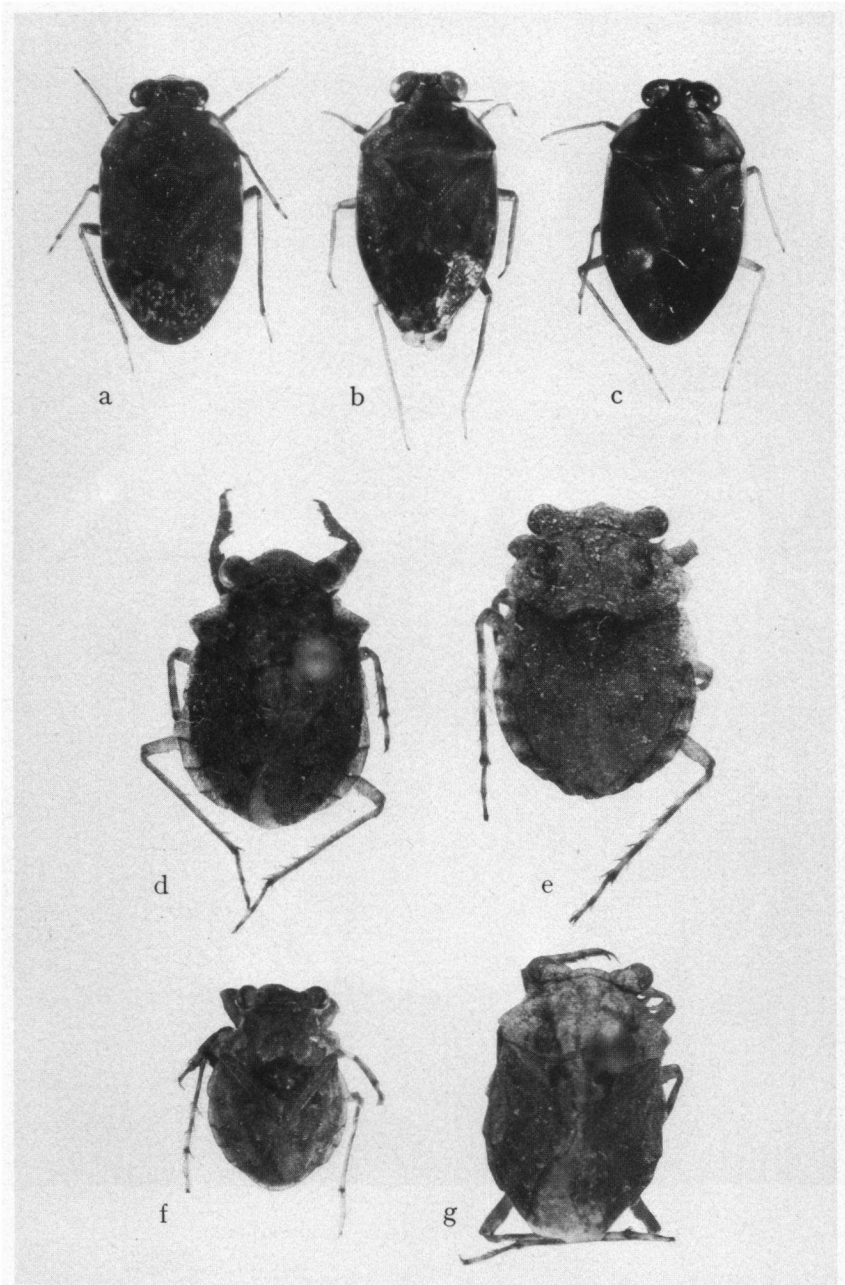
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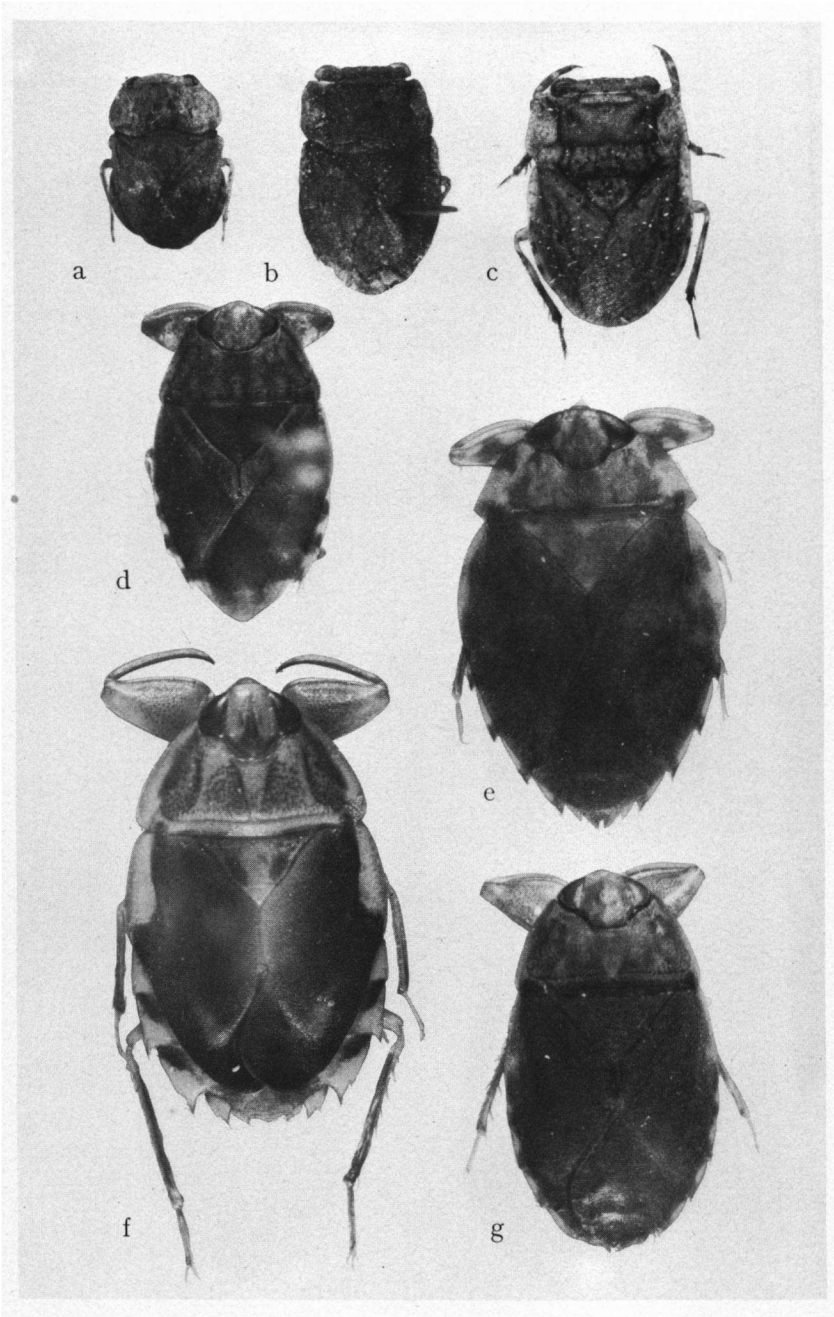
Pl. I. — *Limnocoris burmeisteri* from Suriname.



