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Peckoltia sabaji, a new species from the Guyana Shield (Siluriformes: Loricariidae)

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Abstract

Peckoltia sabaji is described based on specimens from the Guyana Shield regions of the Essequibo, Negro, and Orinoco River drainages of Guyana and Venezuela. *Peckoltia sabaji* is a member of the loricariid subfamily Hypostominae, tribe Ancistrini. The species differs from nearly all other members of the Hypostominae based on coloration — small spots on the head with spots becoming very large on the posterior part of the body. Those species with a similar coloration either do not have elongated bodies (vs. body very elongate) or have odontodes on the opercle as adults (vs. odontodes on opercle absent, rarely with one or two odontodes in adults).

Keywords: Ancistrini, *Hemiancistrus*, Hypostominae, South America, suckermouth armored catfish, Venezuela

Introduction

The Loricariidae, suckermouth-armored catfish, is the largest family of catfishes and among the largest of all fish families (Eschmeyer, 2003). New species of the Loricariidae are consistently being discovered in poorly-sampled areas of South America like the Guyana Shield. One example is the species described herein as *Peckoltia sabaji*.

Currently, *Peckoltia* is recognized in the subfamily Hypostominae, tribe Ancistrini of the Loricariidae (Armbruster, in press). It is considered a basal genus of the Ancistrini with no clear relationships to other taxa and it is likely that it may be synonymous with *Hemiancistrus*. *Peckoltia* and *Hemiancistrus* are not diagnosable from one another and neither genus is supported by synapomorphies. The placement of the species described in this paper in the vicinity of *Hemiancistrus* and *Peckoltia* is suggested by the lack of odontodes on the opercles of adults. Among the Ancistrini, opercles lack odontodes only in *Hemiancistrus, Panaque*, and *Peckoltia* (these odontodes are not to be confused with the hypertrophied cheek odontodes of the Ancistrini that can be everted at about a 90° angle to the

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head). *Panaque* is a well diagnosed genus most readily recognized by the development of teeth into spoon-shaped structures (Schaefer and Stewart, 1993; Armbruster, in press), and it is clear that the new species does not belong in *Panaque*.

Despite complications of taxonomy, a preliminary survey of *Hemiancistrus*, *Peckoltia*, and all similar species based on examination of original descriptions and types reveals no species similar to that described herein as *Peckoltia sabaji.* Placing the species in *Peckoltia* is arbitrary as there are no synapomorphies for the species of *Peckoltia* or *Hemiancistrus* and osteology is proving unhelpful in diagnosing the taxa (Armbruster 1997; in press). Color pattern of *P. sabaji* (Fig. 2) is neither like that of typical *Peckoltia* (typically dark saddles on a light background) or that of typical *Hemiancistrus* (gray with dark or light spots), and the narrow, elongate body morphology is unlike that of any other member of the Ancistrini. Based on a preliminary examination of osteology, *P. sabaji* may belong in its own genus; however, the state of the taxonomy of the basal Ancistrini is so confused at this moment that there is no justification for describing another genus . The color pattern of *P. sabaji* is more like that of *Peckoltia* than of *Hemiancistrus*. It must be noted that much work needs to be done to reconcile all of the species of *Peckoltia* and *Hemiancistrus* and to diagnose each genus. Further discussion of the osteology and relationships of *P. sabaji* awaits completion of a revision of *Peckoltia*, *Hemiancistrus*, and similar-looking genera. *Peckoltia sabaji* was in the phylogenetic analysis of Armbruster (in press) as *Peckoltia* sp. big spot.

One specimen was cleared and stained for examination of bone and cartilage using the methods of Taylor and Van Dyke (1985). Institutional abbreviations are as in Leviton et al. (1985) with the addition of UG/CSBD for the University of Guyana, Center for the Study of Biological Diversity. Comparative specimens of other loricariids examined are listed in Armbruster (in press). Localities are given as drainage, state/region, catalog number, number of individuals examined, SL, locality, latitude and longitude, collectors, date. The following abbreviations are used in the text: cs. = cleared and stained, D. = distance, Dia. = diameter, Dp. = depth, Dr. = drainage, L. = length, W = width.

