

## Two New Species of *Guianacara* from the Guiana Shield of Eastern Venezuela (Perciformes: Cichlidae)

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We describe two new species of *Guianacara* from the Guiana Shield of eastern Venezuela. *Guianacara stergiosi*, new species and *G. cuyunii*, new species belong in the subgenus *Guianacara* and thus are distinguished from *G. oelemariensis* (subgenus *Oelemaria*) by the possession of two (vs. one) supraneurals and produced lappets on the dorsal-fin spines. *Guianacara stergiosi* can be distinguished from all other species in the subgenus *Guianacara* by the possession of a round midlateral spot almost entirely below the upper lateral line, forming the darkest area in the midlateral bar. In other species with a midlateral spot, the spot is oval-shaped and located on and above the upper lateral line (*G. sphenozona*), or on and below the upper lateral line (*G. owroewefi*). In *Guianacara stergiosi* the midlateral bar progressively fades into a midlateral spot in all but small juvenile specimens, distinguishing the species from *G. geayi*, which generally has a complete midlateral bar; in *G. geayi* the midlateral bar can be reduced to a midlateral spot in large specimens, in which case the black coloration of the anterior dorsal-fin lappets is lost, whereas it is maintained in *G. stergiosi* at all sizes. *Guianacara stergiosi* is known from the Caroní and lower Aro River drainages, and from the upper Caura River basin upstream of the Para rapids. *Guianacara cuyunii* is distinguished from all other species in the subgenus by the possession of a thinner midlateral bar (about three scales wide vs. four scales wide) that is generally not replaced by a midlateral spot, except in very large specimens, by having a pectoral fin that does not reach the anal fin, and for being the only known species without a grayish branchiostegal membrane. *Guianacara cuyunii* is known from the upper Cuyuní River drainage in Venezuela, including its major tributaries. It is currently unknown whether the distribution of this species spans the lower reaches of the Cuyuní and Essequibo drainages.

Describimos dos especies nuevas de *Guianacara* del Escudo Guayanés en el este de Venezuela. *Guianacara stergiosi* sp. nov. y *G. cuyunii* sp. nov. pertenecen al subgénero *Guianacara* y por lo tanto se distinguen de *G. oelemariensis* (subgénero *Oelemaria*) por poseer dos (en lugar de uno) supraneurales y prolongaciones de las membranas de las espinas de la aleta dorsal. *Guianacara stergiosi* se distingue de las otras especies en el subgénero *Guianacara* por poseer una mancha medio-lateral redonda, localizada casi enteramente bajo la línea lateral superior formando el área más oscura de la banda medio-lateral. En otras especies con mancha medio-lateral, la mancha es de forma oval y está localizada sobre y arriba de la línea lateral superior (*G. sphenozona*), o sobre y abajo de la línea lateral superior (*G. owroewefi*). En *Guianacara stergiosi* la banda medio-lateral desaparece progresivamente hasta tornarse en una mancha medio-lateral en todos los especímenes excepto en pequeños juveniles, distinguiendo esta especie de *G. geayi* que generalmente tiene una banda medio-lateral completa; en *G. geayi* la banda medio-lateral puede reducirse a una mancha medio-lateral en especímenes grandes, en cuyo caso la coloración negra de las membranas dorsales anteriores desaparece, mientras esta coloración es mantenida en *G. stergiosi* de todas las tallas. *Guianacara stergiosi* se conoce de las cuencas del Río Caroní y el bajo Río Aro, y de la parte superior de la cuenca del Río Caura, aguas arriba del Salto Para. *Guianacara cuyunii* se distingue de todas las otras especies en el subgénero por tener una banda medio-lateral más fina (alrededor de tres escamas en lugar de cuatro), por carecer de mancha medio-lateral sobre la banda medio-lateral, por tener una aleta pectoral que no alcanza la aleta anal, y por ser la única especie conocida que no tiene una membrana branquiostegal grisácea. *Guianacara cuyunii* se conoce de la parte alta de la cuenca del Río Cuyuní en Venezuela, incluyendo sus principales tributarios. Actualmente se desconoce si la distribución de la especie alcanza las cuencas del bajo Río Cuyuní y el Essequibo.

THE genus *Guianacara* was established by Kullander and Nijssen (1989) to include three Surinamese taxa closely related to the species then known as *Aequidens geayi*. Kullander and Nijssen suggested that *Guianacara* was not related to *Aequidens*, but rather the genus probably was related to *Acarichthys* and other *Geophagus*-like genera. Based on a morphological phylogenetic analysis, Kullander (1998) formally proposed that *Guianacara* and *Acarichthys* were sister-taxa and formed the tribe Acarichthyini, a lineage within the Neotropical cichlid subfamily Geophaginae. Molecular (Farias et al., 1998, 1999; López-Fernández et al., 2005a) and combined molecular and morphological analyses (Farias et al., 2000; 2001; López-Fernández et al., 2005b) have generally confirmed this relationship, even though unambiguous morphological synapomorphies of the group remain elusive (see López-Fernández et al., 2005b).

*Guianacara* currently consists of four described species: *G. geayi*, *G. sphenozona*, and *G. owroewefi* are placed in the subgenus *Guianacara* (two supraneurals, produced membranes on dorsal-fin spines, complete midlateral bar), and *G. oelemariensis* is placed in the subgenus *Oelemaria* (one supraneural, dorsal-fin membranes not produced, midlateral bar absent). All currently recognized species are restricted to the eastern portion of the Guiana Shield in French Guiana and Surinam, where they have relatively limited geographic distributions. With the exception of *G. oelemariensis* and *G. owroewefi*, which are sympatric in the Oelemari River (Kullander and Nijssen, 1989), all species appear to be allopatric.

