THE GENUS HYPOSTOMUS LACÉPÈDE, 1803, AND ITS SURINAM REPRESENTATIVES (SILURIFORMES, LORICARIIDAE)

by

M. BOESEMAN

Rijksmuseum van Natuurlijke Historie, Leiden

With 6 text-figures, 18 plates, 20 tables, and 19 diagrams

CONTENTS

INTRODUCTION

The imminent realization of the so-called "Brokopondo Project", first put forward in 1950, and involving the establishment of a barrage and hydro-electric plant in the Surinam River at Afobaka, eventually induced members of the Stichting Natuurwetenschappelijke Studiekring voor Suriname en de Nederlandse Antillen (Foundation for Scientific Research in Surinam and the Netherlands Antilles) to initiate a Biological Brokopondo Research Project. The basic subjects were to be the establishment of the various original biological aspects of the threatened area, and of the changes brought about by the development of an almost stagnant inland lake expected to finally cover at least 1300 square kilometres.

Under these auspices [1]), the present author initiated the zoological research from November 1963 to October 1964, a period including the closing of the Afobaka barrage and the most spectacular changes of environment and fauna; as the closing took place already on February 1, 1964, the initial activities had to be almost entirely restricted to the assembling of a representative collection of the original fish fauna. Subsequently, Dr. G. F. Mees, Curator of Ornithology at the Leiden Museum, took over from March 1965 to July 1966, adding to his task various collecting trips to other parts of Surinam. Finally, Mr. H. Nijssen, Curator of Fishes at the Amsterdam Museum, concluded the zoological part of the project during a visit from April 1966 to July 1967. Independently, Dr. W. Vervoort, Curator of Invertebrates at the Leiden Museum, also visited Surinam from March to July, 1966, assembling a collection of fishes mostly marine or from the coastal region. Excepting the material collected by Nijssen for the Amsterdam Museum, all specimens have been included in the Leiden Museum collections, with an estimated total number of 60 or 70 thousand.

The present paper deals with only a small part of this material, to which some specimens from previous collections available in the Leiden Museum are added. It is expected to be the fourth of a series of papers on Surinam fishes which may, eventually, make the Surinam freshwater fish fauna one of the best known of the whole South American continent. Three papers mostly based on the present collections already have been issued (Nijssen & Isbrücker, 1967, 1968; Mees, 1967; see list of references).

The generic name

The present genus has hitherto alternatively been named either *Plecostomus*, with Gronovius (Gronov, Gronow; 1763), Meuschen (1778), or Walbaum (1792) as authors, or *Hypostomus* Lacépède (1803). Erroneous or pre-Linnean references as given, e.g., by Regan (1904: 202; "*Plecostomus*

1) Besides important official support by the Surinam Government, and generous material support by the SURALCO (Surinam Aluminum Company), the necessary funds for the Biological Brokopondo Research Project were provided by the Stichting Wetenschappelijk Onderzoek Suriname — Nederlandse Antillen (Netherlands Foundation for the Advancement of Research in Surinam and the Netherlands Antilles), since 1965 the Stichting voor Wetenschappelijk Onderzoek in de Tropen (Netherlands Foundation for the Advancement of Tropical Research), and the Rijksmuseum van Natuurlijke Historie at Leiden, which also provided the collecting equipment. The Zoölogisch Insulinde Fonds kindly provided the means to visit the British Museum (Natural History), London.

Gronow, Mus. i. p. 24 (1758)", should be dated 1754) or Puyo (1949: 104; "Gen. **Plecostomus** Gronov, 1754") are here neglected.

In a previous paper (1960: 114), I already briefly discussed this subject, but it seems opportune to here reconsider the arguments more in detail, especially as I previously omitted to evaluate Walbaum as a potential author of *Plecostomus*.

To my knowledge, the name *Plecostomus* was first used by Artedi when preparing a manuscript on Seba's fishes (see Wheeler, 1962: xiii-xiv), shortly before his untimely death in 1735. This was correctly referred to by Gronovius (1754: 24; 1756: 15), who was the first to publish the name, including in the genus four species which may be identified as: no. 67 (cf. Gronovius), *Hypostomus plecostomus* (Linnaeus, 1758); no. 68, *Loricaria* (or *Loricariichthys*) *maculata* Bloch (1794); no. 69, *Loricaria cataphracta* Linnaeus (1758); and no. 167, *Ancistrus cirrhosus* (Valenciennes, 1840) or *A. temminckii* (Valenciennes, 1840), as already suggested by Valenciennes (1840). I re-examined the still extant type specimen of Gronovius' no. 69 (BM 1853.11.12.195-6), and found that Valenciennes was evidently correct when identifying it with *Loricaria cataphracta* Linnaeus, in spite of different suggestions expressed by Wheeler (1958: 214). The identity of the here most interesting item, Gronovius' species no. 67, will be discussed in a later chapter of the present paper.

Linnaeus (1754: 55; 1758: 238, 307-8; 1766: 508) never used the generic name *Plecostomus*. This does not surprise us for the first item, published in the same year as Gronovius' first publication of the name (though his acquaintenance with Artedi might have induced him to use it), but in the second and third Gronovius is repeatedly quoted, indicating that Linnaeus deliberately omitted its use. Unfortunately, Linnaeus in the first two items included Gronovius' *Plecostomus* no. 67 in his genus *Acipenser*, where it proved to be so well hidden that many subsequent authors considered *Loricaria plecostomus* Linnaeus (1766: 508) the first record of the only [2]) real *Plecostomus* species known at the time (e.g., Günther, 1864: 231; Regan, 1904: 205; Ribeiro, 1911: 414; Eigenmann, 1912: 223; van der Stigchel, 1946: 128, 1947: 128). Favourable exceptions, correctly referring to *Acipenser plecostomus* Linnaeus (1758: 238) are (e.g.) Bleeker (1864: 8), Gosline (1947: 128), and Fowler (1954: 191).

The first post-Linnean record of the name *Plecostomus* was again by Gronovius (1763: 127), and as such was generally accepted by subsequent authors until 1954, when Gronovius' "Zoophylacium" was placed on the official

2) Neglecting pre-Linnean literature (Marcgrave, 1648).

index by the International Commission on Zoological Nomenclature (Opinion 261, (ed.) Hemming, 1954), and thereby became no longer available for nomenclatorial purposes. In fact, the "Zoophylacium" had already been "eliminated from consideration as respects (its) systematic names" in 1925 (Opinion 89, (ed.) Stiles & Jordan), but some authors continued using it in this sense, while others since that time referred to Meuschen (1778: 39) as the author of *Plecostomus*. But the same fate struck Meuschen, when in 1954 it was also placed on the index (Opinion 260, (ed.) Hemming).

Though some authors continued considering either Gronovius or Meuschen the authors of *Plecostomus*, apparently unaware of the above decisions, others started ascribing the genus to Walbaum (1792: 663), e.g., Fowler (1954: 191), or neglected the authorship problem.

Walbaum's volume (1792) consists of extensive original and binominal parts, as addenda to his review of Artedi's "Genera Piscium", which seem wholly acceptable and have found general acceptance by modern authors. However, in other large sections Walbaum merely quoted or extracted previous, partly non-binominal, literature (Klein, Linnaeus, Gronovius, Bloch, Forskål, Gouan, Forster, Brünnich, Scopoli, Hermann, and Houttuyn). In the present case, *Plecostomus* is proposed as a generic name in the chapter "Nova genera Gronovii" (: 633-669), neglecting references to Seba and Gronovius elsewhere (: 573, 624-5). In this chapter, Gronovius' nomenclature and diagnoses are repeated and, considering the occasional addition of binominal synonyms (e.g., from Linnaeus, 1766) of no primary importance, it seems beyond doubt that this whole chapter should be rejected for nomenclatorial purposes and placed on the official index. In fact, the same has already been done with the chapter "Nova genera Kleinii" (Opinion 21, (ed.) Stiles, 1910).

Reconsidering the evidence as stated above, the next proposal of the generic name *Hypostomus* (= *Plecostomus* auct.) by Lacépède (1803: 145) must be regarded as the first wholly complying with current nomenclatorial requisitions.

The type species of Hypostomus Lacépède

Lacepède (1803: 145, pl. 4 fig. 2) included in his genus *Hypostomus* only a single species. *H. guacari*, which therefore must represent the type species. Unfortunately, the identification of Lacépède's species, usually considered identical with *Hypostomus plecostomus* (Linnaeus, 1758), poses some problems.

The textual information provided in Lacépède's description, as usually, is very scanty and does not distinguish his species from most *Hypostomus* species now known; only the description of the colour and markings: "des taches inégales, arrondies, brunes ou noires", somewhat restricts the possibilities. The general colour, described as "différentes nuances d'orangé", is not surprising, as I found such a colour in several old specimens preserved in alcohol; quite likely, this information was based on Bloch's description and coloured figure (1794: 71, pl. 374), or taken from Marcgrave (1648: 166).

Lacépède does not state to have seen any specimens, and this can neither be deduced from his figure, presented as "*variété de* L'HYPOSTOME *guacari*", as this appears to have been made after a drawing by Commerson (cf. Valenciennes, 1840: 366 (495)) representing *H. commersonii* Valenciennes. Considering the distribution of *H. commersonii*, this interpretation agrees with the fact that Commerson in 1766 directly sailed from France to Montevideo and Buenos Aires (Boeseman, 1960a: 91). Therefore, it may be assumed that Lacépède based his species solely on the descriptions by previous authors, which he listed in his short discourse, and which must here be discussed in some detail to try to ascertain the identity of the species. Lacépède's figure needs not be discussed here, as it is stated to represent a mere variety (in fact a separate species), and not the species he actually had in mind.

Lacépède's references are as follows:

"Loricaria pleocostomus. *Linné, édition de Gmelin.*" — In this edition (1788: 1363), the crucial paragraph is identical with that given previously by Linnaeus (1766), in which a few references (Seba, 1758; Marcgrave, 1648) were added to Linnaeus' 1758 text. The introduction here of Marcgrave is unfortunate as that author must have described (a) different species (D I.11?; from northeastern Brazil, probably *Hypostomus duodecimalis* Valenciennes (= *Pterygoplichthys etentaculatus* (Spix), as already presumed by Valenciennes, 1840), but apparently this did not influence the scant information provided in Linnaeus' earlier edition except by enlarging the distributional area from Surinam to South America. Seba, subsequently discussed, evidently figured the same species as described by Linnaeus. Therefore, "Gmelin's" description should be identified with *Hypostomus plecostomus* (Linnaeus), a species without spots on the belly from coastal Surinam, as will be discussed in the next chapter.

"Loricaire guacari. *Daubenton et Haüy, Encyclopédie méthodique*". — This reference is inaccurate as Daubenton & Haüy (1787: 133) list the species only as "Diptère". After a list of the usual references (Linnaeus, 1754, 1766; Gronovius, 1754; Seba, 1758; and unfortunately Marcgrave, 1648; excepting Marcgrave all apparently concerning *H. plecostomus* (Linnaeus)), they give a detailed description stated to be wholly taken from Gronovius (1754). Linnaeus' species has correctly always been considered identical with that of Gronovius, as will be discussed further on. Therefore, this reference evidently concerns *Hypostomus plecostomus* (Linnaeus).

"Id. *Bonnaterre, planches de l'Encyclopédie méthodique*". — The figure given by Bonnaterre (1788, pl. 65 fig. 260) is a slightly altered copy of a better figure by Gronovius (1754, pl. 3 fig. 1), thus should be interpreted as *Hypostomus plecostomus* (Linnaeus).

"Loricaire plécostome. *Bloch, pl.* 374". — (pl. 1 fig. 2). — Bloch's figures (1794, pl. 374) apparently represent a species with a subdivided post-occipital scute, with a dorsal fin which, when deflated, falls considerably short of the second dorsal, and with a depth of the caudal peduncle comprised about 1.9 times in the interdorsal length. These characters make the current identification with *Hypostomus plecostomus* (Linnaeus) quite impossible, but completely correspond with those I found in *H. watwata* Hancock (1828), a species frequently occurring in the coastal regions of the western Guyanas. Unfortunately, the figure representing a ventral view shows a belly without dark spots; such spots would have strongly confirmed an identification with *H. watwata*, but the markings may have been deliberately left out as in his text Bloch states "Ueberall bemerkt man ... Flecke" (: 71). The statement that the principal colour of the species is orange, as also shown by the figure, was repeated by Lacépède and may have originated with Marcgrave's description (1648: 166), though that author must have described a (probably two) different species. Bloch distinguished himself by referring, in this text, to Marcgrave's species in plural ("Diejenigen Arten dieses Fisches, die sich im heiligen Franciska-Flusse aufhalten, ..."). Resuming, there seem to be conclusive arguments to identify Bloch's figures with *Hypostomus watwata* Hancock, especially as Bloch described several Surinam species, while his text is composite.

"*Mus. Ad. Frid.* 1, *p.* 55, *tab.* 28, *fig.* 4". — (pl. 1 fig. 1). — This refers to the first description of Linnaeus' species (*Acipenser indicus*; 1754: 55), and must be identified as *Hypostomus plecostomus* (Linnaeus).

"Plecostomus dorso dipterygio, etc. Gronov. *Mus.* 1, *n.* 67, *tab.* 3, *fig.* 1 *et* 2". — (pl. 2 fig. 1, 2). — As will be explained further on, Gronovius' species (1754: 24, pl. 3 fig. 1 & 2), already referred to as identical by Linnaeus (1758: 238), should be identified with *Hypostomus plecostomus* (Linnaeus).

"*Seba, Mus.* 3, *tab.* 29, *fig.* 11". — (pl. 2 fig. 3). — Seba (1758, pl. 28 fig. 11) had in his collection many specimens of Surinam fishes, which must have been collected in the coastal regions considering the dangers of venturing further inland, at the time increased by the slave revolts. As Seba figures a species without spots on the belly, and with a dorsal which, when deflated, reaches the second dorsal, an identification of his species with *Hypostomus plecostomus* (Linnaeus) seems most plausible.

"Guaccari. *Marcgrav. Brasil.* 166". — The interpretation of the information provided by Marcgrave (1648: 166, fig.) is difficult because the rather extensive description does hardly contain any pertinent characters, while apparently a separate form from the São Francisco is referred to in the final paragraph. However, considering also Marcgrave's figure (D I. 11), there seems to remain little doubt that the principal parts of the description should be identified with *Pterygoplichthys etentaculatus* (Spix, 1829), as already suggested by Valenciennes (1840: 368 (498)), while the São Francisco form may be regarded as possibly a real *Hypostomus* species, but of uncertain identity.

Reconsidering, Lacépède's references apparently include *Hypostomus plecostomus* (Linnaeus) (6 authors), *Hypostomus watwata* Hancock (1 author), and *Pterygoplichthys etentaculatus* (Spix) (1 author), while his figure is presumed to represent *Hypostomus commersonii* Valenciennes. As *Hypostomus watwata* (since 1912, cf. Eigenmann, 1912: 225), *H. commersonii*, and *Pterygoplichthys etentaculatus* are all well established names, and as *H. guacari* has hitherto invariably been synonymized with *H. plecostomus* (Linnaeus), the only way to stabilize current nomenclature must be an interpretation of Lacépède's species as *Acipenser plecostomus* Linnaeus, of which it becomes a subjective junior synonym. This also agrees with the circumstance that Lacépède quite likely did not have any material available (I was unable to locate any specimens in Paris which Lacépède may have had at his disposal), while in his references Linnaeus' species by far prevails. To create a sound base for this decision, the neotype of *Acipenser plecostomus* Linnaeus (Leiden Museum, reg. no. RMNH 18240; see next chapter) is hereby also indicated as the neotype of *Hypostomus guacari* Lacépède, 1803.

As a result, *Acipenser plecostomus* Linnaeus (= *Hypostomus plecostomus* (Linnaeus)) becomes the type species of *Hypostomus* Lacépède; the same species had previously already been designated as the type species of "*Plecostomus* Art., Gron." by Bleeker (1862: 2).

While the name of the type species has thus been established, its identity now needs further consideration.

The identity of Acipenser plecostomus Linnaeus

Linnaeus (1758: 238) based *Acipenser plecostomus* on his *Acipenser indicus* (1754: 55, pl. 28 fig. 4) and on Gronovius' *Plecostomus* species no.

67 (1754: 24, pl. 3 fig. 1, 2).

The first reference seems the most important, as it concerns (a) specimen(s) examined by Linnaeus himself. Unfortunately, the scant description by Linnaeus does not provide any pertinent information enabling a specific identification, but the figures, though not very accurate, seem to indicate that the species concerned has a dorsal fin which, when deflated, about reaches the second dorsal, and a depth of the caudal peduncle comprised about 1.6 times in the interdorsal length in the figure showing an oblique dorsal view; in the second figure, representing the same specimen in oblique ventral view, the depth of the caudal peduncle seems much less, but presumably the peduncle here is seen more obliquely.

Linnaeus (1754) gives as locality only "India", which must mean the West Indies, thus presumably the northern South American coast. In this connection, it is of utmost interest to know from where King Adolf Fredrik obtained the South American species, which were included in his cabinet and described by Linnaeus. The year of issue of Linnaeus' paper is here decisive: it is well known that Daniel Rolander, a pupil of Linnaeus, visited South America, but he left Sweden only in 1755. The only previous collector who presented specimens to King Adolf Fredrik (in 1754), was Carl Gustaf Dahlberg, who stayed in Surinam from about 1746 to 1781, not counting three short visits to Europe. An interesting account on his life in Surinam has been given by Holthuis (1959), from which this information is taken. It seems beyond doubt that Dahlberg collected also the specimen(s) described by Linnaeus, and that consequently the specimen(s) came from Surinam. Considering also the dificulties at the time encountered when venturing inland, increased by the slave revolts, we may assume that Linnaeus' specimen came from coastal Surinam, probably not very far from Paramaribo. In fact Linnaeus (1758: 238) records Surinam as the locality.

An identification of Gronovius' species meets with about the same difficulties, but both Gronovius' text and figures are much more detailed and accurate. They concern a species with the deflated dorsal fin reaching the second dorsal, and with the depth of the caudal peduncle comprised slightly more than once in the interdorsal length, both characters about agreeing with Linnaeus' *Acipenser indicus*. Furthermore, the specimen is described to be ash greyish, with small scattered round dark spots, lacking on the light belly; the dorsal, pectoral, and ventral fins are darkly spotted.

The specimen is stated to have been collected in a Surinam river, and it is interesting to note that Gronovius may have received Surinam specimens from the Governor of Surinam (via D. Luyx Massis) and possibly from A. Vosmaer, who afterwards became director of the cabinet of the Stadholder, eventually known to have included many Surinam specimens (Wheeler, 1958: 202). Circumstances for collecting having been the same as encountered by Dahlberg, we may assume that Gronovius' specimen too came from coastal Surinam, probably from a river outlet not far from Paramaribo.

Reconsidering the above evidence, it seems most likely that Linnaeus' and Gronovius' specimens belonged to the same species, occurring in costal Surinam, and distinguished by a deflated dorsal reaching the second dorsal, by a depth of the caudal peduncle comprised at most 1.7 times in the interdorsal length, and with a belly lacking spots.

During my present research on more than 600 *Hypostomus* specimens from Surinam, excluding several additional examples from Guyana, Surinam, and (French) Guyane examined in the British and Paris Museums, I found that only two species frequently occur in the Surinam coastal zone, while about a dozen are mostly restricted to the inland cataracts. One of the coastal forms, here identified as *Hypostomus watwata* Hancock, has a dorsal fin which, when deflated, falls considerably short of the second dorsal fin, a depth of the caudal peduncle comprised 1.9 to 2.3 times in the interdorsal length, and a conspicuously spotted belly, therefore can not be considered identical with Linnaeus' (and Gronovius') species. The second, however, shows a complete agreement in these pertinent characters as recorded by Linnaeus and Gronovius, and should be identified as *Hypostomus plecostomus* (Linnaeus), the type species of *Hypostomus* Lacépède, 1803. This confirms most of the identifications I previously recorded (Boeseman, 1953: 10, excepting the Marowijne basin items; 1954: 22; 1956: 190).

Unfortunately, the original specimens described in 1754 by Linnaeus and Gronovius are apparently no longer extant (cf. Günther, 1899; Holm, 1957; Lönnberg, 1896; Dr. Greta Vestergren, Stockholm, in lit.; Mr. P. J. P. Whitehead, London, in lit.). Dr. Vestergren actually found three juvenile specimens (57, 80, 84 mm) labelled "*Loricaria Plecostomus*", and presumably from the Adolf Fredrik collection, in the Stockholm Museum. However, a comparison of these examples with Linnaeus' figure (1754, pl. 28 fig. 4) showed that "neither of the specimens does fully agree with the figure", while "in some cases the differences are so conspicuous that ... none of these three specimens may have been the prototype for Linné's figure", so they do not seem acceptable for type selection. Therefore, to further nomenclatorial stability, I hereby designate a specimen from the coastal waters of the Surinam River outlet (reg. no. RMNH 18240, leg. Dr. D. C. Geijskes, August 1944, 175 (233) mm) as the neotype of *Acipenser plecostomus* Linnaeus, 1758 (= *Hypostomus plecostomus* (Linnaeus)). At the same time, the type locality is restricted to the Surinam River outlet.

The distribution and habitats of the Surinam species (fig. 1, 2)

The remarkably large number of species of *Hypostomus* I found represented in the new collections, which will be described in detail elsewhere in the present paper, can be divided geographically and ecologically into two groups, one inhabiting the interior, the other occurring only in the coastal region.

The species found in the interior seem to usually occur only in or near cataracts and rapids, in well aerated clear water, about saturated with oxygen. In the Surinam River basin, smaller specimens occasionally were found in forest tributaries, with a temperature of the water of about 24 to 25° C and a pH measuring 5.0 to 6.1, but larger specimens usually in the main rivers, with the temperature reaching about 30° C and the pH almost 7.0 (Afobaka, November 1963; Leentvaar, 1964b: 5). While I am inclined to surmise that juveniles are not or much less strictly bound to rapids or cataracts, these seem to be at least the favourite habitats of more adult specimens. In fact, the adults of at least some species appear to have lost the possibility to pass the more tranquil stretches of the river, though possibly only in upstream direction. This was convincingly demonstrated a few times during our survey of the Surinam River, when, passing cataracts or rapids just reached by the upper limits of the stagnant water of the developing Brokopondo Lake, we saw numerous dead *Hypostomus* specimens floating on the surface. Unfortunately, all *Hypostomus* specimens in the Surinam River at the time being expected to represent only the common species *H. plecostomus* and *H. watwata*, none of the rapidly deteriorating specimens was collected or adequately identified. No, or hardly any, other fish species were seen floating in these circumstances, and it seems clear that other species either had no difficulty in evading the increasing lake by swimming upstream, or were able to survive in stagnant waters.

Considering this strong attachment to a very special and localized environment, it is not surprising that I found most inland species in Surinam to be restricted each to a rather small area, consisting of only a single, or a few adjacent, river systems. Most likely, this circumstance also had a considerable, possibly even decisive, influence on speciation, as it seems difficult to otherwise explain the occurrence of several related species in the same river system (e.g., four or five species in the inland Surinam River basin).

The coastal species (*H. plecostomus* and *H. watwata*, neglecting a single specimen from near Paramaribo evidently representing a rare third species) live in an area where no cataracts or rapids occur, in more slowly flowing, muddy water, even venturing into the rather salty estuaries of the Surinam rivers. Apparently, their distribution must have met with hardly any physical or chemical obstacles, and in fact the area they inhabit has been recorded to reach from Venezuela eastward to probably somewhere in or beyond (French) Guyane. On the other hand, the inland records exceeding a distance from the coast of about 100 km, and covering most of tropical South America, must be erroneous if only for environmental reasons.

Actually, the distribution of *H. watwata* Hancock appears to be much more restricted. During a visit to the Paris Museum, I found that the type material of *H. verres* Valenciennes, hitherto invariably considered identical with *H. watwata* by Eigenmann (1912) and all following authors, consists of two different species, one from Cayenne, (French) Guyane (reg. nos. A 9450 & A 9451), and another from Cayenne and the Surinam River (reg. nos. A 8919, A 9570 & A 9927), the second being apparently identical with *H. watwata*. By here indicating one of the Cayenne specimens (reg. no. A 9450) as the lectotype of *H. verres* Valenciennes, this name becomes applicable for a separate eastern form.

Moreover, the Paris material of *H. plecostomus* Valenciennes (nec Linnaeus) (reg. nos. 755, A 9448, & A 9449), all from the Lago de Maracaibo, Venezuela, proved to represent a third *watwata*-like species, presumably *H. tenuicauda* (Steindachner) or *H. villarsi* (Lütken) [3]), and not as hitherto presumed *H. watwata* (pl. 18 fig. 1, 2). It seems to agree with *H. watwata* sensu Schultz (1944: 321) from the Maracaibo region. It was remarkable that among the numerous specimens from (French) Guyane in the Paris Museum collection, I found only a single specimen referable to *H. plecostomus* (Linnaeus), unfortunately without accurate locality (MNHN B 320, 108 mm standard length). No specimens belonging to *H. plecostomus* were found among the Guyana examples in the British Museum (Natural History), all those indicated as *H. bicirrhosus*, *H. guacari*, or *H. plecostomus* actually belonging to *H. watwata* or, presumably, *H. ventromaculatus* nov. spec., but a single example from the Berbice River near New Amsterdam was found in the Leiden Museum collection (RMNH 10721).

Resuming, *H. watwata* seems to occur only in the coastal zone of South

3) Both have been considered junior synonyms of *H. emarginatus* Valenciennes (1840: 369 (500)). In this context, it is interesting to note that Valenciennes described *H. emarginatus* to have the occipital scute "a son bord postérieur échancré". After verification on the holotype in the Paris Museum (reg. no. A 9447), I can confirm this character which, unless considered a mere anomaly, clearly distinguishes *H. emarginatus* from *H. tenuicauda* and *H. villarsi*. Gosline (1945: 79) and Miles (1947: 105) re-established *H. tenuicauda* as a separate species. A possible explanation of the occipital shape has been given by Kner (1854: 259-260), but could hardly be verified on the stuffed holotype of *H. emarginatus* without damaging the specimen. However, the apparent shape of the occipital region (see pl. 2 fig. 4) does not seem to support Kner's suggestion.

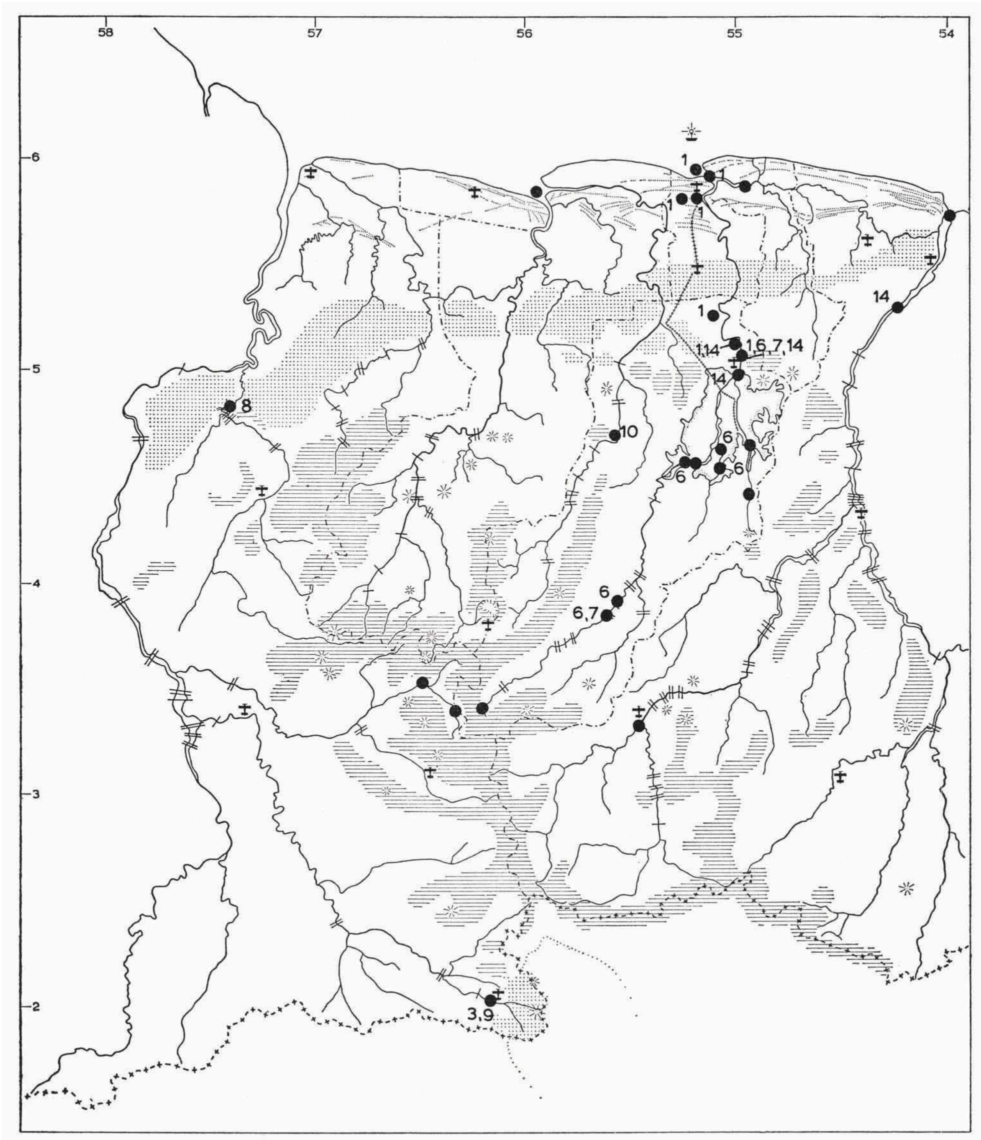


Fig. 1. Recorded distribution of the Surinam forms of *Hypostomus* belonging to the *plecostomus*-group — 1, *H. plecostomus* (Linnaeus); 3, *H. crassicauda* n. sp.; 6, *H. micromaculatus* n. sp.; 7, *H. paucimaculatus* n. sp.; 8, *H. pseudohemiurus* n. sp.; 9, *H. ps. macrophthalmus* n. ssp.; 10, *H. saramaccensis* n. sp.; 14, *H. ventromaculatus* n. sp.

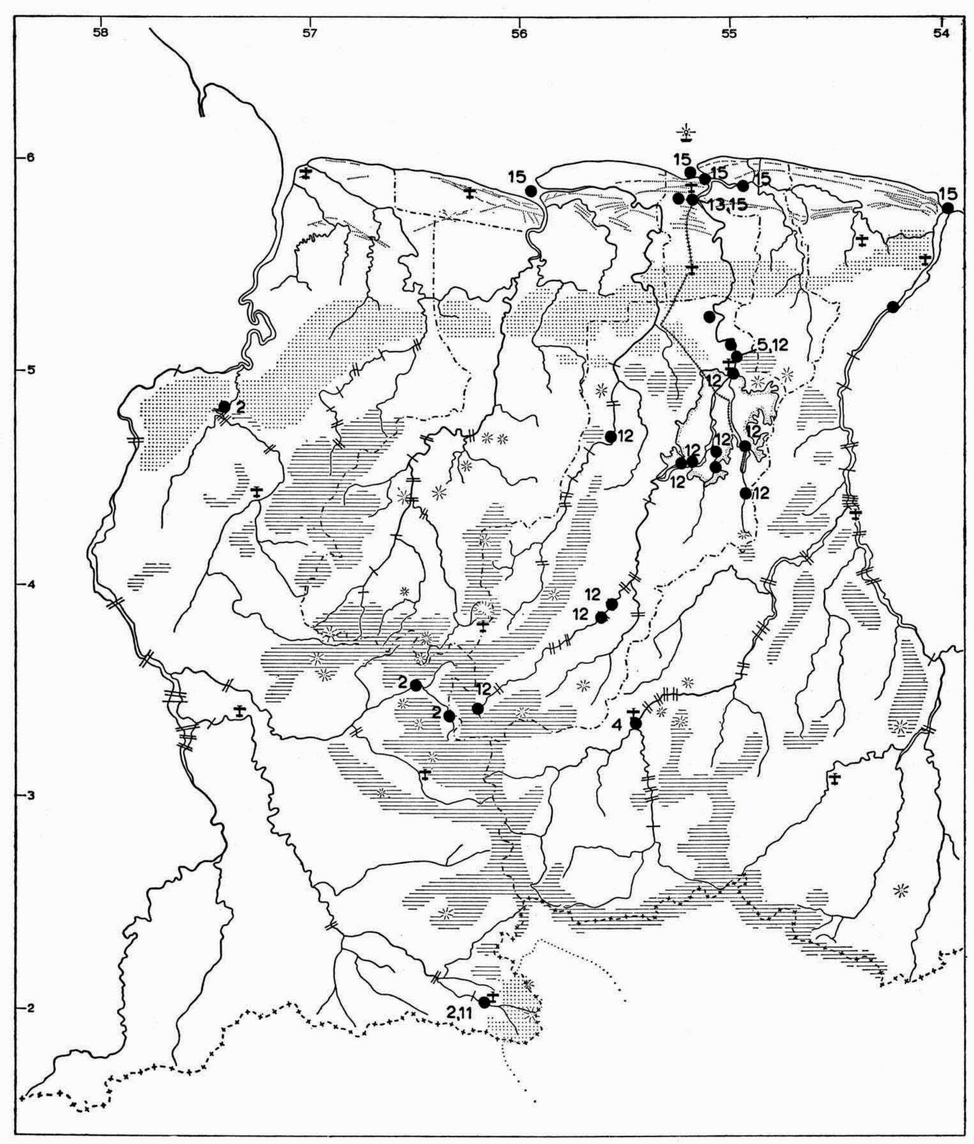


Fig. 2. Recorded distribution of the Surinam forms of *Hypostomus* belonging to the *watwata*-gropu — 2, *H. corantijni* n. sp.; 4, *H. gynnorhynchus* (Norman); 5, *H. g. occidentalis* n. ssp.; 11, *H. sipaliwinii* n. sp.; 12, *H. surinamensis* n. sp.; 13, *H. tenuis* n. sp.; 15, *H. watwata* Hancock.

America between Cayenne and Venezuela, while it is replaced eastward by *H. vesses* and westward presumably by *H. tenuicauda* and/or *H. villarsi*. *Hypostomus plecostomus* is also a coastal species and does apparently rarely occur eastward of Surinam, while the westward extension of its distributional area still remains to be established. Schubart (1964: 13) was evidently correct when doubting the occurrence of *H. plecostomus* in the Mogi Guaçu basin.

This distributional pattern for *H. plecostomus* and *H. watwata* does not concur with the ideas on the subject put forward by previous authors. *H. plecostomus* has been recorded to occur in the large area reaching from Panama (both slopes) to Paraguay and Uruguay, and from the Peruvian Andes to São Paulo and the Rio Tocantins; *H. watwata* has been recorded from the coastal zone of Venezuela to the Ilha de Marajó at the Amazon River outlet, but also from inland localities like Alto Amazonas and the Rio Guaporé. Therefore, it is necessary to reconsider and probably restore *H. seminudus* (Eigenmann & Eigenmann, 1888: 169; type locality, Brazil) and *H. boulengeri* (Eigenmann & Kennedy, 1903: 502; type locality, Mato Grosso or Ascuncion, Paraguay), both hitherto considered identical with *H. plecostomus*, and *H. pantherinus* Kner (1854: 267; type locality, Rio Guaporé), considered identical with *H. watwata*. Evidently, *H. carinatus* (Steindachner, 1881: 108; type locality, Amazon River) should also be reconsidered, as it has been synonymized with *H. verres* Valenciennes (and *H. watwata* Hancock) by Ribeiro (1911: 414), while Regan (1904: 209) considers it to be very closely allied to that species.

Unfortunately, the Leiden Museum collection includes only a single stuffed specimen from the Brazilian interior identified as *H. plecostomus* (reg. no. RMNH 1895, Mato Grosso, received from the Vienna Museum, 1856; evidently from the Natterer collection; omitted by van der Stigchel, 1946, 1947), and none from the interior identified as *H. watwata*. I re-examined the specimen and found it to differ from *H. plecostomus* by having the length of the base of the first dorsal fin equal to its distance to the caudal base (in our specimens of *H. plecostomus* only about equalling the distance to the tip of the spine of the second dorsal fin), while the width at the cleithra seems somewhat larger. Moreover, Kner (1854: 264) describes Natterer's specimens to have spots on the belly, of which only a few dubious remains now seem discernable in our specimen. Neglecting the longer base of the first dorsal fin (or the shorter peduncle), and taking into account that the specimen is of a much larger size than the two types of *H. boulengeri* (standard length 185 mm against 60 and 100 mm), the agreement with that species seems most convincing, and it is now tentatively identified as such.

This confirms the suspicions regarding the identity of inland specimens recorded as *H. plecostomus*, as expressed in the previous paragraph of the present chapter. It remains a mystery how *H. boulengeri*, described by Eigenmann & Kennedy (1903: 502) to have large spots on the belly, could ever have been included in the synonymy of *H. plecostomus*, a species known to never show this character.

Finally, some attention may be given to *H. emarginatus* Valenciennes, as currently understood. This species seems to have been recorded from Guyana only by Schomburgk, as stated with some doubt by Eigenmann (1912: 227), and is not known to occur either in Surinam or in (French) Guyane, apparently only inhabiting the inland Amazon and Orinoco basins. Among *Hypostomus* specimens recently collected by Mrs. R. McConnell, née Lowe, in the Rupununi River, which I examined during a recent visit to the British Museum, I found two specimens (coll. nos. 453, 603) which, in my opinion, might be referred to this species. I am inclined to consider *H. emarginatus* as a relatively recent invader of Guyana which has not (yet) reached Surinam territory and, in this sense, seems comparable with, e.g., *Arapaima gigas* (though possibly a relict), *Cochliodon* (*C. cochliodon* or a close relative, a Rupununi specimen seen in the British Museum, leg. R. McConnell, coll. no. 665), or *Pterophyllum* species (see Schultz, 1967: 5, 10, pl. 1).

It is interesting to note that, while several Amazonean species seem to have invaded Guyana and, less frequently, (French) Guyane, none seem to have succeeded in passing directly into Surinam.

The relationship of the Surinam species (fig. 3)

In the present paper, fifteen separate forms are distinguished, thirteen as distinct species and two tentatively as subspecies. Of these fifteen, only one species, represented by a single example from the environs of Paramaribo (no. 13, *Hypostomus tenuis* nov. spec.), shows a considerably different aspect, as will be shown subsequently in the descriptive paragraphs and the diagrams.

Neglecting for the moment this aberrant form, the remaining fourteen all show approximately the same aspect. They are more or less stoutly built, with the maximum depth usually comprised less than five times in the standard length, the depth at the tip of the occipital process varying between 4.45 and 6.3 in the standard length. The width between the outer margins of the cleithra varies from 2.85 to 3.85, the head length to the tip of the occipital process from 2.3 to 3.35, as comprised in standard length. The snout length is 1.45 to 2.1, the maximum diameter of the orbit 3.15 to 6.8, the interorbital width 2.05 to 3.4 times comprised in the head length, the length of the mandibular ramus 1.8 to 3.5 times in the interorbital width.

While some of these ranges may seem considerable, it is remarkable that, with often wide overlapping between the species, all intermediate ratios occur, partly as a result of normal variation and partly as a result of allometric development, obscuring the morphological differences between the various species and subspecies. Additional morphological ratios (see diagrams 1-19) almost invariably show the same peculiarity.

The number of scutes in a longitudinal series, excluding the elongate (and usually single) scute on the caudal base, only varies between 26 and 28 normally, while a number of either 25 or 29 rarely occurs in aberrant specimens and almost invariably only on one side. The scutes are always more or less, or partially, carinate. The throat, between the widely rounded lower lip and the coracoidal zone, is naked in juveniles but may become more or less covered with age, presenting about the whole scale of possibilities. The belly too is always naked in juveniles, but usually becomes almost wholly covered in adults. The snout and the occipital process are variably pointed, the second penetrating into the first post-occipital scute (which may be multiple). The pectoral spines are nearly always longer than the first ventral rays, occasionally of approximately the same length. The markings of all Surinam forms always consist of dark spots or blotches on a lighter substratum.

The specific morphological characters showing only moderate differences, often obscured by variation, the markings (size, shape, pattern, and distribution) must play an important role in the identification of the various Surinam forms, though some corroborating morphological data usually can be provided. As seems evident from previous literature, most authors hitherto considered the markings, presumed very variable, as of little use, largely therefore depending on morphological characters and, consequently, often lumping more or less related species. In the present case, the available general or local keys (e.g., Eigenmann, 1912: 223; Eigenmann & Eigenmann, 1888: 167, 1890: 397; Gosline, 1947: 132; Regan, 1904: 203; Ribeiro, 1911: 41; Schubart, 1964: 15; Schultz, 1944: 320), when used for the Surinam specimens, by elimination almost invariably lead to an identification with *Hypostomus plecostomus* (Linnaeus), occasionally (Schubart) with a species (*H. ancistroides* (Ihering)) subsequently presumed identical with *H. plecostomus* (Linnaeus) (cf. Gosline, 1947: 128), or to an identification with *Hypostomus watwata* Hancock. Additional possibilities not included in these keys seemed, since Eigenmann first described the species in 1912, *H. hemiurus* (Essequibo basin, Georgetown, ?Ireng River) and, since first described in 1926, *H.*

gymnorhynchus Norman (Approuaque River), both forms closely related to *H. plecostomus* and possibly therefore previously overlooked, but only the second was (questionably) found among the Surinam material.

This striking uniformity is especially remarkable as the genus *Hypostomus* is known to be very rich in forms, often showing rather obvious distinguishing characters, e.g., by being strongly depressed or elongated, or by having light markings on a darker substratum. As Gosline (1945: 77-82), in his catalogue of the South- and Central American Nematognaths, lists more than 70 species, most of which are well distinguished from *H. plecostomus,* the present seems to be statistically a remarkably aberrant situation.

Reconsidering the circumstances as stated above, it seems plausible to assume that these fourteen Surinam species, with extralimital species hitherto erroneously identified as *H. plecostomus* (Linnaeus) or *H. watwata* Hancock (or *H. verres* auct., Valenciennes p.p.), represent a strongly interrelated species-group derived from a common ancestor which, considering the limited morphological differences, may have evolved rather recently. While a more detailed examination of *Hypostomus* specimens from the adjacent regions may well yield additional new species hitherto overlooked, it seems doubtful that elsewhere on the South American continent so large a group of closely related forms of *Hypostomus* will be found on such a small territory. Anyhow, the present results seem to point to a quite active process of speciation in the area and it is tempting to assume, as stated before, that the strong attachment of many forms to a very special habitat has been of considerable influence in furthering such a process.

Fortunately, the Surinam species fall apart in two (or three, if the aberrant Paramaribo species *H. tenuis,* no. 13, is separated from the remainder) distinct groups by comparing their ratios between the minimum depth of the caudal peduncle and the interdorsal length (see diagram 19), which may be named the *plecostomus*-group (species nos. 1, 3, 6, 7, 8, 9, 10, 14 in the descriptive part of this paper; black blocks in the diagrams) and the *watwata*-group (species nos. 2, 4, 5, 11, 12, 13, 15; white blocks in the diagrams), though the aberrant species (no. 13) should in fact be included in a third group with, e.g., the species *H. emarginatus, H. horridus, H. tenuicauda, H. villarsii,* and *H. verres.* This division is confirmed, though more vaguely as a result of some overlapping, by other ratios (see diagrams 1, 2, 3, 12, 17, 18, and possibly 7 and 16). It should be noted that the ranges of the ratios of the various species, as presented in the diagrams, must be compared with some reserve considering the differences in size ranges of the various species as represented in our collections; a comparison of specimens of about equal size can be accomplished with the aid of the tables 1 to 15.

Another confirmation of the division of the Surinam forms into two groups is provided by the ratios between the length of the base of the first dorsal fin and the interdorsal length, these ratios being usually more than 1.65 in the *plecostomus*-group and less than 1.6 in the *watwata*-group. Unfortunately, aberrant ratios occur in the *plecostomus*-group, especially in *H. plecostomus*, where incidentally this ratio may come down to below 1.5.

Though the now known Surinam *Hypostomus* species may be referred to two distinct groups on the base of these few morphological characters, as yet these should not be evaluated as of any phylogenetic significance. Lacking the necessary osteological and other anatomical confirmation, the phylogenetic evaluation of the characters hitherto found to be of value for *Hypostomus* taxonomy can not yet be attempted satisfactorily. However, this does not mean that no (vague) trends are as yet discernable, and a tentative phylogeny

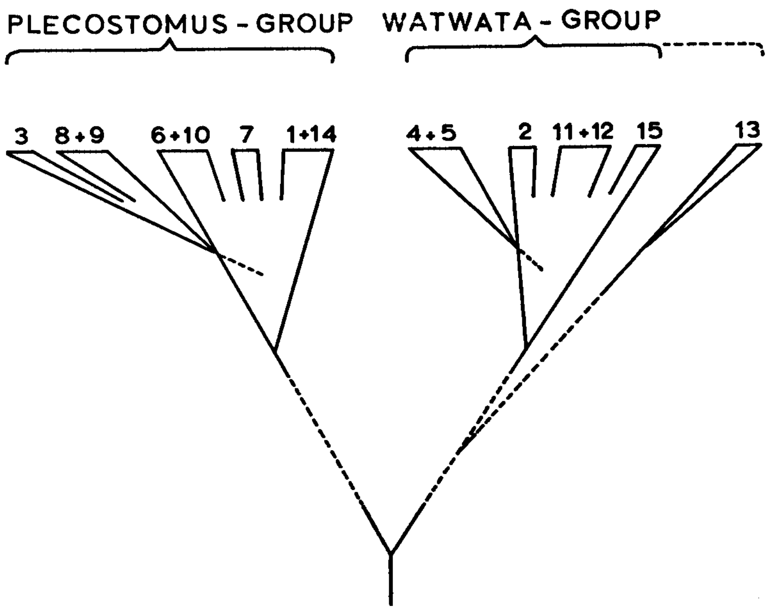


Fig. 3. Tentative phylogenetic diagram of the Surinam forms of *Hypostomus*. The numbers represent the species and subspecies as subsequently listed (p. 30).

is given (fig. 3). Though entirely and indiscriminately based on morphological data only, it nowhere seriously clashes with the available zoogeographical information.

The subdivision of the post-occipital scute, as found in *H. watwata*, seems merely a neotenic character as it regularly occurs in juvenile examples of all species I examined, and therefore evidently should not be considered of phylogenetic importance.

SOME PHYSIOLOGICAL DATA ON SURINAM WATERS

To correctly understand the environmental characteristics of the various localities as listed in the next chapter, some of the principal general aspects may be condensed here. More extensive and detailed information on the subject has been provided, primarily for the Brokopondo Lake area, by Leentvaar and van der Heide in the Progress Reports on the Biological Brokopondo Research Project, 1964-1967.

An alluvial coastal zone with a width varying from 25 km in the east to about 80 km in the west of Surinam is interrupted by the wide estuaries of the principal rivers: Marowijne River, Surinam- and Commewijne Rivers, Coppename- and Saramacca Rivers, and Corantijn River. These river outlets show during the rainy seasons the phenomenon of a layer of more or less brackish, muddy freshwater flowing out over the heavier salty waters of the sea; in contrast, during the dry season salt water is known to deeply penetrate into the rivers. The bottom and shores are muddy, and banks of mud occur along the coast, apparently consisting of alluvial material of Amazonean origin deposited by the Guyana Stream. Only near the Marowijne River outlet, near Galibi, sandy beaches and banks occur. The lower reaches of the rivers, crossing the alluvial zone, also have muddy embankments, characterized by a dense growth of mangroves and other vegetation adapted to the brackish environment. The water here is more or less silty, the speed is moderate to swift, largely depending on the seasons, viz. the inland rainfall. Aquatic plants occur almost only along the embankments, not to mention possible patches of *Eichhornia* drifting downstream. There are in these lower parts of the rivers no rapids or cataracts.

To the south, the coastal area is followed by a narrower area mainly consisting of savannahs with coarse sand, covered with a much less abundant vegetation of grasses, herbs, shrubs and lighter woods. Here the river beds contain much gravel and sand, while the embankments are still covered with an accompanying belt of dense forest. The salt or brackish water does not or hardly reach this region, penetrating only about 30 to 40 km inland, but the tidal influence may well be felt for at least twice that distance, measured along the river, thereby reaching in the Surinam River to the southern limit of the savannah zone, occasionally even to near Brokopondo. The main rivers are quite clear, but the lesser streams and creeks in this zone show a, sometimes very dark, brownish colour, typical for the savannah creeks; the pH (Tibiti River 4.8-5.3; Commewijne River 3.8; Cottica River 3.6) is considerably lower than in the main rivers (Surinam River 6.9). The aquatic vegetation may be dense in the lesser streams (*Eichhornia, Montrichardia*), but remains very moderate in the main rivers. Shallows with banks of sand and gravel occur, but real rapids or cataracts are still lacking. While the level of the water in the main rivers strongly varies with the seasons, the small creeks may partly fall dry during the dry season, mere stagnant isolated muddy or sandy puddles remaining. This savannah zone is indicated on the maps (fig. 1, 2, 4) by a rather narrow speckled band between halfway the localities 1 and 2, and locality 24.

Further inland, a dense tropical rain-forest covers most of the hilly or low mountainous highland, with a small area of savannahs near the upper Sipaliwini River. Here the first rapids and cataracts are found in the main rivers, about on a line connecting my localities 2 and 24 (fig. 4). Above these first rapids, the main rivers usually have only limited stretches of tranquil flowing water, with occasional banks of gravel, sand and some mud, each ending at a new series of rocky obstructions, some even with small falls. The rivers are mostly wide, swiftly flowing except in occasional more or less stagnant pools near or among the rapids, the speed and depth largely depending on the season. The embankments are covered with dense rain-forest, mostly secondary along the Surinam River, but aquatic vegetation is not prominent and is mostly confined to the shores and the rapids (Podostemaceae). While some of the larger branch rivers show about the same general aspects, the small creeks running through the rainforest differ by having most of their courses not obstructed by rapids, these being restricted to the more hilly regions of their origins. They usually contain much debris and, during the dry season, they are often reduced to isolated muddy pools with stagnant water. Here too, the aquatic vegetation is scarce, and the water is rather brownish, but this may also be found in some of the larger branch rivers (e.g., Sara Creek), though never in the main rivers.

The water in the main streams has a temperature of about 27 to 31°C, dropping occasionally to about 25° after rainfall; in the shaded forest creeks the temperature is lower, and 24 to 25° has been measured in the creeks around Afobaka. The pH seems to vary between the main river basins, about 7 having been measured in the Surinam River, 6.1 in the Tapanahoni River (Marowijne basin), 5.0 to 5.1 in the Saramacca River, and 4.8 to 5.3 in the Tibiti River (Coppename basin); in the small forest creeks near Afobaka, a considerably lower pH (5.0 to 6.1) was measured than in the main river, which may well represent the usual situation. While the water in the Surinam River was found to be nearly or quite saturated with oxygen (6.5 to 8.5 mg/l), the small Afobaka creeks showed much lower values (2.6 to 4.9).

The turbidity was found to be invariably small, especially in the main rivers.

As the important influence of the seasons on the environmental characteristics has been frequently indicated in the previous paragraphs, a correct evaluation of the habitats at the various localities can only be attained by taking into account that there are two rainy seasons, a minor rainy season from November to February, and a main rainy season from April to August. During my visit in 1964, however, both were hardly discernable.

In the Surinam River, at Afobaka, a barrage was closed on February 1, 1964, which had a disastrous effect on the fish fauna, including the *Hypostomus* species there. The stagnant waters reached Kabel (about 12 km SW of Afobaka) around February 20, the approximate centre of the lake area at Beerdoti around end April, and the Moesoembaprati Falls around November 1964. After this, the stagnant water extended upstream only slowly and hesitatingly, reaching the Mamadam Falls only around May 1965, a situation still extant. Along the Sara Creek, the stagnant water reached Dam around November 1964, after having passed the Locus Creek outlet (about 12 km S of Afobaka) around February 20, 1964.

In the increasing lake area, the environmental changes soon became evident. Within a few months, the invasion of the hitherto (in the main stream) rare *Eichhornia* and its explosive growth, together with (primarily in the Sara Creek region) the waterfern *Ceratopteris* and some species of duckweed, threatened the Brokopondo Project by largely increasing the evaporation, on the other hand providing new ecological niches especially suited for fish brood.

Beneath a layer of about 2 to 3 metres oxygen disappeared, and with it all animal life. The pH dropped to about 5.5, and the water became more turbid. When reaching the cataracts and rapids, the stagnant water killed numerous *Hypostomus* specimens, adapted to the well-aerated turbulent water, which were found drifting on the surface.

Also downstream of the Afobaka barrage, the consequences proved most serious. Within a few weeks, the river bed fell dry to well below Brokopondo, about to the upper limit of the tidal influence, only isolated pools of more or less stagnant water remaining, the effluence of water from the small tributary forest creeks apparently being insufficient to maintain a steady flow.

While this change of environment already drastically reduced the number of fish species, only a moderate part being able to survive, the killing off of the fish fauna was about completed by a test run of one of the turbines in March 1965, causing oxygen-deficient water to enter the downstream river bed, killing or driving away the remaining fishes. The oxygen content,

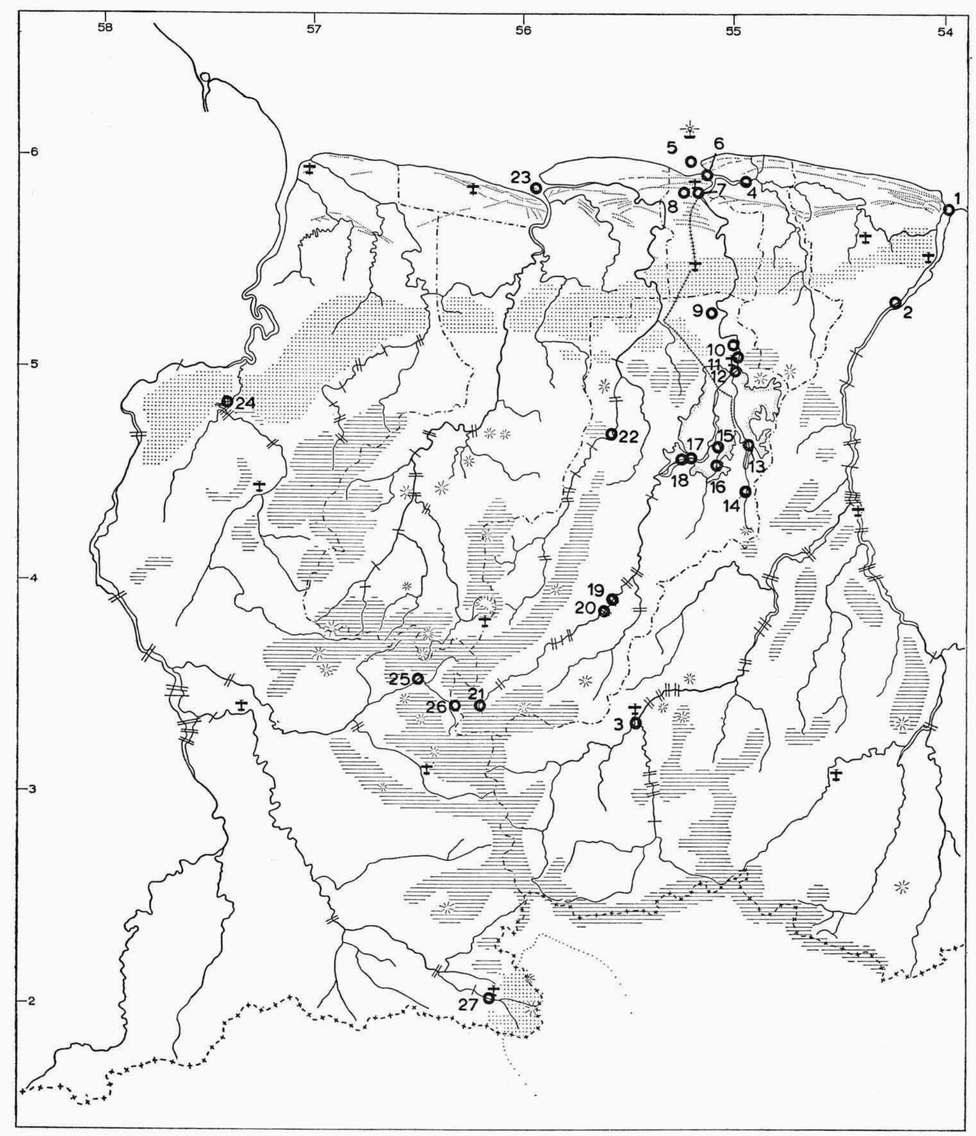


Fig. 4. Map of the collecting localities.

almost reaching the saturation point beforehand, fell down to almost zero. The pH of about 7 came down close behind the barrage to 5.7. These test runs were subsequently repeated at irregular intervals, but some of the longer interruptions showed the existence of remarkable possibilities of faunal recuperation, though presumably only for a limited number of species. Most likely, fishes found refuge near the outlets and in the small creeks, where the conditions remained normal, to re-invade the main river after the remarkably rapid restoration of the environment (especially of the oxygen contents) during the intervals between the turbine tests.

