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Review of the Malagasy Sicydiine Gobies (Teleostei: Gobiidae), with Description of a New Species and Comments on the Taxonomic Status of *Gobius lagocephalus* Pallas, 1770

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ABSTRACT

Malagasy sicydiine gobies are reviewed, compared with other members of the subfamily in the Mascarene region, and a new species belonging to the genus *Sicyopterus* Gill, 1860 is described on the basis of material collected in northeastern Madagascar. The new species differs from *Sicyopterus franouxi* (Pellegrin, 1935), the only other known species of sicydiine goby inhabiting the freshwaters of Madagascar, in the number of branched rays in the second dorsal fin, the color pattern of the body and fins, the number and shape of the premaxillary teeth, and the size and number of scales on the nape and abdomen. *Sicyopterus franouxi*, a taxon described on the basis of a single juvenile specimen, is redescribed based on adult material. The taxonomic status of *Gobius lagocephalus* Pallas, 1770, a nominal sicydiine species incorrectly ascribed to the Mascarene islands of the western Indian Ocean, is discussed. This species is herein concluded to be a *nomen dubium* of uncertain placement beyond the subfamilial level.

INTRODUCTION

Freshwater gobies of the genus *Sicyopterus* Gill, 1860 (subfamily Sicydiinae) inhabit tropical and subtropical swift-flowing streams and rivers in the Indo-Pacific region, islands of the southwestern Pacific Ocean, and islands of the Mascarene region in the

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western Indian Ocean. These small fishes are often referred to as "rock-climbing gobies" due to their ability to ascend steep, torrential streams and waterfalls (Fukui, 1979; Parenti and Maciolek, 1993; Balon and Bruton, 1994). Throughout their range, sicydiine gobies exhibit a high degree of island-group endemism (Parenti and Maciolek, 1993, 1996; this study). Two species of *Sicyopterus* are presently known to inhabit the freshwaters of Madagascar (Sparks and Stiassny, 2003): One of these is herein described as new to science.

Monophyly of sicydiine gobies is well supported by morphological evidence (Hoese, 1984; Harrison, 1989; Parenti and Maciolek, 1993; Birdsong et al., 1998; Parenti and Thomas, 1998). Parenti and Maciolek (1993) and Parenti and Thomas (1998) recognized five genera within the subfamily Sicydiinae: *Sicydium* Valenciennes, in Cuvier and Valenciennes, 1837, *Sicyopterus* Gill, 1860, *Lentipes* Günther, 1861, *Sicyopus* Gill, 1863, and *Stiphodon* Weber, 1895. On the basis of a low number of premaxillary teeth (7–23 vs. >25 in other Sicydiinae), Watson (1995a) recognized a sixth sicydiine genus from Réunion and Mauritius, *Cotylopus* Guichenot, 1863. The subfamily comprises about 100 nominal species; approximately 40 of these species are presently placed in the genus *Sicyopterus* (Parenti and Maciolek, 1996; Eschmeyer, 1998). *Sicyopterus* and *Sicydium* are hypothesized to be sister genera based on the following derived features: an uninterrupted oculoscapular canal extending posteriorly from the eye to the posterior margin of the opercle, with fusion of oculoscapular-canal pores H and K (Akihito et al., 1984; Pezold, 1993), and a blunt ascending process of the premaxilla (Parenti and Maciolek, 1993). Akihito and Meguro (1979) presented and discussed a number of features useful for distinguishing between members of *Sicydium* and *Sicyopterus*. *Sicyopterus* has been hypothesized to be monophyletic on the basis of a marked medial gap between the left and right premaxillary tooth rows (Parenti and Maciolek, 1993, 1996).

In this paper we review the species of sicydiine gobies inhabiting Madagascar and the Mascarene region, describe a new species of *Sicyopterus* from northeastern Madagascar (fig. 1), and compare the new taxon with *S. franouxi* (Pellegrin, 1935), the only other sicydiine goby known to inhabit the freshwaters of Madagascar. Pellegrin described *S. franouxi* on the basis of a single juvenile specimen. Herein, we redescribe this taxon on the basis of adult material. We also discuss the taxonomy of *Gobius lagocephalus* Pallas, 1770, a nominal sicydiine taxon historically and incorrectly ascribed to Madagascar and other islands of the Mascarene region. A summary of the taxonomic conclusions of this study is presented in table 1.

MATERIALS AND METHODS

Representatives of the new species are deposited at the University of Michigan Museum of Zoology, Ann Arbor (UMMZ), the Museum National d'Histoire Naturelle, Paris (MNHN), and at the American Museum of Natural History, New York (AMNH). Institutional abbreviations for material examined follow Leviton et al. (1985). Materials examined are listed in appendix 1.

Osteological characters of the new species and related taxa were examined using cleared-and-stained individuals (CS), radiographs, or from scanning electron microscope (SEM) images. SEM images of dried and coated premaxillary bones were produced using a Hitachi S4700 Field Emission Scanning Electron Microscope (FE-SEM). Premaxillary tooth counts were taken from either the left or right element; counts are approximations due to the uncertainty associated with estimating missing teeth. Gaps were included in the tooth count if the gap width was judged to exceed tooth width in that region and it was apparent from the insertion point that a tooth was missing. Specimens were cleared and stained using a modified protocol based on Taylor and Van Dyke (1985). Morphometric measurements were recorded to the nearest 0.1 mm using digital or dial calipers. Standard length (SL) is used throughout. Body depth *A* was measured as a vertical transect at the origin of the pelvic fin, body depth *B* as a vertical transect at the origin of the second dorsal fin, and body depth *C* at the least depth of the caudal peduncle. The distance between the last spinous ray of the first dorsal fin and the first ray of

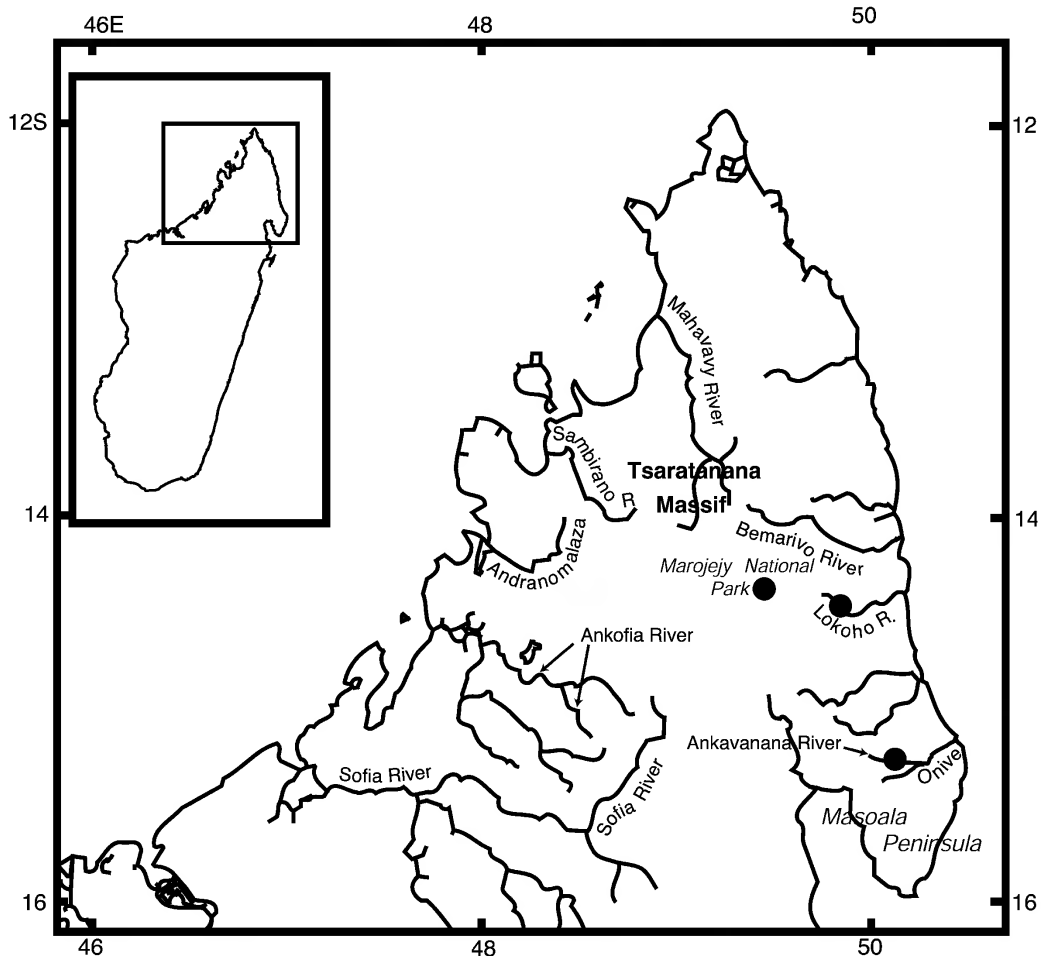

Fig. 1. Map of northern Madagascar illustrating drainages from which the new species has been collected. Solid circles may represent more than a single collecting locality.

the second dorsal fin, as well as the lengths of the bases of the dorsal and anal fins, were measured from radiographs. Vertebral counts included the ural centrum (= last half-centrum). Vertebral and fin spine/ray counts were obtained from radiographs. The terminal dorsal- and anal-fin rays, which are branched to the base of the fin, were counted as a single element. Transverse scale rows were counted from the dorsal margin of the gill opening to the caudal flexure (Parenti and Maciolek, 1993). Scale counts are approximations, due to high intra- and interspecific variability, irregular arrangement, and because small scale size and the degree to which scales are embedded makes accurate counts problematic. Nomenclature for the cephalic seismosensory system follows that of Akihito et al. (1984).