Undescribed forms of *Guianacara* are known to occur in the Branco and Trombetas drainages in northeastern Brazil (Kullander and Nijssen, 1989) and the Caroní and Caura drainages in Venezuela (Staeck and Linke, 1995; Lasso and Machado-Allison, 2000; Weidner, 2000). Two undescribed species of *Guianacara* (subgenus *Guianacara*) from the Caroní and Cuyuní drainages in eastern Venezuela were identified several years ago, but have not been formally described. The Caroní form has been identified as *Acarichthys* sp. from the Caura River (Lasso and Machado-Allison, 2000; Lasso et al., 2004), and it is known in the German aquarium literature as *Guianacara* sp. "Río Caroní" (Staeck and Linke, 1995; Weidner, 2000). To our knowledge, the Cuyuní form has not been distinguished elsewhere. In this paper, we describe the new species from the Caroní/Caura and Cuyuní drainages, provide a map of their distribution, and present an updated key to the described species of *Guianacara*.

## MATERIALS AND METHODS

All measurements were taken using dial and/or digital calipers to the nearest 0.1 mm. Counts of fin rays, scales, and gill rakers were made under a dissecting microscope. Counts and measurements follow Kullander (1986) and Kullander and Nijssen (1989). Counts are given as observed count followed by the number of individuals with that observed count in parentheses, for example, 18(3) indicates a count of 18 in three individuals. Scale row nomenclature follows Kullander (1996) and López-Fernández and Taphorn (2004), and scale pattern descriptions follow López-Fernández et al. (2005b). For the purpose of these descriptions, we refer to a midlateral bar as a dark, approximately vertical stripe of melanophores roughly at mid-length (Fig. 1). "Midlateral spot" refers to the darkest area of the midlateral bar, which can be placed at a variety of positions with respect to the upper lateral line. For practical reasons we treat the bar and the spot as independent; thus, although a specimen generally has both the bar and the spot, it can also have only one of the two. In adult specimens of several species of *Guianacara* the midlateral bar can fade such that only the midlateral spot is visible, yet in other species the bar may be always or nearly always visible. Juvenile specimens of all species except *G. oelemariensis* have a uniformly dark midlateral bar from which a midlateral spot is not distinguishable (Kullander and Nijssen, 1989). Vertebral counts were made from x-rayed and/or cleared-and-stained specimens following Taylor and Van Dyke (1985). Institutional abbreviations are as listed in Leviton et al. (1985) and Leviton and Gibbs (1988).

### *Guianacara (Guianacara) stergiosi*, new species Figures 1A, 2–4

*Holotype*.—MCNG 52840, 46.4 mm SL, Venezuela, Bolívar, Caroní, Claro River E of Los Tanques, 7.9222°N, 63.1014°W, 5 March 1988, D. C. Taphorn et al.

*Paratypes*.—MCNG 2643, 1, 60.8 mm SL, Venezuela, Bolívar, Erebató River at Cuchimi, 24 March 1981. MCNG 18317, 5, 44.5–66.3 mm SL, Venezuela, Bolívar, Tocoma River approximately 5 km downstream from Mojacasabe creek, 7.6806°N, 63.1472°W, 10 March 1988. MCNG 18404, 195, 14.0–58.5 mm SL (4 measured), collected with holotype. MCNG 18597, 82, 13.4–58.6 mm SL (5 measured), Venezuela, Bolívar, Caroní River, Mojacasabe creek 800 m upstream from confluence with Tocoma River, 7.6431°N,

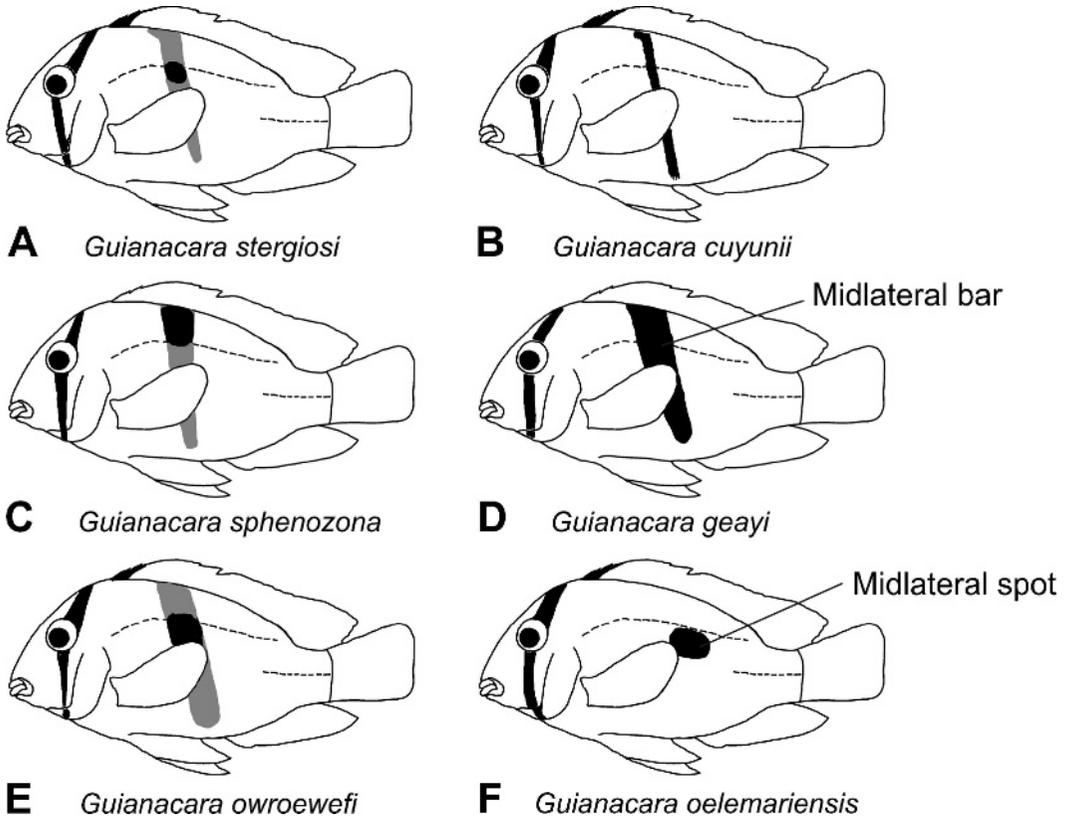


Fig. 1. Diagrammatic representation of melanic coloration distinguishing the species of *Guianacara*. (A) *G. stergiosi*, new species; (B) *G. cuyunii*, new species; (C) *G. sphenozona*; (D) *G. geayi*; (E) *G. owroewefi*; and (F) *G. oelemariensis*.



