Derhamia hoffmannorum gen. et sp. n. – a new pencil fish (Teleostei, Characiformes, Lebiasinidae), endemic from the Mazaruni River in Guyana

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Abstract. A new genus and species, *Derhamia hoffmannorum* gen. et sp. n., of the Lebiasinidae, Lebiasininae, close to *Lebiasina* but looking more like a *Pyrrhulina* or a *Nannostomus*, is described from the confluence of the Kamarang with the upper Mazaruni River in Guyana. Some anatomical peculiarities of the lebiasinids are discussed. The endemism of the isolated upper Mazaruni River is pointed out.

Résumé. Un genre et espèce nouveaux des Lebiasinidae Lebiasininae, proche de *Lebiasina* mais ressemblant plutôt à une *Pyrrhulina* ou un *Nannostomus*, *Derhamia hoffmannorum* gen. et sp. n., est décrit du confluent du Kamarang avec le haut Mazaruni en Guyana. Certaines particularités anatomiques des lebiasinides sont discutées. L'endémisme du haut bassin du Mazaruni est souligné.

Kurzfassung. Eine neue Gattung und Art der Lebiasinidae, Lebiasininae, *Lebiasina* nahe stehend aber stärker an eine *Pyrrhulina*- oder *Nannostomus*-Art erinnernd, *Derhamia hoffmannorum* gen. et sp. n., wird vom Zusammenfluss des Kamarang mit dem Mazaruni in Guyana beschrieben. Einige anatomische Merkmale der Lebianisiden werden diskutiert. Auf die Endemismen des isolierten oberen Mazaruni-Flusses wird hingewiesen.

Key words. Systematics, ichthyology, freshwater, Characiformes, Lebiasinidae, new genus and species, Guyana, endemism.

Introduction

More than 25 years ago, P. de Rham attended a seminar on the evaluation of the possible ecological and sociological impact of a large hydroelectric project including the construction of a dam on the upper Mazaruni River and the creation of a several hundred square km artificial lake. The seminar in Georgetown was convened by the government of Guyana. On this occasion P. de Rham made two field trips to the project area of Kamarang in north-western Guyana.

Fortunately the project was later abandoned, sparing at least temporarily from destruction the highly endemic flora and fauna, as well as the important Amerindian community living in this isolated region, one of the few unmodified spots on earth. Small samples of fish from the confluence of the Kamarang River with the Mazaruni River (see localities below), showed that only one species could be identified out of six, the rare characiidid *Ammocryptocharax lateralis* (Eigenmann, 1909), formerly only known from the Potaro River in Guyana. The five other characiform species were all apparently new to science, but in most cases difficult to place (too few or damaged specimens). Among them was an intriguing immature lebiasinid that was neither a pyrrhulinid nor a nannostomid and obviously an evolutionary novelty. In absence of important data such as the size of the species (most of the lebiasinins and some of the pyrrhulinins attain twice or thrice the size of the nannostomins), its colouration *in vivo* and its biology, it was decided (by the senior author) to wait in order to make the description of such an interesting form with more complete biological material. Only recently P. and M. Hoffmann (2002) succeeded in October 2001 in bringing back alive several specimens from the same location. These fish are now at adult size, and some were friendly given us for study. The aim of this paper is to describe this new genus and species.

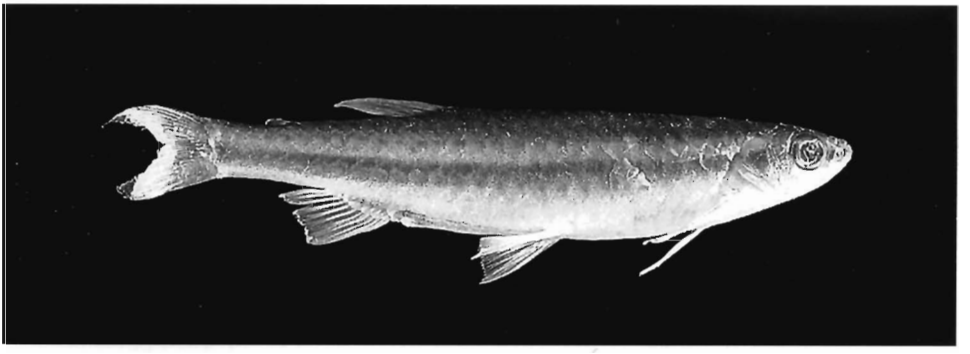

Fig. 1: Holotype of *Derhamia hoffmannorum* gen. et sp. n., MTD F 26 491, 61.4mm SL, lateral view.

In the meantime, publications confirmed the presence of endemic forms in the Mazaruni River; apart from the well-known *Nannostomus minimus* Eigenmann and *Nannostomus espei* (Meinken) the following occur: the cichlid *Mazarunia mazaruni* Kullander, the cyprinodontid *Rivulus torrenticola* Vermeulen & Isbrücker and the characiidid *Skiotocharax meizon* Presswell *et al.* (also from the Berbice River). The area is certainly highly interesting on the point of view of the biodiversity and should be protected.

Material and methods

Counts and proportions as in GÉRY (1972); measurements taken under a microscope with a digital square calliper. One specimen cleared and stained, one with the jaws dissected: the variability of the details not visible on undissected specimens is thus not well known. The unbranched fin rays (usually soft in Characiformes) are given in small Roman numbers. The proportions are given in table 1 as percentages (rounded to the nearest 0.05) of the SL and of the head length, and in the text in the classical form, to facilitate comparisons and discussion.
Abbreviations: **MHNG** = Muséum d'Histoire naturelle de Genève, **MTD F** = Staatliche Naturhistorische Sammlungen Dresden, Museum für Tierkunde, Fischsammlung; SL = standard length.

