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Gobiodon limmoni, a new coral-associated goby (Teleostei: Gobiidae) from the Moluccas, eastern Indonesia

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Abstract. The new species of coral-associated goby *Gobiodon limmoni* is described from nine specimens collected off the Moluccas Islands, Indonesia. The new species is readily distinguishable from all congeners by the following combination of characters: dorsal-fin rays VI-I/10; anal-fin rays I/8; pectoral-fin rays 17–19 (mode 18); head and body without scales; gill opening large, extending ventrally to level with lowermost pectoral-fin base; groove between isthmus and interopercle absent; post-symphysial canine teeth present; prepelvic-fin length 30.6–34.5% of SL; body depth at the pelvic- and anal-fin origins 29.9–34.0% of SL and 23.0–26.8% of SL, respectively; ground colour of head and body greenish-brown to greenish-grey, with interconnected, vertically-oblique irregular reddish-orange spots and vermiculate bars on cheek and opercular regions; no distinct dusky spot on posterodorsal tip of gill opening.

Key words. Ambon Island, Ceram Island, colouration, Gobiinae, morphology, taxonomy

INTRODUCTION

The gobiid genus *Gobiodon* Bleeker, 1856 comprises small marine benthic fishes, usually less than 40 mm standard length, but occasionally exceeding this size, widely distributed in shallow tropical to temperate Indo-Pacific waters, where they are commonly associated with scleractinian corals in the genera *Acropora*, *Stylophora*, *Echinopora*, *Hydnophora*, and *Pocillopora* (Harold & Winterbottom, 1995; Suzuki et al., 2012; Herler et al., 2013; Shibukawa et al., 2013; Hildebrandt et al., 2024). Diagnostic features of the genus, shared by most species, include a deep laterally compressed head and body, the general absence of scales on both the head and body (some species with a few longitudinal scales on the caudal peduncle), and a narrow gill opening restricted to the base of the pectoral fin (Harold & Winterbottom, 1995; Shibukawa et al., 2013; Hildebrandt et al., 2024). The genus *Gobiodon* currently comprises 31 valid species (Herler et al., 2013; Shibukawa et al., 2013; Hildebrandt et al., 2024; Fricke et al., 2025).

In Indonesian waters, sixteen species of *Gobiodon* have been reported, including *G. acicularis* Harold and Winterbottom, 1995, *G. aoyagii* Shibukawa, Suzuki & Aizawa, 2013, *G. atrangulatus* Garman, 1903, *G. brochus* Harold & Winterbottom, 1999, *G. ceramensis* (Bleeker, 1853), *G. citrinus* (Rüppell, 1838), *G. erythrospilus* Bleeker, 1875, *G. fuscoruber* Herler, Bogorodsky & Suzuki, 2013, *G. heterospilos* Bleeker, 1856, *G. histrio* (Valenciennes, 1837), *G. multilineatus* Wu, 1979, *G. okinawae* Sawada, Arai & Abe, 1972, *G. prolixus* Winterbottom & Harold, 2005, *G. quinquestrigatus* (Valenciennes, 1837), *G. rivulatus* (Rüppell, 1830), and *G. unicolor* (Castelnau, 1873) (Shibukawa et al., 2003; Allen & Erdmann, 2024). Notably, *G. unicolor* is regarded as a junior synonym of *G. histrio* based on the holotype-based revision of Herler et al. (2013). Indonesian records attributed to *G. unicolor* are unlikely to represent *G. histrio* and are considered referable to *G. fuscoruber*, following Herler et al. (2013). Despite this apparent diversity, information on the taxonomy, distribution, and ecology of Indonesian *Gobiodon* species remains scarce compared with that of other regions in the Indo-Pacific. Recent study indicates that at least four undescribed *Gobiodon* species are distributed within this region (Allen & Erdmann, 2024). Given Indonesia's extensive coral reef ecosystems, further studies are likely to reveal additional undescribed species within this genus.

During an ichthyofaunal survey supported by the Faculty of Fisheries and Marine Science, Pattimura University, nine specimens of an undescribed species of *Gobiodon* were collected from coastal waters off Ambon and Ceram islands (Moluccas, eastern Indonesia). Examination of the material indicated that, while several meristic and morphometric characters distinguish these specimens from known congeners, their most diagnostic feature is a distinctive colouration pattern. The new species possesses a greenish-brown to greenish-grey ground colour on the head and body, overlaid with interconnected, vertically oblique reddish-orange spots and vermiculate bars on the cheek

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Table 1. Measurements (expressed as percentages of standard length) of *Gobiodon limmoni*, new species.

	Holotype	Paratypes	
	MZB 27852	n = 8	mean
Standard length (mm)	21.4	16.5–20.7	
% of SL			
Head length	29.1	28.1–30.7	29.3
Snout to 1st dorsal fin origin	35.7	33.6–36.1	34.6
Snout to 2nd dorsal fin origin	56.3	56.0–58.4	57.2
Snout to anus	51.5	50.5–55.5	52.1
Snout to anal fin origin	63.1	59.8–64.1	61.3
Prepelvic-fin length	32.9	30.6–34.5	32.8
Caudal peduncle length	18.3	17.7–21.1	19.4
Caudal peduncle depth	14.1	14.1–15.1	14.6
First dorsal-fin base length	19.1	17.4–21.1	18.9
Second dorsal-fin base length	27.6	25.5–29.0	27.1
Anal-fin base length	22.0	19.0–21.4	20.4
Caudal-fin length	19.9	18.5–26.2	21.6
Pectoral-fin length	25.5	24.1–26.2	25.3
Pelvic-fin length	17.3	16.3–18.7	17.4
Body depth at pelvic-fin origin	29.9	30.0–34.0	32.3
Body depth at anal-fin origin	23.9	23.0–26.8	24.4
Body width at anal-fin origin	12.5	12.1–15.7	13.7
Pelvic-fin origin to anus	19.1	18.8–25.1	21.2
% of HL			
Snout length	22.3	21.1–23.9	22.5
Eye diameter	23.5	22.5–27.8	25.8
Postorbital length	56.9	49.1–56.4	52.5
Cheek depth	43.9	39.5–43.8	41.8
Head width at upper gill-opening	50.6	48.0–56.1	51.3
Head width (maximum)	60.9	59.5–68.6	64.5
Fleshy interorbital width	21.4	20.4–23.7	22.0
Bony interorbital width	12.7	11.3–14.9	13.7
Lower jaw length	23.8	22.5–25.9	24.4

and opercular regions, and notably lacks the dusky mark on the posterodorsal tip of the gill opening. This unique combination of characters supports its recognition as a new species, for which detailed comparisons with related taxa are provided herein.