Fig. 2. *Guianacara stergiosi*, holotype, MCNG 52840, 46.4 mm SL, Venezuela, Bolívar, Caroní, Claro River E of Los Tanques, 7.9222°N, 63.1014°W.

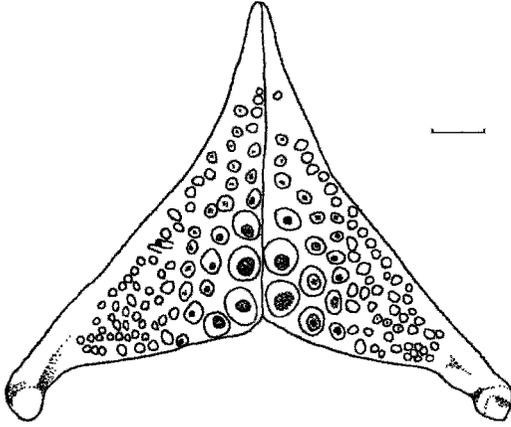


Fig. 3. *Guianacara stergiosi*, lower pharyngeal tooth plate in occlusal view, MCNG 34152, 81.0 mm SL. Scale bar = 1.0 mm.

63.1583°W, 10 March 1988. MCNG 18832, 1, 18.5 mm SL, Venezuela, Bolívar, Caura River, 20 m upstream from mouth of small tributary, 5.0167°N, 64.2667°W, 12 May 1988. MCNG 18862, 106, 16.3–44.3 mm SL (1 measured), Venezuela, Bolívar, Caura River, Yumucukena creek, within 4 km from mouth, 5.1667°N, 64.1500°W, 15 March 1988. MCNG 18889, 426, 14.5–69.3 mm SL (2 measured), Venezuela, Bolívar, Caura River, Sabaro River, 5.3167°N, 64.2000°W, 19 May 1988. MCNG 18923, 266, 15.9–66.1 mm SL (3 measured), Venezuela, Bolívar, Caura River, upstream from Paují rapids, 5.8750°N, 64.4667°W, 24 May 1988. MCNG 18942, 70, 12.4–31.8 mm SL (1 measured), Venezuela, Bolívar, Caura River, Mouth of Erebató River, “Entre Ríos” camp, 5.9542°N, 64.4250°W, 24 May 1988. MCNG 30064, 23, 26.8–62.5 mm SL (2 measured), Venezuela, Bolívar, Caroní River at Guri camp, 26 May 1994. MCNG 47902, 20, 17.7–47.1 mm SL (3 measured), Venezuela, Bolívar, Paragua River, Chiguao River, 19.4 km E of La Paragua, 6.0000°N, 63.2500°W, 8 Jan. 2003. MCNG 47943, 5, 18.3–79.7 (1 measured), Venezuela, Bolívar, Paragua at Salto Uraima, 67 km SW of La Paragua, 6.3013°N, 63.6274°W, 9 Jan. 2003. MCNG 49800, 5, 39.0–62.4 mm SL, Venezuela, Bolívar, Aro River on the road from Maripa to Ciudad Bolívar, 7.6064°N, 64.1275°W, 5 Feb. 2004. AMNH 91069, 1, 49.3 mm SL, Venezuela, Bolívar, Paragua River near Guaiquinima rapids at sand beach, 5°55′N, 63°55′W, ca. 19 Feb. 1990. AMNH 236103 (ex MCNG 18309), 22, 13.7–49.4 (1 measured), Venezuela, Bolívar, Claro River at “Hato El Delfín.” AMNH 235174, 27, Venezuela, Bolívar, Claro River, bridge on the road to Guri,

7°54.924′N, 63°05.44′W, 25 Jan. 2000. ANSP 146215, 2, 15.2–27.4 mm SL, Venezuela, Bolívar, Cusimí River upstream from “Entre Ríos,” 5°45′N, 64°24′W, 2 July 1977. NRM 12035, 1, 50.7 mm SL, Venezuela, Bolívar, Guri Dam, approximately 20 km N of “El Manteco,” then left from the road, 4 July 1990. NRM 24042, 7, 47.1–76.3 mm SL, Venezuela, Bolívar, Paragua River, N of “El Casabe,” 2 July 1985. NRM 52399 (ex MCNG 18317), 2, 45.3–49.8 mm SL, Venezuela, Bolívar, Tocoma River approximately 5 km downstream from Mojacasabe creek, 7.6806°N, 63.1472°W, 10 March 1988.

**Diagnosis.**—*Guianacara stergiosi* (Fig. 1A–3) belongs to the subgenus *Guianacara*; thus, it can be distinguished from *G. oelemariensis* (Fig. 1F, subgenus *Oelemaria*) by the possession of two supraneural bones and by possessing a midlateral bar and a midlateral spot, whereas *G. oelemariensis* lacks a midlateral bar. *Guianacara stergiosi* can be distinguished from all other species in the subgenus *Guianacara* by the possession of a round midlateral spot placed almost entirely below the upper lateral line, and representing the darkest area in the midlateral bar (Fig. 1A). In other species in which a midlateral spot is present, the spot is oval-shaped and located on and above the upper lateral line (*G. sphenozona*, Fig. 1C) or on and below the upper lateral line (*G. owroewefi*, Fig. 1E). In *G. stergiosi* the upper lateral line is in contact with the upper fifth of the round midlateral spot, whereas in *G. owroewefi* the upper lateral line is in contact with the upper third or fourth of the oval midlateral spot. In *Guianacara stergiosi* the midlateral bar progressively fades, and the midlateral spot becomes darker in all but