Derhamia gen. nov.

Gender: feminine
Type-species. *Derhamia hoffmannorum* sp. n.

Etymology. Named after the discoverer of the taxon, Patrick de Rham (Lausanne, Switzerland), well-known ichthyologist and aquarist, later expert ecologist to the Coopération Technique Suisse.

Diagnosis. An elongate lebiasinid with the general aspect of a *Pyrrhulina* or a short *Copeina*, with the dorsal fin posterior to midbody (whereas the other lebiasinids have the dorsal fin near midbody), but with an adipose fin rather well developed, and the general colour-pattern of a nannostomine, with a lateral black band very similar to that of *Nannostomus minimus* Eigenmann (see DITTMAR 2002), a vicariant from the Mazaruni of the type-species of *Nannostomus*, *N. beckfordi* (Günther).
Fins of moderate length, without filaments; pelvic fins anterior to midbody, dorsal fin distinctly posterior to midbody, anal fin short, with less than 14 rays in total, originating under the level of the last dorsal ray; adipose fin present; base of caudal lobes covered with 3–4 scales, not smaller than those on the caudal peduncle; dorsal region rounded; space between the insertions of the pectoral fins and of the pelvic fins distinctly but slightly keeled in V, the angle not acute (about 90°); a similar, more acute, keel between pelvic and anal.

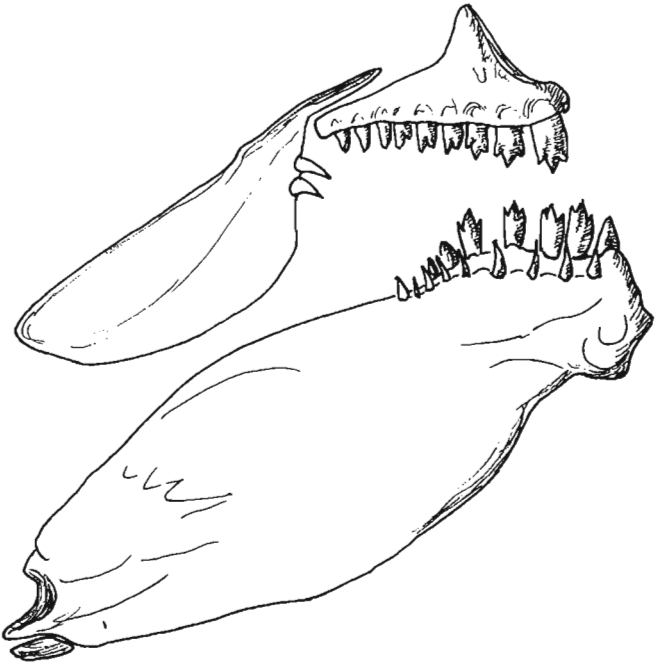

Fig. 2: Left jaws of *Derhamia hoffmannorum* gen. et sp. n. (internal view, semi-schematic assemblage).

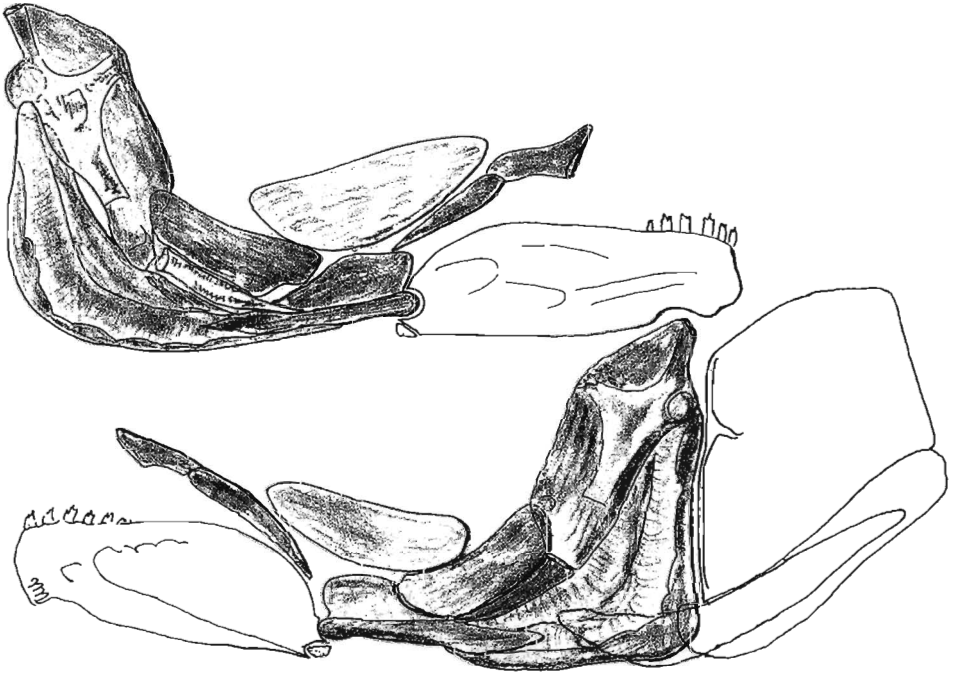

Fig. 3: Left hyomandibular series of *Derhamia hoffmannorum* gen. et sp. n. (above, external view; below, internal view with outline of opercle to show its form).