Institutional Abbreviations

AMNH	American Museum of Natural History, New York
MNHN	Museum National d'Histoire Naturelle, Paris
NHRM	Naturhistoriska Riksmuseet, Stockholm
RUSI	J.L.B. Smith Institute of Ichthyology, Grahamstown
UMMZ	University of Michigan, Museum of Zoology, Ann Arbor
USNM	National Museum of Natural History, Smithsonian Institution,Washington, D.C.

TABLE 1
Taxonomic Conclusions of the Present Study

Taxon	Status	Range	Remarks
Sicyopterus franouxi (Pellegrin, 1935)	Valid	Madagascar	Historically misidentified as *S. fasciatus* due to presence of scales of reduced size on nape and abdomen.
Sicyopterus punctissimus, n.sp.	New description	NE Madagascar	Historically misidentified as *S. lagocephalus* (*nomen dubium*), or *S. laticeps* due to presence of scales on nape and abdomen that are of similar size to those on flanks.
Sicyopterus fasciatus (Day, 1874)	Valid	Burma (Myanmar); India?	Attributions of *S. fasciatus* to Madagascar by Pellegrin (1935) and others are incorrect; these specimens are assignable to *S. franouxi*.
Sicyopterus laticeps (Valenciennes, in Cuvier and Valenciennes, 1837)	Valid	Réunion and Mauritius	Does not occur in Madagascar as some authors have suggested (e.g., Pollen, 1875). May be conspecific with *Sicyopterus (Gobius) caeruleus*.
Gobius lagocephalus (Pallas, 1770)	*Nomen dubium* of uncertain placement beyond subfamily level	Uncertain (America?)	The name is not available for any of the presently recognized Malagasy and Mascarene sicydiine gobies (see text for discussion).
Gobius caeruleus (Commerson, in Lacépède, 1800)	Available name	Réunion	Based on Commerson's description we are unable to determine if this species (no type material exists) is conspecific with *S. laticeps*.
Sicyopterus sp. "Comoros"	Undescribed	Comoros Islands	Balon and Bruton (1994) refer to this population as *S. lagocephalus*. They differ from other Mascarene sicydiine gobies in the overall coloration of the body.
Cotylopus acutipinnis Guichenot, 1863	Valid	Réunion	Distinguished from all other sicydiine genera on the basis of a low number of premaxillary teeth (7–23 vs. > 25 in other Sicydiinae).

SYSTEMATIC ACCOUNTS

Sicyopterus franouxi (Pellegrin, 1935)
Figures 2–3, 5A, 6A, B

Sicydium lagocephalum (*nomen dubium*): Pollen, 1875: 6; Sauvage, 1891: 520; Catala, 1982: 60.
Sicyopterus lagocephalus (*nomen dubium*): Kiener, 1963: 64, pl. 33; Maugé, 1986: 383–384; Reinthal and Stiassny, 1991: 234; Stiassny and Raminosoa, 1994: 139; Stiassny and Harrison, 2000: 151–153.
Sicydium laticeps (misidentifications): Pollen, 1875: 6; Sauvage, 1891: 378, 520, 531, pl. 40A, fig. 2, 2a, pl. 47, fig. 5.
Sicyopterus laticeps (misidentification): Kiener, 1963: pl. 33.
Sicydium fasciatum (misidentifications): Pellegrin, 1933: 153–154, pl. 2, fig. 5; Pellegrin, 1935: 72; Arnoult, 1959: 99; Catala, 1982: 60.
Sicyopterus fasciatus (misidentifications): Kiener, 1963: 64–65, pl. 33; Maugé, 1986: 383; Stiassny and Raminosoa, 1994: 139; Stiassny and Harrison, 2000: 151–153.
Sicydium franouxi Pellegrin, 1935: Catala, 1982: 60.

TYPE MATERIAL EXAMINED: MNHN 1935–0017, holotype, juvenile, 44 mm SL, sex undetermined; southeastern Madagascar, region of Ranopitso (Fort-Dauphin), Ankondro River, near to Tsimelahy; R. Catala.

ADDITIONAL NONTYPE MATERIAL EXAMINED: Total of 33 specimens, all from Madagascar. AMNH 97068 (1, 39.0 mm SL), Ta-

Fig. 2. *Sicyopterus franouxi*, holotype, MNHN 1935-0017, 44.4 mm SL, juvenile, Madagascar: region of Ranopitso (Fort-Dauphin), Akondro River, near Tsimelahy.

matave Province, Mangoro River drainage, stream by Ambinanindra village, M.L.J. Stiassny, P.N. Reinthal, and G.J.P. Naylor, 19 Sept. 1990; AMNH 97071 (3, 53.4–84.5 mm SL), Tamatave Province, Mangoro River drainage, Sahala River near Andranovolo, M.L.J. Stiassny, P.N. Reinthal, and G.J.P. Naylor, 19 Sept. 1990; AMNH 97080 (7, 62.9–95.3 mm SL), Tamatave Province, Mangoro River drainage, Nosivolo River below Ampasimaniona village, 26 km ENE of Marolambo, M.L.J. Stiassny, P.N. Reinthal, and G.J.P. Naylor, 20 Sept. 1990; AMNH 97149 (4, 76.2–110.1 mm SL), Tamatave Province, Mangoro River drainage, Nosivolo River below Ampasimaniona village, 16 km ENE of Marolambo, M.L.J. Stiassny, P.N. Reinthal, and G.J.P. Naylor, 21 Sept. 1990; AMNH 215495 (2, 113.9–131.0 mm SL), Andapa Region, Lokoho River, downstream of Belaoko, P. de Rham, 21 Oct. 1993; MNHN 1891–0731 (1, 95.0 mm SL, adult male), Tamatave Province, Sahamandrevo; MNHN 1891–0732 (1, 94.0 mm SL, adult female), Tamatave Province, Sahamandrevo; MNHN 1891–0733 (1, 80.5 mm SL, likely

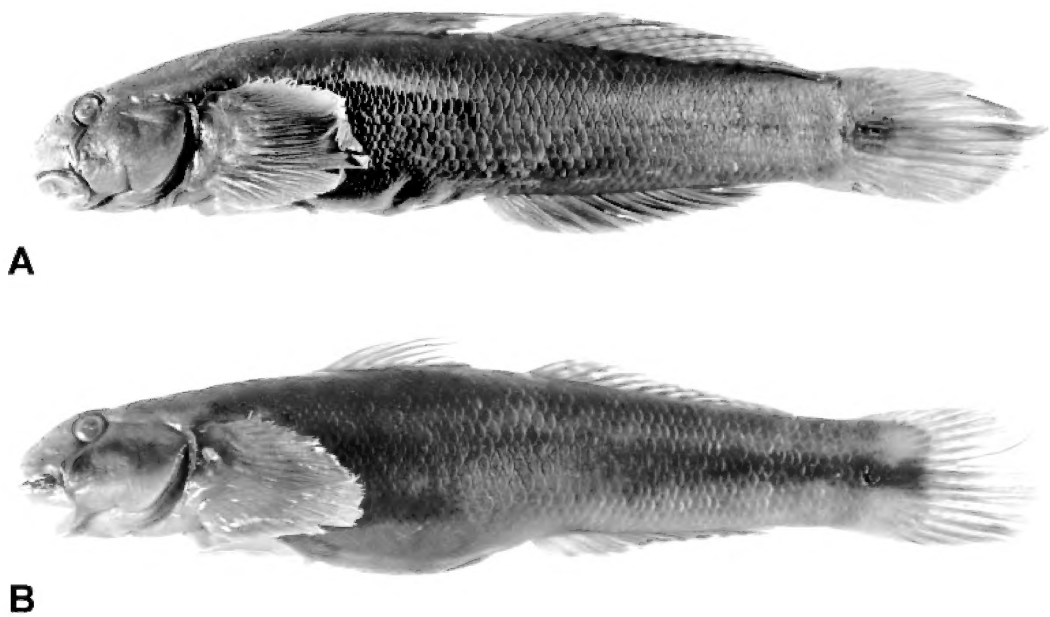

Fig. 3. Representative adult *Sicyopterus franouxi*. **A,** UMMZ 234878, 87.0 mm SL, male, northeastern Madagascar: Masoala Peninsula, Ankavanana River. **B,** UMMZ 234878, 83.1 mm SL, female, northeastern Madagascar: Masoala Peninsula, Ankavanana River.

male), Tamatave Province, Sahamandrevo; MNHN 1891–0734 (1, 71.0 mm SL, male), Tamatave Province, Sahamandrevo; MNHN 1966–1081 (2, 78.8–89.0 mm SL), Majunga Province, Sahatelo River, Kiener and Therezien, Oct. 1962; UMMZ 234874 (2, 78.8–78.9 mm SL), Masoala Peninsula, Lohantozona River, JSS 94-32, J.S. Sparks, K.J. Riseng, and guides, 9 Sept. 1994; UMMZ 234876 (1, 74.6 mm SL), Antalaha Province, Masoala Peninsula, Ankavanana River (15° 18′ 14″ S, 50° 13′ 20″ E), JSS 94-42, J.S. Sparks, K.J. Riseng, and guides, 27 Sept. 1994; UMMZ 234878 (3, 83.1-87.0 mm SL), Antalaha Province, Masoala Peninsula, Ankavanana River (15° 18′ 35″ S, 50° 14′ 08″ E), JSS 94-40, J.S. Sparks, K.J. Riseng, and guides, 25 Sept. 1994; UMMZ 234880 (3, 72.3-86.5 mm SL, 1 ex. CS), Antalaha Province, Masoala Peninsula, large unnamed tributary of Ankavanana River, JSS 94-45, J.S. Sparks, K.J. Riseng, and guides, Sept. 1994; UMMZ 236538 (1, 97.0 mm SL), Fianarantsoa Province, Parc National de Ranomafana, Namorona River above waterfall (21° 15′ 32″ S, 47° 25′ 17″ E), J.S. Sparks and K.J. Riseng, Aug. 1994.