A principal components analysis for the morphometric data was performed using a covariate matrix of log-transformed measurements in JMP (Vers. 5.01a, SAS Institute, 2002). Dorsal-fin spine length was excluded because some specimens have a greatly elongated dorsal-fin spine. Barbel length was also excluded as barbels were often damaged.

Methods

Measurements were made with the use of digital calipers to the nearest 0.1 mm. Measurements and counts of bilaterally symmetrical features were from the left side of the body when possible; if a feature was missing or broken on the left side, it was examined on the right side. Measurements were based on the landmarks pictured in Fig. 1 and defined in Table 1. See Table 2 for names of inter-landmark distances.

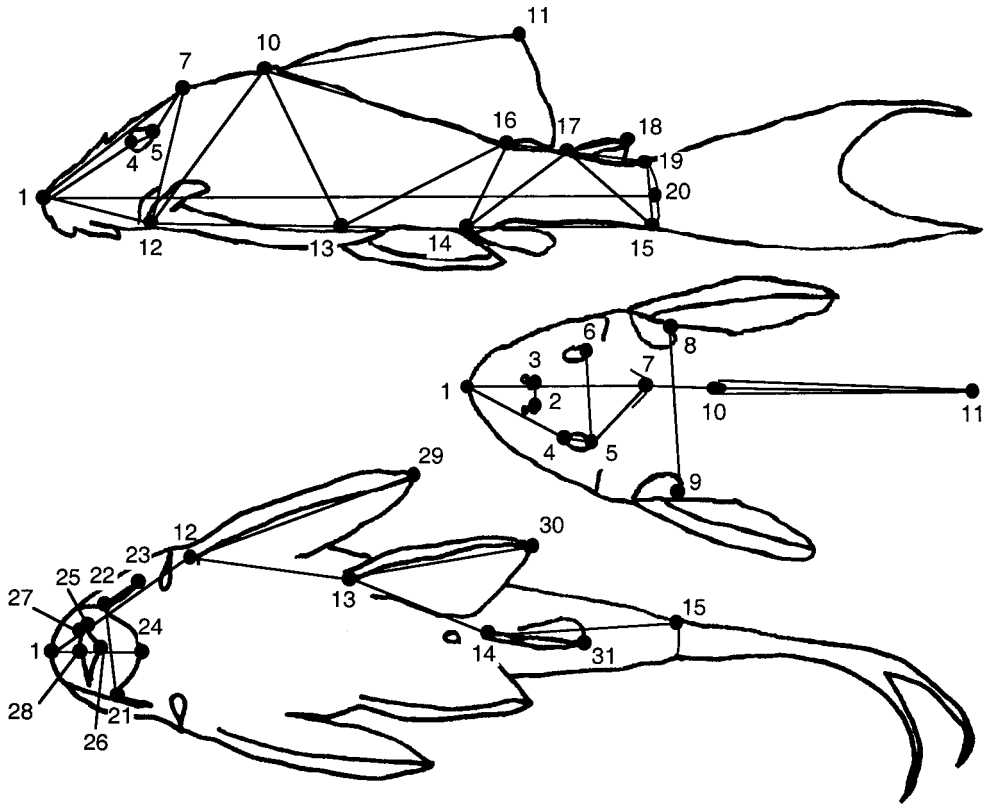

FIGURE 1. Landmarks and distances measured. See Table 1 for definitions of landmarks and Table 2 for names of interlandmark distances.

Meristics include the following: lateral plates are the number of plates with the lateral-line canal from the first complete plate posterior to the pterotic-supracleithrum up to, but not including, the elongate plate that covers the insertion of the caudal-fin rays; dorsal-, pectoral-, pelvic-, anal-, and caudal-fin ray counts include the first one or two unbranched rays as spines; dorsal and ventral procurrent caudal-fin rays; number of teeth in the left dentary and premaxilla includes only those teeth that are fully erect; evertible cheek odontodes include only those hypertrophied odontodes that have erupted from the fleshy odontode sheath and that are between the posterior end of the mass and the area where plates become clearly visible and are no longer covered by thick skin anteriorly.

