

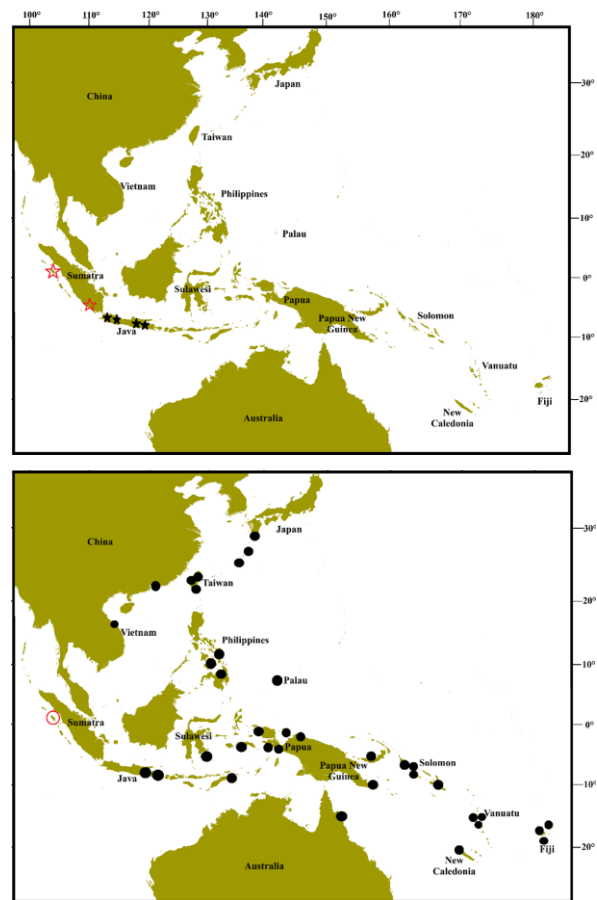


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## Two newly recorded gobiid fishes (*Sicyopus* spp.) from Sumatra, Indonesia

Fishes of the family Gobiidae, with an incredible diversity of over 2,000 species across 250 genera, represent one of the most diverse groups of vertebrates (Gill & Mooi 2012, Parenti 2021). The subfamily Sicydiinae is a speciose group of gobies that occupy tropical to temperate island streams in Indo-Pacific regions (Keith *et al.* 2015). Within this subfamily, the genus *Sicyopus* Gill, 1863, consists of eight valid species: *S. auxilimentus* Watson & Kotellat, 1994; *S. beremensis* Keith, Amick, Toko & Lord, 2019; *S. discordipinnis* Watson, 1995; *S. jonklaasi* Klausewitz & Henrich, 1986; *S. lord* Keith, Marquet & Tailbois, 2011; *S. multisquamis* de Beaufort, 1912; *S. rubicundus* Keith, Hadiaty, Buson & Hubert, 2014; and *S. zosterophorus* (Bleeker, 1856). This genus can be recognised by possessing widely spaced, mostly recurved, conical teeth on both the premaxillary and dentary jaws. Additionally, the premaxillary ascending process is narrowly tipped dorsally, and the tongue is free from the mouth floor (Keith *et al.* 2014a, 2015). Recent ichthyofaunal surveys conducted in the streams of western Sumatra resulted in the collection of several specimens belonging to two distinct *Sicyopus* species. These findings represent novel records and significant range extensions for *Sicyopus* spp. within the Indonesian archipelago. Brief descriptions of the two newly recorded species based on the current collected specimens, as well as morphological character comparisons, are presented in this study.

All samples were collected from streams via snorkelling with a hand net in Bengkulu (4°26'03"S, 103°16'45"E) and Nias Island (1°11'30"S, 97°38'31"E, and 1°24'02", 97°23'03"E), Sumatra, Indonesia (Fig. 1).



**Figure 1.** Distribution range of *rubicundus* with black stars (**above**), and *S. zosterophorus* with black dots (**below**); new site records are in red

Immediately after the collection, fish specimens were photographed using a Nikon D7100, equipped with macro lens. All specimens were preserved in 10% formalin and then transferred to 70% ethanol. Morphological measurements generally follow Miller (1988), and meristic counts follow Chen & Shao (1996). The terminology of the cephalic sensory canals and free neuromast organs (sensory papillae) follows Wongrat & Miller (1991), based on Sanzo (1911). Morphometric measurements were

recorded from the specimens to the nearest 0.01 mm using a digital caliper with the aid of a stereo microscope. Measurements are reported as a range of percentages of standard length (SL), head length (HL), and caudal peduncle length (CPL). All specimens are deposited at the Museum Zoologicum Bogoriense (MZB), Directorate of Scientific Collection Management, Cibinong, Indonesia.