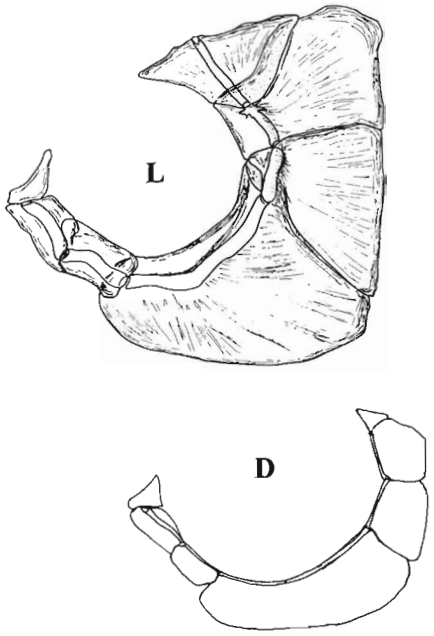

Fig. 4: Left circumorbital series of *Lebiasina bimaculata* (L) and *Derhamia hoffmannorum* gen. et sp. n. (D).

Lateral line very short, of only 5–6 pored scales; scales cycloid, of the *Lebiasina* type, as deep as long, the radii originating along a vertical radius from the central region and radiating in all directions, and the circuli of the apex zone convergent toward the axis of the scale, but simplified as compared with those of a *Lebiasina*, with about half of the circuli (ca. 20 in basal zone and 10 in apical zone (cf. approximately 40/20) and less radii, much more irregularly distributed; scales relatively large (the type–species has 30–32 longitudinal scales and 6 or 6 1/2 transverse scales from dorsal to pelvic).

Mouth sub-superior; premaxilla not movable over ethmoid, triangular with a distinct ascending apophysis (fig. 2); teeth tri-, bi- to unicuspid, uniserial, relatively not numerous, maxilla short, scarcely longer than the premaxilla, very partly covered by the antorbital, with a straight, thick dorsum, a convex, thin, anterior border and a narrow superior apophysis, with very few conical teeth at angle; dentary not movable on the rest of the mandible, with two series of teeth, the anterior one with less than 7 or 8 bi-, tri- to conical teeth and the posterior one with less than 10 conical teeth.

Hyomandibular series (fig. 3) of the lebiasinid type, i.e. not very elongate, only slightly longer than deep; the rectangular metapterygoid is complete, without indentation in its anterior part; whereas the anterior part of the quadrate, of which the border is vertical, is developed posteriorly, with the metapterygoid inserted within the posterior angle of the quadrate: the development of the two bones does not provide a more or less circular opening or fenestra; this is to be hypothesized a derived character, characteristic for the Lebiasinidae and uniquely shared by the members of the family (in *Nannaethiops*, Distichodidae, the gap is filled by the development of the symplectic); hyomandibular not two-headed; opercle distinctly low, almost longer than deep, not rounded posteriorly. Six circumorbitals (fig. 4), all but the sixth with a completely developed canal, the sixth (dermosphenotic), triangular, rather rudimentary and its canal not completely developed (at least in juvenile specimens); 1st and 2nd suborbitals separated by a suture, the first one slightly covering the maxilla, 3rd elongate horizontally, separated from the 4th by an oblique suture somewhat above the angle and in contact with the subopercular canal below, SO4 and SO5 extending posteriorly almost up to subopercular canal; no supraorbital; nares of the *Lebiasina* s.l. type, i.e. close together at middistance between tip of snout and eye, the anterior one formed by a very short round tube

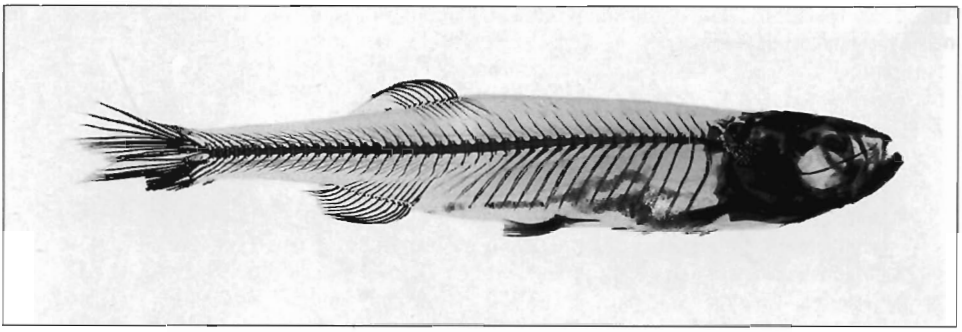

Fig. 5: *Derhamia hoffmannorum* gen. et sp. n., MTD F 26 497, 21.2mm SL, cleared and stained, lateral view.

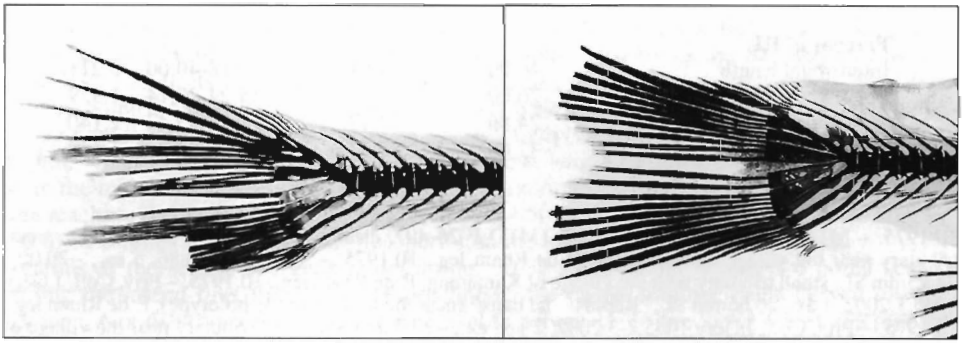

Fig. 6: *Derhamia hoffmannorum* gen. et sp. n., MTD F 26 497, cleared and stained, hypural complex (left).
Fig. 7: *Lebiasina panamensis*, MTD F 22 306, cleared and stained, hypural complex (right).