DIAGNOSIS: A species of *Sicyopterus* distinguished from congeners by the following combination of characters: a broad, darkly pigmented, midlateral band extending the length of the body and onto the caudal fin; an absence of spotting on the posterior flank and caudal-fin base; second dorsal fin with one weak spine and 10 branched rays; broad lateral cleft in upper lip; and scales on the nape, abdomen, and behind the pectoral-fin axil markedly reduced in size compared to scales on the sides of the body.

DESCRIPTION: BODY AND FINS: Selected proportional measurements and meristic data are presented in table 2. Body cylindrical anteriorly; becoming progressively laterally compressed posterior to second dorsal-fin origin. Head large, blunt, and rounded in lateral profile. First dorsal fin with six weakly developed spines; second dorsal fin with one weak spine and 10 branched rays. Sixth spine of first dorsal fin widely separated from preceding spine. First dorsal fin more elongate than second; third spine longest. This spine markedly longer in males than in females. In adult males, depressed third spine extends posteriorly to midpoint of second dorsal fin. Anal fin with one weak spine and 10 branched rays. Pectoral fin large and fan-shaped, tips of fin rays slightly exserted from edge of fin membrane, but not elongate or filamentous. Caudal fin rounded. Pelvic fins fused into strong, cuplike suction disc. Total vertebral count 25–26: 10 precaudal + 15 caudal, 11 precaudal + 14 caudal, 10 precaudal + 16 caudal. Three preopercular canal pores (M′, N, and O′) present. Oculoscapular-canal pore pattern comprised of A′, B, C, D (single), F, HK, and L′ (fig. 4). Pore A′ located just anterior and medial to anterior nasal tube; pore B is just anterior and medial to posterior nasal opening. Pattern of free neuromasts (pit organs) on head and anterior part of body similar to that of the new species (see description below; fig. 4).

MOUTH AND TEETH: Mouth subterminal and wide. Upper jaw short, extends posteriorly at most to level of vertical through anterior margin of orbit (fig. 5A). Upper lip broad, lower edge weakly crenulate. Symphyseal cleft in upper lip shallow and poorly developed. Lateral cleft wide throughout, not expanded dorsally (fig. 5A). Single row of fleshy, lightly pigmented papillae present between upper lip and premaxilla; papillae at symphyseal and lateral cleft larger than others in row. Enlarged lateral papilla expanded laterally into area of cleft. Premaxillae separated by median gap. Premaxillary teeth tricuspid; cusps short and broad, including median cusp (fig. 6A, B). Tooth shaft expanded at distal end, near articulation with tooth crown, and proximal to insertion on premaxilla; shaft tapered medially (fig. 6B). Articulation of tooth shaft and crown forms prominent angled ridge (fig. 6B). Premaxillary tooth count (approximately) 53 to 59, arrayed in single functional row. Numerous rows of replacement teeth (Mochizuki and Fukui, 1983) present on upper jaw. Dentary teeth composed of outer row of setiform (labial) teeth forming horizontal plate and an inner row of caniniform, slightly curved teeth; anteriormost one to two and posteriormost two to three of these caniniform teeth largest. Gill rakers weakly developed.

SQUAMATION: Body covered with strongly ctenoid scales; frequently irregularly arranged. Head and underside of body anterior

TABLE 2

Morphometric and Meristic Data of *Sicyopterus punctissimus*, n.sp., and *S. franouxi*

Measurements (mm) in percent standard length (SL) or percent head length (HL), unless noted otherwise.

	S. punctissimus					*S. franouxi*				
Character	N	Holotype	Range	Mean	SD	N	Holotype	Range	Mean	SD
Standard length (mm)	11	77.6	44.5–121.9	83.3		29	44.4	39.0–131.0	80.3	
Head length % SL	11	25.3	22.3–25.4	23.7	1.06	29	24.3	21.7–26.9	24.7	1.15
Body depth A % SL	11	16.8	14.5–18.7	16.8	1.21	29	15.1	13.1–17.6	15.3	1.07
Body depth B % SL	11	16.8	16.4–19.9	18.2	1.07	29	16.4	15.5–20.1	17.3	0.98
Predorsal length % SL	11	34.4	33.4–36.7	35.0	1.11	29	37.2	32.8–38.0	35.7	1.33
Prepelvic length % SL	11	22.7	19.0–22.9	20.8	1.25	29	21.6	18.1–22.7	20.2	1.17
Preanal length % SL	11	54.1	50.7–59.5	55.0	2.73	29	53.8	53.8–61.4	57.2	2.20
ID base length % SL	11	13.5	12.6–14.6	13.9	0.51	29	14.4	12.2–16.2	14.6	0.96
IID base length % SL	11	26.9	26.9–34.4	30.5	2.05	29	24.1	23.5–28.6	25.5	1.40
Distance between ID & IID % SL	11	9.2	8.8–10.5	9.8	0.57	29	11.3	8.5–11.8	10.2	0.74
Length anal base % SL	11	24.5	23.6–28.0	26.2	1.50	29	22.5	20.1–26.5	22.8	1.84
Length caudal % SL	11	24.2	20.4–24.2	22.0	1.20	25	20.5	19.2–27.3	22.3	2.48
Depth caudal peduncle % SL	11	13.7	12.3–14.1	13.5	0.70	29	11.5	10.5–14.4	12.6	0.80
Length pectoral % SL	11	22.6	19.2–24.2	21.1	1.68	26	20.3	19.3–25.4	21.6	1.47
Length pelvic disk % SL	10	15.6	12.7–19.9	14.9	1.99	26	15.8	14.4–17.8	16.3	0.85
Width pelvic disk % SL	9	17.1	13.9–21.8	16.1	2.30	24	14.9	14.9–19.3	17.2	1.12
Snout length % HL	11	40.3	37.0–48.2	42.6	3.56	29	32.4	32.4–48.9	42.4	2.81
Upper jaw length % HL	11	38.3	38.3–47.6	44.7	2.65	29	41.7	41.1–54.1	45.8	3.12
Interorbital width % HL	11	37.3	33.6–44.2	40.5	3.00	29	27.8	27.8–44.0	36.8	3.06
Orbit diameter % HL	11	19.9	14.2–21.6	18.2	2.31	29	27.8	13.6–29.2	19.0	3.35
Preorbital depth % HL	11	20.9	19.1–24.1	21.5	1.62	29	17.6	17.6–25.7	21.3	1.99
Scales in lateral series	9	50–55				10	65–71			
First dorsal fin	11	6				29	6			
Second dorsal fin	11	I 11				29	I 10			
Anal fin	11	I 10				29	I 10			
Vertebrae (precaudal + caudal)	11	10 + 15 = 25				29	10 + 15 = 25 (19), 11 + 14 = 25 (9), 10 + 16 = 26 (1)			

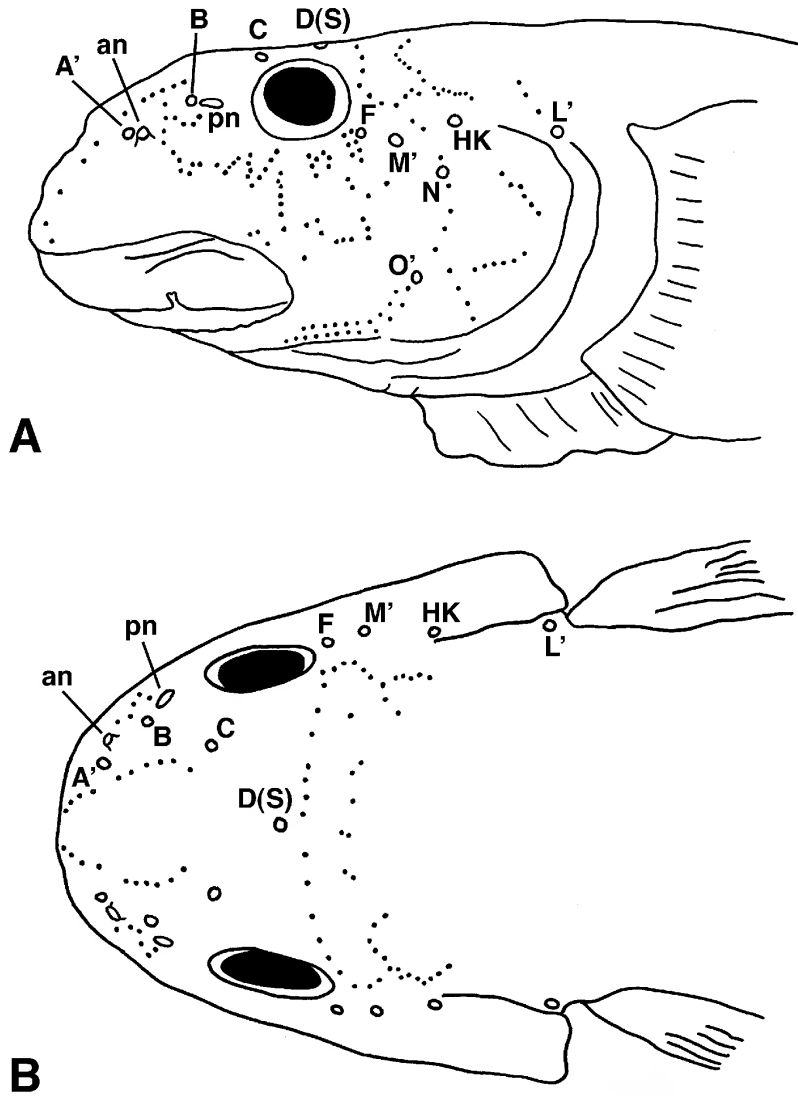

Fig. 4. Diagrammatic illustration of oculoscapular-canal pore pattern and pattern of free neuromasts (= pit organs) on head and anterior part of body of *S. franouxi* and *S. punctissimus*. **A,** left lateral view. **B,** dorsal view. Abbreviations: an, anterior nasal tube; pn, posterior nasal opening; A′, B, C, D, F, HK, L′, M′, N, O′, cephalic seismosensory pores (see text).

