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New Species of *Steindachnerina* (Characiformes: Curimatidae) from the Rio Tapajós, Brazil, and Review of the Genus in the Rio Tapajós and Rio Xingu Basins

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New Species of *Steindachnerina* (Characiformes: Curimatidae) from the Rio Tapajós, Brazil, and Review of the Genus in the Rio Tapajós and Rio Xingu Basins

André L. Netto-Ferreira[1] and Richard P. Vari[2]

A new species of *Steindachnerina*, family Curimatidae, is described from the headwaters of the Rio Jamanxim in the central portion of the Rio Tapajós basin of the Brazilian Amazon. The species is distinguished from its congeners on the basis of pigmentation and various meristic and morphometric features. The phylogenetic placement of the new species within *Steindachnerina* is investigated, and notwithstanding the similarities in pigmentation patterns between that species and *S. fasciata*, those forms were not found to be closely related. The new species represents the first reported occurrence of a species of *Steindachnerina* within the Rio Tapajós, the fifth largest component of the Amazon. The occurrence of a second species of the genus, *S. fasciata*, in the Rio Teles Pires, another tributary of the Rio Tapajós basin is also documented. *Steindachnerina brevipinna*, a species widespread through major portions of the Río de La Plata system, is confirmed to occur in the Rio Xingu of the Amazon basin.

Uma nova espécie de *Steindachnerina*, família Curimatidae, é descrita de nascentes do rio Jamanxim, no trecho médio da bacia do rio Tapajós na Amazônia brasileira. A espécie distingue-se de suas congêneres com base no colorido e diversos caracteres merísticos e morfométricos. O posicionamento filogenético da nova espécie em *Steindachnerina* é proposto e, apesar das semelhanças no padrão de colorido entre a espécie e *S. fasciata*, uma relação próxima entre ambas não foi observada. A nova espécie representa a primeira ocorrência de Steindachnerina no rio Tapajós, o quinto maior componente da bacia amazônica. A ocorrência de uma segunda espécie do gênero, *S. fasciata*, no rio Teles Pires, outro tributário da bacia do rio Tapajós, também é documentada. A ocorrência de *Steindachnerina brevipinna*, espécie de ampla distribuição no sistema do rio da Prata, é confirmada no rio Xingu na bacia amazônica.

THE 101 recognized species of the Curimatidae (Vari, 2003; Lucinda and Vari, 2009; Vari et al., 2010, in press) are notable for a series of modifications of multiple body systems associated with food acquisition and processing. Prominent among these are the loss of oral dentition and pronounced restructurings of the jaws, gill arches, and digestive tract. These adaptations permit members of the family to gather the biofilm and copious detritus that cover subaquatic surfaces and may account for the extensive populations of many species in the Curimatidae across major portions of South and southern Central America. Although 34 species of the Curimatidae, or approximately one-third of the total recognized species in the family, have been described as new in the last three decades, ichthyological explorations continue to reveal previously unknown species of the family from many drainages across the range of the family (Lucinda and Vari, 2009; Vari et al., 2010, in press).

With 23 recognized species (Vari, 1991a; Pavenelli and Britski, 1999; Lucinda and Vari, 2009), *Steindachnerina* is the second most species-rich of the genera within the Curimatidae. Species of *Steindachnerina* range through many of the river basins of cis-Andean South America from the Caribbean versant coastal watersheds of northern Venezuela to the Río de La Plata basin and with one species endemic to the Río Atrato west of the Andean Cordilleras of northwestern Colombia. One strikingly apparent lacuna in the known distribution of *Steindachnerina* was the Rio Tapajós. Despite encompassing 490,000 km^2 and being the fifth largest component of the Amazon basin (Goulding et al., 2003), no species of *Steindachnerina* were known to occur within the Rio Tapajós, although some samples of *S. leucisca* originated proximate to where that river empties into the mainstream Amazon (Vari, 1991a:fig. 14). The apparent absence of *Steindachnerina* across the expanse of that vast catchment was all the more striking, given the presence of members of the genus in the Rio Xingu and Rio Madeira basins to each side of the Rio Tapajós. Ichthyological surveys within upriver portions of the Rio Tapajós catchment, however, yielded a new species of *Steindachnerina* that we describe herein. These efforts also documented the presence within the Rio Tapajós system of a second species of the genus, *S. fasciata,* which was previously thought to be endemic to the adjoining Rio Madeira basin. Recent surveys also yielded series of specimens which confirmed that *S. brevipinna,* a species widely distributed through major portions of the Río de La Plata basin, also occurs in the upper reaches of the Rio Xingu system.