MATERIAL AND METHODS

Counts and measurements followed Chen & Shao (1996) and Miller (1988), respectively. All measurements were taken to the nearest 0.01 mm using digital callipers under a stereo microscope, and are presented as ranges [expressed as percentages of standard length (SL) and head length (HL)]. The specimens exhibited little to no mucous layer (occasionally a slight residue on the fins), so no additional cleaning was required prior to measurement. Terminology for cephalic sensory canals and free neuromast organs (sensory papillae) follows Wongrat & Miller (1991), based on Sanzo (1911). Osteological features were examined using computed tomography (CT) scanning at the CRYO EM Laboratory, Genomic Building, KST Soekarno, National Research and Innovation Agency (BRIN), Indonesia, utilising a Bruker SkyScan 2214. The scans were performed at 30–50 kV and 180–200 μA, using a 1501×1944 pixel Flat Panel detector with a resolution of 10–640 μm. Visualisation and analysis of the CT data were carried out using 3D Slicer v.5.6.2 (https://www.slicer.org/), with skeletal terminology following Murdy (1985). Curatorial procedures for the collected specimens followed Motomura & Ishikawa (2013). The specimens examined in this study are held in the Museum Zoologicum Bogoriense (MZB, Indonesia) and the Zoological Reference Collection, Department of Zoology, University of Singapore (ZRC, Singapore).

Comparative materials: *Gobiodon atrangulatus*: ZRC 36181, 25.1 mm SL, ZRC 36182, 24.2 mm SL, reef at Tg. Gemal, Bintan Island, Riau Archipelago, Sumatra, Indonesia, coll. Ng et al., May 1993. *Gobiodon histrio*: ZRC 36208, 33.1 mm SL, ZRC 36209, 31.8 mm SL, ZRC 36210, 23.9 mm SL, Beting Bemban Laut, Singapore, coll. Goh BPL, 29 August 1986; ZRC 36214, 29.3 mm SL, ZRC 36215, 22.2

mm SL, reef at Pempang Laut, Singapore, coll. Goh BPL, 9 September 1986; MZB 27053 33.4 mm SL, Seribu Islands, Jakarta, obtained from CV Cahaya Baru, Jakarta, 26 March 2024; MZB 27151, 33.8 mm SL, Seribu Islands, Jakarta, coll. Indonesia Mantap Team with CV Cahaya Baru, 24 May 2024.

In addition to the data obtained from material examined in this study, data from previously published descriptions and taxonomic revisions of *Gobiodon* species were also used for comparative purposes (see Table 2 and Comparisons section). This approach provides a comprehensive basis for evaluating diagnostic characters across the genus.

TAXONOMY

Gobiodon limmoni, new species

New English name: Limmon's Coral Goby; new Indonesian name: Gobi Karang Limmon
(Figs. 1–4; Tables 1, 2)

Holotype. MZB 27852, 20.7 mm SL, off Amahai, south coast of Ceram Island, Maluku Tengah, Maluku Province, Indonesia, 3°21′39.0″S 128°58′17.0″E, 2–3 m depth, hand net, coll. K. Wibowo, 11–12 December 2024.

Paratypes. MZB 27859, 21.4 mm SL, MZB 27862, 16.9 mm SL, MZB 27863, 17.0 mm SL, MZB 27864, 16.0 mm SL, MZB 27877, 18.1 mm SL, MZB 27878, 18.0 mm SL, off Amahai, south coast of Ceram Island, Maluku Tengah, Maluku Province, Indonesia, 3°21′39.0″S 128°58′17.0″E, 2–3 m depth, hand net, coll. K. Wibowo, 11–12 December 2024; MZB 27879, 16.5 mm SL, MZB 27880, 19.4 mm SL, off Hukurila, Leitimur Selatan, Ambon, Maluku Province, Indonesia, 3°44′17″S 128°14′54″E, 4 m depth, hand net, coll. K. Wibowo, 20 November 2022.

Diagnosis. A new species of *Gobiodon* with the following combination of characters: dorsal-fin rays VI-I/10; anal-fin rays I/8; pectoral-fin rays 17–19 (mode 18); head and body without scales; gill opening large, extending ventrally to level with lowermost pectoral-fin base; groove between isthmus and interopercle absent; post-symphysial canine teeth present; prepelvic-fin length 30.6–34.5% of SL; body depth at pelvic- and anal-fin origins 29.9–34.0% of SL and 23.0–26.8% of SL, respectively; ground colour of head and body greenish-brown to greenish-grey, with interconnected, vertically-oblique irregular reddish-orange spots and vermiculate bars on cheek and opercular regions; no distinct dusky spot on posterodorsal tip of gill opening.

