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CYPHOCHARAX PANTOSTICTOS, A NEW SPECIES (PISCES: OSTARIOPHYSI: CHARACIFORMES: CURIMATIDAE) FROM THE WESTERN PORTIONS OF THE AMAZON BASIN

Richard P. Vari and Ramiro Barriga S.

Abstract.—*Cyphocharax pantostictos,* a species of curimatid characiform with a distinctive pattern of dark spots arranged in longitudinal series along the sides of the body, is described as new from the Río Napo, Rio Putumayo, Rio Ucayali, and Río Nanay in Ecuador and northern Peru. *Cyphocharax multilineatus* (Myers), the only other species in that questionably monophyletic genus with a similar pigmentation pattern has dark wavy horizontal lines, rather than discrete spots arranged in horizontal patterns. The dark body pigmentation in the two species also differs in its relative position on the scales. The pigmentation pattern and overall external appearance of *C. pantostictos* are nearly identical to that of *Steindachnerina fasciata* (Vari & Géry) a species endemic to the upper Rio Madeira system in Brazil. The two species can be readily distinguished on the basis of a series of meristic and morphometric features, and in differences in the portion of buccopharyngeal complex on the roof of the oral cavity. A series of polarized characters indicate furthermore that the two species are not closely related.

The myriad drainage systems, range of stream gradients, and complexity of aquatic habitats found in the drainage basins of the western portions of the Amazon basin are reflected in the remarkable diversity of the fish fauna in that region (Ortega & Vari 1986, Stewart et al. 1987). This region is also one of the areas of greatest diversity for the family Curimatidae, involving both species widely distributed within the Amazon basin (e.g., *Curimata aspera* Gunther (Vari 1988: fig.8) and *C. vittata* Kner (Vari 1989b:42)), or ranging north and south of that system into the Río Orinoco or Rio de La Plata systems (e.g., *Steindachnerina guentheri* (Eigenmann & Eigenmann) (Vari 1990)). Other curimatids in this area of high species diversity have much more restricted ranges (e.g., *Steindachnerina quasimodoi* Vari & Vari (see Vari & Vari 1989:477)) and are known only to occur in the region that Kullander (1986:40) termed the "Western Amazonian endemic area" based on distributional data from various neotropical genera of the perciform family Cichlidae. In the course of investigations of the fish fauna of eastern Ecuador and northern Peru we independently collected a distinctive species of curimatid with an unusual pigmentation pattern consisting of seven or eight longitudinal series of dark spots along the sides of the body. This material first appeared to represent a major extension in the known distribution of *Curimata fasciata* which Vari & Géry (1985) described from the Rio Madeira system in Brazil, a considerable distance southeast of the region from which the Ecuadorian and Peruvian specimens originated. More recently Vari (1989a:tables 2, 3), in an analysis of intrafamilial phylogenetic relationships, restricted *Curimata* to a single lineage within the family and reassignedfasciata to *Steindachnerina* Fowler (1906) on the basis of a series of derived

characters. Further examination of our specimens surprisingly showed that they neither constitute a major range extension for Steindachnerina fasciata, nor do they even represent a species of Steindachnerina. Rather they are a species of Cyphocharax Fowler (1906) previously unknown to science. This new curimatid is described herein and is yet another fish species with a known range limited to the Western Amazonian endemic area identified by Kullander.

Materials and methods.—Counts and measurements were made following methods outlined in Vari (1989b, 1989c, 1990). Ranges for meristic and morphometric features include values of all examined specimens. The values in square brackets are those of the holotype. Subunits of the head are presented as proportions of head length (HL). Head length itself and measurements of body parts are presented as proportions of standard length (SL).

The following abbreviations for institutions are used: Academy of Natural Sciences of Philadelphia (ANSP); British Museum (Natural History), London (BMNH); California Academy of Sciences, San Francisco (CAS); Stanford University, collections now deposited at CAS (CAS-SU); Instituto Nacional de Pesquisas da Amazônia, Manaus (INPA); Indiana University, collections now deposited at various repositories (IU); Museo de Biologia, Universidad Central de Venezuela, Caracas (MBUCV); Museo de Biología de la Escuela Politécnica Nacional, Quito (MEPN); Museum d'Histoire Naturelle, Geneva (MHNG); Museu Nacional, Rio de Janeiro (MNRJ); Museu de Zoologia, Universidade de São Paulo, São Paulo (MZUSP); Naturhistoriska Riksmuseet, Stockholm (NRM); and National Museum of Natural History, Smithsonian Institution, Washington, D.C. (USNM).