MATERIALS AND METHODS

Museum abbreviations follow Leviton et al. (1985). Counts and measurements follow Vari (1991a). Measurements were point-to-point linear distances taken using digital calipers with a precision of 0.1 mm. In the description, the number of examined specimens with a particular count is provided in parentheses with the value of the holotype in square brackets. Comparative information for other species of *Steindachnerina* was taken from Vari (1991b), Pavanelli and Britski (1999), and Lucinda and Vari (2009), but with the use of *S. varii* rather than *S. runa* following Vari (1993). No specimens of *S. corumbae* were available for osteological examination and that species is not included in the phylogenetic analysis. Abbreviations in the text are cleared

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Fig. 1. *Steindachnerina seriata,* holotype, MZUSP 97569, 78.9 mm SL, Brazil, Pará, Novo Progresso, Rio Jamanxim, Rio Tapajós basin.

and stained (CS), head length (HL), and standard length (SL). The phylogenetic analysis was performed with aid of the Willi Hennig Society version of TNT (Goloboff et al., 2008) using the exact search algorithm (ienum). Following the premises described in Vari (1991a) and in keeping with the arguments of Wilkinson (1992) and Wiens (2001), multistate characters were treated as ordered.

Steindachnerina seriata, new species

Figure 1, Table 1

Holotype.—MZUSP 97569, 78.9 mm SL, Brazil, Pará, Novo Progresso, Rio Jamanxim basin of Rio Tapajós system, near bridge along highway BR 163, south of Vila Mil, 07°51′47″S, 055°10′47″W, J. Birindelli, L. Sousa, A. Netto-Ferreira, M. Sabaj Pérez, N. Lujan, 27 October 2007.

Paratypes.—MZUSP 106055 (ex MZUSP 97569), 1, 83.1 mm SL, collected with holotype; MZUSP 97543, 2, 49.7–52.8 mm SL, ANSP 191430, 1, 49.7 mm SL, USNM 396026, 1, 50.7 mm SL, Brazil, Pará, Novo Progresso, Rio Jamanxim basin of Rio Tapajós system, near bridge along highway BR 163, 07°21′08″S, 055°17′45″W, J. Birindelli, L. Sousa, A. Netto-Ferreira, M. Sabaj Pérez, N. Lujan, 24 October 2007.

Diagnosis.—*Steindachnerina seriata* is distinguished from all congeners with the exception of *S. fasciata* by the presence of multiple narrow, dark stripes extending along the lateral and dorsolateral portion of the body. It differs from *S. fasciata* in the position on the scales of the dark stripes extending along the body (positioned along the areas of contact of proximate horizontal scale rows versus situated along the middle of the scales of each row, respectively), in the pigmentation pattern of the lateral surface of the caudal peduncle (the absence of a horizontally elongate, midlateral, dark stripe on the caudal peduncle versus the presence of such pigmentation, respectively), the distance from the tip of the snout to the origin of the anal fin (79.2–82.7% versus 84.1–88.9% of SL, respectively), the distance from the tip of the snout to the anus (76.2–78.0% versus 78.8–83.9% of SL, respectively), the length of the snout (33.5–34.6% versus 28.9–32.3% of HL, respectively), and the length of the postorbital portion of the head (36.3–38.8% versus 39.7–43.6% of HL, respectively). *Steindachnerina seriata* can be further distinguished from *S. argentea, S. bimaculata, S. binotata, S. conspersa, S. leucisca,* and *S. notograptos* in the form of the fleshy lining of the roof of the oral cavity (the presence of a distinct series of multiple very fleshy folds extending ventrally from the dorsal surface of the oral cavity versus the presence of only three weakly to moderately developed longitudinal folds in that region, respectively), from *S. gracilis, S. hypostoma, S. planiventris,* and *S. quasimodoi* in the transverse form of the prepelvic region (obtusely flattened versus distinctly flattened, respectively) and the number of scales across the transversely flattened prepelvic region immediately anterior to the insertion of the pelvic fins (3 or 4 versus 5 or 6 scales, respectively), from *S. binotata, S. corumbae, S. dobula, S. hypostoma, S. insculpta, S. leucisca, S. notograptos,* and *S. varii* in the pigmentation of the dorsal fin (the presence of a spot of dark pigmentation on the basal portions of the fin versus the absence of such pigmentation on the fin throughout ontogeny, respectively), from *S. amazonica, S. argentea, S. atratoensis, S. biornata, S. brevipinna, S. conspersa, S. dobula, S. elegans, S. fasciata. S. guentheri, S. hypostoma, S. insculpta, S. notonota,* and *S. varii* in the pigmentation pattern along the midlateral portions of the body and caudal fin (the absence of distinct dark pigmentation along the midlateral surface of the body and caudal fin versus the presence of a dark midlateral stripe extending along the lateral line and/or a patch of horizontally elongate dark pigmentation along the caudal peduncle and/or dark pigmentation along the middle caudal-fin rays, respectively).

Description.—Morphometric data presented in Table 1. Body robust overall, but somewhat compressed and moderately elongate. Dorsal profile of head convex from margin of upper lip to vertical situated slightly posterior of anterior nares, straight from that point to posterior terminus of supraoccipital spine. Dorsal profile of body slightly convex from tip of supraoccipital spine to dorsal-fin origin; straight to slightly convex and posteroventrally slanted from base of last dorsal-fin ray to origin of adipose fin and very slightly concave from rear of adipose-fin base to insertion of anteriormost dorsal procurrent fin ray. Dorsal surface of

Table 1. Morphometrics of Holotype and Five Paratypes of *Steindachnerina seriata*, New Species. Range and mean include all specimens.