Description. Morphometric data provided in Table 1; external morphology and CT-scanned skeleton shown in Figs. 1 and 4, respectively. Head and body slender, moderately compressed (Fig. 1). Maximum body depth at pelvic-fin origin 29.9–34.0% of SL, decreasing posteriorly; body depth at anal-fin origin 23.0–26.8% of SL. Head width at upper gill opening 48.0–56.1% of HL. Prepelvic-fin length 30.6–34.5% of SL, approximately equal to body depth at pelvic-fin origin. Head profile very steep from snout tip to above anterior margin of eye; median ethmoid, frontal, and supraoccipital forming steep cranial profile. Snout short 21.1–23.9% of HL, its length distinctly shorter than eye diameter. Eye large, dorsolateral, its diameter 22.5–27.8% of HL. Lower jaw length 22.5–25.9% of HL, approximately equal to eye diameter. Upper jaw projecting slightly beyond lower jaw. Mouth oblique; maxilla extending slightly beyond vertical through anterior margin of orbit. No scales on head and body.

Dentition with marked size variation; jaw with uniscupid and elongated recurved canines anteriorly, multiserial rows of small teeth posteriorly; lower jaw with large postsymphysial canines present on each side. Dentary, premaxilla, maxilla, vomer, and palatine well developed. Anterior nostril with short tapering tube level with ventral edge of eye; posterior nostril with low raised rim level with middle of eye. Cheek slightly fleshy, its depth 39.5–43.9% of HL, distinctly shorter than postorbital length. Gill opening large, extending ventrally to level with base of lowermost pectoral-fin ray. Groove between isthmus and interopercle absent. Interopercle, opercle, subopercle, and five branchiostegals distinct.

First dorsal fin with VI spines, rounded, without filamentous rays; origin slightly posterior to uppermost point of pectoral-fin base; depressed tip reaching second dorsal fin origin; first dorsal-fin base length 17.4–21.1% of SL, shorter than second dorsal-fin base 25.5–29.0% of SL. Second dorsal fin with I spine and 10 branched rays; last ray split into two rays supported by single pterygiophore. Anal fin with I spine and 8 branched rays; last ray split; origin below first branched ray of second dorsal fin; anal-fin base length 19.0–21.4% of SL, approximately equal to first dorsal-fin base. Dorsal- and anal-fin spines, rays, and pterygiophores distinct. Pectoral fin rounded, with 18 branched rays (17 and 19 each in two paratypes); tip reaching vertical through origin of anal fin. Pelvic fins medially united, with I spine and 5 rays; cup-shaped, with well-developed connecting membrane; depressed tip not reaching anus (just reaching anterior margin of anus in 2 paratypes). Pelvis and pelvic-fin elements clearly defined. Caudal fin rounded; principal caudal-fin rays 17; supported by single epural, five hypurals (1–5), parhypural, and dorsal and ventral procurrent rays. Vertebrae 10 + 15; preural centrum and hemal spine distinct.

Cephalic canals and sensory papillae (Fig. 3). Nasal extension of anterior oculoscapular canal with pore σ located dorsally on snout between anterior and posterior nostrils. Anterior interorbital with paired pore λ. Posterior interorbital single pore κ. Paired pore α behind posterior edge of eye. Lateral canal section of posterior oculoscapular with pore ρ. Preopercular canal with two pores γ and ε. Row d above edge of posterior mouth. Rows e and i closely arranged. Rows ot, oi and os well separated on preopercle. Row f paired. Thick mucous layer may obscure some papillae.

Fresh colouration (Fig. 1). Head from snout to operculum, and upper pectoral-fin base with prominent interconnected, vertically-oblique irregular reddish-orange spots and short