Plate II

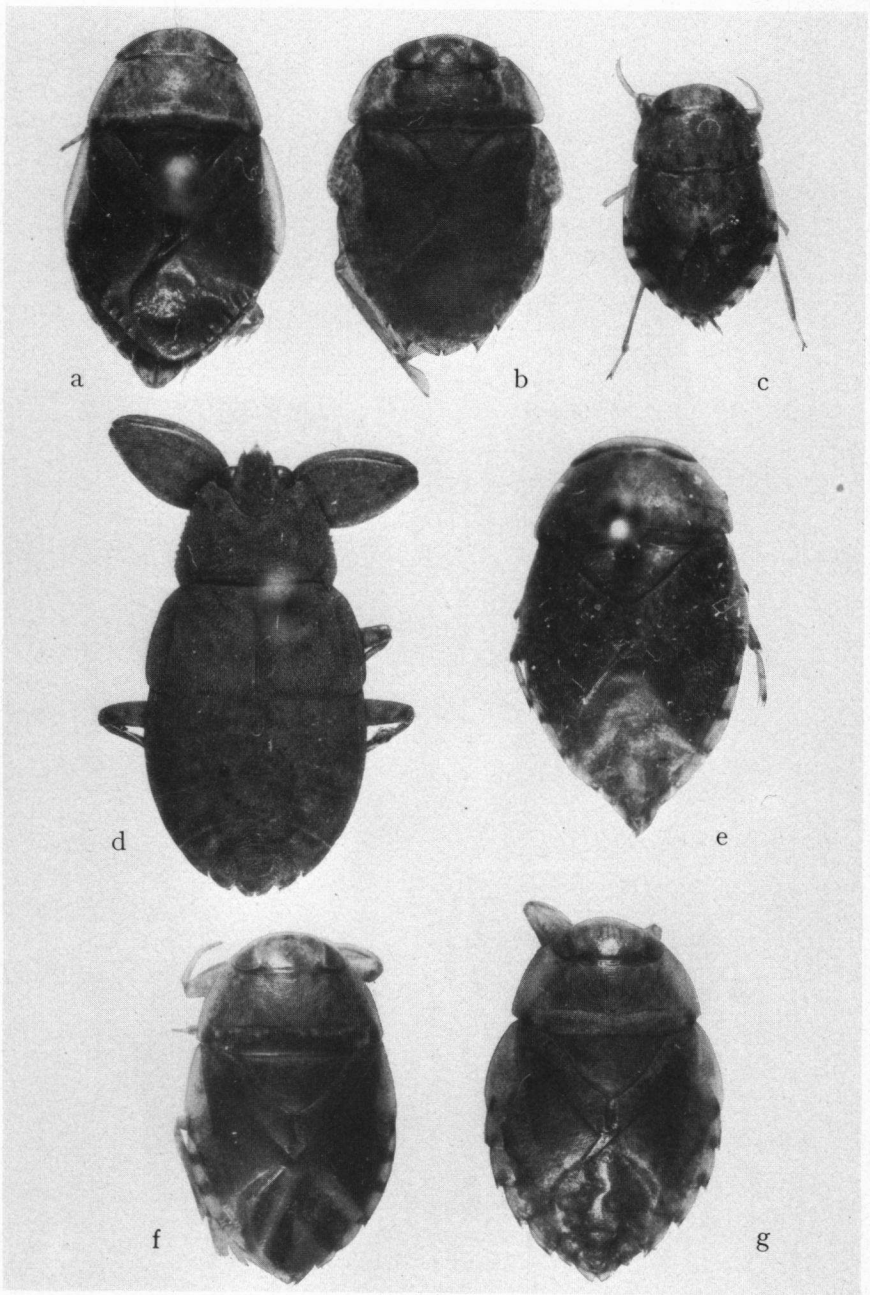


Pl. II. — a *Ochterus perbosci* from Suriname; b *O. aeneifrons surinamensis*, holotype, from Suriname; c *O. tenebrosus*, paratype, from Suriname; d *Gelastocoris fuscus* from Suriname; e *Montandonius angulatus* from Suriname; f *Gelastocoris flavus flavus* from Suriname; g *G. amazonensis* from Amazonas.

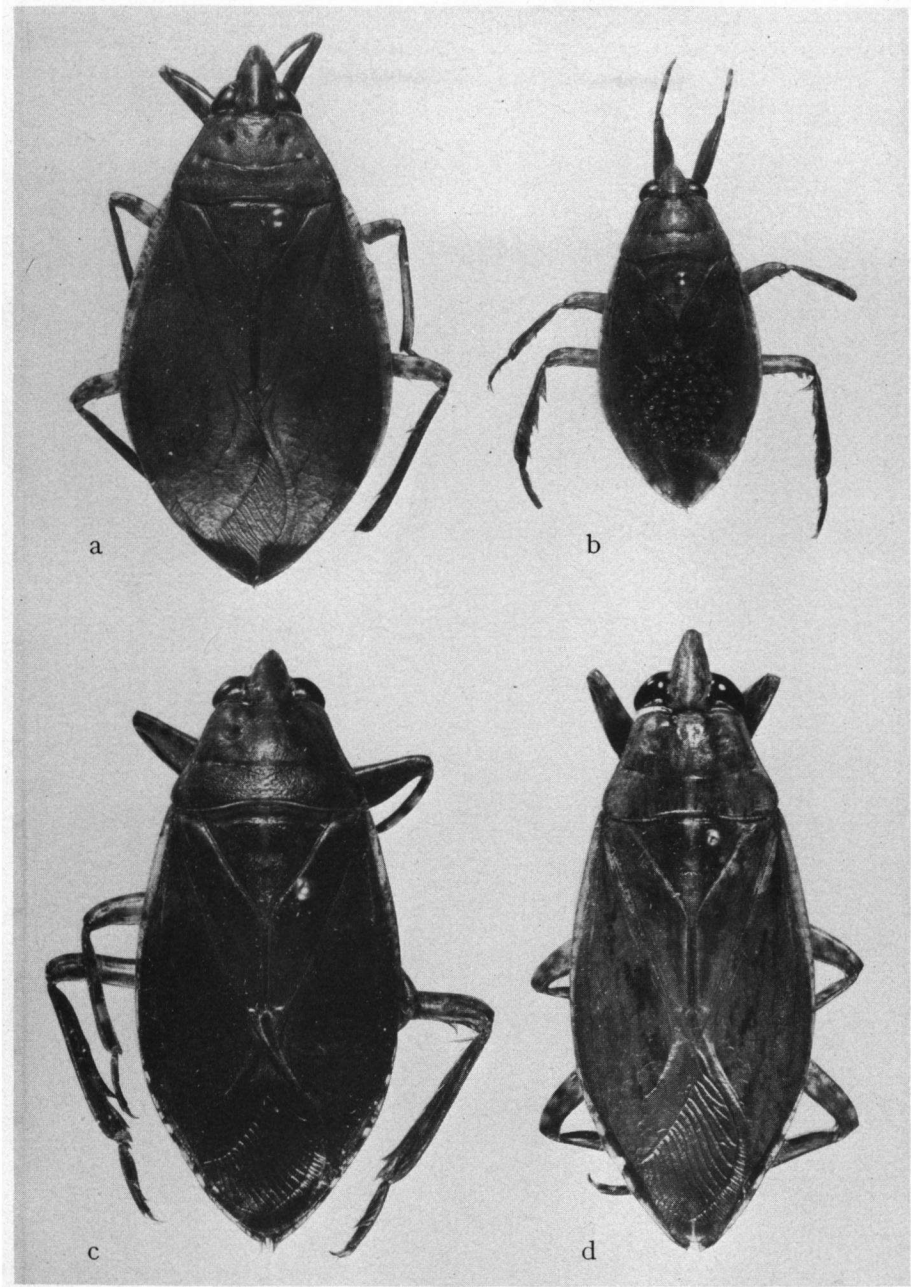


Pl. III. — a *Nerthra raptoria* from Suriname; b *N. borealis*, holotype, from N. Brasil; c *N. terrestris* from Suriname; d *Ambrysus bifidus*, paratype, from Suriname; e *A. usingeri* from Suriname; f *A. siolii* from Amazonas; g *A. stáli* from Suriname.