	Holotype	Range	Mean
Standard length (mm)	78.9	49.7–83.1	61.0
Percent of SL			
Greatest body depth	38.3	31.9–38.3	35.2
Snout to dorsal-fin origin	48.0	47.6–51.0	49.4
Snout to pectoral-fin origin	29.0	28.5–31.2	29.6
Snout to pelvic-fin origin	54.0	51.5–54.1	53.2
Snout to anal-fin origin	82.0	79.2–82.7	81.1
Snout to anus	77.8	76.2–78.0	77.1
Dorsal-fin origin to hypural joint	61.2	56.2–61.2	58.6
Dorsal-fin origin to anal-fin origin	50.8	46.1–50.8	47.7
Dorsal-fin origin to pelvic-fin insertion	38.6	32.0–38.6	35.4
Dorsal-fin origin to pectoral-fin insertion	36.0	30.8–36.0	33.9
Caudal-peduncle depth	12.9	12.2–13.3	12.7
Pectoral-fin length	19.4	17.2–20.0	18.8
Pelvic-fin length	21.5	20.3–22.2	21.4
Dorsal-fin length	29.2	28.5–29.8	29.1
Head length	28.2	26.7–30.7	29.0
Percent of HL			
Snout length	33.5	33.5–34.6	34.0
Orbital diameter	29.1	29.1–36.9	32.8
Postorbital length	36.2	36.3–38.8	37.0
Interorbital width	28.7	28.5–31.7	29.7

body somewhat flattened medially in region anterior to dorsal fin and transversely rounded posterior to base of dorsal fin. Ventral profile of head very slightly convex to nearly straight from margin of lower lip to isthmus. Ventral profile of body slightly convex from isthmus to insertion of pelvic fin, slightly convex from that point to insertion of ultimate anal-fin ray and then slightly concave to insertion of anteriormost ventral procurrent fin ray. Prepelvic region somewhat flattened transversely with obtuse, albeit obvious, lateral angles in body wall. Postpelvic region of body transversely rounded in smaller paratypes and with obtuse median keel in larger paratype and holotype.

Dorsal fin pointed, with distal margin straight to slightly convex and first branched ray longest. Longest dorsal-fin ray approximately 2.9 times length of ultimate ray. Pectoral-fin profile pointed. Tip of adpressed pectoral fin reaches to point approximately two-thirds of distance to vertical through insertion of pelvic fin. Pelvic fin profile pointed. Tip of adpressed pelvic fin falls approximately two scales short of anus. Caudal fin forked with tips of lobes somewhat pointed. Adipose fin well developed. Distal margin of anal fin emarginate with subequal last unbranched and first branched rays longest and about 2.4 times length of ultimate ray. Tip of adpressed anal fin approximates insertion of ventralmost caudal-fin ray.

Head profile pointed overall, but rounded anterior to vertical through posterior nostril. Upper jaw distinctly longer than lower jaw, with mouth subterminal. Portion of buccopharyngeal complex situated on roof of oral cavity consisting of multiple ventrally extending fleshy folds. Nares very close; anterior circular, posterior crescent-shaped with aperture closed by thin flap of skin separating nares. Adipose eyelid moderately developed and extending posteriorly onto anterodorsal portion of opercle. Central aperture of adipose eyelid round across size range of examined specimens.

All scales of lateral line pored with primary laterosensory canal straight. Pored lateral line scales from supracleithrum to hypural joint 36 (1), 37 (4), or 38 (1) [36]. Pored scales on basal portions of caudal fin posterior to hypural joint 2 (4) or 3 (2) [2]. Scales in transverse series from dorsal-fin origin to lateral line not including median scale 5 (6) [5]. Scales in transverse series from anal-fin origin to lateral line not including median scale 4 (6) [4]. Scales across obtusely transversely flattened prepelvic region immediately anterior to insertion of pelvic fin 3 or 4. Scales between anus and anal-fin origin 2 (6) [2]. Middorsal series of scales from rear of supraoccipital spine to dorsal-fin origin 10 (4) or 11 (2) [10]. Caudal fin lacking adherent scales continuing posteriorly onto each lobe of fin.

Dorsal-fin rays iii,9 (6) [iii,9]; with first ray very short. Anal-fin rays iii,7 (6) [iii,7]; with first ray very short. Pelvic-fin rays i,8 (6) [i,8]. Pectoral-fin rays i,13 (4) or i,14 (2) [i,13]. Total vertebrae 31 (1) or 32 (5) [31].

Coloration in alcohol.—Overall coloration of head and body light brown, but darker dorsally. Upper lip, dorsolateral portion of snout, dorsal half of opercle and dorsal surface of head with variably intense dark pigmentation; pigmentation most developed over dorsal surface of head. Dark spot of pigmentation situated on medial surface of opercle variably apparent externally midway along vertical extent of translucent bone. Ventrolateral and ventral portions of head lacking dark pigmentation.