One specimen was cleared and stained for examination of bone and cartilage using the methods of Taylor and Van Dyke (1985). Institutional abbreviations are as in Leviton et al. (1985) with the addition of UG/CSBD for the University of Guyana, Center for the Study of Biological Diversity. Comparative specimens of other loricariids examined are listed in Armbruster (in press). Localities are given as drainage, state/region, catalog number, number of individuals examined, SL, locality, latitude and longitude, collectors, date. The following abbreviations are used in the text: cs. = cleared and stained, D. = distance, Dia. = diameter, Dp. = depth, Dr. = drainage, L. = length, W = width.

TABLE 1. Definitions of morphometric landmarks (Fig. 1).

Landmark	Definition
1	Tip of snout
2	Posteromedial border of posterior left naris
3	Posteromedial border of posterior right naris
4	Anterior border of left orbit
5	Posterior border of left orbit
6	Posterior border of right orbit
7	Posteromedial margin of supraoccipital
8	Posterior margin of right cleithrum
9	Posterior margin of left cleithrum
10	Anterior margin of dorsal-fin spinelet
11	Tip of dorsal-fin spine
12	Insertion of pectoral-fin spine
13	Insertion of pelvic-fin spine
14	Insertion of anal-fin spine
15	Posterior margin of last lateral plate of ventral plate series
16	Insertion of last dorsal-fin ray
17	Insertion of adipose-fin spine
18	Tip of adipose-fin spine
19	Posterior margin of last lateral plate of dorsal plate series
20	Posterior margin of last lateral plate of median plate series
21	Posterior angle of right maxillary barbel and lip
22	Posterior angle of left maxillary barbel and lip
23	Tip of left barbel
24	Posteromedial margin of lip
25	Lateral margin of dentary tooth cup
26	Medial margin of dentary tooth cup
27	Lateral margin of premaxillary tooth cup
28	Medial margin of premaxillary tooth cup
29	Tip of pectoral-fin spine
30	Tip of pelvic-fin spine
31	Tip of anal-fin spine

A principal components analysis for the morphometric data was performed using a covariate matrix of log-transformed measurements in JMP (Vers. 5.01a, SAS Institute, 2002). Dorsal-fin spine length was excluded because some specimens have a greatly elongated dorsal-fin spine. Barbel length was also excluded as barbels were often damaged.

TABLE 2. Selected morphometrics of *Peckoltia sabaji*. Landmarks represent the two landmarks the measurement is between (Fig. 1). Measurements are ratios of SL (predorsal L. to pelvic-dorsal D.) or head l. (head-eye L. to premaxillary tooth cup L.).

Landmarks	Measurement	N	Average ± SD	Range
1–20	SL (mm)	14	124.8 ± 36.4	74.6 – 197.7
1–10	Predorsal L.	14	38.6 ± 1.9	35.2 – 42.1
1–7	Head L. (HL)	14	31.3 ± 1.8	28.4 – 34.5
7–10	Head-dorsal L.	14	7.5 ± 0.8	6.0 – 8.8
8–9	Cleithral W.	14	24.7 ± 1.8	21.8 – 27.9
1–12	Head-pectoral L.	14	23.5 ± 1.3	21.3 – 25.4
12–13	Thorax L.	14	22.8 ± 1.3	20.7 – 25.6
12–29	Pectoral-spine L.	14	31.5 ± 1.7	28.1 – 33.6
13–14	Abdominal L.	14	22.5 ± 0.8	21.7 – 24.1
13–30	Pelvic-spine L.	14	25.8 ± 1.8	22.8 – 28.5
14–15	Postanal L.	14	37.6 ± 1.7	35.7 – 41.0
14–31	Anal-fin spine L.	14	15.5 ± 0.8	14.1 – 16.7
10–12	Dorsal-pectoral D.	14	24.8 ± 1.4	22.5 – 27.0
10–11	Dorsal spine L.	14	40.5 ± 5.1	31.9 – 48.9
10–13	Dorsal-pelvic D.	14	21.7 ± 1.5	18.8 – 24.4
10–16	Dorsal-fin base L.	14	27.0 ± 1.5	25.0 – 30.7
16–17	Dorsal-adipose D.	14	18.5 ± 1.2	16.0 – 20.3
17–18	Adipose-spine L.	14	8.7 ± 0.6	7.7 – 9.7
17–19	Dorsal Adipose-caudal D.	14	17.8 ± 1.4	15.9 – 20.3
15–19	Caudal peduncle Dp.	14	10.3 ± 0.8	8.8 – 11.6
15–17	Ventral adipose-caudal D.	14	22.8 ± 1.0	21.1 – 24.5
14–17	Adipose-anal D.	14	19.9 ± 1.1	17.5 – 22.2
14–16	Dorsal-anal D.	14	14.1 ± 0.7	13.1 – 15.1
13–16	Pelvic-dorsal D.	14	25.5 ± 1.1	22.2 – 27.6
5–7	Head-eye L.	14	10.6 ± 0.8	9.6 – 12.2
4–5	Orbit Dia.	14	6.2 ± 0.9	4.9 – 7.7
1–4	Snout L.	14	19.0 ± 0.8	17.7 – 20.5
2–3	Internares W.	14	3.9 ± 0.2	3.5 – 4.3
5–6	Interorbital W.	14	10.0 ± 0.6	9.0 – 11.2
7–12	Head Dp.	14	20.9 ± 1.4	18.9 – 23.1
1–24	Mouth L.	14	14.9 ± 1.3	12.7 – 18.0
21–22	Mouth W.	14	15.1 ± 1.1	13.5 – 16.5
22–23	Barbel L.	13	5.7 ± 0.7	4.7 – 7.2
25–26	Dentary tooth cup L.	14	4.5 ± 0.6	3.1 – 5.1
27–28	Premaxillary tooth cup L.	14	4.4 ± 0.5	3.6 – 5.2