Cyphocharax pantostictos, new species
Figs. 1, 4

Diagnosis.—The new species is assigned to Cyphocharax, a genus that Vari (1989a: 58-59) noted was not defined on the basis of known derived features. Cyphocharax of that classification was rather an assemblage of species lacking the derived features diagnostic of the three other genera (Steindachnerina, Curimatella Eigenmann & Eigenmann, and Pseudocurimata Fernández-Yépez) which together with Cyphocharax form an unresolved terminal polytomy in Vari's hypothesis of intrafamilial relationships within the Curimatidae. The absence of identified synapomorphies for *Cyphocharax* increases the likelihood that the genus may not be monophyletic. Ongoing studies by the senior author focus on the question of the monophyly of *Cyphocharax* and its subunits. In the interim we assign the new species to Cyphocharax given that C. pantostictos shares the synapomorphies for the clade formed by Cyphocharax, Steindachnerina, Curimatella, and *Pseudocurimata,* but lacks the derived features that diagnose each of Steindachnerina, *Curimatella,* and Pseudocurimata. The striking pattern of seven or eight horizontal series of prominent dark spots aligned along the center of the body scales is unique to the Cyphocharax pantostictos within the genus (Fig. 1). Only one other Cyphocharax species, C. multilineatus (Myers 1927) of the Río Negro system in Venezuela and Brazil, has a pattern of horizontal dark body pigmentation reminiscent of that in C. *pantostictos.* The pattern of dark body pigmentation in C. multilineatus (Fig. 2) differs from that in C. pantostictos in forming solid wavy horizontal lines rather than a series of discrete rotund spots (compare Figs. 1 and 2). Furthermore, the dark stripes in C. multilineatus are positioned along the area of overlap of horizontal rows of scales along the body, rather than being aligned along the center of the scale rows as are the spots in C. pantostictos. Thus the patterns of longitudinal dark pigmentation on the bodies in the two species are apparently non-homologous. Cyphocharax multilineatus also has a discrete dark band across the mid-

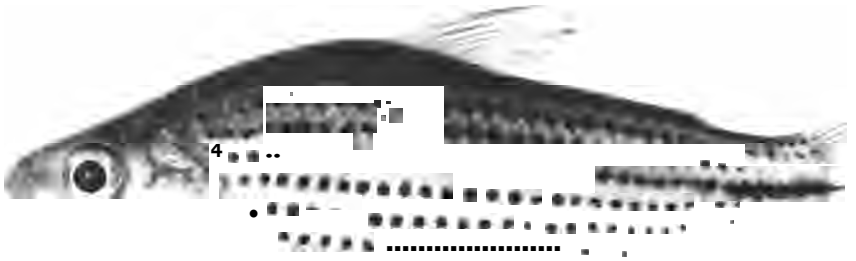

Fig. 1. *Cyphocharax pantostictos,* new species, holotype, USNM 306594, 72.4 mm SL; Ecuador, Napo, Laguna de Jatuncocha.

lateral surface of the head anterior and posterior to the orbit, a pigmentation pattern lacking in *C. pantostictos*. *Cyphocharax pantostictos,* in turn, is characterized by a well-developed, mid-lateral, horizontally elongate patch of dark pigmentation on the caudal peduncle that is absent in *C. multilineatus*. It is likely that various meristic and morphometric features further distinguish *C. pantostictos* within *Cyphocharax*. Identification of those characters must await the completion of revisionary studies within that speciose genus.