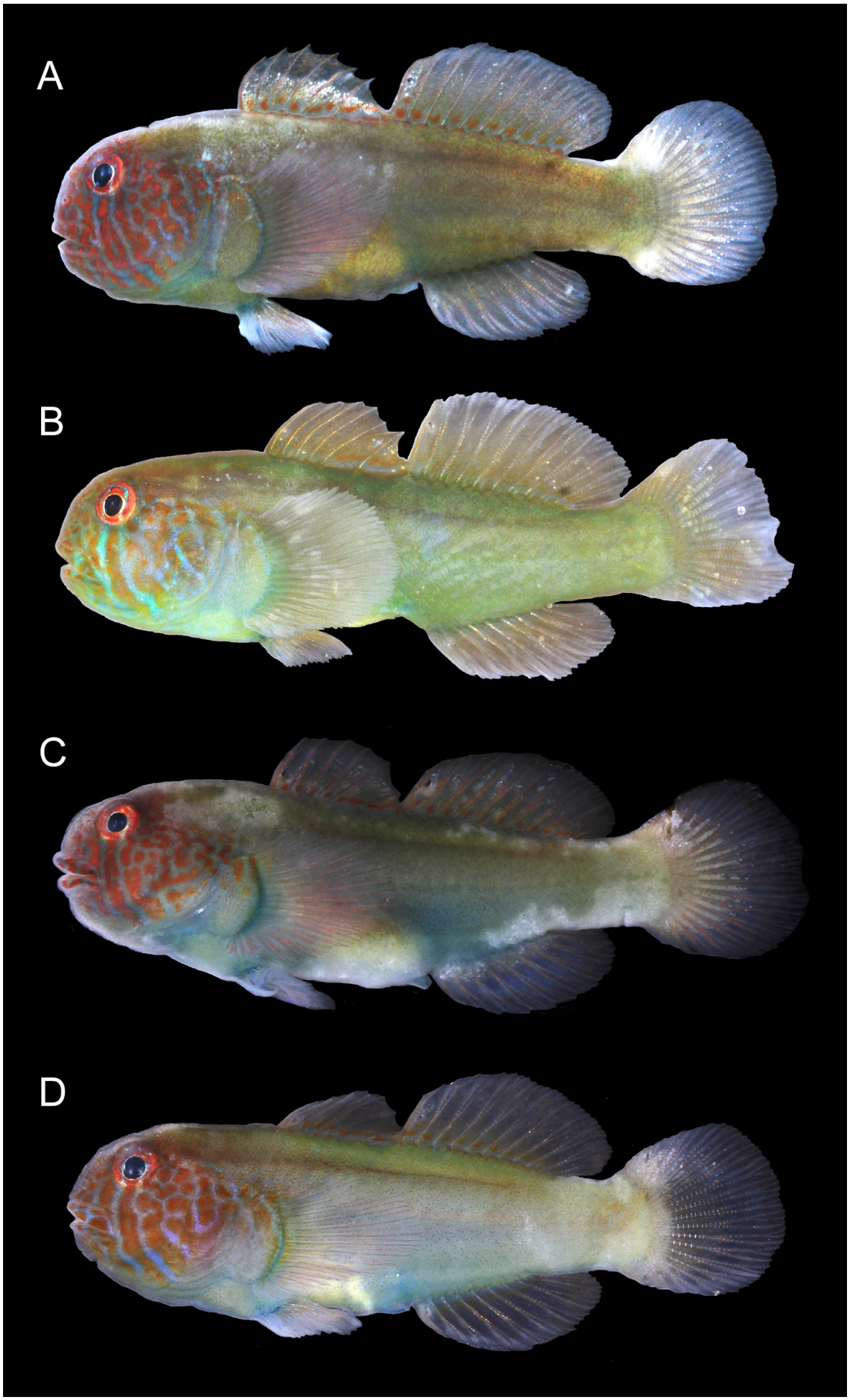

Fig. 1. Fresh specimens of *Gobiodon limmoni*, new species. A, MZB 27852, holotype, 20.7 mm SL; B, MZB 27859, paratype, 21.4 mm SL; C, MZB 27879, paratype, 16.5 mm SL; D, MZB 27880, paratype, 19.4 mm SL.

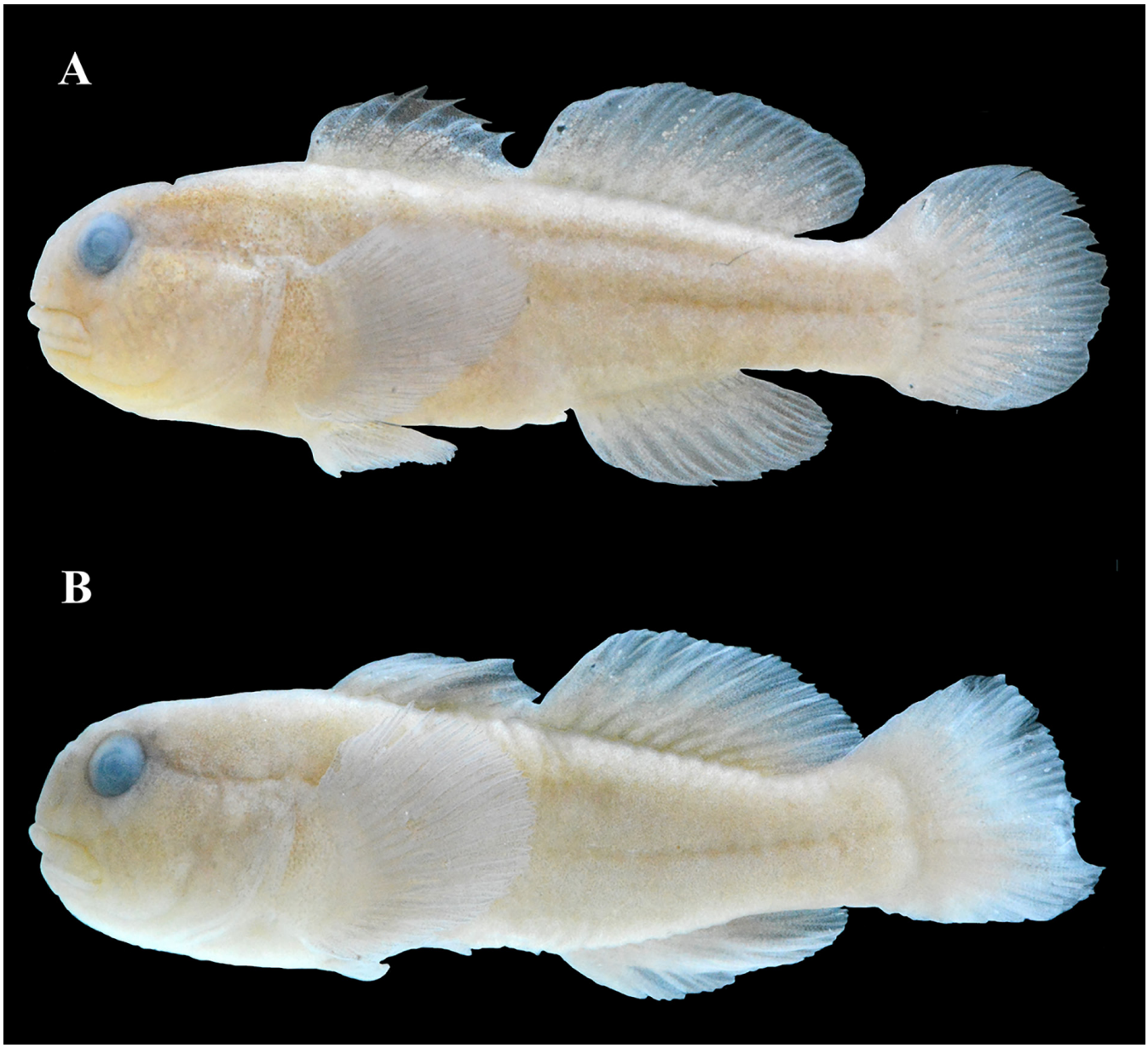

Fig. 2. Preserved specimens of *Gobiodon limmoni*, new species. A, MZB 27852, holotype, 20.7 mm SL; B, MZB 27859, paratype, 21.4 mm SL.

vermiculate bars; interspaces pale bluish-green to bluish-grey, forming reticulated appearance. Eye encircled by narrow reddish-orange ring. Body greenish-brown to greenish-grey, with indistinct brownish longitudinal stripe on upper lateral surface, extending from posterior orbit to below posterior end of dorsal-fin base. All fins with semi-translucent membranes; dorsal fins with small reddish-orange spot at base of each membrane between rays (indistinct in Fig. 1B, likely due to reduced colour clarity caused by the formalin treatment applied during fin-spreading.)