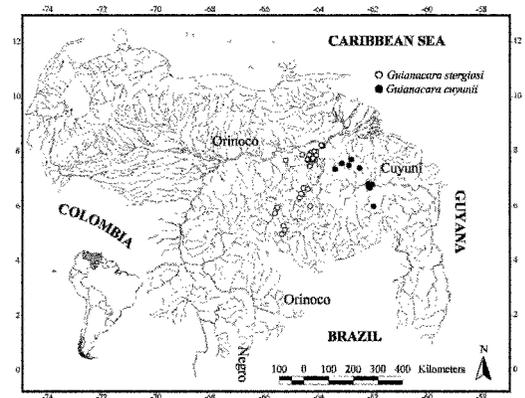


Fig. 4. Sample localities of *Guianacara stergiosi* and *G. cuyunii* on a map of river drainages of Venezuela and neighboring Guyana. One dot may represent more than one collection locality.

TABLE 1. MORPHOMETRICS OF *Guianacara stergiosi* AND *G. cuyunii*.

	<i>Guianacara stergiosi</i>						<i>Guianacara cuyunii</i>					
	Holotype	n	Mean	Min	Max	SD	Holotype	n	Mean	Min	Max	SD
SL	46.4	37	53.2	31.8	79.7	9.5	74.90	18	52.6	36.1	74.6	11.9
Percent SL												
Body depth	48.3	37	44.4	40.9	47.5	1.4	49.3	18	46.7	42.2	50.8	2.1
Head length	33.8	37	34.0	30.3	37.5	1.7	31.5	18	33.4	31.7	35.1	1.0
Caudal-peduncle depth	17.0	37	15.7	14.1	17.6	0.8	16.6	18	15.9	14.6	17.1	0.7
Caudal-peduncle length	13.8	37	13.9	12.1	16.0	0.9	13.6	18	14.2	13.0	16.4	0.9
Pectoral-fin length	34.7	37	33.7	30.9	37.6	1.7	31.5	18	33.0	30.5	36.3	1.9
Pelvic-fin length	32.3	37	33.4	30.3	38.0	1.9	33.8	18	35.3	27.3	42.9	4.2
Last dorsal-spine length	15.7	37	16.5	13.1	19.1	1.4	15.1	18	15.8	15.0	18.3	1.1
Percent head length												
Head width	50.3	37	51.6	41.3	57.8	3.5	53.4	18	53.2	46.5	57.0	2.2
Snout length	38.9	37	37.6	29.7	48.8	4.8	41.9	18	37.5	31.6	44.0	3.7
Orbital diameter	36.9	37	36.0	30.4	43.9	3.5	30.1	18	32.4	30.1	35.5	1.6
Interorbital width	30.6	37	27.4	23.0	35.6	3.1	33.1	18	28.2	22.5	33.0	3.0
Preorbital depth	35.0	37	33.1	23.2	53.9	6.1	36.4	18	31.2	23.3	43.8	6.0

small juvenile specimens, distinguishing the species from *G. geayi*, which generally has a complete midlateral bar; in *G. geayi* the midlateral bar can fade, giving rise to a midlateral spot in large specimens, in which case the black coloration of the anterior dorsal-fin lappets is lost, whereas it is maintained in *G. stergiosi* at all sizes.

*Description*.—Based on holotype (46.4 mm SL) and 27 paratypes 13.7 to 62.4 mm SL. Measurements are summarized in Table 1. Sexes appear to be isomorphic, but an aquarium-based report indicates that males grow larger and may develop a “weakly developed nuchal hump” (Weidner, 2000:322).

Head slightly broader ventrally than dorsally; nape increasingly keeled in correspondence to increase in SL; interorbital area flat to slightly convex. Dorsal head profile ascending, markedly convex to insertion of dorsal fin; dorsal-fin base descending, convex; dorsal caudal peduncle straight to caudal-fin base. Ventral head profile straight, descending to insertion of pelvic fin; ascending, convex to insertion of anal fin, straighter in specimens 36.9 mm SL and smaller; anal-fin base ascending, straight to slightly convex; ventral caudal peduncle ascending, straight to caudal-fin base; ventral caudal peduncle as long as dorsal. Lips moderately wide; lower lip fold discontinuous at dentary symphysis. Maxilla reaching about one-third of distance between nostril and orbit; ascending premaxillary process almost reaching anterior border of

orbit. Opercle, preopercle, cleithrum, supracleithrum, and post-temporal smooth.

Scales in row E1 24(2), 25(16), 26(13); scales between upper lateral line and dorsal fin 4 1/2(29), 4(1) anteriorly, 1 1/2(30) posteriorly. Scales between lateral lines 2. Upper lateral line 16(2), 17(12), 18(15), 19(2); lower lateral line 8(8), 9(18), 10(5). Circumpeduncular scales rows 7 above lower lateral line, 7 below, ctenoid. Opercle and subopercle fully scaled, cycloid. Interopercle caudo-dorsally scaled, cycloid. Cheek fully scaled, cycloid. One column of postorbital, cycloid scales. Occipital and flank scales ctenoid. Lateral chest scales variable, predominantly cycloid, smaller than flank scales. Pectoral, pelvic, dorsal, and anal fins naked, without scaled pad or sheath at the base. Caudal fin with single rows of scales to approximately one-third of its length, cycloid. Accessory caudal-fin extension on lateral line dorsally between rays D3 and D4, absent on ventral lobe.

Dorsal fin XV.9(6), XV.10(23), XV.11(2); anal fin III.7(4), III.8(26). Dorsal spines increasing in length from first to fourth, decreasing to eighth, then about equal length; loose membranes (lappets) behind anterior 7–8 spines, pointed, about one-fifth of spine length. Soft portion moderately expanded and pointed, reaching caudal-fin base up to one-fourth to one-third of fin length; rays 5–6 longest, but not produced into filaments. Anal fin pointed with soft rays 3–5 longest, without filaments, reaching caudal fin up to one-third of its length in larger specimens (>49.0 mm SL). Caudal fin emarginate with lobes

of approximately equal length, without produced filaments. Pectoral fin straight dorsally, rounded caudally and ventrally; longest at fifth ray, reaching anal-fin insertion, then rays progressively shorter. Pelvic fin triangular, outer branch of first soft ray longest, not produced into a filament, reaching first or second anal-fin spine.