The overall pigmentation pattern and overall external appearance of *C. pantostictos* are strikingly similar to that of one other member of the Curimatidae, *Steindachnerina fasciata* (Fig. 3), an endemic of the Rio Madeira basin, and have lead to misidentifications of the two species. *Cyphocharax pantostictos* lacks the derived features that diagnose *Steindachnerina* (see Vari 1989a: 58, 1990), and lacks the intrageneric synapomorphies for the clades that include *S. fasciata* (see Vari 1990 for details). One of the most obvious differences between the two species involves the form of the buccopharyngeal complex on the roof of the oral cavity. *Cyphocharax pantostictos* has three simple longitudinal fleshy folds in that region. *Steindachnerina fasciata,* in contrast, has a mass of lobulate fleshy bodies that extend ventrally into the oral cavity, a hypothesized derived condition unique to a

Fig. 2. *Cyphocharax multilineatus,* USNM 269987, 111.8 mm SL; Venezuela, Territorio Federal Amazonas, Departamento Rio Negro, Caño Tremblador where crossed by road from San Carlos de Rio Negro to Solano.

Fig. 3. *Steindachnerina fasciata,* MNRJ 11208, 89.6 mm SL, holotype of *Curimata fasciata* Vari and Géry; Brazil, Território de Rondônia, Município de Ouro Preto do Oeste, Rio Romari (or São Domingo) near Nova União.

subunit of Steindachnerina (see Vari 1989a: 31-35, 1990, for a discussion of the buccopharyngeal complex).

The two species also differ in various meristic and morphometric values including the number of vertebrae (31 in *Cyphocharax* pantostictos versus 32 to 34, typically 33, in Steindachnerina fasciata), the number of scales in a longitudinal series to the hypural joint (29 to 31 versus 32 to 37), the number of scale rows above the lateral line to the origin of dorsal fin (4½ versus 5½ or 6½), the relative length of the pelvic fin (0.20-0.23 of SL versus 0.23-0.25), and the relative gape width (0.24-0.28 of HL versus 0.28-0.32).

Description. —Body moderately elongate, somewhat compressed. Dorsal profile of head straight overall, slightly convex anteriorly. Dorsal profile of body smoothly convex from posterior portion of head to origin of dorsal fin; straight or slightly convex, posteroventrally slanted at base of dorsal fin, greatly convex from base of last dorsal-fin ray to caudal peduncle. Dorsal surface of body with indistinct median keel anterior to dorsal fin, smoothly rounded transversely posterior to fin. Ventral profile of body gently curved from tip of lower jaw to caudal peduncle. Pre-pelvic region very obtusely flattened, scales of that area not notably enlarged relative to those on lateral surfaces of body. Median pre-pelvic scale series somewhat irregular, particularly near origin of pelvic fin. No distinct median keel posterior to origin of pelvic fin. Barely discernable secondary obtuse keel on each side of post-pelvic portion of body about two scales dorsal of ventral midline

Greatest body depth at origin of dorsal fin, depth 0.35-0.40 [0.37], relatively deeper in larger specimens; snout tip to origin of dorsal fin 0.47-0.52 [0.50]; snout tip to origin of anal fin 0.83-0.85 [0.83]; snout tip to origin of pelvic fin 0.52-0.57 [0.56]; snout tip to anus 0.78-0.79 [0.78]; origin of dorsal fin to hypural joint 0.54-0.58 [0.56]. Margin of dorsal fin rounded posteriorly; anteriormost rays approximately two to two and one-half times length of ultimate ray. Margin of pectoral fin pointed; length of pectoral fin 0.18-0.21 [0.20], extending slightly over one-half distance to vertical line through origin of pelvic fin. Margin of pelvic fin pointed, length of pelvic fin 0.20-0.23 [0.22], tip reaches to anus in holotype, falls somewhat short of that point in larger specimens. Caudal fin forked. Adipose fin well developed. Anal fin emarginate, anteriormost branched rays about two and one-half times length of ultimate ray. Caudal peduncle depth 0.12-0.14 [0.14].

Head profile distinctly pointed anteriorly, head length 0.29-0.33 [0.31]; upper jaw somewhat longer than lower, mouth subterminal; snout length 0.27-0.31 [0.30]; nares of each side very close, anterior rotund, posterior crescent-shaped with aperture partially closed by thin flap of skin separating nares; orbital diameter 0.27-0.32 [0.31]; adipose eyelid present, moderately developed, with rotund opening over center of eye; length of postorbital portion of head 0.42-0.46 [0.44]; gape width 0.24-0.28 [0.27]; interorbital width 0.39-0.43 [0.43].