Plate IV

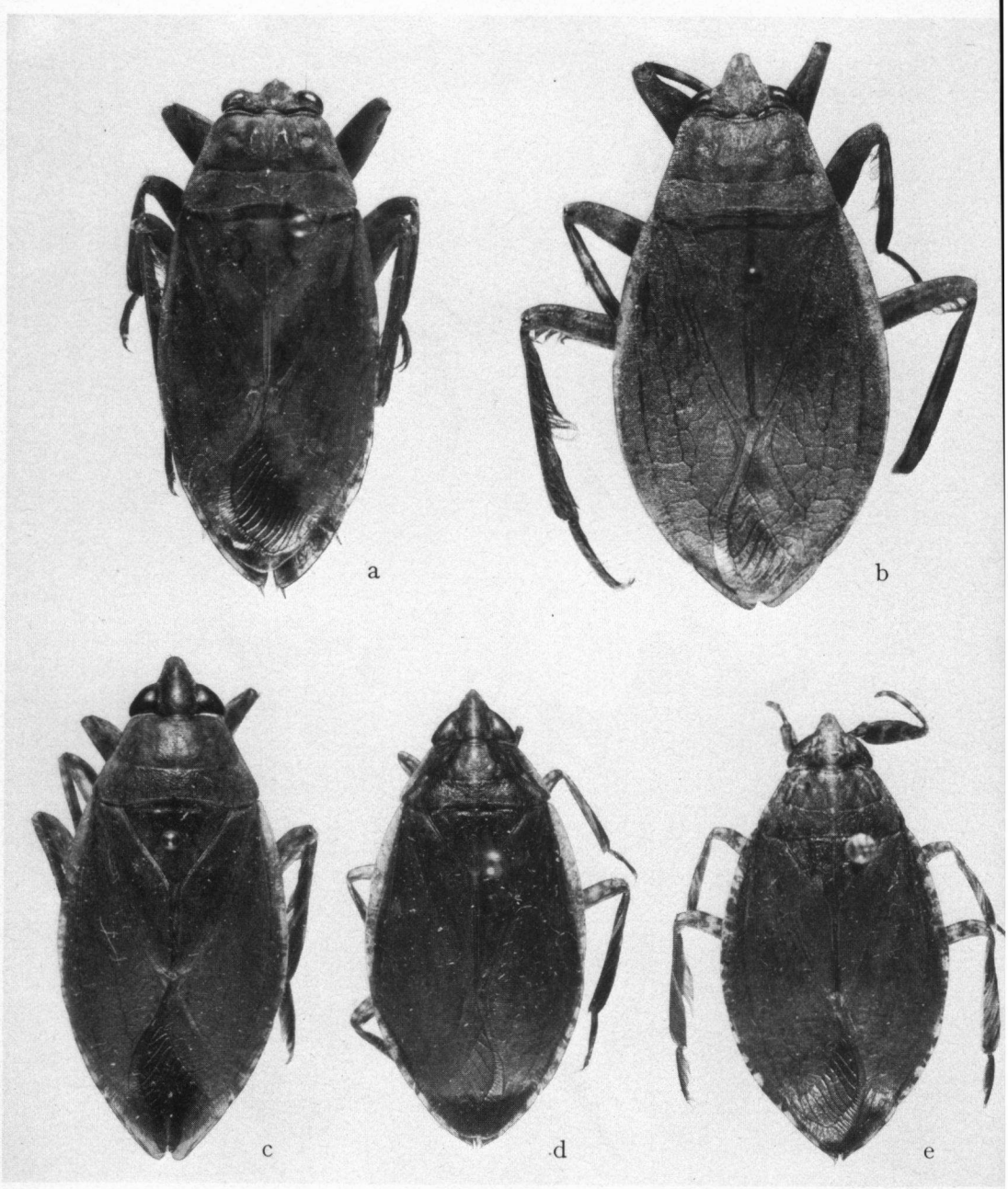


Pl. IV. — *Heleocoris spinipes* from Amazonas; b *Limnocoris fitzkau* surinamensis, paratype, from Suriname; c *Pelocoris procurrans* from Amazonas; d *Cryphocricos granulosus* from Brasil; e *Pelocoris politus* from Amazonas; f *P. poeyi* from Suriname. g *P. impicticollis* from Suriname.



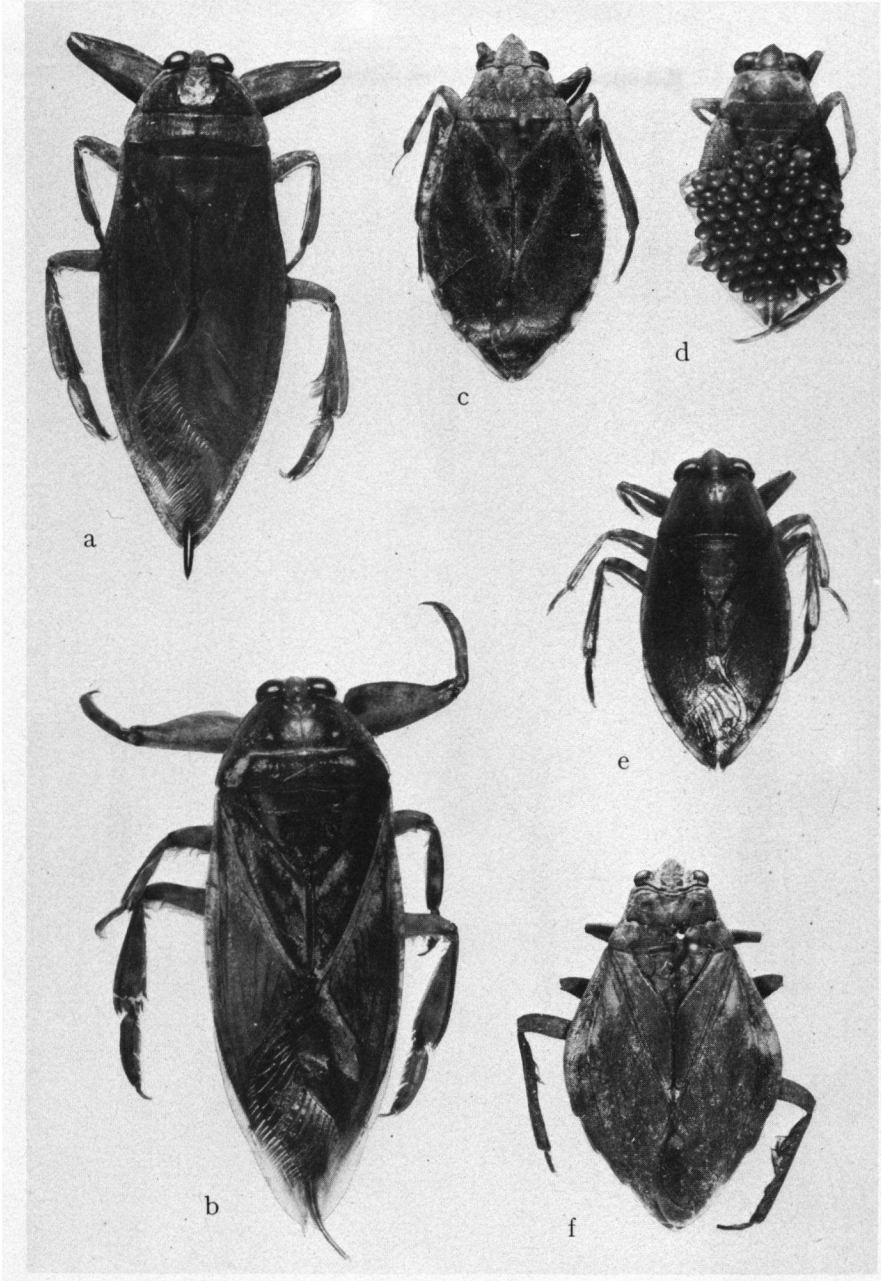
Pl. V. — a *Belostoma gestroi* from Suriname; b *B. guianae* from Suriname; c *B. harrisi* from Suriname; d *B. malkini*, paratype, from Venezuela.