Moreover, the latest reports (Leentvaar, 1968, in litt.) show that oxygen again occurs down to the bottom layers of the lake, an unexpected development allowing a more optimistic view on eventual lake fisheries.

COLLECTING LOCALITIES (fig. 4)

In the following enumeration, the localities given are occasionally more or less approximate, e.g., the locality Paramaribo stands for not only the Surinam River near Paramaribo, but also for the various creeks within the town's limits. The sequence is by subsequent river system from east to west, and within each from north to south. Between brackets, the numbers of the species, as listed subsequently, occurring at each locality, are given.

1. Marowijne River outlet near Galibi (15).
2. Rivulet on a small island in the Marowijne River between Bigiston and Maria's Hoop (Mopikondre) (14).
3. Upper Tapanahoni River and Paloemeu River outlet near air strip (4).
4. Commewijne River (locality indication vague but probably not far from Paramaribo) (15).
5. Surinam River outlet (1, 15).
6. Surinam River estuary (1, 15).
7. Paramaribo (1. 13, 15).
8. Saramacca Canal (1).
9. Maréchal Creek (1).
10. Compagnie Creek (1, 14).
11. Surinam River and Tapoeripa Creek near Brokopondo (1, 5, 6, 7, 12, 14).
12. Surinam River near Afobaka (12, 14).
13. Kwambaolo Creek, small tributary of the Sara Creek above Dam (12).
14. Upper Sara Creek near Langetabbetje (12).
15. Gran Creek and small tributary near Bofroedèdè, estimated at about 4 and 10 km above outlet into Surinam River (6, 12).
16. Gran Creek, large rapids near bivouac at approximately the ultimate lake limit (6).
17. Moesoembaprati Falls, Surinam River (12).
18. Pools and creeks around Mamadam Falls, Surinam River (6, 12).
19. Grandam Falls, Gran Rio (6, 12).
20. Awaradam Falls above Ligolio, Gran Rio (6, 7, 12).
21. Upper Gran Rio (12).
22. Pool below Feddiprati rapids, Saramacca River (10, 12).
23. Outlet of Coppename- and Saramacca Rivers (15).
24. Avanavero- and Zand (= Sand) Falls, the second about 10 km above the Avanavero Falls, just above the entrance of the Dalbana Creek (2, 8).
25. Lucie River (Oost Rivier) (2).
26. Upper Lucie River (Oost Rivier) (2).
27. Sipaliwini River near air strip (2, 3, 9, 11).

Collecting and collections

The circumstances in the tropical rain-forest, the kind of survey, and the limited time available, all forced me to use an almost complete repertory of fishing methods, excluding only the use of explosives. While all, even shooting with bow and arrow or cutlassing, more or less enriched the assembled collections, by far the most efficacious proved to be the use of fish poison, and both the industrial and the native (pulverized *Lonchocarpus*) varieties were frequently used. Especially to obtain the necessary material for a sufficiently founded quantitative analysis of fish faunas in creeks, the poison proved invaluable. On the other hand, no methods proved satisfactory in the increasing lake area, between the submerged trees and shrubs of the rain-forest, but apparently no *Hypostomus* species survived there.

While a few native canoes (corials) were constantly at my disposition, success was primarily warranted by the circumstance that we all had the good fortune to be continuously assisted by two or three bush-negro servants who, after a short period of instruction by the present author, soon became extremely capable as well as enthusiastic in putting the various collecting techniques into practice. Moreover, their local knowledge, including both a considerable knowledge about fishes and about how to pass awkward rapids, proved also an invaluable asset.

The collected specimens I always put immediately into alcohol, a method not always meeting with success in the tropics. Dr. Mees always first preserved the specimens he collected in formaline.

Measurements and methods (fig. 5)

The methods applied for taking the various measurements, the characters by which these are indicated (A-S), and the principal terminology used here are all shown on the accompanying schematic figure or in the added explanation. The same characters to indicate measurements and ratios are used in the tables and diagrams, and in the single graph (fig. 6). The species are all numbered (1-15) in alphabetic order, only starting with the type species *H. plecostomus,* while the species are indicated by the same numbers in the diagrams. The same sequence is used in the descriptive part.

In the tables, usually the same sequence of species is adopted, with the exception (for convenience sake) that the table concerning species 14 is placed behind species 11, necessitating a placement of species 12 and 13 in tables 13 and 14. To prevent errors in the consultation of these tables, the species number is added between brackets to the specific names heading the tables.

In the tables, the relative values or ratios are given between brackets while at the head of the column is indicated which ratio is meant, e.g., (A) stands for comprised in A (= standard length). Finally, the total ranges of the ratios, the averages, and the apparent allometric trends are given, the last named often more distinctly discernible in the diagrams, but occasionally only suggested in juveniles. The principal types are indicated by asterisks.

As seems customary nowadays, presumably to prove the job was professionably done, I can add that the measurements were taken with dialed

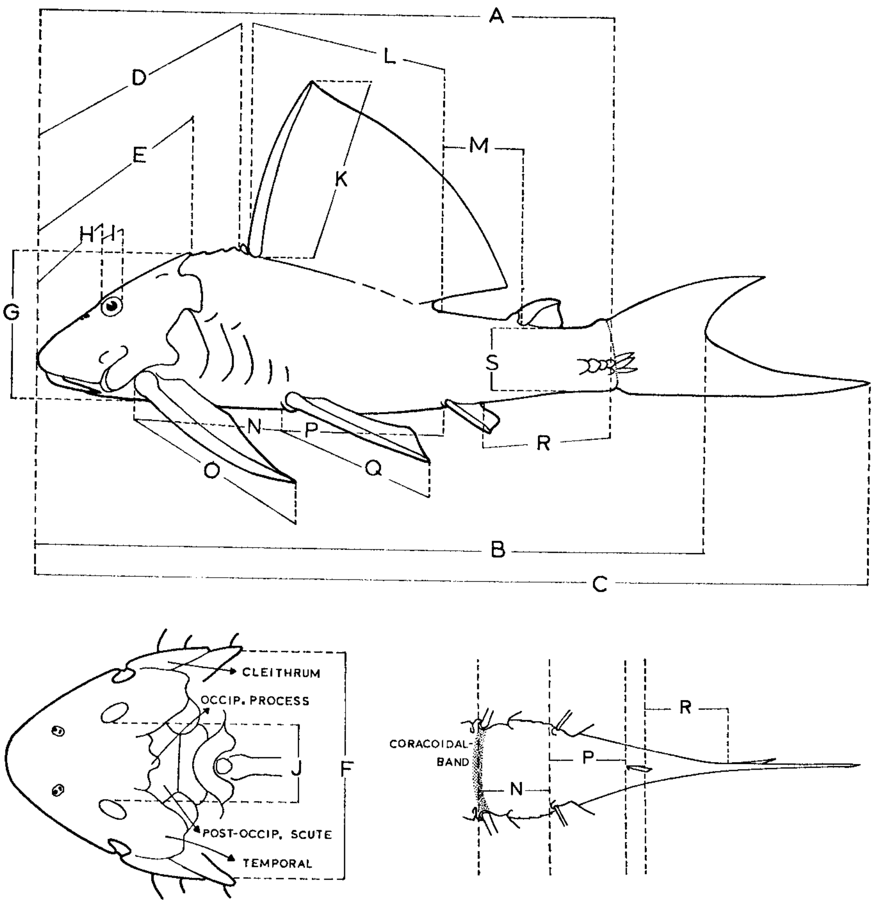


Fig. 5. Measurements and terminology. A, standard length; B, axial length; C, total length; D, pre-dorsal length; E, length of head; F, cleithral width; G, depth of head; H, length of snout; I, orbital diameter; J, interorbital width; K, length of dorsal spine; L, length of base of first dorsal fin; M, interdorsal length; N, thoracic length along median line; O, length of pectoral spine; P, abdominal length along median line; Q, length of first ventral ray; R, post-anal peduncular length; S, depth of caudal peduncle.

calipers, the ratios were obtained with the aid of a slide-rule, and the averages with a calculating-machine; all measurements are given to the nearest 0.1 mm, all ratios to the nearest 0.05, all averages to the nearest 0.05 mm.

Though the measurements were taken with utmost care, some show a considerably wider range of variation than others. Partly this may be caused by a more extensive allometric growth, especially in series with a wider size range, but also it may well reflect the difficulty to obtain some of the measurements accurately. It is clear that some measurements and ratios vary considerably when specimens are more or less stretched or curved examples straightened, while also the condition or way of preservation are of influence: specimens first preserved in formaline or in very strong alcohol are firm and seem slightly more robust than less well preserved and soft examples. I may repeat here that the averages should only be compared with caution, the age (or size) composition of the available material of the various species being often quite dissimilar.

In the diagrams, the black blocks represent the *plecostomus*-group, the white blocks the *watwata*-group. The average is indicated by a triangle, the value for the type by a T, the value of the smallest example by a vertical line. The type being always the largest or one of the larger specimens, it is not thought necessary to add values of specimens slightly surpassing the length of the holotypes by using still another indication in the diagrams. Especially in species represented by series with a moderate size range, the values for the holotype and the smallest example may coincide, in which case the vertical lines are omitted, or even they may be placed in such a way that they seem to suggest an allometric trend contrary to expectation. Moreover, the situation of the vertical line indicating the value for the smallest example is usually much less accurate owing to the difficulty in obtaining correct measurements from very small specimens.

Excepting a few specimens indicated as belonging to the Paris, London, Amsterdam, and San Francisco Museums (MNHN, BM, ZMA, CAS), all specimens discussed here belong to the fish collections of the Leiden Museum (RMNH); in the tables, only the register numbers are given for the Leiden Museum examples.

Miscellaneous remarks

In the following descriptive chapters, the principal references given for each species only include those to the original description and the Surinam records, both of course only in the three species for which these are available. However, whenever pertinent to a discussion, additional references are given in the paragraph Remarks.

The extent of the descriptions is restricted as most of the morphological data can be found in the accompanying tables, diagrams, and on the plates. Concerning the mandibular ramus ratios it should well be kept in mind that these are considerably variable, depending largely on the pressure on the calipers used for this purpose as well as on the exact place where these measurements are taken. In the present case, the length of the ramus was measured deeper inward and with less pressure than I did previously (Boeseman, 1960), and therefore the results are not directly comparable. This may illustrate the difficulty in correctly evaluating such measurements which have nevertheless previously been used for the discrimination between species.

The colours and markings are of considerable importance for the discrimination of the closely related species, but unfortunately they often fade in preserved specimens, sometimes wholly disappearing in old or badly preserved material. Therefore, I have tried to find some supporting diagnostic morphological characters, with varying success.

An interesting aspect of the colour markings in the Surinam *Hypostomus* species is that there appears to be a strong tendency for the spots to maintain about the same size during growth, resulting in a relative decrease in size usually accompanied by an increase in number. In some species the markings of juveniles and adults show a marked difference in pattern, while in specimens of comparable sizes the markings may show a pronounced variation in intensity.

In the descriptions, no fin formulae are given as they are almost invariably the same: D I.7-I; A i.4; P. I.6; V i.5; C (14-)16 (the outer pairs may coalesce). Among the large number of specimens examined, only the following aberrant numbers of rays were found: D I.8-I (1 ex., *H. pseudohemiurus*); A i.3 (1 ex., *H. watwata*); P I.5 (1 ex., *H. sipaliwinii*, one side only); C 12 (1 ex., *H. surinamensis*), C 14 (1 ex., *H. paucimaculatus*), C 15 (1 ex., *H. plecostomus*; 1 ex., *H. corantijni*; 2 ex., *H. surinamensis*), C 17 (1 ex., *H. surinamensis*; 1 ex., *H. ventromaculatus*). All species have the dorsal origin before the insertions of the ventrals.

There are in the Surinam species always three scutes between the occipital and the dorsal origin.

THE SURINAM SPECIES

In this enumeration, the names are preceded by the species numbers also used in the diagrams and the descriptive part, while they are followed by the number of specimens (omitting a few, occasionally large, series of juveniles), their size ranges in mm, and the river basin in which they are known to occur unless indicated as coastal; finally, the indications P or W are given, referring them either to the *plecostomus*-group or the *watwata*-group. Occasional gaps in the size ranges are indicated with the character G, placed so as to approximately indicate where a gap in the ranges occurs.

1. *H. plecostomus* (Linnaeus)	43	36-215	coastal	P
2. *H. corantijni* n. sp.	16	53G-188	Corantijne R.	W
3. *H. crassicauda* n. sp.	5	G120-143	Corantijne R.	P
4. *H. gymnorhynchus* (Norman)	22	56-170	Marowijne R.	W
5. *H. g. occidentalis* n. ssp.	5	62-G146	Surinam R.	W
6. *H. micromaculatus* n. sp.	18	25-185	Surinam R.	P
7. *H. paucimaculatus* n. sp.	4	31-G120	Surinam R.	P
8. *H. pseudohemiurus* n. sp.	20	35-62G?	Corantijne R.	P
9. *H. ps. macrophthalmus* n. ssp.	20	39-72G?	Corantijne R.	P
10. *H. saramaccensis* n. sp.	20	45-115	Saramacca R.	P
11. *H. sipaliwinii* n. sp.	2	G83-G126	Corantijne R.	W
12. *H. surinamensis* n. sp.	51	59-165	Sur. R., Saram. R.	W
13. *H. tenuis* n. sp.	1	G195	Sur. R. or coastal	(W)
14. *H. ventromaculatus* n. sp.	15	56-150	Marow. R., Sur. R.	P
15. *H. watwata* Hancock	37	52-265	coastal	W

Key to the Surinam species

This key in itself may not always lead to success, especially for the identification of juvenile specimens, but it is hoped to provide the means to correctly identify all specimens with the additional aid of the information given in the descriptions, tables, and diagrams, and by comparison with the plates. On account of the pronounced allometric growth in several of the morphological characters, especially a verification with the aid of the tables seems always advisable.

1. Depth of caudal peduncle 1.35-1.7 in interdorsal length (*plecostomus*-group: 1, 3, 6, 7, 8, 9, 10, 14) 2
— Depth of caudal peduncle 1.8-2.7 in interdorsal length (*watwata*-group: 2, 4, 5, 11, 12, 13, 15) 9
2. Dorsal and caudal fins wholly or almost wholly dusky, or finely marked (6, 8) 3
— Dorsal and caudal fins mostly spotted or with bands (1, 3, 7, 9, 10, 14) . . . 4
3. Spots on body and fins very small and usually elongate, several on each scute . . . . (6) *micromaculatus* n. sp.
— Spots relatively large, ovate, lacking on posterior peduncle; diameter of orbit 4.35-4.9 in head . . . . (8) *pseudohemiurus* n. sp.
4. Spots relatively large, ovate, lacking on posterior peduncle; lower caudal lobe dusky without spots; diameter of orbit 3.65-4.0 in head . . (9) *ps. macrophthalmus* n. ssp.
— Spots also on posterior peduncle; lower caudal lobe spotted or banded (1, 3, 7, 10, 14) 5
5. Belly wholly covered with rather large and distinct spots . (14) *ventromaculatus* n. sp.
— Belly with at most a few indistinct spots (1, 3, 7, 10) 6
6. Deflated first dorsal almost or hardly reaching spine of second dorsal; mandibular ramus 1.8-2.1 in interorbital width (3, 10) 7
— Deflated first dorsal usually overlapping second dorsal; mandibular ramus 2.5-3.3 in interorbital width (1, 7) 8
7. Dorsal spine shorter than predorsal length, 2.45-3.2 in standard length; depth 5.4-6.3 in standard length, 1.85-2.25 in head; spots on distal dorsal usually vague or lacking,

on body small and roundish with a diameter distinctly less than interspaces, on pectoral spines large, round, and widely interspaced . . (10) *saramaccensis* n. sp.

— Dorsal spine slightly surpassing predorsal length, 2.25-2.5 in standard length; depth 5.1-5.6 in standard length, 1.75-1.85 in head (possibly more or less in juveniles); spots dense on whole dorsal, on body less small and ovate with a diameter about equalling interspaces, on pectoral spines small, numerous and dense . . . . (3) *crassicauda* n. sp.

8. Depth of head 5.0-5.7 in standard length; spots on body and fins intense, of moderate size, very widely interspaced, even smaller spots on snout not dense; spots on caudal irregularly arranged , ... (7) *paucimaculatus* n. sp.

— Depth of head 4.45-5.1 in standard length; spots on body and fins vague, large, on snout small and dense, forming transverse bands on caudal . . . . (1) *plecostomus* (Linnaeus)

9. Depth of caudal peduncle about 2.7 in interdorsal length; cleithral width about 4.0, depth about 6.6 in standard length; scutes 29 . . . . . . (13) *tenuis* n. sp.

— Depth of caudal peduncle 1.8-2.35 in interdorsal length; cleithral width 3.05-3.85, depth 4.7-5.9 in standard length; scutes (25) 26-28 (2, 4, 5, 11, 12, 15) . . . 10

10. Deflated dorsal usually about reaching second dorsal (11, 12, occasionally also 4 and possibly 5, see below) 11

— Deflated dorsal usually falling distinctly short of second dorsal (2, 4, 5, 15) . 12

11. Scutes 28; dorsal spine rather long, 2.4 in standard length; spots rather intense, on body and peduncle moderately large and slightly oblong, well defined . . . . (11) *sipaliwinii* n. sp.

— Scutes almost invariably 27, if occasionally 26 or 28 usually on one side only; dorsal spine shorter, 2.5-3.2 in standard length, average 2.85; spots variably intense, smaller, roundish and rather well defined . . . . (12) *surinamensis* n. sp.

12. Post-occipital scute single; cleithral width moderate, 3.25-3.85 in standard length; mandibular ramus 2.0-3.0 in interorbital width; belly without spots (2, 4, 5) . 13

— Post-occiptal multiple; cleithral width considerable, 3.05-3.45 in standard length; mandibular ramus 2.6-3.5 in interorbital width; belly wholly covered with moderate to large dark spots . . . . (15) *watwata* Hancock

13. Spots moderate, variably intense and usually less well defined; length of dorsal spine 2.55-3.65 in standard length, becoming relatively shorter with age; mandibular teeth usually 20-40 on each side (in adults), seldom more (4, 5) 14

— Spots rather small, very intense and numerous, well defined; length of dorsal spine 2.4-2.8 in standard length but apparently without allometric growth; mandibular teeth usually about 40-60 (in adults) . . . . (2) *corantijni* n. sp.

14. Depth of caudal peduncle in adults usually about 2.0 in interdorsal length; deflated dorsal falling variably short of second dorsal, occasionally the distance minute; the vague spots on body and fins rather intense . . (4) *gymnorhynchus* (Norman)

— Depth of caudal peduncle in adult (1 ex.!) 2.3 in interdorsal length; deflated dorsal falling far short of second dorsal; the vague spots on body and fins less intense and slightly smaller . . . . (5) *g. occidentalis* n. ssp.

Descriptions of the Surinam species

Hypostomus Lacépède, 1803

Plecostomus Gronovius, 1754: 24 (pre-Linnean).

Acipenser Linnaeus, 1754: 55 (pre-Linnean).

Acipenser Linnaeus, 1758: 237 (partly, not as since restricted: type species *Acipenser sturio* Linnaeus, 1758, by Linnean tautonomy).

Plecostomus Gronovius, 1763: 127 (non-binominal, therefore invalid: Opinion 89, 1925, and Opinion 261, 1954).

Loricaria Linnaeus, 1766: 508 (extension of *Loricaria* Linnaeus, 1758: 307; partly, not as since restricted: type species *Loricaria cataphracta* Linnaeus, 1758, by first designation of Bleeker, 1862: 3).

Plecostomus Meuschen, 1778; 39 (suppressed: Opinion 260, 1954).

Plecostomus Walbaum, 1792: 663 (wholly after Gronovius, non-binominal and therefore invalid).

Hypostomus Lacépède, 1803: 145 (type species *Hypostomus guacari* Lacépède, 1803, to be identified with *Hypostomus plecostomus* (Linnaeus, 1758), by monotypy; concurring with previous designation of Bleeker, 1862: 2).

1. **Hypostomus plecostomus** (Linnaeus)
(plate 3 fig. 1-4, table 1)

Acipenser plecostomus Linnaeus, 1758: 238 (Surinami).

Plecostomus dorso dipterygio etc. Gronovius, 1763: 128, pl. 3 fig. 1, 2 (Surinamae Fluvius, cf. Gronovius, 1754: 25; references partly).

Plecostomus bicirrhosus; Günther, 1864: 281 (partly; Dutch Guiana); Steindachner, 1881: 109 (partly; Surinam); Kappler, 1881: 167 (Holländisch Guiana), 1885: 919 (Holländisch Guiana), 1887: 152 (Surinam); all probably mixed with *Hypostomus watwata* Hancock and other species.

Plecostomus brasiliensis Bleeker, 1864: 7 (partly; Surinama); mixed with *Hypostomus walwata* Hancock and other species.

Plecostomus plecostomus; Eigenmann & Eigenmann, 1890: 406 (partly; Surinam); Popta, 1916: 575 (Surinam; not distribution); Fowler, 1915: 233 (Surinam), 1919: 130 (Surinam); Van der Stigchel, 1946: 134 (partly; Surinam), 1947: 134 (idem); Boeseman, 1953: 10 (Saramacca Canal near Paramaribo and Surinam River outlet, Surinam; not Marowini basin), 1954: 22 (neighbourhood of Paramaribo, Surinam), 1956: 190 (10 miles above outlet Surinam River, Surinam); most early records probably mixed with *Hypostomus watwata* Hancock, distinguished only since 1912.

Hypostomus plecostomus; Kner, 1854: 263 (partly; Surinam); probably mixed with *Hypostomus watwata* Hancock.

Material. — RMNH 2412 (stuffed), Surinam, 1824-1842, don. H. H. Dieperink, 1 ex., 230 mm (paralectotype) of *Plecostomus brasiliensis* Bleeker, 1864); RMNH 3095, "Mexique"? [4]), n.d., don. Museum Berlin 1848, 2 ex., 72, 74 mm (paralectotypes of *Plecostomus brasiliensis* Bleeker, 1864; locality evidently erroneous); RMNH 3102, Surinam, 1824-1842, don. H. H. Dieperink, 1 ex., 215 mm (lectotype of *Plecostomus brasiliensis* Bleeker, 1864); RMNH 17335, Surinam, June 1910, don. D. G. J. Bolten, 2 ex., 110, 210 mm; RMNH 17338, Surinam (coastal region between Commewijne- and Saramacca Rivers), 1911, don. Jhr. W. C. van Heurn, 2 ex., 48.5, 51 mm; RMNH 18240, coast at Surinam River outlet, Surinam, August 1944, don. Dr. D. C. Geijskes, 1 ex., 175 mm (proposed neotype of *Acipenser plecostomus* Linnaeus, 1758, and *Hypostomus guacari* Lacépède, 1803); RMNH 18241, Saramacca Canal near Paramaribo, Surinam, August 1944, don. Dr. D. C. Geijskes, 12 ex., 100-115 mm; RMNH 18666, Sommelsdijkse Kreek near Wolffenbüttel, Paramaribo, Surinam, 3 September 1948, don. Dr. D. C. Geijskes & P. Creutzberg (Surinam Expedition 1948/49), 2 ex., 89, 97 mm; RMNH 19786, Surinam (near Paramaribo?), 1952?, don. Zoological Garden Rotterdam (Blijdorp), 2 ex., 68, 93 mm; RMNH 21378, Surinam (aquarium import), 1951?, don. E. C. Stol, 7 ex., 53-110 mm; RMNH 21449, fish-trap 10 miles above Surinam River outlet, Surinam,

4) This locality record is evidently not correct as the genus *Hypostomus* is not known to occur in Mexico. As Lichtenstein (1823: 113, 117) records Surinam specimens in the Berlin Museum collection, Surinam may well be the correct origin.

11 February 1954, don. H. W. Lijding, 1 ex., 36 mm; RMNH 25463, Compagnie Creek, Surinam, 19 December 1965, leg. Dr. G. F. Mees (Brokopondo Research 1965/66), 4 ex., 97-135 mm; RMNH 25464, Maréchal Creek, Surinam, 28 December 1965, leg. Dr. G. F. Mees (Brokopondo Research 1965/66), 2 ex., 53, 95 mm; RMNH 25465, Surinam River near Brokonpondo, Surinam, 24 June 1964, leg. Dr. M. Boeseman (Brokopondo Research 1963/64), 1 ex., 90 mm; RMNH 25466, Compagnie Creek, Surinam, 19 December 1965, leg. Dr. G. F. Mees (Brokopondo Research 1965/66), 1 ex., 67 mm; RMNH 25467, Surinam, n.d., don. H. H. Dieperink?, 2 ex., 65, 87 mm (paralectotypes of *Plecostomus brasiliensis* Bleeker, 1864); RMNH 25786, Surinam, June 1910, leg. D. G. J. Bolten, 1 ex., 76 mm; RMNH 10721, Berbice River near New Amsterdam, Guyana, n.d., don. C. G. Young, 1 ex., 135 mm.

Diagnosis. — Depth of caudal peduncle in interdorsal length 1.4-1.7 (average 1.6); mandibular ramus in interorbital width 2.6-3.3, the ratio increasing with age; deflated first dorsal fin usually distinctly overlapping base of spine of second dorsal fin; body and peduncle covered with large and rather vague dark spots or blotches, lacking only on belly; first dorsal fin and caudal fin wholly covered with distinct series of rather large dark spots.

This species being the oldest known of a group of closely related Surinam species, the group is here named *plecostomus*-group; it is primarily distinguished by its ratio between the depth of the caudal peduncle and the interdorsal length of at most 1.7.

Description. — The present species becomes quite robust with age, with a high and wide anterior body and with a compact and deep caudal peduncle. In dorsal view, the head shows a rather pronounced triangular shape in the larger specimens, while it is more ovate in juveniles.

Depth of head at tip of occipital process 4.45-5.1 (av. 4.8), width at cleithra 2.85-3.25 (3.05), in standard length. Diameter of orbit 1.95-4.25 in snout, 1.6-3.1 in interorbital width, relatively decreasing with age. Additional measurements, ratios, averages and allometric trends are given in table 1.

Scutes in longitudinal lateral series 25/29 (1 ex.), 26/26 (15 ex.), 26/27 (7 ex.), 27/27 (19 ex.), 27/29 (1 ex.), neglecting the elongate scute on caudal base; the normal number appears to be 26 or 27, the few extremes evidently being the results of aberrant subdividing or coalescence of scutes. There are about 6 interdorsal scutes, 3 or 4 between second dorsal and caudal, and 13 post-anal, while one or two additional small scutes usually cover the origins of these fins. The post-occipital scute is nearly always single, only juveniles up to about 50 mm having 5 or more, but an approximately median suture may occasionally remain more or less distinct. The belly is wholly or almost wholly naked in juveniles up to 75 mm, mostly naked in specimens up to about 100 mm, mostly covered in the larger specimens, the largest retaining only a small naked region near the insertion of the ventrals; the development of the ventral squamation usually starts on the coracoidal region, soon forming a coracoidal band, subsequently also from the sides and along the median line. Excepting the plates curved around the margins, the lower head is wholly naked in young specimens, but it becomes almost completely covered in large adults, only the throat retaining a more or less fragmentary cover; the tip of the snout retains a small naked area.

The number of mandibular teeth counted varied from about 10 to 32, but with additional teeth usually hidden in the gums and easily overlooked; the total number probably seldom surpasses 30, while the average may be about 25 on each mandible.

When deflated, the first dorsal fin usually more or less overlaps the base of the spine of the second dorsal; in 43 examples, it seems to hardly or almost reach the spine in only 4 specimens, while a rather considerable overlapping was found in 4 examples.

The colours and colour markings have usually faded or even disappeared in old specimens, but they are still distinct in those recently assembled. The ground colour is usually rather dark, greyish-brown, and the large round spots or blotches, moreover vague, do not sharply contrast. The number of spots is small in juveniles, increasing in number (but not or hardly in size) with age. On the head, especially on the snout, the spots are much smaller, more intense, and far sharper defined. The lighter belly is not covered with spots, but a few more or less vague spots occasionally are found on a restricted part of the belly.

The first dorsal fin has only a few large dark spots on each interradial membrane in juveniles, forming 2 or 3 distinct transverse rows; in larger specimens, each interradial membrane has two series of relatively smaller spots, the posterior series usually more intense but none well defined, the spots forming several less regularly arranged transverse rows. The caudal, pectoral, and ventral fins also have variably intense vague spots forming slightly oblique cross-bands, rather wide in juveniles but relatively more narrow in adults, and occasionally indistinct in dusky examples. The pectoral spines show a series of dark cross-bands, the number increasing with age, occasionally consisting each of 2 or 3 vaguely connected spots in larger specimens.

Habitat. — All specimens here recorded with accurate localities were collected in the coastal area below the first cataracts. The large examples all seem to have been collected in the more or less brackish water of the estuaries or river outlets, the smaller at least partly somewhat higher upstream in the main rivers or in small tributaries. None were collected in cataracts, and the species seems to do well even in rather muddy water.

If introduced, this seems to be the species most likely to survive in the shallow, oxygenated parts of the Brokopondo Lake.

Distribution. — The species appears to have its distributional centre in coastal Surinam, probably occurring westward not beyond Guyana, eastward only infrequently beyond the Marowijne basin, and inland probably not farther than about 100 km at most.

Remarks. — It seems now clear that the present species since Gronovius and Linnaeus has unanimously been misconceived, with subsequent authors gradually including an increasing number of actually separate species. Some information on this subject has already been provided in my initial chapters. It now appears most likely, in the light of the present findings, that most records of *Hypostomus plecostomus* (Linnaeus) from localities outside the distributional area as delimited above refer to other, related species, while the few records from nearby localities at least need detailed confirmation. A few of the most interesting references and synonymies by previous authors (Regan, 1904: 205; van der Stigchel, 1946: 134, 1947: 134; Fowler, 1954: 191) may be discussed here.

As already stated in one of the initial chapters, *Loricaria plecostomus* Bloch (1794: 69, pl. 374) is based on a plate probably representing *Hypostomus watwata* Hancock and a composite description including *Hypostomus* and *Pterygoplichthys* species. If the description also includes information on the present species, which can not be ascertained with certainty, these data are probably taken from previous literature as extensively referred to. But most of the descriptive part appears to be based on a specimen, presumably the same as figured on Bloch's plate, and the species therefore should be referred to as *Loricaria plecostomus* Bloch, 1794 (nec *Acipenser plecostomus* Linnaeus, 1758) = *Hypostomus watwata* Hancock, 1828 (partly).

Loricaria flava Shaw (1805: 38, pl. 101) presents a similar case, with the exception that Shaw evidently did not examine any specimens and restricted himself to extracting a short and rather irrelevant description from the scant literature available at the time (in the references given by him, Bloch, 1794, takes a prominent place), adding a hardly modified, inverse reproduction of Bloch's figure of *Loricaria plecostomus*. Therefore, it seems advisable to primarily refer Shaw's species to *Hypostomus watwata* Hancock, though evidently with admixtures which can not be identified: *Loricaria flava* Shaw, 1805 = *Hypostomus watwata* Hancock, 1828 (partly). Additional remarks on *H. flava* are given in the chapter on *H. watwata* (no. 15).

Hypostomus plecostomus Valenciennes (1840: 361 (489)) has been previously (and erroneously) referred to *Hypostomus plecostomus* (Linnaeus, 1758). I re-examined Valenciennes' specimens, as listed by Bertin & Estève (1950: 69), in the Paris Museum (reg. no. MNHN 755, 1 ex. in spirits;

MNHN A 9448 & 9449, 2 ex., stuffed; all from the Lago de Maracaibo, Venezuela) and found them to belong to a quite different species related to *H. emarginatus* Valenciennes, presumably *H. tenuicauda* (Steindachner, 1879) known from the Rio Magdalena (type locality) and the Rio Cauca. The agreegment of Valenciennes' specimens with *H. tenuicauda*, exquisitely figured by Steindachner (1879, pl. 6) is far better than with the closely related species *H. emarginatus* Valenciennes, 1840, and *H. villarsi* (Lütken, 1874), the second also figured (and redescribed) by Steindachner (1879: 42, pl. 7), both recorded from Venezuela. Unfortunately, I have not been able to examine specimens of *H. tenuicauda* or *H. villarsi*, but the figures provided by Steindachner seem sufficiently accurate for comparison even though this accuracy may be less in details hitherto not considered of importance for specific discrimination. If the ratios of measurements taken from Steindachner's figures are compared with these taken from specimens of *H. emarginatus* (table 16) and from Valenciennes' specimens of "*plecostomus*" (table 18), there appears to be a very strong resemblance apparent between *H. plecostomus* sensu Valenciennes and *H. tenuicauda*, and between *H. villarsi* and *H. emarginatus*. E.g., the ratios between the depth of the caudal peduncle and the interdorsal length seem illustrative: *H. plecostomus* sensu Valenciennes 3.0-3.1; *H. tenuicauda* 2.6?; *H. emarginatus* (2.95, juv., -)3.95; *H. villarsi* 3.85?, especially if we bear in mind that the figures of *H. tenuicauda* and *H. villarsi* represent specimens measuring 480 (or possibly 250) mm and 320 mm. Still, the identification of *H. plecostomus* sensu Valenciennes must remain tentative only pending a re-examination of the types and a correct establishment of the status of the various nominal species hitherto usually lumped under the name *H. emarginatus* Valenciennes, but probably including several separate forms. Only *H. tenuicauda* seems nowadays to be accepted as a separate species (Gosline, 1945: 79; Miles, 1947: 105; but not van der Stigchel, 1946: 140, 1947: 140), while *H. horridus* Kner was re-established by Regan (1906: 94), a decision accepted by Gosline (1945: 81).

Hypostomus robinii Valenciennes has since long been considered a separate species, but was again included in the synonymy of *Hypostomus plecostomus* (Linnaeus) by van der Stigchel (1946: 135; 1947: 135), since *robinii* Gill is evidently identical with Valenciennes' species of the same name. Though this subject has already been discussed by the present author (Boeseman, 1960: 113), additional information on the species is provided in table 19, based on a stuffed specimen in the Paris Museum belonging to Valenciennes' type material, now indicated as lectotype of *Hypostomus robinii* Valenciennes (MNHN A 9569). These morphometric data distinctly confirm that *H. robinii* is a separate species; moreover, it has a spotted belly (cf. Güntert, 1942: 36 and RMNH 2558).

Plecostomus brasiliensis Bleeker has invariably been considered identical with *Hypostomus plecostomus* (Linnaeus, 1758), which is only partly correct. Bleeker (1864: 7) based his description on 12 examples measuring 100-340 mm (total length), from the collections of the Amsterdam and Leiden Museums, but this appears not to be the complete type material as he remarks (:9): "Ma description est faite d'après une série de douze individus conservés dans la liqueur et appartenant aux Musées de Leide et d'Amsterdam, et en outre j'ai comparé quelques autres individus secs du Musée de Leide". I have succeeded in finding nine examples in the Leiden Museum and two in the Amsterdam Museum, all in spirits, which must have been available at the time of Bleeker's research, while according to the auction catalogue (Hubrecht, 1879: 39) one example from Bleeker's collection was sold in the "B" series (see Whitehead, Boeseman & Wheeler, 1966: 6) and must be considered lost; moreover, there are two or three, possibly four stuffed examples in Leiden which Bleeker may have compared, the exact number depending on Bleeker's possibilities to discriminate related forms. The localities given by Bleeker are Surinam, Mexico, Cuyaba, and Chile, while the specimens in spirits located by me came from Surinam, Mexico, Chile, and Brazil; two stuffed specimens came from Surinam, while Bleeker may also have included one from Mato Grosso (coll. Natterer) and, less likely, one from Cuyaba (also coll. Natterer). While van der Stigchel (1946: 135; 1947: 135) enumerates most of these as belonging to *Hypostomus plecostomus* (Linnaeus), some are omitted, and one stuffed example from Cuyaba is correctly recorded as *Cochliodon cochliodon* (Kner) (: 157). In fact, the material he recorded as *H. plecostomus* consists of several species and the whole series may now be listed as follows: a. *H. plecostomus* (Linnaeus, 1758): RMNH 3102 (Surinam, 1 ex.), RMNH 3095 ("Mexique"?, 2 ex.), RMNH 25467 (Surinam, 2 ex.), RMNH 2412 (Surinam, stuffed, 1 ex.); b. *H. watwata* Hancock, 1825: RMNH 3101 (Surinam, 1 ex.), RMNH 3104 (Surinam, 2 ex.), RMNH 1908 (Surinam, stuffed, 1 ex.); c. *H. wuchereri* (Günther, 1864): RMNH 3103 (Chile, 1 ex.); d. *H. boulengeri* (Eigenmann & Kennedy, 1903): ZMA 104.740 (Brazil, 2 ex.), RMNH 1895 (Mato Grosso, stuffed, 1 ex.); and possibly to be included here, e. *Cochliodon cochliodon* (Kner, 1854): RMNH 1879 (Cuyaba, stuffed, 1 ex.).

It is surprising that Bleeker records the locality Cuyaba, apparently for material in spirits, but omits Mato Grosso, although specimens from both these localities were available to him. The Amsterdam examples from Brazil, probably also from the Natterer collection, may have come from Cuyaba, but in spite of the kind cooperation of H. Nijssen, curator at the Amsterdam Museum, I was unable to obtain any further indications as to their exact locality.

To further nomenclatorial stability, it seems advisable to select from the above specimens an adequate lectotype. Taking into account the proposed name *brasiliensis*, it seems plausible to restrict the choice to the Brazilian specimens, but unfortunately the single specimen from a locality in Brazil recorded by Bleeker, Cuyaba, is of uncertain typical status and moreover stuffed, while the remaining specimens are either from a locality not recorded by Bleeker or without any accurate locality at all. Moreover, *H. brasiliensis* (Bleeker) has invariably been referred to the synonymy of *H. plecostomus* (Linnaeus, 1758), a species most probably not occurring in Brazil. Therefore, I prefer to designate as the lectotype of *Plecostomus brasiliensis* Bleeker, 1864, a Surinam specimen of *H. plecostomus,* reg. no. RMNH 3102, collected by H. H. Dieperink (who assembled most of the material discussed by Bleeker) probably in the neighbourhood of Paramaribo. As a result of this designation, *Plecostomus brasiliensis* Bleeker, 1864, remains a subjective synonym of *Hypostomus plecostomus* (Linnaeus, 1758).

Considering Bleeker's species concept in the present case, and the references provided by him, one is apt to wonder why he started using a new name for a species already oversupplied with names. The explanation is that Bleeker here, for reasons unknown, extended priority to pre-Linnean names, in the present case to *Cataphractus brasiliensis* Willughby, 1686; a similar case is Bleeker's using in the same paper (1864: 18) the name *Loricaria dura* after Linnaeus, 1754, for the species generally known as *Loricaria cataphracta* Linnaeus, 1758. This led Günther (1865: 169) to criticize Bleeker with the words "Hence it appears that Dr. Bleeker goes back to the seventeenth century for the regeneration of our nomenclature!"; but, almost the same year (1864 : 231) Günther did little better by referring to the present species as *Plecostomus bicirrhosus* Gronovius (Gray), 1854, while correctly listing *Loricaria plecostomus* Linnaeus, 1766, among his references.

Plecostomus bicirrhosus Günther (1864: 231) moreover appears to have been based on heterogeneous material. A re-examination of some of the British Museum examples listed by Günther revealed that at least two species were mixed: *H. plecostomus* (Linnaeus) (1 ex.) and *H. watwata* Hancock (3 ex.), the single *H. plecostomus* specimen being without locality (= "Dutch Guiana"?).

The original *Plecostomus bicirrhosus,* as named and described by Gronovius (ed. Gray) (1854: 158) is identical with the non-binominal *Plecostomus* *bicirrhosus* etc. Gronovius (1763: 128), thus with *H. plecostomus* (Linnaeus, 1758).

Both *Plecostomus seminudus* Eigenmann & Eigenmann, 1888, and *Plecostomus boulengeri* Eigenmann & Kennedy, 1903, have since been unanimously considered identical with *H. plecostomus* (Linnaeus). As stated before, this synonymy is most unlikely, even if only for zoogeographical reasons. In fact, *Plecostomus seminudus* "is based on a single specimen without size given and surely very indifferently diagnosed, or hardly described", to use Fowler's (1941: 147) words which, if possible, seem to be an understatement considering the curiously deficient way in which the species is "defined". It is stated to be a *Hypostomus* of unknown locality with 27 scutes in lateral line, with a strong occipital keel, weaker temporal keels, strong median keels on the upper lateral plates, and wholly spotted with brown except on the plain ventral surface. The remaining information, all on the squamation, describes a situation found in the juveniles of all species I am acquainted with, and I am inclined to agree with Fowler (1941) who presumed the species to be based on a juvenile of a species probably different from *H. plecostomus*. A re-examination of the holotype will possibly confirm this point of view, though a correct evaluation of a single juvenile example may prove difficult.

Plecostomus boulengeri is much better described, if not up to the present standard; however, it is easily distinguished from the true *H. plecostomus* by having the body covered with small round spots, "those on the belly large, leaving a mere reticulation of the lighter ground colour". But no remains are now to be found on the belly of a small paratype, and *H. boulengeri* may therefore well represent the adult form of *H. seminudus*. One of the types of *Plecostomus brasiliensis* Bleeker (see above; RMNH 1895, stuffed, from the Mato Grosso, type locality of *P. boulengeri*) is now tentatively identified as *H. boulengeri* (Eigenmann & Kennedy); a comparison with the juvenile paratype of *P. boulengeri* (CAS 9869) reveals no differences which can not be explained as normal variation or the result of allometric growth. The same applies to two Amsterdam examples (ZMA 104.740).

Puyo (1949: 106) records *Hypostomus plecostomus* from (French) Guyane, but his description seems rather unreliable: he states e.g., that the eyes are relatively larger in very large specimens than in those of more moderate size, while he records an unlikely low number of 25 scutes in lateral series. Most of the description, however, may concern *H. plecostomus*, but is actually rather irrelevant as to the species meant.

The correct interpretation of *Hypostomus guacari* Lacépède, 1803, has already extensively been discussed in one of the initial chapters, where a neotype has been designated.

Etymology. — Pleco (gr.) = plecto (lat.), folded; stoma (gr.), mouth.

2. **Hypostomus corantijni** nov. spec.

(plate 4 fig. 1-4, table 2)

Material. — RMNH 25470, Avanavero Falls, Kabalebo River, Surinam, 24 September 1965, leg. Dr. G. F. Mees (Brokopondo Research 1965/66), 1 ex., 188 mm (paratype); RMNH 25471, Sipaliwini River, Surinam, 9 February 1966, leg. Dr. G. F. Mees (Brokopondo Research 1965/66), 3 ex., 133-175 mm (holotype (largest example), 2 paratypes); RMNH 25472, Sipaliwini River, Surinam, 23 January 1966, leg. Dr. G. F. Mees (Brokopondo Research 1965/66), 9 ex., 128-170 mm (paratypes); RMNH 25473, Sipaliwini River, Surinam, 26 January 1966, leg. Dr. G. F. Mees (Brokopondo Research 1965/66), 1 ex., 127 mm (paratype); RMNH 25474, Lucie encampment, Lucie River (Oost Rivier), Surinam, 26 July 1963, leg. Dr. D. C. Geijskes & H. P. Pijpers, 1 ex., 55 mm (paratype); RMNH 25475, Lucie encampment, Lucie River (Oost Rivier), Surinam, 12 August 1963, leg. Dr. D. C. Geijskes & H. P. Pijpers, 1 ex., 53 mm (paratype); RMNH 25519, upper Lucie River (Noord Rivier) [5]), Surinam, September 1910, leg. K. M. Hulk (Corantijn Expedition 1910/11), 1 ex., 90 mm; RMNH 25523, Zandvallen (Sand Falls), Kabalebo River, Surinam, 23 September 1965, leg. Dr. G. F. Mees (Brokopondo Research 1965/66), 1 ex., 32 mm (paratype).

Diagnosis. — Depth of caudal peduncle in interdorsal length 2.1-2.3 (average 2.2), the species thus belonging to the *watwata*-group; mandibular ramus in interorbital width 2.2-2.5, without allometric growth; deflated first dorsal fin falling considerably short of base of spine of second dorsal fin; body and peduncle covered with numerous, rather small, roundish, intensely dark and well defined spots, only lacking on belly; similar spots on fins, usually lacking on distal zone of first dorsal fin, forming irregular cross-bands or transverse series on caudal fin.

Description. — This is a moderately slender species, with the rounded snout distinctly ovate in dorsal view.

Depth of head at tip of occipital process 5.15-5.65 (av. 5.4), width at cleithra 3.5-3.85 (3.65), in standard length. Diameter of orbit 2.6-4.0 in snout, 1.7-2.2 in interorbital width, relatively decreasing with age. Additional measurements, ratios, averages and allometric trends are given in table 2.

Scutes in longitudinal lateral series 27/27 (13 ex.), 27/28 (2 ex.), 28/28 (2 ex.), not counted in small juvenile example (RMNH 25523), all neglecting

5) The specimen from the upper Lucie River (Noord Rivier) (RMNH 25519) has in accordance with its old label hitherto been considered to have been collected in the Surinam River. However, K. M. Hulk obtained the specimen during the Corantijn Expedition 1910/11, during which the Corantijn River was reached by ascending the Surinam River to near the source of the Gran Rio and subsequently crossing the narrow divide between the Gran Rio and the Lucie River basin. The specimen was presumably collected during September or October 1910, when Hulk frequently crossed the divide, and erroneously recorded from the Surinam River. It does not agree with any of the known Surinam River species, but shows a very close agreement with the present species. See Käyser (1912: 21-26, map).

the elongate scute on caudal base. There appear to be 6 or 7 interdorsal scutes, 3 or 4 between second dorsal and caudal, and 13 post-anal, one or two small additional scutes usually cover the origins of these fins. The post-occipital scute is always single, apparently even in the smallest example available. The belly is naked up to a size of at least 55 mm, partly covered up to 140 mm, mostly covered up to about 160 mm, in still larger examples completely covered except small naked areas near the ventral insertions; this squamation usually starts on the coracoidal region, while lateral and median bands are soon formed. In young specimens, the lower head is mostly naked excepting a narrow lateral area covered by plates curving around the margins and anteriorly two narrow projecting platelets curving around the anterior snout; in larger examples the lateral covers slightly increase, especially posteriorly before the gill apertures, a narrow transverse patch develops on the area behind the lower lip, and the lower snout is partly covered by a series of three roundish or transverse platelets which may form a narrow transverse band with age. A rather large area at the tip of the snout remains naked, separated from naked lateral snout areas by the two projections from the dorsal squamation.

The number of mandibular teeth counted on each ramus usually varies between 40 and 60, but only about 25 were counted in young specimens measuring at most 55 mm, probably with more teeth still hidden in the gums.

The deflated dorsal almost invariably falls distinctly short of the base of the spine of the second dorsal fin, almost reaching this spine in only a single example.

The colour markings are very distinct in adults, but less so in young specimens. The spots appear to increase in number and intensity with growth, but the size remains approximately the same. The spots gradually diminish in size on the head towards the snout, but on body, peduncle and fins they seem rather large in young specimens, moderate to small on adults. In juveniles they form 3 or 4 transverse series on the dorsal, and a few vague irregular transverse series on the caudal, but in adults their arrangement seems less regular on the dorsal, while more regular on the caudal. The pectorals and ventrals are irregularly spotted, only in small juveniles vaguely banded.

Habitat. — As far as could be ascertained, all present specimens were collected in cataracts, rapids, or falls, or in pools or creeks nearby, usually in rapidly flowing water; however, during dry periods they may be able to survive in well-oxygenated water of stagnant or semi-stagnant pools.

Distribution. — This species apparently occurs throughout the whole Corantijn River basin above the first cataracts.

Remarks. — This species at first view seems to strongly resemble *Hypostomus sipaliwinii* nov. spec. (no. 11), but it can be distinguished by having a deflated first dorsal fin falling usually more considerably short of the base of the spine of the second dorsal, by a distinctly lower ratio between the mandibular ramus and the interorbital width (2.2-2.5, in *H. sipaliwinii* 2.6-2.8), by the apparently slightly shorter dorsal spine (av. 2.65 in standard length, in *H. sipaliwinii* 2.4), and by a slightly higher ratio between cleithral width and standard length (3.5-3.85, in *H. sipaliwinii* 3.35-3.4). These differences are mostly small and may possibly be influenced by allometric growth and the difference in size ranges of the material available of both species, but as these size ranges at least partly overlap the present differences seem sufficient to warrant specific distinction.

Etymology. — Named after the Corantijn River basin, to which it seems restricted.

3. **Hypostomus crassicauda** nov. spec.
(plate 17 fig. 1 & 2, table 3)

Material. — RMNH 25489, Sipaliwini River, Surinam, 23 January 1966, leg. Dr. G. F. Mees (Brokopondo Research 1965/66), 5 ex., 120-143 mm (holotype, 140 mm, and paratypes).

Diagnosis. — Depth of caudal peduncle in interdorsal length 1.4-1.6 (av. 1.45), the species thus belonging to the *plecostomus*-group; mandibular ramus in interorbital width 1.9-2.1, presumably not changing with age; deflated first dorsal fin usually almost or just reaching base of spine of second dorsal fin; spine of first dorsal fin slightly longer than pre-dorsal length; excepting the plain ventral surface, wholly covered with numerous moderately sized dark spots, smaller and still more dense on head, rather suboblong on body and peduncle, usually not sharply defined; the spots especially dense on the fins, irregularly arranged or in wavy series on distal first dorsal fin.

Description. — A rather robust, compact species, with a very stout caudal peduncle, and with the rounded snout ovate in dorsal view.

Depth of head at tip of occipital process 5.1-5.6 (av. 5.35), width at cleithra 3.1-3.3 (3.2), in standard length. Diameter of orbit 2.85-3.1 in snout, 1.7-1.8 in interorbital width (in the small size range available without appreciable allometric growth). Additional measurements, ratios, averages and allometric trends are given in table 3.

Scutes in longitudinal lateral series invariably 26/26, neglecting the elongate scute on caudal base. There are 5 or 6 interdorsal scutes, 2 between second dorsal and caudal, and 12 or 13 post-anal, while one or two small scutes cover the origins of these fins. The post-occipital scute is single, without any remains of a suture. There are no juvenile specimens available, but even at a size of 120-130 mm the belly is naked, only a coracoidal transverse band can be perceived; in larger examples a scattered squamation develops on the belly, usually starting along the sides, but even in the largest specimen this squamation remains scattered. The lower surface of the head is almost completely naked in the smallest example (120 mm), being covered only laterally by plates curved around the margins, with a distinct projection before each gill aperture and slightly widened near the mouth, the lower snout naked but with a pair of narrow projections from the dorsal armature curved around the anterior margin and bordering the widely naked tip; in larger specimens the whole lower surface of the head behind the mouth covered and on each side of the lower snout a transverse projection from the marginal plates directed towards a small median patch, the tip of the snout remaining naked.

The number of mandibular teeth on each ramus was found to vary only between 33 and 40, apparently with none or few hidden in the gums.

The deflated first dorsal fin may fail to reach the base of the spine of the second dorsal fin (2 ex.), just reach the spine base (2 ex.), or even slightly surpass the spine (1 ex., pl. 17); in the figured specimen the deflated first dorsal fin seems to considerably surpass the spine, but this is chiefly caused by the fact that the specimen represented is slightly curved.

The colour markings consist of numerous very densely distributed dark spots, usually of moderate size and slightly vague, smaller and still more dense on head, on the fins also very dense and with at most a rather vague indication of a slightly wavy arrangement in series on the distal first dorsal fin.

Habitat. — All present examples have been collected in or near rapids or cataracts, together with examples belonging to the previous species.

Distribution. — The species is as yet only known to occur in the Sipaliwini River, one of the principal tributaries of the Corantijn River.

Remarks. — When the present specimens are compared with examples of comparable sizes belonging to the other Surinam species, they appear to have the smallest orbit-head ratio, thus relatively the largest orbital diameters (neglecting a few aberrant specimens). Throughout the size range 39-72 mm, the same was found for *Hypostomus pseudohemiurus macrophthalmus* nov. spec. et subspec. (no. 9), also recorded from the Sipaliwini River, the types partly even having been collected together with the present material. This seems to suggest that possibly *H. pseudohemiurus macrophthalmus* merely represents the young of *H. crassicauda*, especially as the allometric trends of some of the morphometric characters as given in table 9 seem to support such a possibility. However, this would mean that the present species shows a remarkably extreme change in colour pattern during growth, while only moderate changes of this kind are found in all other Surinam species. Therefore, it seems preferable to provisionally consider the two Sipaliwini forms to represent separate species.

Etymology. — Crassus (lat.), stout; cauda (lat.), tail.

4. **Hypostomus gymnorhynchus** (Norman)
(plate 5 fig. 1-4, table 4)

Plecostomus gymnorhynchus Norman, 1926: 95 (Iponcin Creek, into Approuague River, French Guiana).

Material. — RMNH 25476, upper Tapanahoni River, Surinam, 27 November 1965, leg. Dr. G. F. Mees (Brokopondo Research 1965/66), 6 ex., 67-170 mm; RMNH 25477, Tapanahoni River opposite Paloemeu airstrip, Surinam, 29 November 1965, leg. Dr. G. F. Mees (Brokopondo Research 1965/66), 11 ex., 56-155 mm; RMNH 25478, Tapanahoni River, about 2 km downstream of Paloemeu River outlet, Surinam, 17 November 1965, leg. Dr. G. F. Mees (Brokopondo Research 1965/66), 4 ex., 69-123 mm.

Diagnosis. — Depth of caudal peduncle in interdorsal length 1.8-2.1 (possibly at least 2.25, see below) (av. 1.95), the species thus belonging to the *watwata*-group; mandibular ramus in interorbital width 2.0-3.0, its length relatively and absolutely increasing with age; deflated first dorsal fin falling distinctly short of base of spine of second dorsal fin, rarely reaching spine in young specimens; ventral surface plain but otherwise wholly covered with rather large dark-brownish, rather well defined, round spots, which may become slightly oblong on body and peduncle in adults, very dense and small on head, forming variably distinct and more or less wavy series or bands on the fins.

Description. — A rather robust species with a broadly rounded head, about ovate in dorsal view, but with a relatively slender caudal peduncle.

Depth of head at tip of occipital process 5.0-5.7 (av. 5.35), width at cleithra 3.25-3.85 (3.5), in standard length. Diameter of orbit 2.25-3.65 in snout, 1.35-2.1 in interorbital width, relatively diminishing in size with age. Additional measurements, ratios, averages and allometric trends are given in table 4.

Scutes in longitudinal lateral series 26/26 (1 ex., aberrant, with two additional scutes on caudal base), 27/27 (21 ex.), neglecting the elongate scute on caudal base. There are 6 interdorsal scutes, 2 or 3 between second dorsal and caudal, and 12 or 13 post-anal, while one or two small scutes cover the origins of these fins. The post-occipital is single, but an about median suture may be discernable (2 ex.). The belly is naked up to a size of about 75 mm, though a few scattered scutelets may occur; it is mostly covered with scattered scutes up to about 100 mm, in still larger specimens mostly or almost wholly covered, though naked parts may remain especially on posterior half. In juveniles, the lower surface of the head is mostly naked, only the lateral marginal plates curving around the margins forming a narrow cover variably produced immediately before the gill apertures, while on each side of the widely naked snout tip a narrow projection of the dorsal armature also curves around the margin; in large examples extensive triangular areas on both sides of the oral disc are covered, their bases usually connected by a few separate small scutelets across the throat, and the tops of the triangles connected by a transverse series of three platelets (possibly developing into a complete band in still larger specimens) crossing the lower snout; the tip of the snout remains widely naked.

The number of mandibular teeth on each ramus seems to vary between 20 and 37, the low counts presumably being caused by overlooking teeth hidden in the gums.

The deflated first dorsal fin usually falls distinctly short of the base of the spine of second dorsal fin, but occasionally almost or even actually reaches the spine, especially in a few young examples.

The colour markings consist of moderately dense, usually rather well defined, moderately large spots, lacking only on the plain belly, more or less suboblong on body and caudal peduncle, much more dense and round on head, on the fins rather large (usually?, see below, discussion of holotype) and more or less distinctly forming cross-bands or series especially on the caudal fin; caudal with dusky tips.

Habitat. — All specimens were collected in cataracts or rapids, or in pools nearby formed in the rocky river bed during the dry period.

Distribution. — The species was originally described from a tributary of the Approuague River, about 200 miles east of the Tapanahoni River, and had never been recorded since either from the intermediate region or from elsewhere! The Tapanahoni River specimens are now tentatively considered conspecific.