Pored lateral-line scales from supracleithrum to hypural joint 29 to 31 [29]; all scales of lateral line pored, canals in scales straight; 2 or 3 pored scales extend beyond hypural joint onto caudal-fin base; 4½ [4½] scales in transverse series from origin of dorsal fin to lateral line; 3½ to 41/2 [4] scales in transverse series from lateral line to origin of anal fin.

Dorsal-fin rays ii,9 [ii,9]; anal-fin rays ii,7 or iii,7 [ii,7]; pectoral-fin rays 13 to 15 [15]; pelvic-fin rays i,8 or i,7,i [i,7,i].

Total vertebrae 31 in 8 specimens.

Color in life.—(Based on photograph of paratype (USNM 280573) from the Rio Nanay of Peru taken shortly after capture.) Overall coloration silvery with slightly olive-grey cast on dorsal portions of head and body. Series of black spots arranged in horizontal series along dorsal and lateral surfaces of body. Distinct black mid-lateral stripe on caudal peduncle. Fins hyaline.

Color in alcohol.—See Fig. 1 for preserved color pattern. Available specimens largely lacking guanine on scales. Overall ground coloration yellowish-tan, darker on dorsal portions of head and body. Scales on lateral and dorsal surfaces of body with dark patch of pigmentation on each scale; size of spots largest mid-laterally; overall intensity of spots not as pronounced in smaller individuals. Spots forming 7 or 8 horizontal series, dorsal most series not apparent in smaller specimens. Series of dark spots on scales less developed posteriorly on scale rows ventral of lateral line; very poorly developed in series starting immediately dorsal to origin of pectoral fin. Intense dark spots also progressively less pronounced in horizontal series dorsal to lateral line. Patches of dark pigmentation located on center of scale, with midpoint of spots lying medial of margin of preceding scale. Scales dorsal to lateral line with secondary area of diffuse dark pigmentation posterior to discrete central dark spot; secondary dark pigmentation increasingly pronounced on dorsal portions of body. Dark pigmentation patches on scales along lateral line merging posteriorly into distinct horizontal stripe on mid-lateral surface of caudal peduncle; stripe continuing onto base of middle caudal-fin rays. Deeper lying, dusky band extends along mid-lateral surface of body from supracleithrum to caudal peduncle.

Caudal fin with small streak of dark pigmentation on basal portions of middle rays; basal two-thirds of fin somewhat more dusky than remainder of fin. Median and paired fins somewhat dusky.

Distribution.—Río Napo, Rio Putumayo, Río Ucayali, and Río Nanay systems in Ecuador and northern Peru (Fig. 4).

Ecology.—Two of the specimens from Peru (USNM 280573, NRM SOK/1986293.5292) were collected in acidic black waters among grass and submerged vegetation. The specimens from the holotype locality were collected in submerged vegetation in blackwater of pH 5.5 at a depth of 1.5 m. The Río Yasuni specimens came from a slow flowing turbid stream with a pH of 6.0 lacking submerged vegetation.

Etymology.—Pantostictos, from the Greek for "spotted all over" refers to the prominent dark spots on the lateral and dorsal surfaces of the body.

Remarks.—As noted above, *Cyphocharax* pantostictos is very similar in body form and pigmentation to Steindachnerina fasciata which is apparently endemic to upper portions of the eastern drainages of the Rio Madeira basin in Brazil (see Var 1990:fig.