***Peckoltia sabaji* new species**
Figs. 2–4

Holotype: GUYANA: Rupununi (Region 9), Essequibo River Dr., UG/CSBD 11041 (ex. AUM 35555). 115.8 mm SL. Rupununi R. 5.9 km WSW village of Sand Creek, 02.96656°, -059.56943°, D.C. Werneke, C.L. Allison, M.R. Thomas, C.J. Chin, D. Arjoon, M.H. Sabaj, J.W. Armbruster, 4 November 2002.

Paratypes: All localities GUYANA, Essequibo River Dr.: Upper Demerara-Berbice (Region 10): AUM 35546, 1, 169.4, Essequibo River at Kurukupari, east bank, 04.66149°, -058.67519°, J.W. Armbruster, M.H. Sabaj, D.C. Werneke, C.L. Allison, M.R. Thomas, C.J. Chin, D. Arjoon, S.M. James, 4 November 2002. Rupununi (Region 9): AUM 35521, 2, 18.9–29.6 and UG/CSBD 11042, 1, 40.3, Simoni River - 4 sites from 6.6 km SE to 3.2 km W Karanambo, 03.71917°, -059.26121°, J.W. Armbruster, M.H. Sabaj, C.L. Allison, M.R. Thomas, R. Francis, 29 October 2002; ANSP 179211, 3, 32.9–94.2, AUM 35537, 2, 45.6–78.1, and SIUC 49166, 2, 36.4-74.6, Rupununi River 4.6 km NW Massara, 03.92603°, -059.28037°, J.W. Armbruster, M.H. Sabaj, D.C. Werneke, C.L. Allison, M.R. Thomas, C.J. Chin, D. Arjoon, S.M. James, S. Mario, 4 November 2002.

Nontypes: GUYANA: Takutu River - Rio Branco - Rio Negro Dr., Rupununi (Region 9), AUM 35733, 5, 109.5–155.2, Takutu River ca. 2.75 km W Saint Ignatius, 03.35500°, -059,83077°, J.W. Armbruster, M.H. Sabaj, D.C. Werneke, C.L. Allison, M.R. Thomas, C.J. Chin, D. Arjoon, 5–6 November 2002. VENEZUELA, Río Cinaruco - Río Orinoco Dr., Apure, MCNG 20164, 1, 197.7, Río Cinaruco in Laguna Larga, 6°31’N, 67°21’W, D.C. Taphorn et al., 25 April 1989. VENEZUELA: Río Siapa - Río Casiquiare - Río Negro Dr., Amazonas, MCNG 37043, 2 +1 cs. 116.3–149.0, Río Siapa immediately below Raudal Gallineta, Departmento Río Negro, 1°49’N, 65°47’W, L. Nico, S. Walsh, and A. Arrington, 14 January 1998.