Remarks. — The holotype of *Hypostomus gymnorhynchus* (Norman) (BM 1926.3.2: 74) has a deflated dorsal fin falling considerably short of the base of the spine of the second dorsal fin (see plate 5 fig. 1), but the same is found, though to a slightly lesser degree, in some of the present Tapanahoni specimens, which show a considerable variation in this character; on the other hand, this character completely agrees with the same feature in the holotype of *H. gymnorhynchus occidentalis* nov. subspec. (no. 5, see plate 6 fig. 1), from the Surinam River, and of approximately the same size. Furthermore, the holotype of *H. gymnorhynchus* shows a remarkably high ratio between the depth of the caudal peduncle and the interdorsal length: at least 2.25, while the Tapanahoni specimens merely show a range of 1.8-2.1, the subspecies *occidentalis,* however, of 2.0-2.3. Also the holotype of *H. gymnorhynchus* has the spots on body and peduncle less intense and more vague, and on the fins, especially the caudal fin, much smaller and less intense than in the Tapanahoni examples, though this difference may at least partly be caused by the fact that the Approuague specimen was collected before 1926 and the spots may have faded. Nevertheless, these characters seem to indicate that rather the Surinam River specimens, and not the Tapanahoni examples, should be considered conspecific with the Approuague species and identified as *Hypostomus gymnorhynchus,* the Tapanahoni specimens representing a closely related but separate species or subspecies.

On the other hand, the Surinam River specimens here referred to the subspecies *occidentalis* (no. 5) also have the spots on body and peduncle more densely distributed, while still less intense, than found on the holotype of *H. gymnorhynchus*; unfortunately, the markings on the caudal fin can not be compared as the holotype of *occidentalis,* the only available specimen of comparable size, has the caudal mutilated. Furthermore, the ratio between the diameter of the orbit and the snout length in the holotype of *H. gymnorhynchus* (3.3) agrees better with our Tapanahoni specimens of comparable size (3.3) than with the *H. occidentalis* example (3.05) from the Surinam River. Finally, if the Surinam River specimens were to be identified with the Approuague species, the specimens from the Tapanahoni River would have to be referred to a separate subspecies (or species) occupying an intermediate region (Marowijne River basin), which would seem a very unlikely situation for zoogeographical reasons.

In this context, it may be pointed out as an additional drawback that the Approuague River species has been based on only a single example, which may well prove to be either aberrant or representing a very variable species, and which does not provide the necessary information for a correct evaluation of the species. Unfortunately, Puyo (1949) omits the species.

Considering these circumstances, it seems preferable to tentatively identify the Tapanahoni specimens with *H. gymnorhynchus* (Norman), and to refer the Surinam River examples to a closely related separate subspecies, pending additional information based on new material, especially on examples to be collected in the Approuague River and in western inland (French) Guyane between the Approuague and Tapanahoni Rivers. It does not seem unlikely that eventually there will be found sufficient evidence to prove that in fact three (or even more) closely related separate species or subspecies inhabit the various river systems in this region, especially as all other Surinam inland species appear to inhabit a remarkably restricted area, usually consisting of a single river basin.

The holotype of *H. gymnorhynchus* has been well described by Norman (1926: 95), but a few corrections may be made. I counted 22 teeth on each mandibular ramus, with possibly some more hidden in the gums (about 18 cf. Norman), and 27 scutes in longitudinal lateral series (26 cf. Norman). Some differences in the ratios must be caused by a different way in taking the various measurements (see table 4). Norman described the species to differ from most other members of the genus "in the form of the snout, with a naked margin", but this character is not at all exceptional. Norman's name seems to indicate a naked throat, but this is only partly correct as some small scutelets from the coracoidal band invade the throat region, though less far and still less frequently than found in the Tapanahoni specimens of similar size. Also, the triangular lateral covered parts of the lower head before the gill apertures and lateral of the oral disc are more fragmentary in Norman's holotype.

Etymology. — Gymnos (gr.), naked, bare; rhynchos (gr.), snout.

5. **Hypostomus gymnorhynchus occidentalis** nov. subspec.
(plate 6 fig. 1-4, table 5)

Material. — RMNH 25479, Surinam River near Brokopondo, Surinam, 3-4 February 1964, leg. Dr. M. Boeseman (Brokopondo Research 1963/64), 3 ex., 62-70 mm (paratypes); RMNH 25480, Surinam River near Brokopondo, Surinam, 13 February 1964, leg. Dr. M. Boeseman (Brokopondo Research 1963/64), 1 ex., 70 mm (paratype); RMNH 25520, Surinam River near Brokopondo, Surinam, 20 March 1965, leg. Dr. G. F. Mees (Brokopondo Research 1965/66), 1 ex., 146 mm (holotype).

Diagnosis. — Depth of caudal peduncle in interdorsal length 2.0-2.3, (av. 2.05), the subspecies thus belonging to the *watwata*-group; mandibular ramus in interorbital width 2.2-3.0, its length relatively and absolutely increasing with age; deflated first dorsal fin usually falling distinctly, or considerably, short of the base of the spine of second dorsal fin; excepting the plain belly wholly covered with moderate and rather vague spots, apparently never oblong or hardly so in juveniles, in transverse series or bands on the caudal fin (at least in juveniles; the single adult specimen has the caudal fin mutilated, without apparent markings).

Description. — This is a robust subspecies with the snout in dorsal view very broadly rounded, at least if the single adult example available can be considered representative.

Depth of head at tip of occipital process 5.5-5.9 (av. 5.65), width at cleithra 3.5-3.65 (3.55), in standard length. Diameter of orbit 2.35-3.05 in snout, 1.55-1.85 in interorbital width, relatively diminishing in size with age. Additional measurements, ratios, averages and allometric trends are given in table 5.

Scutes in longitudinal lateral series all 27/27, neglecting the elongate scute on caudal base. There are 6 interdorsal scutes, 3 between second dorsal and caudal, and 12 or 13 post-anal, while one or two small additional scutes cover the origins of these fins. The post-occipital is single, without any remains of a suture. The belly is naked in the four young specimens, the single adult has the anterior half of the belly almost wholly covered but the posterior half mostly naked with a few scattered median scutes. The armature of the lower head in the juvenile specimens merely consists of a lateral marginal cover formed by dorsal plates curving around the margin, and two projections from the upper snout armament also curving around the margin and bordering the rather widely naked snout tip. In the single adult example, the lateral marginal bands are wider, especially near the gill apertures where wide covered areas reach towards the throat region; below the snout there are two narrow square projections directed towards a moderate median patch; the throat is wholly naked but for a small median patch; the snout tip, between the two projections from the dorsal armature, remains widely naked.

The number of mandibular teeth counted on each ramus varies between 30 and 48, the number thus being usually higher than in the (presumed) nominate form as represented by Tapanahoni River specimens (no. 4 : 20-37), and even considerably higher than found in the holotype of the species from the Approuague River (22), but teeth hidden in the gums may partly account for the low numbers.

The deflated first dorsal fin falls distinctly short of the base of the spine of the second dorsal fin, the distance being even considerable in the single adult specimen (see plate 6 fig. 1).

Excepting the plain belly, the specimens are wholly covered with moderate, rather dark spots, usually round but slightly oblong on body and peduncle in juveniles, on the single adult example rather vague and indistinct, never really intense or well defined. The fins are similarly spotted, the spots forming cross-bands on the caudal fin (at least in the juvenile specimens; the mutilated caudal of the single adult example available does not show any indications of dark cross-bands of the kind found on the Tapanahoni River specimens presumed to represent the nominate form).

Habitat. — In pools near cataracts and rapids in the main river. The juveniles were collected a few days after the closing of the Afobaka barrage, when the river near Brokopondo was falling dry or had been reduced to more or less isolated pools. The large specimen was found suffocated after a trial of the Afobaka turbines, after having survived in the almost stagnant pools for over a year; it may have survived in this apparently unfavourable environment as a result of the high oxygen content.

Distribution. — This subspecies has hitherto only been found in the Surinam River near Brokopondo, but must be expected to have occupied a much larger area before the Brokopondo Lake took shape.

Remarks. — The subspecies has been extensively discussed in the paragraph Remarks of the nominate (or presumed nominate) form (no. 4).

Etymology. — Occidens (lat.), western.

6. **Hypostomus micromaculatus** nov. spec.
(plate 7 fig. 1-4, table 6)

Material. — RMNH 25482, Surinam River near Brokopondo, Surinam, 2 May 1964, leg. Dr. M. Boeseman (Brokopondo Research 1963/64), 1 ex., 120 mm (paratype); RMNH 25483, Surinam River near Brokopondo, Surinam, 12 May 1964, leg. Dr. M. Boeseman (Brokopondo Research 1963/64), 1 ex., 160 mm (paratype); RMNH 25484, Grandam (falls), Gran Rio, upper Surinam River basin, Surinam, 18 July 1965, leg. Dr. G. F. Mees (Brokopondo Research 1965/66), 4 ex., 53-82 mm (paratypes); RMNH 25485, large rapids near bivouac, middle course Gran Creek, Surinam River basin, Surinam, 31 July 1964, leg. Dr. M. Boeseman (Brokopondo Research 1963/64), 2 ex., 45, 67 mm (paratypes); RMNH 25486, Awaradam (rapids), Gran Rio, upper Surinam River basin, Surinam, 17 July 1965, leg. Dr. G. F. Mees (Brokopondo Research 1965/66), 20 ex., 25-53 mm (paratypes); RMNH 25487, Mamadam (falls), Surinam River, Surinam, 13 August 1965, leg. Dr. G. F. Mees (Brokopondo Research 1965/66), 2 ex., 165, 185 mm (paratype and holotype respectively), and 39 juvs.; RMNH 25521, rapids in lower Gran Creek, about 4 km above outlet into Surinam River, Surinam, 6 March 1964, leg. Dr. M. Boeseman (Brokopondo Research 1963/64), 1 ex., 36 mm (paratype); RMNH 25787, Awaradam (rapids), Gran Rio, upper Surinam River basin, Surinam, 17 July 1965, leg. Dr. G. F. Mees (Brokopondo Research 1965/66), 198 ex., 14-53 mm; RMNH 25938, Surinam River near Brokopondo, Surinam, 20 March 1965, leg. Dr. G. F. Mees (Brokopondo Research 1965/66), 1 ex., 165 mm (paratype).

Diagnosis. — Depth of caudal peduncle in interdorsal length 1.4-1.45 (average 1.4), the species thus belonging to the *plecostomus*-group; mandibular ramus in interorbital width 1.9-2.1, apparently not changing with age; deflated first dorsal fin usually just reaching base of spine of second dorsal fin; excepting the plain ventral surface, wholly covered with small longitudinal spots, few (in juveniles) to numerous (in adults) on each scute, very small on dorsal fins, indistinct or lacking on dusky caudal fin and in juveniles on dusky dorsal fin too, with occasional transverse bands or series only in very small juveniles on first dorsal and caudal fins.

Description. — A robust species with a very stout caudal peduncle in adults, the wide snout broadly rounded.

Depth of head at tip of occipital process 4.8-6.1 (av. 5.35), width at cleithra 2.9-3.55 (3.15), in standard length. Diameter of orbit 1.6-3.85 in snout, 1.05-2.15 in interorbital width, relatively diminishing in size with age. Additional measurements, ratios, averages and allometric trends are given in table 6.

Scutes in longitudinal lateral series 25/25 (1 ex.), 26/26 (13 ex.), 27/27 (2 ex.), not counted in most juveniles, all excluding the elongate scute on caudal base. There are 5 or 6 interdorsal scutes, 2 between second dorsal and caudal, and 13 post-anal, neglecting one or two small scutes covering the origins of these fins. The post-occipital scute is always single in adults, multiple in small juveniles, the coalescence being completed at a size of about 40 or 45 mm. The belly is wholly or almost wholly naked up to a size of about 70 mm, mostly naked up to about 120 mm (or possibly more), only the posterior two-thirds or half is rather naked at 160-185 mm, which represents the final stage in the present series and possibly in the species; the squamation usually starts with some scattered scutes near the median line, the formation of a coracoidal band, and the formation of some lateral scutelets. The lower surface of the head is mostly naked in juveniles, only the lateral margins being covered by a narrow extension of the dorsal armature curving around the margins, while a pair of narrow projections from the dorsal armature of the snout laterally borders the naked snout tip; in adults, a transverse band projects on each side from the posterior margins just before the gill apertures, with an additional roundish patch in its anterior axil, while a series of three slightly elongate transverse patches crosses the lower snout before the upper lip, possibly coalescing in specimens still larger than now available. The throat, the snout tip, and the lateral margins of the snout remain naked.

The number of mandibular teeth counted on each ramus varies between 20 and 38, but in the cases with low counts additional teeth are probably hidden in the gums.

The deflated first dorsal fin usually just reaches or slightly surpasses the base of the spine of the second dorsal fin; occasionally, this base is rather distinctly surpassed, while in juveniles the deflated first dorsal fin may fail to reach the spine base.

The colour markings are diagnostic in the present species. Markings are lacking on the plain ventral surface, but small elongate spots cover most of body and peduncle, varying between a small series on each scute in juveniles and more numerous spots in two or more series on each scute in adults, the approximate size of each spot remaining about constant during growth. Smaller and more roundish spots are found on the head and fins in adults, more or less lacking on the dusky fins in juveniles, though vague bands occur in very small juveniles on first dorsal and caudal fins. See also Remarks.

Habitat. — Most of the present specimens were found in or near rapids and cataracts, only the Brokopondo specimens were collected in pools downstream of the barrage where they may have survived as a result of the rather high oxygen content subsequently observed.

Distribution. — This characteristic species has only been collected in the Surinam River basin, downwards to near Brokopondo.

Remarks. — The large series of juveniles collected at some of the localities seem to indicate that the species frequently occurs, and possibly propagates, in the upper reaches of the Surinam River basin. Probably, some populations have now become completely isolated since the species disappeared from the lake area, apparently not being able to subsist in the suddenly modified environmental circumstances.

The very small juveniles, only briefly dealt with above, may show more or less aberrant patterns of colour markings, and it seems of interest to trace in more detail the developments in this character.

At a standard length of about 20 mm, the body is irregularly mottled, the upper surface mostly dark but occasionally with lighter blotches before and behind the first dorsal fin and near the second dorsal fin; the first dorsal has a dark (anterior) base and usually one horizontal bar; the pectorals show two or three, relatively wide cross-bars or series of spots, while the same is usually found on the ventrals; the caudal fin has about two wide and often irregular cross-bands; the lighter parts of the fins are still slightly reddish. In somewhat larger examples, the mottling is replaced by small dark spots, usually first developing on the lateral peduncle.

At about 30 mm, the body and peduncle are covered with numerous very fine spots, especially diminutive on the peduncle; while some mottling may remain, the back occasionally shows a few large lighter saddles, especially before and behind the first dorsal but sometimes also below or behind the second dorsal, giving the impression of vague cross-bands; the first dorsal has two, usually vague, cross series of spots, disappearing with age (size); the pectorals and ventrals show either a few cross-bands in small examples or, in slightly larger specimens, several irregularly arranged smaller spots, occasionally still more or less in series; the caudal fin has three variably distinct cross-bands, often persisting on the upper half only; the lighter parts of the fins are still slightly reddish.

At about 40 mm, the body and peduncle are covered with numerous very small spots, slightly fainter on peduncle, and still show remains of lighter saddles on the back, especially before but occasionally behind the first dorsal fin; the first dorsal shows only a few remains of dark spots near the base or anteriorly, or appears wholly dusky being covered with small greyish spots; the pectoral spine has a series of 5-6 spots, the pectoral and ventral fins are irregularly spotted along the rays; the caudal fin shows some remains of 4 or 5 cross-bands, especially on the upper lobe, but occasionally a series of spots is discernable along the lower ray, or often the whole fin is mostly dusky.

At 50 mm, the body may occasionally still show remains of the saddles, but usually body and peduncle are covered with small spots only; the first dorsal fin, the pectorals, ventrals, and the caudal all seem dusky, being wholly covered with small spots.

At various sizes, specimens are found with the distal parts of the paired fins hyaline.

Etymology. — Mikros (gr.), small; macula (lat.), spot.

7. **Hypostomus paucimaculatus** nov. spec.
(plate 8 fig. 1-4, table 7)

Material. — RMNH 25468, Surinam River near Brokopondo, Surinam, 20 March 1965, leg. Dr. G. F. Mees (Brokopondo Research 1965/66), 1 ex., 120 mm (holotype); RMNH 25469, Surinam River near Brokopondo, Surinam, 14 February 1964, leg. Dr. M. Boeseman (Brokopondo Research 1963/64), 2 ex., 53, 57 mm (paratypes); RMNH 25518, Awarradam (rapids), Gran Rio, upper Surinam River basin, Surinam, 17 July 1965, leg. Dr. G. F. Mees (Brokopondo Research 1965/66), 1 ex., 31 mm (paratype).

Diagnosis. — Depth of caudal peduncle in interdorsal length 1.35-1.4 (average 1.4), the species thus belonging to the *plecostomus*-group; mandibular ramus in interorbital width 2.5-2.7, the ratio constant or possibly slightly decreasing with age; deflated first dorsal fin reaching base of spine of second dorsal fin; excepting the plain ventral surface, wholly covered with moderate, roundish, intense and very widely interspaced spots, only lacking or indistinct in juveniles on peduncle and caudal fin; the spots smaller on head, but even on the snout relatively large and wide interspaced.

Description. — A rather slender species, though with a stout peduncle; the snout regularly ovate in dorsal view.

Depth of head at tip of occipital process 5.0-5.7 (av. 5.3), width at cleithra 3.0-3.15 (3.1), in standard length. Diameter of orbit 2.2-3.0 in snout, 1.4-1.85 in interorbital width, relatively diminishing in size with age. Additional measurements, ratios, averages and allometric trends are given in table 7.

Scutes in longitudinal lateral series 27/27 (3 ex.) or 28/28 (1 ex.), excluding the elongate scute on caudal base. There are 5 interdorsal scutes, 3 between second dorsal and caudal, and 13 post-anal, neglecting one or two small scutelets on the origins of these fins. The post-occipital scute single, though in one juvenile (53 mm) still with a suture. The belly is naked in the three small examples, the single adult has most of the anterior half covered, the posterior half with scattered platelets; still larger specimens may show a more complete ventral armature. The lower surface of the head in juveniles only shows the usual narrow marginal cover laterally, and the two extensions of the upper armature projecting on both sides of the naked snout tip; in the larger example, the lateral cover is strongly widened posteriorly, before the gill apertures, the ventro-lateral cover thereby being shaped like an irregular comma; the throat remains naked but narrowly, being posteriorly slightly invaded by the convex anterior part of the coracoidal band; the lower snout too remains naked neglecting the narrow extensions of the dorsal armature bordering the naked snout tip.

The number of mandibular teeth counted on each ramus varies between 28 and 38, but a few additional teeth may have been overlooked, some usually being found hidden in the gums.

The deflated first dorsal fin distinctly reaches the spine of the second dorsal fin in all available specimens, which seems to indicate a very restricted variability in this character.

The colour markings distinctly separate the present species from all other Surinam representatives of the genus. Excepting the wholly plain ventral surface, the whole adult example is covered with moderate, roundish, intense and widely interspaced spots, slightly smaller on the head, especially the snout, but even there not minute as found on other species and also rather well interspaced; the spots on the fins show the same general aspect, the spots being only slightly smaller than those on body and peduncle. In the juveniles, the spots have about the same size as in the adult, thereby being relatively much larger, and the number of spots is accordingly much reduced; the spots are more or less lacking on the snout and the posterior and lower peduncle, and are more vague or indistinct on the fins, especially on the caudal fin.

Habitat. — The juveniles were all found in or near rapids; the single large specimen was found suffocated in a pool downstream of the barrage after a trial of the turbines, and must have survived for more than a year in an apparently unfavourable environment, which probably became possible as a result of the high oxygen content of these pools.

Distribution. — This species is only recorded from the middle and upper reaches of the Surinam River system, while the scant material gives the impression that its occurrence was very rare. It must now have completely disappeared throughout the lake area.

Remarks. — As other cataract-inhabiting species in the same circumstances, the present species probably is able to subsist for some time in more or less stagnant pools, as similar environmental circumtances are a regular natural feature around the cataracts and rapids during the dry season. However, it seems likely that they will not be able to propagate unless the original situation is more or less restored, and it is therefore doubtful if the population below the Afobaka barrage will be able to surivive.

Etymology. — Paucus (lat.), few; macula (lat.), spot.

8. **Hypostomus pseudohemiurus** nov. spec.

(plate 9 fig. 1-4, table 8)

Material. — RMNH 25516, Kabalebo River, Corantijn River basin, Surinam, 13 September 1965, leg. Dr. G. F. Mees (Brokopondo Research 1965/66), 19 ex., 15-62 mm (largest example holotype, 18 paratypes); RMNH 25517, Avanavero Falls, Corantijn River basin, Surinam, 24 September 1965, leg. Dr. G. F. Mees (Brokopondo Research 1965/66), 76 ex., 18-53 mm (paratypes); RMNH 25785, Zandvallen, Kabalebo River, Corantijn River basin, Surinam, 23 September 1965, leg. Dr. G. F. Mees (Brokopondo Research 1965/66), 3 ex., 21.5-33 mm (paratypes).

Diagnosis. — Depth of caudal peduncle in interdorsal length 1.35-1.45 (average 1.4), the species thus belonging to the *plecostomus*-group; mandibular ramus in interorbital width 1.9-2.1 (2.0), without apparent allometric trend; deflated first dorsal fin almost or just reaching base of spine of second dorsal fin; the pectoral fins hardly reaching the ventral insertions; lower surface plain but otherwise body with rather large and slightly elongate spots, lacking on peduncle; spots on head smaller but not crowded, on first dorsal only along base, none on second dorsal or caudal fin.

Description. — Apparently a small species; the caudal peduncle is rather stout, the snout ovate or rounded triangular in dorsal view.

Depth of head at tip of occipital process 5.35-5.7 (av. 5.55), width at cleithra 3.05-3.3 (3.15), in standard length. Diameter of orbit 2.45-2.9 in snout, 1.35-1.6 in interorbital width, its relative size hardly decreasing with age in the available series. Additional measurements, ratios, averages and allometric trends are given in table 8.

Scutes in longitudinal series 26/26 (15 ex.) or 26/27 (5 ex.), but counted only in part of the material; an additional elongate scute is found on caudal base. There are 5 scutes between the dorsal fins, 2 between second dorsal and caudal fin, and 12 post-anal, neglecting one or two small additional scutes covering the origins of these fins. The post-occipital scute is always single except perhaps in a few of the smallest examples. The belly is wholly naked at all sizes, and the same applies to most of the lower head surface, only the lateral margins of the head being narrowly covered by the extension of the dorsal armature, while two very small projections from the anterior upper snout armament border the naked snout tip.

The number of mandibular teeth counted on each ramus (20 ex.) varies between 19 and 25, with a few additional teeth possibly hidden in the gums.

The deflated first dorsal fin usually almost (seldom quite) reaches the base of the spine of the second dorsal fin.

The colour markings are characteristically distributed, strongly resembling the pattern found on a British Museum paratype of *H. hemiurus* (Eigenmann). The ventral surface is plain, while otherwise the body, the head, and the paired fins are covered with rather large dark spots, slightly oblong on the body and slightly smaller on the head; the caudal peduncle and the unpaired fins show no markings or, at most, a few vague longitudinal stripes on the peduncle; the unpaired fins are rather dusky, and only on the first dorsal fin a few dark spots may be found near the base, especially distinct in larger specimens. As the spots seem to maintain about the same size during growth, the spots on juveniles seem much larger and are less abundant.

Habitat. — All present specimens have been collected in pools in or near rapids or cataracts.

Distribution. — The species is only known to occur in the Kabalebo River, but may eventually be found elsewhere in the Corantijn River basin, our knowledge of the ichthyology of the region still being very scanty.

Remarks. — As already indicated above, the present species at first sight strongly resembles *H. hemiurus* (Eigenmann) as originally described (1912: 225) and when compared with a British Museum paratype of that species (BM 1911.10.31: 113; see pl. 17 fig. 3, 4), especially in the pattern of the colour markings. On the other hand, Eigenmann's figure (1912, pl. 25 fig. 1) shows a rather different pattern: smaller spots, covering the whole first dorsal and caudal fins, while some spots are even to be found on the peduncle. This makes it difficult to understand how Eigenmann's figure can represent the same species as the British Museum paratype which far better agrees with Eigenmann's description.

As *H. hemiurus* has been recorded from the Essequibo and Demerara River basins, both not far distant from the Corantijn River basin, the present species could easily have been identified with *H. hemiurus* by considering only the orthodox characters. However, a comparison of the morphological characteristics of the paratype of *H. hemiurus* (table 17) with those of the present material (table 8) shows some considerable differences, the most obvious being the different ratio between the depth of the caudal peduncle and the interdorsal length in *H. hemiurus* (1.7), which would place that species rather near (or in?) the *watwata*-group.

Considering the number of specimens collected by Dr. Mees, it seems most likely that *H. pseudohemiurus* does not grow to a much larger size than here represented, but the fact that these localities were visited without assistance, forced Dr. Mees to restrict his activities to small shallow pools which may have been the habitats preferred by juveniles only.

Etymology. — Pseudo (gr.), false; hemi (gr.), half; oura (gr.), tail.

9. **Hypostomus pseudohemiurus macrophthalmus** nov. subspec.

(plate 10 fig. 1-4, table 9)

Material. — RMNH 25513, Sipaliwini River, near air strip, Surinam, 9 February 1966, leg. Dr. G. F. Mees (Brokopondo Research 1965/66), 8 ex., 45-79 mm (paratypes); RMNH 25514, Sipaliwini River, near air strip, Surinam, 23 January 1966, leg. Dr. G. F. Mees (Brokopondo Research 1965/66), 11 ex., 39-72 mm (holotype, 65 mm; paratypes); RMNH 25515, Sipaliwini River, near air strip, Surinam, 6 February 1966, leg. Dr. G. F. Mees (Brokopondo Research 1965/66), 1 ex., 48 mm (paratype).

Diagnosis. — Depth of the caudal peduncle in interdorsal length 1.5-1.6 (average 1.55), the subspecies thus belonging to the *plecostomus*-group; mandibular ramus in interorbital width 2.0-2.3, without apparent allometric trend; deflated first dorsal fin (almost) invariably reaching the base of spine of second dorsal fin; the pectorals reaching beyond the ventral insertions; body with large and rather elongate dark spots, smaller and round on the head, lacking or replaced by vague longitudinal stripes on the caudal peduncle, first dorsal and upper lobe of caudal fin with series of spots or transverse bands.

Description. — In general shape strongly resembling the nominate form described in the previous chapter, but the head in dorsal view usually with a less regular, slightly sinuous, ovate outline.

Depth of head at tip of occipital process 5.35-6.15 (av. 5.75), width at cleithra 3.05-3.4 (3.2), in standard length. Diameter of orbit 1.9-2.35 in snout, 1.1-1.3 in interorbital width, with age slightly diminishing in relative size. Additional measurements, ratios, averages and allometric trends are given in table 9.

Scutes in longitudinal lateral series 26/26 (19 ex.), 26/27 counted in one example only, an additional oblong scute on the caudal base. There are 5 interdorsal scutes, 2 between second dorsal and caudal, and 12 post-anal, neglecting one or two small scutelets on the origins of these fins. The post-occipital scute single. The belly invariably naked. The lower surface of the head mostly naked, narrowly covered laterally by an extension of the dorsal armature curving around the margins, the lower surface of the snout always naked neglecting the usual two projections from the upper armature curving around the anterior margin and bordering the naked snout tip.

The number of mandibular teeth on each ramus seems to vary between 22 and 30, with possibly a few more hidden in the gums.

The deflated first dorsal fin usually rather distinctly reaches the base of the spine of the second dorsal fin, falling short of the spine base in only one example.

The pattern of the colour markings strongly resembles that observed in

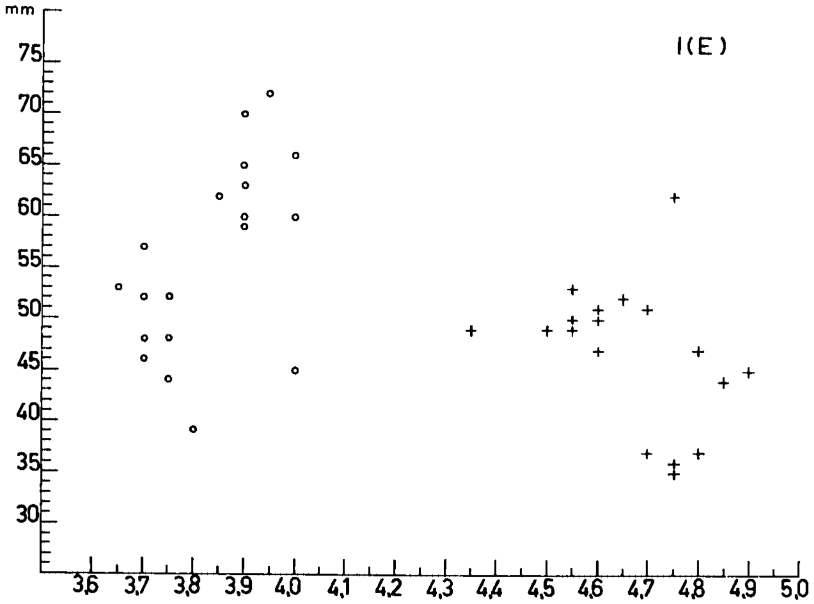


Fig. 6. *Hypostomus pseudohemiurus* n. sp.: the ratios between length of head and orbital diameter of the nominate form and the subspecies *macrophthalmus* n.ssp. throughout the available size ranges. Crosses, *H. pseudohemiurus* n. sp.; circles, *H. ps. macrophthalmus* n.ssp.

the nominate form, differences mainly to be found in the markings on the unpaired fins. The body is covered with large elongate blotches, lacking only on the plain belly; the head shows smaller and round spots, rather larger and more crowded than in the nominate form; there are no spots on the peduncle, but a few longitudinal vague stripes may be discernable; the first dorsal has at least the proximal third or half covered with more or less vague spots in juveniles, but this area appears to increase with age and to ultimately cover about the whole fin, forming more or less regular transverse series; the caudal fin is mostly dusky, but a transversely banded area increasingly covers the upper lobe towards the centre; the pectoral and ventral fins also are spotted, the large round spots forming transverse series.

Habitat. — All specimens were collected in or near rapids.

Distribution. — The present species has hitherto only been found in the upper reaches of the Sipaliwini River, but in fact this is the only locality in the upper Corantijn River basin explored.

Remarks. — The subspecies can easily be distinguished from the nominate form by its relatively large orbit, as illustrated in fig. 6. All specimens collected are rather small, and this seems to confirm the impression, already expressed for the nominate form, that the species probably does not grow to a much larger size. Moreover, the fact that only small examples could be found of both the nominate form and the present subspecies is, next to a considerable morphological similarity, a reason to consider both forms conspecific. A synonymy of the present subspecies with *H. crassicauda* nov. spec. (no. 3) has already been discussed on a previous page and considered unlikely.

Etymology. — Makros (gr.), large; ophthalmos (gr.), eye.

10. **Hypostomus saramaccensis** nov. spec.
(plate 11 fig. 1-4, table 10)

Material. — RMNH 25488, Feddiprati (rapids), middle Saramacca River, Surinam, 9 April 1964, leg. Dr. M. Boeseman (Brokopondo Research 1963/64), 20 ex., 45-115 mm (holotype, 115 mm; paratypes).

Diagnosis. — Depth of caudal peduncle in interdorsal length 1.4-1.45 (average 1.4), the species thus belonging to the *plecostomus*-group, mandibular ramus in interorbital width 1.8-1.9, constant throughout the size range; deflated first dorsal fin usually just, seldom distinctly, reaching base of spine of second dorsal fin; spine of first dorsal fin slightly shorter than pre-dorsal length; ventral surface plain, body with moderate to small dark roundish spots, relatively larger and oblong on juveniles, smaller (but not minute) and round on head; all fins with numerous small spots, not regularly arranged, vague on distal first dorsal fin.

Description. — Apparently a medium-sized, moderately slender species, though with a rather stout caudal peduncle; the snout outline about ovate in dorsal view.

Depth of head at tip of occipital process 5.4-6.3 (av. 5.65), width at cleithra 2.9-3.4 (3.15), in standard length. Diameter of orbit 1.95-2.95 in snout, 1.1-1.75 in interorbital width, relatively decreasing with age. Additional measurements, ratios, averages and allometric trends are given in table 10.

Scutes in longitudinal lateral series invariably 26/26, with an additional elongate scute on caudal base. There are 5 interdorsal scutes, 2 between the second dorsal and caudal, and 12 or 13 post-anal, neglecting one or two small scutelets covering the origins of these fins. The post-occipital scute always single, even in the smallest specimen available without sutures. The belly is usually completely naked, or in larger examples with a few scutes at coracoidal region and near pectoral bases, and only in two examples of over 100 mm there are a rather well developed coracoidal band, the lateral parts more or less covered, and some scattered scutes elsewhere. In young specimens the lower surface of the head mostly naked, with only the usual lateral marginal cover and two narrow projections from the upper snout cover curving around the anterior snout margin and bordering the naked tip. About the same pattern is maintained in the larger examples, but there is an additional moderate, ovate or pear-shaped, patch just before each gill-aperture, while on the lower snout a transverse series of three small ovate patches is found immediately before the upper lip, possibly coalescing if the species attains a larger size or age.

The number of mandibular teeth found on each ramus appears to vary between 31 and 47, but especially to the lower counts a number of teeth hidden in the gums probably should be added.

The deflated first dorsal fin almost invariably just reaches the base of the spine of the second dorsal fin, only in two examples reaching slightly beyond the anterior base of the spine.

The colour markings consist of rather small spots, equally covering body (except the plain belly), peduncle, and most of the fins, slightly smaller and more dense on the head, quite large on the pectoral spines, and forming more or less irregular cross-bands on the caudal fin. In the juveniles, the spots appear to be much larger, and slightly oblong on body and peduncle, but this is at least partly a result of the circumstance that, as usual in the Surinam species, the spots do not grow with the specimens. There is some variation in the size of the spots on the larger specimens.

Habitat. — All specimens available were collected together in a large shallow pool below extensive cataracts.

Distribution. — The species is only known to occur in the Saramacca River, but the extent of its distributional area remains to be ascertained; the type locality is still the only place in the Saramacca River basin where extensive collecting has taken place.

Remarks. — Morphologically, this species seems within the *plecostomus*-group most closely related to *H. micromaculatus*, but it distinctly differs in colour markings.

Etymology. — Named after the Saramacca River, to which it seems restricted.

11. **Hypostomus sipaliwinii** nov. spec.

(plate 12 fig. 1-4, table 11)

Material. — RMNH 25481, Sipaliwini River, upper Corantijn River basin, Surinam, 23 January 1966, leg. Dr. G. F. Mees (Brokopondo Research 1965/66), 2 ex., 83. 126 mm (paratype and holotype respectively).

Diagnosis. — Depth of caudal peduncle in interdorsal length 2.1-2.2 (average 2.1), the species thus belonging to the *watwata*-group; mandibular ramus in interorbital width 2.6-2.8, apparently without allometric growth; deflated first dorsal fin falling just short of base of spine of second dorsal fin; scutes 28; moderately large spots on body and peduncle intense and oblong, irregular on first dorsal, in cross-series or bands on caudal.

Description. — A slender species with a rather thin peduncle, the snout outline in dorsal view about ogival, the tip rather narrowly rounded.

Depth of head at tip of occipital process 5.2-5.35 (av. 5.3), width at cleithra 3.35-3.4, in standard length. Diameter of orbit 2.5-3.1 in snout, 1.6-2.0 in interorbital width, relatively decreasing with age. Additional measurements, ratios, averages and allometric trends are given in table 11.

Scutes in longitudinal series in both types 28/28, with an additional elongate scute on caudal base. There are 7 interdorsal scutes, 3 between second dorsal and caudal, and 13 post-anal, neglecting one or two small scutelets on fin origins. The post-occipital scute is single. The belly is wholly naked in the 83 mm specimen, the 126 mm holotype has some scattered scutes on the coracoidal zone and laterally only. The young specimen has the lower head mostly naked, with only a narrow lateral marginal area covered by the continuation of the upper cover, and with the usual pair of narrow projections from the upper snout cover bordering the naked snout tip; this common juvenile pattern is still maintained in the 126 mm holotype.

The number of mandibular teeth counted on each ramus varies between 31 and 46, with probably some more hidden in the gums especially in the case of the low counts.

The deflated first dorsal fin in both examples falls slightly short of the base of the spine of the second dorsal fin.

The colour markings consist of usually very dark, well defined, and moderately large spots, lacking only on the plain ventral surface. On the body and peduncle they are variably oblong, on the head much smaller and roundish, on the fins roundish, irregularly distributed except on the transversely banded caudal fin, small on pectorals and ventrals; the lower caudal dusky.

Habitat. — The two examples were collected in or near cataracts and rapids.

Distribution. — At present only known to occur in the upper Sipaliwini River.

Remarks. — Within the *watwata*-group, the present species seems closely related to the next species, *H. surinamensis* nov. spec. (12), while also a strong resemblance can be observed to *H.corantijni* (2), as already discussed in the paragraphs dealing with that species.

Etymology. — Named after the Sipaliwini River, in which both types were collected.

12. **Hypostomus surinamensis** nov. spec.

(plate 13 fig. 1-4, 14 fig. 1, 2, table 13)

?*Plecostomus commersonii*; Kappler (nec Valenciennes), 1881: 167; 1885: 919; 1887: 152.

Material. — RMNH 17340, upper Surinam River, Surinam, September 1910, leg. K. M. Hulk (Corantijn Expedition 1910/11), 1 ex., 80 mm; RMNH 25490, Surinam River near Brokopondo, Surinam, 12 May 1964, leg. Dr. M. Boeseman (Brokopondo Research 1963/64), 16 ex., 84-160 mm (paratypes); RMNH 25491, Surinam River near Brokopondo, Surinam, leg. Dr. M. Boeseman (Brokopondo Research 1963/64), 1 ex., 150 mm (paratype); RMNH 25492, Surinam River near Brokopondo, Surinam, 25-26 April 1964, leg. Dr. M. Boeseman (Brokopondo Research 1963/64), 1 ex., 120 mm (paratype); RMNH 25493, upper Sara Creek near Langetabbetje, Surinam River basin, Surinam, 12-14 December 1965, leg. Dr. G. F. Mees (Brokopondo Research 1965/66), 1 ex., 150 mm (paratype); RMNH 25494, Mamadam Falls, Surinam River, Surinam, 13 August 1965, leg. Dr. G. F. Mees (Brokopondo Research 1965/66), 1 ex., 153 mm (paratype); RMNH 25495, Feddiprati (rapids), middle Saramacca River, Surinam, 9 April 1964, leg. Dr. M. Boeseman (Brokopondo Research 1963/64), 2 ex., 59, 140 mm (paratypes); RMNH 25496, small creek below Moesoembaprati Falls, Surinam River basin, Surinam, 21 August 1964, leg. Dr. M. Boeseman (Brokopondo Research 1963/64), 2 ex., 82, 132 mm (paratypes); RMNH 25497, Surinam River near Brokopondo, Surinam, 3-4 February 1964, leg. Dr. M. Boeseman (Brokopondo Research 1963/64), 2 ex., 67, 150 mm (paratype and holotype respectively); RMNH 25498, tributary creek of Gran Rio about 4 km above Ligolio, Surinam River basin, Surinam, 16 July 1965, leg. Dr. G. F. Mees (Brokopondo Research 1965/66), 1 ex., 143 mm (paratype); RMNH 25499, tributary creek of Gran Creek, about 10 km above outlet into Surinam River, Surinam River basin, Surinam, 21 July 1964, leg. Dr. M. Boeseman (Brokopondo Research 1963/64), 1 ex., 125 mm (paratype); RMNH 25500, Surinam River near Brokopondo, Surinam, 2 May 1964, leg. Dr. M. Boeseman (Brokopondo Research 1963/64), 3 ex., 92-132 mm (paratypes); RMNH 25501, Surinam River between Afobaka and Brokopondo, Surinam, 14 February 1964, leg. P. Leentvaar (Brokopondo Research 1963/64), 2 ex., 76, 106 mm (paratypes); RMNH 25502, Kwambaolo Creek, tributary creek of Sara Creek above Dam, Surinam River basin, Surinam, 28 December 1963, leg. Dr. M. Boeseman (Brokopondo Research 1963/64), 11 ex., 60-123 mm (paratypes); RMNH 25503, Grandam (falls), Gran Rio, Surinam River basin, 18 July 1965, leg. Dr. G. F. Mees (Brokopondo Research 1965/66), 6 ex., 123-165 mm (paratypes); RMNH 25504, Surinam River near Brokopondo, Surinam, 7 February 1964, leg. Dr. M. Boeseman (Brokopondo Research 1963/64), 1 ex., 68 mm (paratype); RMNH 25522, rapids in Gran Creek about 4 km above outlet into Surinam River, Surinam River basin, Surinam, 6 March 1964, leg. Dr. M. Boeseman (Brokopondo Research 1963/64), 1 ex., 81 mm (paratype).

Diagnosis. — Depth of caudal peduncle in interdorsal length 1.8-2.1 (average 1.95), the species thus belonging to the *watwata*-group; mandibular ramus in interorbital width 2.4-3.0, the ratio decreasing with age; deflated first dorsal fin usually falling just short of base of spine of second dorsal fin, occasionally falling more distinctly short or just reaching spine; scutes almost invariably 27, if 26 or 28 usually on one side only; spots lacking only on plain ventral surface, small, variably intense, round or hardly oblong, only on caudal in more or less regular cross-series or bands.

Description. — A moderately slender species, the outline of the snout in dorsal view about ovate or ogival, the snout tip rather narrowly rounded.

Depth of head at tip of occipital process 5.2-5.9 (av. 5.55), width at cleithra 3.35-3.75, in standard length. Diameter of orbit 2.3-3.75 in snout, 1.55-2.35 in interorbital width, relatively decreasing with age. Additional measurements, ratios, averages and allometric trends are given in table 13.

Scutes in longitudinal series 26/27 (2 ex.), 27/27 (47 ex.), 27/28 (1 ex.), 28/28 (1 ex.), the additional elongate scute on caudal base not included. There appear to be invariably 6 scutes between the dorsal fins, 3 between second dorsal and caudal, and 13 post-anal, excluding one or two small scutelets at the origins of these fins. The post-occipital scute is always single, neglecting the deformed squamation in one example. The belly is naked, or with only a few scattered scutes, up to a size of about 100 mm, though occasionally a partial median and lateral cover may occur at smaller sizes; coracoidal, median and lateral scutes variably occur up to a size of about 125 mm, still larger examples being mostly covered, but considerable variation remains in this character. The lower surface of the head shows the usual aspect in juveniles, being mostly naked but with the lateral margins covered by extensions of the upper armature, and with the two narrow extensions of the upper snout armature bordering the naked snout tip; in large examples, narrow extensions of the lateral cover project before the gill apertures, narrowing and hardly continuous behind the lower lip, while three ovate or rectangular platelets form a transverse series across the lower snout surface, possibly coalescing in specimens still larger than now available.

The number of mandibular teeth counted on each ramus varies between 20 and 60, but the low numbers are presumably caused by the circumstance that part of the teeth are hidden in the gums, the actual variation probably having about 40 as a lower limit.

The deflated first dorsal fin usually falls more or less distinctly short of the base of the spine of the second dorsal fin, exceptionally reaching the spine.

The colour markings are somewhat variable in intensity as well as in the size of the usually rather small spots which almost wholly cover the specimens, except the plain lower surface. On body and peduncle, the spots vary between small roundish and slightly larger suboblong; on the head, the spots are still smaller, round, and more dense. Small spots are irregularly covering the first dorsal and the paired fins, but form more or less regular cross-series or bands on the caudal. Juveniles show the same aspects though with the spots relatively larger and less numerous.

Habitat. — Most of the present examples were collected in or near rapids, cataracts, or falls, only a few having been found in almost stagnant pools near Brokopondo after closing of the barrage and after the Surinam River bed had mostly fallen dry. The survival of some specimens during apparently unfavourable circumstances may be ascribed to the high oxygen content developing in the pools; on the other hand, the circumstances in the pools may have been not too much different from those normally found near the rapids during the dry season.

Distribution. — The present species is known to occur only in the Surinam River and Saramacca River basins, thus presents the exceptional case (for Surinam) of inhabiting two river basins. As the two river basins are adjoining, this distribution can be easily explained as being the result of stream capture near the divide.

Remarks. — As stated in the remarks pertaining to the previous species, *H. surinamensis* strongly resembles *H. sipaliwinii*, and the two must be closely related though, geographically, this is difficult to explain unless *H. sipaliwinii* also inhabits the Lucie River (Noord Rivier). The principal differences between the two may be found in the key.

Here it is interesting to note that Kappler (1881: 167; 1885: 919; 1887: 152) recorded a *Hypostomus* species from Surinam which he named *H. commersonii*. This is obviously erroneous as *H. commersonii* Valenciennes, 1840, only occurs in southeastern Brazil. As in the fish collections of the British Museum I found Surinam specimens collected by Kappler representing *H. plecostomus* (Linnaeus) (BM, no number, 1 ex., 155 mm), and *H. surinamensis* nov. spec. (BM 1870.3.10: 5-6, 2 ex., 150, 235 mm; BM, no number, 2 ex., 235, 275 mm; all with about 40 to 55 teeth on each mandibular ramus; as "*Plecostomus guacari*"), I presume that probably *H. commersonii* sensu Kappler (nec Valenciennes) is identical with the present species.

Etymology. — Named after the Surinam River, in which it appears to be the predominant species.

13. **Hypostomus tenuis** nov. spec.

(plate 14 fig. 3, 4, table 14)

Material. — RMNH 16198, near Paramaribo, Surinam, May-October 1911, leg. Jhr. W. C. van Heurn, 1 ex., 195 mm (holotype).

Diagnosis. — Depth of caudal peduncle in interdorsal length 2.7, a rather aberrant ratio for a Surinam species, but the species is here provisionally included in the *watwata*-group (see Remarks); mandibular ramus in interorbital width 3.1; deflated first dorsal fin falling considerably short of the base of the spine of second dorsal; spots on body and fins exceptionally small among Surinam species, round, apparently lacking on the ventral surface, not forming bands or series on fins.

Description. — This is a very slender species with a remarkably elongate peduncle, the snout outline in dorsal view rounded triangular or ovate, and the head rather depressed.

Depth of head at tip of occipital process 6.6, width at cleithra 4.0, in standard length. Diameter of orbit 4.25 in snout, 2.85 in interorbital width. Scutes 29. Additional measurements are given in table 14.

Scutes in longitudinal lateral series 29/29, not counting an elongate scute on caudal base. There are 7 interdorsal scutes, 4 between second dorsal and caudal, and 14 post-anal, neglecting one or two small scutelets on the origins of these fins. The post-occipital scute is single, without suture. The belly is wholly covered except a pair of naked areas near the ventral insertions. The lower head shows the usual, but more developed, lateral marginal cover continuous with the upper armature, and continued anteriorly to include most of the lateral snout, of which only the narrow tip remains naked; large trapezoid patches are found before the gill apertures, narrowly separated from a large transversely ovate patch on the throat; the lower snout, besides having the already mentioned marginal cover, which slightly widens before reaching the naked snout tip, is mostly covered by a wide, transverse, brace-shaped patch situated before the upper lip.

The number of teeth counted on each ramus was about 37, a few more may remain hidden in the gums.

The deflated first dorsal fin falls far short of the base of the spine of the second dorsal fin.

The colour markings consist of very fine spots, indistinct on the bleached body, peduncle and head, but still distinct on the fins, and apparently lacking on the ventral surface; they are all irregular distributed, nowhere forming regular series or bands.

Habitat. — There is no indication available on the exact locality where the single specimen was collected, but the vague locality "Paramaribo" seems to make it certain that the present species inhabits the coastal area where no rapids or cataracts occur.

Distribution. — Hitherto known only from the type locality.

Remarks. — For Surinam, this appears to be quite an aberrant species, apparently closely related to the nominal species *H. emarginatus* Valenciennes, *H. verres* Valenciennes, *H. squalinum* Schomburgk or *H. squalitus* Müller & Troschel, *H. horridus* Kner, *H. villarsi* (Lütken), *H. tenuicauda* (Steindachner), and a few others, the actual status of most of which still has to be ascertained (see also tables 16, 18, and 20 (partly), and plate 18 fig. 1-4); for convenience' sake, the present species is here added to the *watwata*-group, though in fact it should here have been placed in a group of itself. It must be a very rare species, as only a single specimen has been found, notwithstanding the fact that it is indicated to have been collected in about the hitherto best explored part of Surinam.

Etymology. — Tenuis (lat.), thin.

14. **Hypostomus ventromaculatus** nov. spec.
(plate 15 fig. 1-4, table 12)

Material. — RMNH 18793, Marowijne River basin(?), Surinam, autumn 1951, aquarium import, don. E. C. Stol, 2 ex., 74, 107 mm (paratypes) [6]; RMNH 25505, Compagnie Creek, Surinam River basin, Surinam, 19 December 1965, leg. Dr. G. F. Mees (Brokopondo Research 1965/66), 2 ex., 81, 130 mm (paratypes); RMNH 25506, Surinam River near Brokopondo, Surinam, 3-4 February 1964, leg. Dr. M. Boeseman (Brokopondo Research 1963/64), 1 ex., 125 mm (paratype); RMNH 25507, Surinam River between Afobaka and Brokopondo, Surinam, 14 February 1964, leg. P. Leentvaar (Brokopondo Research 1963/64), 1 ex., 150 mm (holotype); RMNH 25508, Surinam River before Hermansdorp (native village upstream adjacent to Brokopodo), Surinam, 13 May 1964, leg. Dr. M. Boeseman (Brokopondo Research 1963/64), 1 ex., 125 mm (paratype); RMNH 25509, Tapoeripa Creek near Brokopondo, Surinam River basin, Surinam, 22 December 1963, leg. Dr. M. Boeseman (Brokopondo Research 1963/64), 7 ex., 56-95 mm (paratypes); RMNH 25510, tributary creek of lower Marowijne River between Mopikondre and Bigiston, 17 June 1966, leg. Dr. W. Vervoort, 1 ex., 72 mm (paratype).

Diagnosis. — Depth of caudal peduncle in interdorsal length 1.55-1.7 (average 1.65), the species thus belonging to the *plecostomus*-group; mandibular ramus in interorbital width 2.8-3.0, the ratio possibly slightly in-

6) The two specimens in reg. no. RMNH 18793 have previously been recorded as *Plecostomus plecostomus* (Linnaeus) (Boeseman, 1953: 10).

creasing with age; deflated first dorsal fin almost or just reaching base of spine of second dorsal fin; post-occipital scute single; body and peduncle, including the ventral surface, covered with rather large, round, vague, dark spots, also more or less distinctly extending on the fins, forming (or replaced by) transverse bands on the caudal fin; spots on head small and dense.

Description. — This is a rather robust species, with a stout peduncle; the snout outline is about ovate in dorsal view, though occasionally somewhat sinuous.

Depth of head at tip of occipital process 4.6-5.25 (av. 5.05), width at cleithra 2.9-3.25 (3.15), in standard length. Diameter of orbit 2.35-3.35 in snout, 1.8-2.3 in interorbital width, relatively decreasing with age. Additional measurements, ratios, averages and allometric trends are given in table 12.

Scutes in longitudinal lateral series 26/27 (2 ex.), 27/27 (12 ex.), 27/28 (1 ex.), neglecting the elongate scute on caudal base. There are 5 or 6 interdorsal scutes, 2 or 3 between second dorsal and caudal, and 12 or 13 post-anal, one or two adidtional small scutelets at the origins of these fins not included. The post-occipital scute is single, though in juveniles occasionally with one or two sutures still visible. The belly is wholly or almost wholly naked up to a size of about 60 mm, partly covered with usually coracoidal, lateral and median scutes up to about 75 mm, mostly covered up to about 100 mm, still larger examples being wholly covered excepting a pair of small areas near the ventral insertions, but some variation in this character occurs. In small examples, the lower surface of the head has, as usual, a narrow lateral marginal area covered by the extending dorsal armature, but with a wide transverse extension before each gill aperture, while the lower snout surface only shows the two narrow extensions of the upper snout armature curving around the margin and bordering the narrow naked snout tip; in large examples, the lateral marginal area extends to near the oral disc, while the lower snout is wholly covered except the small naked snout tip.

The number of mandibular teeth counted on each ramus varies between 20 and 30, with some additional teeth probably hidden in the gums and presumably accounting for the low numbers.

The deflated first dorsal fin just reaches the base of the spine of the second dorsal fin (8 ex.) or falls just short of that spine (7 ex.).

The whole specimens, including the belly, are covered with dark, round, somewhat vague spots, usually rather large but much smaller and better defined on the head; on the dorsal surface of body and peduncle rather obscure on account of the brownish ground colour, but very distinct on belly and fins, irregularly arranged except on the caudal fin where they form distinct cross-bands, more vague on juveniles.

Habitat. — The species has hitherto (in Surinam) been collected in or slightly below the lowermost rapids, or in tributaries below these rapids, thus seems less restricted to the usual habitat (rapids and cataracts) of the inland species; one example (RMNH 25508) was captured in a stagnant pool in the dry river bed after the Afobaka barrage had been closed for more than three months, but other species are known to have survived in exactly the same circumstances, probably as a result of the high oxygen content of these pools.

Distribution. — Hitherto with certainty only known to occur in the Surinam River and Marowijne River basins, in or below the lowermost rapids, but probably also in similar areas of Guyane and (possibly) Guyana (see below).

Remarks. — Both in morphological characters and in colour, the present species closely resembles *H. plecostomus,* of which it appears to be the nearest relative. It shows the same rather vague spots, obscure on the brownish upper surface, but the spots are distinctly smaller and, moreover, also cover the ventral surface. In this context, it is interesting to note that the species seems to occupy a rather narrow zone also representing the marginal inland distribution of *H. plecostomus,* about coinciding with the zone of the lowermost rapids which reaches the coast in (French) Guyane.

Quite likely, the present species occupies the same zone in Guyane, as among the specimens examined in the Paris Museum I found some from the Marowijne River, Cayenne (River?), and presumably the intermediate region ("Guyane Française") which may be referred to the present species (MNHN 03-240, A 8665, B 342, B 320 (largest ex.), 95-120). Unfortunately, this distributional extension is obscured by the occurrence in the same area of a similar species, though with a higher ratio between peduncular depth and interdorsal length (1.8-1.95) (MNHN 03-241(?), 00-156, A 9926, 58-187), and verification remains necessary. Also a specimen in the British Museum, collected in a tributary creek of the Mazaruni River near the Penal Settlement (BM 1934.9.12: 427) may belong to the present species.

Etymology. — Venter (lat.), belly; maculatus (lat.), spotted.

15. **Hypostomus watwata** Hancock
(plate 16 fig. 1-5, table 15)

Hypostomus watwata Hancock, 1828: 246 (sea-shore of Demerara).
Plecostomus plecostomus; Popta (nec Linnaeus), 1916: 575 (partly; Suriname).
Plecostomus watwata; Boeseman, 1952: 182 (sea coast near Surinam River outlet, Marowini Basin); Boeseman, 1953: 10 (Sommelsdijkse Kreek near Wolffenbuttel (asylum), Paramaribo, and Marowini Basin (?)); Boeseman, 1956: 190 (Surinam, Surinam River 10 miles above outlet and 8-10 miles above outlet?).

To these should be added most of the early references given for *Hypostomus plecostomus,* as these apparently concern heterogeneous material including the present species.