to pelvic disk naked. Scales of nape, abdomen, and immediately behind pectoral-fin axil markedly reduced in size compared to those on flanks. Scales in axil of pectoral fin and under free edges of pelvic disk embedded in integument. Caudal fin scaled over one-third of length; scales markedly reduced in size posteriorly on scaled part of fin. Approximately 65–71 rows of scales in lateral series. Approximately 27–37 scales between posterior edge of pelvic disk and anus. Predorsal scale count 26–31.

SEXUAL DIMORPHISM: Third spine of first dorsal fin in males markedly elongate. Pigmentation and coloration of females less pronounced. Males much darker overall, nearly solid black in life, with several lighter golden-brown bars on flanks. Size and shape of urogenital papilla differs between sexes, as has been reported for other sicydiine gobies

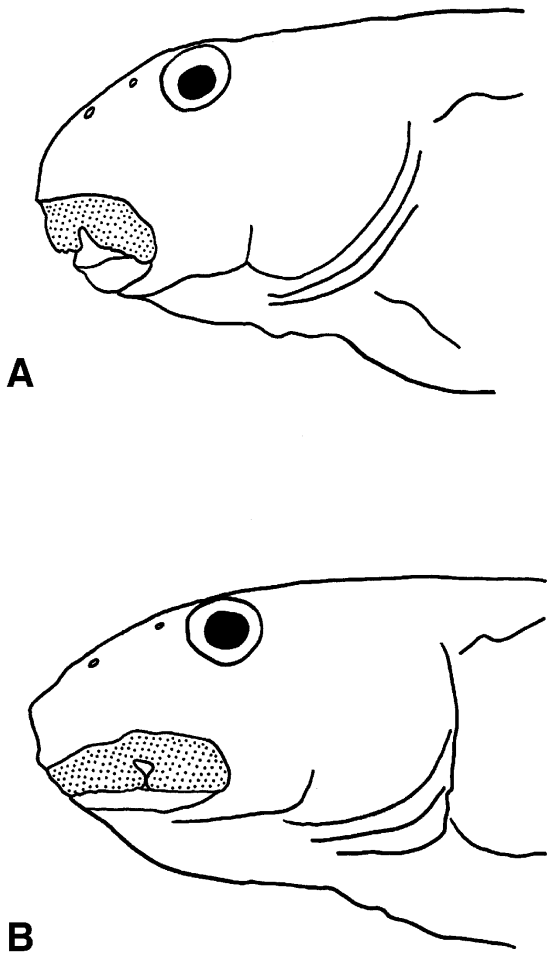

Fig. 5. Left lateral view of head of (**A**) *Sicyopterus franouxi*, UMMZ 234878, 87.0 mm SL and (**B**) *Sicyopterus punctissimus*, AMNH 226656, paratype, 108.7 mm SL. Upper lip stippled to facilitate visualization of lateral cleft.

(e.g., Parenti and Maciolek, 1993; Watson, 1995a, 1995b). Urogenital papilla of males bulbous and rounded distally; in females papilla bilobed and tapered distally. Gap present between distal tip of genital papilla and anal-fin origin in females; in males, distal tip of genital papilla extends to anal-fin origin.

PIGMENTATION AND COLORATION IN LIFE: Males black on head, dorsum, and flanks, whitish on throat and belly. Some males, presumably exhibiting breeding coloration, nearly solid black, with only small whitish or silvery region on throat and belly. Solid black males characterized by several golden-brown to iridescent golden bars on flanks. Dark, wide midlateral stripe discernible only in females and more lightly pigmented males. Midlateral stripe extends length of body. Females brownish and considerably lighter overall in coloration. Females light brown to whitish on throat, belly, and dorsal to anal-fin base. Rays of second dorsal fin, in both males and females, with dark brown spots. No spotting evident on flanks or near caudal base of either sex.

PIGMENTATION AND COLORATION IN PRESERVATION (FIGS. 2, 3): Upper part of head and body dark brown in both sexes. Males nearly uniform brown to grayish-brown. Lower part of head, beginning at level of upper lip, whitish to very light brown. Thin, curved, suborbital bar extends anteroventrally from orbit to upper lip. Wide, brown, midlateral stripe present and more evident in females, which are lighter overall. Midlateral stripe begins on head and terminates on anterior region of caudal fin. Faint brownish vertical bars discernible on flanks in females, especially above midline. Abdomen and pelvic disk light brown in females, medium brown to grayish in males. Pectoral fins and caudal fin of males nearly uniform dark brown or gray, margins somewhat lighter. Pectoral fins of females light to medium brown with dark brown rays. Rays of first dorsal and caudal fin dark brown or gray in males, dark brown in females. Anal fin of males dark grayish-brown; distal margin of fin lighter brown. Anal fin of females brown to grayish proximal to base, followed by black submarginal band, and light brown along margin. Rays of second dorsal with dark brown spots in both males and females. No spotting on flanks or near caudal-fin base.

DISTRIBUTION AND HABITAT: Although *S. franouxi* exhibits a somewhat patchy distribution throughout its range, the species has been collected from drainages spanning nearly the entire eastern coast of Madagascar. We have examined a single lot of *S. franouxi* (MNHN 1966-1081) that was reportedly collected in northwestern Madagascar, in the region of Mahajunga (= Majunga). We know of no other records of *S. franouxi* from western Madagascar, and the species has not been collected in a number of recent surveys focusing on that region. *Sicyopterus franouxi*

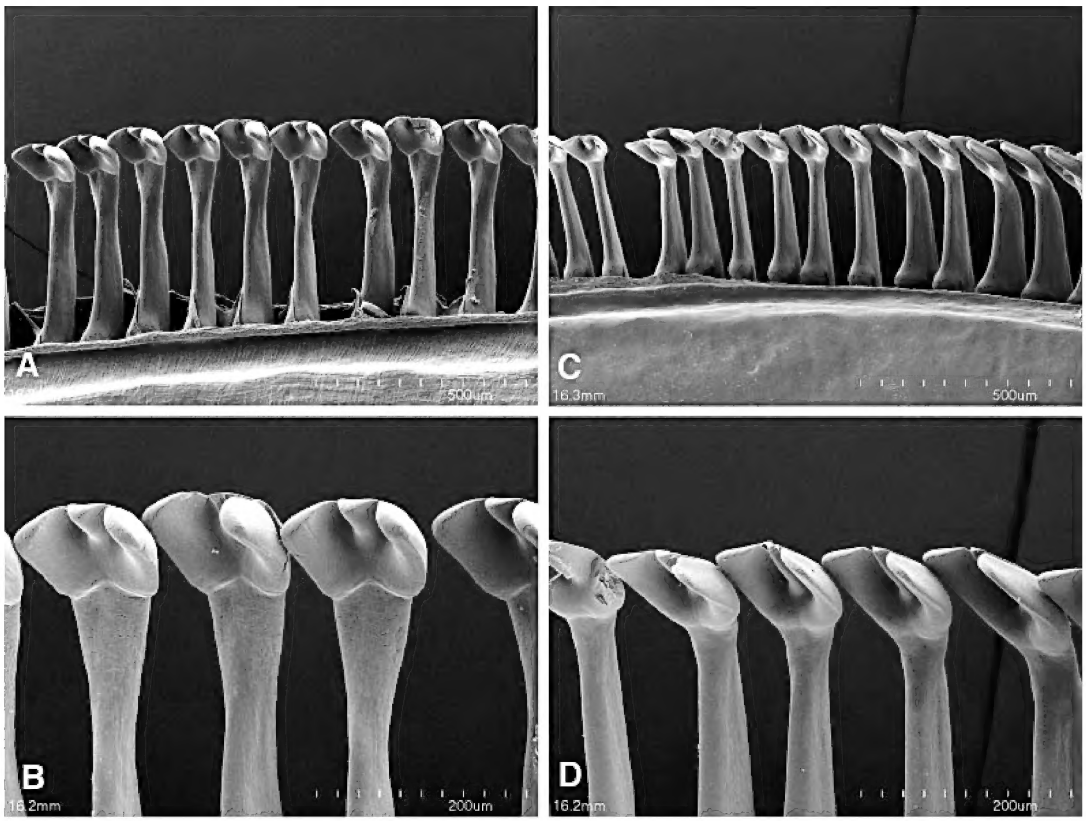

Fig. 6. Scanning electron micrographs of right premaxillary teeth in medial view. **A, B,** *Sicyopterus franouxi*, UMMZ 234880, 79.7 mm SL, 100× and 250× magnification. **C, D,** *Sicyopterus punctissimus*, paratype, UMMZ 234879, 73.4 mm SL, 100× and 250× magnification.

occurs in clear, swift-flowing rivers and streams. The species is frequently captured quite far inland and upstream of large falls (e.g., Namorona River, Ranomafana National Park, in the southeastern highlands).