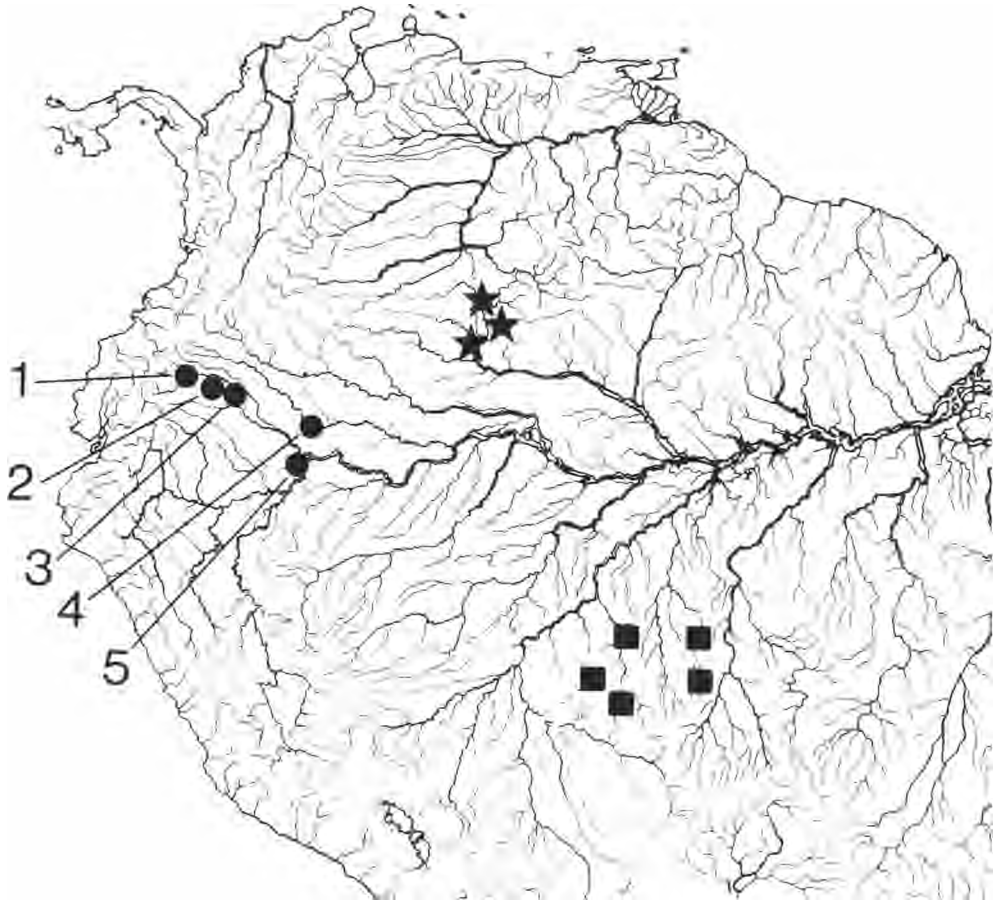

Fig. 4. Map of Amazon basin and adjoining areas showing distribution of Cyphocharax pantostictus (dots; localities: 1 = Rio Napo above Coca; 2 = Río Yasuni; 3 = Laguna Jatuncocha, type locality; 4 = Rio Putumayo, El Estrecho; 5 = Rio Nanay, Nanay beach), Steindachnerina fasciata (squares), and Cyphocharax multilineatus (stars) (see under "Material examined" for additional locality information).

40). Nonetheless those two species differ in many meristic and morphometric features, and Cyphocharax pantostictos furthermore lacks the derived characters that both define Steindachnerina and clades within the genus that include S. fasciata (see Vari (1990) for details).

Such pronounced superficial similarities between two distantly related species would at first consideration apparently represent a case of intergeneric mimicry. Interestingly, however, there is no overlap in the distributions of the two species, whose known ranges are separated by over two thousand river kilometers. Thus mimicry would not appear to be involved in the remarkable external resemblance between *Cyphocharax* pantostictos and Steindachnerina fasciata.

Material examined. —10 specimens, 34.4-98.2 mm SL.

Holotype.—Ecuador: Napo. Laguna de Jatuncocha (01°00'S, 75°29'W), collected by R. Barriga, 29 Sep 1988, USNM 306594, 72.4 mm SL.

Paratypes.—Ecuador: Napo. Laguna de Jatuncocha (1°00'S, 75°29'W) collected with holotype, MEPN 4554, 1 specimen, 74.9 mm SL. Estero Culebrero, tributary of Río

Yasuni (0°54'45"S, 76°13'03"W) collected by R. Barriga, 9 May 1988, USNM 305617, 1 specimen, 98.2 mm SL; MEPN 4557, 1 specimen, 81.8 mm SL. Río Napo, 2.7 km along river above the bridge at Coca (0°29.0'S, 77°04.0'W), collected by D. Stewart, R. Barriga, and M. Ibarra, 2 Oct 1983, USNM 305616, 1 specimen, 66.7 mm SL; MEPN 4558, 1 specimen, 63.0 mm SL.