Preserved colouration (Fig. 2). All green and red colouration faded; head and body creamy yellow to whitish; all fins semi-translucent whitish.

Distribution. The species is currently known only from the coastal waters of Ambon and Ceram islands, Moluccas, eastern Indonesia (Fig. 5). Specimens were collected from *Acropora gemmifera* coral habitats in depths of 2–4 m.

Etymology. The species is named *Gobiodon limmoni* in honour of Gino V. Limmon (Pattimura University), who generously supported the ichthyofaunal survey in waters surrounding the Moluccas, Indonesia. The specific epithet is formed from the Latin genitive case.

Comparisons. The morphological characters of the species were compared with those of 31 congeners (Table 2). Of these, 22 species exhibited conspicuous head markings such as bands, lines, stripes, or spots, whereas the remaining species lack such markings and instead having uniformly plain head colouration. Although *Gobiodon limmoni* shared bright head markings with the former group, the distinctive reddish-orange colouration of interconnected, vertically-

Table 2. Selected morphological characters of 32 *Gobiodon* spp. Asterisks indicate species with conspicuous head markings.

Species	Second dorsal fin	Anal fin	Pectoral fin	First dorsal fin profile	Lateral scales	Interopercle isthmus groove	Pelvic fin length	Black spot on posterodorsal tip of gill opening	Source
G. limmoni, new species*	I/10	I/8	17–19	not elongate	absent	absent	usually not reaching anus	absent	Present study
G. acicularis	I/10–11	I/9	16–17	1st spine elongate	absent	absent	reaching anus	absent	Harold & Winterbottom, 1995
*G. albofasciatus**	I/9–10	I/9	17	not elongate	absent	–	–	present	Nakabo, 2002
*G. albolineatus**	I/9–10	I/9	18–20	not elongate	absent	present	–	present	Heemstra et al., 2022
*G. aoyagii**	I/9–11	I/8–9	19–21	not elongate	3 or 4 longitudinal series	deep groove	not reaching anus	absent	Shibukawa et al., 2013
G. ater	I/10	I/8	19–20	not elongate	absent	deep groove	not reaching anus	absent	Herler et al., 2013
*G. atrangulatus**	I/10–11	I/8–9	19–20	not elongate	absent	–	–	present	Allen & Erdmann, 2024
G. axillaris	I10	I/8–9	16	–	–	absent	–	–	Heemstra et al., 2022
*G. bicalvolineatus**	I/10	I/9–10	19	not elongate	absent	deep groove	not reaching anus	absent	Hildebrandt et al., 2024
*G. bilineatus**	I/10–11	I/8–9	19–20	not elongate	absent	absent	not reaching anus	absent	Herler et al., 2013
*G. brochus**	I/10–12	I/9–10	18–20	not elongate	absent	–	not reaching anus	absent	Harold & Winterbottom, 1999
G. ceramensis	I/10	I/8–9	17–19	not elongate	absent	–	not reaching anus	absent	Allen & Erdmann, 2024
*G. citrinus**	I/10–11	I/8–9	17–19	not elongate	absent	absent	not reaching anus	present	Heemstra et al., 2022
*G. cobenjaminsis**	I/10	I/10	19	not elongate	absent	deep groove	not reaching anus	present	Hildebrandt et al., 2024
*G. erythrospilus**	I/10–11	I/8–10	18–21	not elongate	1 longitudinal series	deep groove	not reaching anus	absent, or if present, with faint melanophores	Shibukawa et al., 2013
G. fulvus	I/11	I/8–9	18–19	not elongate	absent	–	–	–	Herre, 1927
G. fuscoruber	I/10	I/8	19–20	not elongate	absent	obvious groove	not reaching anus	absent	Herler et al., 2013
*G. heterospilos**	I/8	I/8	16–17	not elongate	absent	–	–	present	Allen & Erdmann, 2024
*G. histrio**	I/10	I/9	19–21	not elongate	1 longitudinal series	obvious groove	not reaching anus	present	Shibukawa et al., 2013
G. howsoni	I/10	I/8–9	15–17	not elongate	absent	–	–	absent	Allen, 2021
*G. irregularis**	I/10–11	I/9–10	20	not elongate	absent	absent	not reaching anus	absent	Herler et al., 2013
*G. micropus**	I/12–13	I/11	19–20	not elongate	–	present	–	–	Heemstra et al., 2022

Species	Second dorsal fin	Anal fin	Pectoral fin	First dorsal fin profile	Lateral scales	Interopercle isthmus groove	Pelvic fin length	Black spot on posterodorsal tip of gill opening	Source
*G. multilineatus**	I/10	I/8–9	18	not elongate	absent	–	–	–	Allen & Erdmann, 2024
*G. oculolineatus**	I/10	I/10	19	not elongate	absent	–	–	–	Nakabo, 2002
G. okinawae	I/10–11	I/9–10	16–17	not elongate	absent	–	–	absent	Sawada et al., 1972
*G. prolixus**	I/10	I/8	18–19	not elongate	absent	shallow groove or absent	reaching anus	absent	Winterbottom & Harold, 2005
*G. quinquestrigatus**	I/10–11	I/8–9	19–20	not elongate	absent	–	not reaching anus	absent	Allen & Erdmann, 2024
*G. reticulatus**	I/10–12	I/9–10	19–21	not elongate	absent	absent	–	absent	Heemstra et al., 2022
*G. rivulatus**	I/10–11	I/8–9	18–21	not elongate	–	absent	–	absent	Heemstra et al., 2022
*G. spadix**	I/9-11	I/8-9	19–21	not elongate	absent	absent	not reaching anus	absent	Sato & Motomura, 2024
G. spilophthalmus	I/11	I/8	16	not elongate	absent	–	–	absent	Fowler, 1944
G. winterbottomi	I/10	I/9	15–16	not elongate	absent	absent	reaching mid to posterior half of genital papilla	absent	Suzuki et al., 2012