Plate VI



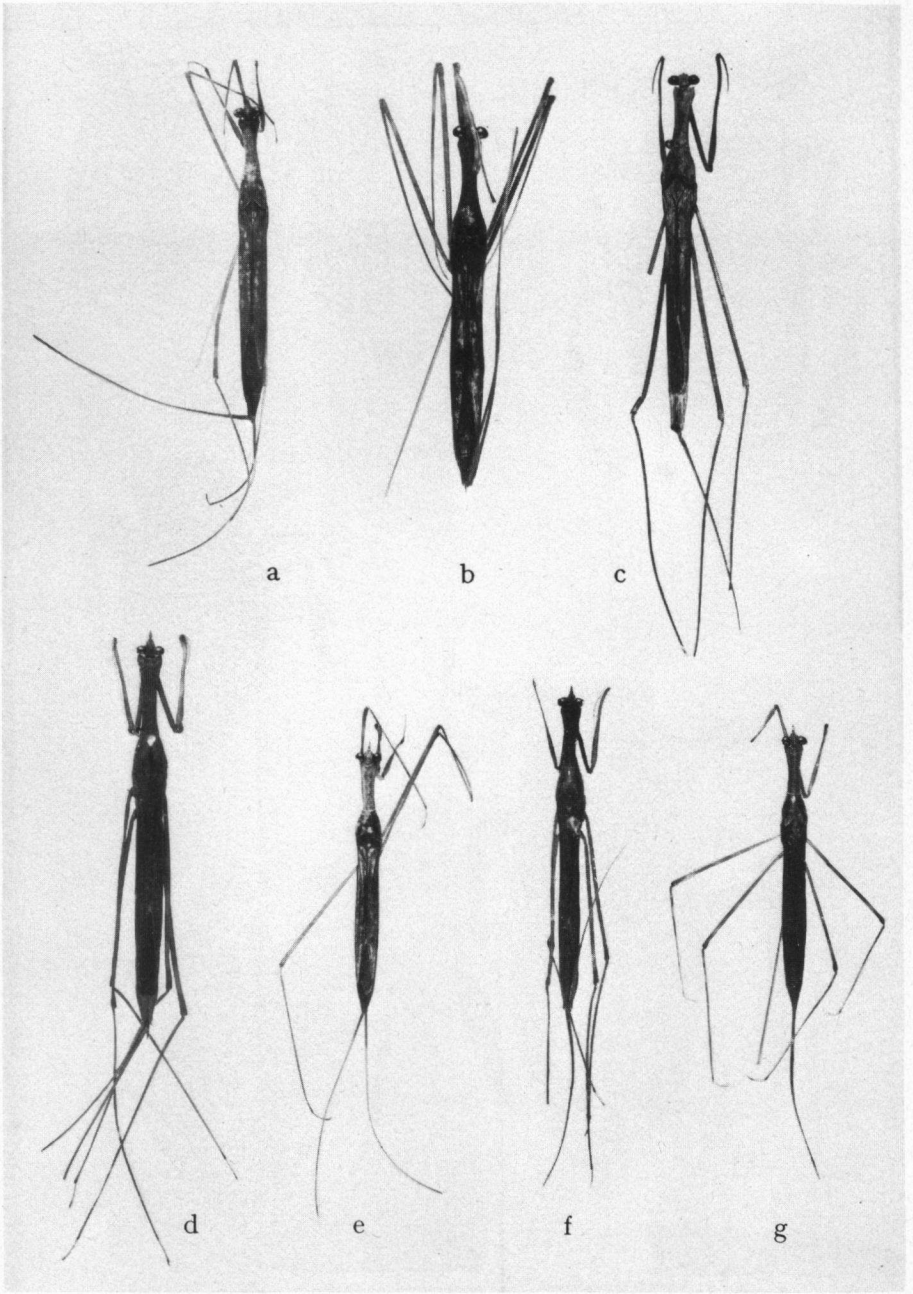
Pl. VI. — a *Belostoma aurivillianum* from Suriname; b *B. stollii* from Suriname; c *B. discretum* from Amazonas; d *B. bosqi* from Argentina; e *B. truxali* from Suriname.