ETYMOLOGY: Pellegrin dedicated the species to and named it after Mr. Franoux, a collaborator of Mr. R. Catala, who collected the holotype.

Sicyopterus punctissimus, new species
Figures 5B, 6C, D, 7

Sicydium lagocephalum (*nomen dubium*): Pollen, 1875: 6; Sauvage, 1891: 520; Catala, 1982: 60.

Sicyopterus lagocephalus (*nomen dubium*): Kiener, 1963: 64, pl. 33; Maugé, 1986: 383–384; Reinthal and Stiassny, 1991: 234; Stiassny and Raminosoa, 1994: 139; Stiassny and Harrison, 2000: 151–153.

Sicydium laticeps (misidentifications): Pollen, 1875: 6; Sauvage, 1891: 378, 520, 531, pl. 40A, fig. 2, 2a, pl. 47, fig. 5.

Sicyopterus laticeps (misidentification): Kiener, 1963: pl. 33.

HOLOTYPE: UMMZ 242048, 77.6 mm SL, adult male; Madagascar, Masoala Peninsula, large unnamed cascading tributary of Ankavanana River (15° 18′ S; 50° 16′ E), JSS 94-45; collected using small seines, J.S. Sparks, K.J. Riseng, and local Malagasy guides, 29 Sept. 1994.

PARATYPES: Total of 10 specimens, all from northeastern Madagascar: AMNH 215498 (3, 76.1–121.9 mm SL), Andapa Region, Lokoho River, downstream of Belaoko, P. de Rham, 21 Oct. 1993; AMNH 226656 (1, 106.7 mm SL), Diego-Suarez Region, Manantenina River, southeastern boundary of Parc National de Marojejy (14° 18′ S, 49°

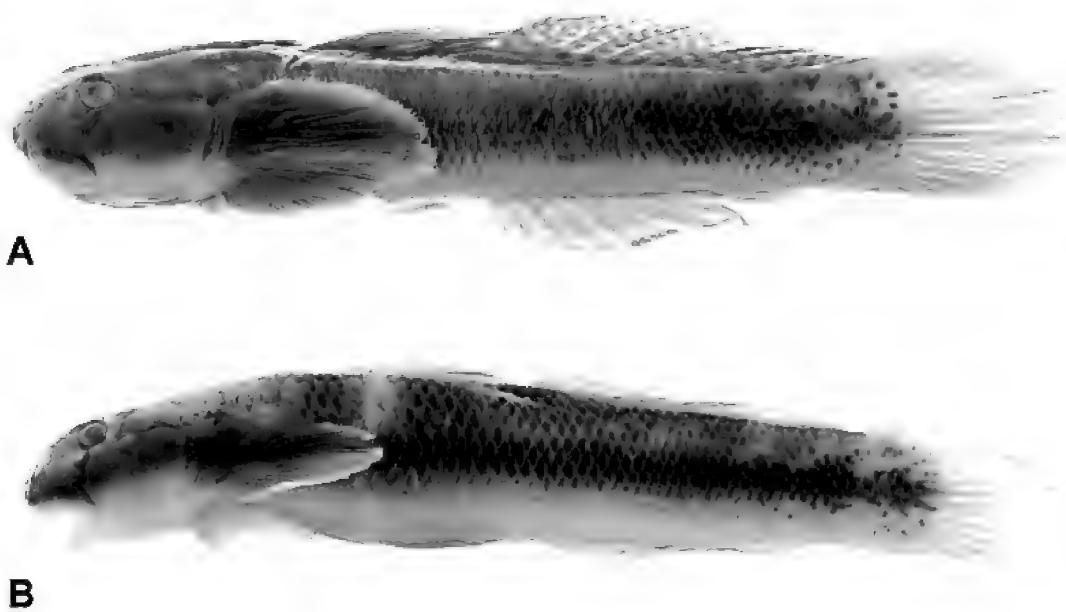

Fig. 7. *Sicyopterus punctissimus*. **A,** holotype, UMMZ 242048, 77.6 mm SL, adult male. **B,** paratype, UMMZ 234879, 73.0 mm SL, adult female. Northeastern Madagascar: Masoala Peninsula, Ankavanana River.

33′ E), M.L.J. Stiassny and fisherwomen, 10 Nov. 1996; MNHN 1968-174 (2, 44.5–66.5 mm SL), no locality data (incorrect coordinates reported in MNHN database), Kiener; UMMZ 234877 (1, 74.9 mm SL), Masoala Peninsula, Ankavanana River (15° 18′ 14″ S, 50° 13′ 20″ E), JSS 94-42, small seine, J.S. Sparks, K.J. Riseng, and local Malagasy guides, 27 Sept. 1994; UMMZ 234879 (2, 73–75.3 mm SL, 1 ex. CS), Masoala Peninsula, Ankavanana River, near Projet Masoala site 1005 (15° 18′ 35″ S, 50° 14′ 08″ E), JSS 94-40, small seine, J.S. Sparks, K.J. Riseng, and local Malagasy guides, 25–26 Sept. 1994; UMMZ 234881 (1, 93.2 mm SL), data as for holotype.

DIAGNOSIS: The new species differs from all congeners in possessing the following combination of characters: a broad, darkly pigmented, midlateral band on the posterior half of the body extending onto the base of the caudal fin; numerous small dark (brownish) spots on the posterior half of the body, dorsal and ventral to this midlateral band; numerous small dark spots on the second dorsal fin; second dorsal, anal, caudal, and pectoral fins with light-colored (whitish to yellow) distal margins; second dorsal fin with one weak spine and 11 branched rays; lateral cleft in the upper lip markedly expanded dorsally; and scales on the nape and abdomen similar in size to scales on the sides of the body.

DESCRIPTION: BODY AND FINS: Selected proportional measurements and meristic data presented in table 2. Body robust, cylindrical anteriorly, becoming somewhat laterally compressed posterior to origin of second dorsal fin. Body depth greatest approximately at level of first dorsal fin, but not varying greatly along entire body length. Head large, blunt, and rounded in lateral profile. First dorsal fin with six weakly developed spines; second dorsal fin with one weak spine and 11 branched rays. Anal fin with one weak spine and 10 branched rays. First dorsal fin slightly more elongate than second; third spine longest. This spine markedly longer in males than in females. In males, depressed third spine extends well posterior of second dorsal-fin origin. Sixth spine of first dorsal fin very small; widely separated from pre-

ceding spine. Second dorsal fin and anal fin approximately same height; all rays of each fin branched near tips. Pectoral fin large and fan-shaped; length of longest ray approximately equal to head length. All pectoral fin rays, except uppermost 4–6, branched; tips of fin rays slightly exserted from edge of fin membrane, but not elongated or "silklike" (i.e., filamentous). Posterior margin of caudal fin rounded; length of longest rays approximately equal to head length. Pelvic fins fused into robust, cuplike suction disc. Total vertebral count 25: 10 precaudal + 15 caudal.

MOUTH AND TEETH: Mouth subterminal, large, and wide. Upper jaw long, extends posteriorly to level of vertical through middle of orbit (fig. 5B). Upper lip broad, its lower edge weakly crenulate. Symphyseal cleft in upper lip simple although relatively deep; lateral cleft extremely narrow ventrally (i.e., slitlike) and markedly expanded and rounded dorsally (fig. 5B). Large, fleshy papilla just inside symphyseal cleft of upper lip. Single row of fleshy, lightly pigmented papillae present between upper lip and premaxilla; papillae at symphyseal and lateral cleft larger than others in row. Lateral papilla expanded laterally (into area of cleft). Premaxillae separated by median gap. Premaxillary teeth tricuspid (fig. 6C, D). Lateral cusps relatively broad and median cusp slender (fig. 6D). Tooth shaft not expanded distally, but tapered from base to articulation with tooth crown. Premaxillary tooth count (approximately) 67 to 80, arrayed in single functional row. Numerous rows of replacement teeth (Mochizuki and Fukui, 1983) present on upper jaw. Dentary teeth composed of outer row of setiform (labial) teeth forming horizontal plate and an inner row of caniniform, slightly curved teeth; anteriormost one to two and posteriormost two of these caniniform teeth largest. In largest specimens of type series (e.g. AMNH 215498: 121.9 and 106.7 mm SL) labial teeth almost entirely buried in flesh of lower lip and all caniniform teeth of inner tooth row comparatively larger than in smaller individuals. Gill rakers weakly developed.

SEISMOSENSORY SYSTEM: Cephalic seismosensory pores—Oculoscapular canal continuous; pores A′, B, C, D (single), F, HK, and L′ present; preopercular canal pores M′, N, O′ present (fig. 4). Pore A′ located just anterior and medial to anterior nasal tube; pore B is just anterior and medial to posterior nasal opening. Based on material examined and descriptions and illustrations of other gobiid taxa in the literature (e.g., Akihito et al., 1984; Pezold, 1993) this pore pattern appears to be unique within the subfamily to the genera *Sicyopterus* and *Sicydium*. All examined species of *Sicyopterus* exhibited these character states, although in one species of the latter genus (*Sicydium crenilabrum*) pore A′ is located posterior to the anterior nasal tube (Harrison, 1993: fig. 5). A survey of these features throughout the subfamily is not complete.