Hemiseries in outer row of premaxilla with 9–12 subconical, slightly recurved, blunt teeth, 4–5 anterior teeth largest then thinner caudally. Two or three inner rows of smaller, unicuspid teeth, separated from anterior row by a gap. Dentary hemiseries with 4–5 rows of teeth approximately the same size, outer row with 17–22 teeth slightly more blunt than those of inner rows. Teeth on each hemiseries separated by a small, irregular symphyseal gap.

External gill rakers on first gill arch 7(8), 8(18), 9(4). Gills with narrow skin cover. Lower pharyngeal tooth plate wide; length of bone 82% of width; dentigerous area 74% of width, 67% of length; 19 teeth in posterior row, 7–10 on median row. Anterior teeth cylindrical, erect, not recurved, unicuspid; lateral marginal teeth like anteriormost, smaller on caudal half of plate; posteromedial teeth much larger, cylindrical with medial, blunt cusps of molariform aspect (Fig. 3). Three tooth plates on ceratobranchial 4. Vertebrae.  $13+13=26(2)$ ,  $13+14=27(1)$ .

*Coloration in preservative.*—(Fig. 1A, 2) Base color yellowish white to brownish yellow, depending on preservation, counter shaded; nape, snout, and lachrymal area ash to whitish gray; lips grayish white, upper slightly darker than lower. Supraorbital stripe on posterior fourth of orbit, approximately two scales wide, slightly caudally directed, dorsal end about two scales anterior to dorsal-fin insertion. Infraorbital stripe just posterior to middle of orbit, slightly thinner than supraorbital stripe, descending continuously to caudal edge of interopercle, and with a small, pointed, dorsally directed extension on the preopercle. Cheek yellowish anterior to infraorbital stripe; gill cover with base color. Ventrally, interopercle and preopercle whitish, branchiostegal membrane of same color, grayer in individuals larger than 47.0 mm SL. Chest yellowish white laterally and ventrally. Flank scales with darker caudal edge, increasingly diffuse with increasing size. A midlateral, dark brown bar (midlateral bar) extends between the base of dorsal-fin spines 7 to 9–10 and the region anterior to the anus; the bar is four scales wide at its widest point, which coincides with the upper lateral line and above it to the base of the dorsal fin, the bar progressively thins to three scales wide fading and disappearing ventrally at H3–H4; intensity of brown

diminishes with body size, being darker in juveniles approximately 37.0 mm SL or less. All specimens have a darker area on the midlateral bar forming a round, midlateral spot approximately three scales wide and two scales deep, placed entirely below the upper lateral line. In larger specimens, the midlateral bar becomes progressively fainter, except for the midlateral spot, which can eventually become the only remaining lateral marking. The midlateral bar is highlighted anteriorly and posteriorly by lighter colored bars, approximately two to three scales wide.

Dorsal fin dusky, anterior two or three rays and respective membranes black; tips of rays on spiny portion dark, forming a thin dark edge along fin; small white spots form four to five approximately linear, longitudinal rows on the soft portion and caudal half of spiny portion; spots are smaller than the spotted pattern formed by the darker area surrounding them. Anal fin hyaline or slightly dusky. Caudal fin hyaline or slightly dusky, with small white spots on membranes, forming three to four vertical rows on anterior two-thirds of fin. Pectoral fin hyaline. Pelvic fin hyaline to dusky, anterior 2–3 rays darker gray.

*Coloration in life.*—From live photographs of recently captured specimens and from photographs in aquarium literature. Background color yellowish or pinkish beige. Head with background color except for the jet black supra and infraorbital bars. In aquarium specimens the supraorbital bar can disappear, and the infraorbital bar can be reduced to a square mark at the joint of the preopercle, subopercle, and interopercle (e.g., Weidner, 2000:320, fig. 1). Midlateral bar dusky brown in field-captured live specimens, apparently turning jet black in aquarium (Staeck and Linke, 1995:110, Weidner, 2000:320, fig. 1). Recently captured specimens with dusky spots along the E1 and lower lateral-line rows of scales and the base of dorsal fin. Anteriormost spot anterior to midlateral bar, sometimes expanded dorsally, forming a faint bar from base of dorsal fin to dorsal edge of pectoral fin. Three spots on flank, posterior to midlateral bar, posteriormost spot on caudal peduncle. Flank spots appear to be absent from aquarium specimens (e.g., Weidner, 2000:320). Flank scales of field-collected specimens with iridescent, slightly bluish spots; creamy white in aquarium specimens. Dorsal fin with black membranes on anterior three spines, and on dorsal third of spines; otherwise fin is dusky yellow; bluish white dots form several rows on soft portion, extending anteriorly to about caudal half of spiny portion. Caudal fin dusky yellow with

bluish white spots. Anal fin hyaline to yellowish except for a dusky distal darker edge and a few whitish spots on membrane of posteriormost rays. Pectoral fin hyaline. Pelvic fin with spine and first ray dark; otherwise hyaline. Fin coloration of aquarium specimens in Weidner (2000:320–321, figs. 1–2, 324, fig. 1) with less colored fins.

*Distribution and habitat.*—(Fig. 4). *Guianacara stergiosi* has a known distribution restricted to clear and blackwater tributaries in the Venezuelan portion of the Guiana Shield. The species is most abundant in the Caroní River drainage, with most samples coming from the Claro and the Paragua rivers. Some samples from the upper reaches of the Caura drainage, upstream from the falls at Salto Para, suggest the species may be common in that area. Interestingly, however, the species appears to be absent from the lower Caura drainage. One sample is available from the lower Río Aro, a smaller drainage between the Caroní and Caura basins (but see below). Our own field observations and published reports (e.g., Weidner, 2000) coincide in that *G. stergiosi* (as do other species in the genus) generally inhabits moderately shallow, clear-black, acid waters with slow to moderate currents on rocky bottoms.