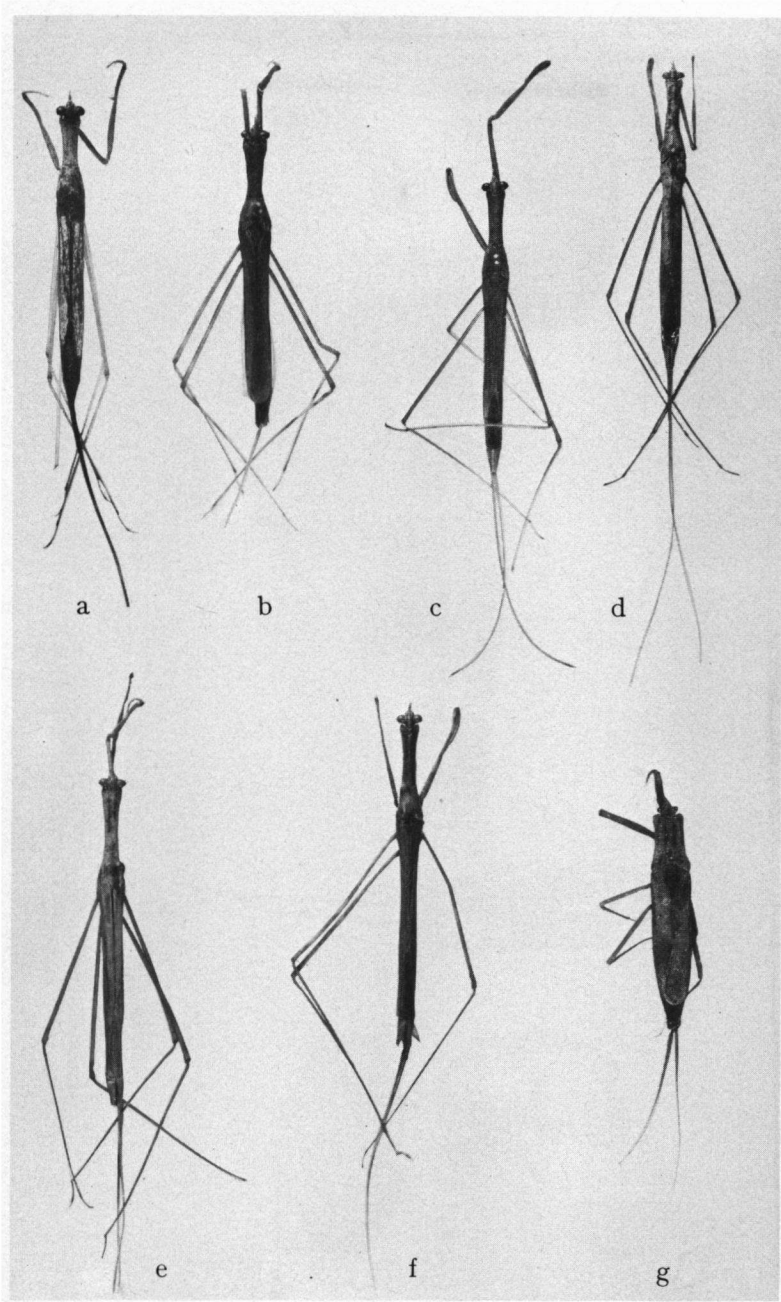


Pl. VII. — a *Lethocerus delpontei* from Suriname; b *L. annulipes* from Suriname; c *Belostoma bicavum*, paratype, from Amazonas; d *B. micantulum* from Suriname; e *B. denticolle* from Suriname; f *Weberiella rhomboides*, holotype, from Guyane Française.

Plate VIII

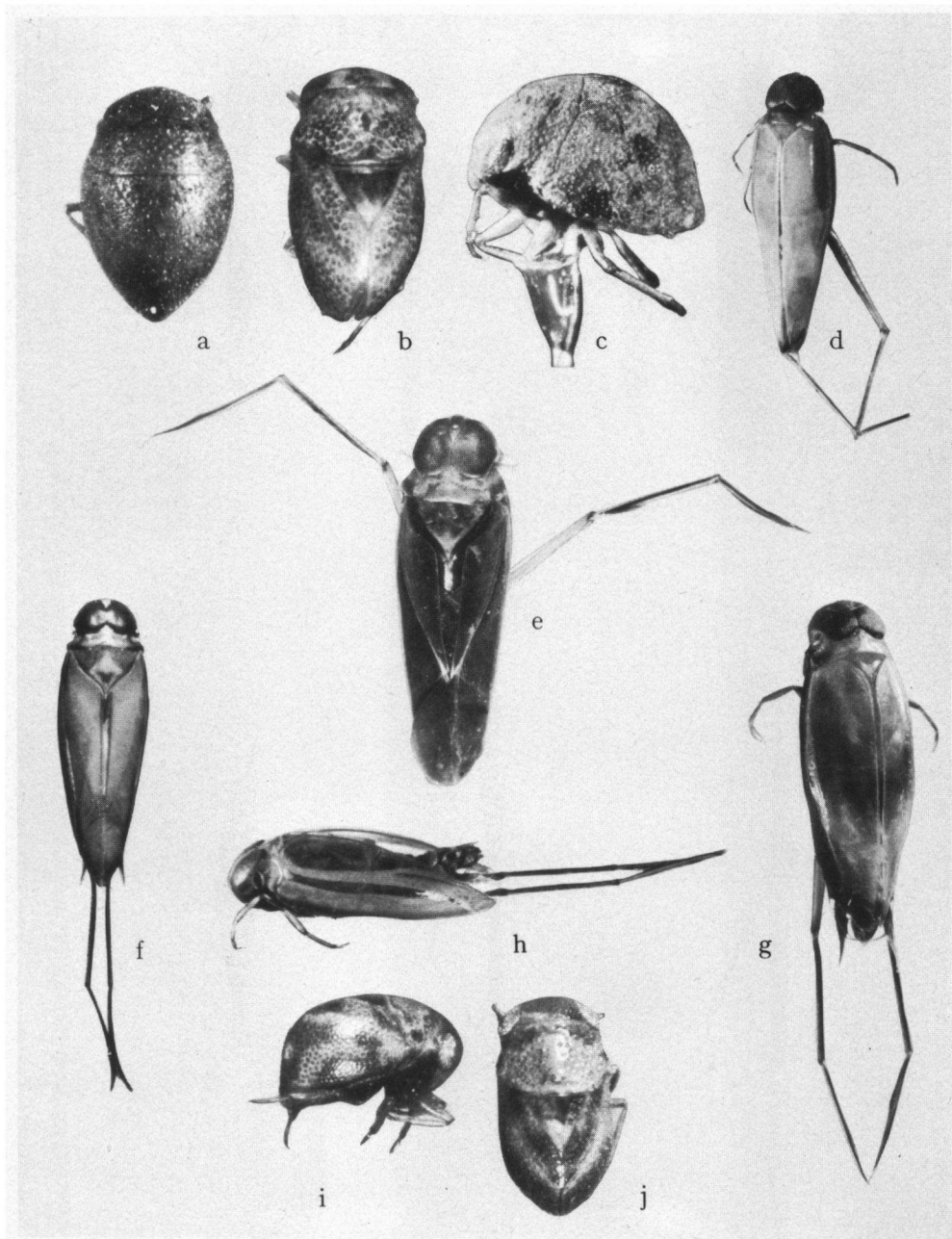


PL. VIII. — a *Ranatra doesburgi* from Suriname; b *R. macrophthalma* from Suriname; c *R. sattleri*, holotype, from Pará; d *R. tuberculifrons* from Suriname; e *R. mediana* from Suriname; f *R. mixta* from Suriname; g *R. obscura* from Suriname.