Free neuromasts (= pit organs) on the head and body are present as follows (fig. 4). There is an almost straight line of 3–5 organs starting at the tip of the snout and terminating anterior and medial to the anterior nasal tube, followed by a brief interruption, then continuing posteriorly in a line of 6–8 organs to just medial to the posterior nasal opening. A row of pit organs traverses the occipital region, beginning just posterior to the eye and passing just posterior to cephalic pore D. Another transverse row just posterior to, and essentially continuous with, this occipital row extends about one-third of the distance to the dorsal midline (fig. 4B). A series of irregularly spaced pit organs, variable in number, is located medially and just posterior to the anterior transverse row. An anteroposteriorly oriented row beginning at the upper, posterior margin of the orbit abuts the lower portion of the posterior, transverse occipital row. Several short rows of organs radiate across the suborbital region and cheek. A short row of pit organs extends dorsoventrally about midway between the anterior and posterior nasal openings, and another short, anteroposteriorly directed row abuts this vertical row at about its midpoint. A curved row of about 12–15 organs, beginning at the anteriormost internarial free neuromast, abuts the lowermost portion of the first (anteriormost) suborbital row. Three rows of organs are present in the opercular region (fig. 4A): a nearly straight dorsoventral row of 11–15 organs beginning just posterior and dorsal to preopercular cephalic pore M′, at the anterior portion of the opercle, and terminating near

the ventral margin of the opercle; an approximately dorsoventral row of about 6–10 organs near the posterior margin of the opercle; and a generally shorter, anteroposteriorly directed row of 5–8 organs located slightly below the lowermost portion of the posterior opercular row. In the preopercular-mandibular region there is a double row of 10–12 pairs of pit organs between pore O′ of the preopercle and the posterior corner of the mouth. A few other free neuromasts, scattered about the head, are not arranged in any discernible pattern.

SQUAMATION: Body covered with regularly imbricate, strongly ctenoid scales. Head and underside of body anterior to pelvic disk devoid of scales. Scales of nape and abdomen of approximately same size as those of sides of body. In axil of pectoral fin and under free edges of pelvic disk, scales embedded in integument. Caudal fin scaled over approximately one-fifth to one-fourth of length; scales become progressively reduced in size posteriorly on scaled portion of fin. Approximately 50–55 rows of scales in lateral series. Approximately 13–18 scales present between posterior edge of pelvic disk and anus. Predorsal scale count 12–14.

SEXUAL DIMORPHISM: In males, third spine of first dorsal fin elongate, usually greater than twice the length of first spine. Pigmentation and coloration of females differs somewhat from males, mainly in being more muted, but not as strongly dimorphic as in some sicydiine gobies (see color descriptions below). Size and shape of urogenital papilla differs between sexes. This variation has been discussed and/or figured for various sicydiine genera by other authors (e.g., Parenti and Maciolek, 1993; Watson, 1995a, 1995b). In males, urogenital papilla bulbous and rounded distally, whereas in females papilla bilobed and more tapered distally. Gap present in females between distal tip of genital papilla and anal-fin origin, whereas in males, distal tip of genital papilla extends to anal-fin origin.

PIGMENTATION AND COLORATION IN LIFE: Males dark brown to black on head, dorsum, and flanks, whitish to silvery on throat and belly (lighter areas restricted ventrally in males). Dark, brown to black, wide midlateral stripe present. Dark brown to blackish spotting present on caudal half of body and on second dorsal fin. Spotting particularly prevalent on caudal peduncle and near caudal base. Pectoral fins and caudal fin yellow or golden at margins of upper and lower lobes, dark brown or blackish elsewhere. Pelvic disk brown anteriorly, cream to pale yellow elsewhere. Anal fin dark brown or gray, hyaline along distal margin. First dorsal fin brown to blackish proximal to body and lighter brown to yellowish along dorsal margin. Second dorsal fin dark brown to blackish proximal to body. Margin of second dorsal fin olive to yellow distally.

Females similar in coloration to males, but more muted overall. Females also lighter ventrally, and over more expansive area that extends further dorsally onto flanks and above anal-fin base. Margins of pectoral fins and caudal fin whitish to pale yellow.

PIGMENTATION AND COLORATION IN PRESERVATION (FIG. 7): Upper part of head and body dark brown. Lower part of head, beginning at level of upper lip, whitish to very light brown. Dark brown to black suborbital bar extends ventrally or anteroventrally from orbit to upper lip. Brown pigmentation of head and anterior portion of body continues onto posterior portion of body as wide midlateral stripe. In males, this midlateral stripe begins under anterior rays of second dorsal fin and terminates on anterior portion of caudal fin. In females, midlateral stripe begins on head, extends length of body, and terminates on anterior portion of caudal fin, as in males. Compared to males, midlateral stripe of females not as deep on caudal peduncle. Above and particularly below lateral stripe, body more lightly pigmented due to lighter pigmentation on edges of scales. This results in distinct, small brown spots, which cover 75–90% of each scale on this part of body. These small brown spots extend slightly posterior to terminal scale rows and onto anterior part of caudal fin, forming indistinct crescent-shaped pattern. Caudal fin a uniform light brown, with narrow, whitish border at margins of upper and lower lobes. A few indistinct darker spots present on upper part of caudal fin. First dorsal fin uniformly dark brown. Brown pigmentation of second dorsal fin rays interrupted by areas of lighter color, resulting in an irregularly spotted pattern.

Distal margin of second dorsal fin more faintly pigmented. Anal fin brown, with darker brown submarginal streak and whitish distal margin. Pectoral fins uniformly brown, with much lighter brown streak extending along medial 2–3 rays, and with distinct whitish distal margin. Underside of head and gular region light brown. Abdomen and pelvic disk whitish.

Little sexual dimorphism evident with respect to pigmentation or color pattern in preserved material, particularly in comparison with some other species of sicydiine gobies. In females, however, anal fin light brown in color, making brown submarginal streak more prominent in females than in males. In addition, lower half of caudal fin more darkly pigmented than upper half, and midlateral stripe on body extends, as more faint stripe, to distal portions of caudal rays. Midlateral stripe more prominent in females due to lighter overall coloration, especially anteriorly. Flank region in females, between midlateral stripe and anal fin, more weakly pigmented and with fewer spots than in males.

In largest specimens of type series (AMNH 215498, 106.7–121.9 mm SL, and AMNH 226656, 108.7 mm SL), midlateral stripe and spotting pattern on posterior region of body and second dorsal fin much less pronounced, due to darker overall coloration of these individuals. In largest female specimen, anal fin more uniformly dark brown. Prominent whitish distal margins of second dorsal, anal, caudal, and pectoral fins remain readily apparent regardless of size.

DISTRIBUTION AND HABITAT: The new species is known from only a few isolated collection localities in northeastern Madagascar (fig. 1). All specimens collected by the first author (catalogued as UMMZ lots) were captured in clear, swift-flowing streams and rivers on the eastern slope of the Masoala Peninsula, northeastern Madagascar. *Sicyopterus franouxi* is sympatric with the new species, but unlike *S. punctissimus*, the range of *S. franouxi* extends much farther south (to the southeastern highlands).

ETYMOLOGY: The specific name, *punctissimus,* is a Latin adjective, superlative form, and refers to the presence of numerous small spots on the sides of the body and second dorsal fin in the new species.

DISCUSSION

MALAGASY AND MASCARENE *SICYOPTERUS*, COMPARISONS AND COMMENTS

Preserved specimens of the new species are easily differentiated from *S. franouxi*, the only other sicydiine goby presently known to occur in the freshwaters of Madagascar, by a number of features. The number of branched rays in the second dorsal fin is invariably 11, whereas in *S. franouxi* the number of branched rays is 10. In *S. punctissimus*, the scales of the nape and abdomen are approximately the same size as those on the flanks. In *S. franouxi* the scales of the nape and abdomen (and behind the pectoral-fin axil) are markedly reduced in size in comparison to the scales of the sides of the body. Compared to *S. franouxi*, *S. punctissimus* has a higher number of premaxillary teeth (67–80 vs. 53–59), fewer scales in lateral series (50–55 vs. 65–71), fewer predorsal scales (12–14 vs. 26–31), and fewer scale rows between the pelvic disk and anus (13–18 vs. 27–37). Premaxillary teeth in *S. punctissimus* are characterized by a slender median cusp (fig. 6D; vs. broad in *S. franouxi*; fig. 6B), and a tooth shaft that is tapered over its length (fig. 6C; vs. tooth shaft expanded both proximal to base and distally, near articulation with crown; fig. 6A). In *S. punctissimus* the upper jaw extends posteriorly to about the level of mid orbit, whereas in *S. franouxi*, the upper jaw extends at most to the level of the anterior margin of the orbit (fig. 5). The lateral cleft in the upper lip is a narrow slit ventrally and is markedly expanded and rounded dorsally in *S. punctissimus* (fig. 5B); it is wide and about of equal width throughout in *S. franouxi* (fig. 5A).