Material. — RMNH 1908 (stuffed), Surinam, 1824-1842, don. H. H. Dieperink, 1 ex., 285 mm (paralectotype of *Plecostomus brasiliensis* Bleeker); RMNH 3101, Surinam, ?1824-1842, don. ?H. H. Dieperink, 1 ex., 123 mm (presumably paralectotype of *Plecostomus brasiliensis* Bleeker); RMNH 3104, Surinam, 1824-1842, don. H. H. Dieperink, 2 ex., 58, 65 mm (paralectotypes of *Plecostomus brasiliensis* Bleeker); RMNH 3352, Surinam, June 1910, leg. D. G. J. Bolten, 3 ex., 117-175 mm; RMNH 8407, Paramaribo, Surinam, 1904, don. Dr. P. Buitendijk, 1 ex., 265 mm; RMNH 11058, Commewijne River, Surinam, 23 August 1911, leg. Jhr. W. C. van Heurn, 1 ex., 171 mm; RMNH 11059, Surinam, summer 1911, leg. Jhr. W. C. van Heurn, 1 ex., 122 mm; RMNH 17259, Cultuurtuin, Paramaribo, Surinam, 17 March 1939, leg. H. W. Cossee, 1 ex., 182 mm; RMNH 17306, Surinam, n.d., leg. J. Th. Noordijk, 1 ex., 66 mm; RMNH 17336, Surinam, June 1910, leg. D. G. J. Bolten, 1 ex., 88 mm; RMNH 17337, Paramaribo, Surinam, 1911, leg. Jhr. W. C. van Heurn, 4 ex., 69-127 mm; RMNH 17339, Surinam River, Surinam, June 1910, leg. D. G. J. Bolten, 1 ex., 52 mm; RMNH 18242, sea coast near Surinam River outlet, Surinam, August 1944, leg. Dr. D. C. Geijskes, 1ex., 217 mm; RMNH 18791, Sommelsdijkse Kreek near Wolffenbuttel (asylum), Paramaribo, Surinam, 3 September 1948, leg. Dr. D. C. Geijskes & P. Creutzberg (Surinam Expedition 1948/49), 1 ex., 100 mm; RMNH 18792, Marowijne River basin, Surinam, summer 1951, aquarium import, don. E. C. Stol, 3 ex., 110-150 mm; RMNH 18799, ?Marowijne River basin, Surinam, autumn 1951, aquarium import, don. E. C. Stol, 2 ex., 75, 82 mm; RMNH 21376, Surinam, December 1951, aquarium import, don. E. C. Stol, 1 ex., 155 mm; RMNH 21434, Surinam River, 10 miles upstream of outlet, Surinam, 11 February 1954, leg. H. W. Lijding, 1 ex., 113 mm; RMNH 21435, Surinam River, about 8-10 miles above outlet?, Surinam, 11 February 1954, leg. H. W. Lijding, 1 ex., 137 mm; RMNH 24770, Surinam, n.d., leg. Ir. Z. Salverda, 1 ex., 75 mm; RMNH 25511, Marowijne River outlet near Galibi, Surinam, 1-2 June 1966, leg. Dr. W. Vervoort, 4 ex., 130-253 mm; RMNH 25512, outlet of Coppename and Saramacca Rivers, Surinam, 23 June 1966, leg. Dr. W. Vervoort, 4 ex., 138-202 mm.

Diagnosis. — Depth of caudal peduncle in interdorsal length 2.0-2.35 (average 2.15), the species in that respect representative of the group of species with relatively elongate peduncle here named *watwata*-group; mandibular ramus in interorbital width 2.6-3.5, the ratio increasing with age; deflated first dorsal fin usually falling far short of the base of spine of second dorsal fin, occasionally falling only moderately short of the spine (pl. 16 fig. 1, 3); the post-occipital scute multiple; wholly covered with moderate or large round spots, also on ventral surface, the spots smaller and crowded on head, rather vague especially on fins, usually irregularly distributed or, occasionally, in transverse series on caudal; pectoral spines usually with wide cross-bands.

Description. — Though the species has a rather elongate caudal peduncle, the anterior body becomes heavy and strongly arched in adults; in dorsal view, the outline of the snout is slightly sinuous ovate in juveniles, but rather triangular in adults, which have the snout tip narrowly rounded.

Depth of head at tip of occipital process 4.7-5.5 (av. 5.15), width at cleithra

3.05-3.45 (3.25), in standard length. Diameter of orbit 2.35-4.3 in snout, 1.9-3.45 in interorbital width, relatively decreasing with age. Additional measurements, ratios, averages and allometric trends are given in table 15.

Scutes in longitudinal lateral series 25/26 (4 ex.), 26/26 (27 ex.), 26/27 (4 ex.), 27/27 (1 ex.), 27/28 (1 ex.), neglecting one (or two) elongate scutes on caudal base. There are 6 interdorsal scutes, 4 between second dorsal and caudal, and 13 post-anal, while one or two small additional scutelets cover the origins of these fins. The post-occipital consists of 5-7, seldom 3 scutes. The belly is naked with only a few scattered scutes in specimens up to a size of about 65 mm, mostly covered with scattered scutes in specimens up to about 90 mm, usually wholly covered in still larger examples, only a pair of small naked areas near the ventral insertions remaining. Already in rather small examples, the lower surface of the head is mostly covered, the dermal armature only lacking around the lower lip and on the throat; in adults, the whole ventral surface of the head is covered with strong plates, and even the usual naked snout tip is missing.

The number of mandibular teeth on each ramus was found to vary between 19 and 32, but some teeth hidden in the gums may account for the low numbers.

The deflated first dorsal fin usually falls far short of the base of the spine of the second dorsal fin, but occasionally it reaches farther and approaches the spine (see plate).

The whole specimens, including the ventral surface, are covered with usually moderate dark spots, smaller on the head and moderate to large on the belly, but all spots are relatively larger on juveniles than on adults, the size apparently not or little increasing with age. Most spots are rather vague, on the upper surface often obscured by the darker ground colour, those on the head better defined and dense; as a rule, the spots on the fins are irregularly distributed, forming more or less distinct transverse series or bands only on the caudal, rarely also on pectorals and ventrals, while the pectoral spines are usually showing wide cross-bands. The spots may become vague or even disappear in old or badly preserved examples.

Habitat. — The species only occurs in the lower reaches of the rivers, in the outlets, and even along the nearby shore. Although partly inhabiting the same region as *Hypostomus plecostomus* (1), it does not venture that far inland and seems even better adapted to semi-marine environments with muddy or sandy bottom and often silty water, not requiring rapids or cataracts.

Distribution. — The species is here reported from only a few localities along or slightly inland of the Surinam coast, but examples seen in the Paris

Museum and the British Museum show that this range should be extended eastward at least to Cayenne, Guyane, and westward at least to include the Demerara coastal zone.

Remarks. — The actual name of the present species, *watwata* Hancock, has been considered a nomen dubium until 1912, when Eigenmann started to use it as a senior synonym of *verres* Valenciennes (Eigenmann, 1912: 225), and has ever since been almost unanimously accepted [7]). This is remarkable as Hancock's original description (1828: 246) could apply to almost any *Hypostomus* species, while Eigenmann fails to give any reasons for restoring a name rightly neglected. Whatever Eigenmann's reasons for this action may have been, it has evidently its merits as it makes Hancock's name available for the present species which Eigenmann erroneously considered identical with *verres* Valenciennes. As stated in one of the earlier chapters, *Hypostomus verres* Valenciennes (1840: 365 (494)) was based on heterogeneous material including *H. watwata* sensu Eigenmann (MNHN A 8919, from Cayenne, 1 ex.; A 9570, from the Surinam River, 1 ex.; and A 9927, from the Surinam River, 2 ex.), and a second species hitherto not distinguished to which I attach the name *H. verres* Valenciennes by appropriate lectotype selection (MNHN A 9450, lectotype, from Cayenne; A 9451, from Cayenne, 1 ex.). The species *H. verres* Valenciennes appears to be the same as *H. watwata* sensu Puyo (1936, 1949) as figured by that author (: 151, fig. 31; : 105, fig. 55); see also plate 18 fig. 3-4, and table 20.

The priority of the name *Hypostomus watwata* Hancock, 1828, seems endangered by the apparent availability of the early name *Loricaria flava* Shaw, 1805, but there are several reasons not to take this too seriously.

As already stated in the chapter on *Hypostomus plecostomus*, Shaw (1805: 38, pl. 101) gives the impression not to have examined any specimens, but to have compiled his scanty description from the restricted literature at his disposition, of which references are given at the head of the crucial paragraph. Of the three references listed, two concern *Hypostomus plecostomus* (Linnaeus, 1754, 1766), the third (Bloch, 1794) presenting a heterogeneous description and a figure referable to *watwata*; this figure, slightly altered, and inversely, is reproduced by Shaw. It seems clear that, though Shaw's figure apparently represents *H. watwata*, *Loricaria flava* Shaw should be understood to represent a composite species only partly referable to the present species as now delimited.

Shaw's name appears to have been later used only once, by Vaillant (1880:

7) It is interesting to note that in the same paper Eigenmann (1912) first employed the at the time usual name *verres* (: 66), and subsequently (: 205) restored *watwata*.

15; from Calderon, Haute-Amazonie), to actually name a species, all other references to *flava* Shaw being in synonymies. And even this single item concerns a specimen collected far from the now established distributional area of *H. watwata*, thus must represent a different species, probably not even known at the time when Shaw published his account.

On the other hand, *watwata* Hancock has since 1912 been in general use, though at first it must have taken some years to convince authors like Steindacher (1915: 104) and possibly some others, who stubbornly adhered to the erroneous concept of a very wide-spread polymorphic *Hypostomus plecostomus* (Linnaeus).

Unfortunately, I was unable to find any old Demerara specimens sent by Hancock to the Zoological Society in the British Museum, and I can only confirm Günther's (1864: 230, footnote) [8]) statement that the typical specimen appears to be lost.

Considering these circumstances, and the evident importance of preventing future diverging interpretations of *H. watwata*, it seems of much importance to provide Hancock's species with a sound base. Therefore, a specimen in the British Museum (BM 1932.11.10: 31), from off the Berbice River, Guyana, 260 mm, is hereby indicated as neotype for *Hypostomus watwata* Hancock, 1828. It is figured on plate 16 fig. 1, 2.

As hitherto *H. verres* Valenciennes has been generally considered identical with *H. watwata* Hancock, and as Valenciennes' types were stated to have at least partly been collected near Cayenne, it is astonishing to read Hoedeman's comment on the present species (1961: 130): "This seems to be the first record of this species from Cayenne island; it was previously known to occur in the mainland waters"; in fact, the town Cayenne is located on the Cayenne Island, and only the Cayenne River, to which nowhere is referred, is situated on the mainland. The species was subsequently recorded from Cayenne by Bertin & Estève (1950: 70), where they list Valenciennes' types and, contrary to general usage, retain the name *verres*. As stated before, one of Valenciennes' types of *H. verres* from Cayenne indeed belongs to *H. watwata* Hancock. Furthermore, Puyo (1949: 104) actually lists *H. watwata*, giving as habitat "les petits golfes rocheux qui entourent vers la mer la ville de Cayenne", but possibly his description and certainly his figure (fig. 55) represent the real *H. verres* Valenciennes, and not *H. watwata*

8) Günther also explains, in the same footnote, the correct interpretation of Hancock's fin formula; this may also throw a light on some "erroneous" fin formulae by old authors, e.g., by Bloch and Lacépède (see Nijssen & Isbrücker, 1967; 22, 23). The same explanation is given by Bonnaterre (1788: vii).

Hancock. Puyo's synonymy may also be commented upon; it includes *Hypostomus plecostomus* sensu Valenciennes (nec Linnaeus), which is elsewhere in the present paper demonstrated to probably represent *H. tenuicauda* (Steindachner); *Hypostomus verres* Valenciennes, now a separate species distinct from *H. watwata*; *Plecostomus bicirrhosus* Günther, probably including both *H. plecostomus* (Linnaeus) and *H. watwata* Hancock; *Plecostomus verres* sensu Miranda Ribeiro, a Brazilian species, whereas *H. watwata* seems restricted to the Guyanas. About the same seems to apply to an earlier record by Puyo (1936: 150).

Etymology. — Watwata, after "Watawata, or Watwata, of the Creoles" (cf. Hancock, 1828: 246).

Hypostomus spec. incert.

Material. — RMNH 20398, Brokopondo Lake near (submerged) Kabel, Surinam River basin, Surinam, 1 September 1955, leg. Dr. P. Wagenaar Hummelinck, 1 ex., 17 mm.

Remarks. — The specimen, beside being in a rather bad condition, is still in the early juvenile stage with an only partly developed armature. With the allometric growth observed in all present species and the lack of colour markings, the partial armature prevents a satisfactory identification.

Here may be added that of the more than 600 examples, only this small specimen could not be identified. It seems warranted to state that this result seems to prove the correctness of the species delimitations here proposed.

ACKNOWLEDGEMENTS

For various information, the loan of specimens, and a most generous hospitality during visits to the London and Paris Museums, I am greatly indebted to the scientific staff of the British Museum of Natural History (BM), London, especially Dr. E. Trewavas and Mr. P. J. P. Whitehead; to the scientific staff of the herpetological and ichthyological section of the Museum National d'Histoire Naturelle (MNHN), Paris, especially Drs. J. Guibé and M. Blanc, and Mr. P. Guézé; to Dr. W. I. Follett of the California Academy of Science (CAS), San Francisco; to Dr. Greta Vestergren of the Naturhistoriska Riksmuseet, Stockholm; and to Mr. H. Nijssen of the Zoölogisch Museum (ZMA), Amsterdam.

The accompanying plates have been made after photographs by Chr. Hoorn, the figures and diagrams were drawn by J. J. M. Vreeburg, both of the Leiden Museum.

Summary

The correct generic name, its type species, and the identity of the type species are established. The species *Hypostomus plecostomus* (Linnaeus, 1758) and *Hypostomus watwata* Hancock, 1828, are restricted to their proper extents. Related forms and synonymies are discussed. Neotypes are indicated for *Acipenser plecostomus* Linnaeus, 1758, for *Hypostomus guacari* Lacépède, 1803, and for *Hypostomus watwata* Hancock, 1828. Lectotypes are selected for *Hypostomus robinii* Valenciennes, 1840, for *Hypostomus verres* Valenciennes, 1840, and for *Plecostomus brasiliensis* Bleeker, 1864.

Fifteen forms of *Hypostomus* from Surinam are described, figured, and discussed, including ten new species and two new subspecies; a key to the Surinam species is given, and their habitats and relationships are discussed.

References

Bertin, L., & R. Estève, 1950. Ostariophysaires (Siluriformes). Catalogue des types de poissons du Muséum National d'Histoire Naturelle **5**: 1-85.

Bleeker, P., 1862. Atlas ichthyologique des Indes Orientales Néêrlandaises **2**: 1-112, pl. (Silur.) 1-53.

——, 1864. Description des espèces de Silures de Suriname conservées aux musées de Leide et d'Amsterdam. — Nat. Verh. Holl. Maatsch. Wet., Haarlem (2) **20**: 1-104, pl. 1-16.

Bloch, M. E., 1794. Allgemeine Naturgeschichte der Fische **11**: 1-174, pl. 361-396 (= Allgemeine Naturgeschichte der ausländischen Fische, **8**).

Boeseman, M., 1952. A preliminary list of Surinam fishes not included in Eigenmann's enumeration of 1912. — Zool. Med., Leiden **31** (17): 179-200.

——, 1953. Scientific results of the Surinam Expedition 1948-1949. Part II. Zoology, No. 2. The fishes (1). — Zool Med., Leiden **32** (1): 1-24, fig. 1, 2.

——, 1954. On a small collection of Surinam fishes. — Zool. Med., Leiden **33** (3): 17-24.

——, 1956. On recent accessions of Surinam fishes. — Zool. Med., Leiden **34** (12): 183-199.

——, 1960. The fresh-water fishes of the island of Trinidad. — Stud. Faun. Curaçao Caribb. Is. (48) **10**: 72-153, fig. 36, 37 (= publ. Natuurw. Stud. Sur. Ned. Ant. **21**).

——, 1960a. A tragedy of errors: the status of Carcharhinus Blainville, 1816; Galeolamna Owen, 1853; Eulamia Gill, 1861; and the identity of Carcharhinus commersonii Blainville, 1825. — Zool. Med., Leiden **37** (6): 81-100, fig. 1, pl. 7, 8.

Bonnaterre, (J. P.), 1788. Tableau encyclopédique et méthodique des trois règnes de la nature ... Ichthyologie: i-lvi, 1-215, pl. A, B, 1-100.

Daubenton, L. J. M., & R. J. Haüy, 1787. Histoire naturelle (3) contenant les poissons. — Encyclopédie méthodique **3**: i-lx, 1-435.

Eigenmann, C. H., 1912. The freshwater fishes of British Guiana, including a study of the ecological grouping of species and the relation of the fauna of the plateau to that of the lowlands. — Mem. Carn. Mus., Pittsburgh **5**: i-xxii, 1-578, fig. 1-39, pl. 1-103.

——, & R. S. Eigenmann, 1888. Preliminary notes on South American Nemathognathi. — Proc. Cal. Acad. Sci. (2) **1**: 119-172.

——, & ——, 1890. A revision of the South American Nemathognathi or cat-fishes. — Occ. Pap. Cal. Acad. Sci. **1**: 1-508, fig. 1-57, 1 map.

——, & C. H. Kennedy, 1903. On a collection of fishes from Paraguay, with a synopsis of the American genera of Cichlids. — Proc. Acad. Nat. Sci. Philadelphia **55**: 497-537 (= Contr. Zool. Dept. Indiana Univ. **56**).

Fowler, H. W., 1915. Notes on Nematognathous fishes. — Proc. Acad. Nat. Sci. Philadelphia **67**: 203-243, fig. 1-11.

——, 1919. Notes on tropical American fishes. — Proc. Acad. Nat. Sci. Philadelphia **71**: 128-155.

——, 1941. A collection of fresh-water fishes obtained in eastern Brazil by Dr. Rodolpho von Ihering. — Proc. Acad. Nat. Sci. Philadelphia **93**: 123-199, fig. 1-104.

——, 1954. Os peixes de água doce do Brasil (4.ª entrega). — Arq. Zool. São Paulo **9**: I-IX, 1-400, fig. 590-905.

GMELIN, J. F., 1788. See Linnaeus, 1788.

GOSLINE, W. A., 1945. Catálogo dos Nematognatos de água-doce da América do Sul e Central. — Biol. Mus. Nac. Rio de Janeiro (nov. sér.), Zoologia **33**: 1-138.

——, 1947. Contributions to the classification of the Loricariid catfishes. — Arq. Mus. Nac. Rio de Janeiro **41**: 79-134, fig. 1-11, pl. 1-9.

GRAY, J. E., 1854. See Gronovius, 1854.

GRONOVIUS, L. T., 1754. Museum ichthyologicum, sistens piscium indigenorum & quorundam exoticorum, etc.: (i-x), 1-68, pl. 1-4.

——, 1756. Musei ichthyologici tomus secundus, sistens piscium indigenorum & nonnullorum exoticorum, etc.: (i-viii), 1-88, pl. 5-7.

——, 1763. Zoophylacii Gronoviani fasciculus primus exhibens animalia quadrupeda, amphibia atque pisces, etc.: 1-136, 1-4, pl. 1-17.

—— (ed. J. E. Gray), 1854. Catalogue of fish collected and described by Laurence Theodore Gronow, now in the British Museum: 1-196.

GÜNTERT, H., 1942. Beschreibung einiger zum Teil noch unbekannter südamerikanischer Siluriden aus dem Naturhistorischen Museum in Basel. — Zool. Anz., Leipzig **138**: 27-40, fig. 1-7.

GÜNTHER, A. (C. L. G.), 1864. Catalogue of the Physostomi, etc. In: Catalogue of the fishes in the British Museum, London **5**: i-xxii, 1-455, 55 figs.

——, 1865. Pisces. — Zoological Record **1864**: 133-188.

——, 1899. Complete catalogue of Linné's private collection of fishes, now in possession of the Linnean Society. — Proc. Linn. Soc. London (Zool.) **1899**: 15-38.

HANCOCK, J., 1828. Notes on some species of fishes and reptiles, from Demerara, presented to the Zoological Society by John Hancock, Esq., Corr. Memb. Zool. Soc. — Zool. Journ. **4**: 240-247.

HEIDE, J. VAN DER, 1965. Hydrobiological observations: Oct.-Dec. 1964. — Progr. Repts. Biol. Brokopondo Res. Project **1964**: 65-72.

——, 1965a. Additional report on the hydrobiological survey in 1964. — Progr. Repts. Biol. Brokopondo Res. Project **1964**: 73-79, 1 pl.

——, 1965b. Hydrobiological observations: January-March, 1965. — Progr. Repts. Biol. Brokopondo Res. Project **1965**: 94-98.

——, 1966. Hydrobiological observations: April-June, July-September, October-December, 1965. — Progr. Repts. Biol. Brokopondo Res. Project **1965**: 100-110, 111-118, 119-124, 3 pls.

——, 1967. Hydrobiological observations: Jan.-March, Apr.-June, July-Oct., 1966. — Progr. Repts. Biol. Brokopondo Res. Project **1966**: 143-150, 151-154, 155-160, 3 pls.

HEMMING, F., 1954. See International Commission on Zoological Nomenclature, 1954.

HOEDEMAN, J. J., 1961. Additional records of Siluriform fishes (2). Notes on the ichthyology of Surinam and other Guianas 8. — Bull. Aquat. Biol., Amsterdam **2** (23): 129-139, fig. 1-4.

HOLM, Å., 1957. Specimina Linnaeana, i Uppsala bevarade zoologiska samlingar från Linnés tid. — Uppsala Univ. Årsskr. **1957** (6): 1-68, fig. 1-14 (With English summary).

HOLTHUIS, L. B., 1959. The Crustacea Decapoda of Suriname (Dutch Guiana). — Zool. Verhand., Leiden **44**: 1-296, pl. 1-16, fig. 1-68, map 1, 2.

HUBRECHT, A. A. W., 1879. Catalogue des collections formées et laisées par M.-P. Bleeker, etc. Leide: i-iv, 1-71.

INTERNATIONAL COMMISSION ON ZOOLOGICAL NOMENCLATURE (ed. C. W. Stiles), 1910. Opinion 21, Shall the genera of Klein. 1744, reprinted by Walbaum, 1792, be accepted? — Opin. Int. Comm. Zool. Nomencl., Washington, Smithson. Inst. Misc. Publ. **1938**: 51-52.

—— (ed. C. W. Stiles & D. S. Jordan), 1925. Opinion 89, Suspension of the rules in the case of Gronow 1763, Commerson 1803, Gesellschaft Schauplatz 1775 to 1781, Catesby 1771, Browne 1789, Valmont de Bomare 1768 to 1775. — Opin. Int. Comm. Zool. Nomencl. Washington **73** (3): 27-33.

—— (ed. F. Hemming), 1954. Opinion 260, Rejection for nomenclatorial purposes of the work by Meuschen (F.C.) issued in 1778 under the title "Museum Gronovianum". — Opin. decl. Int. Comm. Zool. Nomencl., London **5** (21): 265-280, pl. 1, 2.

—— (ed. F. Hemming), 1954a. Opinion 261, Rejection for nomenclatorial purposes of the index to the Zoophylacium Gronovianum of Gronovius prepared by Meuschen (F.C.) and published in 1781. — Opin. decl. Int. Comm. Zool. Nomencl., London **5** (22): 281-296, 1 facs.

KÄYSER, C. C., 1912. Verslag der Corantijn-Expeditie. (19 Juli 1940-1 April 1911). — Tijdschr. K. Ned. Aardrijksk. Gen., Leiden (2) **29** (4): 1-76, fig. 1-27, 1 map.

KAPPLER, A., 1881. Holländisch-Guiana. Erlebnisse und Erfahrungen während eines 43 jährigen Aufenthalts in der Kolonie Surinam: i-x, 1-495, 1 pl., 1 map.

——, 1885. Die Tierwelt im Holländischen Guiana. — Das Ausland, Wochenschr. Länd. Völkerk. **58** (46): 918-920.

——, 1887. Surinam, sein Land, seine Natur, Bevölkerung und seine Kultur-Verhältnisse mit Bezug auf Kolonisation: 1-384, 10 figs., 1 map.

KNER, R., 1854. Die Hypostomiden. Zweite Hauptgruppe der Familie der Panzerfische. (Loricata vel Goniodontes). — Denkschr. K. Akad. Wiss., Wien **7**: 251-286, pl. 1-5.

LACÉPÈDE, (B. G. E.), 1803. Histoire naturelle des poissons **5**: i-lxviii, 1-803, 1 fig., pl. 1-21.

LEENTVAAR, P., 1963. Progress Report Biological Brokopondo Research Project, Surinam **1**: 1-2.

——, 1964. Progress Report Biological Brokopondo Research Project, Surinam **2**: 1-4.

——, 1964a. Samenvatting van de hydrobiologische waarnemingen tot 1 april 1964. Biological Brokopondo Research Project, Surinam: 1-4.

——, 1964b. Hydrobiological observations: Nov. 1963-March 1964. — Progr. Repts. Biol. Brokopondo Res. Project **1964**: 5-10.

——, & J. VAN DER HEIDE, 1964. Hydrobiological observations: 1 April-1 July, July-Sept., 1964. — Progr. Repts. Biol. Brokopondo Res. Project **1964**: 23-31, 45-50, 1 map.

LICHTENSTEIN, H., 1823. Verzeichniss der Doubletten des zoologischen Museums der Königl. Universität zu Berlin nebst Beschreibung vieler bisher unbekannter Arten von Säugethieren. Vögeln, Amphibien und Fischen: i-x, 1-118, 1 fig.

LINNAEUS, C., 1754. Museum S. R. M. Adolphi Friderici Regis Suecorum ... in quo animalia rariora imprimis, et exotica ... describuntur et determinantur, Latine et Suecice, etc.: i-xxx, 1-96, 1-8, pl. 1-33.

——, 1758. Systema naturae per regna tria naturae, etc. (ed. 10) **1**: 1-824.

——, 1766. Systema naturae per regna tria naturae, etc. (ed. 12) **1**: 1-532.

—— (ed. J. F. GMELIN), 1788. Systema naturae per regna tria naturae, etc. (ed. 13 Lipsiae) **1** (3): 1033-1516.

LÖNNBERG, A. J. E., 1896. Linnaean type-specimens of birds, reptiles, batrachians and fishes in the zoological museum of the Royal University in Upsala. — Bihang Handl. Svensk. Vet. Akad., Stockholm **22** (1): 1-45.

LÜTKEN, C. F., 1874. Nogle nye eller mindre fuldstaendigt kjendte Pandsermaller, isaer fra det nordlige Sydamerika. Ichthyographiske bidrag i. — Vid. Medd., Kjøbenhavn **1873**: 202-220, pl. 4. (Not seen, reference copied).

MARCGRAVE, G., 1648. Historiae rerum naturalium Brasiliae, libri octo: quorum ... quartus de Piscibus: 142-189, 105 figs.

MEES, G. F., 1967. Freshwater fishes of Suriname: The genus Heptapterus (Pimelodidae). — Zool. Med., Leiden **42** (20): 215-229, fig. 1-4.

MEUSCHEN, F. C., 1778. Museum Gronovianum. Sive index rerum naturalium tam Mammalium Amphibiorum Piscium Insectivorum Conchyliorum Zoophytorum Plantarum et Mineralium etc.: i-vi, 1-252.

MILES, C., 1947. Los peces del Rio Magdalena ("A field book of Magdalena fishes"): 1-214, i-xxviii.

NORMAN, J. R., 1926. Descriptions of nine new freshwater fishes from French Guiana and Brazil. — Ann. Mag. Nat. Hist. (9) **18**: 91-97.

NIJSSEN, H., & I. J. H. ISBRÜCKER, 1967. Notes on the Guiana species of Corydoras Lacépède, 1803, with descriptions of seven new species and designation of a neotype for Corydoras punctatus (Bloch, 1794) — (Pisces, Cypriniformes, Callichthyidae). — Zool. Med., Leiden **42** (5): 21-50, fig. 1-4, pl. 1-5.

——, 1968. Gymnotus carapo and G. anguillaris (syn.: G. coropinae), two often confused species of gymnotid fishes (Pisces, Cypriniformes). — Beaufortia **15** (203): '161-168, 1 fig.

POPTA, C., 1916 (1914-1917). Plecostomus plecostomus (L.) Eigm. In: Encyclopaedie van Nederlandsch West-Indië: 575.

PUYO, J., 1936. Contribution a l'étude ichthyologique de la Guyane Française, pêches et pêcheries. — Bull. Soc. Hist. Nat. Toulouse **70**: 5-258, fig. 1-46.

——, 1949. Poissons de la Guyane Française. — Faune de l'empire Français, Paris **12**: 1-280, fig. 1-139.

REGAN, C. T., 1904. A monograph of the fishes of the family Loricariidae. — Trans. Zool. Soc. London **17** (3): 191-350, pl. 9-21.

——, 1906. Notes on some Loricariid fishes, with descriptions of two new species. — Ann. Mag. Nat. Hist. (7) **17**: 94-98.

RIBEIRO, A. DE M., 1911. Fauna Brasiliense, Peixes IV (A) (Eleutherobranchios Aspirophoros). — Arch. Mus. Nac. Rio de Janeiro **16**: 1-505, fig. 44-144, pl. 22-54.

SCHUBART, O., 1964. Sôbre algumas Loricariidae da bacia do Rio Mogi Guaçu (Pisces, Nematognatha). — Biol. Mus. Nac. Rio de Janeiro (n. ser.) (Zoologia) **251**: 1-19, fig. 1-6.

SCHULTZ, L. P., 1944. The catfishes of Venezuela, with descriptions of thirty-eight new forms. — Proc. U. S. Nat. Mus. **94**: 173-338, fig. 1-5, pl. 1-14.

——, 1967. Review of South American freshwater angelfishes — genus Pterophyllum. — Proc. U. S. Nat. Mus. **120**: 1-10, pl. 1-4.

SEBA, A., 1758. Locupletissimi rerum naturalium thesauri accurata descriptio et iconibus artificiosissimis expresso, etc. **3**: 1-22, 1-212, pl. 1-116. (French re-impression of 1827 consulted).

SHAW, G., 1805. Pisces. General zoology or systematic natural history **5** (1): i-viii, 1-250, pl. 93-132.

SPIX, J. B. DE, 1829. Selecta genera et species piscium quos in itinere per Brasiliam annis 1817-20 ... peracto collegit et pingendos curavit Dr. J. B. de Spix etc. (1): 1-82, pl. 1-48. (With L. Agassiz as co-author; not seen).

STEINDACHNER, F., 1879. Zur Fisch-Fauna des Magdalenen-Stromes. — Denkschr. K. Akad. Wiss., Wien **39**: 19-78, pl. 1-15.

——, 1881. Beiträge zur Kenntniss der Flussfische Südamerika's. II. — Denkschr. K. Akad. Wiss., Wien **43**: 103-146, pl. 1-7.

——, 1915. Beiträge zur Kenntniss der Flussfische Südamerika's. V. — Denkschr. K. Akad. Wiss., Wien **93**: 15-106 (reprint: 1-92), fig. 1-4, pl. 1-13.

STIGCHEL, J. W. B. VAN DER, 1946. South American Nematognathi: 1-204, fig. 1, 2, tables 1-3. (Thesis, Leiden).
——, 1947. The South American Nematognathi of the museums at Leiden and Amsterdam. — Zool. Med., Leiden **27**: 1-204, fig. 1, 2, tables 1-3.
STILES, C. W., 1910, 1925. See International Commission on Zoological Nomenclature, 1910, 1925.
——, & D. S. JORDAN, 1925. See International Commission on Zoological Nomenclature, 1925.
VAILLANT, L. L., 1880. Synopsis des espèces de Siluridae recueillies par M. le Dr. Jobert, à Caldéron (Haute-Amazonie). — Bull. Soc. Philom. Paris 1879 (7) **4**: 150-159.
VALENCIENNES, A., 1840. Histoire naturelle des poissons **15**: i-xxiv, 1-397, (col.) pl. 421-455. (Strassbourg edition; the usual edition: 1-540).
WALBAUM, J. J., 1792. Petri Artedi Sueci Genera piscium. Ichthyologiae pars III. Emendata et aucta: (i-viii), 1-723, pl. 1-3. (Reprint 1966).
WHEELER, A. C., 1958. The Gronovius fish collection: a catalogue and historical account. — Bull. B.M. (N.H.), Hist. Ser. **1** (5): 187-249, pl. 26-34.
——, 1962. The life and work of Peter Artedi. Introduction to reprint of P. Artedi's Ichthyologia: vii-xxiii. (Issued separately in 1961).
WHITEHEAD, P. J. P., M. BOESEMAN & A. C. WHEELER, 1966. The types of Bleeker's indo-pacific Elopoid and Clupeoid fishes. — Zool. Verhand. Leiden **84**: 1-159, 1 fig., pls. 1-19, tables 1-3.
WILLUGHBY, F., 1686. De historia piscium libri quatuor, ... In quibus non tantum De Piscibus in genere agitur, sed & species omnes, tum ab aliis traditae, tum novae & nondum editae bene multae, naturae ductum servante methodo dispositae, accurate describuntur, etc.: (i-vii), 1-343, 1-30, (1-12), 187 pl.

ADDENDUM

After the main part of this paper had been completed, Mr. H. Nijssen kindly put at my disposal an additional collection of more than 200 examples of Hypostomids collected in Surinam during 1966 and 1967. From his collection, the following specimens proved to belong to species newly described on the previous pages, and are now also designated as paratypes.

Furthermore, Nijssen's collection includes examples of *Hypostomus plecostomus*, *Hypostomus watwata*, and two new forms, all of which will be reported on in a forthcoming complementary paper.

6. **Hypostomus micromaculatus** nov. spec.

Material. — ZMA 106.015, Sara Creek, about 27 km S of Dam, Surinam River basin, Surinam, 14 October 1966, leg. H. Nijssen (Brokopondo Research 1966/67), 10 ex., 89-145 mm (paratypes).

Remarks. — These specimens were reported to have been collected in still flowing water, with a depth of about 150 cm, the bottom sandy with loam, rocks and debris.

10. **Hypostomus saramaccensis** nov. spec.

Material. — ZMA 105.586, Kleine Saramacca, R. tributary of Saramacca River, about 14 km SE of outlet, Surinam, 28 February 1967, leg. H. Nijssen (Brokopondo Research 1966/67), 12 ex., 27-76 mm (paratypes); ZMA 105.621, R. tributary of Kleine Saramacca, about 11 km from outlet, Surinam, 27 February 1967, leg. H. Nijssen (Brokopondo Research 1966/67), 4 ex., 22-67 mm (paratypes).

Remarks. — All collected in shallow flowing water in or near rapids, the bottom sandy with rocks. Several specimens have the caudal fin dusky and, especially in the small examples, few or no spots are discernable. One example with scutes 27/27 instead of the usual 26/26.

12. **Hypostomus surinamensis** nov. spec.

Material. — ZMA 105.270, Gran Creek, about 63 km S of Afobaka, Surinam River basin, Surinam, 20 October 1966, leg. H. Nijssen (Brokopondo Research 1966/67), 25 ex., 38-183 mm (paratypes); ZMA 105.440, L. tributary of Gran Rio, about 3 km NE of northeastern Awaradam Falls, Surinam River basin, Surinam, 1 February 1967, leg. H. Nijssen (Brokopondo Research 1966/67), 2 ex., 48 & 125 mm (paratypes); ZMA 105.534, R. tributary creek of Gran Rio, about 4 km NE of northeastern Awaradam Falls, Surinam River basin, Surinam, 31 January 1967, leg. H. Nijssen (Brokopondo Research 1966/67), 11 ex., 75-152 mm (paratypes); ZMA 105.538, Gran Mau, R. tributary of Gran Rio, about 1 km NE of Dombai (Bendi Watra), Surinam River basin, Surinam, 30 January 1967, leg. H. Nijssen (Brokopondo Research 1966/67), 5 ex., 97-133 mm (paratypes); ZMA 105.685, Jenjee Creek, R. tributary of Surinam River, about 7.5 km N of Botopasi, Surinam, 21 March 1967, leg. H. Nijssen (Brokopondo Research 1966/67), 3 ex., 93-131 mm (paratypes); ZMA 105.739, Parwapa (= Pabo) Creek, L. tributary of Surinam River, about 2.5 km N of Botopasi, Surinam, 20 March 1967, leg. H. Nijssen (Brokopondo Research 1966/67), 37 ex., 72.5-140 mm (paratypes); ZMA 105.757, Awara Creek, R. tributary of Surinam River, about 1.5 km S of Botopasi, Surinam, 18 March 1967, leg. H. Nijssen (Brokopondo Research 1966/67), 3 ex., 101-120 mm (paratypes); ZMA 106.013, Gran Creek, about 55 km S of Afobaka, Surinam River basin, Surinam, 24 May 1966, leg. H. Nijssen (Brokopondo Research 1966/67), 1 ex., 94 mm (paratype); ZMA 106.149, Sara Creek, about 27 km S of Dam, Surinam River basin, Surinam, 14 October 1966, leg. H. Nijssen (Brokopondo Research 1966/67), 43 ex., 43-159 mm (paratypes); ZMA 106.151, R. tributary of Kleine Saramacca, about 11 km from outlet, Surinam, 27 February 1967, leg. H. Nijssen (Brokopondo Research 1966/67), 1 ex., 29 mm (paratype); ZMA 106.152, Kleine Saramacca River, R. tributary of Saramacca River, about 14 km SE of outlet, Surinam, 28 February 1967, leg. H. Nijssen (Brokopondo Research 1966/67), 3 ex., 31-63 mm (paratypes).

Remarks. — Except one example from the transitional zone between stagnant and flowing water (ZMA 106.013), all were collected in flowing water, partly in rapids, at a depth of at most 150 or 200 cm; the bottom was sandy with occasionally mud or loam, and rocks. The numbers of scutes in longitudinal series confirm the wide range previously found: 26/26 (2 ex.), 26/27 (1), 27/27 (120), 27/28 (5), 28/28 (6). One example shows a few vague spots on the belly (ZMA 105.538); two specimens have a very oblique caudal base (ZMA 105.534 & 105.757), in the second specimen the caudal fin is directed obliquely upward.

14. **Hypostomus ventromaculatus** nov. spec.

Material. — ZMA 105.555, Sara Creek, about 5 km S of Dam, Surinam River basin, Surinam, 24 February 1967, leg. H. Nijssen (Brokopondo Research 1966/67), 1 ex., 120 mm (paratype); ZMA 106.150, Maréchal Creek, Surinam River tributary, Surinam, 8 December 1966, leg. H. Nijssen (Brokopondo Research 1966/67), 1 ex., 162 mm (paratype).

Remarks. — Both specimens show the characteristic spots on the belly and the usual morphological and meristic features. One of the specimens was found on a submerged tree in the stagnant water of the lake (ZMA 105.555); presumably, the water was well oxygenated by algae.

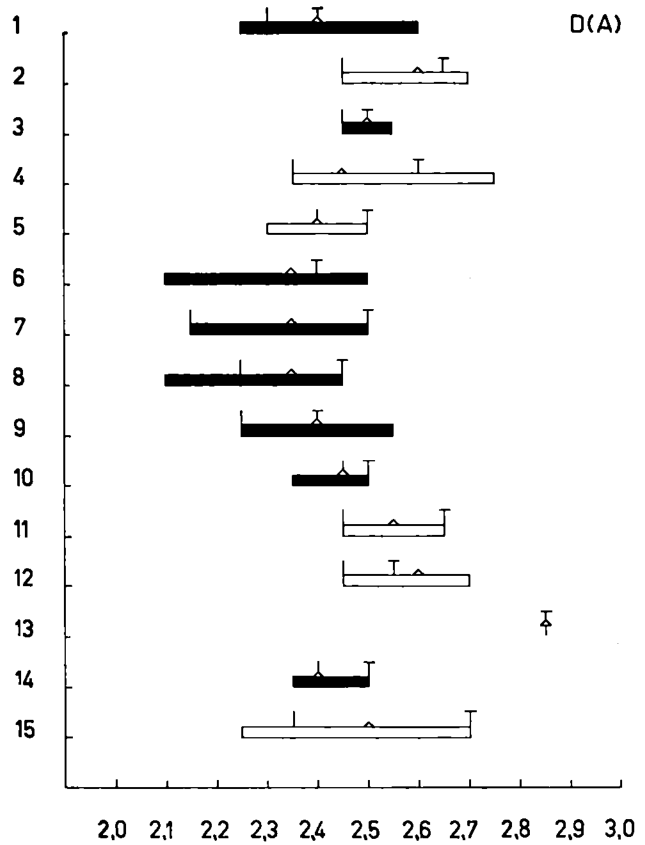


Diagram 1. The range of variation of the ratio between standard length and predorsal length in fifteen Surinam forms of *Hypostomus*. For explanation see p. 26-28.

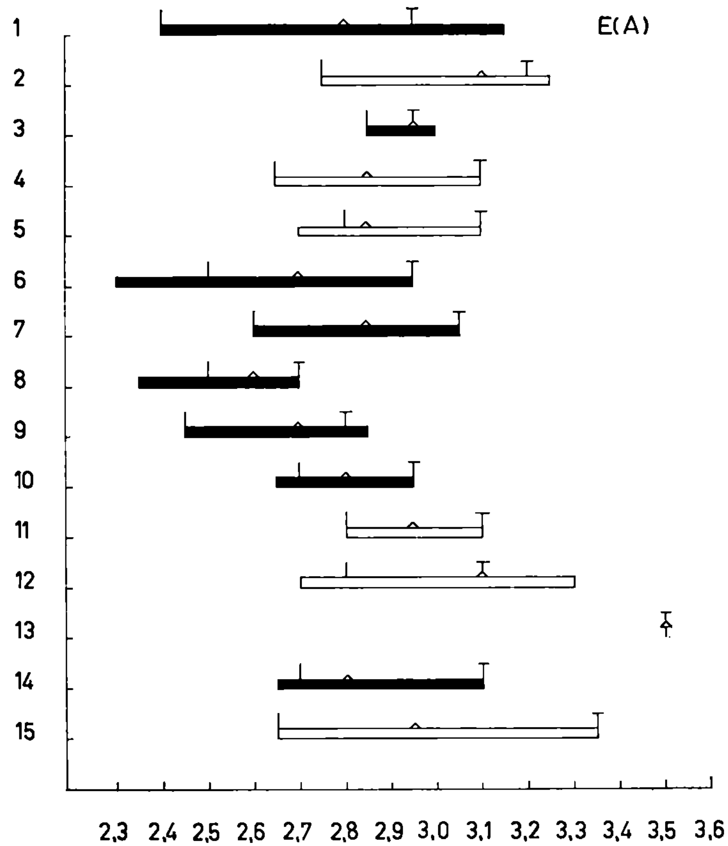


Diagram 2. The range of variation of the ratio between standard length and length of head in fifteen Surinam forms of *Hypostomus*.

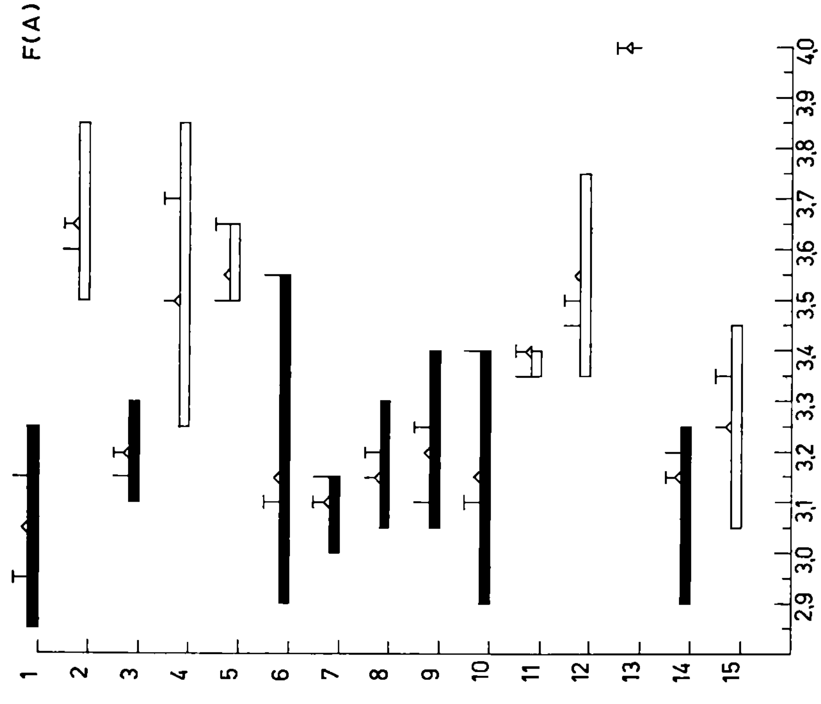


Diagram 3. The range of variation of the ratio between standard length and cleithral width in fifteen Surinam forms of *Hypostomus*.

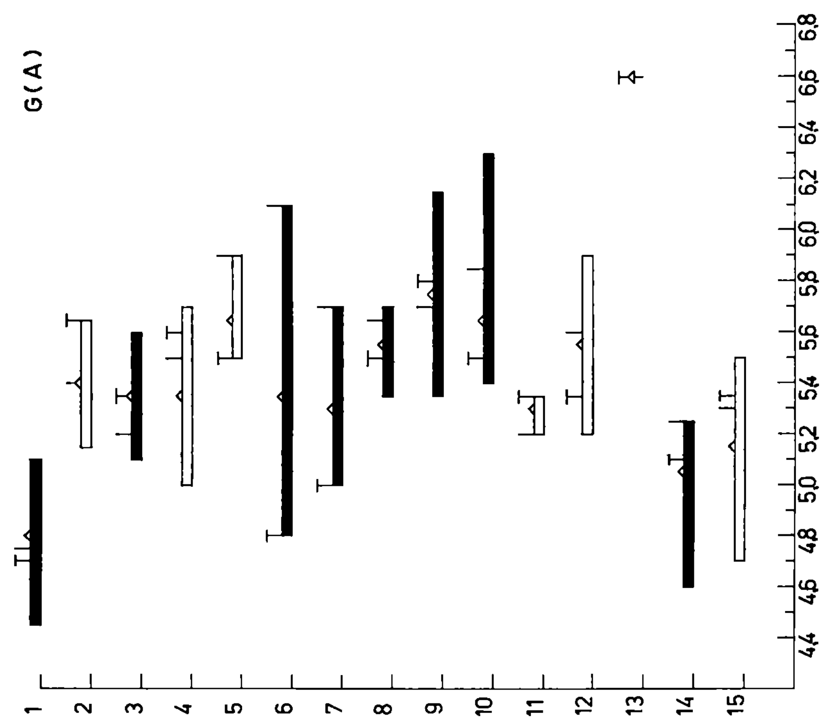


Diagram 4. The range of variation of the ratio between standard length and depth of head in fifteen Surinam forms of *Hypostomus*.

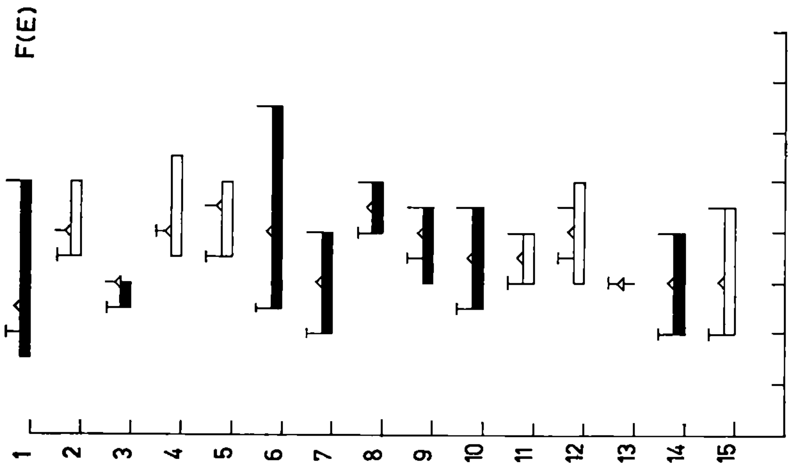


Diagram 5. The range of variation of the ratio between head length and cleithral width in fifteen Surinam forms of *Hypostomus*.

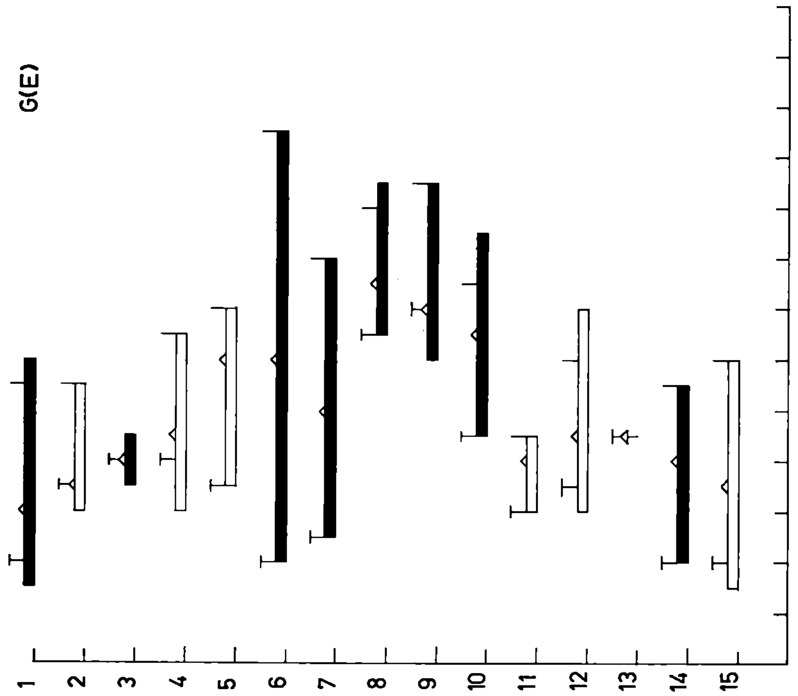


Diagram 6. The range of variation of the ratio between head length and depth of head in fifteen Surinam forms of *Hypostomus*.

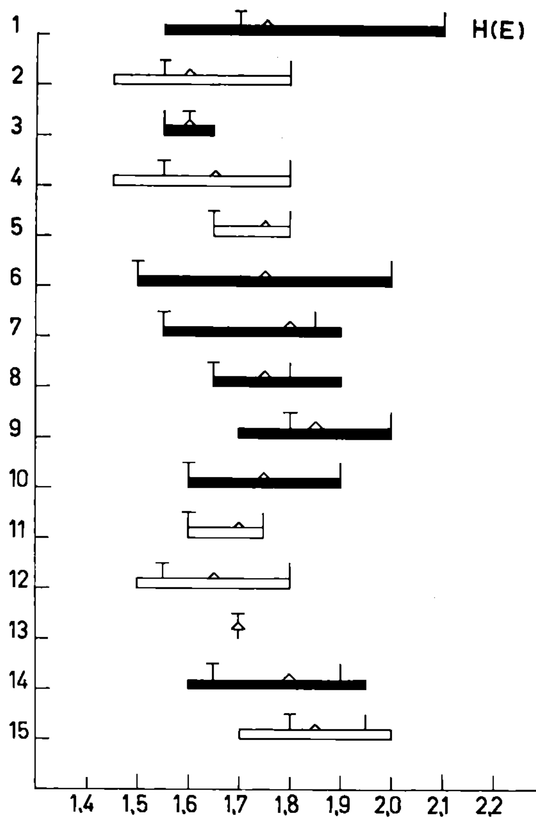


Diagram 7. The range of variation of the ratio between head length and length of snout in fifteen Surinam forms of *Hypostomus*.

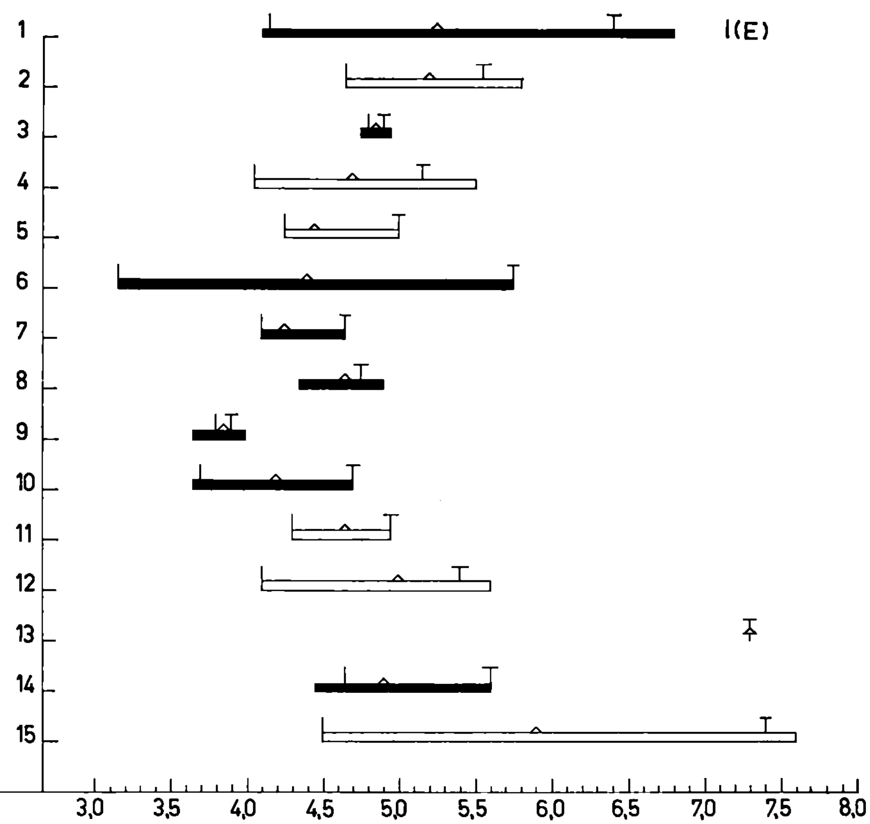


Diagram 8. The range of variation of the ratio between head length and orbital diameter in fifteen Surinam forms of *Hypostomus*.

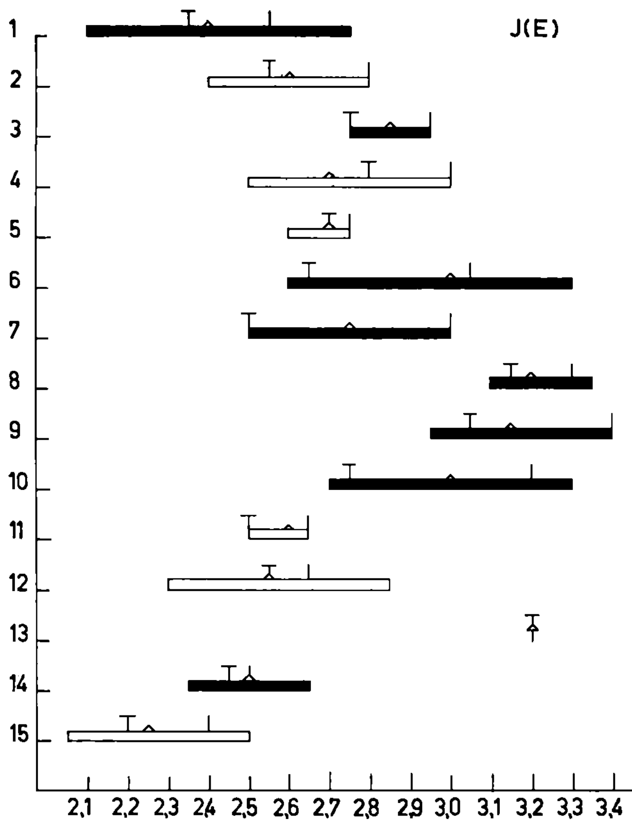


Diagram 9. The range of variation of the ratio between head length and interorbital width in fifteen Surinam forms of *Hypostomus*.

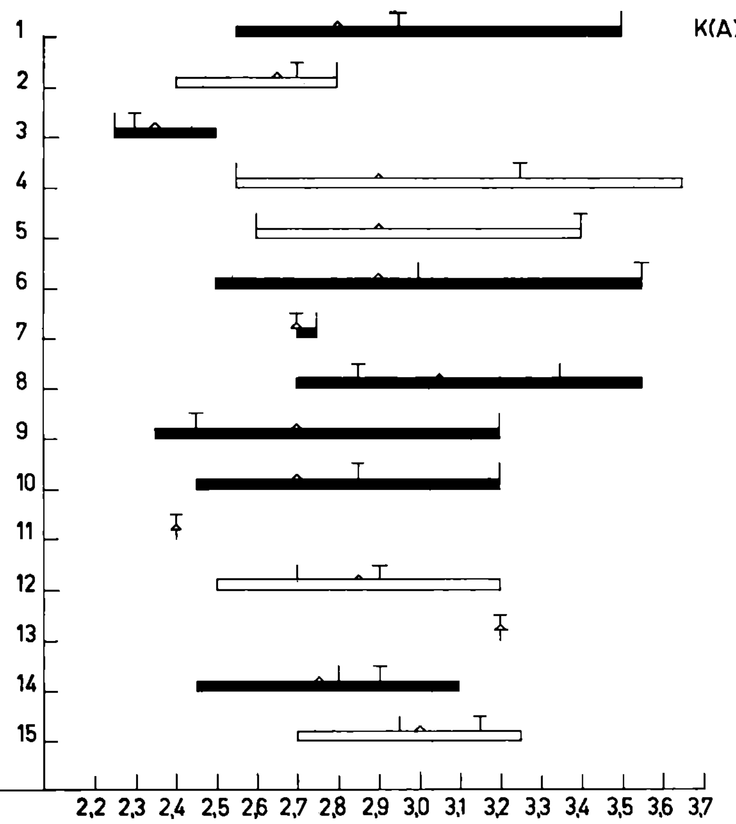


Diagram 10. The range of variation of the ratio between standard length and length of dorsal spine in fifteen Surinam forms of *Hypostomus*.