FIGURE 2. *Peckoltia sabaji* UG/CSBD 11041, Holotype, 115.8 mm SL.. Photo by M.H. Sabaj.

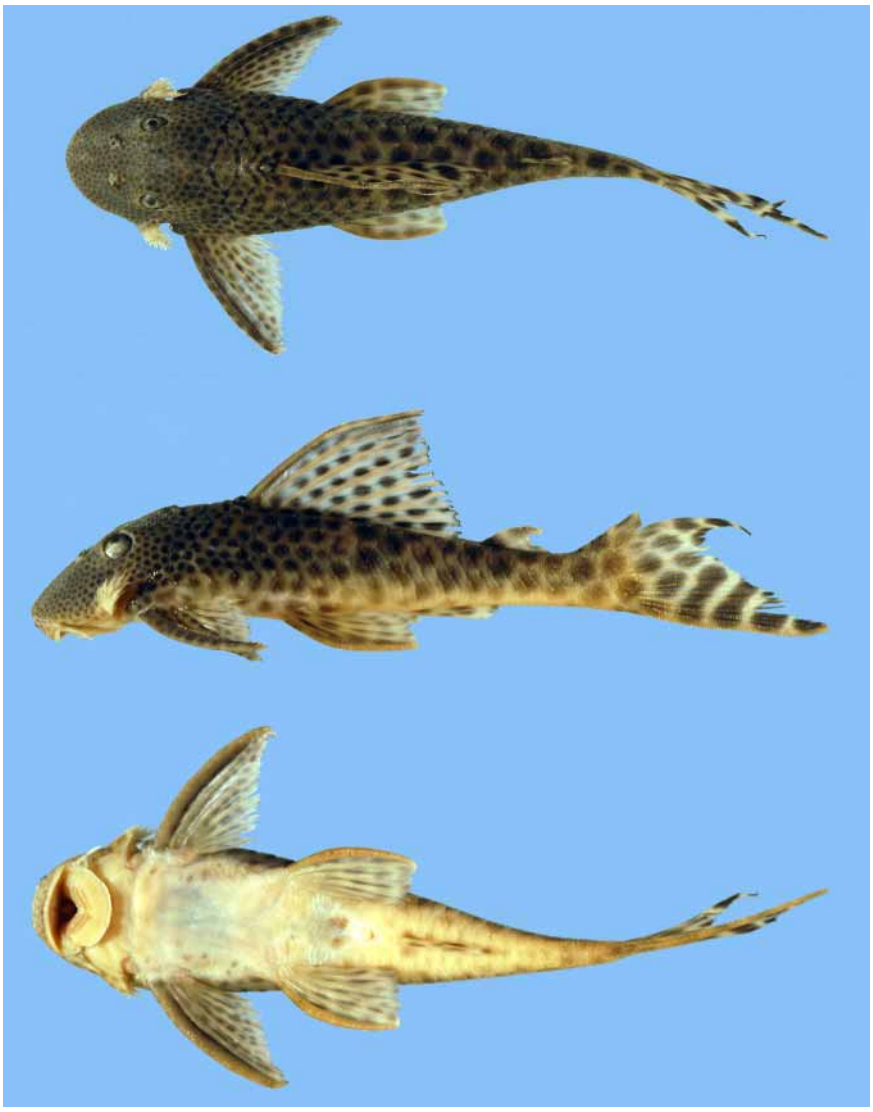

FIGURE 3. *Peckoltia sabaji* UG/CSBD 11041, Holotype, dorsal, lateral, and ventral views. Photos by J.W. Armbruster.

FIGURE 4. Juvenile *Peckoltia sabaji*, lateral view, AUM 35521, 40.3 mm SL. Photo by J.W. Armbruster.