Comparison of morphometric measurements taken on the two species (table 2) reveals few differences between them. Body depth data, at all three points at which measurements were taken, were slightly greater in *S. punctissimus* than in *S. franouxi*. The length of the base of the second dorsal fin is greater in the former species, and is probably attributable to the greater number of fin rays (11 vs. 10). The length of the anal-fin base in *S. punctissimus* also appears to be slightly greater than that in *S. franouxi*. The basic color pattern (in preservation) of the two spe-

cies is similar: brownish anteriorly, light-colored or whitish ventrally, with a broad, brown, midlateral stripe along the side of the body. However, in *S. franouxi* the midlateral stripe is well defined at, and even anterior to, a vertical from the origin of the first dorsal (figs. 2, 3), whereas in the new species the overall ground coloration of the body is darker much farther posteriorly and the midlateral stripe is frequently not evident until about the origin of the second dorsal fin (fig. 7). In *S. franouxi* there are also several faint vertical bars on the flanks, which are slightly darker than the ground color. These bars were not readily discernable in all specimens examined; however, similar bars are not present in any specimen of the new species. The body, including the caudal peduncle and caudal-fin base, of *S. franouxi* is devoid of distinctive brown spots (figs. 2, 3), and the fins lack the whitish margins, as well as the light brown streak extending along the medial 2–3 rays of the pectoral fin, characteristic of the new species (fig. 7).

In the course of this investigation, we have also been able to clarify the identity of specimens from Madagascar that have been erroneously attributed to *Sicyopterus fasciatus*. Pellegrin (1933) first reported *S. fasciatus* (Day, 1874) from Madagascar: four specimens from "la rivière Sahembendrana (région de Tamatave)". Examination of these specimens indicates that they are adult specimens of *Sicyopterus franouxi*. Pellegrin (1935) described *S. franouxi* on the basis of a single juvenile specimen, measuring only 44.4 mm SL (MNHN 1935-0017). He apparently misidentified the four adults he examined (MNHN 1891-0731 to 0734) as *S. fasciatus*, and considered them to be distinct from *S. franouxi*. Similar to *S. franouxi*, *S. fasciatus* possesses scales of reduced size on the nape and abdomen, which may at least partly explain the numerous historical misidentifications of *S. franouxi*.

The type material of *S. fasciatus* has been lost, although we have been able to examine a recently collected specimen from the Rakhine region of Myanmar (= Burma). This specimen compares very well with Day's (1874, 1876) description and specimen he figured—particularly the color pattern composed of prominent "vertical darker bands on the body wider than the ground color". None of the specimens of *Sicyopterus* from Madagascar (or the Mascarene region for that matter) that we have examined exhibit a similar color pattern, although certain specimens of *S. franouxi* do possess some faint, vertical bars on the sides of the body. However, in *S. franouxi* the wide, dark midlateral band largely obscures these bars. Moreover, other character states observed in this Myanmar specimen (e.g., the thickened upper lip with numerous transverse plicae and the extremely high number of premaxillary teeth) are significantly different from those observed in the Mascarene material. We therefore conclude that attributions of *S. fasciatus* to Madagascar are incorrect, and that specimens so identified in the past are simply adults of *S. franouxi*.

Sicyopterus laticeps, a species inhabiting the Mascarene islands of Réunion and Mauritius, but reported to occur in Madagascar according to Valenciennes, in Cuvier and Valenciennes (1837), and Pollen (1875), lacks a dark, midlateral stripe, and the caudal fin of this species has distinctive, black submarginal bars on both the upper and lower lobes (fig. 8). We have not examined any material assignable to *S. laticeps* from Madagascar, and conclude that the species does not occur on the island.

There is potentially yet another Mascarene species of *Sicyopterus*, which inhabits the freshwaters of the Comoros Islands. Balon and Bruton (1994), referring to this population as *S. lagocephalus*, provided an excellent description of the fish, as well as a detailed account of its habitat and biology. Specimens of this species (which we refer herein to as *Sicyopterus* sp. "Comoros") are similar to *S. laticeps* in the presence of dark (blackish) submarginal bars on the upper and lower lobes of the caudal fin, but they differ from other Mascarene sicydiine gobies in the overall coloration of the body. In the Comoros specimens, the body is uniformly dark brown on the head, dorsum, and flanks, and is whitish on the underside. A few vague vertical, darker brown bars on the flanks are discernible in some specimens.

Finally, *Gobius caeruleus* (Commerson, in Lacepède, 1800), "le Gobie Bleu", also a sicydiine goby described from material col-

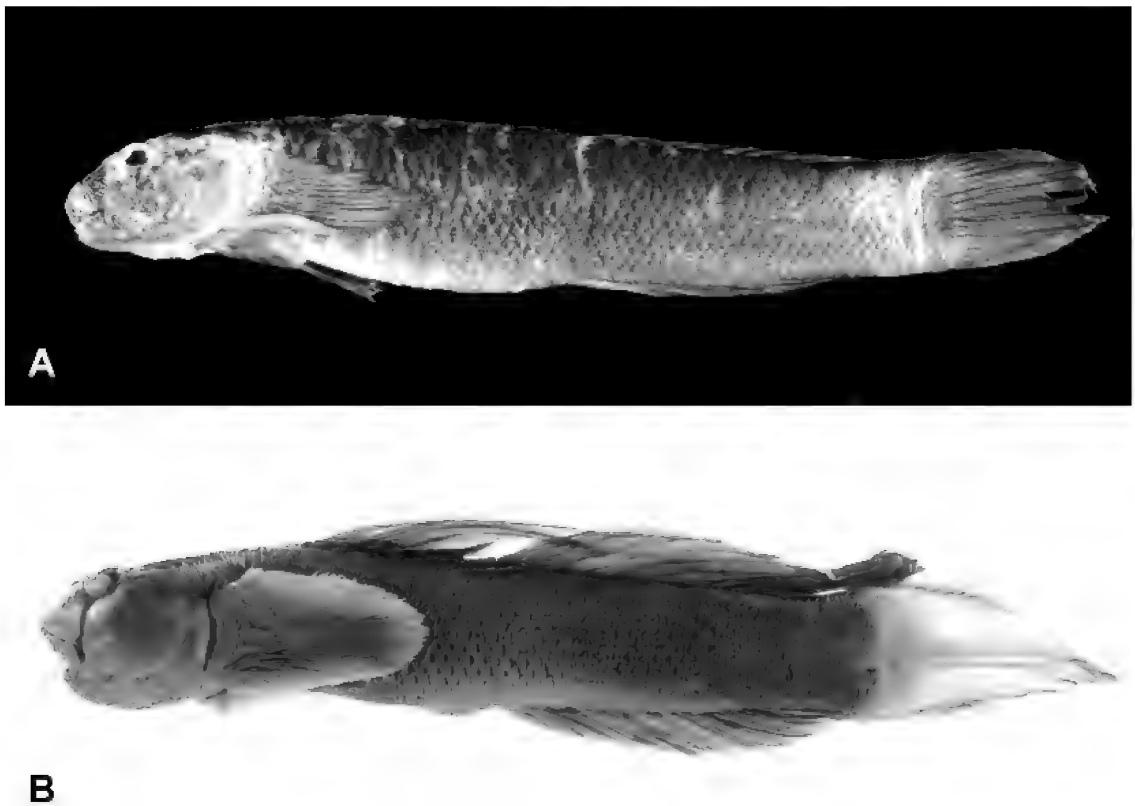

Fig. 8. *Sicyopterus laticeps*. **A,** MNHN 918, syntype, adult male, 97.6 mm SL, Réunion. **B,** MNHN 1984-806, adult male, 96.7 mm SL, Réunion.

lected in Réunion, is determined to be an available name. Based on Commerson's description, however, we are unable to determine if the species is conspecific with *S. laticeps*. No type material exists for this species, and we defer resolution of the nomenclatural problem of the Réunion *Sicyopterus* to a later study.

Taxonomic Status of *Gobius lagocephalus* Pallas, 1770

Gobius lagocephalus was described by Pallas on the basis of a single specimen examined by him in the St. Petersburg Museum. The specimen had earlier been described as a *Gobius* by Joseph Koelreuter (1764). Neither Pallas nor Koelreuter knew where the specimen had been collected. Pallas wrote: "*Pisculum ipse ex America habui. Koelreuterus e specimen Musei Petropolitani descripsit, ignoravit autem patriam.*" We translate this as: "I myself regard the small fish to be from America. Koelreuter described [the species] from a specimen in the St. Petersburg Museum, however he was ignorant of [its] native land."

The description and figures of the specimen presented by Pallas (1770) leave little doubt that the fish was a sicydiine goby. However, identification of the specimen to the specific (or even generic) level is not possible from the description or figures. Character states (e.g., number of rays in the second dorsal fin [10] and pectoral fin [15]) reported by Pallas, are inconclusive in establishing taxonomic identity. The specimen upon which Pallas based his description has been lost.

Valenciennes, in Cuvier and Valenciennes (1837), placing the species into the newly de-

scribed genus *Sicydium*, was the first to attribute *Gobius lagocephalus* to the Mascarene region: ". . . des iles de France et de Bourbon . . . ". Valenciennes, in this same paper, described *Sicydium laticeps* from "les eaux douces de l'Île de Bourbon . . . " (= freshwaters of the island of Bourbon). This latter name is the correct one for the species of *Sicyopterus* inhabiting the island of Réunion (= l'Île de Bourbon). The syntypes of *S. laticeps* (which we have examined) are in good condition (fig. 8A), and pigmentation pattern and coloration are well preserved. Peters (1868) ascribed *S. lagocephalus* to the Comoros Islands, and it appears that Pollen (1875) was the first to attribute this species (along with *S. laticeps*) to Madagascar, although he did not provide specific localities (e.g., "Le Pêches â Madagascar et ses Dépendances"). Likewise, several more recent ichthyofaunal inventory studies have also reported *S. lagocephalus* from the freshwaters of Madagascar (e.g., Kiener, 1963; Catala, 1982; Maugé, 1986; Reinthal and Stiassny, 1991; Stiassny and Raminosoa, 1994; Stiassny and Harrison, 2000).