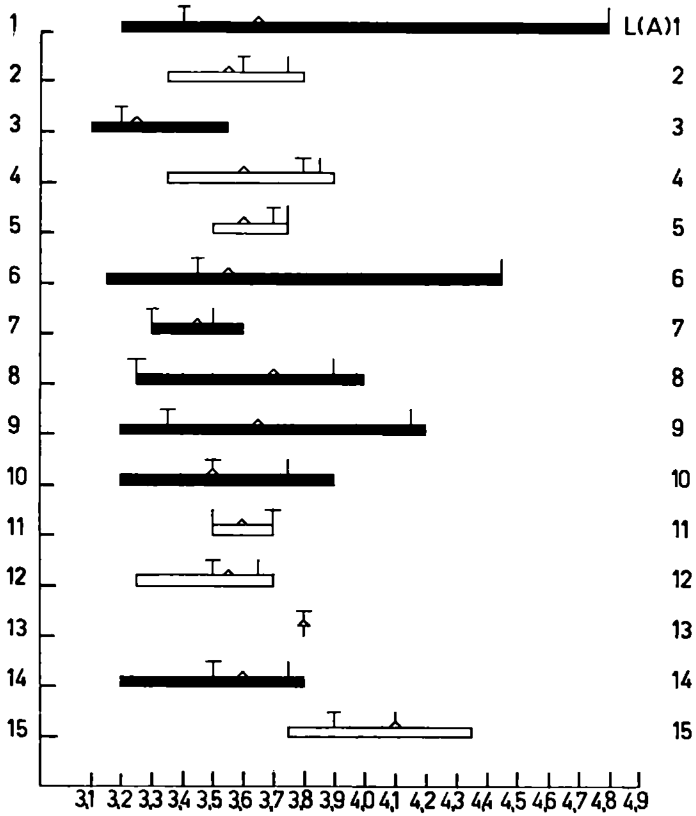


Diagram 11. The range of variation of the ratio between standard length and length of base of first dorsal fin in fifteen Surinam forms of *Hypostomus*.

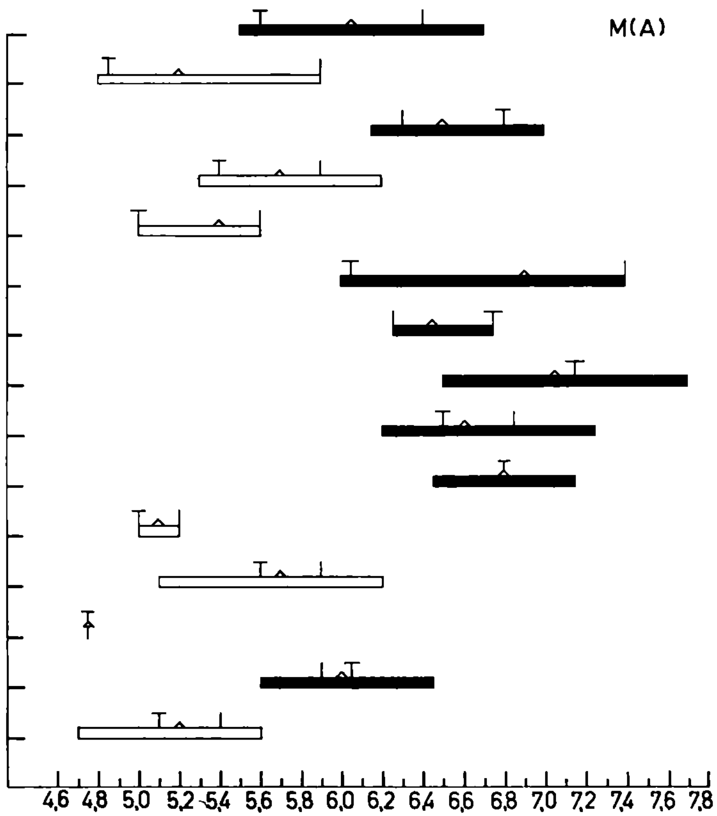


Diagram 12. The range of variation of the ratio between standard length and interdorsal length in fifteen Surinam forms of *Hypostomus*.

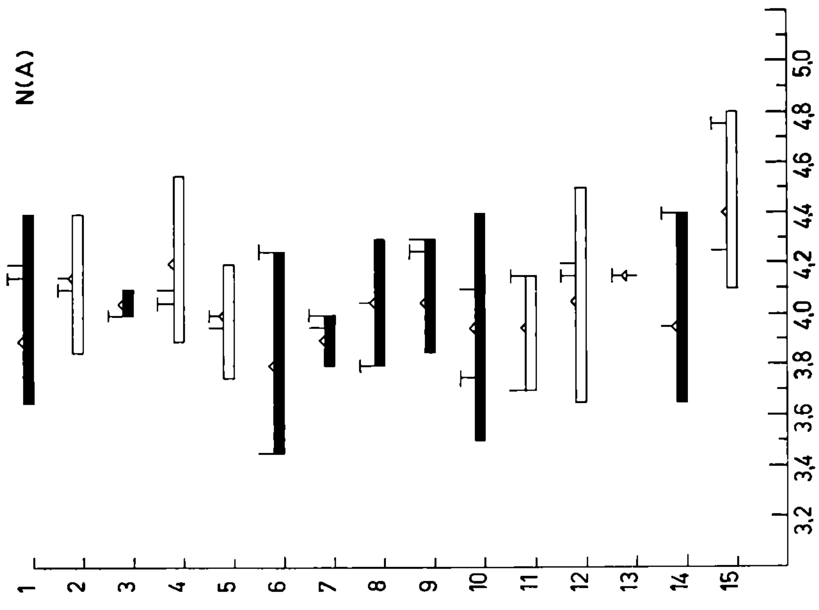


Diagram 13. The range of variation of the ratio between standard length and thoracic length in fifteen Surinam forms of *Hypostomus*.

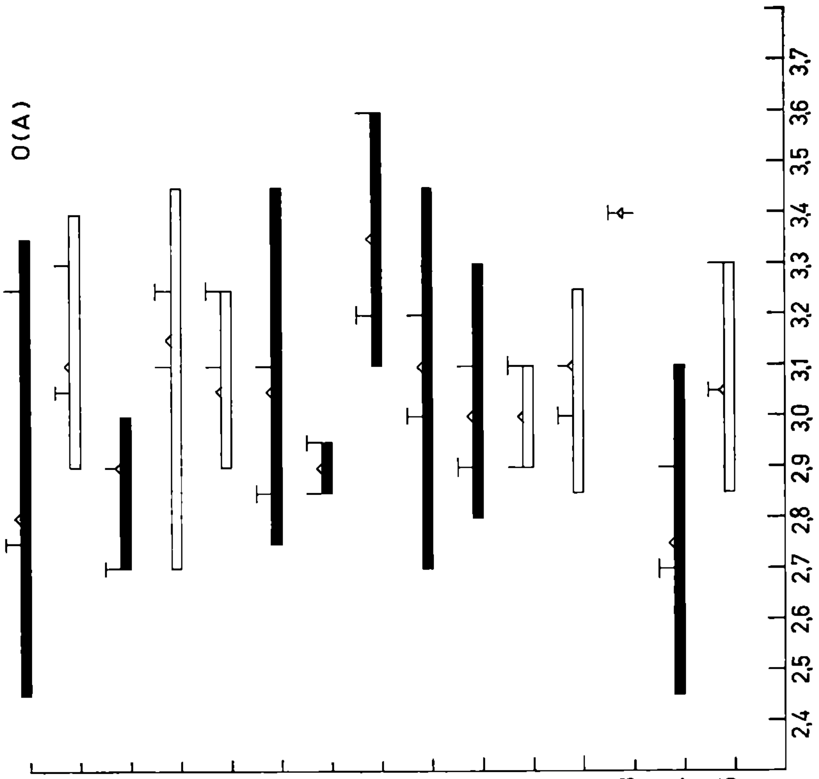


Diagram 14. The range of variation of the ratio between standard length and length of pectoral spine in fifteen Surinam forms of *Hypostomus*.

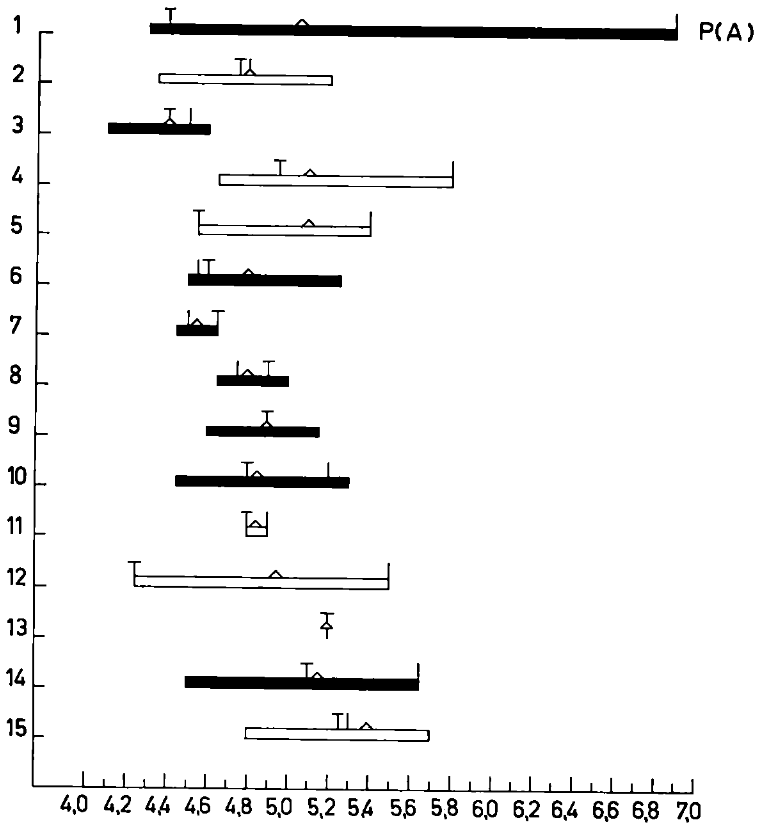


Diagram 15. The range of variation of the ratio between standard length and abdominal length in fifteen Surinam forms of *Hypostomus*.

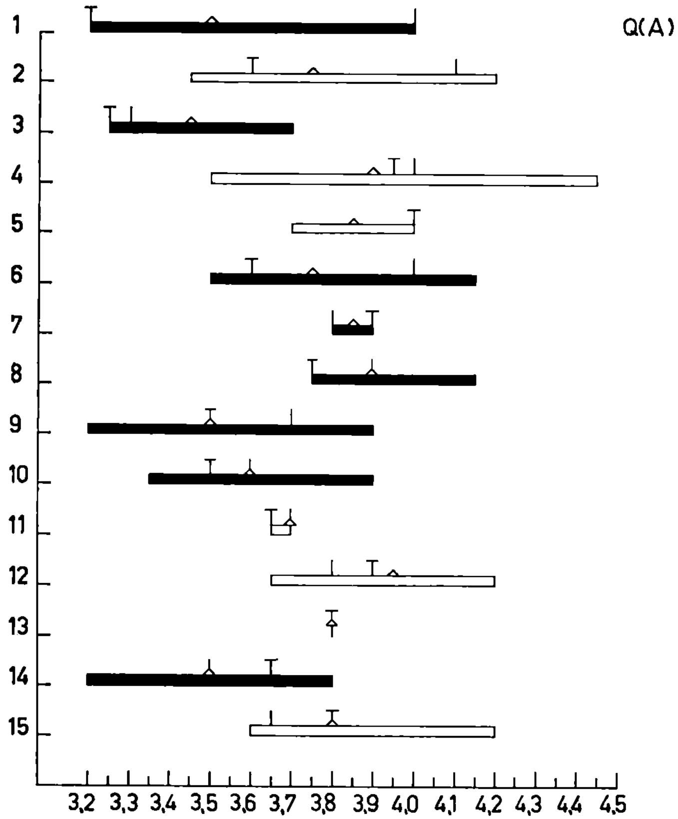


Diagram 16. The range of variation of the ratio between standard length and length of first ventral ray in fifteen Surinam forms of *Hypostomus*.

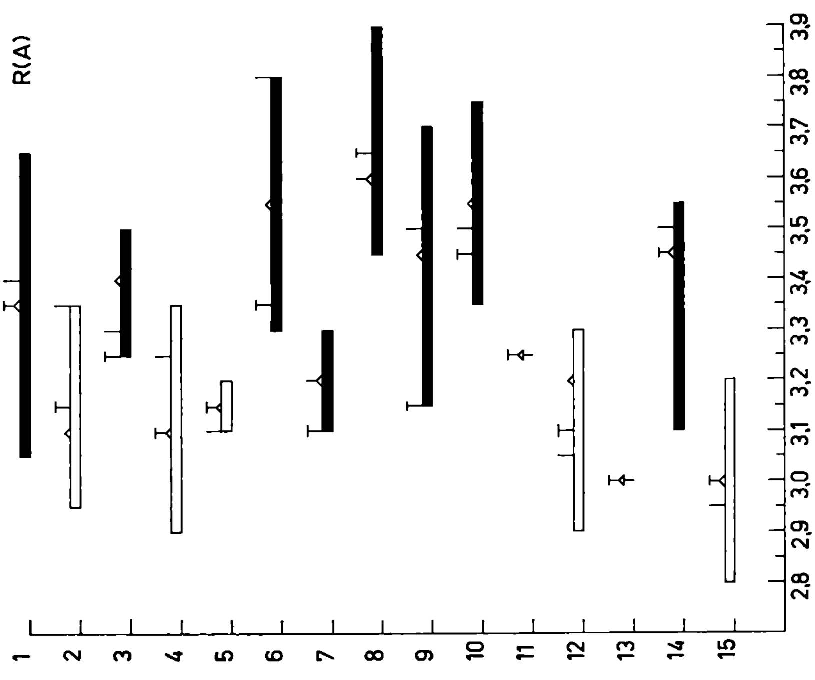


Diagram 17. The range of variation of the ratio between standard length and post-anal length in fifteen Surinam forms of *Hypostomus*.

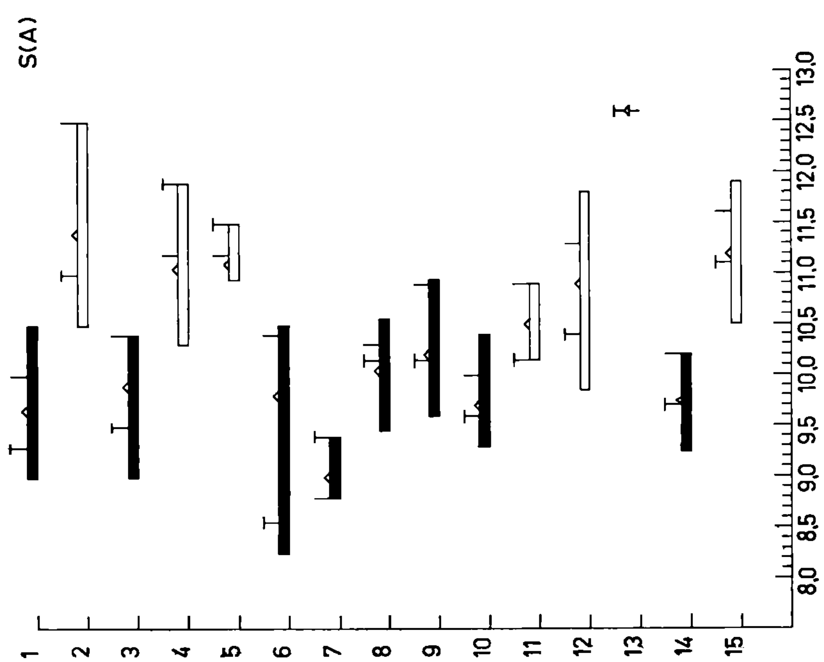


Diagram 18. The range of variation of the ratio between standard length and depth of caudal peduncle in fifteen Surinam forms of *Hypostomus*.

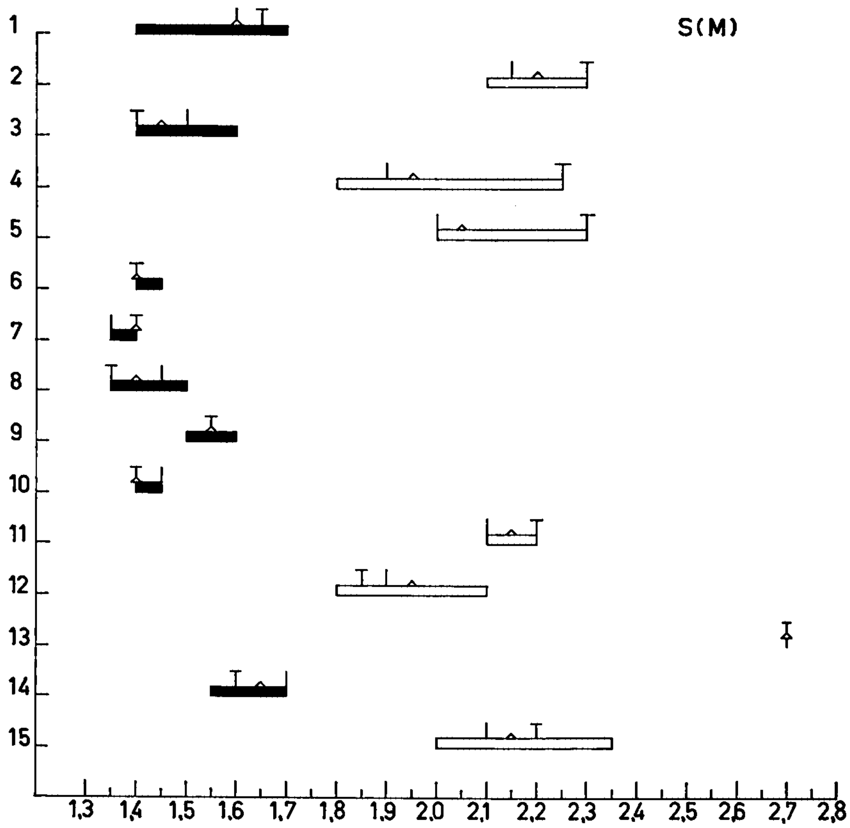


Diagram 19. The range of variation of the ratio between interdorsal length and depth of caudal peduncle in fifteen Surinam forms of *Hypostomus*.

TABULATED MORPHOLOGICAL DATA

The meaning and usage of the characters A-S is explained on p. 26-28 and in fig. 5; types, excluding paratypes, are indicated by asteriscs; some trends are merely suggested.

1. The Surinam species and subspecies

Table 1. *Hypostomus plecostomus* (Linnaeus) — (species no. 1).

Reg. no:	A	B	C	D (A)	E (A)	F (E)	G (E)	H (E)	I (E)	J (E)	K (A)	L (A)	M (A)	N (A)	O (A)	P (A)	O (A)	R (A)	S (A)	S(M)
3102	215	265	336	86.0 (2.5)	68.1 (3.15)	71.0 (0.95)	43.3 (1.55)	43.0 (1.6)	10.4 (6.5)	28.3 (2.4)	79.0 (2.7)	63.0 (3.4)	36.7 (5.85)	53.8 (4.0)	84.5 (2.55)	45.0 (4.75)	62.0 (3.5)	67.0 (3.2)	23.0 (9.35)	1.6
17335	210	255	280+	84.0 (2.5)	68.5 (3.05)	71.7 (0.95)	44.0 (1.55)	43.5 (1.55)	10.2 (6.8)	31.8 (2.15)	60+ (-)	61.8 (3.4)	38.0 (5.5)	48.8 (4.3)	79.5 (2.65)	42.0 (5.0)	65.0 (3.25)	65.0 (3.25)	22.7 (9.25)	1.65
*18240	175	213	233	73.0 (2.4)	59.0 (2.95)	59.0 (1.0)	37.2 (1.6)	35.5 (1.7)	9.2 (6.4)	25.0 (2.35)	59.0 (2.95)	51.5 (3.4)	31.3 (5.6)	42.0 (4.15)	63.3 (2.75)	39.5 (4.4)	55.0 (3.2)	52.0 (3.35)	18.9 (9.3)	1.65
10721	135	175	205	60.0 (2.25)	49.0 (2.75)	47.1 (1.0)	30.0 (1.65)	30.0 (1.65)	7.5 (6.5)	21.0 (2.3)	51.6 (2.65)	40.2 (3.35)	22.5 (6.0)	36.2 (3.7)	55.2 (2.45)	26.3 (5.1)	41.0 (3.3)	42.0 (3.2)	14.2 (9.5)	1.6
25463	135	175	205	54.8 (2.45)	45.8 (2.95)	45.5 (1.0)	29.5 (1.55)	27.8 (1.65)	7.2 (6.4)	19.3 (2.35)	50.2 (2.7)	40.9 (3.3)	22.2 (6.1)	36.0 (3.75)	46.7 (2.9)	26.8 (5.0)	38.2 (3.5)	41.6 (3.25)	14.0 (9.6)	1.6
25463	115	145	180	48.0 (2.4)	40.4 (2.85)	36.2 (1.1)	24.8 (1.65)	23.3 (1.7)	7.2 (5.6)	16.0 (2.5)	45.5 (2.55)	35.9 (3.2)	17.7 (6.5)	30.0 (3.8)	42.4 (2.7)	24.4 (4.7)	36.0 (3.2)	34.6 (3.3)	11.4 (10.0)	1.55
18241	115	140	170	47.8 (2.4)	39.6 (2.9)	38.8 (1.0)	24.6 (1.6)	23.0 (1.7)	6.5 (6.1)	17.9 (2.2)	29+ (-)	32.0 (3.6)	21.1 (5.5)	30.0 (3.8)	42.0 (2.75)	23.9 (4.8)	34.8 (3.3)	35.1 (3.25)	12.3 (9.4)	1.7
18241	115	140	171	46.0 (2.5)	38.0 (3.0)	38.3 (1.0)	23.8 (1.6)	23.0 (1.65)	7.3 (5.2)	16.9 (2.25)	41.2 (2.8)	32.2 (3.55)	19.6 (5.85)	30.1 (3.8)	39.0 (2.95)	24.0 (4.8)	32.0 (3.6)	34.9 (3.3)	12.0 (9.5)	1.65
18241	113	140	161	43.1 (2.6)	38.8 (2.9)	38.4 (1.05)	23.0 (1.7)	22.5 (1.75)	7.0 (5.5)	16.8 (2.3)	40+ (-)	30.8 (3.65)	18.6 (6.2)	31.0 (3.65)	40.8 (2.8)	23.9 (4.7)	32.2 (3.5)	32.8 (3.55)	11.6 (9.7)	1.6
18241	113	140	165	45.7 (2.5)	38.2 (2.95)	38.4 (1.0)	24.3 (1.6)	22.8 (1.7)	7.0 (5.5)	18.2 (2.1)	44.0 (2.55)	31.0 (3.65)	19.2 (5.9)	30.1 (3.75)	42.6 (2.65)	24.0 (4.7)	32.6 (3.45)	32.9 (3.55)	12.0 (9.5)	1.6
18241	112	140	166	46.4 (2.4)	39.3 (2.85)	38.5 (1.0)	24.3 (1.6)	22.5 (1.75)	7.4 (5.3)	17.5 (2.25)	43.0 (2.6)	31.0 (3.6)	18.8 (6.0)	29.2 (3.85)	40.7 (2.75)	24.2 (4.65)	35.0 (3.2)	32.4 (3.45)	12.3 (9.0)	1.5
17335	110	138	163+	46.0 (2.4)	37.7 (2.9)	36.2 (1.05)	22.5 (1.65)	22.3 (1.7)	6.8 (5.5)	16.6 (2.3)	42.0 (2.6)	31.0 (3.55)	19.4 (5.7)	27.0 (4.05)	41.8 (2.65)	23.3 (4.7)	32.2 (3.4)	34.6 (3.2)	11.7 (9.4)	1.65
21378	110	135	173	45.4 (2.4)	38.3 (2.9)	37.2 (1.0)	23.2 (1.65)	22.3 (1.7)	6.8 (5.6)	16.0 (2.4)	39.6 (2.75)	32.2 (3.4)	17.5 (6.3)	27.2 (4.05)	39.8 (2.75)	20.6 (5.3)	30.9 (3.55)	32.0 (3.4)	11.3 (9.7)	1.55
18241	108	135	170	44.5 (2.45)	38.7 (2.8)	36.5 (1.05)	22.2 (1.75)	22.2 (1.75)	7.3 (5.3)	15.9 (2.45)	40.5 (2.65)	29.5 (3.65)	18.2 (5.9)	27.5 (3.9)	39.6 (2.7)	22.4 (4.8)	31.7 (3.5)	32.2 (3.35)	11.8 (9.3)	1.55
25463	105	135	165	43.5 (2.4)	36.8 (2.85)	35.7 (1.05)	21.8 (1.7)	21.8 (1.7)	7.1 (5.2)	14.8 (2.5)	39.7 (2.65)	29.2 (3.6)	16.3 (6.4)	27.9 (3.75)	39.2 (2.7)	24.0 (4.35)	32.8 (3.2)	32.0 (3.35)	10.7 (9.8)	1.5
18241	105	125	152	42.8 (2.45)	36.8 (2.85)	36.3 (1.0)	21.8 (1.7)	21.0 (1.75)	7.1 (5.2)	15.5 (2.4)	38.5 (2.75)	27.5 (3.8)	19.0 (5.5)	27.5 (3.8)	39.7 (2.65)	23.4 (4.5)	31.2 (3.35)	29.0 (3.6)	11.3 (9.3)	1.7
18241	103	125	150	42.3 (2.45)	35.7 (2.9)	35.2 (1.0)	21.6 (1.65)	20.6 (1.75)	6.6 (5.4)	15.2 (2.35)	37.0 (2.8)	29.0 (3.55)	16.5 (6.25)	28.0 (3.7)	37.1 (2.75)	24.0 (4.3)	28.2 (3.65)	30.3 (3.4)	11.0 (9.35)	1.5
18241	103	128	147	42.9 (2.4)	36.9 (2.8)	35.0 (1.05)	23.1 (1.6)	21.3 (1.75)	7.4 (5.0)	15.9 (2.3)	36.5 (2.85)	29.8 (3.45)	17.0 (6.1)	28.4 (3.65)	39.0 (2.65)	22.4 (4.6)	30.7 (3.35)	29.6 (3.45)	11.3 (9.3)	1.5
18241	100	125	150	42.7 (2.35)	36.2 (2.75)	34.8 (1.05)	21.4 (1.7)	21.1 (1.75)	6.3 (5.7)	15.3 (2.35)	36.0 (2.75)	27.5 (3.6)	18.0 (5.6)	25.8 (3.85)	36.5 (2.75)	19.5 (5.1)	28.5 (3.5)	29.8 (3.35)	10.5 (9.5)	1.7
18241	100	125	166	40.9 (2.45)	34.7 (2.9)	33.3 (1.0)	20.4 (1.7)	20.0 (1.75)	6.4 (5.4)	14.4 (2.4)	26+ (-)	29.8 (3.35)	18.2 (5.5)	26.7 (3.75)	38.8 (2.5)	19.3 (5.2)	29.6 (3.4)	31.2 (3.2)	10.9 (9.2)	1.7
18241	100	126	160	41.4 (2.4)	35.5 (2.8)	33.7 (1.05)	21.6 (1.65)	20.2 (1.75)	6.6 (5.35)	15.0 (2.35)	36.8 (2.7)	27.5 (3.65)	16.0 (6.2)	26.5 (3.75)	37.2 (2.7)	20.3 (4.9)	28.6 (3.5)	29.5 (3.4)	10.4 (9.6)	1.55
25463	97	120	154	41.6 (2.35)	35.2 (2.75)	31.0 (1.15)	21.4 (1.65)	21.0 (1.65)	6.8 (5.2)	15.0 (2.35)	36.5 (2.65)	27.5 (3.5)	16.4 (5.9)	25.0 (3.85)	35.8 (2.7)	20.5 (4.7)	29.0 (3.35)	29.0 (3.35)	9.9 (9.8)	1.65
18666	97	120	148	42.2 (2.3)	34.9 (2.65)	33.0 (1.1)	21.6 (1.7)	21.4 (1.7)	6.5 (5.35)	15.2 (2.45)	35.1 (2.75)	26.5 (3.65)	15.8 (6.1)	21+ (-)	34.7 (2.8)	19.0 (5.1)	27.5 (3.5)	28.3 (3.4)	10.0 (9.7)	1.6
25464	95	117	143	41.3 (2.3)	34.1 (2.8)	31.7 (1.05)	20.8 (1.65)	20.1 (1.7)	6.8 (5.0)	15.1 (2.25)	33.1 (2.85)	26.6 (3.55)	16.2 (5.9)	24.8 (3.8)	34.3 (2.75)	19.5 (4.9)	21.5? (-)	26.2 (3.6)	9.8 (9.7)	1.65
21378	95	?	?	38.5 (2.45)	33.4 (2.85)	30.0 (1.1)	19.6 (1.65)	18.9 (1.75)	6.3 (5.15)	13.7 (2.55)	? (-)	25.5 (3.7)	16.2 (5.9)	25.0 (3.8)	32.3 (2.95)	19.2 (4.9)	26.0 (3.65)	27.3 (3.5)	10.0 (9.5)	1.6
19786	93	113	124+	38.9 (2.4)	33.6 (2.75)	30.7 (1.1)	19.3 (1.75)	19.0 (1.75)	6.3 (5.3)	13.6 (2.5)	32.5 (2.85)	23.7 (3.9)	15.3 (6.1)	23.8 (3.9)	32.9 (2.85)	17.5 (5.3)	25.4 (3.65)	26.4 (3.5)	10.3 (9.0)	1.5
25465	90	113	140	38.5 (2.35)	32.7 (2.75)	29.2 (1.1)	18.2 (1.8)	17.3 (1.9)	6.8 (4.8)	12.7 (2.55)	31.5 (2.85)	26.0 (3.45)	16.4 (5.5)	24.5 (3.65)	32.7 (2.75)	18.8 (4.8)	25.8 (3.5)	26.5 (3.4)	10.0 (9.0)	1.6
18666	89	110	128+	39.3 (2.25)	33.2 (2.7)	30.3 (1.1)	20.0 (1.65)	19.3 (1.7)	6.3 (5.25)	13.6 (2.45)	31+ (-)	26.1 (3.4)	14.4 (6.2)	21.7 (4.1)	31.8 (2.8)	16.8 (5.3)	24.9 (3.6)	26.5 (3.35)	9.7 (9.2)	1.5
25467	87	107	120+	34.7 (2.5)	30.0 (2.9)	26.8 (1.1)	17.5 (1.7)	17.2 (1.75)	5.5 (5.45)	13.0 (2.3)	? (-)	24.7 (3.35)	15.0 (5.8)	22.4 (3.9)	29.1 (2.95)	16.6 (5.2)	24.2 (3.6)	26.0 (3.35)	8.8 (9.9)	1.7
3095	74	?	?	31.0 (2.4)	25.8 (2.85)	23.0 (1.1)	14.5 (1.8)	14.4 (1.8)	5.8 (4.5)	9.9 (2.6)	? (-)	18.8 (3.95)	13.6 (5.5)	18.0 (4.1)	24.7 (3.0)	14.0 (5.3)	? (-)	23.2 (3.2)	8.2 (9.1)	1.6
3095	72	?	?	32.2 (2.25)	27.0 (2.7)	23.4 (1.15)	14.2 (1.9)	14.5 (1.85)	5.7 (4.7)	9.8 (2.75)	? (-)	18.8 (3.8)	11.6 (6.2)	17.8 (4.05)	21+ (-)	13.9 (5.2)	? (-)	22.7 (3.2)	7.1 (10.1)	1.65
21378	68	85	?	27.9 (2.45)	24.9 (2.75)	21.8 (1.15)	13.6 (1.85)	13.4 (1.85)	5.5 (4.5)	9.9 (2.5)	22.2 (3.05)	17.5 (3.9)	10.4 (6.5)	16.5 (4.1)	23+ (-)	14.0 (4.85)	18.1 (3.75)	20.0 (3.4)	6.8 (10.0)	1.5
19786	68	?	?	29.0 (2.35)	26.3 (2.6)	22.5 (1.1)	13.7 (1.8)	13.7 (1.8)	5.0 (5.0)	10.4 (2.4)	17+ (-)	17.7 (3.85)	10.5 (6.5)	15.3 (4.4)	22.5 (3.0)	13.0 (5.2)	16+ (-)	20.0 (3.4)	7.0 (9.7)	1.5
21378	67	85	98+	27.7 (2.4)	25.0 (2.7)	23.3 (1.05)	14.1 (1.8)	14.0 (1.8)	5.2 (4.8)	10.3 (2.45)	23.5 (2.85)	17.5 (3.8)	10.0 (6.7)	16.3 (4.1)	26.4 (2.55)	13.0 (5.15)	16+ (-)	19.6 (3.4)	7.0 (9.5)	1.4
25466	67	84	109	28.0 (2.4)	24.3 (2.75)	22.4 (1.1)	13.6 (1.8)	13.4 (1.8)	5.3 (4.6)	10.0 (2.45)	24.0 (2.8)	17.4 (3.85)	10.4 (6.45)	17.0 (3.95)	22.7 (2.95)	12.9 (5.2)	19.6 (3.4)	20.2 (3.3)	6.5 (10.1)	1.6
25467	65	80	102	27.5 (2.35)	23.1 (2.8)	21.5 (1.1)	13.0 (1.8)	12.4 (1.85)	5.0 (4.6)	9.0 (2.55)	? (-)	17.0 (3.8)	10.3 (6.3)	16.8 (3.85)	20.6 (3.15)	12.8 (5.1)	17.8 (3.65)	21.4 (3.05)	6.2 (10.5)	1.65
21378	64	75	82	27.1 (2.35)	23.4 (2.75)	21.7 (1.1)	13.1 (1.8)	12.7 (1.85)	4.9 (4.75)	10.1 (2.3)	16+ (-)	17.5 (3.65)	10.0 (6.4)	16.6 (3.85)	22.3 (2.85)	12.0 (5.3)	16.8 (3.8)	17.5 (3.65)	6.5 (9.8)	1.55
21378	63	72	80	26.8 (2.35)	23.6 (2.65)	21.3 (1.1)	13.0 (1.8)	12.7 (1.85)	5.1 (4.6)	9.4 (2.5)	19.0 (3.3)*	17.5 (3.6)	9.6 (6.6)	15.0 (4.2)	22.0 (2.85)	12.0 (5.25)	16.6 (3.8)	18.2 (3.45)	6.3 (10.0)	1.5
25464	53	65	78	23.0 (2.3)	20.3 (2.6)	16.8 (1.2)	10.6 (1.9)	10.4 (1.95)	4.9 (4.1)	8.0 (2.55)	17.2 (3.1)	12.9 (4.1)	8.3 (6.4)	14.3 (3.7)	15+ (-)	10.0 (5.3)	14.5 (3.65)	14.6 (3.6)	5.1 (10.5)	1.6
21378	53	?	?	22.3 (2.4)	20.0 (2.65)	17.7 (1.15)	10.7 (1.85)	10.5 (1.9)	4.5 (4.45)	7.7 (2.6)	15.2 (3.5)	12.8 (4.15)	8.5 (6.25)	13.4 (3.95)	14+ (-)	9.8 (5.4)	8+ (-)	15.7 (3.4)	5.2 (10.0)	1.65
17338	51	63	74	22.8 (2.25)	20.1 (2.55)	16.8 (1.2)	10.0 (2.0)	10.1 (2.0)	4.1 (4.9)	8.0 (2.5)	? (-)	12.4 (4.1)	8.0 (6.4)	11.5 (4.4)	15.6 (3.25)	7.7 (6.6)	12.7 (4.0)	15.3 (3.35)	4.8 (10.5)	1.65
17338	48.5	61	685+	21.4 (2.25)	18.3 (2.65)	14.8 (1.25)	9.7 (1.9)	9.2 (2.0)	3.8 (4.8)	7.5 (2.45)	? (-)	11.6 (4.15)	8.0 (6.05)	11.6 (4.2)	14.5 (3.35)	7.4 (6.5)	12.5 (3.85)	15.3 (3.2)	4.8 (10.0)	1.65
21449	36	44	46+	15.5 (2.3)	14.9 (2.4)	11.4 (1.3)	7.6 (1.95)	7.0 (2.1)	3.6 (4.15)	5.8 (2.55)	? (-)	7.5 (4.8)	5.6 (6.4)	8.6 (4.2)	11.0 (3.25)	5.2 (6.9)	9.0 (4.0)	10.5 (3.4)	3.5 (10.0)	1.6
Range of ratios :				2.25-2.6	2.4-3.15	0.95-1.3	1.55-2.0	1.55-2.1	4.1-6.8	2.1-2.75	2.55-3.5	3.2-4.8	5.5-6.7	3.65-4.4	2.45-3.35	4.3-6.9	3.2-4.0	3.05-3.65	9.0-10.5	1.4-1.7
Average of ratios:				2.4	2.8	1.05	1.7	1.75	5.25	2.4	2.8	3.65	6.05	3.9	2.8	5.05	3.5	3.35	9.65	1.6
Allometric trend :				—	—	+	+	+	=	=	+	+	=	=	+	+	+	+	=	=

Table 2. *Hypostomus corantijni* nov. spec. — (species no. 2).

Reg. no:	A	B	C	D (A)	E (A)	F (E)	G (E)	H (E)	I (E)	J (E)	K (A)	L (A)	M (A)	N (A)	O (A)	P (A)	O (A)	R (A)	S (A)	S(M)
25470	188	225	240	70.4 (2.65)	59.5 (3.15)	51.2 (1.15)	34.5 (1.7)	41.0 (1.45)	10.2 (5.8)	21.8 (2.75)	69.0 (2.75)	54.2 (3.45)	37.5 (5.0)	42.5 (4.4)	60.0 (3.1)	43.0 (4.35)	49.2 (3.8)	59.0 (3.2)	18.0 (10.5)	2.1
*25471	175	240	257	66.5 (2.65)	54.5 (3.2)	48.0 (1.15)	31.0 (1.75)	34.5 (1.55)	9.8 (5.55)	21.7 (2.55)	65.4 (2.7)	48.8 (3.6)	36.2 (4.85)	43.0 (4.1)	57.8 (3.05)	36.8 (4.75)	49.0 (3.6)	56.0 (3.15)	15.6 (11.0)	2.3
25472	170	203	240+	65.0 (2.6)	53.8 (3.15)	46.8 (1.15)	31.4 (1.7)	35.1 (1.55)	9.6 (5.6)	20.9 (2.6)	62.7 (2.7)	46.8 (3.6)	32.1 (5.3)	42.2 (4.0)	54.0 (3.15)	34.8 (4.85)	46.7 (3.65)	55.0 (2.95)	15.1 (11.0)	2.15
25472	162	195	232+	64.8 (2.5)	52.4 (3.1)	46.2 (1.15)	31.2 (1.7)	34.4 (1.5)	10.0 (5.25)	21.3 (2.45)	52+ (-)	48.5 (3.35)	30.5 (5.3)	42.0 (3.85)	52.2 (3.1)	36.5 (4.4)	41.5 (3.9)	51.6 (3.15)	14.4 (11.0)	2.1
25472	160	195	235	61.5 (2.6)	50.6 (3.15)	43.9 (1.15)	29.6 (1.75)	33.2 (1.5)	9.6 (5.3)	21.0 (2.4)	62.7 (2.55)	45.8 (3.5)	33.2 (4.8)	38.6 (4.1)	52.0 (3.05)	32.0 (5.0)	45.0 (3.55)	52.0 (3.0)	14.4 (11.0)	2.3
25472	157	187	225	57.4 (2.7)	48.8 (3.2)	40.9 (1.2)	29.0 (1.7)	31.7 (1.55)	9.2 (5.3)	19.0 (2.7)	57.7 (2.7)	43.0 (3.65)	32.2 (4.9)	37.0 (4.25)	50.7 (3.1)	31.0 (5.05)	41.0 (3.8)	51.7 (3.05)	14.0 (11.0)	2.3
25472	155	185	210+	57.5 (2.7)	48.0 (3.2)	40.9 (1.2)	27.4 (1.75)	29.7 (1.6)	9.1 (5.3)	19.6 (2.45)	57.5 (2.7)	42.3 (3.65)	28.4 (5.45)	36.4 (4.25)	49.8 (3.1)	32.0 (4.85)	39.9 (3.9)	50.0 (3.1)	13.6 (11.5)	2.1
25472	153	181	213+	56.2 (2.7)	47.2 (3.25)	41.4 (1.15)	27.5 (1.7)	31.4 (1.5)	9.0 (5.25)	19.7 (2.4)	57.3 (2.65)	42.0 (3.6)	30.5 (5.0)	38.0 (4.0)	49.5 (3.1)	31.2 (4.9)	40.5 (3.75)	51.4 (3.0)	13.5 (11.5)	2.25
25471	150	185	220	59.0 (2.55)	49.5 (3.05)	42.3 (1.15)	28.1 (1.75)	31.8 (1.55)	9.3 (5.3)	18.4 (2.7)	55.8 (2.7)	44.1 (3.4)	27.2 (5.5)	36.0 (4.15)	51.5 (2.9)	31.7 (4.7)	41.0 (3.65)	46.7 (3.2)	13.2 (11.5)	2.1
25472	150	180	207	56.2 (2.65)	47.0 (3.2)	39.5 (1.2)	27.5 (1.7)	30.1 (1.55)	9.0 (5.2)	18.4 (2.55)	57.8 (2.6)	41.4 (3.6)	27.0 (5.55)	35.6 (4.2)	48.7 (3.1)	31.0 (4.8)	41.0 (3.65)	48.0 (3.1)	12.6 (12.0)	2.15
25472	138	168	198	55.7 (2.45)	46.8 (2.95)	39.2 (1.2)	26.8 (1.75)	29.9 (1.55)	9.0 (5.2)	17.8 (2.6)	55.7 (2.5)	40.1 (3.4)	28.5 (4.8)	33.2 (4.15)	46.4 (3.0)	29.4 (4.7)	40.2 (3.45)	44.5 (3.1)	12.2 (11.5)	2.3
25471	133	160	196	53.5 (2.5)	43.6 (3.05)	36.4 (1.2)	24.6 (1.7)	28.2 (1.55)	8.5 (5.15)	16.7 (2.6)	52.0 (2.55)	38.1 (3.5)	26.8 (4.9)	33.0 (4.0)	44.5 (3.0)	27.4 (4.85)	38.0 (3.5)	41.8 (3.15)	12.0 (11.0)	2.25
25472	128	155	181	50.3 (2.55)	41.5 (3.1)	34.4 (1.2)	23.6 (1.75)	25.7 (1.6)	8.5 (4.9)	16.5 (2.5)	32+ (-)	36.4 (3.5)	24.6 (5.0)	30.8 (4.15)	43.0 (3.0)	26.5 (4.8)	34.5 (3.65)	41.2 (3.1)	11.2 (11.5)	2.2
25473	127	158	194	51.0 (2.5)	42.9 (2.95)	35.5 (1.2)	24.0 (1.8)	25.8 (1.65)	8.9 (4.8)	16.7 (2.55)	53.0 (2.4)	35.8 (3.55)	23.8 (5.3)	30.0 (4.2)	42.0 (3.0)	26.7 (4.75)	35.0 (3.6)	40.6 (3.1)	11.2 (11.5)	2.15
25474	55	65	80	21.8 (2.5)	19.6 (2.8)	15.0 (1.3)	10.0 (1.95)	10.8 (1.8)	4.1 (4.8)	7.1 (2.75)	19.7 (2.8)	14.5 (3.8)	10.0 (5.5)	13.4 (4.1)	16.1 (3.4)	10.5 (5.2)	13.0 (4.2)	17.3 (3.2)	4.6 (12.0)	2.2
25475	53	64	79	21.7 (2.45)	19.2 (2.75)	14.8 (1.2)	9.8 (1.95)	10.7 (1.8)	4.1 (4.65)	6.9 (2.8)	15+ (-)	14.2 (3.75)	9.0 (5.9)	12.8 (4.15)	16.0 (3.3)	11.0 (4.8)	12.9 (4.1)	15.8 (3.35)	4.2 (12.5)	2.15
Range of ratios :				2.45-2.7	2.75-3.25	1.15-1.3	1.7-1.95	1.45-1.8	4.65-5.8	2.4-2.8	2.4-2.8	3.35-3.8	4.8-5.9	3.85-4.4	2.9-3.4	4.35-5.2	3.45-4.2	2.95-3.35	10.5-12.5	2.1-2.3
Average of ratios:				2.6	3.1	1.2	1.75	1.6	5.2	2.6	2.65	3.55	5.2	4.15	3.1	4.8	3.75	3.1	11.4	2.2
Allometric trend :				−	−	+	+	+	−	=	=	+	+	=	+	+	+	=	+	=

Table 3. *Hypostomus crassicauda* nov. spec. — (species no. 3).

Reg. no:	A	B	C	D (A)	E (A)	F (E)	G (E)	H (E)	I (E)	J (E)	K (A)	L (A)	M (A)	N (A)	O (A)	P (A)	O (A)	R (A)	S (A)	S(M)
25489	143	175	190+	58.3 (2.45)	48.6 (2.95)	43.5 (1.1)	26.4 (1.85)	30.5 (1.6)	9.8 (4.95)	16.7 (2.9)	59? (-)	44.4 (3.2)	20.4 (7.0)	35.0 (4.1)	48.2 (3.0)	31.0 (4.6)	40.1 (3.55)	40.9 (3.5)	14.3 (10.0)	1.4
*25489	140	172	212	56.2 (2.5)	47.1 (2.95)	43.9 (1.05)	26.2 (1.8)	29.5 (1.6)	9.6 (4.9)	17.2 (2.75)	61.1 (2.3)	43.7 (3.2)	20.5 (6.8)	35.0 (4.0)	52.0 (2.7)	31.7 (4.4)	43.0 (3.25)	43.0 (3.25)	14.7 (9.5)	1.4
25489	136	164	180+	53.6 (2.55)	45.0 (3.0)	41.1 (1.1)	24.2 (1.85)	27.0 (1.65)	9.5 (4.75)	16.3 (2.75)	54.5 (2.5)	38.2 (3.55)	21.8 (6.3)	34.0 (4.0)	45.7 (3.0)	30.0 (4.5)	36.5 (3.7)	39.5 (3.45)	13.3 (10.2)	1.6
25489	130	160	192+	53.6 (2.45)	44.5 (2.95)	41.6 (1.05)	25.5 (1.75)	28.0 (1.6)	9.3 (4.75)	15.8 (2.8)	54+ (2.4-)	42.0 (3.1)	21.2 (6.15)	31.5 (4.1)	46.0 (2.85)	31.8 (4.1)	38.0 (3.4)	38.0 (3.4)	14.6 (9.0)	1.45
25489	120	150	175	48.9 (2.45)	42.0 (2.85)	38.0 (1.1)	23.0 (1.8)	26.7 (1.55)	8.7 (4.8)	14.3 (2.95)	53.2 (2.25)	37.2 (3.2)	19.0 (6.3)	30.0 (4.0)	41.5 (2.9)	26.7 (4.5)	35.7 (3.3)	35.7 (3.3)	12.5 (10.4)	1.5
Range of ratios :				2.45-2.55	2.85-3.0	1.05-1.1	1.75-1.85	1.55-1.65	4.75-4.95	2.75-2.95	2.25-2.5	3.1-3.55	6.15-7.0	4.0-4.1	2.7-3.0	4.1-4.6	3.25-3.7	3.25-3.5	9.0-10.4	1.4-1.6
Average of ratios:				2.5	2.95	1.1	1.8	1.6	4.85	2.85	2.35	3.25	6.5	4.05	2.9	4.4	3.45	3.4	9.9	1.45
Allometric trend :				=	=	=	=	=	−	=	=	=	−	=	=	=	=	=	=	+

Table 4. *Hypostomus gymnorhynchus* (Norman) — (species no. 4).

Reg. no:	A	B	C	D (A)	E (A)	F (E)	G (E)	H (E)	I (E)	J (E)	K (A)	L (A)	M (A)	N (A)	O (A)	P (A)	O (A)	R (A)	S (A)	S(M)
25476	170	195	210	67.7 (2.5)	56.8 (3.0)	47.8 (1.2)	31.3 (1.8)	38.1 (1.5)	10.4 (5.45)	21.6 (2.6)	46.1 (3.65)	45.5 (3.75)	32.0 (5.3)	39.5 (4.3)	49.1 (3.45)	35.3 (4.8)	38.0 (4.45)	53.5 (3.2)	15.2 (11.2)	2.1
25476	166	190	212	64.5 (2.55)	55.7 (3.0)	47.2 (1.2)	30.3 (1.85)	37.0 (1.5)	10.2 (5.45)	21.1 (2.65)	48.1 (3.45)	45.9 (3.55)	30.0 (5.5)	38.8 (4.3)	51.4 (3.25)	34.5 (4.8)	39.0 (4.25)	53.5 (3.1)	14.5 (11.45)	2.05
25476	156	187	211	63.5 (2.45)	53.3 (2.95)	45.8 (1.15)	28.7 (1.85)	36.4 (1.45)	10.7 (5.0)	19.5 (2.75)	46.9 (3.35)	41.8 (3.75)	28.5 (5.5)	40.5 (3.9)	50.7 (3.1)	32.0 (4.9)	38.0 (4.1)	48.7 (3.2)	14.4 (10.85)	2.0
25476	155	183	214	63.2 (2.45)	53.7 (2.9)	46.5 (1.15)	28.8 (1.85)	35.6 (1.5)	9.7 (5.5)	20.0 (2.7)	50.0 (3.1)	43.6 (3.55)	27.7 (5.6)	37.3 (4.15)	51.2 (3.05)	33.3 (4.65)	42.0 (3.7)	49.0 (3.15)	15.0 (10.3)	1.85
25477	155	183	210	58.2 (2.65)	50.0 (3.1)	43.0 (1.15)	29.5 (1.7)	31.6 (1.55)	9.6 (5.2)	19.5 (2.55)	49.7 (3.1)	43.7 (3.55)	27.4 (5.65)	37.0 (4.2)	47.0 (3.3)	31.2 (4.95)	38.4 (4.05)	50.5 (3.05)	14.5 (10.7)	1.9
25477	148	164	203	54.2 (2.75)	45.3 (2.7)	38.3 (1.2)	27.0 (1.7)	29.0 (1.55)	8.8 (5.1)	16.2 (2.8)	44.5 (3.3)	40.7 (3.65)	25.8 (5.7)	32.6 (4.55)	44.8 (3.3)	30.2 (4.9)	34.6 (4.25)	45.0 (3.3)	12.6 (11.8)	2.05
*BM 1926.3.2:74	145	170	197	56.0 (2.6)	46.5 (3.1)	39.0 (1.2)	25.9 (1.8)	29.7 (1.55)	9.0 (5.15)	16.5 (2.8)	42.4 (3.25)	37.7 (3.8)	27.0 (5.4)	35.6 (4.05)	44.8 (3.25)	29.3 (4.95)	36.7 (3.95)	45.7 (3.1)	12.2 (11.9)	2.25
25478	123	145	165	50.2 (2.45)	41.0 (3.0)	35.2 (1.15)	22.9 (1.8)	26.0 (1.6)	8.5 (4.8)	16.3 (2.5)	42.4 (2.9)	36.1 (3.4)	21.5 (5.7)	28.8 (4.25)	39.5 (3.1)	26.5 (4.65)	31.5 (3.9)	38.0 (3.25)	11.8 (10.4)	1.8
25476	104	125	150	40.4 (2.6)	35.1 (2.95)	28.9 (1.2)	19.1 (1.85)	21.5 (1.65)	7.5 (4.7)	13.3 (2.65)	37.7 (2.75)	28.8 (3.6)	17.7 (5.85)	25.5 (4.1)	33.8 (3.1)	21.6 (4.8)	28.1 (3.7)	34.5 (3.0)	9.0 (11.55)	1.95
25477	103	126	150	42.2 (2.5)	36.0 (2.95)	30.0 (1.2)	20.6 (1.75)	22.0 (1.65)	7.7 (4.65)	14.0 (2.55)	37.4 (2.85)	30.0 (3.55)	19.2 (5.5)	24.8 (4.3)	32.4 (3.25)	22.0 (4.8)	28.5 (3.7)	34.0 (3.1)	9.6 (10.8)	2.0
25477	100	122	145	41.2 (2.45)	36.1 (2.75)	29.3 (1.25)	19.8 (1.8)	22.5 (1.6)	7.6 (4.75)	13.9 (2.6)	36.5 (2.75)	30.0 (3.35)	17.5 (5.7)	24.5 (4.1)	33.5 (3.0)	19.2 (5.2)	27.0 (3.7)	34.5 (2.9)	9.4 (10.6)	1.85
25477	98	120	143	40.6 (2.4)	34.7 (2.8)	27.5 (1.25)	18.1 (1.9)	21.1 (1.65)	7.5 (4.6)	13.0 (2.65)	36.2 (2.7)	27.7 (3.55)	18.3 (5.35)	23.0 (4.25)	31.7 (3.1)	20.4 (4.8)	25.0 (3.9)	32.3 (3.05)	8.7 (11.3)	2.1
25477	78	93	121	33.0 (2.4)	28.2 (2.8)	23.0 (1.2)	14.5 (1.95)	15.9 (1.75)	6.3 (4.45)	10.8 (2.6)	30.0 (2.65)	22.4 (3.5)	13.2 (5.95)	19.2 (4.1)	25.7 (3.05)	14.7 (5.35)	20.7 (3.8)	25.6 (3.1)	7.2 (11.0)	1.85
25478	77	95	117	31.5 (2.45)	27.8 (2.75)	22.7 (1.2)	14.2 (1.95)	15.5 (1.8)	6.1 (4.55)	10.0 (2.8)	28.7 (2.7)	21.0 (3.65)	14.0 (5.5)	19.0 (4.05)	25.0 (3.1)	14.3 (5.4)	19.7 (3.9)	24.5 (3.15)	7.0 (11.0)	2.0
25477	75	92	110	32.1 (2.35)	27.6 (2.7)	22.4 (1.25)	15.0 (1.85)	15.8 (1.75)	6.4 (4.3)	10.5 (2.65)	26.0 (2.9)	21.5 (3.5)	13.0 (5.75)	17.4 (4.3)	25.0 (3.0)	14.7 (5.1)	20.1 (3.7)	24.0 (3.1)	7.3 (10.3)	1.8
25477	72	87	108	29.3 (2.45)	25.6 (2.8)	20.5 (1.25)	13.1 (1.95)	14.6 (1.75)	6.0 (4.25)	9.0 (2.85)	27.8 (2.6)	19.6 (3.65)	12.8 (5.6)	17.0 (4.25)	23.0 (3.15)	13.3 (5.4)	19.0 (3.8)	24.7 (3.05)	6.4 (11.2)	2.0
25478	72	87	108	28.9 (2.5)	24.9 (2.9)	20.8 (1.2)	13.4 (1.85)	14.0 (1.8)	5.7 (4.35)	9.2 (2.7)	26.8 (2.7)	20.0 (3.6)	11.8 (6.1)	17.5 (4.1)	21.7 (3.3)	13.8 (5.2)	19.3 (3.7)	22.5 (3.2)	6.4 (11.2)	1.85
25478	69	85	98	29.5 (2.35)	25.9 (2.7)	19.4 (1.35)	12.9 (2.0)	14.3 (1.8)	5.6 (4.65)	9.5 (2.75)	24.7 (2.8)	17.7 (3.9)	12.1 (5.7)	16.0 (4.3)	22.4 (3.1)	13.5 (5.1)	18.3 (3.8)	22.6 (3.05)	6.3 (11.0)	1.9
25476	67	81	97	27.5 (2.45)	23.6 (2.85)	18.5 (1.3)	11.7 (2.0)	13.0 (1.8)	5.6 (4.3)	9.0 (2.65)	24.2 (2.75)	18.5 (3.6)	11.4 (5.85)	16.0 (4.2)	21.3 (3.15)	12.2 (5.45)	16.0 (4.45)	20.0 (3.35)	5.7 (11.7)	2.0
25477	65	82	100	27.6 (2.35)	24.6 (2.65)	19.9 (1.25)	12.5 (1.95)	14.0 (1.75)	5.7 (4.3)	9.0 (2.75)	27.5 (2.7)	18.7 (3.5)	10.5 (6.2)	16.4 (3.95)	24.1 (2.7)	11.8 (5.5)	18.5 (3.5)	21.5 (3.0)	5.8 (11.2)	1.8
25477	65	81	103	27.8 (2.35)	23.6 (2.75)	19.1 (1.25)	12.5 (1.9)	13.8 (1.7)	5.8 (4.1)	8.7 (2.7)	24.9 (2.6)	17.8 (3.65)	11.5 (5.65)	15.0 (4.35)	21.2 (3.05)	11.8 (5.5)	16.5 (3.95)	21.5 (3.0)	6.0 (10.8)	1.9
25477	56	67	82+	24.0 (2.35)	21.0 (2.65)	16.0 (1.2)	10.2 (2.05)	11.6 (1.8)	5.2 (4.05)	7.0 (3.0)	21.8 (2.55)	14.5 (3.85)	9.5 (5.9)	13.6 (4.1)	18.0 (3.1)	9.6 (5.8)	14.0 (4.0)	17.1 (3.25)	5.0 (11.2)	1.9
Range of ratios :				2.35-2.75	2.65-3.1	1.15-1.35	1.7-2.05	1.45-1.8	4.05-5.5	2.5-3.0	2.55-3.65	3.35-3.9	5.3-6.2	3.9-4.55	2.7-3.45	4.65-5.8	3.5-4.45	2.9-3.35	10.3-11.9	1.8-2.25
Average of ratios:				2.45	2.85	1.2	1.85	1.65	4.7	2.7	2.9	3.6	5.7	4.2	3.15	5.1	3.9	3.1	11.05	1.95
Allometric trend :				−	−	=	+	+	−	=	−	=	=	=	=	+	=	=	=	=

Table 5. *Hypostomus gymnorhynchus occidentalis* nov. subspec. — (species no. 5).