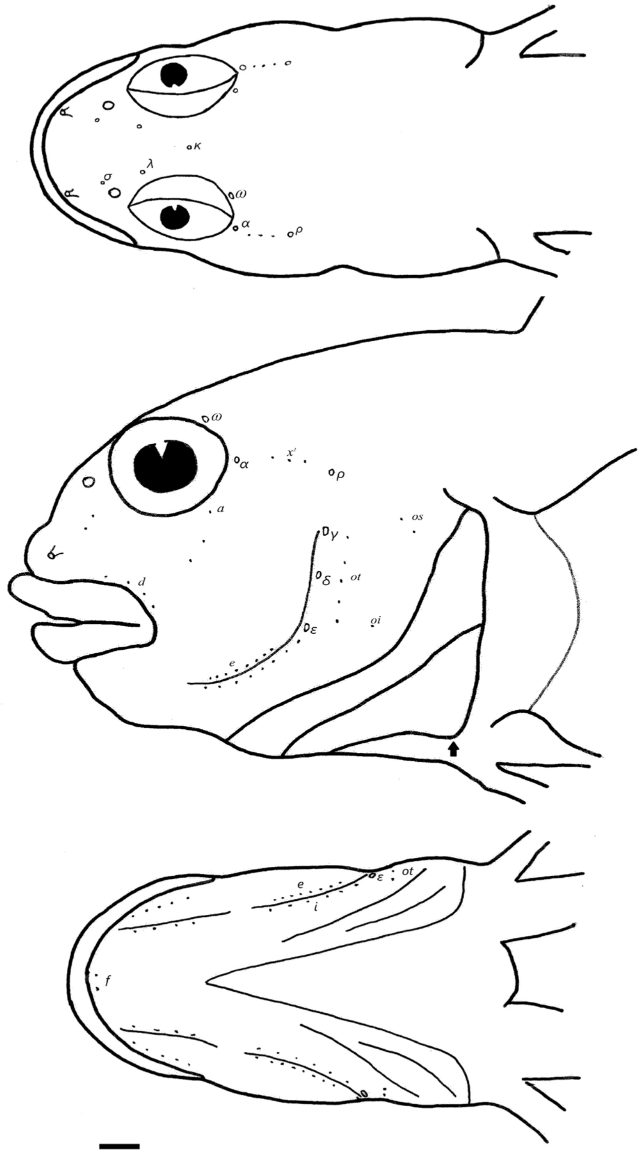

Fig. 3. Head lateral-line system of *Gobiodon limmoni*, new species. MZB 27852, holotype, 20.7 mm SL. Above, middle, and below in dorsal, lateral and ventral views, respectively. Arrow indicates position of ventral end of gill opening. Bar = 1 mm.

oblique irregular spots and short vermiculate bars is entirely unique, clearly differing from all the other species.

Gobiodon limmoni is characterised by a uniformly plain greenish-brown to greenish-grey body (Fig. 1), which contrasts with most congeners that possess conspicuous head markings. Only a few species, such as *Gobiodon atrangulatus* Garman, 1903 and *Gobiodon brochus* Harold & Winterbottom, 1999, also exhibit a generally plain body colouration. However, beyond head colouration, *G. limmoni* can be readily distinguished from the latter two species by a combination of meristic and morphological characters: from *G. atrangulatus* by having fewer pectoral-fin rays (17–19, usually 18 vs. 19–20) and lacking a black spot on the posterodorsal tip of the gill opening (vs. spot present) (Nakabo, 2002; Allen & Erdmann, 2024; Table 2); and from *G. brochus* by having fewer anal-fin rays (I/8 vs. I/9–10) (Harold & Winterbottom, 1999; Allen & Erdmann, 2024; Table 2).