Scales of lateral and dorsolateral portions of body with dark pigmentation situated along dorsal and ventral limits of exposed portions of scales. Dark body pigmentation pattern on body differs somewhat in smaller examined specimens (49.7–52.8 mm SL) versus larger available individuals (78.9–83.9 mm SL). Smaller individuals with dark pigmentation on sequential scales conjoined to form irregularly margined narrow stripes along dorsolateral and

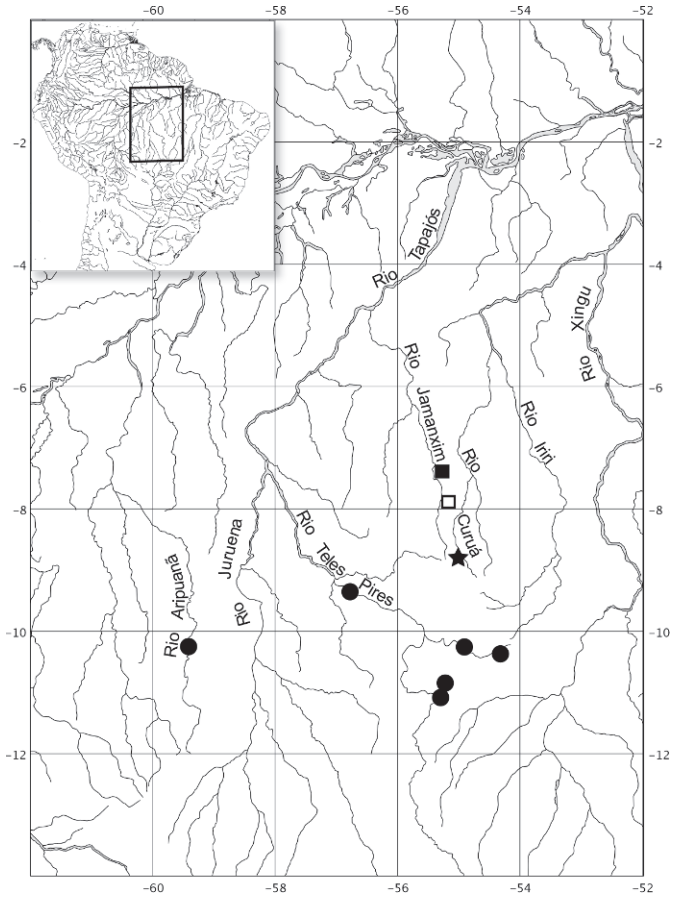

Fig. 2. Map of the Rio Tapajós and adjoining portions of the Rio Madeira and Rio Xingu basins showing collecting localities for *Steindachnerina seriata* (squares; filled in symbol indicates holotype locality), *S. fasciata* (dots; for other sites of occurrence of species in Rio Madeira basin see Vari, 1991a:fig. 41), and *S. brevipinna* (star). Symbols may represent more than one collection event.

dorsal portions of body. Pigmentation along scale margins of scale rows along lateral surface of body horizontally contiguous anteriorly, but in form of series of dark spots along posterior half of body. Dark pigmentation along dorsal margin of scale row situated immediately dorsal to base of pectoral fin in form of series of dark spots extending posteriorly to above insertion of anal fin. Gaps between sequential dark spots in series more extensive posteriorly.

Larger examined specimens (78.9–83.9 mm SL) with dark stripes more intensely pigmented than in smaller individuals, but with largely uniform dark pigmentation on dorsal portion of body masking or partially masking horizontal stripes obvious in smaller individuals along scale margins in that region. Lateral surface of body with series of narrow dark stripes comparable to those of smaller specimens, but with stripes continuing further posteriorly onto ventrolateral portion of body than in smaller individuals. Stripes attenuating posteriorly with two ventralmost stripes of series faint and terminating posteriorly above anal fin.

Dusky deep-lying midlateral stripe present on posterior portion of body. Stripe commences in region slightly posterior to (smaller specimens) or under (larger specimens) base of dorsal fin. Stripe one scale high and bordered dorsally and ventrally by darker surface pigmentation along margins of lateral line scales. Deep-lying stripe terminating posteriorly approximately at caudal peduncle. Specimens of all examined sizes with small, variably positioned, vertically elongate or ovoid dark spots situated on dorsolateral portion of body.

Fin rays of last unbranched dorsal-fin ray covered with small, dark chromatophores. Distinct dark blotch present on basal portions of first through sixth branched dorsal-fin rays. Blotch separated basally from body margin anteriorly, but continuing to base of fin rays posteriorly. Spot very dark and prominent in smaller examined specimens, but more dusky, albeit still obvious, in larger individuals. Remainder of dorsal fin hyaline. Adipose fin with scattered small dark chromatophores. Caudal fin hyaline or with limited dark pigmentation along dorsal and ventralmost rays in largest specimens. Anal, pectoral, and pelvic fins hyaline.