### Taxonomy

*Sicyopus rubicundus* Keith, Hadiaty, Busson & Hubert, 2014  
(Figs. 2, 3, Sup. Tables 1–2)

**Materials examined.** MZB 28248, male, 2, 34.8–38.2 mm SL, MZB 28249, female, 3, 37.5–40.7 mm Padang Guci River, Bungin Tambun Village, Kaur District, Bengkulu Province, coll. Haryono *et al.* 07 December 2024; MZB 28250, male, 1, 34.5 mm SL, Nalua River, Hiligodu Village, Nias Utara District, Nias Island, coll. T. Harefa, 12 June 2024.

**Description.** Body elongated, cylindrical anteriorly and somewhat compressed posteriorly. Head slightly large, depressed, snout not protruding. Upper lip thick, more prominent than lower lip. Mouth oblique, posterior end of maxilla extending to vertical through posterior margin of orbit. Eyes large, dorsolateral. Anterior nasal with a short tapering tube, posterior opening pore-like with low raised rim. First dorsal-fin element IV–V, spines not filamentous, all about equal length, not connected to second dorsal-fin basally. Second dorsal-fin element I,9, all rays branched, last ray always two rays with one pterygiophore. Anal-fin element I,10, origin beginning at vertical to origin of second dorsal fin, all rays branched, last ray always two rays with one pterygiophore. Pectoral-fin rays 16, all branched, longest ray not reaching anus. Pelvic-fin I,5, small, rounded, forming a cup-like disc with fleshy frenum. Caudal-fin rays 16–17 with rear margin rounded. Lateral scale rows 35–41. Transverse scale row 16–17. Predorsal midline without scale. Cheek, opercle, pectoral-fin base, chest and belly naked. Body scales dominantly ctenoid with few cycloid on dorsal and anal-fins base.

**Head canals and pores.** Nasal extension of anterior oculoscapular canal with pore  $\sigma$  located on dorsal side of snout between anterior and posterior nostrils. Anterior interorbital region with paired pore  $\lambda$ . A single pore  $\kappa$  in posterior

interorbital. Behind posterior edge of eye with a paired pore  $\alpha$ . Lateral canal section of posterior oculoscapular with pores  $\rho$ ,  $\theta$ , and  $\tau$ . Preopercular canal with two pores  $\gamma$  and  $\varepsilon$ .

**Head sensory papillae.** Infraorbital papillae with 6 short transverse rows. Row *c* with transverse and longitudinal papillae. Row *d* with above edge of posterior part of mouth. Rows *e* and *i* closely arranged. Rows *ot*, *oi*, and *os* well separated on preopercle. Row *f* paired.

**Colouration.** Male with head and body greyish background. Dorsal side of head greyish, and ventral side of head including lips, snout, cheek, and opercle reddish. A black band extending vertically from midventral margin of eye to middle of cheek or posterior end of jaw. Ventral half of body, from origin of anal fin to caudal fin base with orange-redish colour. Body scales with black margin. First dorsal, pelvic, and pectoral-fins translucent. Second dorsal and anal-fins translucent with bluish outer margin. Caudal fin translucent, with orange-reddish medially, margins of upper and lower lobes bluish.

Female with head and body greyish background. A vertical blackish band extending from midventral margin of eye to middle of cheek or posterior end of jaw. Opercle with large blackish spot. A horizontal blackish band on the middle pectoral-fin base. Blackish dash-line extending along lateral body. Body scales with black margin. All fins translucent.

**Distribution.** *Sicyopus rubicundus* has been previously recorded only in Java, Lombok, and Bali Islands, Indonesia (Keith *et al.* 2014a, 2015). The present specimens of *S. rubicundus* collected from the freshwater streams of Bengkulu and Nias Island, becomes the westernmost and the northernmost record of the species in Indonesia (Fig. 1).