*Remarks.*—*Guianacara stergiosi* is known in the aquarium hobby as *Guianacara* sp. “Caroní” and has been reported from Paso Caruachi, Cucurital River, and Parque Cachama (Stawikowski and Werner, 2004) in the Caroní drainage. A form characterized by a patch of red color on the opercle and subopercle is distinguished in the aquarium hobby as *Guianacara* sp. “Río Aro” (Stawikowski and Werner, 2004) or *Guianacara* sp. “Red Cheek” (Weidner, 2000). It was first reported from near Ciudad Piar, Bolívar State, Venezuela (Stawikowski and Werner, 1988), and later from a pool west of the Caroní River (Weidner, 2000). Ciudad Piar sits on a small tributary of the Carapo River, part of the upper Aro River drainage, which drains to the Orinoco River east of the Caura River, and Stawikowski and Werner (2004) refer to the “Red Cheek” form as present only in the Aro River. Judging by aquarium literature descriptions, and especially, photographs, the “Red Cheek” form appears to be distinguishable from *G. stergiosi* only by the red gill cover. “Red Cheek” occurs within the area of distribution of *G. stergiosi* and possesses a mid-lateral spot placed almost entirely below the upper lateral line as in *G. stergiosi* (Stawikowski and Werner, 1988:139, top figure; Weidner, 2000: 324, fig. 2; Stawikowski and Werner,

2004:277, top figure). Although we have examined some specimens of *G. stergiosi* from the lower Aro River, we have not had access to specimens from its upper reaches. Whether the “Red Cheek” form from the Aro represents an unrecognized form diagnosable from *G. stergiosi* remains a possibility that will require further study.

*Etymology.*—Named to honor Dr. Basil Stergios, whose numerous botanical expeditions into the remote regions of southern Venezuela have encountered a variety of undescribed species of fishes, including most of the upper Caura specimens of *G. stergiosi*.

#### *Guianacara (Guianacara) cuyunii*, new species

Figures 4–6

*Holotype.*—MCNG 52841, 74.9 mm SL, Venezuela, Bolívar, Creek of Venamo River, upstream from Apanao rapids, 6.6667°N, 61.1667°W, 18 Aug. 1979, D. Taphorn.

*Paratypes.*—MCNG 949, 11, 28.7–45.8 mm SL (3 measured), collected with holotype. MCNG 13544, 3, 36.7–66.0 mm SL, Venezuela, Bolívar, Caño Negro, tributary of Cuyuní River, upstream from Anacoco island, 6.7833°N, 61.2000°W, 17 Feb. 1980. MCNG 16523, 3, 44.4–98.9 mm SL, Venezuela, Bolívar, Cuyuní River, upstream from the mouth of the Venamo River, 6.7250°N, 61.1833°W, 25 Aug. 1979. MCNG 16674, 28, 18.6–74.6 mm SL (8 measured), Venezuela, Bolívar, Cuyuní River, préstamo on road Tumeremo-El Dorado, 6.0000°N, 61.0000°W, 25 Feb. 1980. MCNG 29343, 1, 59.0 mm SL, Venezuela, Bolívar, Tributary of Yuruarí River, approximately 15 km E of El Manteco at the bridge, 7.3000°N, 62.3644°W, 9 Jan. 1994. MCNG 29468, 10, 17.0–54.3 mm SL, Venezuela, Bolívar, Cuyuní River drainage, El Miamo, NE from Guasipati, 7.6414°N, 61.7942°W, 11 Jan. 1994. MCNG 29540, 7, 23.4–70.3 mm SL, Venezuela, Bolívar, Yuruarí River W of Guasipati near La Pastora, 7.5039°N, 62.1322°W, 10 Jan. 1994. AMNH 236104 (ex MCNG 16527), 4, 40.4–50.0 mm SL, Venezuela, Bolívar, Cuyuní River at Anacoco island, beach near ferry, 6.7500°N, 61.1167°W, 26 Aug. 1979. NRM 52397 (ex MCNG 29540), 3, 49.6–66.6 mm SL, Venezuela, Bolívar, Yuruarí River W of Guasipati near La Pastora, 7.5039°N, 62.1322°W, 10 Jan. 1994. NRM 52398 (ex MCNG 29468), 5, 18.3–46.6 mm SL, Venezuela, Bolívar, Cuyuní River drainage, El Miamo, NE from Guasipati, 7.6414°N, 61.7942°W, 11 Jan. 1994.



Fig. 5. *Guianacara cuyunii* holotype, MCNG 52841, 74.9 mm SL, Venezuela, Bolívar, Creek of Venamo River, upstream from Apanao rapids, 6.6667°N, 61.1667°W.

*Diagnosis.*—*Guianacara cuyunii* (Figs. 1B, 5) belongs to the subgenus *Guianacara* and can be diagnosed from *G. oelemariensis* (Fig. 1F, subgenus *Oelemaria*) by the possession of two supraneurals instead of one and by possessing a uniformly dark midlateral bar, in contrast with a midlateral spot. *Guianacara cuyunii* can be distinguished from *G. stergiosi* (Fig. 1A), *G. geayi* (Fig. 1D), and *G. sphenozone* (Fig. 1C) by the possession of a thinner midlateral bar which is

three scales at its widest point, gradually thinning to two scales below the lateral line, as opposite to the other species in which the midlateral bar is four scales at its widest and is never thinned to less than three scales. Additionally, adult *G. cuyunii* retain the black coloration in the membranes of the anterior three dorsal spines, which is lost in adults of *G. sphenozone* and *G. geayi*. *Guianacara cuyunii* can be distinguished from *G. ouroewefi* (Fig. 1E) by its thinner, never faint midlateral bar. Additionally, *G. cuyunii* can be distinguished from *G. stergiosi*, *G. ouroewefi*, and *G. sphenozone* by having a pectoral fin that does not reach the base of the anal fin, and for a branchiostegal membrane of background body color instead of dusky.