and the posterior one, oval, immediately behind, with only one or two lamellae (instead of ca. 8 visible ones in *Lebiasina)*; no fontanels; top of the head slightly convex, mostly formed by the frontals fused along a suture in the form of an S; about 7 pores on each side; supraorbital and dermosphenotic canals anastomosing, parietal branch of the suborbital canal not reaching the parietal bone; branches of the mandible, forming a V in ventral view, not a U as in certain *Lebiasina* s.l.: about 7 pores on each side; gill-rakers relatively numerous (about 10/15 gill-rakers on the first branchial arch in the type-species); gill-membranes not continuing over isthmus, joined to it on a very small, anterior, part; structure of the gas-bladder not known; probably 4 branchiostegal rays, the fourth one rudimentary; 45 vertebrae (counted on the cleared specimen), including 4+15 precaudal and 26 caudal ones (as compared with 4+16+20 in a cleared specimen of *Lebiasina* (or *Piabucina*) *panamensis*). Hypural complex less compact than that of a generalized *Brycon* (WEITZMAN 1962), with only 3 upper hypurals (or the first fused, cf. 4 in *Brycon*), no epural, and the procurrent rays more numerous below (ca. 9–10) than above (ca. 5–6).

Derhamia hoffmannorum sp. n. (Figs. 1–6, 8, 11; Tab. 1)

Holotype: MTD F 26 491, male, 61.4mm SL, sand bank at the confluent of the Kamarang River and the Mazaruni River, north-western part of Guyana north of the Roraima, P. and M. Hoffmann leg., 10.2001.
Paratypes: MTD F 26 492–26 493, 2 ex., 24.8-56.3mm SL, same data as for the holotype. – MTD F 26 494, 1 ex., 24.14mm SL, "Rapids sand bank" (near the locality of the holotype), P. de Rham leg.,

Tab. 1: Morphometric data of the holotype and 6 paratypes of *Derhamia hoffmannorum* gen. et sp. n., SD = standard deviation.

	Holotype	Mean	Range	SD
Standard length (mm)	61.4		20.3-61.4	
Percents of SL				
Body depth	18.89	19.78	18.35-21.63	1.196
Head length	22.36	24.35	22.36-26.77	1.439
Predorsal distance	63.51	63.18	60.99-65.15	1.637
Postdorsal distance	37.30	38.97	36.29-41.07	1.726
Preventral distance	47.88	47.30	45.77-48.61	0.994
Postventral distance	57.68	56.11	54.27-58.08	1.423
Caudal peduncle depth	8.31	8.21	7.34- 8.88	0.502
Caudal peduncle length	20.52	20.69	19.23-23.92	1.658
Percent of HL				
Interorbital length	40.00	34.51	31.18-40.00	3.211
Maxilla	20.00	20.00	18.24-22.14	1.329
Snout length	24.80	22.13	19.74-25.42	2.140
Eye	32.00	32.91	30.26-34.34	1.432

10.1975. – MTD F 26 495–26 497, 3 juv., (MTD F 26 497, cleared and stained), 21,2mm SL, small tributary near the village of Kamarang, P. de Rham leg., 10.1975. – MHNG 2630.86, 5 ex., ~20.00 - 24.25mm SL, small tributary near the village of Kamarang, P. de Rham leg., 10.1975. – Priv. Coll. J.Géry 1055.1.2002, 1 ex., 26.66mm SL, "Rapids sand bank" (near the locality of the holotype), P. de Rham leg., 10.1975. – Priv. Coll. J.Géry 1055.2-3.2002, 2 juv. ex., ~20.0 mm SL, small tributary near the village of Kamarang, P. de Rham leg., 10.1975.

Etymology. Named after Mr. Peter Hoffmann and Dr. Martin Hoffmann, Salzgitter and Hannover, respectively, Germany, who managed to collect and acclimate the species and gave us precious information about its biology.

Diagnosis. A small pencil fish (family Lebiasinidae) of about 60mm SL, probably not reaching more than 65mm SL in males and 70mm SL in females in aquarium, evoking an improbable hybrid between a *Pyrrhulina* and a *Nannostomus*, characterized by: (1) an elongate body (greatest depth 4.60-5.45 in the SL) with a narrow caudal peduncle, a symmetrical caudal fin and a dorsal fin far backward; (2) the presence of an adipose fin; (3) 30-32 longitudinal scales with only the first 5-6 scales pored, 6 or 6½ transverse scales from dorsal to pelvic, 15½ or 16 predorsal scales and 10 or 11 circumpeduncular scales; (4) a somewhat superior mouth with a short maxilla (its apparent length 4.50-5.50 in the head length), not quite reaching the level of the eye's front margin; (5) a relatively large eye; and (6) a single longitudinal black band surmounted by a light line, from opercle to base of middle caudal rays.