*Sicyopus zosterophorus* (Bleeker, 1856)  
(Figs. 2, 4, Sup. Tables 1–2)

*Sicydium zosterophorum* Bleeker, 1856: 296 (type locality: Boleling, northern Bali, Indonesia)

*Sicydium balinense* Bleeker, 1856: 297 (type locality: Boleling, Bali, Indonesia)

*Sicyopus balinense* (Bleeker, 1856)—Allen 1991, Maugé *et al.* 1992

*Sicyopus balinensis* (Bleeker, 1856)—Kotellat *et al.* 1993

**Materials examined.** Indonesia; Sumatera Utara: MZB 28251, 8, 33.1–38.8 mm SL, Humogo River, tributary of Idanoi River, Gunungsitoli

City, Nias Island, coll. T. Harefa, 03 April 2024; MZB 28252, 7, 31.2–34.8 mm SL, Nalua River, Hiligodu Village, Nias Utara District, Nias Island, coll. T. Harefa, 12 June 2024.

**Description.** Morphometric data are given in Table 1. Body elongated, cylindrical anteriorly and somewhat compressed posteriorly. Head slightly large, depressed, with snout not protruding. Upper lip thick, more prominent than lower lip. Mouth oblique, posterior end of maxilla extending to vertical through posterior margin of orbit. Eyes large, dorsolateral. Anterior nasal with a short tapering tube, posterior opening pore-like with a low raised rim. First dorsal-fin element VI, spines not filamentous, all about equal length, not connected to second dorsal-fin basally. Second dorsal-fin element I,9, all rays branched, last two rays always with one pterygiophore. Anal-fin element I,10, origin beginning at vertical to origin of second-dorsal fin, all rays branched, last two rays always with one pterygiophore. Pectoral-fin rays 15, all branched, longest fin ray not reaching anus. Pelvic-fin I,5, small, rounded, forming a cup-like disc with a fleshy frenum. Caudal-fin rays 16–17 with rear margin rounded. Lateral scale rows 27–31. Transverse scale rows 10–11. Predorsal midline is mostly naked in males, but if scaled, with 3 rows; females with 5–8 rows. Cheek, opercle, pectoral-fin base, chest, and belly without scale. Body scales usually ctenoid, few cycloid scales on dorsal and anal-fins fins.

**Head canals and pores.** Nasal extension of anterior oculoscapular canal with pore  $\sigma$  located on dorsal side of snout between anterior and posterior nostrils. Anterior interorbital region with paired pore  $\lambda$ . A single pore  $\kappa$  in posterior interorbital. Behind posterior edge of eye with a paired pore  $\alpha$ . Lateral canal section of posterior oculoscapular with pores  $\rho$ ,  $\theta$ , and  $\tau$ . Preopercular canal with two pores  $\gamma$  and  $\varepsilon$ .

**Head sensory papillae.** Infraorbital papillae present as 6 short transverse rows. Row *c* presents as transverse and longitudinal papillae. Row *d* present above edge of posterior part of mouth. Rows *e* and *i* closely arranged. Rows *ot*, *oi*, and *os* well separated on preopercle. Row *f* paired.

**Colouration.** Male with head and body brownish and greyish background. A black band extends vertically from midventral margin of eye to posterior end of jaws. A large blackish band extends vertically behind eye from anterior nape to lower opercle. Anterior half of body with