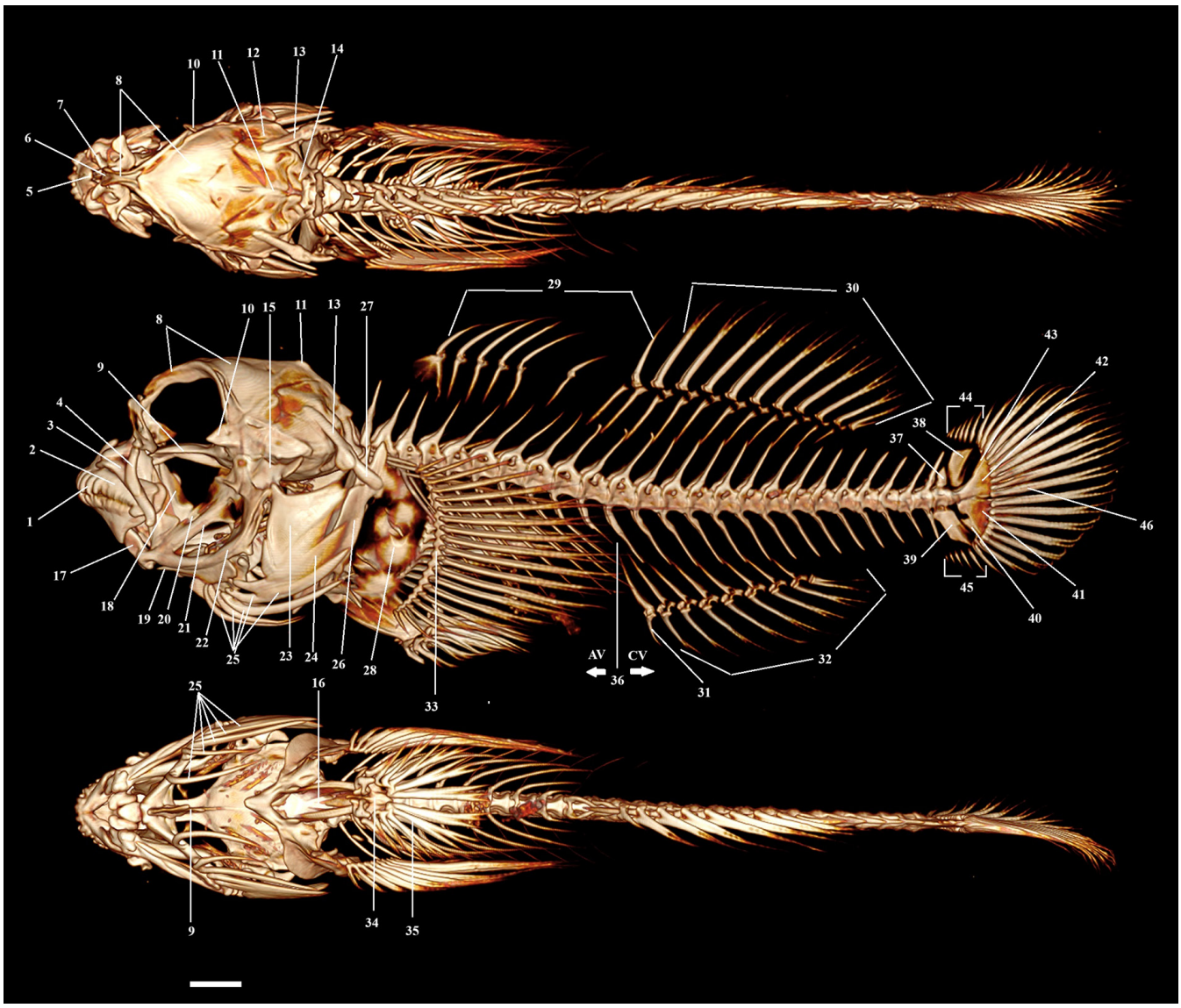

Fig. 4. CT-scanned skeleton of *Gobiodon limmoni*, new species. MZB 27879, paratype, 16.5 mm SL. Above, middle, and below in dorsal, lateral and ventral views, respectively. 1. Dentary teeth, 2. Premaxilla, 3. Maxilla, 4. Palatine, 5. Vomer, 6. Median ethmoid, 7. Lateral ethmoid, 8. Frontal, 9. Parasphenoid, 10. Sphenotic, 11. Supraoccipital, 12. Pterotic, 13. Posttemporal, 14. Exoccipital, 15. Hyomandibula, 16. Basioccipital, 17. Anguloarticular, 18. Ectopterygoid, 19. Interopercle, 20. Quadrate, 21. Symplectic, 22. Preopercle, 23. Opercle, 24. Subopercle, 25. Branchiostegals 1–5, 26. Scapula, 27. Supracleithrum, 28. Proximal radials, 29. Dorsal-fin spines, 30. Dorsal-fin soft rays, 31. Anal-fin spine, 32. Anal-fin soft rays, 33. Pectoral-fin soft rays, 34. Pelvis, 35. Pelvic-fin soft rays, 36. Vertebrae (AV = abdominal vertebrae, CV = caudal vertebrae), 37. Preural centrum, 38. Epural, 39. Hemal spine, 40. Parhypural, 41. Hypurals 1 & 2, 42. Hypurals 3 & 4, 43. Hypural 5, 44. Dorsal procurrent rays, 45. Ventral procurrent rays, 46. Principal caudal-fin rays. Bar = 1 mm.

Although *G. limmoni* exhibits somewhat different patterns of head markings in terms of orientation, structure, and arrangement compared to those of *Gobiodon aoyagii* Shibukawa, Suzuki & Aizawa, 2013, *Gobiodon bicalvolineatus* Hildebrandt, 2024, *Gobiodon erythrospilus* Bleeker, 1875, *Gobiodon irregularis* Herler, Bogorodsky & Suzuki, 2013, and *Gobiodon histrio* (Valenciennes, 1837), all six species share similarly conspicuous, broad head bars or spots (rather than narrow stripe-like markings). However, *G. limmoni* can also be readily distinguished from the other five species by the absence of prominent markings on the lateral body surface (body uniformly greenish-brown to greenish-grey; Fig. 1) [vs. body varying with size from brownish or reddish-orange to yellowish-green with a vermiculated pattern on the dorsolateral surface in *G. irregularis* (Herler et al., 2013: figs. 3, 4) and body with distinct broad reddish lateral horizontal lines, ovals, or interconnected spots in *G. aoyagii*, *G. bicalvolineatus*, *G. erythrospilus*, and *G. histrio* (Shibukawa et al., 2013: fig. 1; Hildebrandt et al., 2024: fig. 3A)].

Moreover, *G. limmoni* differs from *G. irregularis* in having fewer second dorsal-fin soft rays (10 vs. 10–11, usually 11), fewer pectoral-fin rays (mode 18 vs. 20); and wider gill opening, extending ventrally to level with the lowermost pectoral-fin ray base (vs. shorter, extending ventrally to level with the third or fourth lower pectoral-fin ray bases) (Herler et al., 2013: table 4; Table 2). The species is also distinguished from *G. bicalvolineatus* by having fewer anal-fin rays (I/8 vs. I/9–10) and pectoral-fin rays (mode 18 vs. 19) (Hildebrandt