Reg. no:	A	B	C	D (A)	E (A)	F (E)	G (E)	H (E)	I (E)	J (E)	K (A)	L (A)	M (A)	N (A)	O (A)	P (A)	O (A)	R (A)	S (A)	S(M)
* 25520	146	?	?	58.0 (2.5)	46.5 (3.1)	39.8 (1.15)	26.5 (1.75)	28.5 (1.65)	9.3 (5.0)	17.3 (2.7)	43.0 (3.4)	39.5 (3.7)	29.0 (5.0)	36.5 (4.0)	45.0 (3.25)	32.0 (4.55)	36.5 (4.0)	46.0 (3.15)	12.7 (11.5)	2.3
25480	70	85	110	29.5 (2.35)	25.2 (2.75)	20.0 (1.25)	12.7 (2.0)	14.5 (1.75)	5.7 (4.4)	9.7 (2.6)	26.1 (2.65)	20.0 (3.5)	13.0 (5.4)	17.5 (4.0)	24.2 (2.9)	13.5 (5.2)	18.3 (3.8)	21.8 (3.2)	6.4 (10.95)	2.0
25479	70	83	106	30.2 (2.3)	25.6 (2.7)	19.7 (1.3)	12.6 (2.05)	14.6 (1.75)	5.8 (4.4)	9.3 (2.75)	27.0 (2.6)	19.4 (3.6)	12.7 (5.5)	16.7 (4.2)	22.8 (3.05)	13.1 (5.3)	18.6 (3.75)	22.7 (3.1)	6.3 (11.05)	2.0
25479	68	84	106	28.1 (2.4)	24.3 (2.8)	19.3 (1.25)	11.6 (2.1)	14.0 (1.75)	5.6 (4.35)	8.8 (2.75)	? (-)	19.2 (3.55)	12.4 (5.5)	18.0 (3.75)	22.7 (3.0)	13.5 (5.0)	18.4 (3.7)	21.6 (3.15)	6.2 (11.0)	2.0
25479	62	75	92+	25.6 (2.4)	22.0 (2.8)	17.6 (1.25)	10.5 (2.1)	12.2 (1.8)	5.2 (4.25)	8.1 (2.75)	17+ (-)	16.5 (3.75)	11.0 (5.6)	15.6 (3.95)	20.0 (3.1)	11.5 (5.4)	15.5 (4.0)	19.8 (3.1)	5.5 (11.2)	2.0
Range of ratios :				2.3-2.5	2.7-3.1	1.15-1.3	1.75-2.1	1.65-1.8	4.25-5.0	2.6-2.75	2.6-3.4	3.5-3.75	5.0-5.6	3.75-4.2	2.9-3.25	4.55-5.4	3.7-4.0	3.1-3.2	10.95-11.5	2.0-2.3
Average of ratios:				2.4	2.85	1.25	2.0	1.75	4.45	2.7	2.9	3.6	5.4	4.0	3.05	5.1	3.85	3.15	11.1	2.05
Allometric trend :				—	—	+	+	+	—	=	—	=	+	=	=	+	=	=	—	+

Table 6. *Hypostomus micromaculatus* nov. spec. — (species no. 6).

Reg. no:	A	B	C	D (A)	E (A)	F (E)	G (E)	H (E)	I (E)	J (E)	K (A)	L (A)	M (A)	N (A)	O (A)	P (A)	O (A)	R (A)	S (A)	S(M)
* 25487	185	220	260	76.5 (2.4)	62.7 (2.95)	60.0 (1.05)	38.6 (1.6)	42.2 (1.5)	10.9 (5.75)	23.4 (2.65)	51.9 (3.55)	53.5 (3.45)	30.5 (6.05)	43.4 (4.25)	65.3 (2.85)	40.4 (4.6)	51.5 (3.6)	55.1 (3.35)	21.6 (8.55)	1.4
25487	165	195	227	69.3 (2.35)	58.4 (2.8)	53.5 (1.1)	36.0 (1.6)	38.4 (1.5)	10.6 (5.5)	22.4 (2.6)	51.2 (3.2)	51.1 (3.2)	27.5 (6.0)	39.5 (4.15)	60.5 (2.75)	36.5 (4.5)	45.0 (3.65)	47.0 (3.5)	19.5 (8.25)	1.4
25483	160	190	225	63.7 (2.5)	54.5 (2.95)	51.8 (1.05)	32.0 (1.7)	34.4 (1.6)	11.0 (4.9)	21.0 (2.6)	53.5 (3.0)	51.0 (3.15)	26.0 (6.15)	41.0 (3.9)	56.5 (2.85)	34.0 (4.7)	41.0 (3.9)	43.0 (3.7)	18.0 (8.9)	1.45
25482	120	145	182	49.0 (2.45)	41.3 (2.9)	37.8 (1.1)	23.1 (1.8)	25.9 (1.6)	8.5 (4.85)	15.5 (2.65)	39.2 (3.0)	37.3 (3.2)	19.0 (6.3)	31.5 (3.8)	42.5 (2.8)	26.0 (4.6)	31.0 (3.85)	33.6 (3.4)	13.0 (9.2)	1.45
25484	82	103	120	34.5 (2.4)	30.0 (2.75)	26.2 (1.15)	15.0 (2.0)	17.6 (1.7)	6.5 (4.6)	10.2 (2.9)	31.4 (2.6)	23.8 (3.45)	11.4 (7.2)	22.5 (3.65)	26.3 (3.1)	17.2 (4.75)	22.5 (3.65)	23.5 (3.5)	8.2 (10.0)	1.4
25484	68	82	99+	27.6 (2.45)	24.2 (2.8)	21.7 (1.1)	12.1 (2.0)	14.0 (1.75)	5.5 (4.4)	8.1 (3.0)	27.4 (2.5)	19.7 (3.45)	9.3 (7.3)	17.2 (3.95)	22.0 (3.1)	14.5 (4.7)	18.5 (3.65)	18.6 (3.65)	6.7 (10.05)	1.4
25485	67	84	98	28.9 (2.35)	24.7 (2.7)	21.5 (1.15)	13.0 (1.9)	14.0 (1.75)	6.0 (4.1)	8.0 (3.1)	26.8 (2.5)	19.0 (3.5)	10.0 (6.7)	17.5 (3.8)	21.0 (3.2)	13.2 (5.05)	17.8 (3.75)	18.6 (3.6)	6.8 (9.8)	1.45
25484	58	73	90	24.9 (2.35)	21.5 (2.7)	18.8 (1.15)	10.3 (2.1)	11.7 (1.85)	5.1 (4.2)	6.9 (3.1)	22.6 (2.55)	16.5 (3.5)	8.0 (7.25)	16.2 (3.6)	19.0 (3.05)	11.6 (5.0)	15.6 (3.7)	16.6 (3.5)	5.7 (10.1)	1.4
25484	53	66	80	24.2 (2.2)	20.0 (2.65)	17.5 (1.15)	9.7 (2.05)	11.9 (1.7)	4.9 (4.1)	6.4 (3.1)	20.7 (2.55)	14.5 (3.65)	7.3 (7.25)	14.0 (3.8)	17.9 (2.95)	11.2 (4.75)	15.2 (3.5)	15.6 (3.4)	5.2 (10.1)	1.4
25486	52	65	73+	24.7 (2.1)	20.6 (2.5)	17.8 (1.15)	10.4 (2.0)	11.8 (1.75)	5.1 (4.05)	6.9 (3.0)	19.7 (2.65)	14.9 (3.5)	7.4 (7.0)	15.0 (3.45)	17.6 (2.95)	11.3 (4.6)	14.9 (3.5)	15.8 (3.3)	5.3 (9.8)	1.4
25486	51.5	65	69+	22.7 (2.25)	19.5 (2.65)	15.4 (1.25)	8.7 (2.25)	10.4 (1.85)	4.7 (4.15)	6.1 (3.2)	14+ (-)	14.1 (3.4)	7.1 (7.25)	13.6 (3.8)	16.3 (3.15)	9.8 (5.25)	13.8 (4.0)	14.8 (3.5)	5.1 (10.05)	1.4
25486	47	58	66	19.6 (2.4)	17.0 (2.75)	14.1 (1.2)	8.4 (2.05)	9.5 (1.8)	4.1 (4.15)	5.5 (3.1)	17.3 (2.7)	12.9 (3.65)	6.5 (7.2)	12.8 (3.65)	15.0 (3.15)	9.3 (5.05)	11.3 (4.15)	12.6 (3.7)	4.6 (10.1)	1.4
25485	45	55	64	19.0 (2.35)	16.5 (2.7)	13.9 (1.2)	7.6 (2.15)	9.0 (1.85)	3.7 (4.45)	5.0 (3.3)	14.7 (3.05)	12.4 (3.6)	6.2 (7.25)	11.8 (3.8)	13.0 (3.45)	9.0 (5.0)	11.2 (4.0)	12.2 (3.65)	4.3 (10.45)	1.45
25486	45	56	63	18.3 (2.45)	17.0 (2.65)	14.4 (1.2)	8.2 (2.05)	9.6 (1.8)	3.9 (4.35)	5.5 (3.1)	14.2 (3.15)	12.8 (3.5)	6.6 (6.8)	11.5 (3.9)	11.5+ (-)	8.7 (5.2)	12.5 (3.6)	13.3 (3.4)	4.5 (10.0)	1.45
25486	42	53	60	17.7 (2.35)	16.2 (2.6)	13.5 (1.2)	7.7 (2.1)	9.0 (1.8)	3.7 (4.35)	5.3 (3.05)	? (-)	11.0 (3.8)	5.9 (7.1)	11.0 (3.8)	11.0+ (-)	8.5 (4.85)	11.5 (3.65)	12.0 (3.5)	4.0 (10.5)	1.45
25486	38	50	55+	16.8 (2.25)	15.2 (2.5)	12.5 (1.2)	7.2 (2.1)	8.4 (1.8)	3.6 (4.2)	4.8 (3.15)	12.4 (3.05)	11.5 (3.3)	5.2 (7.3)	11.0 (3.45)	12.2 (3.1)	8.3 (4.55)	9.5 (4.0)	10.0 (3.8)	3.7 (10.3)	1.4
25486	26	33	35	11.7 (2.2)	11.2 (2.3)	8.0 (1.4)	5.4 (2.1)	5.7 (1.95)	3.5 (3.2)	3.8 (2.95)	8.0 (3.25)	6.2 (4.2)	3.5 (7.4)	-	-	-	-	-	2.5 (10.4)	1.4
25486	25	31	33	10.5 (2.4)	10.1 (2.5)	7.0 (1.45)	4.1 (2.45)	5.1 (2.0)	3.2 (3.15)	3.3 (3.05)	8.3 (3.0)	5.6 (4.45)	-	-	-	-	-	-	-	-
Range of ratios :				2.1-2.5	2.3-2.95	1.05-1.45	1.6-2.45	1.5-2.0	3.15-5.75	2.6-3.3	2.5-3.55	3.15-4.45	6.0-7.4	3.45-4.25	2.75-3.45	4.5-5.25	3.5-4.15	3.3-3.8	8.25-10.5	1.4-1.45
Average of ratios:				2.35	2.7	1.2	2.0	1.75	4.4	3.0	2.9	3.55	6.9	3.8	3.05	4.8	3.75	3.55	9.8	1.4
Allometric trend :				—	—	+	+	+	—	+	=	+	+	—	+	+	+	=	+	=

Table 7. *Hypostomus paucimaculatus* nov. spec. — (species no. 7).

Reg. no:	A	B	C	D (A)	E (A)	F (E)	G (E)	H (E)	I (E)	J (E)	K (A)	L (A)	M (A)	N (A)	O (A)	P (A)	O (A)	R (A)	S (A)	S(M)
* 25468	120	145	177	47.5 (2.5)	39.4 (3.05)	38.6 (1.0)	23.8 (1.65)	25.2 (1.55)	8.4 (4.65)	15.6 (2.5)	44.6 (2.7)	36.4 (3.3)	17.7 (6.75)	30.0 (4.0)	40.6 (2.95)	25.7 (4.65)	30.6 (3.9)	38.6 (3.1)	12.7 (9.4)	1.4
25469	57	72	?	23.4 (2.45)	20.6 (2.75)	19.1 (1.1)	10.7 (1.9)	10.9 (1.9)	5.0 (4.1)	7.7 (2.7)	21.1 (2.7)	15.8 (3.6)	9.0 (6.3)	14.0 (3.8)	19.4 (2.9)	12.8 (4.45)	14.8 (3.85)	17.3 (3.3)	6.4 (8.9)	1.4
25469	53	65	81	23.0 (2.3)	19.3 (2.75)	17.5 (1.1)	10.3 (1.9)	10.8 (1.8)	4.7 (4.1)	6.8 (2.85)	19.3 (2.75)	15.0 (3.5	8.5 (6.25)	13.4 (3.95)	18.5 (2.85)	11.7 (4.5)	14.0 (3.8)	16.6 (3.2)	6.0 (8.8)	1.4
25518	31	?	42+	14.3 (2.15)	12.0 (2.6)	9.8 (1.2)	5.4 (2.2)	6.4 (1.85)	2.9 (4.1)	4.0 (3.0)	-	-	-	-	-	-	-	-	-	1.35
Range of ratios :				2.15-2.5	2.6-3.05	1.0-1.2	1.65-2.2	1.55-1.9	4.1-4.65	2.5-3.0	2.7-2.75	3.3-3.6	6.25-6.75	3.8-4.0	2.85-2.95	4.45-4.65	3.8-3.9	3.1-3.3	8.8-9.4	1.35-1.4
Average of ratios:				2.35	2.8	1.1	1.9	1.8	4.25	2.75	2.7	3.45	6.45	3.9	2.9	4.55	3.85	3.2	9.0	1.4
Allometric trend :				—	—	+	+	+	—	+	=	+	—	=	=	—	=	=	—	=

Table 8. *Hypostomus pseudohemiurus* nov. spec. — (species no. 8).

Reg. no:	A	B	C	D (A)	E (A)	F (E)	G (E)	H (E)	I (E)	J (E)	K (A)	L (A)	M (A)	N (A)	O (A)	P (A)	Q (A)	R (A)	S (A)	S(M)
* 25516	62	75	90	25.1 (2.45)	23.0 (2.7)	19.5 (1.2)	11.2 (2.05)	14.0 (1.65)	4.8 (4.75)	7.3 (3.15)	21.8 (2.85)	19.0 (3.25)	8.7 (7.15)	16.3 (3.8)	19.5 (3.2)	12.7 (4.9)	16.8 (3.75)	17.1 (3.65)	6.1 (10.15)	1.35
25516	53	65	78	22.3 (2.4)	20.1 (2.65)	16.8 (1.2)	9.6 (2.1)	11.5 (1.75)	4.4 (4.55)	6.1 (3.3)	18.8 (2.8)	15.3 (3.45)	7.8 (6.8)	13.5 (3.95)	16.8 (3.15)	10.8 (4.9)	14.2 (3.75)	14.6 (3.65)	5.3 (10.0)	1.45
25517	53	65	71+	23.0 (2.3)	20.5 (2.6)	16.9 (1.2)	9.8 (2.1)	12.1 (1.7)	4.5 (4.55)	6.1 (3.35)	19.7 (2.7)	14.7 (3.6)	8.0 (6.6)	12.4 (4.25)	17.0 (3.1)	10.7 (4.95)	13.5 (3.9)	14.7 (3.6)	5.5 (9.65)	1.45
25517	52	64	75+	22.0 (2.35)	19.6 (2.65)	16.1 (1.2)	9.3 (2.1)	11.4 (1.7)	4.2 (4.65)	6.1 (3.2)	17.4 (3.0)	15.2 (3.4)	7.3 (7.1)	12.4 (4.2)	16.0 (3.25)	10.7 (4.85)	13.6 (3.8)	14.8 (3.5)	5.0 (10.4)	1.45
25517	51	61	68+	22.0 (2.3)	19.3 (2.65)	15.6 (1.25)	9.2 (2.1)	11.2 (1.7)	4.1 (4.7)	6.0 (3.2)	18.0 (2.85)	13.1 (3.9)	7.8 (6.5)	11.8 (4.3)	15.5 (3.3)	10.4 (4.9)	13.5 (3.8)	14.5 (3.5)	5.2 (9.8)	1.5
25517	51	61	68+	22.0 (2.3)	19.7 (2.6)	16.7 (1.2)	9.5 (2.1)	11.5 (1.7)	4.3 (4.6)	6.1 (3.2)	18.4 (2.75)	13.2 (3.85)	7.7 (6.6)	12.0 (4.25)	15.7 (3.25)	10.2 (5.0)	13.1 (3.9)	14.4 (3.55)	5.4 (9.45)	1.45
25516	50	59	70	20.5 (2.45)	18.7 (2.7)	15.6 (1.2)	9.1 (2.05)	10.6 (1.75)	4.1 (4.55)	5.9 (3.15)	15.8 (3.15)	13.5 (3.7)	6.9 (7.25)	12.1 (4.15)	15.1 (3.3)	10.3 (4.85)	12.8 (3.9)	13.8 (3.6)	4.9 (10.2)	1.4
25516	50	60	70	20.8 (2.4)	18.9 (2.65)	15.8 (1.2)	8.9 (2.1)	10.8 (1.75)	4.1 (4.6)	6.1 (3.1)	17.0 (2.95)	13.1 (3.8)	6.9 (7.25)	12.1 (4.15)	14.9 (3.35)	10.4 (4.8)	12.7 (3.95)	14.0 (3.55)	5.1 (9.8)	1.35
25516	50	61	72	21.2 (2.35)	19.1 (2.6)	16.1 (1.2)	9.1 (2.1)	10.9 (1.75)	4.2 (4.55)	6.1 (3.1)	? (-)	13.6 (3.65)	7.1 (7.1)	12.2 (4.1)	14.8 (3.4)	10.4 (4.8)	13.4 (3.75)	13.9 (3.6)	5.1 (9.8)	1.4
25516	49	59	70	20.4 (2.4)	18.7 (2.65)	15.5 (1.2)	8.8 (2.1)	10.7 (1.75)	4.1 (4.55)	5.9 (3.15)	15.5 (3.15)	13.5 (3.65)	6.6 (7.4)	11.9 (4.1)	14.5 (3.4)	10.2 (4.8)	12.7 (3.85)	13.8 (3.55)	4.9 (10.0)	1.35
25516	49	59	69	20.1 (2.45)	18.3 (2.7)	15.1 (1.2)	8.6 (2.1)	10.2 (1.8)	4.2 (4.35)	5.9 (3.1)	? (-)	13.4 (3.65)	7.0 (7.0)	12.0 (4.1)	14.7 (3.35)	10.3 (4.75)	12.6 (3.9)	13.9 (3.55)	5.0 (9.75)	1.4
25517	49	60	67+	20.8 (2.35)	19.0 (2.6)	15.2 (1.25)	8.6 (2.2)	10.6 (1.8)	4.2 (4.5)	5.8 (3.3)	15.3 (3.2)	13.5 (3.65)	7.5 (6.5)	11.8 (4.15)	15.2 (3.25)	10.2 (4.8)	12.6 (3.9)	14.2 (3.45)	4.9 (10.0)	1.5
25517	47	57	68	19.7 (2.4)	18.0 (2.6)	14.2 (1.25)	8.5 (2.1)	10.1 (1.8)	3.9 (4.6)	5.6 (3.2)	14.7 (3.2)	12.7 (3.7)	6.6 (7.1)	11.7 (4.0)	14.2 (3.3)	10.0 (4.7)	12.2 (3.85)	13.1 (3.6)	4.7 (10.0)	1.4
25517	47	57	64+	19.6 (2.4)	18.3 (2.6)	14.6 (1.25)	8.4 (2.15)	10.2 (1.8)	3.8 (4.8)	5.7 (3.2)	? (-)	12.7 (3.7)	6.2 (7.7)	11.5 (4.1)	14.0 (3.35)	10.0 (4.7)	12.1 (3.9)	13.1 (3.6)	4.6 (10.2)	1.35
25516	45	53	63	19.2 (2.35)	17.3 (2.6)	14.4 (1.2)	8.1 (2.15)	9.7 (1.8)	3.5 (4.9)	5.6 (3.1)	? (-)	12.2 (3.7)	6.2 (7.35)	11.4 (3.95)	12.6 (3.55)	9.4 (4.8)	10.8 (4.15)	11.8 (3.8)	4.3 (10.45)	1.45
25516	44	52	61+	18.9 (2.35)	17.0 (2.6)	13.6 (1.25)	8.0 (2.1)	9.5 (1.8)	3.5 (4.85)	5.5 (3.1)	14.1 (3.1)	12.1 (3.65)	5.9 (7.4)	11.3 (3.9)	12.3 (3.6)	9.3 (4.8)	10.6 (4.15)	11.2 (3.9)	4.3 (10.2)	1.35
25516	37	45	52+	16.0 (2.3)	15.0 (2.45)	11.7 (1.2)	6.7 (2.25)	8.2 (1.85)	3.2 (4.7)	4.5 (3.35)	10.4 (3.55)	9.2 (4.0)	5.3 (7.0)	9.5 (3.9)	10.4 (3.55)	7.8 (4.75)	9.1 (4.05)	10.0 (3.7)	3.7 (10.0)	1.45
25516	37	46	54+	16.2 (2.3)	15.4 (2.4)	11.7 (1.3)	6.5 (2.35)	8.0 (1.9)	3.2 (4.8)	4.6 (3.35)	10.9 (3.4)	9.2 (4.0)	5.2 (7.1)	9.6 (3.85)	10.3 (3.6)	7.5 (4.9)	9.5 (3.9)	10.5 (3.55)	3.5 (10.55)	1.45
25516	36	45	54	17.2 (2.1)	15.2 (2.35)	11.6 (1.3)	6.6 (2.3)	8.5 (1.8)	3.2 (4.75)	4.6 (3.3)	11.6 (3.1)	9.3 (3.85)	5.1 (7.05)	9.0 (4.0)	11.0 (3.3)	7.7 (4.65)	9.0 (4.0)	10.1 (3.55)	3.6 (10.0)	1.4
25516	35	43	50	15.6 (2.25)	14.1 (2.5)	11.1 (1.3)	6.2 (2.3)	7.8 (1.8)	3.0 (4.75)	4.3 (3.3)	10.5 (3.35)	9.0 (3.9)	4.9 (7.15)	8.7 (4.05)	9.7 (3.6)	7.4 (4.75)	9.0 (3.9)	9.8 (3.6)	3.4 (10.3)	1.45
Range of ratios :				2.1-2.45	2.35-2.7	1.2-1.3	2.05-2.35	1.65-1.9	4.35-4.9	3.1-3.35	2.7-3.55	3.25-4.0	6.5-7.7	3.8-4.3	3.1-3.6	4.65-5.0	3.75-4.15	3.45-3.9	9.45-10.55	1.35-1.5
Average of ratios:				2.35	2.6	1.25	2.15	1.75	4.65	3.2	3.05	3.7	7.05	4.05	3.35	4.8	3.9	3.6	10.05	1.4
Allometric trend :				−	−	+	+	+	=	=	+	+	=	=	+	=	+	=	=	=

Table 9. *Hypostomus pseudohemiurus macrophthalmus* nov. subspec. — (species no. 9).

Reg. no:	A	B	C	D (A)	E (A)	F (E)	G (E)	H (E)	I (E)	J (E)	K (A)	L (A)	M (A)	N (A)	O (A)	P (A)	O (A)	R (A)	S (A)	S(M)
25514	72	91	107	29.8 (2.4)	25.6 (2.8)	22.7 (1.15)	13.0 (2.0)	14.5 (1.75)	6.5 (3.95)	8.2 (3.1)	28.7 (2.5)	21.1 (3.4)	11.2 (6.4)	17.0 (4.2)	24.7 (2.9)	15.6 (4.6)	21.6 (3.3)	22.8 (3.15)	7.3 (9.9)	1.55
25513	70	88	110	30.0 (2.35)	25.8 (2.7)	22.9 (1.15)	12.8 (2.0)	14.9 (1.75)	6.6 (3.9)	8.0 (3.2)	30.0 (2.35)	21.9 (3.2)	11.3 (6.2)	17.6 (4.0)	25.9 (2.7)	15.0 (4.65)	21.8 (3.2)	20.8 (3.35)	7.3 (9.6)	1.5
25514	66	81	105	28.0 (2.35)	24.5 (2.7)	20.5 (1.2)	12.3 (2.0)	14.3 (1.7)	6.1 (4.0)	7.7 (3.2)	? (-)	19.6 (3.35)	10.3 (6.4)	15.9 (4.15)	23.0 (2.85)	13.5 (4.9)	20.0 (3.3)	20.7 (3.2)	6.6 (10.0)	1.55
* 25514	65	79	97	27.0 (2.4)	23.4 (2.8)	20.0 (1.15)	11.1 (2.1)	12.9 (1.8)	6.0 (3.9)	7.7 (3.05)	26.4 (2.45)	19.5 (3.35)	10.0 (6.5)	15.2 (4.25)	21.7 (3.0)	13.3 (4.9)	18.7 (3.5)	20.5 (3.15)	6.4 (10.15)	1.55
25514	63	78	97	26.8 (2.35)	23.1 (2.7)	19.9 (1.15)	11.1 (2.1)	12.8 (1.8)	5.9 (3.9)	7.5 (3.1)	26.1 (2.4)	18.6 (3.4)	9.9 (6.35)	15.7 (4.0)	21.7 (2.9)	12.9 (4.9)	17.8 (3.55)	18.5 (3.4)	6.4 (9.85)	1.55
25514	62	77	95	25.8 (2.3)	23.0 (2.7)	20.0 (1.15)	10.9 (2.1)	12.8 (1.8)	6.0 (3.85)	7.2 (3.2)	24.6 (2.5)	19.0 (3.25)	10.0 (6.2)	15.5 (4.0)	20.6 (3.0)	12.8 (4.85)	? (-)	18.6 (3.35)	6.4 (9.65)	1.55
25514	60	71	84	24.6 (2.45)	22.0 (2.75)	18.5 (1.2)	10.2 (2.15)	12.4 (1.8)	5.6 (3.9)	6.8 (3.25)	24.2 (2.5)	16.7 (3.6)	9.6 (6.2)	15.2 (3.95)	19.0 (3.15)	12.2 (4.9)	16.8 (3.6)	18.1 (3.3)	6.0 (10.0)	1.6
25513	60	75	98	24.8 (2.4)	22.4 (2.7)	18.8 (1.2)	10.5 (2.15)	12.4 (1.8)	5.6 (4.0)	7.2 (3.1)	25.6 (2.35)	16.9 (3.55)	9.1 (6.6)	14.6 (4.1)	20.2 (2.95)	12.3 (4.85)	17.5 (3.4)	17.5 (3.4)	6.0 (10.0)	1.5
25513	59	72	83	24.6 (2.4)	22.2 (2.65)	18.4 (1.2)	10.4 (2.15)	12.0 (1.85)	5.7 (3.9)	7.2 (3.1)	23.6 (2.5)	16.0 (3.65)	8.7 (6.8)	14.6 (4.05)	19.1 (3.1)	11.7 (5.05)	16.9 (3.5)	17.0 (3.45)	5.8 (10.05)	1.5
25513	57	70	80+	22.8 (2.5)	20.5 (2.8)	17.5 (1.2)	10.3 (2.0)	11.3 (1.8)	5.5 (3.75)	6.9 (2.95)	24.0 (2.4)	15.6 (3.65)	8.3 (6.85)	14.2 (4.0)	19.2 (3.0)	11.7 (4.9)	16.7 (3.4)	16.7 (3.4)	5.5 (10.35)	1.5
25513	53	66	74	21.2 (2.5)	18.9 (2.8)	16.0 (1.2)	9.2 (2.05)	10.3 (1.85)	5.2 (3.65)	6.1 (3.1)	18.2 (2.9)	14.6 (3.65)	7.7 (6.9)	13.1 (4.05)	16.0 (3.3)	11.2 (4.7)	14.3 (3.7)	15.0 (3.55)	4.9 (10.8)	1.55
25513	52	64	71	20.9 (2.5)	18.9 (2.6)	16.0 (1.2)	9.1 (2.1)	9.8 (1.9)	5.0 (3.75)	5.8 (3.25)	17.4 (3.0)	13.8 (3.75)	8.0 (6.5)	12.9 (4.05)	15.3 (3.4)	10.7 (4.85)	14.0 (3.7)	14.5 (3.6)	5.0 (10.4)	1.6
25514	52	62	75	20.4 (2.55)	18.5 (2.65)	15.9 (1.15)	9.0 (2.05)	9.8 (1.9)	5.0 (3.7)	5.9 (3.1)	18.1 (2.85)	13.4 (3.85)	7.7 (6.75)	13.1 (3.95)	16.5 (3.15)	10.5 (4.95)	14.5 (3.6)	15.0 (3.45)	5.0 (10.4)	1.55
25513	48	58	65	19.0 (2.5)	16.9 (2.85)	14.0 (1.2)	7.8 (2.15)	8.7 (1.95)	4.5 (3.75)	5.5 (3.05)	? (-)	11.8 (4.05)	7.3 (6.6)	12.0 (4.0)	13.8 (3.45)	9.6 (5.0)	12.3 (3.9)	13.1 (3.65)	4.7 (10.2)	1.55
25514	48	57	71	20.0 (2.4)	16.7 (2.85)	15.1 (1.1)	8.1 (2.05)	8.9 (1.9)	4.5 (3.7)	5.5 (3.05)	? (-)	12.2 (3.9)	7.2 (6.65)	12.0 (4.0)	15.0 (3.2)	9.4 (5.1)	? (-)	13.5 (3.55)	4.8 (10.0)	1.5
25515	48	57	70	19.7 (2.45)	17.5 (2.75)	15.1 (1.15)	8.0 (2.2)	9.3 (1.9)	4.7 (3.7)	5.6 (3.1)	16.1 (3.0)	12.5 (3.85)	6.8 (7.05)	12.2 (3.95)	14.1 (3.4)	9.3 (5.15)	12.4 (3.85)	12.9 (3.7)	4.5 (10.65)	1.5
25514	46	55	67	19.2 (2.4)	17.3 (2.65)	14.8 (1.15)	8.1 (2.15)	9.0 (1.9)	4.7 (3.7)	5.4 (3.2)	16.7 (2.75)	12.4 (3.7)	6.9 (6.65)	11.5 (4.0)	15.2 (3.0)	9.0 (5.1)	12.7 (3.6)	13.0 (3.55)	4.4 (10.4)	1.55
25513	45	54	62	18.0 (2.5)	16.4 (2.75)	13.6 (1.2)	7.7 (2.15)	8.7 (1.9)	4.1 (4.0)	5.0 (3.25)	15.1 (2.95)	11.6 (3.85)	6.2 (7.25)	11.0 (4.1)	13.5 (3.3)	9.0 (5.0)	12.5 (3.6)	12.8 (3.5)	4.1 (10.95)	1.5
25514	44	54	65	18.3 (2.4)	16.5 (2.65)	13.9 (1.2)	7.4 (2.25)	8.5 (1.95)	4.4 (3.75)	5.0 (3.3)	15.0 (2.95)	10.5 (4.2)	6.6 (6.65)	11.4 (3.85)	14.0 (3.15)	8.6 (5.1)	11.5 (3.8)	12.3 (3.55)	4.3 (10.2)	1.55
25514	39	47	55	17.4 (2.25)	15.9 (2.45)	12.5 (1.25)	6.8 (2.35)	8.0 (2.0)	4.2 (3.8)	4.7 (3.4)	12.1 (3.2)	9.4 (4.15)	5.7 (6.85)	9.0 (4.3)	12.1 (3.2)	7.9 (4.9)	10.5 (3.7)	11.1 (3.5)	3.6 (10.8)	1.55
Range of ratios :				2.25-2.55	2.45-2.85	1.1-1.25	2.0-2.35	1.7-2.0	3.65-4.0	2.95-3.4	2.35-3.2	3.2-4.2	6.2-7.25	3.85-4.3	2.7-3.45	4.6-5.15	3.2-3.9	3.15-3.7	9.6-10.95	1.5-1.6
Average of ratios:				2.4	2.7	1.2	2.1	1.85	3.85	3.15	2.7	3.65	6.6	4.05	3.1	4.9	3.5	3.45	10.2	1.55
Allometric trend :				=	−	+	+	+	−	+	+	+	+	=	+	+	+	+	+	=

Table 10. *Hypostomus saramaccensis* nov. spec. — (species no. 10).

Reg. no:	A	B	C	D (A)	E (A)	F (E)	G (E)	H (E)	I (E)	J (E)	K (A)	L (A)	M (A)	N (A)	O (A)	P (A)	O (A)	R (A)	S (A)	S(M)
* 25488	115	140	172	45.9 (2.5)	38.8 (2.95)	36.8 (1.05)	21.0 (1.85)	24.2 (1.6)	8.2 (4.7)	14.2 (2.75)	40.2 (2.85)	32.8 (3.5)	16.9 (6.8)	30.7 (3.75)	40.0 (2.9)	23.9 (4.8)	32.7 (3.5)	33.1 (3.45)	12.0 (9.6)	1.4
25488	105	128	143	42.3 (2.5)	35.9 (2.9)	33.5 (1.05)	19.6 (1.85)	22.4 (1.6)	7.7 (4.65)	12.5 (2.85)	40.6 (2.6)	32.3 (3.25)	15.7 (6.7)	27.7 (3.8)	36.5 (2.9)	23.3 (4.5)	28.8 (3.65)	28.8 (3.65)	11.1 (9.4)	1.4
25488	85	105	128	35.3 (2.4)	30.6 (2.8)	28.2 (1.1)	15.8 (1.95)	18.2 (1.7)	6.8 (4.5)	11.3 (2.7)	33.8 (2.5)	26.8 (3.2)	12.6 (6.75)	24.3 (3.5)	30.6 (2.8)	17.4 (4.9)	24.1 (3.5)	24.1 (3.5)	9.0 (9.4)	1.4
25488	76	94	114	30.1 (2.5)	26.2 (2.9)	24.0 (1.1)	13.3 (1.95)	15.0 (1.75)	6.1 (4.3)	8.8 (2.95)	29.0 (2.6)	22.1 (3.4)	11.3 (6.7)	19.9 (3.8)	25.8 (2.95)	16.0 (4.75)	21.0 (3.6)	21.2 (3.6)	8.0 (9.5)	1.4
25488	73	91	107	29.8 (2.45)	26.2 (2.8)	23.5 (1.15)	13.2 (2.05)	16.5 (1.65)	6.1 (4.45)	9.1 (3.0)	28.4 (2.6)	21.5 (3.4)	11.0 (6.65)	19.5 (3.75)	25.1 (2.9)	15.6 (4.7)	20.0 (3.65)	20.0 (3.65)	7.7 (9.5)	1.4
25488	70	85	103	28.3 (2.5)	24.9 (2.8)	22.1 (1.1)	12.2 (2.05)	13.7 (1.8)	6.1 (4.1)	7.9 (3.15)	26.3 (2.65)	20.1 (3.45)	10.2 (6.85)	17.6 (3.95)	23.0 (3.05)	14.2 (4.9)	20.3 (3.45)	20.3 (3.45)	7.3 (9.6)	1.4
25488	70	85	100	27.8 (2.5)	24.5 (2.85)	21.5 (1.15)	11.9 (2.05)	14.7 (1.65)	5.9 (4.15)	8.3 (2.95)	25.9 (2.7)	19.6 (3.55)	10.1 (6.9)	17.2 (4.05)	23.1 (3.0)	14.4 (4.85)	17.8 (3.9)	19.2 (3.65)	7.0 (10.0)	1.45
25488	67	83	102	28.7 (2.35)	23.9 (2.8)	21.6 (1.1)	12.0 (2.0)	14.0 (1.7)	5.8 (4.1)	8.2 (2.9)	25.1 (2.65)	19.7 (3.4)	10.4 (6.45)	17.5 (3.85)	22.2 (3.0)	15.1 (4.45)	19.0 (3.5)	19.2 (3.5)	7.2 (9.3)	1.45
25488	67	80	97	28.0 (2.4)	25.0 (2.7)	23.0 (1.1)	12.2 (2.05)	14.1 (1.8)	6.0 (4.2)	8.2 (3.05)	23.6 (2.85)	21.0 (3.2)	9.7 (6.9)	17.6 (3.8)	23.8 (2.8)	13.8 (4.9)	20.0 (3.35)	20.0 (3.35)	7.0 (9.6)	1.4
25488	65	78	95	27.0 (2.4)	23.1 (2.8)	20.4 (1.15)	11.7 (2.0)	13.9 (1.65)	5.4 (4.25)	7.8 (2.95)	23.2 (2.8)	19.0 (3.4)	9.4 (6.9)	16.9 (3.85)	22.0 (2.95)	12.8 (5.1)	18.1 (3.6)	18.2 (3.6)	6.7 (9.7)	1.4
25488	62	76	91+	26.2 (2.35)	22.5 (2.75)	20.0 (1.1)	11.4 (2.0)	12.7 (1.8)	5.3 (4.25)	7.7 (2.95)	25.2 (2.45)	17.8 (3.5)	9.2 (6.8)	16.1 (3.85)	21.0 (2.95)	13.0 (4.75)	18.1 (3.4)	18.1 (3.4)	6.4 (9.7)	1.4
25488	62	75	93	26.0 (2.4)	22.2 (2.8)	20.0 (1.1)	11.4 (1.95)	12.6 (1.75)	5.5 (4.05)	7.4 (3.0)	25.0 (2.45)	18.1 (3.4)	9.3 (6.8)	15.2 (4.05)	22.1 (2.8)	12.5 (4.95)	18.2 (3.4)	18.3 (3.4)	6.5 (9.5)	1.4
25488	60	72	88	24.6 (2.45)	21.8 (2.75)	18.4 (1.2)	11.1 (1.95)	12.0 (1.8)	5.2 (4.2)	7.1 (3.05)	22.6 (2.65)	16.5 (3.6)	8.8 (6.8)	14.4 (4.15)	19.1 (3.15)	12.2 (4.9)	16.1 (3.7)	16.1 (3.7)	6.1 (9.8)	1.45
25488	58	71	87	23.3 (2.5)	20.5 (2.8)	18.7 (1.1)	10.2 (2.0)	11.3 (1.8)	5.0 (4.1)	6.9 (3.0)	22.0 (2.65)	17.2 (3.4)	8.9 (6.5)	14.1 (4.1)	18.7 (3.1)	12.4 (4.7)	16.2 (3.6)	16.5 (3.5)	6.2 (9.35)	1.4
25488	57	70	85	24.3 (2.35)	21.5 (2.65)	17.5 (1.2)	10.0 (2.15)	12.0 (1.8)	5.1 (4.2)	6.9 (3.1)	20.5 (2.75)	15.3 (3.7)	8.3 (6.85)	14.0 (4.1)	17.7 (3.2)	12.0 (4.75)	15.2 (3.75)	15.4 (3.7)	5.7 (10.0)	1.45
25488	55	68	83	22.7 (2.4)	20.3 (2.7)	17.1 (1.15)	9.8 (2.1)	10.8 (1.9)	4.9 (4.15)	6.5 (3.1)	20.8 (2.65)	15.1 (3.6)	8.4 (6.5)	13.7 (4.0)	18.1 (3.05)	10.3 (5.3)	15.1 (3.6)	15.6 (3.5)	5.7 (9.65)	1.45
25488	50	60	70	20.6 (2.4)	18.2 (2.75)	15.5 (1.15)	8.7 (2.1)	9.5 (1.9)	4.7 (3.85)	6.3 (2.9)	17.0 (2.95)	13.2 (3.8)	7.2 (6.9)	11.3 (4.4)	16.0 (3.1)	10.0 (5.0)	13.3 (3.75)	13.4 (3.7)	4.9 (10.2)	1.45
25488	49	58	69	20.9 (2.35)	18.2 (2.7)	15.0 (1.2)	8.3 (2.2)	9.7 (1.9)	4.6 (3.95)	5.5 (3.3)	16.5 (2.95)	12.6 (3.9)	7.1 (6.9)	11.5 (4.25)	15.2 (3.2)	9.6 (5.1)	13.0 (3.75)	13.3 (3.7)	4.9 (10.0)	1.45
25488	48	57	69	20.1 (2.4)	17.1 (2.8)	14.7 (1.15)	7.6 (2.25)	9.1 (1.9)	4.7 (3.65)	5.2 (3.3)	? (-)	12.3 (3.9)	6.7 (7.15)	11.2 (4.3)	14.5 (3.3)	9.8 (4.9)	12.5 (3.85)	12.8 (3.75)	4.6 (10.4)	1.45
25488	45	54	64+	18.4 (2.45)	16.6 (2.7)	13.3 (1.25)	7.7 (2.15)	8.8 (1.9)	4.5 (3.7)	5.2 (3.2)	14.0 (3.2)	12.0 (3.75)	6.6 (6.8)	11.0 (4.1)	14.5 (3.1)	8.7 (5.2)	12.6 (3.6)	12.9 (3.5)	4.5 (10.0)	1.45
Range of ratios :				2.35-2.5	2.65-2.95	1.05-1.25	1.85-2.25	1.6-1.9	3.65-4.7	2.7-3.3	2.45-3.2	3.2-3.9	6.45-7.15	3.5-4.4	2.8-3.3	4.45-5.3	3.35-3.9	3.35-3.75	9.3-10.4	1.4-1.45
Average of ratios:				2.45	2.8	1.15	2.05	1.75	4.2	3.0	2.7	3.5	6.8	3.95	3.0	4.85	3.6	3.55	9.7	1.4
Allometric trend :				−	−	+	+	+	−	+	+	+	=	+	+	+	+	+	+	−

Table 11. *Hypostomus sipaliwinii* nov. spec. — (species no. 11).

Reg. no:	A	B	C	D (A)	E (A)	F (E)	G (E)	H (E)	I (E)	J (E)	K (A)	L (A)	M (A)	N (A)	O (A)	P (A)	Q (A)	R (A)	S (A)	S(M)
* 25481	126	155	192	48.1 (2.65)	40.4 (3.1)	36.0 (1.1)	23.5 (1.7)	25.2 (1.6)	8.1 (4.95)	16.2 (2.5)	52.5 (2.4)	34.1 (3.7)	25.3 (5.0)	30.7 (4.15)	42.0 (3.1)	26.4 (4.8)	34.6 (3.65)	38.7 (3.25)	11.4 (10.15)	2.2
25481	83	105	135	34.3 (2.45)	29.7 (2.8)	24.6 (1.2)	16.0 (1.85)	17.1 (1.75)	6.9 (4.3)	11.2 (2.65)	34.4 (2.4)	23.8 (3.5)	16.0 (5.2)	22.5 (3.7)	28.5 (2.9)	16.9 (4.9)	22.3 (3.7)	25.4 (3.25)	7.6 (10.9)	2.1
Range of ratios :				2.45-2.65	2.8-3.1	1.1-1.2	1.7-1.85	1.6-1.75	4.3-4.95	2.5-2.65	2.4	3.5-3.7	5.0-5.2	3.7-4.15	2.9-3.1	4.8-4.9	3.65-3.7	3.25	10.15-10.9	2.1-2.2
Average of ratios:				2.55	2.95	1.15	1.8	1.7	4.65	2.6	2.4	3.6	5.1	3.95	3.0	4.85	3.7	3.25	10.5	2.15
Allometric trend :				−	−	+	+	+	−	+	=	−	+	−	−	=	=	=	+	=

Table 12. *Hypostomus ventromaculatus* nov. spec. — (species no. 14).

Reg. no:	A	B	C	D (A)	E (A)	F (E)	G (E)	H (E)	I (E)	J (E)	K (A)	L (A)	M (A)	N (A)	O (A)	P (A)	O (A)	R (A)	S (A)	S(M)
* 25507	150	180	210	60.1 (2.5)	48.0 (3.1)	47.7 (1.0)	29.6 (1.6)	28.8 (1.65)	8.6 (5.6)	19.7 (2.45)	51.7 (2.9)	42.5 (3.5)	24.8 (6.05)	34.0 (4.4)	55.5 (2.7)	29.6 (5.1)	41.2 (3.65)	43.5 (3.45)	15.5 (9.7)	1.6
25505	130	165	210	54.8 (2.4)	45.7 (2.85)	44.8 (1.0)	28.2 (1.6)	26.9 (1.7)	8.3 (5.5)	18.6 (2.45)	52.8 (2.45)	38.9 (3.35)	21.9 (5.95)	32.0 (4.1)	52.7 (2.45)	28.8 (4.5)	40.3 (3.25)	38.0 (3.4)	14.0 (9.25)	1.55
25506	125	154	193+	51.3 (2.4)	43.0 (2.9)	40.5 (1.05)	25.0 (1.7)	26.6 (1.6)	8.4 (5.1)	18.0 (2.4)	46.4 (2.7)	36.6 (3.4)	20.0 (6.25)	31.7 (3.95)	45.7 (2.75)	25.0 (5.0)	36.1 (3.45)	36.1 (3.45)	12.8 (9.8)	1.55
25508	125	155	202	52.3 (2.4)	42.2 (2.95)	41.7 (1.05)	25.6 (1.65)	24.5 (1.7)	8.3 (5.1)	16.0 (2.65)	42.8 (2.9)	39.0 (3.2)	22.4 (5.6)	33.4 (3.75)	45.7 (2.75)	25.9 (4.8)	35.0 (3.55)	35.1 (3.55)	13.3 (9.4)	1.65
18793	107	130	152	43.2 (2.5)	36.0 (3.0)	33.5 (1.1)	20.5 (1.75)	20.0 (1.8)	7.4 (4.85)	15.0 (2.4)	39.0 (2.75)	30.9 (3.45)	18.5 (5.8)	27.0 (3.95)	39.3 (2.7)	22.2 (4.8)	30.5 (3.5)	32.0 (3.35)	11.1 (9.65)	1.65
25509	95	117	148+	39.7 (2.4)	33.4 (2.85)	29.1 (1.15)	18.7 (1.8)	18.7 (1.8)	6.6 (5.05)	13.2 (2.55)	31+ (-)	25.0 (3.8)	16.5 (5.75)	24.8 (3.8)	35.7 (2.65)	18.6 (5.1)	26.8 (3.55)	27.0 (3.5)	9.6 (9.9)	1.7
25509	92	115	150	38.5 (2.4)	32.1 (2.85)	29.0 (1.1)	18.1 (1.8)	18.9 (1.7)	6.5 (4.9)	13.6 (2.35)	33.7 (2.75)	24.9 (3.7)	14.8 (6.2)	22.7 (4.05)	34.8 (2.65)	17.5 (5.25)	26.3 (3.5)	26.7 (3.45)	9.3 (9.85)	1.6
25505	81	108	124	32.5 (2.5)	28.3 (2.85)	25.5 (1.1)	15.6 (1.8)	15.5 (1.8)	5.7 (4.95)	11.4 (2.5)	30.8 (2.6)	23.0 (3.5)	12.5 (6.45)	20.6 (3.9)	28.7 (2.8)	16.0 (5.05)	22.5 (3.6)	23.4 (3.45)	8.3 (9.75)	1.7
18793	74	92	107+	31.5 (2.35)	27.6 (2.7)	23.7 (1.15)	15.4 (1.8)	15.3 (1.8)	5.5 (5.0)	10.7 (2.6)	23.8+ (-)	19.5 (3.8)	12.3 (6.0)	17.1 (4.3)	24.5 (3.0)	13.6 (5.45)	21.0 (3.5)	21.8 (3.4)	7.3 (10.05)	1.7
25510	72	90	125	30.6 (2.35)	26.7 (2.7)	22.6 (1.2)	13.7 (1.95)	14.4 (1.85)	5.5 (4.85)	10.4 (2.55)	26.9 (2.7)	19.8 (3.65)	12.3 (5.85)	18.5 (3.9)	26.0 (2.75)	13.8 (5.2)	22.6 (3.2)	23.1 (3.1)	7.4 (9.75)	1.65
25509	70	87	104+	28.2 (2.5)	25.5 (2.75)	22.0 (1.15)	14.1 (1.8)	14.1 (1.8)	5.4 (4.7)	10.3 (2.5)	26.8 (2.6)	19.3 (3.6)	12.0 (5.8)	19.1 (3.65)	25.9 (2.7)	13.2 (5.3)	20.0 (3.5)	20.2 (3.45)	7.5 (9.3)	1.7
25509	68	85	110	28.0 (2.4)	24.6 (2.75)	21.0 (1.15)	13.6 (1.8)	13.7 (1.8)	5.4 (4.55)	9.9 (2.5)	24.5 (2.75)	19.4 (3.5)	11.5 (5.9)	17.7 (3.85)	24.7 (2.75)	12.9 (5.25)	19.2 (3.55)	19.7 (3.45)	7.3 (9.3)	1.7
25509	57	69	85	23.6 (2.4)	20.6 (2.65)	17.6 (1.15)	10.8 (1.9)	10.9 (1.95)	4.6 (4.45)	8.4 (2.45)	18.5 (3.1)	15.5 (3.7)	9.1 (6.25)	14.6 (3.9)	18.4 (3.1)	10.5 (5.4)	15.1 (3.8)	16.3 (3.5)	5.6 (10.2)	1.6
25509	56	70	82+	23.7 (2.35)	20.6 (2.7)	17.3 (1.2)	10.6 (1.95)	10.9 (1.9)	4.4 (4.65)	8.6 (2.4)	20.6 (2.7)	14.7 (3.8)	9.5 (5.9)	14.2 (3.95)	19.6 (2.85)	10.0 (5.6)	16.0 (3.5)	16.0 (3.5)	5.6 (10.0)	1.7
25509	56	69	78+	23.2 (2.4)	20.5 (2.7)	17.2 (1.2)	10.6 (1.95)	10.9 (1.9)	4.5 (4.55)	8.2 (2.5)	20.0 (2.8)	15.0 (3.75)	9.5 (5.9)	14.2 (3.95)	19.2 (2.9)	9.8 (5.65)	16.0 (3.5)	16.1 (3.5)	5.5 (10.2)	1.7
Range of ratios :				2.35-2.5	2.65-3.1	1.0-1.2	1.6-1.95	1.6-1.95	4.45-5.6	2.35-2.65	2.45-3.1	3.2-3.8	5.6-6.45	3.65-4.4	2.45-3.1	4.5-5.65	3.2-3.8	3.1-3.55	9.25-10.2	1.55-1.7
Average of ratios:				2.4	2.8	1.1	1.8	1.8	4.9	2.5	2.75	3.6	6.0	3.95	2.75	5.15	3.5	3.45	9.75	1.65
Allometric trend :				=	−	+	+	+	−	=	=	+	=	−	+	+	=	=	=	=

Table 13. *Hypostomus surinamensis* nov. spec. — (species no. 12).