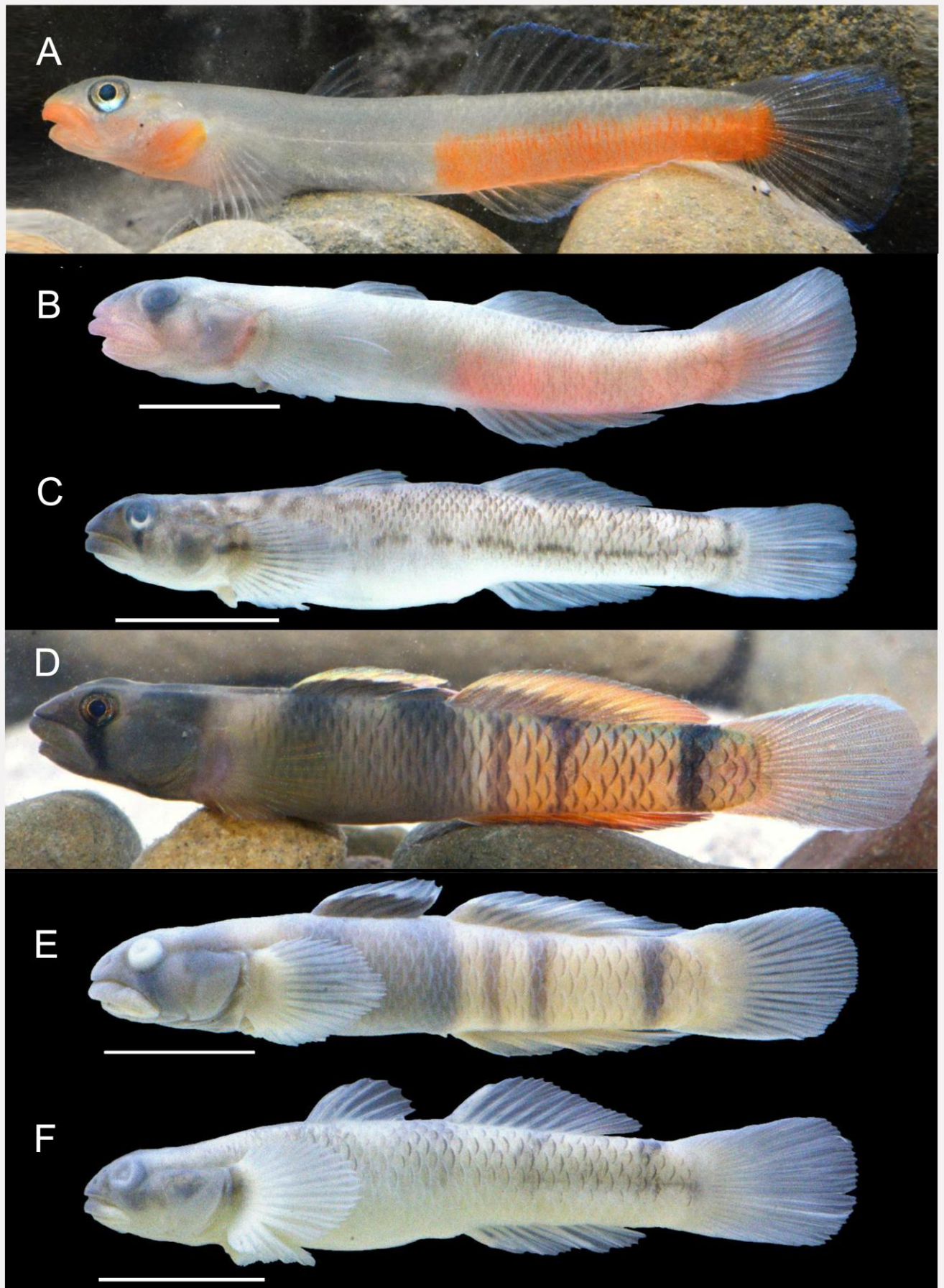
brownish or greyish color, and posterior half orange-reddish color. Body with 4–5 blackish vertical bars, extending to ventral side of body: first bar below 1<sup>st</sup>–4<sup>th</sup> spinous rays of first dorsal fin; second bar between first and second dorsal fin; third bar below 2<sup>nd</sup>–4<sup>th</sup> rays of second dorsal fin; fourth bar below 6<sup>th</sup>–8<sup>th</sup> rays of second dorsal fin, two current specimens lack this bar; fifth bar on caudal peduncle. Body scales with black margin. First dorsal with blackish basally, whitish or yellowish-orange distally. Second dorsal fin with lower half brownish or blackish, upper half reddish-orange, outer margin bluish. Anal fin with orange-reddish basally, brownish distally. Pelvic and pectoral fins translucent. Caudal fin brownish with slightly reddish orange near base, upper and lower margin bluish.

Female with head and body greyish background. A vertical blackish band extends from midventral margin of eye to middle of cheek or posterior end of jaw. Snout, upper lips, cheek and opercle blackish. A horizontal blackish band on middle pectoral fin base. Body with 4 vertical bars, extending to upper half of body: first bar below 1<sup>st</sup>–3<sup>rd</sup> spinous rays of first dorsal fin; second bar between first and second dorsal fins; third bar below 5<sup>th</sup>–7<sup>th</sup> rays of second dorsal fin; fourth bar on caudal peduncle. All fins translucent.