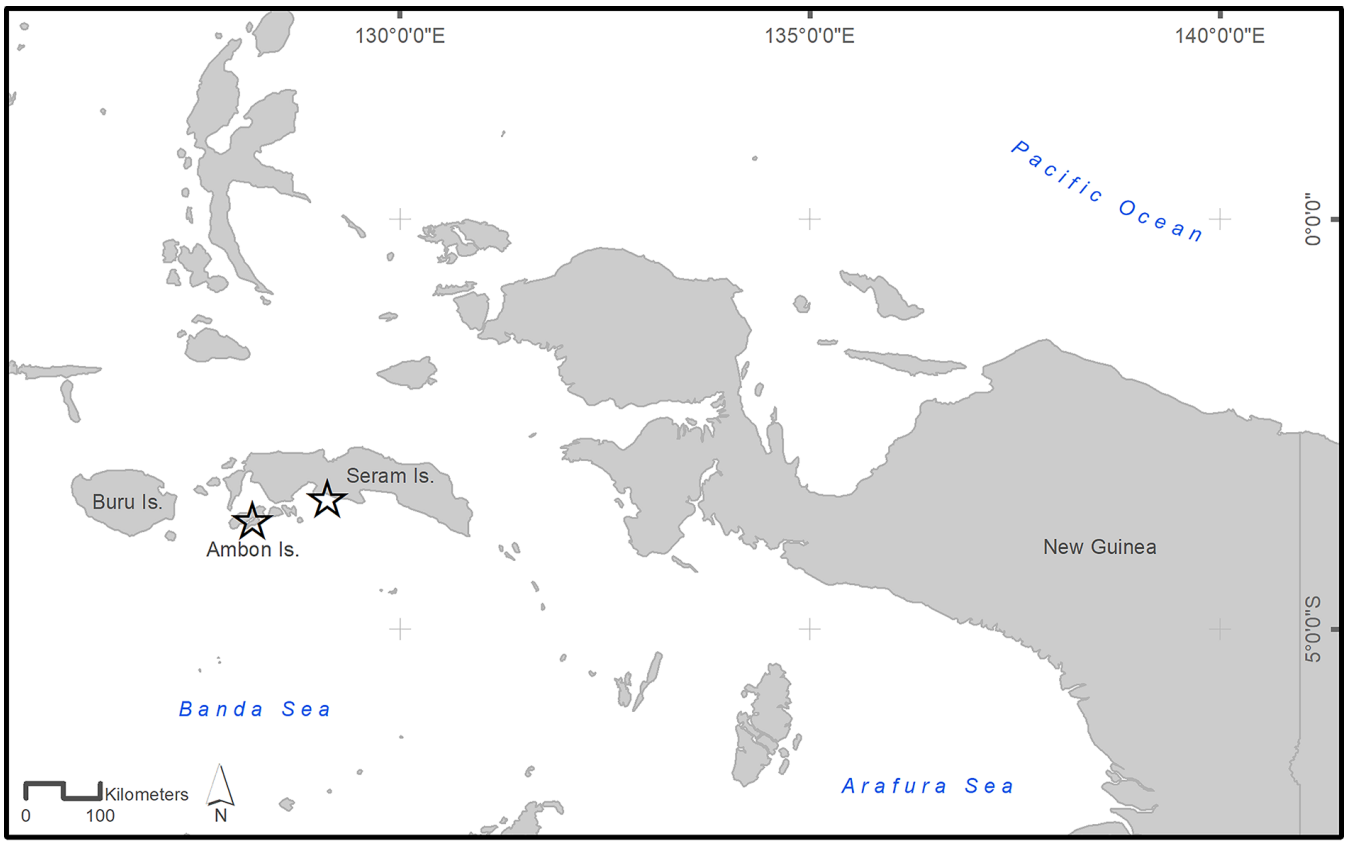

Fig. 5. Collection sites of the specimens of *Gobiodon limmoni*, new species.

et al., 2024; Table 2). Furthermore, *G. limmoni* can also be readily separated from *G. aoyagii*, *G. erythrospilus*, and *G. histrio* by the absence of a longitudinal series of minute, non-imbricate scales (vs. present in the latter three species); fewer anal- and pectoral-fin rays (I/8 vs. I/8–9, and mode 18 vs. 20, respectively, in *G. aoyagii*); the absence of a distinct black spot on the posterodorsal tip of the gill opening (vs. spot present in *G. histrio*) (Shibukawa et al., 2013; Table 2). In terms of morphometric characters, *G. limmoni* can be distinguished from the five latter species by having a shorter prepelvic-fin length, 30.6–34.5% of SL [vs. 36.5–38.0% of SL in *G. irregularis* (Herler et al., 2013: table 4), 37.2–43.2% of SL in *G. bicalvolineatus* (Hildebrandt et al., 2024: table 2), 35.5–39.7% of SL in *G. aoyagii* (Shibukawa et al., 2013: table 1), 34.6–42.3% of SL in *G. erythrospilus* (Shibukawa et al., 2013: table 1), and 35.5–47.0% of SL in *G. histrio* (this study)]; a shallower body depth at the pelvic- and anal-fin origins, 29.9–34.0% of SL and 23.0–26.8% of SL, respectively [vs. 40.6–45.3% of SL and 30.3–40.8% of SL in *G. bicalvolineatus* (Hildebrandt et al., 2024: table 2), 38.1–45.0% of SL and 31.4–37.6% of SL in *G. aoyagii* (Shibukawa et al., 2013: table 1), 36.5–41.5% of SL and 29.0–36.1% of SL in *G. erythrospilus* (Shibukawa et al., 2013: table 1), and 34.5–44.0% of SL and 30.9–37.7% of SL in *G. histrio* (this study)].

The comparative assessment presented here is based exclusively on morphological evidence, as molecular analyses were beyond the scope of this study. Nevertheless, future incorporation of genetic data, particularly in relation to species exhibiting similar colouration patterns, will be valuable for further testing the distinctiveness and phylogenetic affinities of *G. limmoni* within the genus.

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AUTHOR CONTRIBUTIONS

Conceptualisation: KW, TH, DFM. Field collection: KW. Specimen examination: TH. Funding acquisition: KW, AP, TP. Resources: KW, AP, TP. Methodology: KW, TH, DFM. Visualisation: KW, TH. Writing – original draft: KW, TH. Writing – review and editing: KW, DFM, AP, TP.

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