Coloration in life.—Based on photograph of recently captured holotype. Overall dark pigmentation of head, body, and dorsal fin comparable to that in preserved specimen, except for more intense silver coloration of ventrolateral and ventral portions of head and of lateral and ventral surfaces of body. Guanine on scales of body slightly masks dark horizontal stripes running along dorsal and ventral margins of scale rows and completely obscures deep-lying dusky midlateral stripe along posterior portion of body. Dorsal portion of iris distinctly yellowish-orange with that pigmentation progressively fading ventrally in areas anterior and posterior to pupil and completely absent ventral of pupil. Pectoral, pelvic, anal, and most caudal-fin rays yellowish orange with pigmentation most intense on ventralmost branched and unbranched caudal-fin principal rays and forming distinct reddish patch in that region.

Habitat and ecology.—All examined specimens of *Steindachnerina seriata* were collected in flooded areas along the margin of the river among stands of dense aquatic vegetation.

Distribution.—*Steindachnerina seriata* is only known from two localities that lie relatively close to each other in the Rio Jamanxim, a right bank tributary of the Rio Tapajós in the eastern portions of the Amazon basin (Fig. 2). Further sampling is necessary in order to determine whether *S. seriata* has a restricted range as proposed for various groups of Brazilian freshwater fishes by Nogueira et al. (2010). Alternatively, the apparent limited distribution for the species might reflect the undersampling of the Rio Tapajós ichthyofauna as evidenced by the recent discovery of *S. seriata* and *S. fasciata* in that catchment (see comments below).

Etymology.—The specific name, *seriata*, from the Latin for arranged in a series, is in reference to multiple series of narrow dark stripes situated along the scale row margins on the lateral and dorsolateral surface of the body in the species.

Generic placement and phylogenetic relationships.—As now defined, *Steindachnerina* is delimited by its possession of four synapomorphies involving aspects of the first and second infrapharyngobranchials, the ligaments of the ventral portion of the gill arches and the form of the basihyal and basihyal tooth plate (for details see Vari, 1989:58, 1991a:23). Analysis has shown that these character states are present in *Steindachnerina seriata*. The strict consensus (Fig. 3) of the

four most parsimonious trees derived from the parsimony analysis of the data matrix provided in Lucinda and Vari (2009), with the addition of *Steindachnerina seriata,* is isomorphic with that of Vari (1991a) and Lucinda and Vari (2009; Table 2; tree length = 53 steps; CI = 0.64; RI = 0.87). It places *S. seriata* within the largest subclade within *Steindachnerina* delimited by Vari (1991a:21) and now comprising *S. amazonica*, *S. atratoensis*, *S. biornata*, *S. brevipinna*, *S. dobula*, *S. elegans*, *S. fasciata*, *S. gracilis*, *S. guentheri*, *S. hypostoma*, *S. insculpta*, *S. notograptos, S. notonota*, *S. planiventris*, *S. pupula*, *S. quasimodoi, S. seriata,* and *S. varii* (=*S. runa* of Vari, 1991a). The position of *S. seriata* in clade 11 including *S. dobula*, *S. gracilis*, *S. hypostoma*, *S. planiventris, S. pupula,* and *S. quasimodoi* is supported by the absence of dark pigmentation along the lateral line (although faint pigmentation along the lateral line may be present on occasion in *S. quasimodoi, S. planiventris, S. hypostoma,* and *S. gracilis* as noted by Vari, 1991a). *Steindachnerina seriata* and *S. fasciata* are not retrieved as each other's closest relatives (Fig. 3), notwithstanding the superficially similar, albeit positionally non-homologous, pattern of dark horizontal stripping on the bodies of both species, a pigmentation pattern rare within the Curimatidae and unique to these two species in *Steindachnerina*. Coding of multistate characters as unordered retains the major clades within the phylogeny (2, 6, 12) but results in reduced resolution in the remainder of the tree.