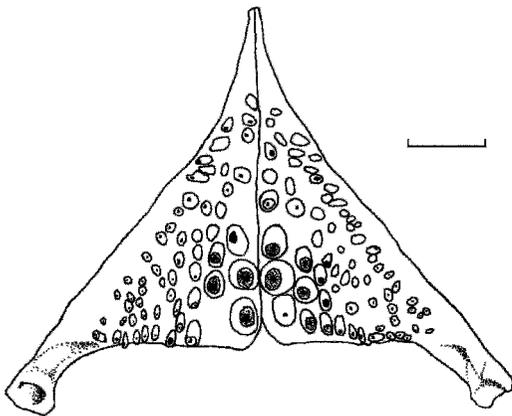


Fig. 6. *Guianacara cuyunii*. Lower pharyngeal tooth plate in occlusal view, MCNG 15544, 65.5 mm SL. Scale bar = 1.0 mm.

*Description.*—Based on holotype (74.9 mm SL) and 18 paratypes 36.1 to 74.6 mm SL. Measurements are summarized in Table 1. Sexes appear to be isomorphic.

Head slightly broader ventrally than dorsally; interorbital area flat to slightly convex. Dorsal head profile ascending, forming a continuous convex curve from upper lip to dorsal insertion; dorsal-fin base descending, convex; dorsal-caudal peduncle straight to slightly convex to base of caudal fin. Ventral head profile straight, descending to opercular mid-length, then convex to pelvic-fin insertion; straight or slightly convex to anal-fin insertion; anal-fin base ascending, slight-

ly convex; ventral caudal peduncle ascending, straight or slightly convex to caudal-fin insertion; ventral caudal-peduncle length 1.1 to 1.2 times on dorsal caudal-peduncle length.

Scale counts of row E1 24(1), 25(16), 26(2); scales between upper lateral line and dorsal fin 4.5(19) anteriorly, 1.5(19) posteriorly. Scales between lateral lines 2. Upper lateral line 18(15), 19(4); lower lateral line 7(1), 8(7), 9(11). Circumpeduncular scales 7 above lower lateral line, 7 above, ctenoid. Opercle and subopercle fully scaled, cycloid. Interopercle scaled caudo-dorsally, scales cycloid. Cheek fully scaled, cycloid. Single column of postorbital squamation, slightly ctenoid. Occipital and flank scales ctenoid. Lateral chest scales variable, predominantly ctenoid, smaller than flank scales. Pectoral, pelvic, dorsal, and anal fins naked, without scaled pad or sheath at the base. Caudal fin with single rows of scales to one-fourth to one-third of its length, ctenoid. Accessory caudal-fin extensions on the caudal fin dorsally between rays D3 and D4 and ventrally between rays V4 and V5.

Dorsal fin XV.10(18), XV.11(1); anal III.17(2), III.18(17). Dorsal spines increasing in length from first to sixth, seventh slightly shorter, then about equal length; lappets behind 11–13 anterior spines, pointed, about one-fifth of spine length in anterior 5–6 spines, shorter posteriorly. Soft portion forming a straight line with spiny portion, or only slightly expanded, pointed, reaching approximately one-fourth of caudal-fin length, rays 4–6 longest, but not produced into filaments. Anal fin pointed, soft rays 3–5 longest, not produced into filaments, reaching about one-fourth of caudal-fin length. Caudal fin emarginate with lobes of about the same length, without filaments. Pectoral fin straight dorsally, rounded caudally and ventrally; longest at fifth ray, not reaching anal-fin insertion. Pelvic fin triangular, outer branch of first soft ray longest, not produced into a filament, reaching first or second anal spine.

Hemiseries in outer row of premaxilla with 12, thin, slightly recurved, sharp teeth larger near symphysis than caudally. Four inner rows of smaller, unicuspid teeth, second row parallel to outer row for almost entire length of dentigerous arm. Dentary hemiseries with an outer row of 22–23 teeth, four inner rows with smaller teeth, separated by a small, irregular gap from anterior row.

External gill rakers on first gill arch 7(20), 8(7), 9(7), 10(2), 11(1). Gills with narrow basal skin cover. Lower pharyngeal tooth plate wide; length of bone 78.8% of width; dentigerous area 67% of width, 63% of length; 21 teeth on posterior row, 7–8 on median row. Anterior teeth

cylindrical, erect, slightly recurved, unicuspid; lateral marginal teeth like anteriormost, smaller on caudal half of plate; posteromedial teeth much larger, cylindrical with medial cusps, molariform (Fig. 6). Two tooth plates on fourth ceratobranchial. Vertebrae. 13+13=26(1), 13+14=27(1).

*Coloration in preservative.*—(Fig. 1B, 5). Base color yellowish white to brownish yellow, depending on preservation; nape, snout, lacrimal area and lips of base color, opercle slightly darker. Supraorbital stripe on posterior third of orbit, 1.5 to 2.5 scales wide, slightly caudally directed, dorsal end about three scales from dorsal-fin insertion. Infraorbital stripe at the middle of orbit, about the same width as supraorbital stripe, descending continuously to caudal edge of interopercle. Ventrally, interopercle and preopercle with base color, branchiostegal membrane whitish. Chest slightly lighter than base color. Midlateral bar extending between the base of dorsal spines 7–9; the bar is three scales wide at its widest point, which coincides with with the pored scales of the upper lateral line, the bar is two and a half scales above the lateral line and up to the base of dorsal fin, it is gradually reduced to two scales wide fading and disappearing ventrally at H4; midlateral most intense below upper lateral line, but midlateral spot distinct only in large specimens (>99.0 mm SL). The bar is maintained in adults, instead of being reduced to a midlateral spot. Midlateral bar highlighted anteriorly and posteriorly by slightly lighter colored bars two to three scales wide.