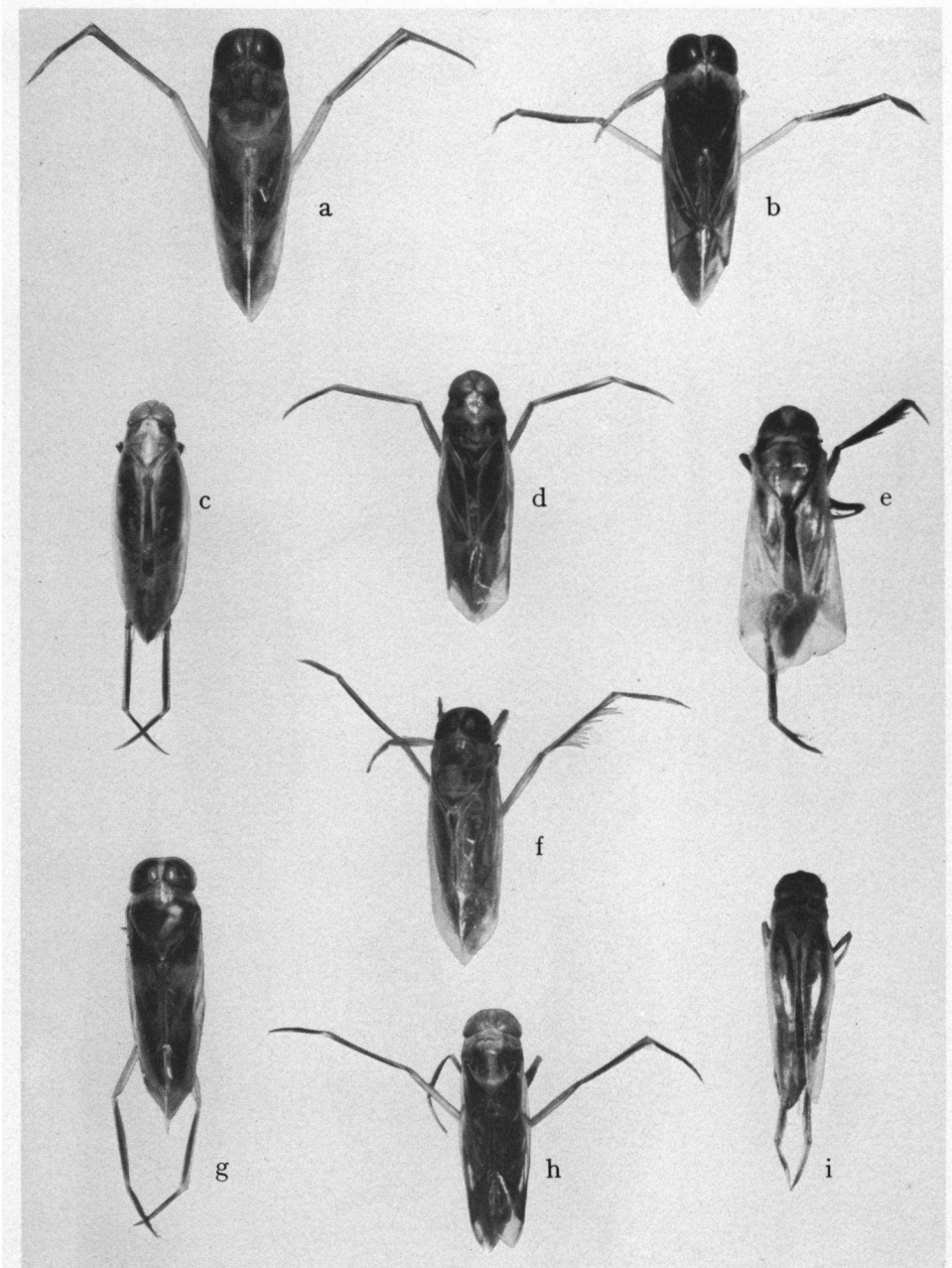


Pl. IX. — a *Ranatra sarmentoi* from Suriname; b *R. weberi*, holotype, from Amazonas; c *R. adelomorpha*, paratype, from Suriname; d *R. signoreti* from Amazonas; e *R. siolii*, holotype, from Pará; f *R. parvula* from Amazonas; g *Curicta doesburgi* from Suriname.



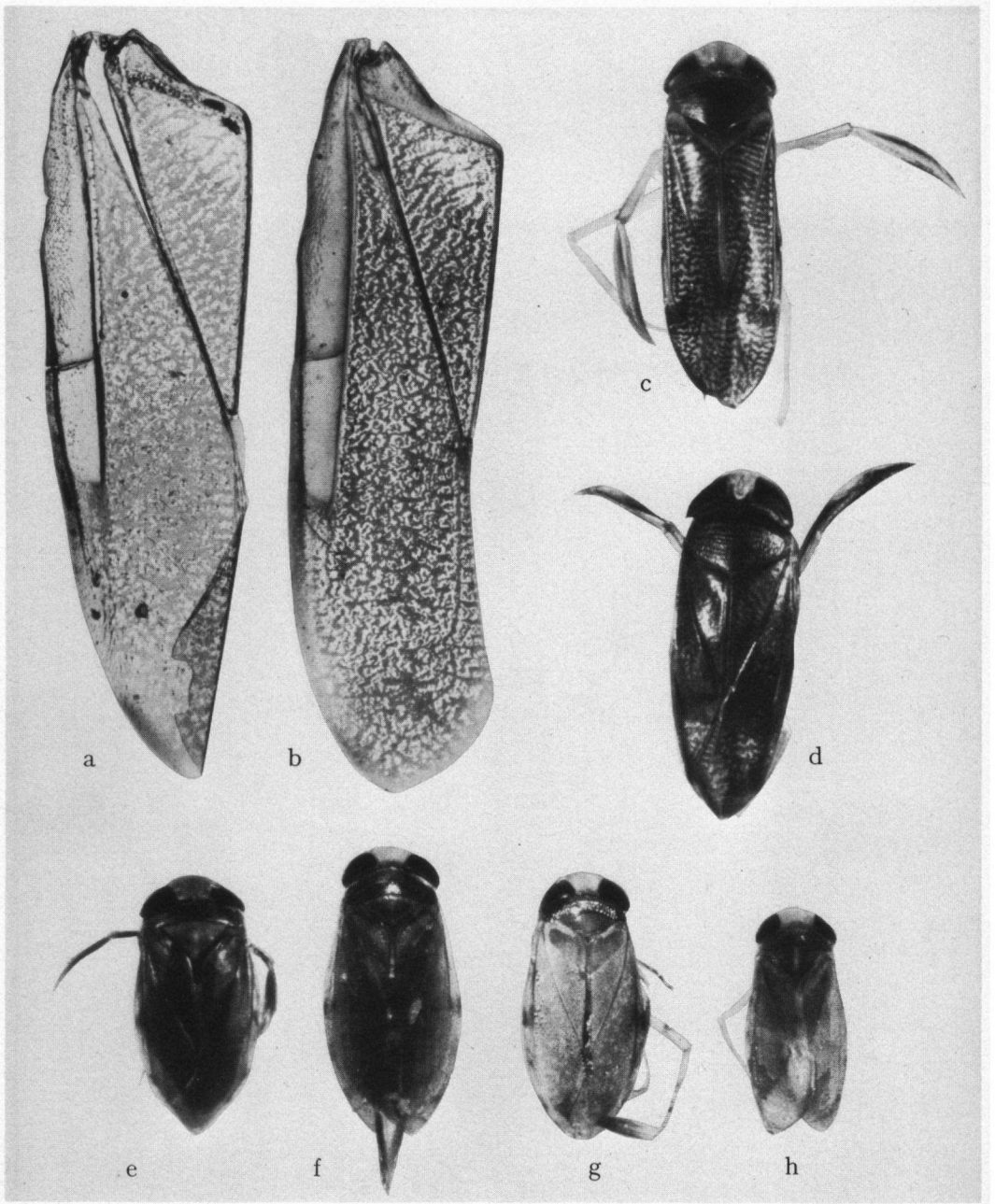


Pl. X. — a *Paratrephes hintoni* from Suriname; b *Paraplea puella* from Suriname; c *Paratrephes hintoni* from Suriname; d *Martarega hungerfordi*, brachypterous, from Suriname; e *M. gonostyla*, macropterous, from Suriname; f *M. brasiliensis*, macropterous, from Suriname; g *M. gonostyla*, brachypterous, from Suriname; h *M. membranacea*, brachypterous, from Suriname; i *Neoplea absona*, from Suriname; j *N. maculosa*, from Suriname.