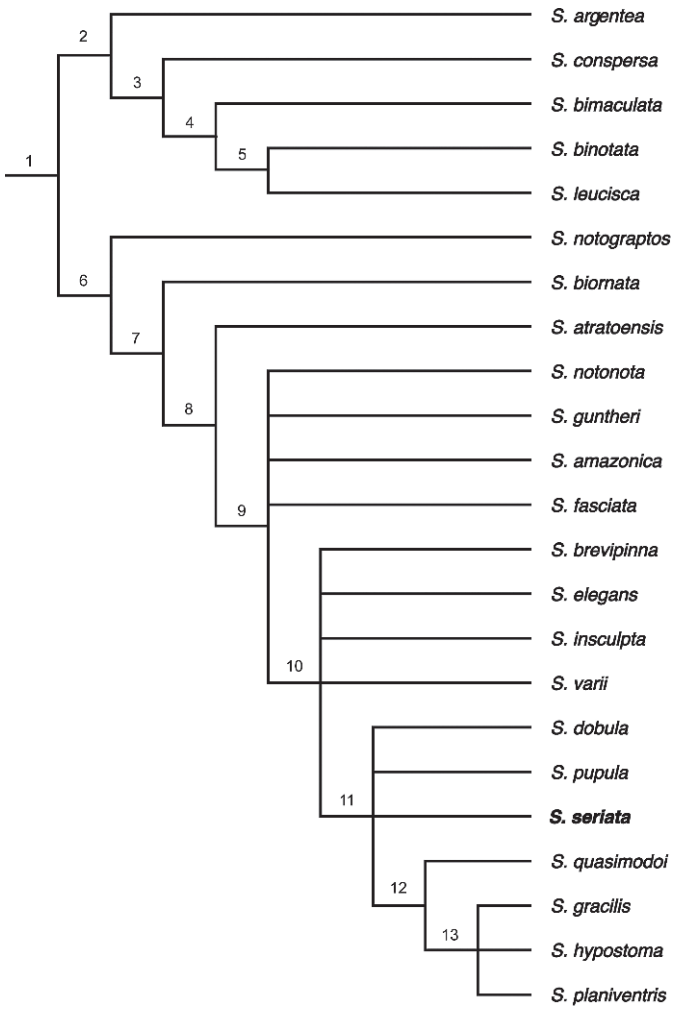

Fig. 3. Most parsimonious cladogram depicting hypothesis of phylogenetic relationships among species of *Steindachnerina.* Length = 53 steps. Consistency Index = 0.64. Retention Index = 0.87. See Appendix A in Lucinda and Vari (2009) for descriptions of characters and character states. Numbers above branches are node numbers. Synapomorphies for the genus, node 1, discussed in text. Common synapomorphies in all four most parsimonious trees (character codes are followed by character-state transformations): (2) 3: 0>1; 24: 0>1. (3) 9: 0>1; 15: 0>1; 16: 0>1; 17: 0>1; 20: 0>1; 21: 0>1. (4) 21:0>1. (5) 24: 1>0; 25: 1>0; 26: 0>1; 27: 0>1; 28: 0>1. (6) 1: 0>1; 2: 0>1; 4: 0>1; 6: 1>2. (7) 23: 0>2. (8) 1: 1>2; 7: 0>1. (9) 1: 2>3; 11: 0>1; 12: 0>1. (10) 13: 0>1; 14: 0>1. (11) 23: 2>0. (12) 19: 1>2. (13) 18: 0>1; 19: 0>1; 26: 0>1; 27: 0>1. Known autapomorphies including autapomorphic reversals for species: *S. dobula*—25: 1>0. *S. hypostoma*—25: 1>0. *S. notograptos*—11: 0>1; 12: 0>1; 22: 0>1; 26: 0>1; 28: 0>1; 29: 0>1. *S. quasimodoi*—2: 1>0. *S. seriata*—22: 0>1.

Steindachnerina *in the Rio Tapajós basin*.—The inadequacy of the present state of our knowledge of the composition of the Neotropical ichthyofauna was commented on by Vari and Malabarba (1998), with that theme repeated by subsequent authors. Vari and Géry (1985:1030) and Vari (1991a:65, fig. 41) documented the presence of *Steindachnerina fasciata* in various upriver locations along right bank tributaries of the Rio Madeira. One of these collection sites was in the upper portions of the Rio Aripuanã above the Cachoeira de Dardanelos (approximately 10°19′42″S, 59°12′30″W). In that region, the headwaters of the Rio Aripuanã (Rio Madeira system) lie close to streams draining into the Rio Juruena (Rio Tapajós basin). A series of specimens of *S. fasciata* examined during our study (see Material Examined, below), originated in the Rio Teles Pires within the upper reaches of the Rio Tapajós (Fig. 2) and represent the first records of the species from the basin. The occurrence of *S. fasciata* in the Rio Tapajós is in some mode a consequence of faunal interchange or past continuity between the ichthyofaunas of the middle reaches of that basin and the adjoining Rio Aripuanã of the Rio Tapajós basin. These records for *S. fasciata* along with the discovery of *S. seriata* represent the first records for *Steindachnerina* in that river system.

Steindachnerina *in the Rio Xingu basin*.—In his revisionary study of *Steindachnerina*, Vari (1991a:102) reported that one lot of relatively small examined specimens of the genus which originated in the upper Rio Curuá in the region of the Serra do Cachimbo in the upper Rio Xingu apparently represented *S. brevipinna* or a very similar member of the genus. The size and condition of the specimens made a definitive identification of that sample impossible. This lot was highlighted because it represented the only examined sample of *Steindachnerina* that originated in the Rio Xingu basin. Furthermore, if it was indeed *S. brevipinna* it represented both a major range extension in terms of absolute distance and more significantly the first record of the species from outside the Río de La Plata basin (Vari, 1991a:fig. 73).