Reg. no:	A	B	C	D (A)	E (A)	F (E)	G (E)	H (E)	I (E)	J (E)	K (A)
25503	165	195	230	65.0 (2.55)	52.7 (3.1)	45.8 (1.15)	30.7 (1.7)	34.0 (1.55)	9.5 (5.5)	21.5 (2.45)	53.5 (3.1)
25490	160	190	222	64.0 (2.5)	51.5 (3.1)	46.6 (1.1)	29.7 (1.75)	32.9 (1.55)	9.5 (5.4)	21.0 (2.45)	55.5 (2.9)
25494	153	180	204	58.7 (2.6)	48.2 (3.15)	42.4 (1.15)	28.0 (1.7)	32.3 (1.5)	8.6 (5.6)	19.3 (2.5)	48.8 (3.1)
25490	151	180	217	55.5 (2.7)	47.0 (3.2)	41.8 (1.1)	26.0 (1.8)	30.0 (1.55)	8.8 (5.35)	19.7 (2.4)	50.1 (3.0)
25490	150	180	205	58.0 (2.6)	46.7 (3.2)	41.2 (1.15)	26.5 (1.75)	30.9 (1.5)	9.0 (5.2)	19.5 (2.4)	50.1 (3.0)
25491	150	180	217	58.5 (2.55)	48.6 (3.1)	43.2 (1.1)	28.6 (1.7)	32.0 (1.5)	8.8 (5.5)	20.8 (2.35)	56.5 (2.65)
25493	150	182	217+	56.3 (2.65)	48.8 (3.1)	42.3 (1.15)	27.5 (1.75)	31.4 (1.55)	8.8 (5.5)	19.3 (2.5)	52.5 (2.85)
* 25497	150	178	207	59.0 (2.55)	48.9 (3.1)	42.6 (1.15)	28.0 (1.75)	31.4 (1.55)	9.0 (5.4)	19.3 (2.55)	52.0 (2.9)
25490	145	175	207	58.7 (2.5)	47.5 (3.05)	40.5 (1.15)	28.0 (1.7)	30.0 (1.6)	9.2 (5.2)	20.1 (2.35)	48.3 (3.0)
25490	145	173	200+	58.0 (2.5)	45.5 (3.2)	41.4 (1.1)	26.2 (1.75)	29.6 (1.55)	9.0 (5.1)	17.9 (2.55)	43+ (-)
25498	143	170	202	59.0 (2.45)	47.3 (3.05)	40.0 (1.2)	26.7 (1.75)	30.4 (1.55)	8.9 (5.3)	18.3 (2.6)	52.0 (2.75)
25495	140	170	200	56.0 (2.5)	46.2 (3.05)	40.1 (1.15)	25.2 (1.8)	29.0 (1.6)	8.8 (5.25)	18.8 (2.45)	49.0 (2.85)
25503	138	165	200	54.7 (2.5)	45.8 (3.0)	38.8 (1.2)	26.0 (1.75)	29.6 (1.55)	8.6 (5.3)	19.0 (2.4)	50.3 (2.75)
25490	138	163	192	55.8 (2.45)	44.9 (3.1)	39.0 (1.1)	24.5 (1.8)	28.7 (1.55)	9.2 (4.9)	17.6 (2.55)	43.0 (3.2)
25490	135	158	190	50.2 (2.7)	40.7 (3.3)	37.8 (1.1)	23.7 (1.7)	26.0 (1.55)	9.0 (4.55)	16.1 (2.55)	43.7 (3.15)
25490	132	157	187	52.0 (2.55)	43.0 (3.05)	38.6 (1.1)	24.6 (1.75)	26.5 (1.6)	8.6 (5.0)	17.8 (2.4)	44.6 (2.95)
25496	132	164	185+	52.7 (2.5)	43.1 (3.05)	37.7 (1.15)	24.6 (1.75)	28.0 (1.55)	8.3 (5.2)	17.3 (2.5)	48.0 (2.75)
25500	132	155	190	52.0 (2.55)	41.9 (3.15)	36.6 (1.15)	23.7 (1.75)	25.8 (1.6)	8.7 (4.8)	16.0 (2.6)	43.5 (3.05)
25490	130	154	184	50.0 (2.6)	41.1 (3.15)	36.2 (1.15)	23.1 (1.75)	25.3 (1.6)	8.4 (4.9)	16.4 (2.5)	46.7 (2.8)
25503	130	154	184	51.2 (2.55)	42.5 (3.05)	37.1 (1.15)	23.5 (1.8)	26.2 (1.65)	8.5 (5.0)	17.5 (2.45)	43.0 (3.0)
25499	125	150	177	50.5 (2.5)	42.4 (2.95)	36.0 (1.2)	22.8 (1.85)	27.1 (1.55)	8.3 (5.1)	17.2 (2.45)	43.6 (2.85)
25503	125	149	181	47.5 (2.65)	40.3 (3.1)	33.7 (1.2)	22.1 (1.8)	25.1 (1.6)	8.0 (5.05)	15.6 (2.6)	44.4 (2.8)
25503	123	151	179	48.3 (2.55)	40.4 (3.05)	33.8 (1.2)	22.6 (1.8)	23.9 (1.7)	7.9 (5.2)	15.3 (2.65)	48.1 (2.55)
25503	123	149	178	48.8 (2.5)	40.2 (3.05)	35.0 (1.15)	22.0 (1.8)	25.0 (1.6)	8.0 (5.0)	16.4 (2.45)	46.3 (2.65)
25502	123	146	180	46.8 (2.6)	40.0 (3.05)	32.7 (1.2)	21.3 (1.85)	24.8 (1.6)	8.0 (5.0)	16.0 (2.5)	43.6 (2.8)
25492	120	150	178	47.8 (2.5)	40.3 (3.0)	34.0 (1.2)	22.2 (1.8)	26.0 (1.55)	8.0 (5.0)	16.7 (2.4)	44.6 (2.7)
25490	117	142	162+	45.2 (2.55)	37.5 (3.1)	31.8 (1.2)	20.0 (1.85)	23.0 (1.65)	7.7 (4.9)	15.0 (2.5)	43.6 (2.7)
25490	115	135	170	45.6 (2.5)	37.6 (3.05)	31.8 (1.2)	20.0 (1.9)	23.1 (1.65)	7.6 (4.95)	14.9 (2.5)	44.6 (2.6)
25502	110	131	156	43.1 (2.55)	36.3 (3.05)	31.5 (1.15)	20.3 (1.8)	22.5 (1.6)	7.5 (4.85)	13.8 (2.6)	39.9 (2.75)
25502	108	131	161	41.1 (2.6)	35.6 (3.05)	30.5 (1.15)	20.0 (1.8)	21.8 (1.65)	7.4 (4.8)	15.5 (2.3)	40.4 (2.7)
25502	108	130	160·	42.1 (2.55)	36.2 (3.0)	30.6 (1.2)	19.6 (1.85)	21.8 (1.65)	7.3 (4.95)	14.2 (2.55)	36.6 (2.95)
25501	106	126	155	40.9 (2.6)	34.0 (3.1)	30.5 (1.1)	18.5 (1.85)	21.0 (1.6)	7.1 (4.8)	14.2 (2.4)	39.2 (2.7)
25490	105	126	153	43.0 (2.45)	34.8 (3.0)	29.9 (1.15)	18.9 (1.85)	21.7 (1.6)	7.1 (4.9)	14.2 (2.45)	40.2 (2.6)
25490	104.5	125	153	40.7 (2.55)	34.8 (3.0)	29.3 (1.2)	18.6 (1.85)	20.8 (1.7)	6.9 (5.05)	13.8 (2.5)	40.5 (2.6)
25502	102	125	152	41.2 (2.5)	35.4 (2.9)	29.7 (1.2)	19.5 (1.8)	21.1 (1.7)	7.1 (5.0)	14.8 (2.4)	40.6 (2.5)
25502	100	122	147	39.0 (2.55)	32.7 (3.05)	27.7 (1.2)	18.5 (1.75)	19.8 (1.65)	7.2 (4.55)	14.3 (2.3)	37.2 (2.7)
25500	93	112	143·	36.2 (2.55)	30.9 (3.0)	27.4 (1.1)	17.3 (1.8)	18.7 (1.65)	6.7 (4.6)	12.6 (2.45)	36.5 (2.55)
25500	92	110	133	36.0 (2.55)	30.3 (3.05)	25.0 (1.2)	15.8 (1.9)	17.7 (1.7)	6.9 (4.4)	11.7 (2.6)	34.3 (2.7)
25490	92	108	135	34.5 (2.65)	30.9 (3.05)	26.4 (1.15)	16.4 (1.9)	18.6 (1.6)	6.8 (4.55)	12.6 (2.45)	33.5 (2.75)
25502	90	108	135	34.6 (2.6)	30.0 (3.0)	25.3 (1.2)	16.5 (1.8)	17.7 (1.7)	6.8 (4.4)	13.0 (2.3)	34.0 (2.65)
25490	85	100	127	33.2 (2.55)	28.7 (2.95)	24.2 (1.2)	14.9 (1.9)	17.3 (1.65)	6.1 (4.7)	11.4 (2.5)	31.5 (2.7)
25490	83.5	100	125	32.2 (2.6)	28.2 (2.95)	23.8 (1.2)	14.8 (1.9)	16.5 (1.7)	6.0 (4.7)	11.3 (2.5)	31.1 (2.7)
25496	82	103	130	33.8 (2.45)	28.7 (2.85)	23.3 (1.25)	14.4 (2.0)	17.2 (1.65)	6.2 (4.65)	10.2 (2.8)	32.0 (2.55)
25502	78	98	120	30.6 (2.55)	27.0 (2.9)	22.2 (1.2)	14.2 (1.9)	16.1 (1.7)	6.0 (4.5)	10.6 (2.55)	28.9 (2.7)
25501	76	94	120	30.5 (2.5)	25.5 (2.95)	21.5 (1.2)	13.8 (1.85)	15.0 (1.7)	5.7 (4.45)	9.7 (2.65)	27.4 (2.75)
25502	72	88	112	28.8 (2.5)	25.3 (2.85)	20.4 (1.25)	12.9 (1.95)	14.8 (1.7)	5.5 (4.6)	10.1 (2.5)	28.0 (2.55)
25504	68	82	103	26.4 (2.6)	23.1 (2.95)	18.2 (1.25)	11.5 (2.0)	13.0 (1.8)	5.2 (4.45)	8.8 (2.6)	24.7 (2.75)
25497	67	81	98	27.7 (2.45)	24.7 (2.7)	20.0 (1.25)	11.8 (2.1)	13.7 (1.8)	5.4 (4.55)	8.7 (2.85)	27.0 (2.5)
25502	66	79	97	25.6 (2.55)	22.9 (2.9)	18.2 (1.25)	11.6 (2.0)	12.9 (1.8)	5.1 (4.5)	9.1 (2.5)	25.7 (2.55)
25502	60	70	85+	23.6 (2.55)	20.7 (2.9)	16.0 (1.3)	10.3 (2.0)	11.8 (1.75)	5.0 (4.15)	8.3 (2.5)	20.9 (2.85)
25495	59	70	91	24.2 (2.45)	21.1 (2.8)	17.0 (1.25)	10.6 (2.0)	11.8 (1.8)	5.1 (4.1)	8.0 (2.65)	21.7 (2.7)
Range of ratios :				2.45-2.7	2.7-3.3	1.1-1.3	1.7-2.1	1.5-1.8	4.1-5.6	2.3-2.85	2.5-3.2
Average of ratios:				2.6	3.1	1.2	1.85	1.65	5.0	2.55	2.85
Allometric trend :				=	−	+	+	+	−	=	−

Reg. no:	L (A)	M (A)	N (A)	O (A)	P (A)	O (A)	R (A)	S (A)	S(M)
25503	47.8 (3.45)	29.2 (5.65)	36.7 (4.5)	57.2 (2.9)	34.3 (4.8)	43.0 (3.85)	53.2 (3.1)	16.1 (10.4)	1.8
25490	47.0 (3.4)	31.5 (5.1)	35.5 (4.5)	52.5 (3.05)	35.7 (4.5)	41.0 (3.9)	50.8 (3.15)	16.2 (9.85)	1.95
25494	42.1 (3.6)	27.7 (5.5)	35.6 (4.3)	49.2 (3.1)	31.2 (4.9)	38.0 (4.0)	48.7 (3.15)	14.0 (10.9)	2.0
25490	42.5 (3.55)	27.5 (5.5)	36.9 (4.1)	46.4 (3.25)	32.2 (4.7)	38.5 (3.9)	46.4 (3.25)	14.2 (10.6)	1.9
25490	44.6 (3.35)	28.0 (5.35)	35.0 (4.3)	46.3 (3.25)	31.5 (4.75)	38.0 (3.95)	48.6 (3.1)	14.1 (10.6)	1.95
25491	43.0 (3.5)	28.3 (5.3)	37.0 (4.05)	49.8 (3.0)	31.5 (4.75)	38.8 (3.9)	48.0 (3.1)	14.6 (10.3)	1.9
25493	42.0 (3.6)	25.8 (5.8)	35.7 (4.2)	48.0 (3.1)	33.0 (4.55)	39.8 (3.8)	46.6 (3.2)	13.6 (11.0)	1.9
* 25497	42.7 (3.5)	26.9 (5.6)	36.2 (4.15)	50.1 (3.0)	31.8 (4.25)	38.8 (3.9)	48.5 (3.1)	14.5 (10.4)	1.85
25490	44.1 (3.3)	27.2 (5.3)	36.5 (4.0)	46.3 (3.15)	34.0 (4.25)	36.9 (3.95)	45.8 (3.15)	13.8 (10.5)	1.95
25490	42.8 (3.4)	26.9 (5.4)	37.0 (3.9)	47.2 (3.05)	32.0 (4.5)	37.0 (3.9)	43.5 (3.3)	14.0 (10.4)	1.9
25498	42.5 (3.35)	26.0 (5.5)	35.8 (4.0)	49.6 (2.9)	30.0 (4.75)	39.0 (3.7)	45.1 (3.15)	14.0 (10.2)	1.85
25495	40.0 (3.5)	25.7 (5.45)	35.0 (4.0)	46.6 (3.0)	31.0 (4.5)	37.2 (3.75)	45.0 (3.1)	13.8 (10.2)	1.85
25503	40.8 (3.4)	24.4 (5.65)	33.4 (4.1)	44.7 (3.1)	30.0 (4.6)	35.9 (3.85)	42.3 (3.25)	13.1 (10.5)	1.85
25490	38.6 (3.6)	24.8 (5.6)	35.8 (3.85)	42.8 (3.2)	30.5 (4.5)	34.7 (3.95)	41.7 (3.3)	12.9 (10.7)	1.9
25490	37.9 (3.55)	25.5 (5.3)	36.5 (3.7)	41.7 (3.25)	27.5 (4.9)	32.2 (4.2)	43.0 (3.1)	13.1 (10.3)	1.95
25490	40.1 (3.3)	23.5 (5.6)	33.6 (3.95)	42.1 (3.15)	29.0 (4.55)	32.0 (4.15)	39.7 (3.3)	12.5 (10.6)	1.9
25496	38.8 (3.4)	23.0 (5.7)	34.0 (3.9)	44.5 (2.95)	29.6 (4.45)	36.4 (3.65)	42.3 (3.1)	12.7 (10.4)	1.8
25500	36.9 (3.55)	24.2 (5.45)	36.0 (3.65)	42.7 (3.1)	27.0 (4.9)	32.7 (4.0)	42.0 (3.1)	12.5 (10.5)	1.9
25490	38.0 (3.4)	24.3 (5.35)	33.2 (3.9)	40.9 (3.2)	26.3 (4.9)	31.8 (4.1)	39.4 (3.3)	12.3 (10.6)	1.95
25503	37.2 (3.5)	23.3 (5.6)	33.2 (3.9)	40.9 (3.2)	26.0 (5.0)	32.5 (4.0)	40.0 (3.25)	11.8 (11.0)	1.95
25499	35.9 (3.5)	21.7 (5.75)	29.9 (4.2)	41.7 (3.0)	26.7 (4.7)	32.0 (3.9)	41.3 (3.05)	12.0 (10.5)	1.8
25503	36.8 (3.4)	22.0 (5.7)	32.7 (3.8)	41.6 (3.0)	24.8 (5.0)	32.6 (3.85)	41.6 (3.0)	11.5 (10.9)	2.0
25503	35.2 (3.5)	22.0 (5.6)	30.8 (4.0)	42.3 (2.9)	25.8 (4.75)	32.7 (3.75)	42.3 (2.9)	11.6 (10.6)	1.9
25503	34.5 (3.55)	23.1 (5.3)	31.1 (3.95)	41.6 (2.95)	24.8 (4.9)	32.6 (3.75)	39.5 (3.1)	11.8 (10.4)	2.0
25502	34.6 (3.55)	21.0 (5.8)	32.1 (3.8)	40.0 (3.05)	25.0 (4.9)	31.0 (3.95)	38.0 (3.2)	11.5 (10.7)	2.0
25492	35.3 (3.4)	22.3 (5.4)	30.3 (3.95)	41.1 (2.9)	25.6 (4.7)	31.6 (3.8)	40.0 (3.0)	12.0 (10.1)	1.85
25490	33.2 (3.5)	20.7 (5.65)	30.0 (3.9)	40.5 (2.9)	24.8 (4.7)	31.2 (3.75)	37.8 (3.1)	11.4 (10.2)	1.8
25490	32.8 (3.5)	21.3 (5.4)	28.3 (4.05)	39.1 (2.95)	24.6 (4.65)	30.0 (3.8)	37.5 (3.05)	11.0 (10.4)	1.9
25502	29.9 (3.7)	20.0 (5.5)	28.1 (3.9)	35.5 (3.1)	21.6 (5.1)	26.8 (4.1)	36.0 (3.05)	10.3 (10.7)	1.95
25502	30.1 (3.6)	18.6 (5.8)	28.8 (3.75)	37.0 (2.9)	21.6 (5.0)	29.0 (3.7)	37.0 (2.9)	9.5 (11.35)	1.95
25502	29.3 (3.7)	18.5 (5.8)	25.8 (4.2)	35.3 (3.05)	21.5 (5.0)	26.8 (4.05)	35.5 (3.05)	9.8 (11.0)	2.1
25501	30.0 (3.55)	19.5 (5.45)	28.5 (3.7)	35.1 (3.0)	20.2 (5.25)	26.5 (4.0)	33.0 (3.2)	10.4 (10.2)	1.85
25490	30.9 (3.4)	19.6 (5.35)	26.8 (3.9)	36.0 (2.9)	22.2 (4.7)	27.8 (3.8)	32.5 (3.2)	10.0 (10.5)	1.95
25490	30.2 (3.45)	19.0 (5.5)	26.0 (4.0)	34.7 (3.0)	21.5 (4.85)	27.5 (3.8)	31.8 (3.3)	10.0 (10.45)	1.9
25502	29.9 (3.4)	17.7 (5.75)	28.0 (3.65)	36.3 (2.9)	21.0 (4.85)	26.7 (3.8)	35.4 (2.9)	9.2 (11.1)	1.9
25502	28.4 (3.5)	16.6 (6.0)	26.2 (3.8)	35.2 (2.85)	19.9 (5.0)	26.2 (3.8)	31.3 (3.2)	8.8 (11.4)	1.9
25500	28.6 (3.25)	15.7 (5.9)	24.3 (3.8)	32.4 (2.85)	18.1 (5.15)	24.8 (3.75)	30.6 (3.05)	8.7 (10.7)	1.8
25500	24.9 (3.7)	16.2 (5.7)	23.8 (3.85)	31.0 (3.0)	19.0 (4.85)	23.6 (3.9)	30.8 (3.0)	8.3 (11.1)	1.95
25490	26.7 (3.45)	15.6 (5.9)	23.5 (3.9)	31.3 (2.95)	18.6 (4.7)	24.0 (3.8)	29.6 (3.1)	8.6 (10.7)	1.8
25502	26.6 (3.4)	15.6 (5.75)	23.8 (3.8)	29.7 (3.05)	17.6 (5.1)	23.4 (3.85)	29.3 (3.1)	8.0 (11.3)	1.8
25490	24.5 (3.45)	15.4 (5.4)	21.7 (3.9)	28.3 (3.0)	17.2 (4.95)	23.0 (3.7)	27.0 (3.15)	8.3 (10.25)	1.85
25490	22.9 (3.65)	15.3 (5.45)	20.5 (4.05)	27.5 (3.05)	16.8 (4.95)	22.5 (3.7)	26.6 (3.15)	8.0 (10.4)	1.9
25496	24.3 (3.35)	14.0 (5.85)	19.2 (4.25)	26.1 (3.15)	17.3 (4.7)	21.8 (3.75)	26.6 (3.1)	7.0 (11.7)	1.9
25502	22.4 (3.45)	13.2 (5.9)	20.6 (3.8)	25.6 (3.05)	14.3 (5.4)	19.4 (4.0)	24.4 (3.2)	7.1 (11.0)	1.85
25501	21.4 (3.55)	14.0 (5.4)	19.5 (3.9)	25.0 (3.05)	14.2 (5.35)	19.3 (3.95)	25.8 (2.95)	7.3 (10.4)	1.9
25502	19.6 (3.65)	13.2 (5.45)	17.8 (4.05)	24.5 (2.95)	13.8 (5.2)	18.4 (3.9)	22.6 (3.2)	6.4 (11.2)	2.05
25504	18.9 (3.6)	11.7 (5.8)	16.1 (4.2)	22.1 (3.05)	12.3 (5.5)	16.6 (4.1)	22.6 (3.0)	6.0 (11.3)	1.95
25497	18.8 (3.55)	12.5 (5.35)	16.2 (4.15)	23.4 (2.85)	13.4 (5.0)	18.2 (3.7)	21.4 (3.15)	6.6 (10.2)	1.9
25502	18.1 (3.65)	11.1 (5.95)	16.1 (4.1)	21.8 (3.05)	12.6 (5.25)	17.0 (3.9)	22.4 (2.95)	5.7 (11.5)	1.95
25502	16.2 (3.7)	9.8 (6.2)	14.5 (4.15)	18.8 (3.2)	11.5 (5.2)	15.0 (4.0)	19.0 (3.15)	5.1 (11.8)	2.05
25495	16.1 (3.65)	10.0 (5.9)	14.0 (4.2)	19.0 (3.1)	10.7 (5.5)	15.6 (3.8)	19.4 (3.05)	5.2 (11.3)	1.9
Range of ratios :	3.25-3.7	5.1-6.2	3,65-4.5	2.85-3.25	4.25-5.5	3.65-4.2	2.9-3.3	9.85-11.8	1.8-2.1
Average of ratios:	3.55	5.7	4.05	3.1	4.95	3.95	3.2	10.9	1.95
Allometric trend :	+	+	−	=	+	=	=	+	=

Table 14. *Hypostomus tenuis* nov. spec. — (species no. 13).

Reg. no:	A	B	C	D (A)	E (A)	F (E)	G (E)	H (E)	I (E)	J (E)	K (A)	L (A)	M (A)	N (A)	O (A)	P (A)	O (A)	R (A)	S (A)	S(M)
* 16198	195	241	260+	68.1 (2.85)	55.6 (3.5)	49.4 (1.1)	30.0 (1.85)	32.9 (1.7)	7.7 (7.3)	22.1 (3.2)	61.5 (3.2)	51.5 (3.8)	41.9 (4.65)	47.0 (4.15)	57.6 (3.4)	37.6 (5.2)	51.0 (3.8)	64.5 (3.0)	15.5 (12.6)	2.7

Table 15. *Hypostomus watwata* Hancock — (species no. 15).

Reg. no:	A	B	C	D (A)	E (A)	F (E)	G (E)	H (E)	I (E)	J (E)	K (A)	L (A)	M (A)	N (A)	O (A)	P (A)	O (A)	R (A)	S (A)	S(M)
8407	265	320	435+	102.9 (2.5)	82.1 (3.25)	78.8 (1.1)	54.0 (1.55)	47.2 (1.8)	11.5 (7.4)	39.5 (2.15)	97.2 (2.7)	68.3 (3.85)	52.5 (5.05)	54.9 (4.8)	90.7 (2.9)	47.8 (5.5)	70.0 (3.8)	93.4 (2.85)	22.5 (11.8)	2.3
* BM 1932.11.10:31	260	318	377	96.3 (2.7)	78.0 (3.35)	77.2 (1.0)	48.6 (1.6)	44.1 (1.8)	10.7 (7.4)	35.0 (2.2)	82.0 (3.15)	66.9 (3.9)	51.0 (5.1)	55.0 (4.75)	84.8 (3.05)	49.5 (5.25)	68.0 (3.8)	86.2 (3.0)	23.4 (11.1)	2.2
25511	253	305	395	94.6 (2.7)	75.9 (3.35)	74.8 (1.0)	46.7 (1.6)	43.4 (1.75)	10.0 (7.6)	33.8 (2.25)	78.6 (3.2)	60.4 (4.2)	49.0 (5.15)	54.4 (4.65)	78.8 (3.2)	47.0 (5.4)	60.6 (4.15)	86.0 (2.95)	21.3 (11.8)	2.3
18242	217	258	327	81.5 (2.65)	68.0 (3.2)	66.4 (1.0)	42.0 (1.6)	39.5 (1.7)	9.5 (7.3)	31.0 (2.2)	68+ (-)	51.4 (4.2)	44.5 (4.9)	48.2 (4.5)	71.5 (3.05)	40.5 (5.35)	54.0 (4.0)	77.0 (2.8)	19.5 (11.1)	2.3
25512	202	244	300	79.6 (2.55)	63.9 (3.15)	61.4 (1.05)	41.5 (1.55)	36.4 (1.75)	9.2 (6.9)	30.1 (2.1)	66.6 (3.05)	51.8 (3.9)	42.7 (4.75)	44.5 (4.55)	68.1 (2.95)	37.6 (5.4)	52.6 (3.85)	69.5 (2.9)	18.5 (10.9)	2.3
25512	200	243	310	80.3 (2.5)	65.3 (3.05)	63.2 (1.05)	42.3 (1.55)	38.8 (1.7)	9.2 (7.1)	30.4 (2.15)	68.9 (2.9)	50.1 (4.0)	42.5 (4.7)	45.5 (4.4)	70.0 (2.85)	37.3 (5.4)	55.8 (3.6)	66.5 (3.0)	19.0 (10.5)	2.25
17259	182	222	281	75.1 (2.45)	59.7 (3.05)	57.4 (1.05)	38.2 (1.55)	35.0 (1.7)	8.6 (6.95)	28.4 (2.1)	65.4 (2.8)	46.1 (3.95)	38.2 (4.75)	38.2 (4.75)	63.3 (2.85)	36.2 (5.0)	48.6 (3.75)	60.4 (3.0)	17.3 (10.5)	2.2
3352	175	212	250+	68.0 (2.6)	55.8 (3.15)	54.2 (1.0)	35.7 (1.55)	32.0 (1.75)	9.0 (6.4)	25.7 (2.15)	60.8 (2.9)	43.0 (4.05)	34.2 (5.1)	40.8 (4.3)	55.0 (3.2)	32.7 (5.35)	46.0 (3.8)	57.4 (3.05)	16.3 (10.75)	2.1
11058	171	205	240+	68.0 (2.5)	56.5 (3.05)	52.2 (1.1)	35.0 (1.6)	31.7 (1.8)	9.0 (6.25)	27.1 (2.1)	60.8 (2.8)	41.5 (4.1)	32.0 (5.35)	38.5 (4.45)	59.0 (2.9)	32.2 (5.3)	44.3 (3.85)	57.7 (2.95)	15.5 (11.0)	2.05
25512	167	200	277	66.3 (2.5)	55.9 (3.0)	51.0 (1.1)	33.1 (1.7)	32.0 (1.75)	8.7 (6.4)	25.2 (2.2)	58.0 (2.9)	42.4 (3.95)	30.8 (5.4)	38.1 (4.4)	58.0 (2.9)	31.2 (5.35)	43.4 (3.85)	55.1 (3.0)	15.5 (10.75)	2.0
25511	160	192	263	64.5 (2.5)	52.0 (3.05)	47.0 (1.1)	30.5 (1.7)	29.7 (1.75)	8.3 (6.25)	23.4 (2.2)	52.7 (3.05)	38.0 (4.2)	30.4 (5.3)	34.7 (4.6)	51.9 (3.1)	31.5 (5.1)	40.2 (4.0)	52.8 (3.05)	13.7 (11.7)	2.2
2137	155	187	232	59.6 (2.6)	50.1 (3.1)	45.0 (1.1)	29.5 (1.7)	28.7 (1.75)	7.7 (6.5)	22.7 (2.2)	51.2 (3.0)	40.1 (3.85)	31.0 (5.0)	35.0 (4.45)	50.4 (3.1)	29.5 (5.25)	40.5 (3.85)	52.6 (2.95)	13.1 (11.8)	2.35
18792	150	177	213	56.0 (2.7)	48.1 (3.1)	44.2 (1.1)	27.2 (1.75)	26.5 (1.8)	7.7 (6.25)	20.4 (2.35)	48.7 (3.05)	36.5 (4.1)	28.5 (5.25)	35.5 (4.2)	49.7 (3.0)	27.0 (5.55)	38.1 (3.95)	49.8 (3.0)	13.0 (11.5)	2.2
25511	140	170	220	55.5 (2.55)	45.8 (3.05)	44.0 (1.05)	27.6 (1.65)	25.5 (1.8)	7.7 (5.95)	20.0 (2.3)	46.2 (3.05)	37.2 (3.75)	28.7 (4.9)	32.6 (4.3)	46.5 (3.0)	24.5 (5.7)	37.0 (3.8)	44.1 (3.15)	13.1 (11.6)	2.2
25512	138	165	218	56.2 (2.45)	46.8 (2.95)	43.3 (1.1)	26.7 (1.75)	25.6 (1.8)	7.5 (6.2)	21.4 (2.2)	47.1 (2.95)	32.1 (4.3)	26.0 (5.3)	32.0 (4.3)	47.2 (2.95)	24.8 (5.6)	36.3 (3.8)	45.8 (3.0)	12.5 (11.05)	2.1
21435	137	163	186+	55.0 (2.5)	46.4 (2.95)	42.3 (1.1)	25.9 (1.8)	25.5 (1.8)	7.8 (5.95)	19.8 (2.35)	44+ (-)	33.7 (4.05)	27.0 (5.05)	30.9 (4.4)	43.2 (3.15)	24.5 (5.6)	35.4 (3.85)	44.8 (3.05)	11.8 (11.6)	2.3
18792	132	158	185+	53.2 (2.5)	45.3 (2.9)	40.3 (1.1)	24.1 (1.85)	23.8 (1.9)	7.6 (5.95)	18.8 (2.4)	44.2 (3.0)	30.4 (4.35)	26.3 (5.0)	30.4 (4.35)	43.2 (3.05)	24.0 (5.5)	33.7 (3.9)	43.0 (3.05)	11.6 (11.35)	2.25
25511	130	155	195	53.2 (2.45)	43.2 (3.0)	40.7 (1.05)	25.1 (1.75)	23.9 (1.8)	7.8 (5.55)	19.7 (2.2)	42.6 (3.05)	32.6 (4.0)	25.5 (5.1)	29.0 (4.45)	40.5 (3.2)	24.0 (5.4)	35.7 (3.65)	44.0 (2.95)	11.7 (11.3)	2.2
3352	130	154	?	50.1 (2.6)	41.9 (3.1)	39.7 (1.05)	24.8 (1.7)	23.8 (1.75)	7.5 (5.6)	20.3 (2.05)	? (-)	31.6 (4.1)	24.0 (5.4)	30.0 (4.35)	40.7 (3.2)	24.2 (5.35)	34.0 (3.8)	44.5 (2.9)	11.7 (11.15)	2.05
17337	127	153	188	52.2 (2.45)	43.5 (2.9)	40.1 (1.1)	24.5 (1.8)	24.3 (1.8)	8.0 (5.4)	19.9 (2.2)	46.5 (2.75)	32.7 (3.9)	23.1 (5.5)	30.0 (4.25)	43.5 (2.9)	23.4 (5.4)	33.2 (3.8)	41.7 (3.05)	11.3 (11.25)	2.05
3101	123	147	163	47.2 (2.6)	40.6 (3.0)	37.5 (1.1)	23.8 (1.7)	22.1 (1.85)	7.5 (5.4)	18.9 (2.15)	42.9 (2.85)	29.6 (4.15)	24.0 (5.1)	27.8 (4.4)	41.0 (3.0)	21.8 (5.6)	32.2 (3.8)	41.5 (2.95)	10.4 (11.8)	2.3
11059	122	150	167	50.0 (2.45)	43.6 (2.8)	38.6 (1.1)	23.6 (1.85)	23.0 (1.9)	8.0 (5.45)	18.6 (2.35)	43.0 (2.85)	30.0 (4.05)	22.5 (5.4)	28.6 (4.25)	40.8 (3.0)	22.6 (5.4)	32.5 (3.75)	40.2 (3.0)	11.2 (10.9)	2.0
3352	117	142	164+	46.6 (2.5)	38.8 (3.0)	37.4 (1.05)	23.2 (1.7)	21.2 (1.85)	7.2 (5.4)	18.3 (2.15)	36.5 (3.2)	28.8 (4.05)	23.0 (5.1)	27.0 (4.3)	41.0 (2.85)	21.6 (5.4)	31.3 (3.75)	38.9 (3.0)	10.7 (10.9)	2.15
21434	113	135	158	46.1 (2.45)	38.5 (2.95)	35.0 (1.1)	20.4 (1.9)	20.8 (1.85)	6.8 (5.65)	17.6 (2.2)	35.9 (3.15)	28.3 (4.0)	23.4 (4.8)	26.4 (4.45)	37.7 (3.0)	21.1 (5.35)	28.8 (3.9)	37.0 (3.05)	10.2 (11.05)	2.2
18792	110	132	158	44.7 (2.45)	37.9 (2.9)	33.5 (1.1)	21.6 (1.75)	20.0 (1.9)	6.6 (5.7)	16.6 (2.3)	35.2 (3.1)	26.0 (4.2)	20.8 (5.3)	26.0 (4.2)	35.8 (3.1)	20.0 (5.5)	29.0 (3.8)	36.0 (3.05)	9.8 (11.2)	2.1
18791	100	122	150+	41.0 (2.45)	36.5 (2.75)	32.9 (1.1)	21.0 (1.75)	20.1 (1.8)	6.5 (5.6)	16.5 (2.2)	? (-)	24.1 (4.15)	19.0 (5.25)	22.5 (4.45)	? (-)	19.3 (5.2)	27.0 (3.7)	31.3 (3.2)	9.4 (10.6)	2.0
17336	88	?	?	34.6 (2.55)	31.0 (2.85)	28.1 (1.1)	17.5 (1.8)	16.9 (1.85)	5.8 (5.35)	14.2 (2.2)	? (-)	21.1 (4.15)	17.3 (5.1)	20.2 (4.35)	30.5 (2.9)	18.2 (4.8)	? (-)	28.3 (3.1)	8.0 (11.0)	2.15
17337	84	104	124	35.5 (2.4)	30.2 (2.8)	26.5 (1.15)	15.9 (1.9)	15.5 (1.95)	5.6 (5.4)	12.1 (2.5)	? (-)	19.8 (4.25)	15.6 (5.35)	19.0 (4.4)	25+ (-)	15.4 (5.4)	22.6 (3.7)	27.6 (3.05)	7.2 (11.6)	2.15
17337	82	101	120	34.2 (2.4)	30.0 (2.75)	26.1 (1.15)	15.7 (1.9)	15.7 (1.9)	5.6 (5.35)	12.0 (2.5)	29.2 (2.8)	19.4 (4.25)	15.5 (5.3)	19.2 (4.25)	27.4 (3.0)	15.3 (5.35)	21.4 (3.8)	27.2 (3.0)	6.9 (11.9)	2.25
18799	82	98	?	33.7 (2.45)	28.9 (2.85)	25.2 (1.15)	15.0 (1.95)	15.0 (1.95)	5.6 (5.15)	12.1 (2.4)	24+ (-)	19.3 (4.25)	15.1 (5.4)	19.2 (4.25)	26.0 (3.15)	15.0 (5.45)	19.5 (4.2)	26.2 (3.1)	7.0 (11.7)	2.15
18799	75	92	109	31.2 (2.4)	27.7 (2.7)	23.4 (1.2)	14.6 (1.9)	14.4 (1.9)	5.4 (5.1)	11.3 (2.45)	23.0 (3.25)	18.6 (4.05)	14.1 (5.3)	18.3 (4.1)	24.7 (3.05)	13.5 (5.55)	19.3 (3.9)	25.2 (3.0)	7.0 (10.7)	2.0
24770	75	90	115	31.8 (2.35)	27.4 (2.75)	23.3 (1.2)	14.7 (1.85)	14.1 (1.95)	5.2 (5.25)	10.9 (2.5)	24.5 (3.05)	18.0 (4.15)	14.4 (5.4)	17.0 (4.4)	23.4 (3.2)	13.3 (5.6)	20.0 (3.75)	24.5 (3.05)	6.5 (11.5)	2.2
17337	69	85	96+	30.8 (2.25)	26.0 (2.65)	22.0 (1.2)	13.7 (1.9)	13.3 (1.95)	5.2 (5.0)	10.9 (2.4)	? (-)	16.2 (4.25)	12.3 (5.6)	15.0 (4.6)	22.2 (3.1)	12.2 (5.65)	18.6 (3.7)	21.5 (3.2)	5.9 (11.7)	2.1
17306	66	80	95	28.1 (2.35)	24.0 (2.75)	19.8 (1.2)	12.9 (1.85)	12.1 (2.0)	5.1 (4.7)	10.5 (2.3)	19+ (-)	16.1 (4.1)	12.5 (5.3)	15.2 (4.35)	20.2 (3.25)	11.7 (5.6)	17.1 (3.85)	21.5 (3.05)	6.0 (11.0)	2.1
3104	65	82	93+	28.0 (2.3)	24.5 (2.65)	19.8 (1.25)	13.1 (1.85)	12.2 (2.0)	4.9 (5.0)	10.4 (2.35)	22.0 (2.95)	15.6 (4.15)	12.7 (5.1)	15.0 (4.3)	21.6 (3.0)	12.0 (5.4)	17.3 (3.75)	21.4 (3.05)	5.9 (11.0)	2.15
3104	58	72	85+	24.6 (2.35)	21.3 (2.7)	18.4 (1.15)	11.5 (1.85)	11.0 (1.95)	4.5 (4.75)	9.1 (2.35)	? (-)	14.5 (4.0)	11.0 (5.3)	13.2 (4.4)	19.4 (3.0)	10.5 (5.5)	15.8 (3.65)	19.7 (2.95)	5.5 (10.55)	2.0
17339	52	63	?	22.1 (2.35)	19.6 (2.65)	15.9 (1.25)	9.8 (2.0)	10.0 (1.95)	4.3 (4.5)	8.1 (2.4)	? (-)	12.6 (4.1)	9.6 (5.4)	12.2 (4.25)	15.7 (3.3)	9.8 (5.3)	? (-)	17.7 (2.95)	4.5 (11.6)	2.1
Range of ratios :				2.25-2.7	2.65-3.35	1.0-1.25	1.55-2.0	1.7-2.0	4.5-7.6	2.05-2.5	2.7-3.25	3.75-4.35	4.7-5.6	4.1-4.8	2.85-3.3	4.8-5.7	3.6-4.2	2.8-3.2	10.5-11.9	2.0-2.35
Average of ratios:				2.5	2.95	1.1	1.75	1.85	5.9	2.25	3.0	4.1	5.2	4.4	3.05	5.4	3.8	3.0	11.2	2.15
Allometric trend :				–	–	+	+	+	–	+	=	=	=	–	+	=	=	=	=	=

2. Extralimital species

Table 16. *Hypostomus emarginatus* Valenciennes, including the holotype.

	A	B	C	D	(A)	E	(A)	F	(E)	G	(E)	H	(E)	I	(E)	J	(E)	K	(A)	L	(A)	M	(A)	N	(A)	O	(A)	P	(A)	O	(A)	R	(A)	S	(A)	S(M)
* MNHN A 9447	405	460?	?	133.0	(3.05)	103.5	(3.9)	93.3	(1.1)	56.0	(1.85)	61.0	(1.7)	11.7	(8.85)	40.3	(2.55)	?	(-)	89.0	(4.55)	108.0	(3.75)	89.0	(4.55)	84.0	(4.8)	82.0	(4.95)	60+	(-)	164.0	(2.45)	27.5	(14.75)	3.95
17996	190	222	238+	68.5	(2.75)	54.7	(3.45)	48.0	(1.15)	27.5	(2.0)	32.5	(1.7)	9.5	(5.75)	21.8	(2.5)	51.8	(3.65)	42.6	(4.45)	46.5	(4.1)	43.0	(4.4)	47.0	(4.05)	37.8	(5.0)	40.0	(4.75)	68.0	(2.8)	13.0	(14.5)	3.6
14752	135	157	180+	50.5	(2.7)	43.0	(3.15)	39.0	(1.1)	21.5	(2.0)	25.0	(1.7)	7.5	(5.7)	18.6	(2.3)	41.3	(3.25)	30.0	(4.5)	31.0	(4.35)	32.5	(4.15)	36.8	(3.65)	26.0	(5.2)	30.0	(4.5)	47.0	(2.85)	9.7	(13.9)	3.2
14752	111	132	155+	42.0	(2.65)	36.0	(3.1)	32.2	(1.1)	16.7	(2.15)	21.4	(1.7)	6.7	(5.35)	15.8	(2.25)	32.5	(3.4)	25.7	(4.3)	24.3	(4.55)	27.5	(4.05)	30.0	(3.7)	20.0	(5.5)	24.0	(4.6)	39.0	(2.85)	8.2	(13.5)	2.95

Table 17. *Hypostomus hemiurus* (Eigenmann), including a syntype.

	A	B	C	D	(A)	E	(A)	F	(E)	G	(E)	H	(E)	I	(E)	J	(E)	K	(A)	L	(A)	M	(A)	N	(A)	O	(A)	P	(A)	O	(A)	R	(A)	S	(A)	S(M)
* BM 1911.10.31:113	120	148	180	46.4	(2.6)	39.5	(3.05)	35.9	(1.1)	20.6	(1.9)	24.1	(1.65)	7.8	(5.05)	14.2	(2.8)	43.3	(2.8)	36.1	(3.3)	20.0	(6.0)	33.8	(3.55)	38.2	(3.15)	25.0	(4.8)	32.6	(3.7)	38.3	(3.15)	11.7	(10.25)	1.7
BM 1936.4.4:48	97	115	?	41.8	(2.1)	36.0	(2.4)	31.7	(1.15)	19.4	(1.85)	20.3	(1.75)	7.7	(4.65)	12.8	(2.8)	?	(-)	26.7	(3.25)	15.5	(5.6)	22.9	(3.8)	35.0	(2.5)	20.0	(4.35)	26.6	(3.25)	28.3	(3.05)	9.1	(9.5)	1.7

Table 18. *Hypostomus plecostomus* Valenciennes, nec Linnaeus (= *H. ?tenuicauda* (Steindachner)), the specimens examined by Valenciennes.

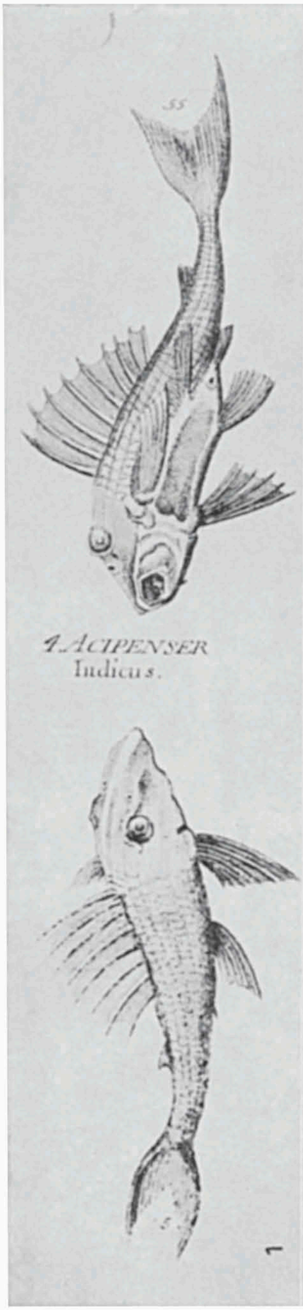
	A	B	C	D	(A)	E	(A)	F	(E)	G	(E)	H	(E)	I	(E)	J	(E)	K	(A)	L	(A)	M	(A)	N	(A)	O	(A)	P	(A)	O	(A)	R	(A)	S	(A)	S(M)
MNHN A 9448	280	328	?	102.2	(2.75)	84.3	(3.3)	70.6	(1.2)	45.8	(1.85)	46.1	(1.8)	10.8	(7.8)	34.8	(2.4)	46.5+	(-)	66.1	(4.25)	65.5	(4.3)	72.5	(3.85)	69.3	(4.05)	52.0	(5.4)	55.0	(5.1)	90.0	(3.1)	21.0	(13.3)	3.1
MNHN 755	230	270	?	83.0	(2.75)	69.4	(3.3)	59.3	(1.15)	36.8	(1.9)	37.9	(1.85)	9.9	(7.0)	30.5	(2.3)	57.7	(3.9)	55.0	(4.2)	52.2	(4.4)	57.5	(4.0)	63.0	(3.65)	45.5	(5.05)	50.5	(4.55)	77.0	(3.0)	17.4	(13.2)	3.0
MNHN A 9449	210	245	?	78.5	(2.7)	65.4	(3.2)	55.0	(1.2)	33.8	(1.95)	36.5	(1.8)	8.7	(7.5)	36.7	(2.45)	53.6+	(-)	44.9	(4.65)	52.3	(4.0)	49.8	(4.2)	58.0	(3.6)	40.2	(5.2)	45.8	(4.55)	78.5	(2.7)	17.3	(12.1)	3.0

Table 19. *Hypostomus robinii* Valenciennes, the lectotype, from Trinidad.

	A	B	C	D	(A)	E	(A)	F	(E)	G	(E)	H	(E)	I	(E)	J	(E)	K	(A)	L	(A)	M	(A)	N	(A)	O	(A)	P	(A)	O	(A)	R	(A)	S	(A)	S(M)
* MNHN A 9569	164	198	?	59.0	(2.8)	46.7	(3.5)	44.2	(1.05)	27.0	(1.75)	28.9	(1.6)	6.7	(7.0)	18.5	(2.5)	?	(-)	42.2	(3.9)	34.6	(4.75)	40.2	(4.1)	50.2	(3.25)	40.0	(4.1)	41.7	(3.9)	46.2	(3.55)	16.4	(10.0)	2.1

Table 20. *Hypostomus verres* Valenciennes, lectotype and paralectotypes.

	A	B	C	D	(A)	E	(A)	F	(E)	G	(E)	H	(E)	I	(E)	J	(E)	K	(A)	L	(A)	M	(A)	N	(A)	O	(A)	P	(A)	O	(A)	R	(A)	S	(A)	S(M)
* MNHN A 9450	325	380	415+	113.5	(2.85)	94.0	(3.45)	90.4	(1.05)	53.2	(1.75)	54.8	(1.7)	11.8	(7.9)	41.0	(2.3)	75.0	(4.3)	71.0	(4.6)	72.5	(4.5)	74.0	(4.4)	99.2	(3.3)	67.4	(4.8)	71.3+	(-)	119.7	(2.7)	27.0	(12.0)	2.7
MNHN A 9451	265	320?	?	98.0	(2.7)	80.6	(3.3)	76.2	(1.05)	50.0	(1.8)	44.6	(1.8)	10.7	(7.5)	33.5	(2.4)	?	(-)	62.2	(4.25)	59.3	(4.45)	65.5	(4.05)	85.0	(3.1)	49.7	(5.3)	52.8	(5.0)	ca. 93.0	(-)	22.0	(12.0)	2.7
MNHN A 8919	202	242	311	78.0	(2.6)	62.0	(3.25)	57.0	(1.1)	37.7	(1.65)	33.0	(1.85)	9.0	(6.9)	28.0	(2.2)	68.8	(2.95)	49.0	(4.1)	38.9	(5.2)	46.6	(4.35)	64.6	(3.1)	39.0	(5.2)	52.0	(3.9)	68.8	(2.95)	16.8	(12.0)	2.2
MNHN 9570	95	114	130	40.1	(2.4)	34.4	(2.8)	31.0	(1.1)	19.6	(1.75)	18.4	(1.85)	6.4	(5.4)	15.0	(2.3)	32.6	(2.95)	22.7	(4.2)	18.3	(5.2)	21.8	(4.35)	31.5	(3.05)	18.2	(5.2)	24.7	(3.85)	32.3	(2.95)	8.3	(11.5)	2.2
MNHN 9927	71.5	86	95+	29.0	(2.45)	24.9	(2.85)	21.4	(1.15)	13.9	(1.75)	13.0	(1.9)	4.6	(5.3)	11.0	(2.25)	?	(-)	16.8	(4.25)	12.8	(5.55)	17.0	(4.2)	22.4	(3.2)	12.8	(5.6)	17.5	(4.1)	23.1	(3.1)	6.4	(11.15)	2.0
MNHN 9927	68	82	99	30.5	(2.25)	25.5	(2.65)	20.7	(1.25)	14.0	(1.8)	13.1	(1.95)	5.1	(5.0)	10.9	(2.35)	?	(-)	15.7	(4.3)	12.6	(5.0)	16.5	(4.1)	?	(-)	14.0	(4.85)	18.5	(3.65)	22.6	(3.0)	6.3	(10.8)	2.0



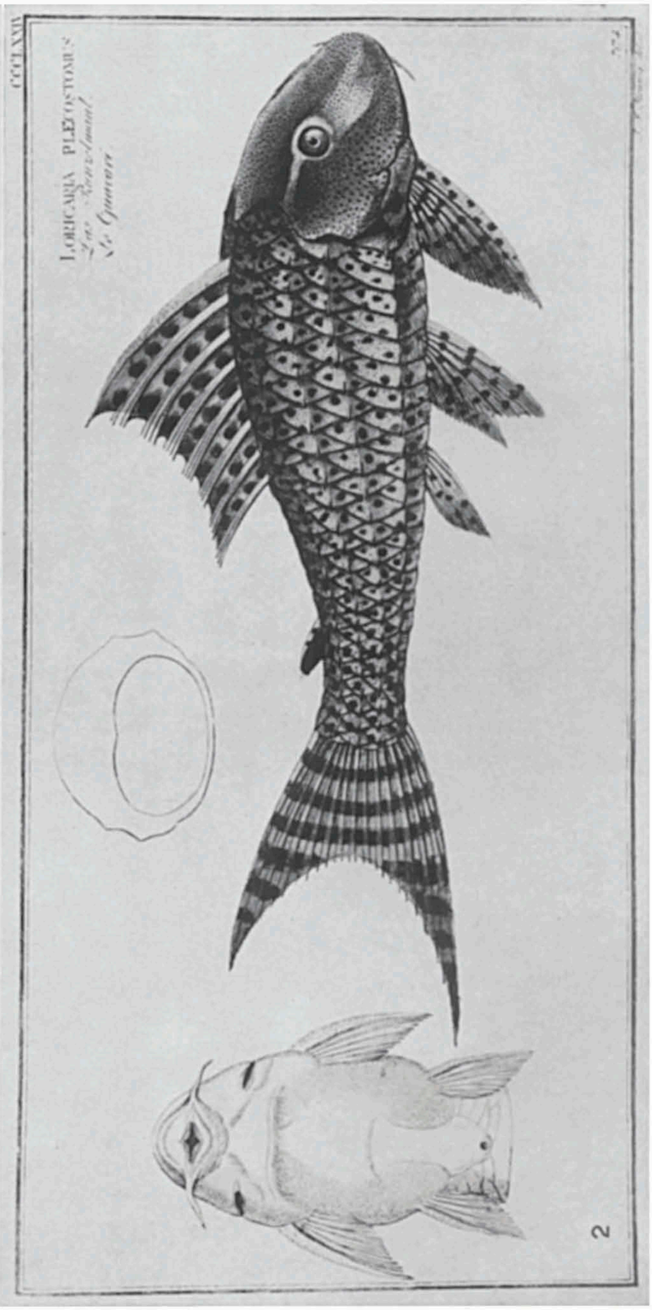
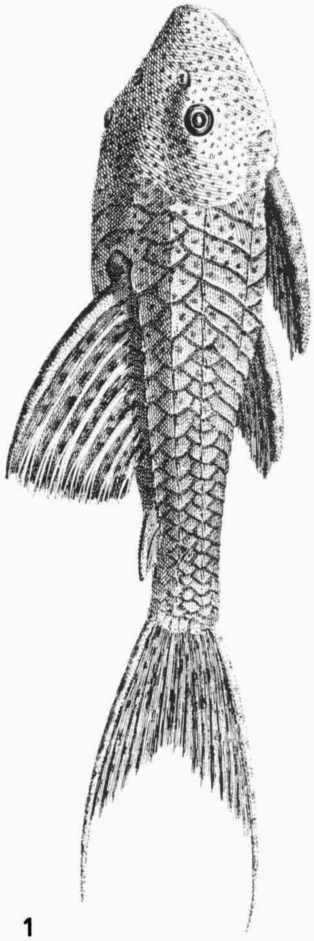
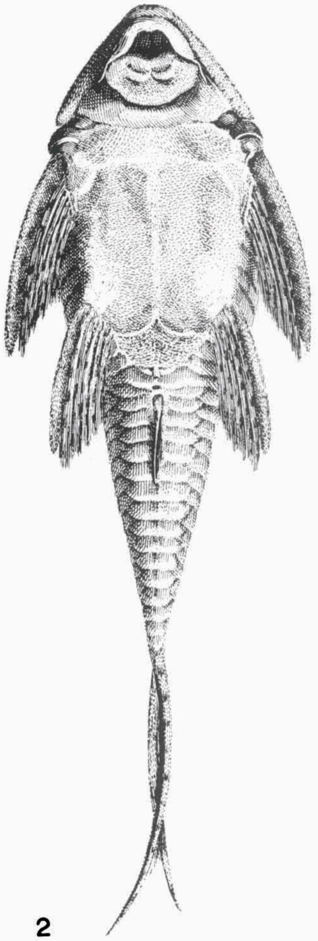


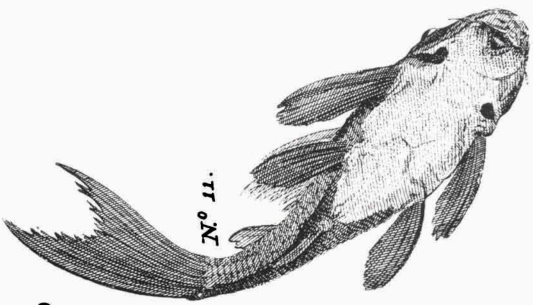
Fig. 1. Reproduction of Linnaeus' figure of *Acipenser indicus*, from the "Museum Adolphi Friderici" (1754, pl. 28 fig. 4), × 3/4; fig. 2. Reproduction of Bloch's figure of *Loricaria plecostomus*, from the "Allgemeine Naturgeschichte der Fische" (11, 1793, pl. 374), × 3/8.



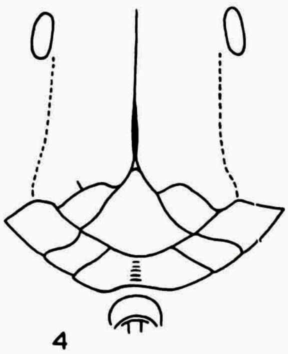
1



2



3



4

Fig. 1, 2. Reproductions of Gronovius' figures of *Plecostomus dorso dipterygio*, etc., from the "Museum Ichthyologicum" (1754, pl. 3 fig. 1, 2), × 2/3; fig. 3. Reproduction of Seba's figure of *Plecostomus cirris duobus*, etc., from the "Locupletissimi rerum naturalium thesauri" (3, 1758, pl. 29 fig. 11), × 2/3; fig. 3. Schematic drawing of the occipital squamation of the holotype of *Hypostomus emarginatus* Valenciennes (Paris, MNHN A 9447), ca. × 2/3.

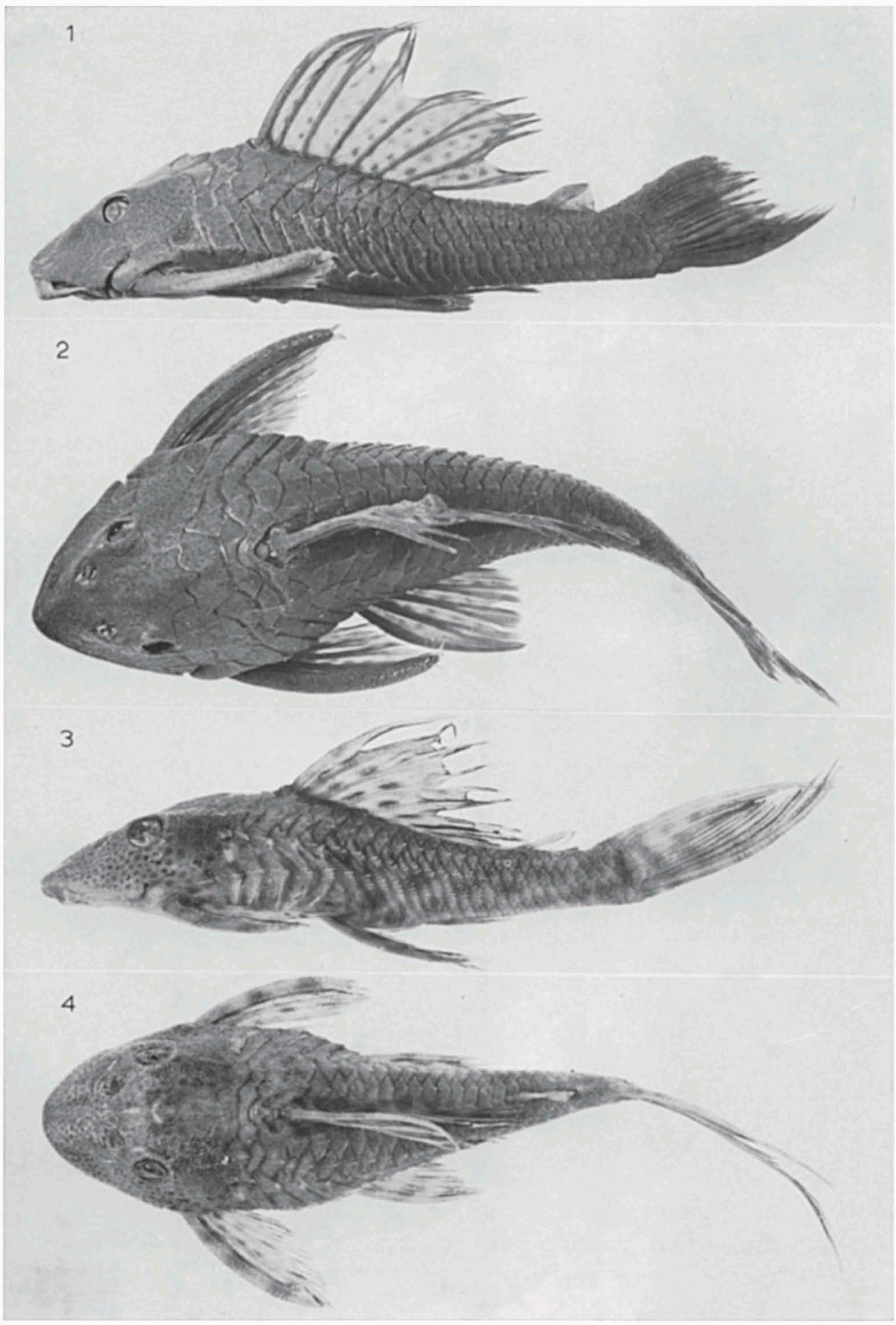


Fig. 1-4. *Hypostomus plecostomus* (Linnaeus); neotype (RMNH 18240, standard length 175 mm) and juvenile (RMNH 25466, standard length 67 mm), in lateral and dorsal view.

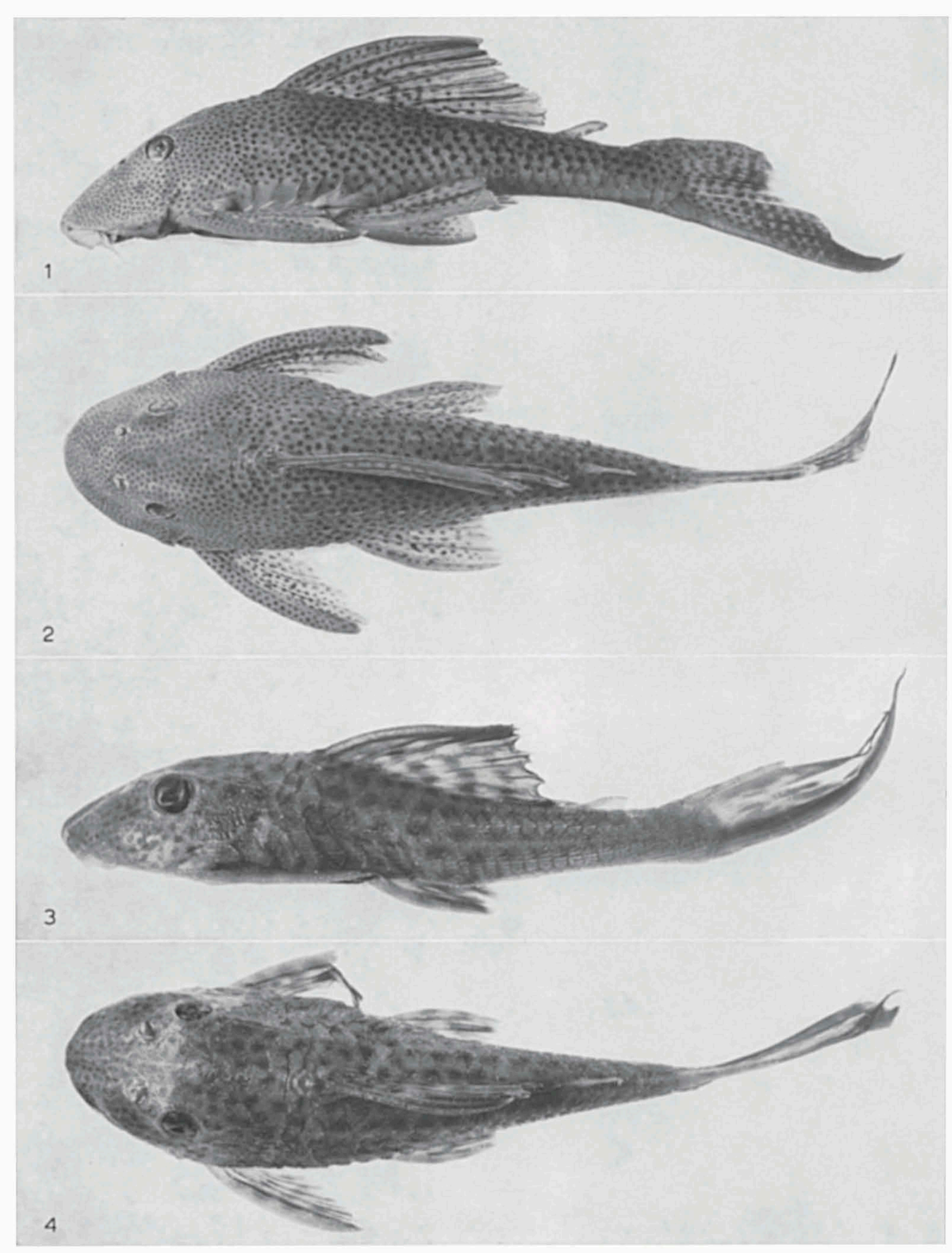


Fig. 1-4. *Hypostomus corantijni* nov. spec.; holotype (RMNH 25471, standard length 175 mm) and juvenile paratype (RMNH 25475, standard length 53 mm), in lateral and dorsal view.