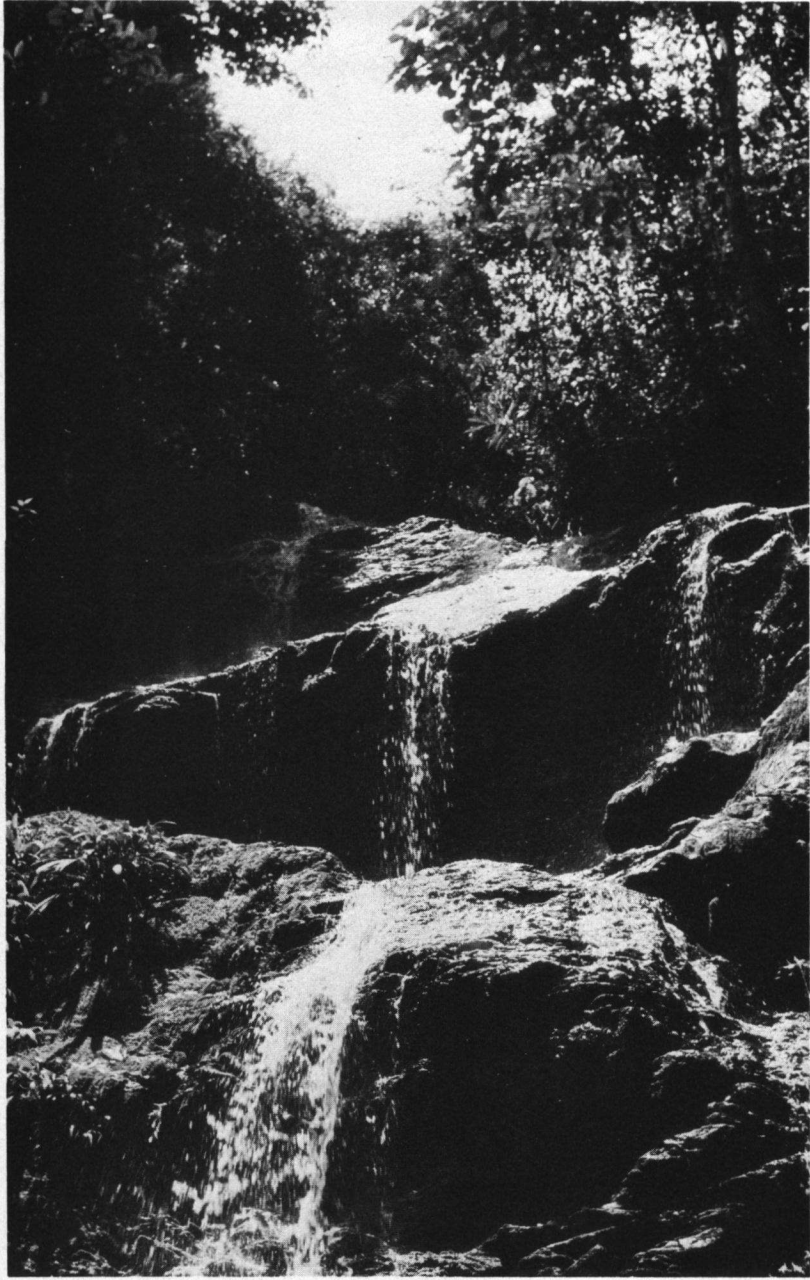


Pl. XI. — a *Buenoa communis* from Suriname; b *B. nitida* from Suriname; c *B. amnigenopsis*, brachypterous paratype, from Suriname; d *B. amnigenopsis*, macropterous paratype, from Suriname; e *B. salutis*, macropterous, from Suriname; f *B. incompta* from Suriname; g *B. fasciata* from Suriname; h *B. truxali* from Suriname; i *B. salutis*, brachypterous, from Suriname.

Plate XII



Pl. XII. — a *Heterocorixa lundbladi*, paratype, from Brasil, hemelytron; b *H. hesperia*, paratype, from Brasil, hemelytron; c *Trichocorixa verticalis* from Suriname; d *Heterocorixa surinamensis* from Suriname; e *Tenagobia schadei* from Suriname; f *T. pseudoromani*, paratype, from Suriname; g *T. latioculata* from Suriname; h *T. socialis* from Suriname.



Pl. XIII. — Brokoondo, Ireneval. Pools at top of water fall with *Buenoa nitida* and *B. truxali*.

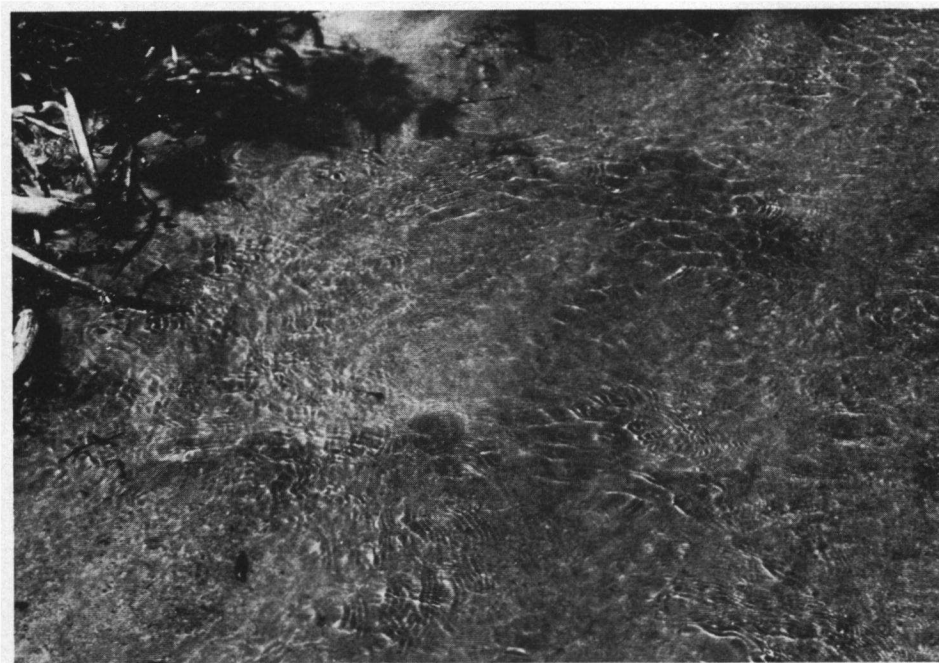
Plate XIV



Pl. XIVA. — Suriname, wet sandflat along the road to Matta (SN165). *Ochterus perbosci* in numbers, *Gelastocoris nebulosus* very few.

Pl. XIVB. — Suriname, mudflat on banks of Carolinacreek (SN096). *Gelastocoris nebulosus* quite abundant; in gully on fore-ground some *Mariarega brasiliensis*.





Pl. XVA. — Brokopoondo "micro barrage lake" along road to Brownsveg (SN230). *Tenagobia incerta* and *T. socialis* common at edges, *Martarega membranacea* abundant in free water.

Pl. XVB. — Suriname, along road to Matta, third tributary of Colakreek (SN162) *Limnocoris burmeisteri* quite abundant.