Diagnosis: *Peckoltia sabaji* is diagnosable from nearly all other members of the Ancistrini based on coloration: small spots on the head with spots becoming very large on the caudal peduncle and caudal fin (Figs. 2–4). Only an undescribed *Peckoltia* among the Ancistrini examined has such large spots on the caudal peduncle. *Peckoltia sabaji* can be separated from the similarly colored undescribed species of *Peckoltia* by having a very long caudal peduncle (no specimens of the undescribed species have been examined for a precise measurement) and by having a much greater number of spots on the body (the undescribed species has fewer than ten spots present on the body posterior to the nape whereas *P. sabaji* has more than ten in adults). *Peckoltia sabaji* can be further separated from all other Ancistrini except *Hemiancistrus, Panaque,* and other *Peckoltia* by lacking (or rarely having) odontodes on the opercle in adults. Species of *Panaque* have widened, spoon-shape teeth (vs. villiform teeth). Sympatric *Hemiancistrus* and *Peckoltia* are without spots and have fewer than 27 lateral-line plates (vs. 27, rarely 26). Sympatric *Ancistrus, Dekeyseria, Hypancistrus, Pseudancistrus,* and *Pseudolithoxus* do not have plates on the abdomen (vs. some plates present in all adults). Sympatric *Lasiancistrus* have three rows of plates on the caudal peduncle (vs. 5). *Pseudacanthicus* has large keel odontodes on the lateral plates (vs. keels absent). Some species of *Hypostomus* (Hypostomini) have a similar color pattern to that of *P. sabaji*, but lack the evertible cheek plates and associated hypertrophied odontodes characteristic of the Ancistrini, and have odontodes on the opercle.

Description: A member of the Hypostominae: Ancistrini. Morphometrics in Table 2. Body low, narrow, and elongate. Body depth increases curvilinearly from snout tip to origin of dorsal fin, decreases to near end of caudal peduncle, and then increases at a steep angle until caudal fin. Ventral surface flat. Body widest at insertion of pectoral fins, narrowest at end of caudal peduncle. Snout rounded. Caudal peduncle oval in cross section with dorsal and ventral surfaces flat.

Dorsal margin of orbit forming ridge higher than interorbital space. Dorsal surface of head between orbits concave laterally and convex medially. Supraoccipital pointed posteriorly; point of supraoccipital slightly raised and with odontodes slightly larger than those of surrounding bones and plates. Following head bones supporting odontodes: infraorbitals, frontal, nasal, pterotic-supracleithrum, and supraoccipital. Preopercle and opercle rarely supporting odontodes. Posterodorsal margin of opercle often covered by plate.

Lower lip wide, covered with short, wide papillae. Upper lip narrow, spotted ventrally, and with very small papillae posteromedially and larger, wider papillae anteriorly and laterally. Only maxillary barbel present, typically reaching about three quarters of way from its origin to gill opening. Some individuals with one or both barbels bifurcated or trifurcated, split barbels are shorter than unsplit barbels. Mouth with small, narrow buccal papilla. Iris with small dorsal flap, not reaching ventral to center of pupil.

Usually 27 lateral plates (one of 14 individuals with 26 and one with 28). Plates unkeeled. Five rows of plates on caudal peduncle. Plates covering almost all surfaces of

body except for anterior margin of snout and between mouth and pectoral girdle. Abdominal plates variable. Most individuals with some small, deeply embedded plates ventral to pectoral girdle, medially on abdomen, ventral to pelvic girdle, near anus, and along sides; however, any abdominal area may be naked. Extent of abdominal plating only partially correlated with size, most small individuals with fewer plates, but some adults with few plates on abdomen.

24–53 (mode = 48) evertible cheek odontodes Longest evertible cheek odontode does not reach posterior to cleithrum. Evertible cheek odontodes supported by plates than can be everted to approximately 90° from the head. Hypertrophied cheek odontodes relatively weak. Slightly longer odontodes present along dorsal-, adipose-, and pectoral-fin spines; largest individual examined with modestly hypertrophied odontodes at tip of pectoral-fin spine.