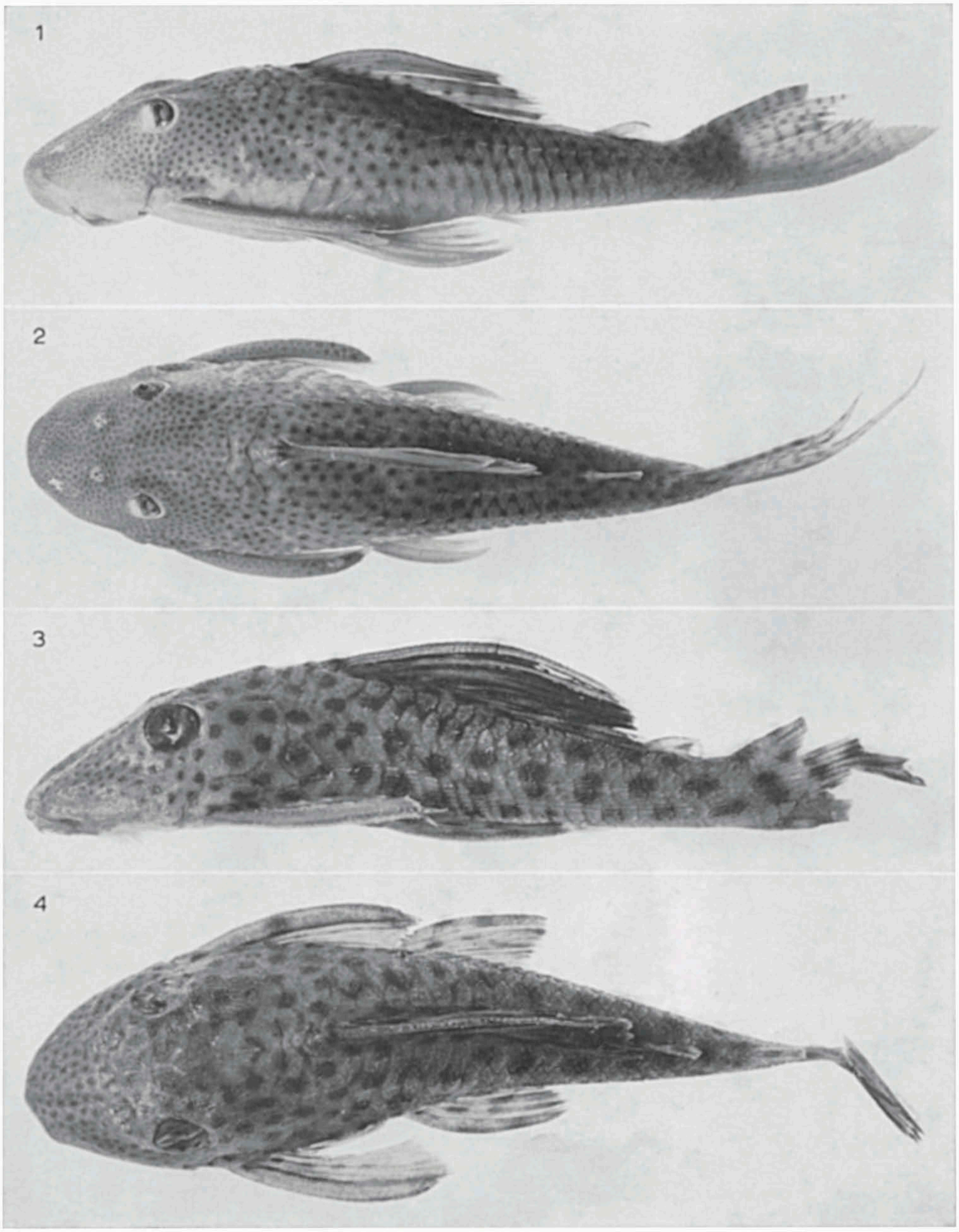


Fig. 1-4. *Hypostomus gymnorhynchus* (Norman); holotype (London, BMNH 1926.3.2:74, standard length 145 mm) and juvenile (RMNH 25477, standard length 56 mm), in lateral and dorsal view.

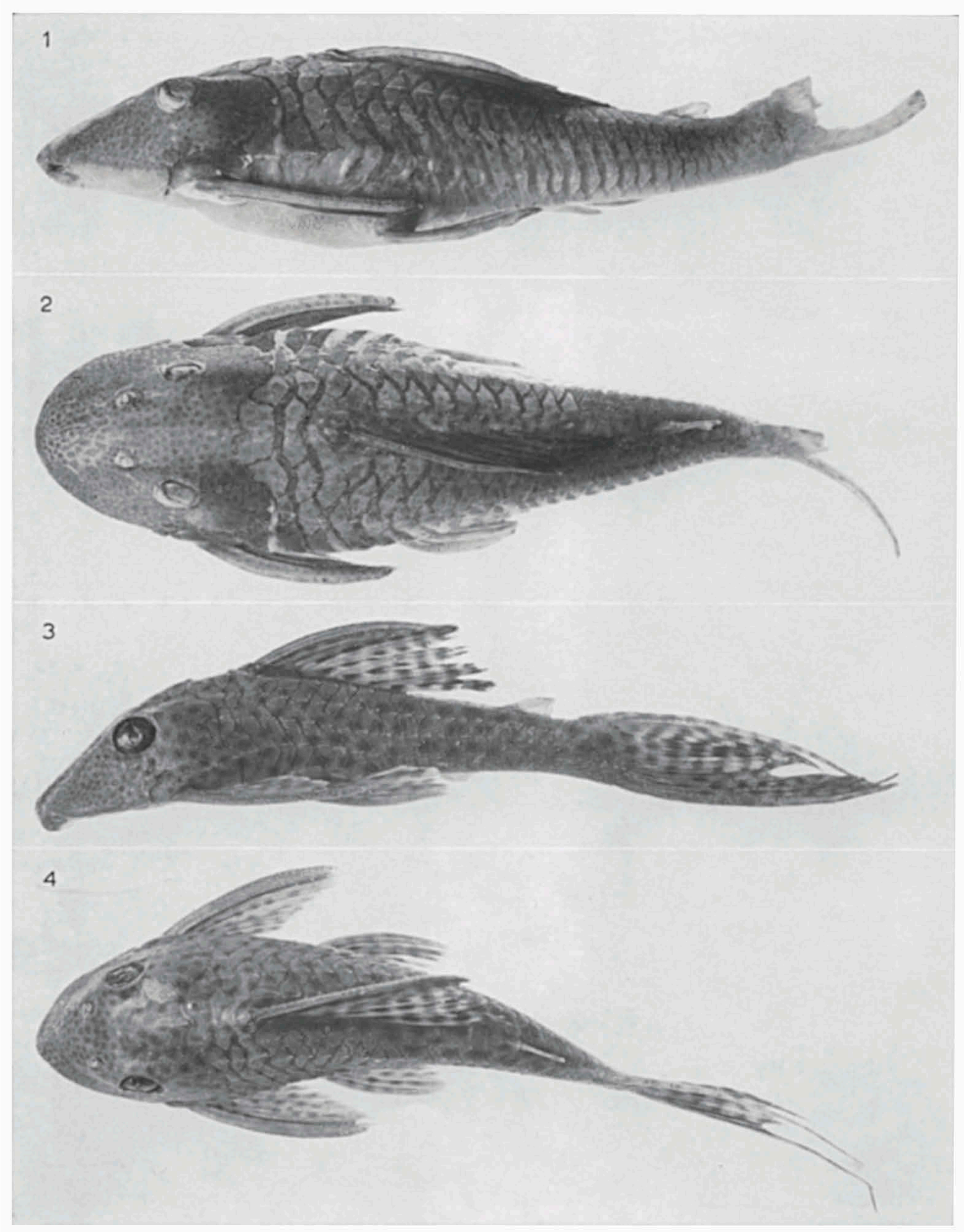


Fig. 1-4. *Hypostomus gymnorhynchus occidentalis* nov. subspec.; holotype (RMNH 25520, standard length 146 mm) and juvenile paratype (RMNH 25480, standard length 70 mm), in lateral and dorsal view.

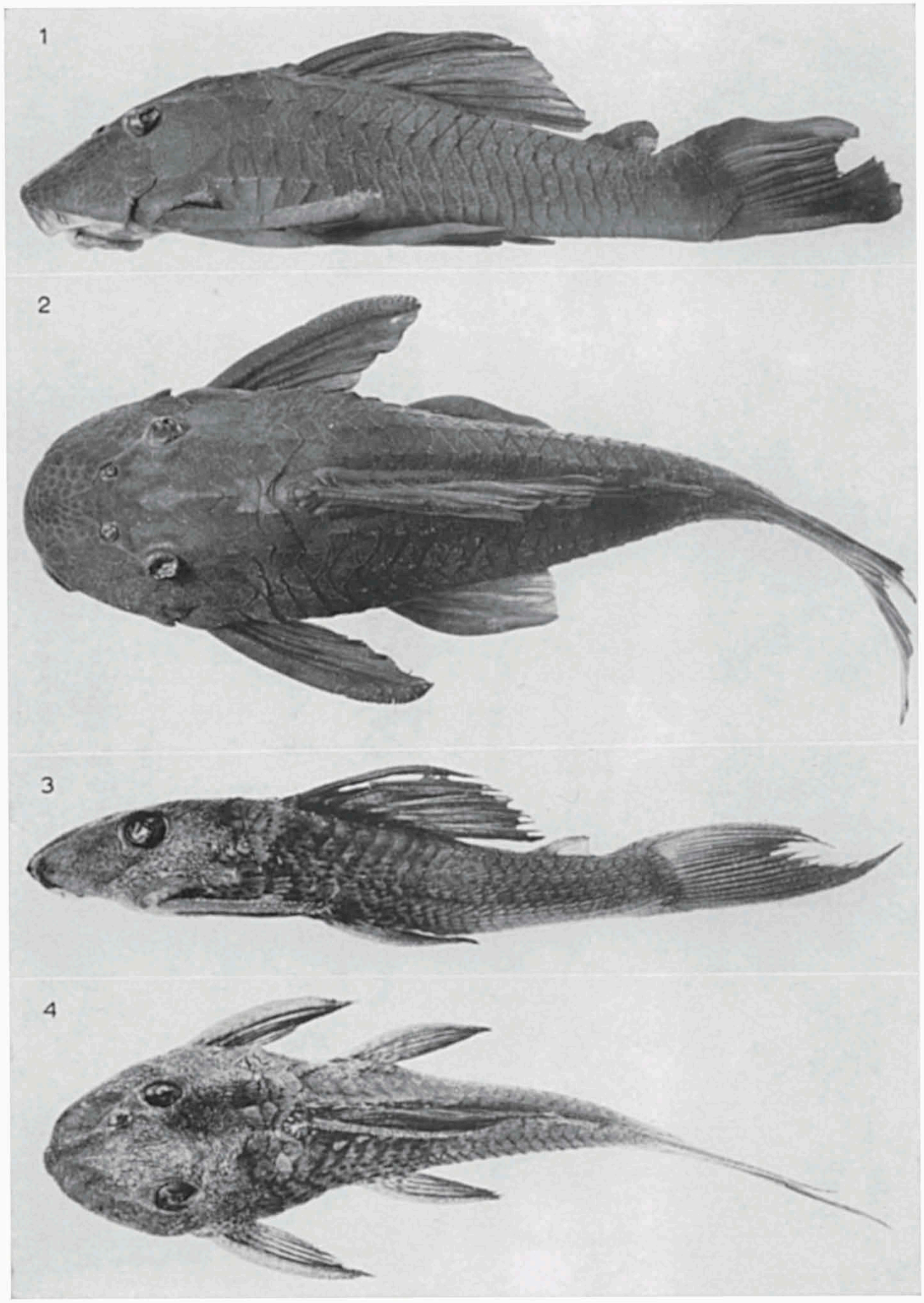


Fig. 1-4. *Hypostomus micromaculatus* nov. spec.; holotype (RMNH 25487, standard length 185 mm) and juvenile paratype (RMNH 25485, standard length 45 mm), in lateral and dorsal view.

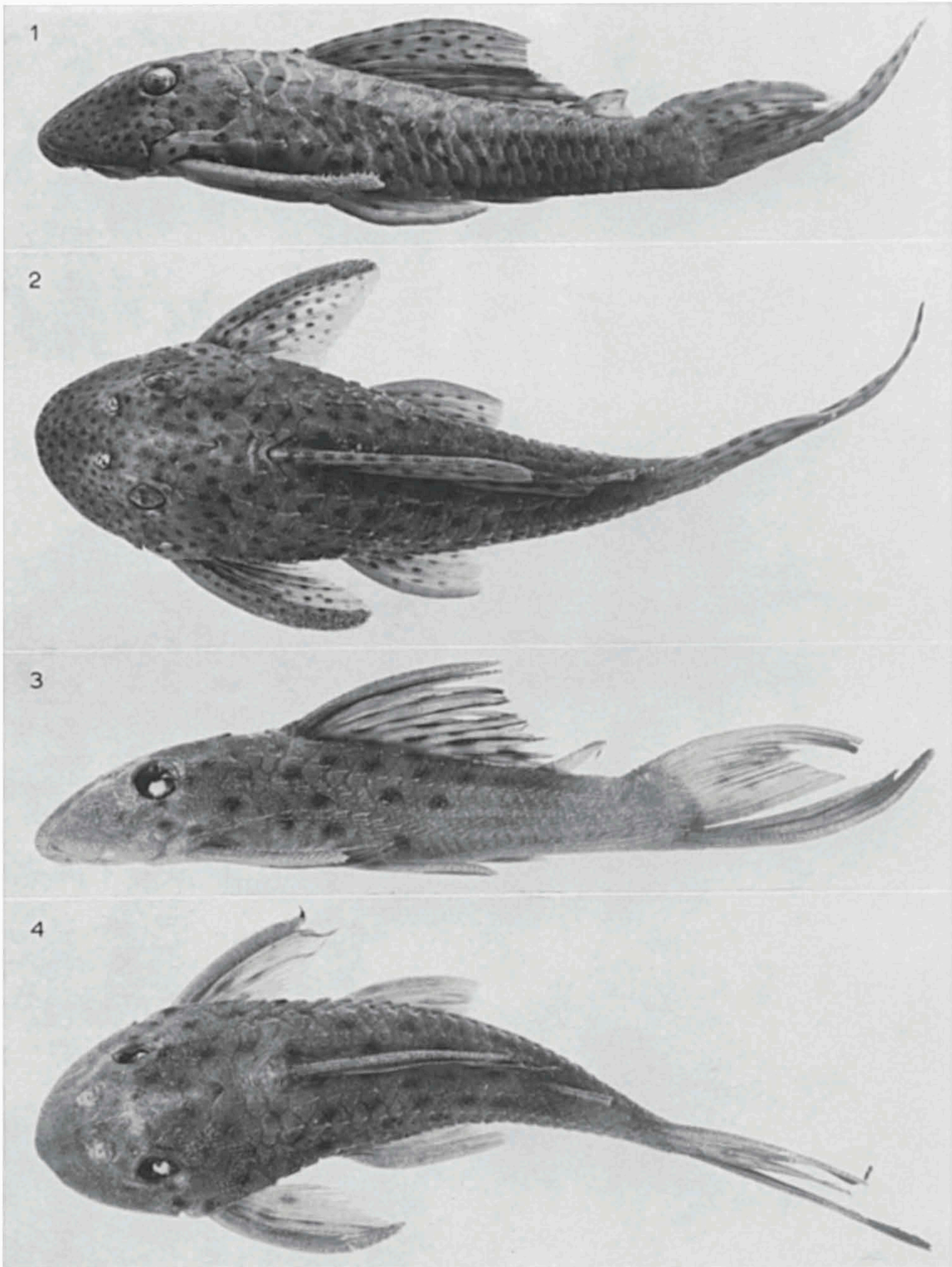


Fig. 1-4. *Hypostomus paucimaculatus* nov. spec.; holotype (RMNH 25468, standard length 120 mm) and juvenile paratype (RMNH 25469, standard length 53 mm), in lateral and dorsal view.

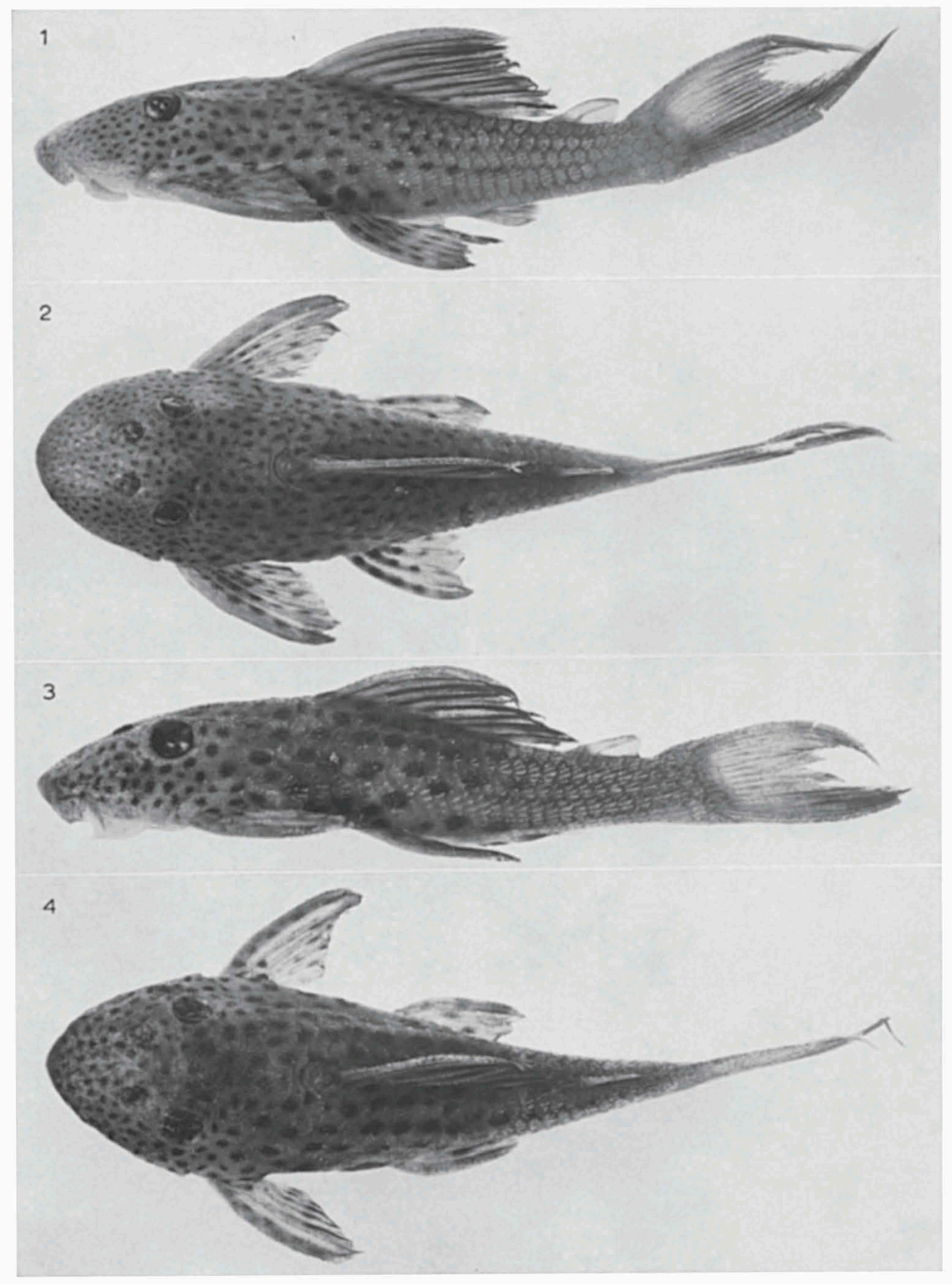


Fig. 1-4. *Hypostomus pseudohemiurus* nov. spec.; holotype (RMNH 25516, standard length 62 mm) and juvenile paratype (RMNH 25516, standard length 37 mm), in lateral and dorsal view.

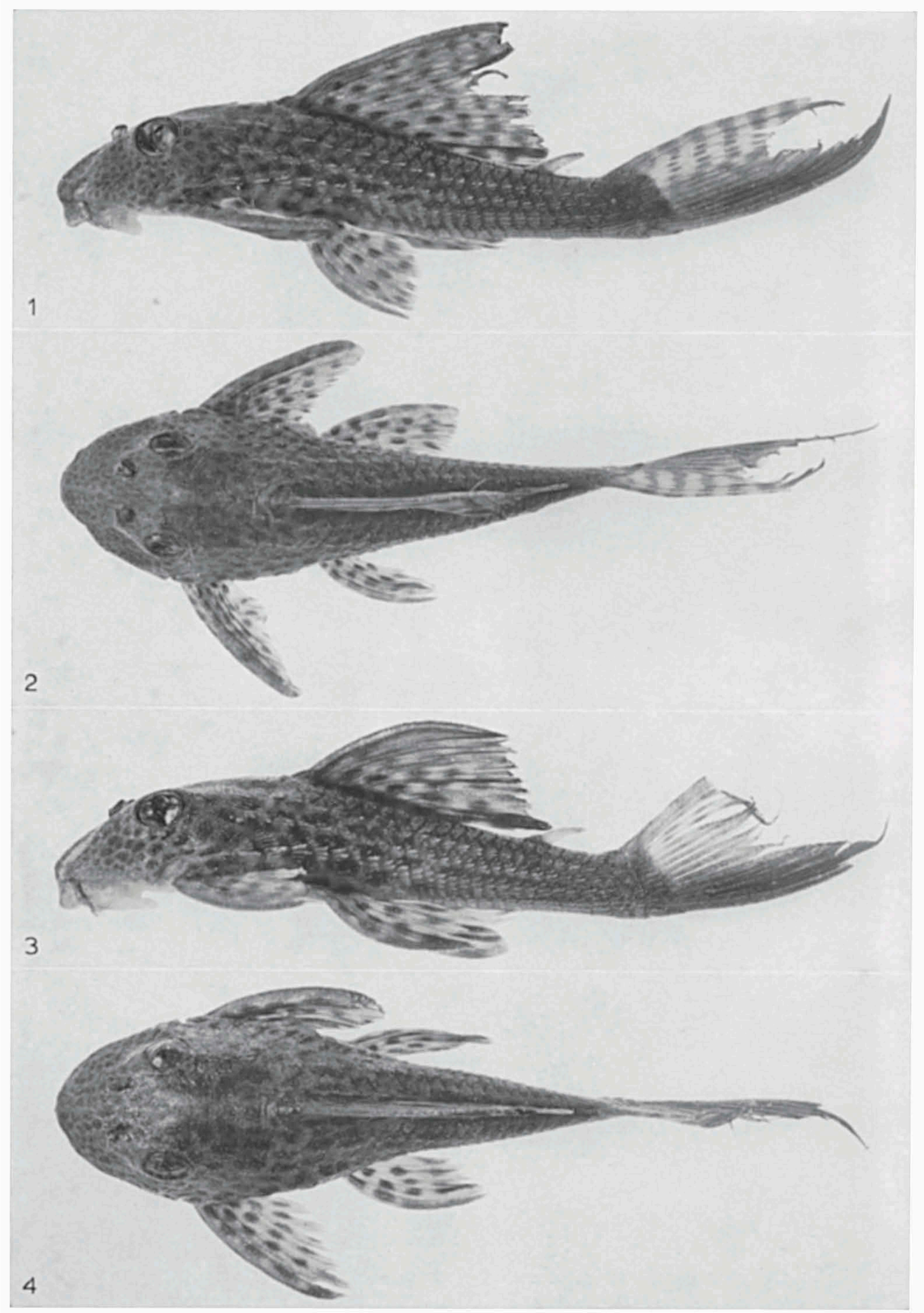


Fig. 1-4. *Hypostomus pseudohemiurus macrophthalmus* nov. subspec.; holotype (RMNH 25514, standard length 65 mm) and juvenile paratype (RMNH 25514, standard length 46 mm), in lateral and dorsal view.

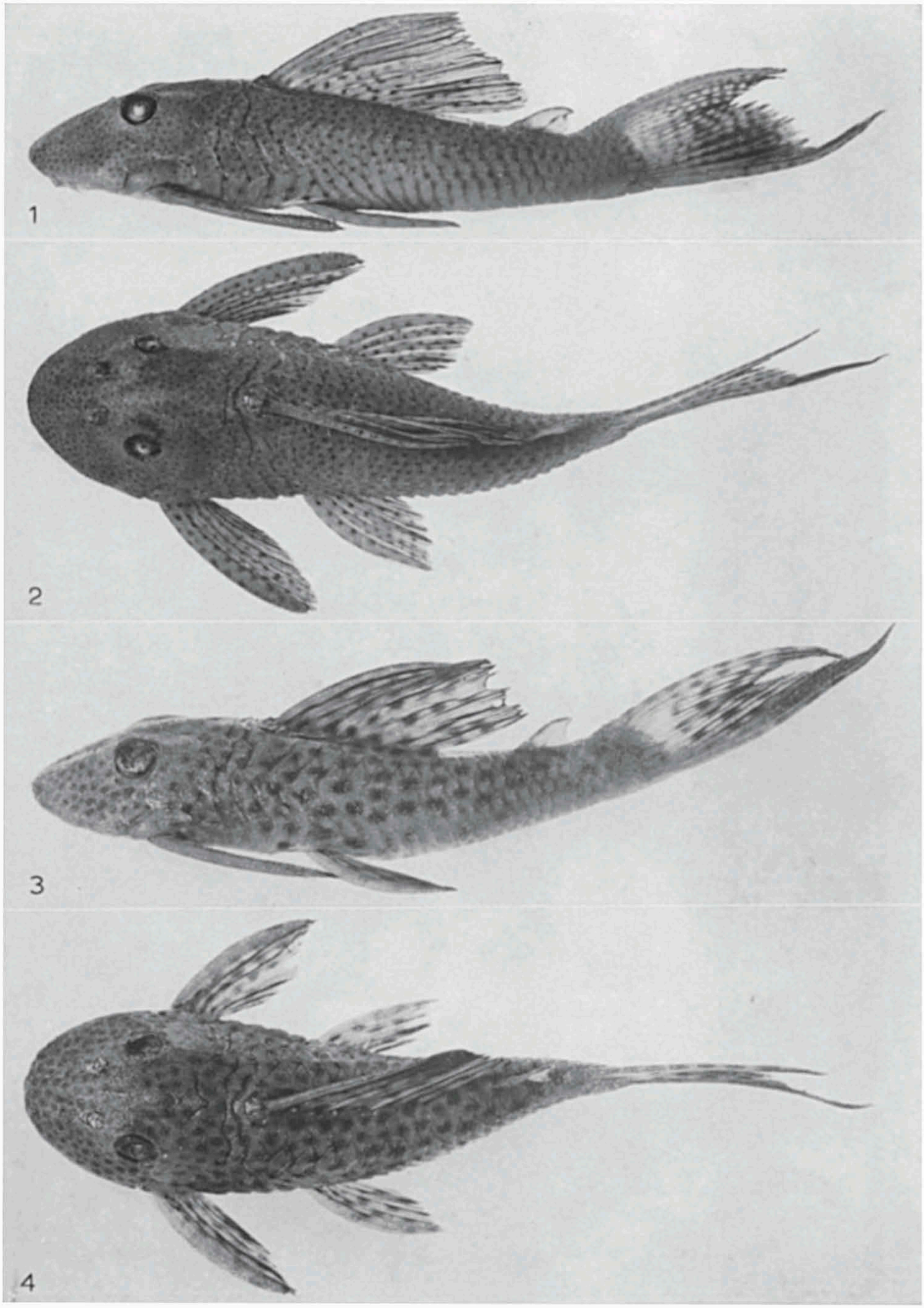


Fig. 1-4. *Hypostomus saramaccensis* nov. spec.; holotype (RMNH 25488, standard length 115 mm) and juvenile paratype (RMNH 25488, standard length 70 mm), in lateral and dorsal view.

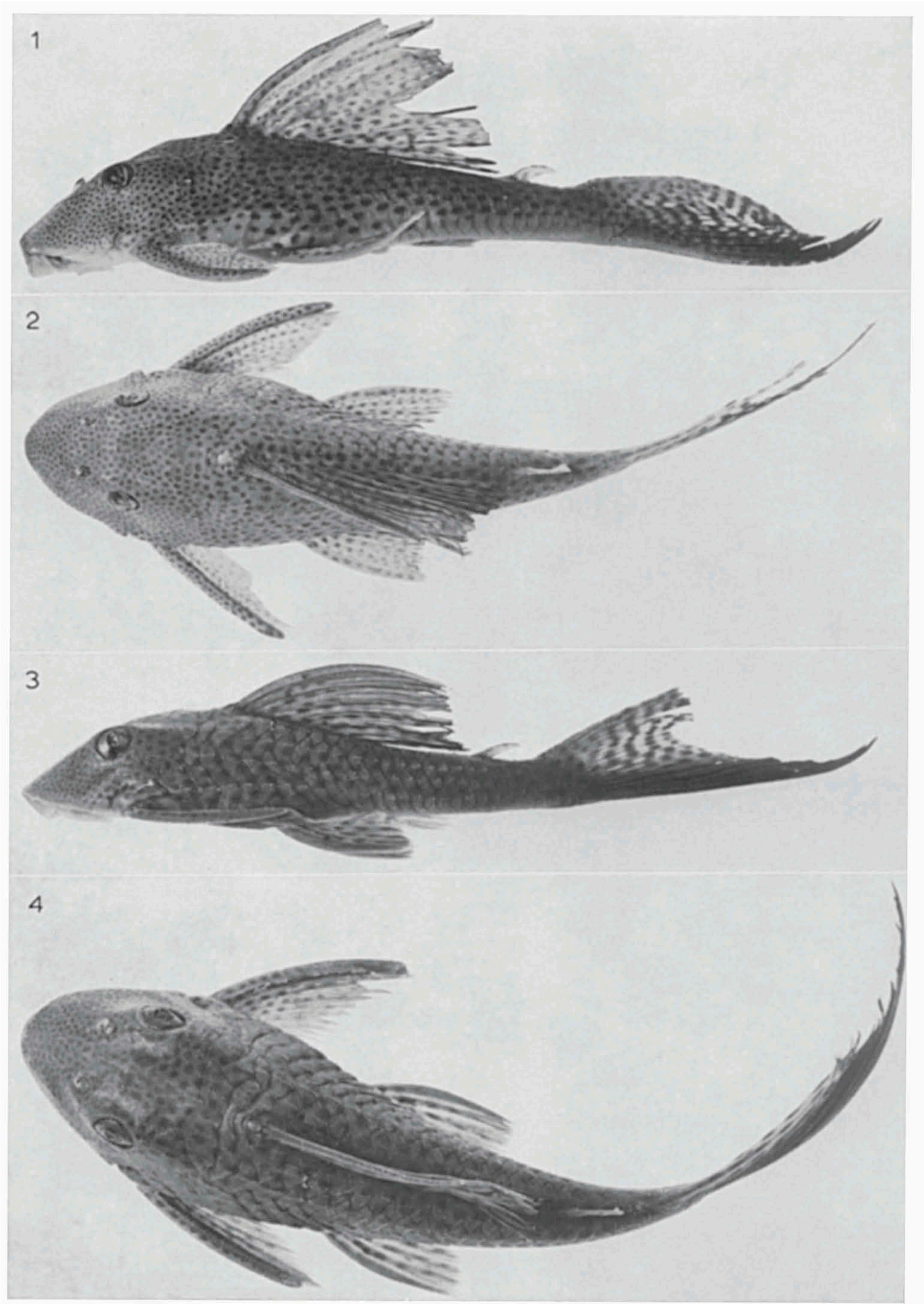


Fig. 1-4. *Hypostomus sipaliwinii* nov. spec.; holotype (RMNH 25481, standard length 126 mm) and juvenile paratype (RMNH 25481, standard length 83 mm), in lateral and dorsal view.

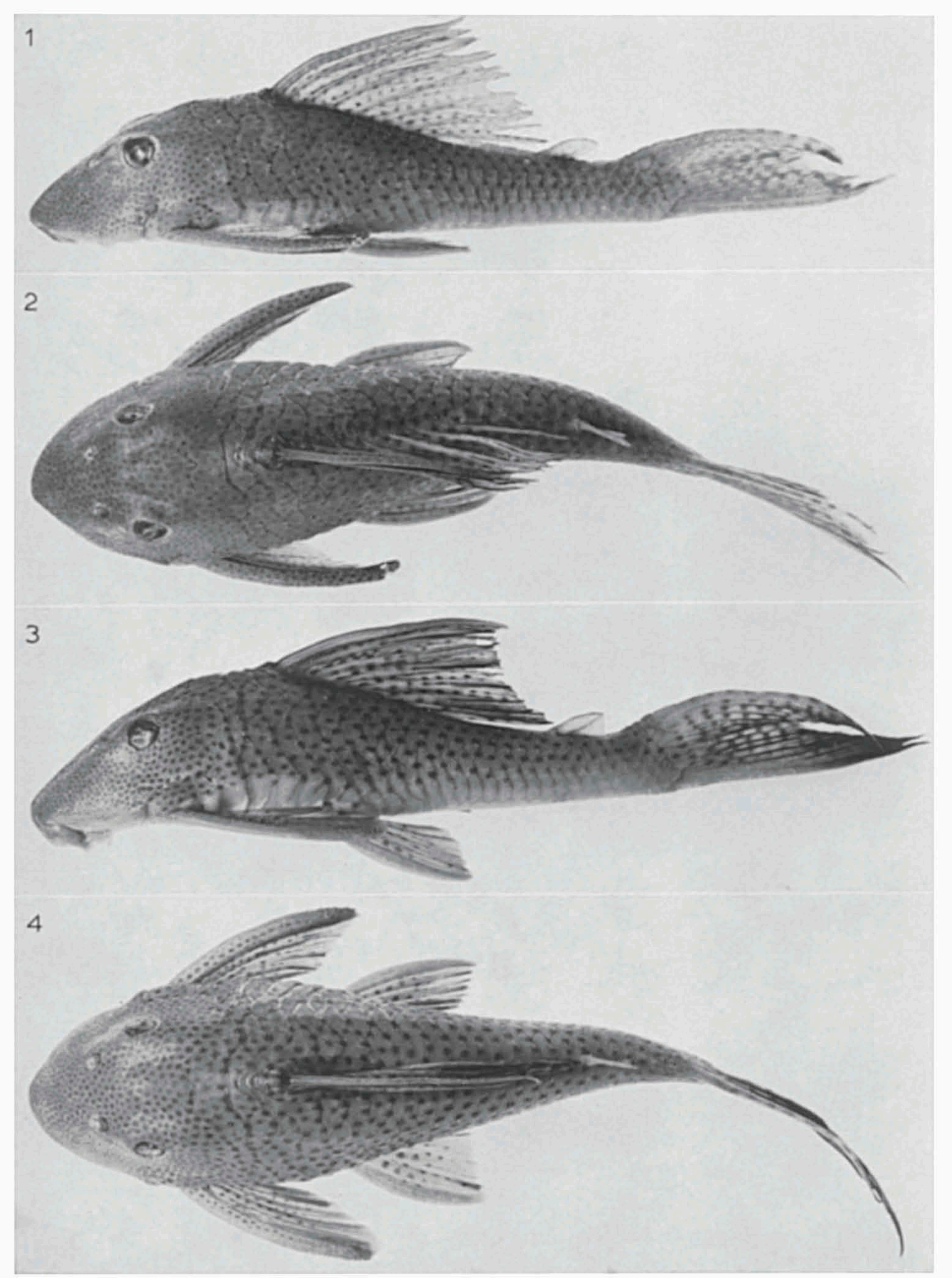


Fig. 1-4. *Hypostomus surinamensis* nov. spec.; holotype (RMNH 25497, standard length 150 mm) and paratype (RMNH 25491, standard length 150 mm, representing the more intensely spotted variation), in lateral and dorsal view.

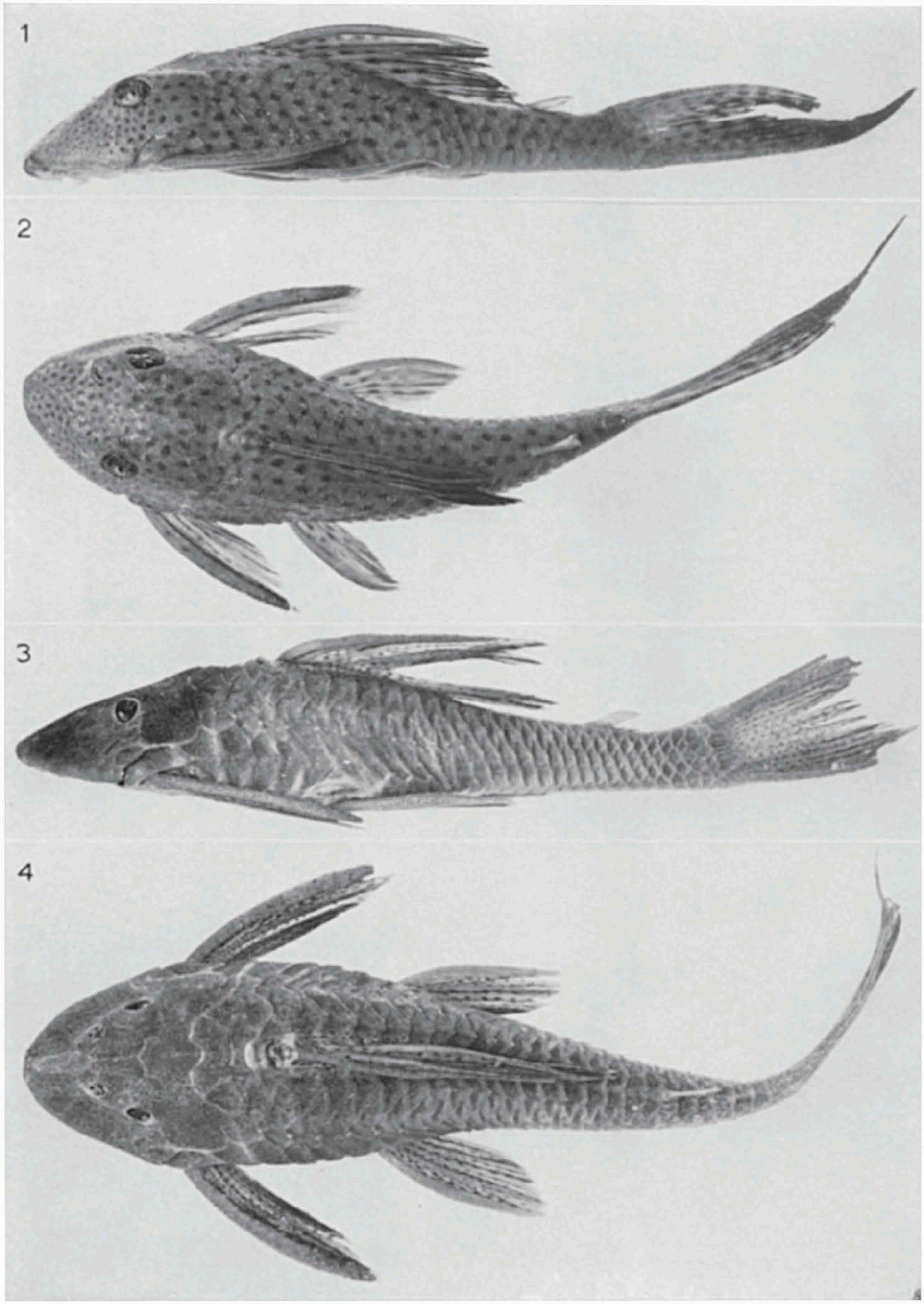


Fig. 1, 2. *Hypostomus surinamensis* nov. spec.; juvenile paratype (RMNH 25496, standard length 82 mm), in lateral and dorsal view; fig. 3, 4. *Hypostomus tenuis* nov. spec.; holotype (RMNN 16198, standard length 195 mm), in lateral and dorsal view.

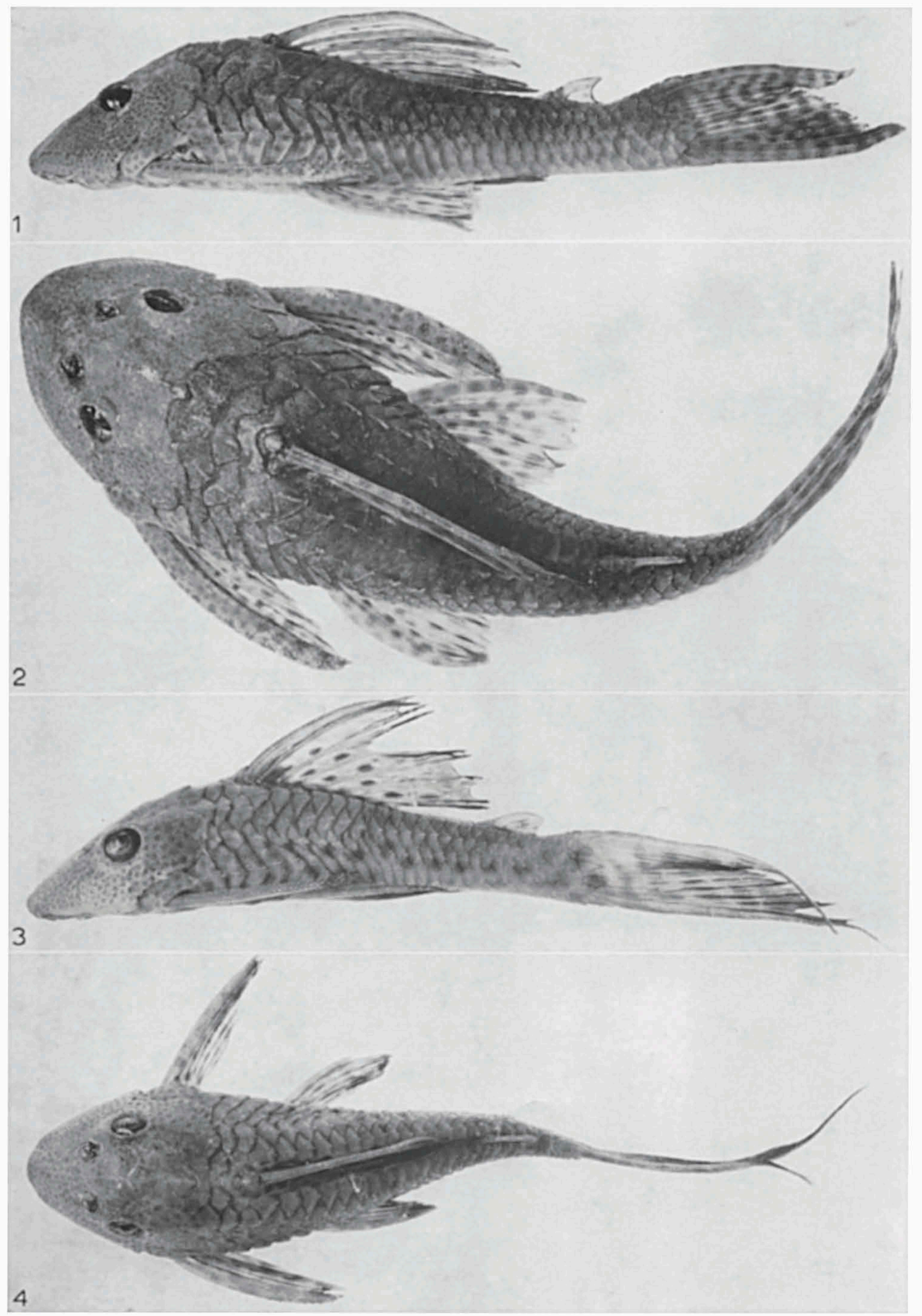


Fig. 1-4. *Hypostomus ventromaculatus* nov. spec.; holotype (RMNH 25507, standard length 150 mm) and juvenile paratype (RMNH 25509, standard length 68 mm), in lateral and dorsal view.

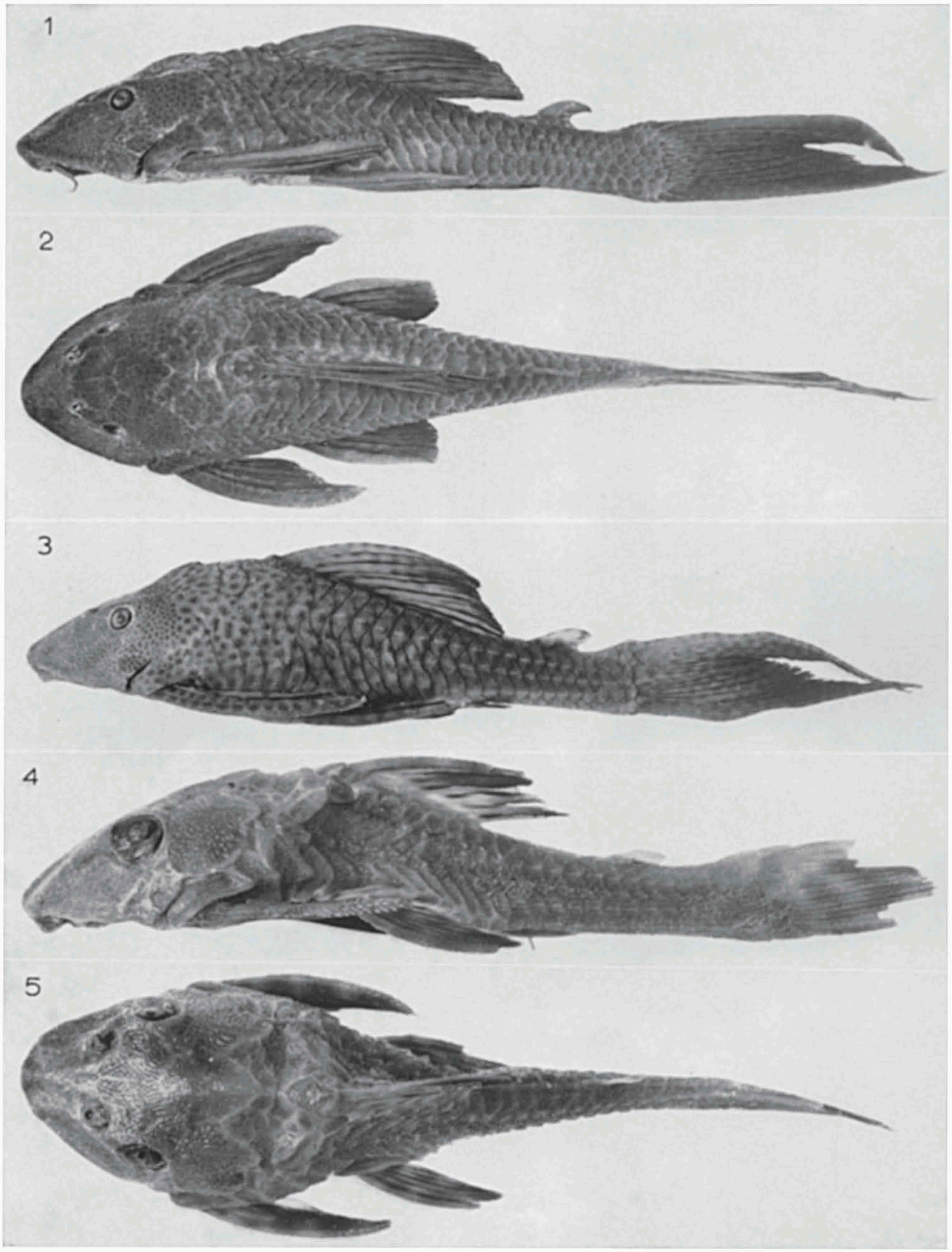


Fig. 1-5. *Hypostomus watwata* Hancock; neotype (London, BMNH 1932.11.10:31, standard length 260 mm), in lateral and dorsal view; a specimen showing a distinct and more usual distance between tip of deflated dorsal fin and second dorsal fin (RMNH 25512, standard length 202 mm), in lateral view; and a juvenile (RMNH 17339, standard length 52 mm), in lateral and dorsal view.

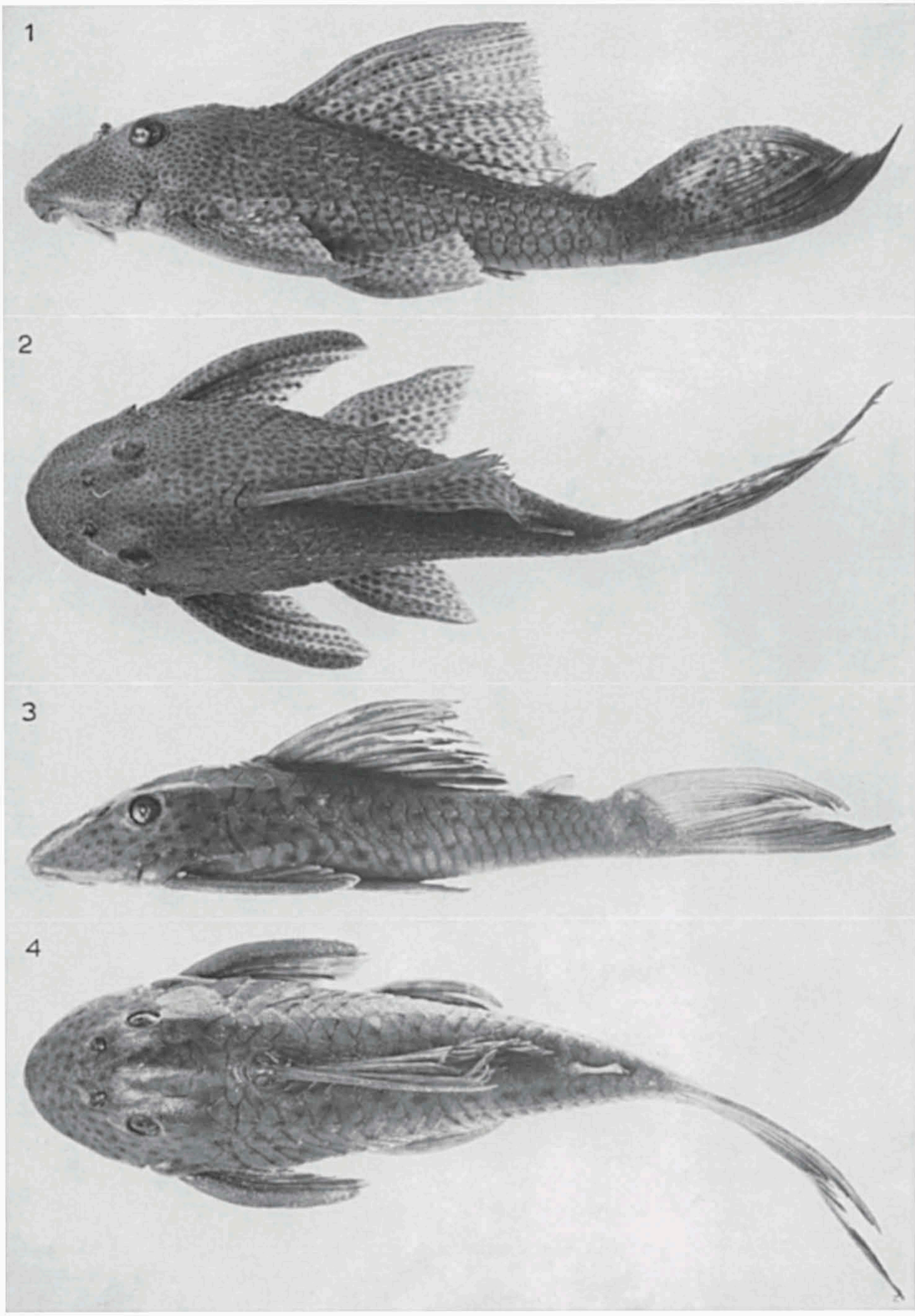


Fig. 1, 2. *Hypostomus crassicauda* nov. spec.; holotype (RMNH 25489, standard length 140 mm), in lateral and dorsal view; fig. 3, 4. *Hypostomus hemiurus* (Eigenmann); paratype (London, BMNH 1911.10.31 : 113, standard length 120 mm), in lateral and dorsal view.

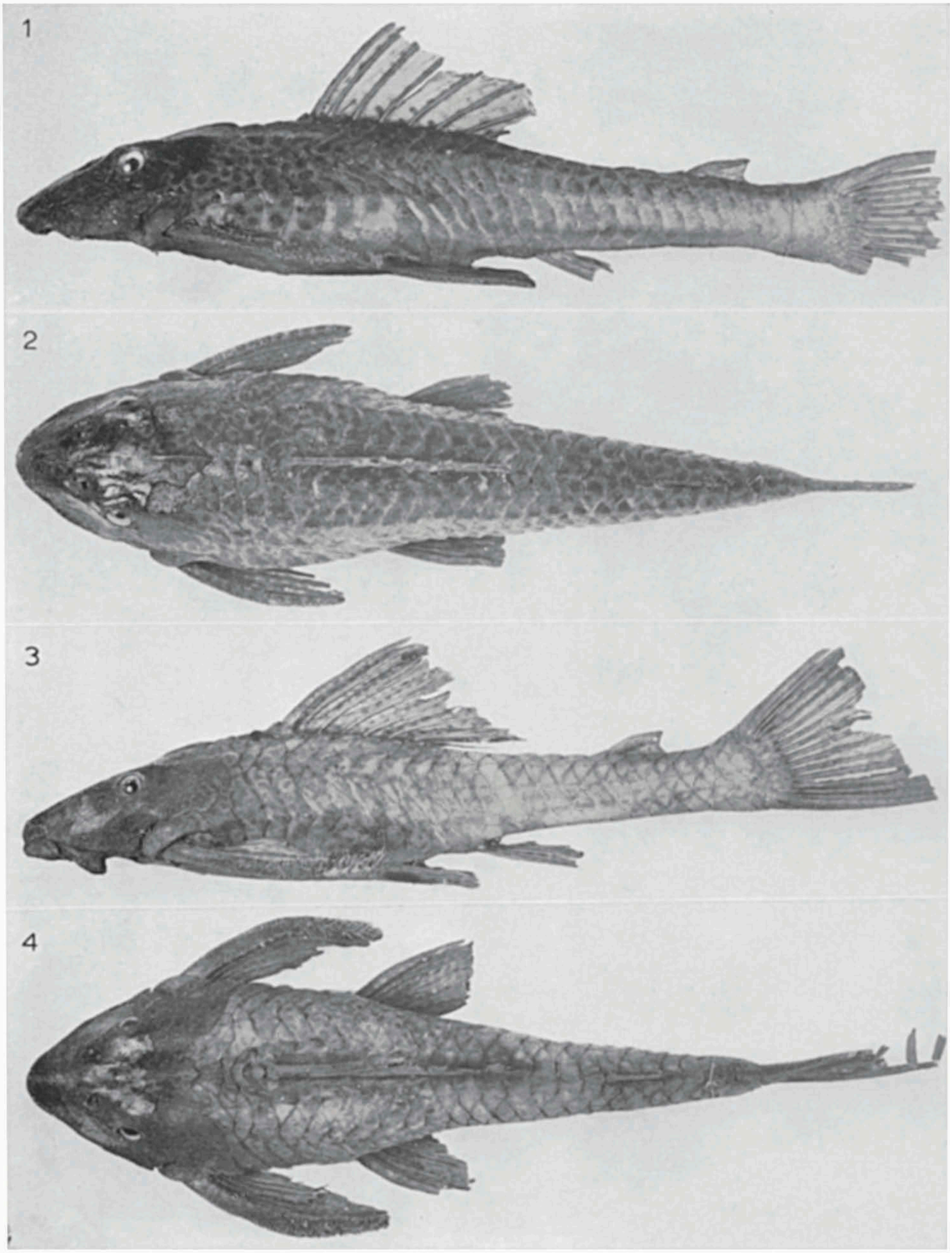


Fig. 1, 2. *Hypostomus plecostomus* sensu Valenciennes, nec Linnaeus, = *Hypostomus ?tenuicauda* (Steindachner) (Paris, MNHN A 9448, standard length 280 mm), in lateral and dorsal view; fig. 3, 4. *Hypostomus verres* Valenciennes; lectotype (Paris, MNHN A 9450, standard length 325 mm), in lateral and dorsal view.