Peru: Loreto. Rio Nanay, Nanay beach along river west of Iquitos (approx. 3°50'S, 073°11'W), collected by R. P. Vari, H. Ortega, A. Gerberich, and J. A. Louton, 17 Aug 1986, USNM 280573, 1 specimen, 72.0 mm SL. Small stream approx. 65 km upstream from mouth of Río Nanay, collected by P. Fromm et al., 18 Aug 1989, ANSP 164981, 1 specimen, 34.4 mm SL. Rio Putumayo drainage, El Estrecho, Quebrada de Las Granjas, collected by S. O. Kullander et al., 16 July 1986, NRM SOK/1986293.5292, 1 specimen, 94.0 mm SL. Along road from Genero Herrera towards Peruvian-Brazilian border, Río Ucayali drainage, collected by P. Fromm et al., 23 Aug 1989, ANSP 164980, 1 specimen, 39.3 mm SL.

Other material examined. —*Cyphocharax multilineatus*. Brazil: Amazonas. Rio Negro below Daraá, USNM 274102, 1. Rio Negro at Bucuri, CAS 58605, 1 (holotype of *Curimatus multilineatus* Myers, formerly IU 17672); CAS-SU 58986, 1. Rio Paduari, MZUSP 21161, 1.

Venezuela: Territorio Federal Amazonas. Caño La Esmeralda, tributary of Río Orinoco, SE of La Esmeralda, MBUCV V-4479, 1. Rio Mawarinuma (0°55'N, 66°10'W), AMNH uncat., 5. Río Urumi, tributary to Rio Negro upstream of Santa Lucia (1°1 TN, 66°51'W), USNM 270241, 1. Caño Tremblador where crossed by road from San Carlos de Río Negro to Solano, USNM 269987, 7. Rio Barria (0°50'N, 66°10'W), MBUCV V-14898, 1.

Steindachnerina fasciata. Brazil: Território de Rondônia, Rio Romarí (or São Domingo) near Nova União, Munícipio of Ouro Preto do Oeste, MNRJ 11208, 1 (holotype of *Curimata fasciata);* USNM 270377, 4 (paratypes of *Curimata fasciata*); MNRJ 11271, 4 (paratypes of *Curimata fasciata).* Jiparaná, Rio Urupá, tributary of Rio Jiparaná, USNM 273306, 3. Rio Machado system, 20 km upstream of Jiparaná, USNM 295126, 1. Mato Grosso. Rio Aripuanã, above Cachoeira de Dardanelos (approx. 10°19'42"S, 59°12'30"W), USNM 270375, 2 (paratypes of *Curimata fasciata);* INPA, 3 (paratypes of *Curimata fasciata).* Rio Aripuanã, approximately 10 km above Cachoeira de Dardanelos, Cidade de Humboldt, USNM 270376, 2 (paratypes of *Curimata fasciata);* INPA, 2 (paratypes of *Curimata fasciata);* BMNH 1985.2.5:1-2, 2 (paratypes of *Curimata fasciata);* MZUSP 28724, 2 (paratypes of *Curimata fasciata).* Rio Aripuanã, above Cachoeira das Andorinhas, MHNG 2226.24, 6 (paratypes of *Curimata fasciata).*

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tostictos from the Río Putumayo. Figures 1 to 3 were prepared by Mr. Theophilus Britt Griswold (USNM). This paper benefitted from the comments and suggestions of Dr. Stanley H. Weitzman (USNM) and Dr. Thomas A. Munroe (National Marine Fisheries Service, Systematics Laboratory), and two anonymous reviewers.

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(RPV) Department of Vertebrate Zoology (Fishes), National Museum of Natural History, Smithsonian Institution, Washington, D.C. 20560; and (RBS) Departamento de Ciencias Biológicas, Escuela Politécnica National, Quito.