All fin spines and rays supporting odontodes. Dorsal fin II7; dorsal-fin spinelet V-shaped, dorsal-fin lock functional; dorsal-fin spine elongated relative to other fin rays in some specimens; dorsal fin reaching adipose fin when adpressed in juveniles, but not in adults. Adipose fin with single median preadipose plate and fairly long curved spine. Caudal fin I14I; caudal fin forked, lower lobe longer than upper; usually 5 dorsal and ventral procurrent caudal-fin rays (one of 14 individuals with 7 dorsal and 6 ventral). Pectoral fin I6; pectoral fin spine reaching beyond base of pelvic fin when adpressed ventral to pelvic fin. Pelvic fin I5; pelvic-fin spine reaching at least to end of base of anal fin when adpressed. Anal fin I4; anal-fin spine slightly shorter than first ray.

Teeth bicuspid with a longer, slightly wider median lobe and a thicker, shorter, darker-yellow lateral lobe. Most teeth are worn such that the two lobes are approximately equal in length. 27–57 dentary teeth (mode = 38). 31–58 premaxillary teeth (mode = 49).

Considerable ontogenetic change in shape. Juveniles more dorsoventrally flattened and not as elongate as adults.

Coloration: In life, the base color is light tan (almost yellow), tending to orange on the fins (Fig. 1). In alcohol, the base color is darker tan (Fig. 3). Small- to medium-sized dark spots on the head becoming much larger posteriorly; corresponds with decrease in numbers of rows of spots. Size of spots varies, even between specimens collected together, but spots always largest on caudal peduncle and fin. Dorsal-fin spine either without spots or spots present distally. Dorsal fin with spots centered on the membranes, rays typically without spots; dark wash present between dorsal-fin spine and first ray and between the distal branches of the first ray; dorsal fin generally with a black margin. Adipose fin with spot present on preadipose plate and one or two large spots along spine; adipose-fin membrane mottled. Spots on caudal fin largest on body, often combining to form bands (particularly ventrally); caudal-fin spots centered on fin rays; spots present along dorsal margin of dorsal and ventral caudal-fin spines, but ventral margin of ventral caudal-fin spine tan. Pectoral fin spots smallest, centered on either side of the pectoral-fin rays and dorsally along the pectoral-fin spine; spots fade distally. Pelvic fin with large spots dorsally, cen-

tered on rays and spine, spots fading posteriorly and distally. Anal fin spotted randomly with spots centered over membranes. Ventral surface behind mouth much lighter than sides, occasionally with slight mottling. Upper lip with small dark spots. Barbels mottled. Eye with dark spots dorsally, mottled ventrally.

Considerable ontogenetic change observed in coloration (Figs. 3 & 4). The smallest individual examined with mottled head and spots that appear to form dorsal saddles posteriorly; large spots present on all fins. Slightly larger individuals with spots on the head, but posterior body spots still forming saddles; dorsal and caudal fins with bands. As individuals grow, the spots become more numerous and the relative size of the spots decreases.

Ecology: Uncommon. Found in medium to large rivers among boulders. Usually in runs and riffles, but small individuals may be found hidden in the holes of lateritic rocks in pools. Most specimens I collected were collected at night. The largest individual was captured in a gill net in the main stem Essequibo and it appeared to be moving from deeper water into the shallows where there were exposed boulders.