Description (see table 1 for proportions in % of SL and of head length of the 7 largest typical specimens, 20.25-61.40mm in SL).
Greatest depth between pectoral and pelvic 4.60-5.45 in the SL; body laterally compressed; dorsal fin posterior to midbody, predorsal 0.56-0.67 in postdorsal, ca. 61-65% of the SL, its rays not prolonged into filaments; insertion of pelvic fin anterior to midbody, prepelvic distance 1.14-1.22 in the postpelvic distance, ca. 49-49% of the SL; predorsal region slightly convex behind supoccipital, then rounded up to dorsal; a not much pronounced ventral keel between pectoral and anal fin, except at the level of the insertion of the pelvic fins; pectorals and pelvics relatively short, their tip not reaching the next respective fin; anal fin insertion

Fig. 8: *Derhamia hoffmannorum* gen. et sp. n., alife in aquarium, topotype, male, about 60mm SL, not preserved.

under the last dorsal ray, its rays not prolonged into filaments; adipose fin relatively long and narrow, present in all specimens; caudal peduncle long, 19-24% of the SL, and narrow, its depth 2.35-3.25 in its length and ca. 7.5-8.5 of the SL; caudal not much indented, the lobes not very pointed and equal, not filamentous, their base covered with 3-4 rows of scales, not smaller than those on the caudal peduncle; head length (without membrane) 3.75-4.15 in the SL; bony interorbital rather broad, 2.75-3.20 in head length (without membrane); eye vertical, in the middle of head, rather large, 2.90-3.30 (holotype) in head; maxilla rather short, not quite reaching the level of the front margin of eye, 4.50-5.50 in head; snout of medium length, 4.50 to 5.50 times in head; mouth subsuperior, at the level of the upper half of eye.
Structure of the scales: see generic definition; 30-32 longitudinal scales, 5-6 pored scales forming the lateral line, the row corresponding to the lateral line not much curved toward abdomen; 6 or 6½ transverse scales from dorsal to pelvic; 15-16 predorsal scales in a regular series, 10 or 11 around caudal peduncle; dorsal fin with 2 unbranched rays, followed by 8 branched ones; 10 pterygiophores, the first one between the 15th and 16th neural spine; anal fin iii,9-10, the first unbranched ray rudimentary, the last branched one split to its base; 12 pterygiophores (minimum, others maybe not yet developed at less than 20mm SL, the size of the preparation), the first one between the 1st and 2nd haemal spine; pectoral fins i,12; pelvic fins i,7.
Premaxillary teeth uniseried, numbering 9 on each side: 5-6 mostly tricuspid teeth followed by 4-3 conical ones; maxilla with one or two slightly recurved conical teeth at angle; mandible with an anterior row consisting of 6 tricuspid teeth about the size of the premaxillary ones; the median (first) one may be bicuspid or conical; posterior row composed only of smaller, conical, teeth, numbering ca. 9, the 5 or 6 median ones just behind the main series and the 4 or 3 other ones, more posterior, rejoining the border of the bone, which makes believes that one has to deal with an outer series of about 10 teeth and a reduced inner series of about 5 teeth; circumorbitals and nares: see generic description; about 10/15 gill-rakers, rather short (the longest about half of a pupils diameter).

Colour-pattern in preservative. A longitudinal dark brown band from chin to the base of the middle caudal rays, through maxilla, eye, postorbitals, opercle and humeral region, on the scale row of the lateral line, where it is darker but does not form a real humeral spot, about 2/3 of a scale high, then slightly enlarged and curved toward the abdomen and along the inferior part of the caudal peduncle; it goes up slightly to attain the middle of the end of the peduncle and the base of the middle rays, without reaching their tip; back brown coloured on about 3 scales, separated from the longitudinal band by a light, not brilliant, band, its tint about that of the abdomen; a dark brown line along predorsal line from occiput to dorsal; fins speckled with a few chromatophores, particularly the pectorals, dorsal and over the accessory caudal rays; an indistinct dark short band on abdomen between pelvic and anal, above the ventral profile at the junction of the V of the keel and the curve of the belly; some dark at

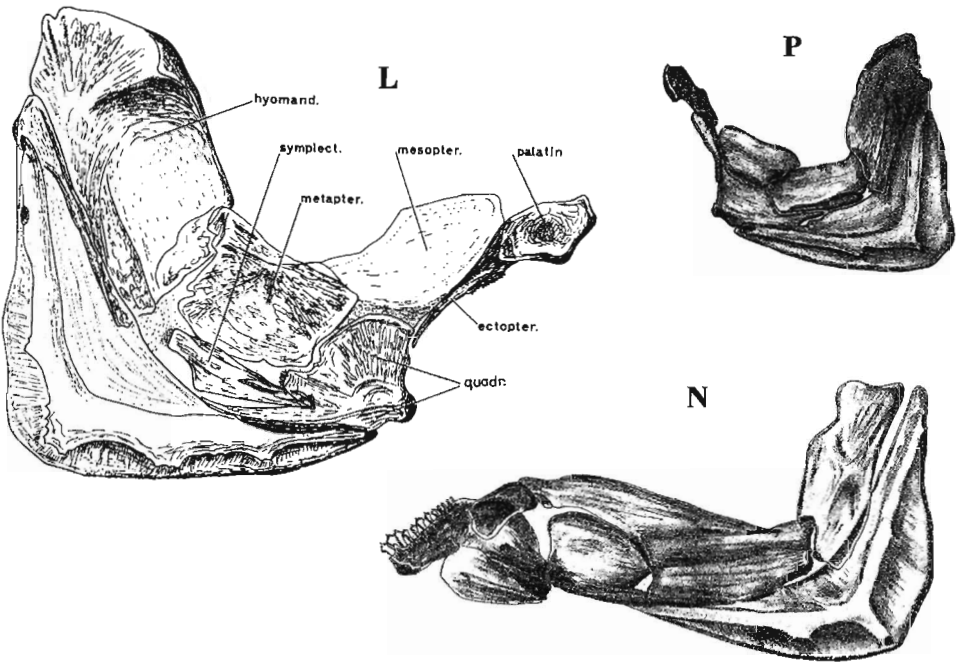

Fig. 9: Right hyomandibular series of *Lebiasina bimaculata* (L), external view; *Pyrrhulina filamentosa* (P), internal view and *Nannostomus beckfordi* (N), internal view. Abbreviations: hyomand. = hyomandibular, symplect. = symplectic, metapter. = metapterygoid, mesopter. = mesopterygoid, palatin. = palatine, ectopter. = ectopterygoid and quadr. = quadrate.

the base of inferior caudal rays, at least in some specimens. The lateral band corresponds apparently to the primary band characteristic of several nannostomins, for example that of *Nannostomus beckfordi*, the type-species of the genus, and of *N. minimus* from the Mazaruni River.