Plate XVI



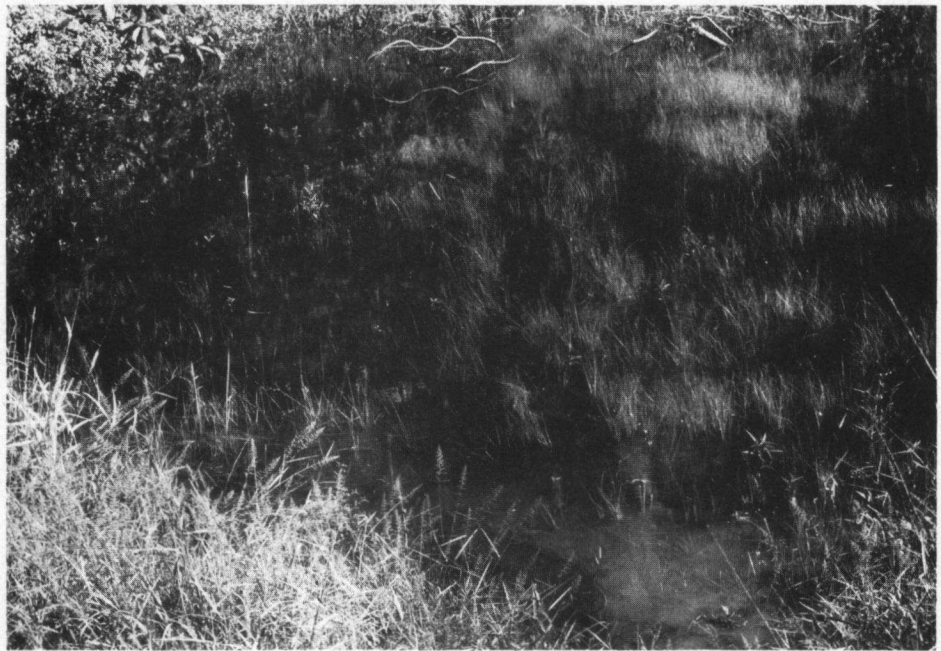
Pl. XVI. — Suriname, Carolinacreek, barrier (SN081/2). Type locality of *Ambrysus bifidus* which was collected together with *A. stali* in full stream; some specimens of *A. usingeri* and *Belostoma micantulum* at edges.



Pl. XVII. — Suriname, ditch in woods along road to Zanderij (S'Noos). Type locality of *Buena amnigenopsis*; *Martarega membranacea* abundant; *Belostoma denticolle* and *Ramatra obscura* one specimen each, at edges.



Plate XVIII



Pl. XVIII A. — Marsh on banks of Parakreek (SNogo). *Martarega brasiliensis*, *Belostoma micantulum* and *B. denticolle* one specimen each.

Pl. XVIII B. — Saramacca, pond on banks of Saramacca-River (SN350). *Tenagobia incerta* common at open edges; *Buenoa amnigenus*, *B. salutis* and *Martarega membranacea* 2, 1 and 1 specimens respectively.



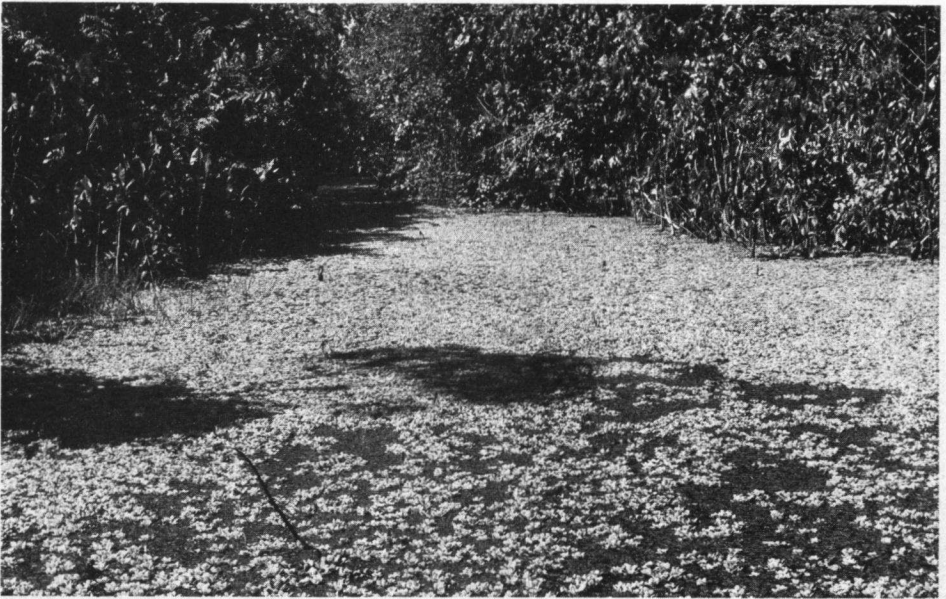
Pl. XIX. — Suriname, ditch along Oost–West Verbinding (SN158). *Plea absona* abundant; *Pelocoris poeyi*, *Curicta doesburgi* and *Belostoma harrisi* 3, 2 and 1 specimens respectively.

Plate XX



Pl. XXA. — Suriname, ditch along Oost-West Verbinding (SNr58, detail).  
Illustrating varied dense floating vegetation.

Pl. XXB. — Suriname, pond at Wilhelmina's Burg (SNo47). The prominent plant  
in and on the water is an *Ipomoea*. *Pelocoris poeyi* and *Plea absona* common;  
*Curicta doesburgi* and *Belostoma micantulum* 2, and 1 specimens respectively.



Pl. XXIA. — Saramacca, Jarikabakreek, dense floating vegetation consisting mainly of 2 species (SNo28). *Pelocoris poeyi* abundant; *Plea absona*, *Curicta doesburgi* and *Tenagobia socialis* 3, 1 and 1 specimens respectively.

Pl. XXIB. — Saramacca, ditch along Garnizoenspad (SNo20). *Pelocoris poeyi* and *Plea absona* abundant, *P. puella* 2 specimens in the floating *Lemna*; *Curicta doesburgi*, *Belostoma harrisi* common, *B. micantulum* 2 specimens on and in the mud at base of *Typha* at edges.





Pl. XXIIA. — Suriname, marsh at Coropinakreek, the stems are *Montrichardia* (SN155). *Martarega membranacea* abundant, *Buena saluti*s and *Tenagobia socialis* rather common.

Pl. XXIIB. — Commewijne, mangrove swamp at Belwaarde Plantation (SNo88). *Belostoma micantulum* and *Buena incompta* abundant; *B. amnigenus*, *Ranatra mediana* and *Tenagobia socialis* 3, 1 and 1 specimens respectively.



Pl. XXIII A. — Suriname, marsh at Coropinakreek, uniform vegetation of *Eleocharis* (SN156). *Belostoma denticolle* common.

Pl. XXIII B. — Suriname, marsh at Onverwacht, varied vegetation (SN179). Some *Belostoma denticolle*, *Paratrephes* (cf. *hintoni*) and *Pelocoris* (cf. *impicticollis*) larvae.

Plate XXIV



Pl. XXIVA. — Marowijne, Wia-Wia Conservancy, survey of saltmarsh at post Bigie Santie (SN470/1).

Pl. XXIVB. — Marowijne, Wia-Wia Conservancy, saltmarsh with *Avicennia*, *Batis* and *Sporobolus*. (SN471). *Trichocorixa orinocoensis*, *T. reticulata* and *T. verticalis* very abundant.