A series of adult specimens from the Rio Curuá in the Serra da Cachimbo region in the Rio Xingu examined during the course of this study (see Material Examined, below) could not be distinguished from populations of *S. brevipinna* in the Rio Paraguay system. As such, *S. brevipinna* represents the first species of the Curimatidae known to be common to the Rio Xingu and Río de La Plata basins. The only other exception to the typical pattern of different curimatid faunas in the Amazon versus La Plata basins is the occurrence of *Psectrogaster curviventris* throughout major portions of the Río de La Plata system and also in the upper

Table 2. Character State Data Matrix for Species of *Steindachnerina*. Modified from Lucinda and Vari (2009) with addition of data for *S. seriata*. See Vari (1991b) and Lucinda and Vari (2009:appendix 1) for discussions and illustrations of character states.

	Characters																														
	1–10										11–20										21–29										
S. amazonica	3	1	0	1	1	2	1	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0	0		
S. argentea	0	0	1	0	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0		
S. atratoensis	2	1	0	1	1	2	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0	0		
S. bimaculata	0	0	1	0	1	1	0	1	1	1	0	0	0	0	1	1	1	0	0	1	1	1	0	1	1	0	0	0	0		
S. binotata	0	0	1	0	1	1	0	1	1	1	0	0	0	0	1	1	1	0	0	1	1	1	0	0	0	1	1	1	0		
S. biornata	1	1	0	1	1	2	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0		
S. brevipinna	3	1	0	1	1	2	1	1	0	1	1	1	1	1	0	0	0	0	0	0	0	0	2	0	1	0	0	0	0		
S. conspersa	0	0	1	0	1	1	0	1	1	1	0	0	0	0	1	1	1	0	0	1	1	0	0	1	1	0	0	0	0		
S. dobula	3	1	0	1	1	2	1	1	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
S. elegans	3	1	0	1	1	2	1	1	0	1	1	1	1	1	0	0	0	0	0	0	0	0	2	0	1	0	0	0	0		
S. fasciata	3	1	0	1	1	2	1	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0	0		
S. gracilis	3	1	0	1	1	2	1	1	0	1	1	1	1	1	0	0	0	1	2	0	0	0	1	0	1	1	1	0	1		
S. guntheri	3	1	0	1	1	2	1	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0	0		
S. hypostoma	3	1	0	1	1	2	1	1	0	1	1	1	1	1	0	0	0	1	2	0	0	0	1	0	0	1	1	0	1		
S. insculpta	3	1	0	1	1	2	1	1	0	1	1	1	1	1	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0		
S. leucisca	0	0	1	0	1	1	0	1	1	1	0	0	0	0	1	1	1	0	0	1	1	1	0	0	0	1	1	1	0		
S. notograptos	1	1	0	1	1	2	0	1	0	1	1	1	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	1	1		
S. notonota	3	1	0	1	1	2	1	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0	0		
S. planiventris	3	1	0	1	1	2	1	1	0	1	1	1	1	1	0	0	0	1	2	0	0	0	1	0	1	1	1	0	1		
S. pupula	3	1	0	1	1	2	1	1	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0		
S. quasimodoi	3	0	0	1	1	2	1	1	0	1	1	1	1	1	0	0	0	1	1	0	0	0	1	0	1	1	1	0	1		
S. seriata	3	1	0	1	1	2	1	1	0	1	1	1	1	1	0	0	0	0	0	0	0	1	0	0	1	0	0	0	1		
S. varii	3	1	0	1	1	2	1	1	0	1	1	1	1	1	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0		

reaches of the Rio Madeira, in the southwestern portions of the Amazon basin (Vari, 1991b:fig. 20). *Steindachnerina brevipinna* remains the only member of the genus confirmed to be present in the Rio Xingu basin, although that catchment is far from exhaustively sampled ichthyologically, and the situation may reflect the incomplete knowledge of the fish fauna in that river.

MATERIAL EXAMINED

Steindachnerina brevipinna: Brazil, Pará, Município de Altamira, Rio Iriri basin: MZUSP 96878, 2, Rio Curuá, at cofferdam of Pequena Central Hidroelétrica Buriti, 08°46′09″S, 54°57′02″W; MZUSP 96935, 2, Rio Curuá, upstream of highest falls, near restaurant along margin of road BR-163, 08°44′09″S, 54°57′46″W; MZUSP 97581, 48, Rio Curuá, upstream of BR-163 bridge, 08°53′54″S, 54°59′20″W; MZUSP 101303, 3, Rio Curuá, 08°45′55″S, 54°57′04″W; MZUSP 101383, 2, Rio Curuá, upstream of BR-163 bridge, 08°53′54″S, 54°59′20″W.