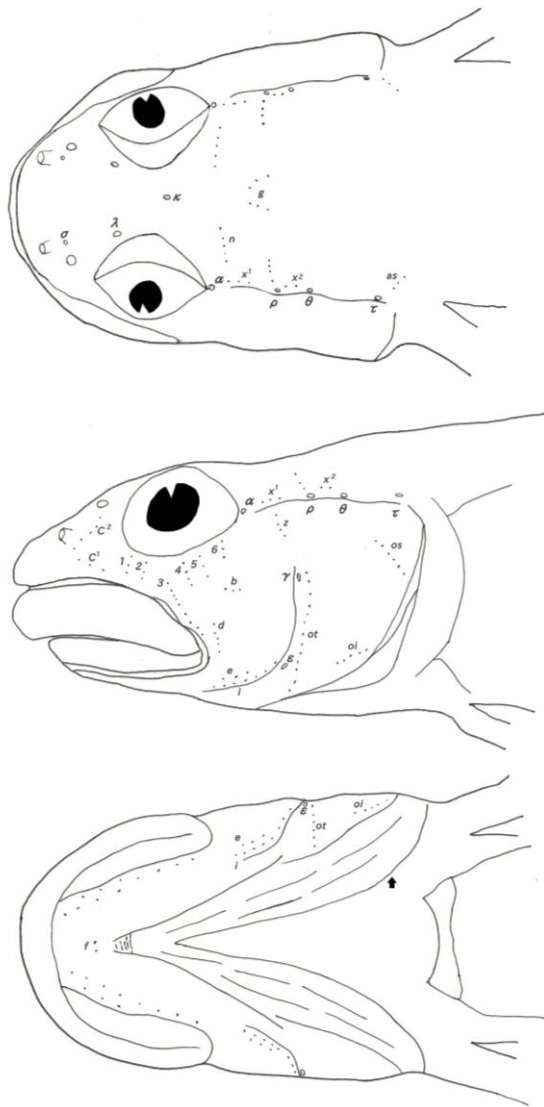
**Distribution.** *Sicyopus zosterophorus* has been recorded widely in freshwater streams of Indo-west Pacific islands, including Fiji, Vanuatu, New Caledonia, Solomon Islands, Australia, Papua New Guinea, Indonesia, Philippines, Palau, Vietnam, Taiwan, China and Japan (Keith *et al.* 2015, Donaldson *et al.* 2023). However, the occurrence of the species in Australia remains uncertain due to the lack of any evidence confirming its presence (B.C. Ebner, James Cook University, pers. comm.). In Indonesia, the species has been recorded in Java, Bali, Sulawesi, Maluku, and Papua. The present specimens of *S. zosterophorus* collected from the freshwater streams of Nias Island become the westernmost record of the species (Fig. 1).

The present study documented new distributional records for two species of *Sicyopus* in Sumatra, Indonesia. Meristic characters of the newly acquired specimens are mostly consistent with the diagnostic characters from previous descriptions (Table 2) (Bleeker 1856; Keith *et al.* 2014a, 2015). However, our specimens of *S. rubicundus* showed minor differences in having more pectoral-fin rays (16 vs 15), which is herein considered as intraspecific variation.

## Plate 30



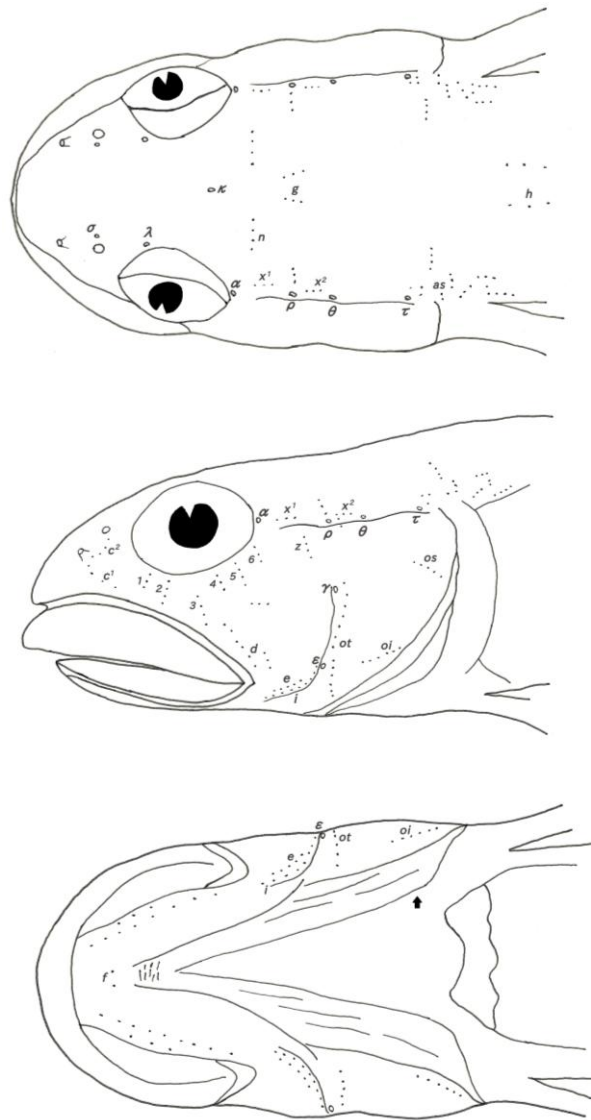
**Figure 2.** *Sicyopus rubicundus* male (MZB 28248, 34.8 mm SL) (A) in life, (B) preserved, (C) female (MZB 28249, 40.2 mm SL); *Sicyopus zoterophorus* male (MZB 28251, 38.8 mm SL) (D) in life, (E) preserved, (F) female (MZB 28252, 34.8 mm SL); © Photo: TH