Colouration in life. According to photographs taken by Mrs. Hoffmann after months of acclimatization (fig. 8), the male is elegant but without striking colours; the black lateral band is surmounted by a light yellowish-white band, with some golden tint in the humeral region, and a dark-olive back; the abdomen is white, the upper part of eye somewhat shiny yellowish, scarcely golden, as is the eye; the fins are not coloured. The females, usually larger, are paler, with the lateral band often broken forming a separated, roundish, humeral spot. The dark colouration of the back is formed by the lozenge-shaped crossbars of the border of the scales, with the lighter centre of the scales more conspicuous than that of the males.

Discussion

(A) Generic level. In our discussion, we will admit that the Lebiasinidae correspond to the Lebiasininae as defined by WEITZMAN (1964), and that they are a monophyletic unit, possibly the sister group of the Erythrinidae, as suggested partly in studies based on cladistics methods (see also BUCKUP 1998, VARI 1995, OYAKAWA 1997, ORTI 1997a-b and ORTI & MEYER, 1997). It should be remarked, however, that these methods failed to reveal the phylogeny of certain characiformes lines. In particular the lebiasinid *Nannostomus* is especially resistant to these methods, at an infrafamilial level (see discussion in WEITZMAN & COBB 1975).

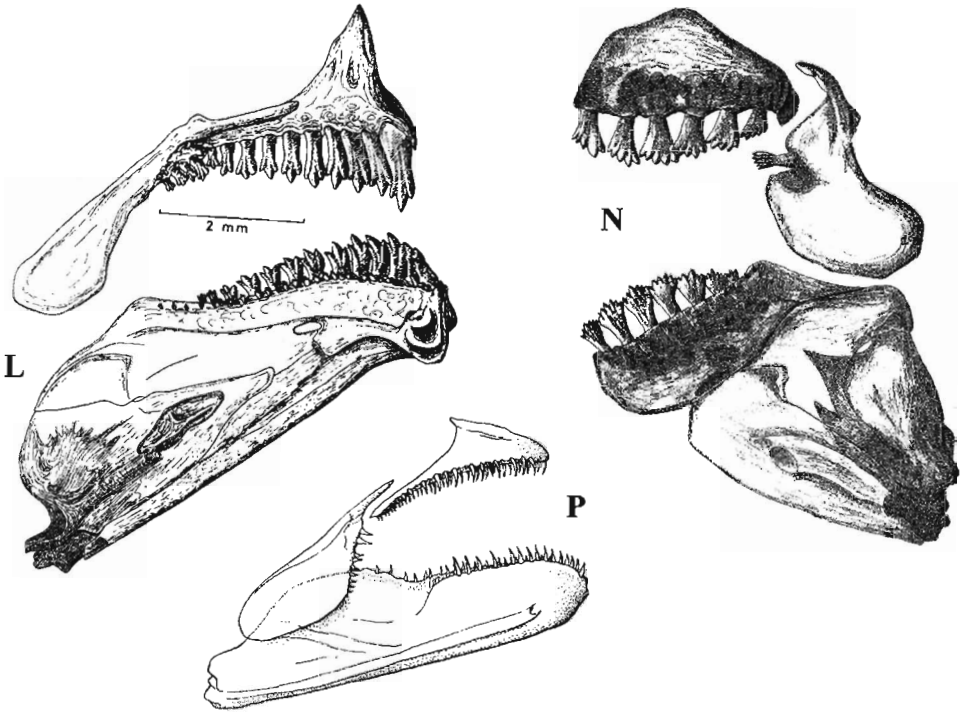

Fig. 10: Left jaws of *Lebiasina bimaculata* (L), internal view, semi-schematic assemblage; *Pyrrhulina filamentosa* (P), external view and *Nannostomus beckfordi* (N), external view, semi-schematic assemblage.

Furthermore we will assume that the Lebiasinidae (in need of a revision, promised since some years and awaited with great interest by the ichthyologists) are composed of three subfamilies, and not two as classically admitted (see for example GÉRY 1978) following the distribution of the synapomorphies (13 for *Lebiasina–Piabucina* and 9 uniting *Copeina, Pyrrhulina, Copella* and *Nannostomus*). We see the Lebiasininae with two genera, including *Derhamia* gen. n.. The genus *Piabucina* classically distinct from *Lebiasina* by the absence of ectopterygoid teeth and the presence of an adipose fin, usually, will be treated here as a putative junior synonym. This is purely for reason of simplicity and of course temporary. We see the Pyrrhulinae with three genera (*Pyrrhulina, Copeina, Copella*) and the Nannostominae of one genus (*Nannostomus*). Indeed, the trophic specializations seen in *Nannostomus*, namely the elongation of the hyomandibular series (fig. 9), the movable premaxillary (over ethmoid) and dentary (over the rest of the mandible, an unique specialization) and the hand-like form of the teeth (fig. 10), are so different to that of *Pyrrhulina* that the two genera cannot be included in the same subfamily. In *Nannostomus beckfordi* (fig. 9), the hyomandibular series is almost twice as long than deep, with a long quadrangular metapterygoid also twice as long than deep; the mesopterygoid is elongated, whereas the palatine and the ectopterygoid, apparently fused together, are short and ventrally directed (instead as dorsally directed in *Lebiasina* as well as in *Hoplias*, Erythrinidae).