Dorsal fin dusky, anterior three spines and respective membranes black, a condition maintained also in adults; tips of spines and anterior two to three rays black, forming a thin, dark edge; small, whitish spots on membranes at the base of rays in the caudal half of soft portion. Anal fin slightly dusky, sometimes with tiny whitish spots on membranes at the base of posteriormost two to three soft rays. Caudal fin hyaline or slightly dusky, with small white spots on anterior half of membranes, not forming a discernible pattern. Pectoral fin hyaline. Pelvic fin hyaline, spine and first ray light grayish in some specimens. We have no information about the live coloration of this species.

*Distribution and habitat.*—(Fig. 4). *Guianacara cuyunii* is known only from the upper Cuyuní River drainage in Venezuela. Most collections come from roadside localities near the Anacoco Island on the Cuyuní main channel and from small tributaries, especially the Venamo, Botanamo, and Yuruarí.

*Etymology*.—This species is named for the Cuyuní River, a tributary of the Essequibo, where the type material was collected. The species epithet is a noun in apposition.

KEY TO THE SPECIES OF *Guianacara*

- 1a. Two supraneurals; produced lappets on tips of anterior dorsal-fin spines; dark midlateral bar present, in some species large individuals may have a faint midlateral bar with a darker area forming a midlateral spot over the midlateral bar ..... (subgenus *Guianacara*) 2
- 1b. One supraneural; no produced lappets associated with anterior dorsal spines; midlateral bar absent, midlateral spot present .....  
*Guianacara oelemariensis* (subgenus *Oelemaria*)
- 2a. Midlateral bar uniformly dark or with darkest area forming a vertically elongate oval ..... 3
- 2b. Darkest area of midlateral bar round, placed almost entirely (about four-fifths of its area) below the upper lateral line ..... *G. stergiosi*
- 3a. Midlateral bar broad (at least three scales wide at its thinner point), faint or absent; midlateral spot present, oval shaped ..... 4
- 3b. Midlateral bar thin (up to three scales wide at its widest point), never faint, uniformly dark along its length or with a slightly darker area between upper and lower segments of the lateral line; midlateral spot, if present, only in specimens with SL > 99.0 mm ..... *G. cuyunii*
- 4a. White dots on dorsal fin smaller than smoky markings surrounding them, confined to soft portion ..... 5
- 4b. White dots on dorsal fin larger or equal to smoky markings surrounding them, present both on soft and spiny portions ..... *G. geayi*
- 5a. Midlateral spot on and below upper lateral line, midlateral bar of uniform thickness along its length (not wedged); black pigmentation of anterior 3 dorsal-fin spines retained in adults ..... *G. ouroewefi*
- 5b. Midlateral spot on and above upper lateral line; midlateral bar wedged, thinner ventrally than dorsally; black pigmentation of anterior three dorsal-fin spines present only in juveniles ..... *G. sphenozona*

DISCUSSION

Even though color pattern and anatomy among *Guianacara* species are largely conserved

(e.g., Kullander and Nijssen, 1989; Keith et al., 2000), the subtle color differences are unambiguously stable within species and provide reliable characters for species diagnosis. Reduced morphological variation in *Guianacara* corresponds with highly conservative habitat preferences and presumably similar ecomorphological traits associated with feeding and habitat use (López-Fernández and Winemiller, unpubl. data). All known species generally prefer clear, soft, and slightly acidic waters with a substrate of large rocks intermixed with sandy patches, often at sites with relatively fast current (HLF and DCT pers. obs., and see Staeck and Linke, 1995; Weidner, 2000). Anatomical and ecological similarity and a general pattern of allopatric distribution (but see Kullander and Nijssen, 1989) suggest that the hydrological history of the Guiana Shield has played an important role in determining the geographic distribution of these fishes. *Guianacara stergiosi* and *G. cuyunii* are no exception to this pattern, and despite the geographic proximity of the Caroní and upper Cuyuní River drainages, the two species appear to be strictly isolated from each other. Interestingly, *G. stergiosi* shares its distribution with *Geophagus grammepareius* (compare fig. 4 and fig. 11 in Kullander et al., 1992). Both species are common in the Caroní; recent collections also report *G. grammepareius* from the poorly explored lower Aro River (MCNG 49799), and both species coexist in the upper reaches of the Caura River while being absent from the lower Caura, downstream from the Pará rapids. This pattern strongly supports the hypothesis that these drainages were once connected through their upper basins (Kullander et al., 1992) and may indicate a general biogeographic phenomenon in the western Guiana Shield. *Guianacara cuyunii* is so far known only from the Venezuelan upper basin of the Cuyuní River, a tributary of the Essequibo in Guyana. Although it is expected that the species is present also in the middle and lower reaches of the basin in Guyana, it is unclear how far the species distribution extends downstream. Observations of material collected in the Essequibo drainage in Guyana (J. Armbruster and M. Sabaj, unpubl. data) suggest that tributaries of the Essequibo other than the Cuyuní may harbor yet another undescribed species of *Guianacara*, distinct from *G. cuyunii*.

ACKNOWLEDGMENTS

We thank J. Armbruster, M. Sabaj, R. Stawikowski, and U. Werner for providing photos and their observations of *Guianacara* and M. Stiassny for the loan of specimens and for her encour-

agement to examine specimens of *Guianacara* during visits by HLF to the AMNH. Curatorial services at the MCNG were provided by K. Marcheto, I. Montaña, and L. Martínez. Museum research was partially funded by Axelrod Fellowships from the Department of Ichthyology at the AMNH to HLF. Funding for fieldwork related to this project was partially provided by grants from the National Geographic Society and the National Science Foundation to K. Winemiller. Fishing permits were provided by the Instituto Nacional de la Pesca y Acuicultura del Ministerio de Agricultura y Tierras of the Venezuelan government.

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Send reprint requests to HLF. Submitted: 15 Oct. 2005. Accepted: 2 May 2006. Section editor: D. Buth.