**Figure 3.** (A) Dorsal, (B) lateral, and (C) ventral head of *Sicyopus rubicundus* (MZB 28250, male, 34.5 mm SL) from Nias Island; © Illustration: TH

Moreover, due to overlapping and limited diagnostic characters in previous studies (Bleeker 1856; Keith *et al.* 2014a), here, we propose additional identifying characteristics for these species. *S. rubicundus* can be distinguished from other congeners by the following combination of characters: first dorsal fin IV–V (modally V) in both sexes; second dorsal fin rays I,9; anal fin rays I,9–10 (modally 10); pectoral fin rays 15–16 (modally 16); lateral scale rows 35–41; transverse scale rows 16–17; body without vertical and horizontal dusky to blackish bands; ventral side of head and posterior half of ventral body with orange-reddish colour; body scales with marginal brown spots; all fins translucent. While for *S. zosterophorus*, the species differs from its congeners by the following combination of characters: first dorsal fin VI in both sexes;

second dorsal fin rays I,9–10 (modally 9); anal fin rays I,9–10 (modally 10), pectoral fin rays 15–16 (modally 15); lateral scale rows 27–31; transverse scale rows 10–11; body with 4–5 blackish vertical bars; body scales with marginal brown spots; dorsal and anal fins with orange-redish and brownish colour.



**Figure 4.** (A) Dorsal, (B) lateral, and (C) ventral head of *Sicyopus zosterophorus* (MZB 28251, male, 38.8 mm SL) from Nias Island; © Illustration: TH

Five *Sicyopus* species are currently recognized in Indonesia: *S. auxiliimentus*, *S. discordipinnis*, *S. multisquamatus*, *S. rubicundus*, and *S. zosterophorus* (Keith *et al.* 2015), primarily found in Java, Sulawesi, Maluku, and Papua. Amphidromous fish distribution, including sicydiine gobies, is influenced by factors such as ocean currents, pelagic larval

duration, larval behaviour, and adult habitat preferences (McDowell 2010; Tallebois *et al.* 2012; Jamonneau *et al.* 2024). The waters off western Sumatra are dominated by a south-to-north current (Purba *et al.* 2021). Considering recent discoveries of new goby species and distributional records in this region (Maeda & Tan 2013; Keith *et al.* 2014b; Harefa & Chen 2022), we hypothesize that western Sumatra should harbour greater freshwater gobiid diversity than is presently documented. Therefore, further targeted surveys are strongly recommended.

#### Diagnostic key of all nominal species of *Sicyopus* from Indonesia.

- 1a. Anal fin rays modally I,9 ..... 2
- b. Anal fin rays modally I,10 ..... 3
- 2a. Lateral scale rows 18–23; body scales on anterior part with bluish margin .....  
..... *S. auxilimentus*
- b. Lateral scale row 35–42; body scales on anterior part mostly blackish .....  
..... *S. discordipinnis*
- 3a. Second dorsal fin rays I,10; lateral scale rows >45 ..... *S. multisquamus*
- b. Second dorsal fin rays I,9; lateral scale rows <45 ..... 4
- 4a. Transverse scale rows 16–17; ventral side of head with orange-redish colour; body without blackish vertical bars ..... *S. rubicundus*
- b. Transverse scale rows 10–11, head without orange reddish colour; body with 4-5 blackish vertical bars ..... *S. zosterophorus*

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#### Supplemental data

<https://doi.org/10.47605/tapro.v14i2.384>

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