The habitus of *Derhamia* gen. n. shows immediately that it belongs to the family Lebiasinidae. The following features, confirming its lebiasinid organization and included in the putative synapomorphies enumerated by WEITZMAN (1964), could be observed: no hyomandibulary fenestra; no supraopercular; supraorbital and dermosphenotic canals anastomosed and parietal branch of supraorbital canal not reaching parietal; antorbital separated from the

first suborbital; six circumorbitals present, well developed; fontanel absent; body elongate with the dorsal fin in front of the short anal fin; two rows of teeth on the lower jaw; scales relatively large, etc.
Within the Lebiasinidae *Derhamia* gen. n. is excluded from the Nannostominae by the structure of the hyomandibular series and from the Pyrrhulininae and the Nannostominae by the four branchiostegal rays, the presence of some scales on the caudal base and the structure of the jaws.
Derhamia gen. n. is clearly a miniaturized (or neotenic?) lebiasinin in the strict sense, and it has to be compared with *Lebiasina* as defined above (i.e. including *Piabucina*). It is worth noting that it seems to follow the tendency toward miniaturisation and regression (losses of lateral line, of adipose etc.) observed in the Lebiasinidae in general (as well as in several other characiform clades).
Derhamia gen. nov. differs from *Lebiasina* (including *Piabucina*) by the following features:
(1) small size (cf. medium-sized),
(2) dorsal fin posterior to midbody, giving an habitus comparable to that of a pyrrhulinin (cf. dorsal fin at midbody, rarely slightly anterior or posterior),
(3) a distinct abdominal keel in the form of a V (cf. keel less distinct),
(4) body laterally compressed (cf. almost cylindrical),
(5) head of moderate length and thickness, with a rather large eye (cf. head heavy with a small, oblique eye giving the aspect of a predator (like an erythrinin for example),
(6) hyomandibular series distinctly less deep, with the palatine and the ectopterygoid narrow, the mesopterygoid, metapterygoid and quadrate less vertically developed; preopercle less developed toward the front, reaching about the level of the anterior tip of the symplectic (cf. largely anterior to it),
(7) circumorbital series very narrow, the SO3 horizontally elongate, the SO6 regressed (cf. circumorbitals very broad, more than 2 times broader, in relation with the smaller eye, the SO3 deep, almost triangular and the SO6 well developed),
(8) mouth small, subsuperior, the maxilla short and the mandible not very heavy and prominent (cf. mouth rather big, subterminal, the maxilla of moderate length and the mandible heavy and prominent)
(9) no ectopterygoid teeth (cf. some teeth on ectopterygoid, at least in some species) and dentition reduced, with less than 8-10 tricuspid teeth on each jaw, tending to loose their cuspids, one or 2 conical maxillary teeth and less than 10-11 conical ones in the second mandibulary series (cf. strong premaxillary teeth, all tricuspid, and about twice the number of well developed tricuspid teeth on maxilla and mandible, and of conical ones on mandible),
(10) lateral line much regressed, with only 5-6 pored scales (cf. lateral line complete),
(11) adipose fin present (cf. adipose fin in the process of disappearing, often absent),
(12) scales with the radii originating along a vertical radius (cf. radiating from the centre), circuli not numerous (cf. about twice the number in *Derhamia* gen. n.),
(13) gill membranes not fused together (cf. partly fused),
(14) caudal vertebrae 26, cf. ca 20; hypural complex with a rudimentary first (upper) hypural (cf. well developed), no epural, or not yet developed (cf. one at last), about 7 upper and 7 lower procurrent rays (the rest maybe not yet developed (cf. about 5/10),
(15) nares with much less lamellae and base of caudal lobes less covered than in *Lebiasina,* and
(16) different behaviour: surface fish often hiding under floating plants (cf. rather aggressive fishes living mostly in mid-water and near the bottom).

(B) Species level. *Derhamia hoffmannorum* gen. et sp. n. is distinct from all other known lebiasinids for the reasons enumerated in the generic discussion.
The differences in the basic colour pattern between *Derhamia hoffmannorum* gen. et sp. n. and *Nannostomus beckfordi,* both from Guyana, are shown in fig. 11.
When young, individuals of *Derhamia hoffmannorum* gen. et sp. n. resemble juveniles of a still undescribed, allopatric, species from the southern slope of the Roraima in Brazil, labelled "unidentified characoid, possibly near *Nannostomus* or *Pyrrhulina*" (GÉRY 1978, p. 567),