We consider *Gobius lagocephalus* to be a *nomen dubium* of uncertain placement (*incertae sedis*) beyond the subfamily level. Therefore, the name is not available for any of the presently recognized Mascarene sicydiine gobies (likewise, it is not available for any species of *Sicyopterus*). However, due to historical misapplication of the name to several species of Mascarene sicydiine gobies, we have included the name in the synonymy of both known Malagasy species.

Recently, both Fricke (1999: 523) and G. Marquet in Watson et al. (2000: 13) have designated neotypes of *Sicyopterus lagocephalus* from specimens collected in the Mascarene region (Réunion). *Gobius lagocephalus* is not an available name for the reasons detailed above. In addition, Eschmeyer (1998; online version updated March 13, 2003) points out that neither of these designations is valid because they fail to meet conditions set out in Article 75.3 of the International Code of Zoological Nomenclature (1999). Fricke later rescinded his neotype designation for *S. lagocephalus*, along with numerous others (see Fricke, 2000: 639). In accordance with the conclusions of this study, the specimens recently designated as neotypes of *S. lagocephalus* are valid as *S. laticeps*. The neotype of *S. lagocephalus* designated by Fricke (1999: 523) is a syntype of *S. laticeps* (MNHN 841).

The numerous synonyms for New Caledonian sicydiine gobies listed by Watson et al. (2000; $n = 12$) under *Sicyopterus lagocephalus* are also problematic. As we have stated above, translation of Pallas (1770) reveals that neither he nor Koelreuter knew the collecting site of the described specimen. Pallas regarded it ". . . to be from America" (see above). Attempting to establish this *nomen dubium* as senior synonym to numerous other nominal sicydiine taxa only further confuses nomenclatural issues in this speciose and wide-ranging group of gobies. Watson et al. (2000) neither compared their diagnosis for *Sicyopterus lagocephalus* with the description presented by Pallas nor did they justify selection of a neotype locality remote from the conjectured "native land" stated in the original description of the species. As we have demonstrated, although the description and figures of *Gobius lagocephalus* presented by Pallas (1770) leave little doubt that the fish described was a sicydiine goby, accurate identification of the specimen to even the generic level is certainly not possible. It is entirely feasible that the specimen described by Pallas (1770) is a member of *Sicydium*, a genus that occurs in the tropical eastern Pacific and Atlantic Oceans, including the Caribbean Sea (i.e., American Seas). Hence, although the research presented by these authors provides some interesting descriptions of habitat and ecology, as well as many excellent color illustrations of New Caledonian *Sicyopterus* species, the taxonomic conclusions reached in the article are not supported by the available evidence. Based on our studies of Malagasy and Mascarene sicydiine gobies, we are of the opinion that, with further study of *Sicyopterus* interrelationships, including proposed molecular analyses, claims of a high degree of island-group endemism for these fishes (Parenti and Maciolek, 1993) will be corroborated and additional geographically distinct populations that have historically been placed in *S. lagocephalus* will be revealed.

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APPENDIX 1

Materials Examined

Representative sicydiine taxa examined in the present study are listed below. Type specimens are listed first. Institutional catalog number, number of specimens examined, and size range follow the species name. CS denotes material cleared and stained for bone and/or cartilage.

Sicydium multipunctatum: UMMZ 189598 (1 CS, 90 mm SL), Mexico, Colima, Rio de Comala, tributary of Rio Armeria drainage, south of Comala and ca. 5 mi north of Colima.

Sicydium plumieri: USNM 313724 (42, 29.6–102.2 mm SL), Caribbean, Dominica B.W.I., foot of Tra-Falgar Falls and portions of Trois Pitons River behind hydroelectric station.

Sicyopterus brevis: USNM 313863 (5, 24.3–27.1 mm SL), American Samoa, Soonapule Stream (Seetaga) near mouth.

Sicyopterus cynocephalus: USNM 340134 (1, 63.5 mm SL), Philippine Islands, Palawan, Plaridel River.

Sicyopterus eudentatus: USNM 322473 (1, paratype, 100.0 mm SL), Caroline Islands, Ponape, Nanpil River, transect above reservoir.

Sicyopterus extraneus: USNM 135671 (2, 103.3–122.5 mm SL), Taiwan, Koroton; USNM 135740 (2, 21.5–62.9 mm SL), Philippine Islands, Camiguin Id (between Leyte and Mindanao).

Sicyopterus fasciatus: NHRM (NRM) 40847 (1, 87.4 mm SL), Myanmar, Rakhine State, Taunggok Thade River Drainage: Yan Khaw Chaung, ca. 4 km from Gwetauk village (18° 47′ 48″N, 94° 21′ 46″E).

Sicyopterus fuliag: USNM 135738 (1, 101.0 mm SL), Philippines, Mindanao, Nonucan River, Iligan Branch, Camp Overton.

Sicyopterus inana: USNM 109379 (1, paratype, 26.5 mm SL), Society Islands, Tahiti, Papenoo Valley; USNM 109371 (1, ~25 mm SL), Marquesas Islands, Oomoa Valley, Fatuhiva.

Sicyopterus japonicus: UMMZ 194566 (2, 75.9–80.6 mm SL, 2 CS); UMMZ 194573 (14, 60.0–68.0 mm SL), Taiwan, I-Ian, Tau Chang, Lan Yan Chi (Nomonhan), Ta-tung Hsiang; USNM 191283 (1, 104.0 mm SL), Taiwan, Chu-Tung, Hsin-Chu Hsien, small stream in coastal plain; USNM 336718 (1, 58.6 mm SL), Taiwan, Taidong, Xin-Gong XI (= New Port Stream).

Sicyopterus lachrymosus: USNM 135739 (12, 46.3–67.6 mm SL), Philippine islands, Luzon, Dumaca River (branch of Tayabes); USNM 313864 (1, 50.0 mm SL), Philippine Islands, northern Luzon, Ilocos Province, Tagudin.

Sicyopterus laticeps: MNHN 841 (1, syntype, 91.1 mm SL), Réunion; MNHN 918 (1, syntype, 97.6 mm SL), Réunion; MNHN 1984–806 (2, 51.0–96.7 mm SL), Réunion.

Sicyopterus lividus: USNM 322470 (4, paratypes, 39.3–42.7 mm SL), Caroline Islands, Ponape; USNM (1, 62.6 mm SL), Caroline Islands, Pohnpei.

Sicyopterus longifilis: USNM 346647 (1, 64.6 mm SL), Philippine Islands, Luzon Island, Quezon Province, Gen. Nakar, Agos River, Brgy. Maigang; USNM 346653 (1, 71.2 mm SL), Philippines, Quezon, Gen. Nakar, Brgy. Banglos, Agos River.

Sicyopterus marquesensis: USNM 109370 (2, paratypes, 42.1–48.1 mm SL), Marquesas Islands, Tohetaivau, Oomoa Valley, Fatuhiva.

Sicyopterus micrurus: UMMZ 189873 (10, 25.0–26.0 mm SL), Society Islands, Tahiti-iti, Vavi Valley; USNM 348156 (2, 29.1–35.5 mm SL), American Samoa, Tau Island, National Park of American Samoa, Laufuti Stream.

Sicyopterus ouwensi: USNM 313867 (3, 24.0–26.0 mm SL), American Samoa, Soonapule Stream (Seetala) near mouth.

Sicyopterus pugnans: USNM 348154 (3, 32.3–42.1 mm SL), American Samoa, Tau Island, National Park of American Samoa, Laufuti Stream.

Sicyopterus rapa: USNM 330077 (1, paratype, 64.8 mm SL), French Polynesia, Rapa, shallow water in Pania River at head of Haurei Bay.

Sicyopterus stimpsoni: UMMZ 196862 (2, 71.0–72.6 mm SL, 2 CS), Hawaiian Islands, Kauai, Wainiha River, 2 km above mouth; USNM 214001 (5, 25.3–82.0 mm SL), Hawaiian Islands, Maui Island, east Maui, Hanawi Stream; USNM 214005 (1, 113.2 mm SL), Hawaiian Islands, Maui Island, west Maui, Waihee Stream.

Sicyopterus taeniurus: USNM 66030 (2, 84.5–91.3 mm SL), Society Islands, Tahiti, Tatana River; USNM 82967 (1, 75.1 mm SL), Society Islands, Tahiti.

Sicyopterus tauae: USNM 51787 (1, holotype, 27.5 mm SL), Western Samoa, Ahia, Upolu Island, Vaisigano River.

Sicyopterus sp. "Comoros": MNHN 1931-257 (2, 23.5–25.4 mm SL), Comoros, Anjouan Island; RUSI 27713 (10, 66.5–91.5 mm SL), Comoros Islands, Anjouan Island, Tatinga River; RUSI 036381 (12, 23.7–110.6 mm SL), Comoros Islands, Anjouan Island, Tatinga River; UMMZ 237080 (6, 79.0–94.0 mm SL, 1 CS), Comoros Islands, Anjouan Island, Tatinga River; UMMZ 237081 (4, 33.0–52.0 mm SL), Comoros Islands, Anjouan Island, Tatinga River.

Sicyopterus sp. "Pohnpei": USNM 362310 (1, 95.0 mm SL), Pohnpei, Lehn Mesi River, 3.2 km NE of Salapwuk.