Steindachnerina fasciata: Brazil, Rio Teles Pires basin: MZUSP 95994, 2, Mato Grosso, Itaúba, Rio Matrinchã, 10°51′09″S, 55°13′44″W; MZUSP 95995, 20, Mato Grosso, Itaúba, at mouth of Rio Renato, 11°05′12″S, 55°18′19″W; MZUSP 96575, 3, Mato Grosso Peixoto de Azevedo, Rio Peixoto de Azevedo, 10°13′14″S, 54°58′02″W; MZUSP 96767, 6, Mato Grosso Peixoto de Azevedo, right bank tributary of Rio Peixoto de Azevedo, 10°17′14″S, 54°50′57″W; MZUSP 96802, 4, Mato Grosso, Peixoto de Azevedo, Cachoeira da Neblina, unnamed tributary of Rio Peixoto de Azevedo, 10°23′10″S, 54°18′22″W; MZUSP 99963, 6, Pará, Jacareacanga, Rio Teles Pires, downstream of Sete Quedas rapids, 09°20′38″S, 56°46′42″W; MZUSP 105938, 6, Mato Grosso, Novo Mundo, Rio Braço Norte, downstream of Pequena Central Hidroelétrica Braço Norte IV; MZUSP 105939, 12, Mato Grosso, Novo Mundo, Rio Braço Norte, bridge downstream of Pequena Central Hidroelétrica Braço Norte IV; MZUSP 105940, 8, Mato Grosso, Novo Mundo, stream tributary of Nhandu; MZUSP 105941, 2, Mato Grosso, Novo Mundo, Rio Braço Norte, downstream Pequena Central Hidroelétrica Braço Norte, approximately 600 m downstream of bridge.

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LITERATURE CITED

Goloboff, P., J. Farris, and K. Nixon. 2008. TNT, a free program for phylogenetic analysis. Cladistics 24:774–786. Program and documentation available from the authors at http://www.zmuc.dk/public/phylogeny/TNT/

Goulding, M., R. Barthem, and E. Ferreira. 2003. The Smithsonian Atlas of the Amazon. Smithsonian Books, Washington, D.C.

Leviton, A. E., R. H. Gibbs, Jr., E. Heal, and C. E. Dawson. 1985. Standards in herpetology and ichthyology: part 1. Standard symbolic codes for institutional resource collections in herpetology and ichthyology. Copeia 1985:802–832.

Lucinda, P. H. F., and R. P. Vari. 2009. New *Steindachnerina* species (Teleostei: Characiformes: Curimatidae) from the Rio Tocantins drainage. Copeia 2009:142–147.

Nogueira, C., P. A. Buckup, N. A. Menezes, O. T. Oyakawa, T. P. Kasecker, M. B. Ramos Neto, and J. A. C. Da Silva. 2010. Restricted-range fishes and the conservation of Brazilian freshwaters. PloS ONE 5(6):e 11390. doi: 10.1371/journal.pone.0011390.

Pavanelli, C. S., and H. A. Britski. 1999. Description of a new species of *Steindachnerina* (Teleostei: Characiformes: Curimatidae) from the upper Rio Paraná basin, Brazil. Ichthyological Exploration of Freshwaters 10:211–216.

Vari, R. P. 1989. A phylogenetic study of the Neotropical characiform family Curimatidae (Pisces: Ostariophysi). Smithsonian Contributions to Zoology 471:1–71.

Vari, R. P. 1991a. Systematics of the Neotropical characiform genus *Steindachnerina* Fowler (Pisces, Ostariophysi). Smithsonian Contributions to Zoology 507:1–118.

Vari, R. P. 1991b. Systematics of the Neotropical characiform genus *Psectrogaster* Eigenmann and Eigenmann (Pisces, Ostariophysi). Smithsonian Contributions to Zoology 481:1–43.

Vari, R. P. 1993. On the status of the nominal curimatid species *Steindachnerina varii* Géry et al., 1991 and *S. runa* Vari, 1991 (Ostariophysi, Characiformes). Copeia 1993:894–896.

Vari, R. P. 2003. Family Curimatidae, toothless characiforms, p. 51–64. *In*: Check List of the Freshwater Fishes of South and Central America. R. E. Reis, S. O. Kullander, and C. J. Ferraris, Jr. (eds.). EDIPUCRS, Porto Alegre, Brazil.

Vari, R. P., and J. Géry. 1985. A new curimatid fish (Characiformes: Curimatidae) from the Amazon basin. Proceedings of the Biological Society of Washington 98:1030–1034.

Vari, R. P., and L. Malabarba. 1998. Neotropical ichthyology: an overview, p. 23–142. *In*: Phylogeny and Classification of Neotropical Fishes. L. Malabarba, R. Reis, R. P. Vari, C. Lucena, and M. Lucena (eds.). EDIPUCRS, Porto Alegre, Brazil.

Vari, R. P., B. Sidlauskas, and P.-Y. LeBail. In press. New species of *Cyphocharax* (Ostariophysi: Characiformes: Curimatidae) from Suriname and French Guiana and an analysis of curimatid diversity on the Guiana Shield. Cybium.

Vari, R. P., A. M. Zanata, and P. Camelier. 2010. New species of *Cyphocharax* (Ostariophysi: Characiformes: Curimatidae) from Rio de Contas drainage, Bahia, Brazil. Copeia 2010:382–387.

Wiens, J. J. 2001. Character analysis in morphological phylogenetics: problems and solutions. Systematic Biology 50:689–699.

Wilkinson, M. 1992. Ordered versus unordered characters. Cladistics 8:375–385.