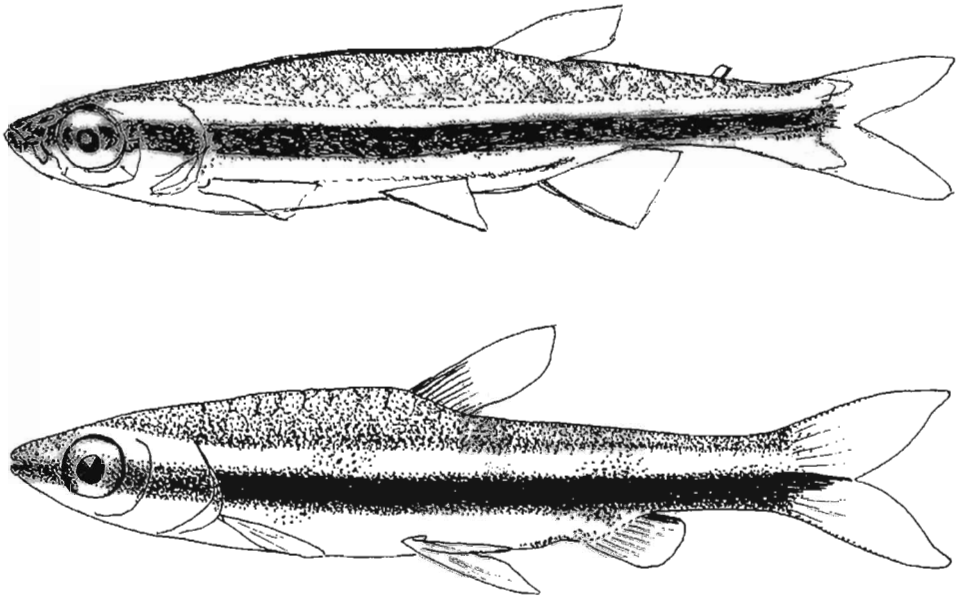

Fig. 11: Comparison of the basic colour pattern of *Derhamia hoffmannorum* gen. et sp. n. (above) and *Nannostomus beckfordi* (below) from Guyana (semi-schematic).

which were only known from a photograph at that time. The senior author was able to study an adult specimen of the same species, preserved in the Museu Goeldi, Belem, under the Nr. 539. This specimen was collected in a tributary of the Rio Uracicoera in the Serra Parima at 1 200m altitude by Sr. Hidasi, March, 1962. It is 94.5mm SL long and is characterized as follows: depth 5.25 and length of head 3.7 in the SL, 28-29 scales in lateral line, which is complete, and 6 from dorsal to pelvic; dorsal fin slightly posterior to midbody, adipose fin present; mouth terminal or very slightly superior; 10-11 tricuspid premaxillary teeth, 6 maxillary and 15 dentary ones, similar, with a second row of backward set conical mandibulary teeth; in ventral view, branches of the mandible form an "U", with ca. 7 pores on each side; an interrupted longitudinal line from snout to end of caudal fin, formed on body by elongate dark spots on the centre of the scales; a similar band on the predorsal region and another, lower one, from pectoral base to end of peduncle along its lower border; between the median and the lower band and the first scales (4 or 5) are also marked, forming the initial section of a fourth band. This species is neither *Lebiasina unitaeniata* (Günther, 1864) nor *L. uruyensis*, and probably new to science. The same is probably true for the syntopic *Lebiasina* mentioned below in the chapter on associated species.

Biology

According to Peter and Martin Hoffmann (in litt. 07.03.02) who could observe the species in its habitat and during 10 months in aquarium (four males, fig. 8, and six females,), the fishes are shy (probably the most timorous pencil-fishes observed, even after several months of acclimatization), living mainly or preferably on the surface and hidden, when possible, under a floating leaf or other hiding possibility; they swim, like trouts, quite actively, in a fitful manner, the moving of the pectorals is alternative, not symmetric. They accept all foods, including dry ones, but only on the surface , actually neglecting what falls on the bottom. No peculiar nocturnal colouration was observed as in other pencil-fishes; no direct courtship was yet observed, only short hunts against each other (within and between sexes) without real

fights. In comparison a much bigger *Lebiasina* sp. from the same location is more aggressive and lives in mid-water or on the bottom. The typical "lateral" courtship of the male *Nannostomus* has not been observed in *Derhamia hoffmannorum* gen. et sp. n. yet.

Biotope and associated species

The Kamarang River, coming from the west, meets at a right angle the upper Mazaruni River (flowing in a south-north direction, up to the sharp curve of the Peaima Fall), at a point about 75km north of Mount Roraima (2 867m) and about 75km east of the Guyana-Venezuela border (coordinates of the locus typicus ca. 5°54'N and 60°35'W, altitude about 500m). The rivers coming from the Pakaraima range flow rather rapidly mostly in canyons with numerous rapids. However, in the Kamarang area the terrain is comparatively flat and, with the exception of a few riffles, the two rivers flow quietly for several km, both before and below the village of Kamarang. Only further downstream the Mazaruni river enters a stretch of ca. 60km of rapids and falls starting with the Peaima Fall. This series of rapids and falls form a unsurmountable obstacle to the penetration of fish species living downstream. It is without doubt one of the reasons for the high rate of endemism of the upper part of the basin. The blackwater is practically devoid of electrolytes owing to the ground, the so-called Kaïeteurian series, a coarse sandstone without fossils dating probably from the Trias (-245 to -205 millions of years), with many volcanic intrusions, the whole covering the antecambrian shelf. This foot of what has been called the "lost world" is rather unchanged since more than 100 millions years before the continental drift (it was then somewhere on the west of what is now Dakar). This may also explain the endemism of the upper Mazaruni basin upstream of the falls.

Beside of the cichlid and the cyprinodontid mentioned in the introduction, *Derhamia hoffmannorum* gen. et sp. n. lives in syntopy with the following small-sized Characiformes: *Hyphessobrycon* sp. n., resembling *H. maxillaris* from the very remote Rio Paraguay basin, *Astyanax* sp., close to *A. mutator* from Guyana (Characidae), *Ammocryptocharax lateralis* (Eigenmann) (Characidiidae), *Lebiasina* sp. or sp. n. (Lebiasinidae, still alive and not studied) and two unidentifiable juveniles. One, maybe a Hemiodid, is interesting because it is very similar to it in form and coloration, and seems to form a mimetic association.

According to de Rham (in litt., 18.8.2002), Franz Vermeulen also collected a parodontid identified as *Apareiodon gransabana* Starnes & Schindler, as well as several other species not yet studied, on a sand bank near the village Wema in the same region. *A. gransabana* was originally described from the Caroni drainage in Venezuela.

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