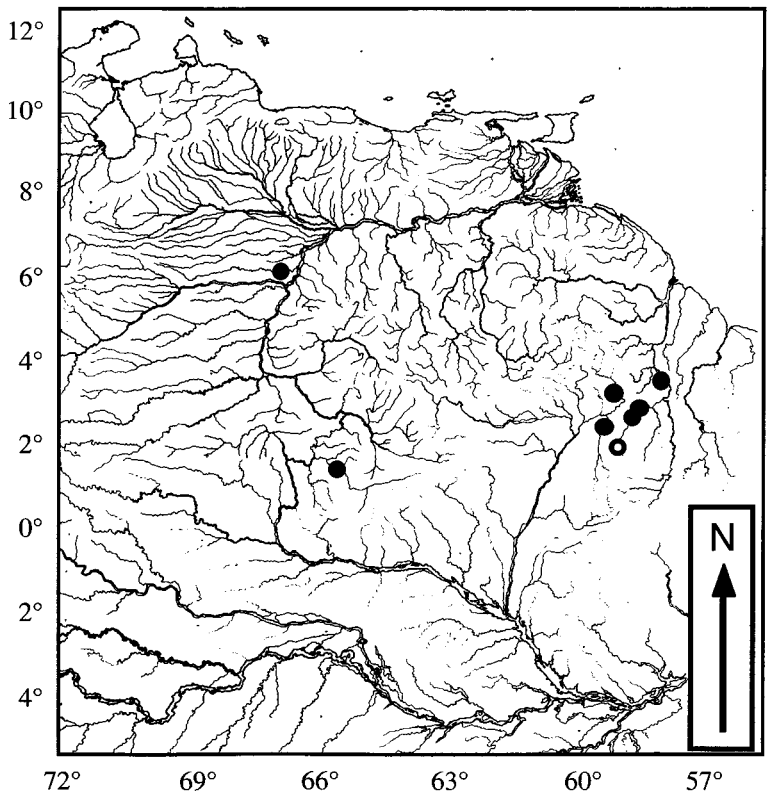

FIGURE 5. Range of *Peckoltia sabaji*, open symbol is type locality.

Range: Currently known from the Rupununi, Essequibo, and Takutu River drainages of Guyana, and from single localities in the Río Casiquiare - Río Negro and the Río Cinaruco - Río Orinoco drainages of Venezuela (Fig. 5).

Etymology: Named for Dr. Mark Henry Sabaj, Collection Manager of Ichthyology, Academy of Natural Sciences of Philadelphia, for his tremendous help in collecting specimens throughout South America, and because he collected the first live specimen that I ever saw. Pronounced sah-bay'-i.

Discussion

Some variation was found in PCA among the three populations (Fig. 6, most strongly weighted characters shown along axes); however, there are far too few collections available at this time to determine if these morphometric differences represent interspecific differences. Color and meristics did not vary significantly among populations. Type specimens were restricted to the Essequibo River drainage because future effort might determine that the three known populations (Essequibo, Negro, Orinoco) should be separated.

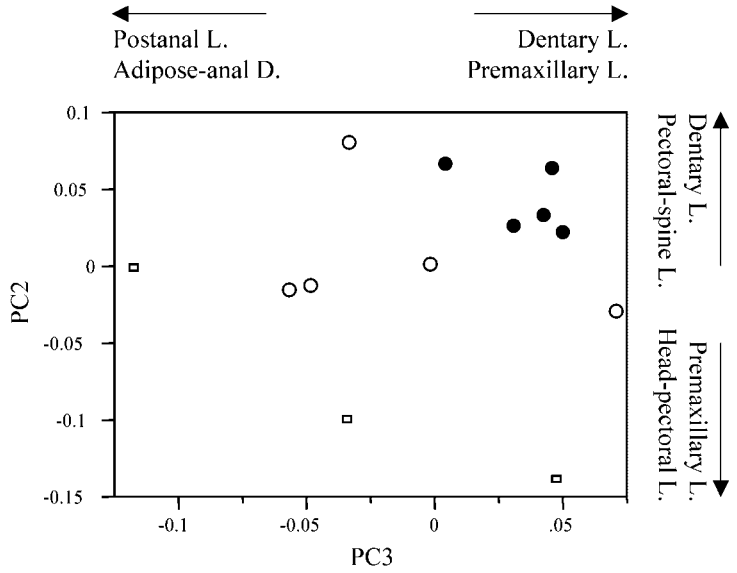

FIGURE 6. Results of Principal Components Analysis. Rectangles - Venezuela, open circles Guyana - Essequibo River Dr., closed circles – Guyana - Takutu River Dr.

The distribution of *Peckoltia sabaji* can be explained by current (seasonal and permanent) connections between the Orinoco, Negro, and Essequibo River drainages. The seasonally flooded Rupununi Savannah allows movement between the watersheds of the Rupununi River (Essequibo Dr.) and Takutu River (Branco-Negro-Amazon Dr.), and the Río Casiquiare allows movement of upper Río Negro fauna into the upper Río Orinoco. The lack of strong geographic variation in the morphology of *P. sabaji* suggests that this species may frequently disperse via these passageways. The large specimen from Kurukupari on the Essequibo River (AUM 35546) was collected at night in a gill net and appeared

to be moving from deeper water into the shallows suggesting that the species may make diurnal migrations.

Acknowledgements

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