Zootaxa 5550 (1): 189–199
https://www.mapress.com/zt/
Copyright © 2024 Magnolia Press

Article

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

https://doi.org/10.11646/zootaxa.5550.1.19
http://zoobank.org/urn:lsid:zoobank.org:pub:5CA40574-EB14-4D40-92F3-FBBC08A03E4A

Two new species of *Luciogobius* Gill (Teleostei: Gobiidae) from the Matsu Islands in Taiwan

I-SHIUNG CHEN[1,2], YI-TA SHAO[1,2], LI-CHIN CHOU[3,4], KUO-SHU CHEN[3,*] & CHIH-WEI CHANG[3,5,6,*]
[1]*Institute of Marine Biology, National Taiwan Ocean University, Keelung, 202301, Taiwan, R.O.C.*
iscfish@gmail.com; *https://orcid.org/0000-0002-4190-7720*
[2]*Center of Excellence for the Oceans, National Taiwan Ocean University, Keelung, 202301, Taiwan, R.O.C.*
itshao@mail.ntou.edu.tw; *https://orcid.org/0000-0001-5093-9540*
[3]*Marine Ecology and Conservation Research Center, National Academy of Marine Research, Kaohsiung, 806614, Taiwan, R.O.C.*
kschen.2011@gmail.com; *https://orcid.org/0000-0001-7574-415X*
[4]*Department of Aquaculture, National Taiwan Ocean University, Keelung, 202301, Taiwan, R.O.C.*
choulc@namr.gov.tw; *https://orcid.org/0000-0003-4040-9364*
[5]*Department of Oceanography, and Institute of Marine Ecology and Conservation, National Sun Yat-sen University, Kaohsiung, 804201, Taiwan, R.O.C.*
changcw@namr.gov.tw; *https://orcid.org/0000-0002-0659-9582*
[6]*Institute of Marine Biology, National Dong Hwa University; National Museum of Marine Biology and Aquarium, Pingtung, 944401, Taiwan, R.O.C.*
[*]*Corresponding authors*

Abstract

Two new gobiid fishes of *Luciogobius* Gill, 1859 have recently been collected from the intertidal waters of the Matsu Islands in Taiwan. The first new species, *Luciogobius matsuensis* **sp. nov.**, is characterized by the following unique combination of features: (1) second dorsal fin rays: I/12 and anal fin rays I/12; (2) pectoral fin rays modally 16 and with one upper, short free soft ray; (3) vertebral count modally 17+20–21=37–38; and (4) specific coloration: second dorsal fin translucent with tiny brown spots; caudal fin with many tiny brown spots; anal fins pale yellow and translucent, spotless, and darker in its rays; and pectoral fin creamy yellow with anterior 2/3 region with tiny brownish to black spots. The second new species, *Luciogobius dongyinensis* **sp. nov.**, is characterized by the following unique combination of features: (1) second dorsal fin rays: I/16 and anal fin rays I/16; (2) pectoral fin rays modally 14 and with 2 upper, short free soft rays; (3) vertebral count modally 18+23=41; and (4) specific coloration: a long infraorbital deep brown stripe below eye; a long deep brown stripe above and along upper jaw; pectoral fin with many small patches of melanophores except posterior, distal 1/5 region; and caudal fin brown with many light rounded spots. A brief discussion of their own related species will also be addressed.

Key words: new goby, *Luciogobius*, fish taxonomy, Matsu, Taiwan

Introduction

The gobiid fishes in the family Gobiidae comprise the most diverse group among teleosts (Miller 1998, Chen & Kottelat 2005). The great diversity of longitudinal gobioid fauna with a higher vertebral count is mostly endemic to the West Pacific and north-western Pacific. For example, the genus *Luciogobius* and other related genera typically reside in freshwater to marine habitats in Eastern Asia, where they are endemic to Japan, Taiwan, China, and Korea (Chen 1932, Akihito *et al.* 1984, Chen & Fang 1999, Suzuki & Shibukawa 2004). In Japanese waters, there are more than 16 nominal species that have been revised as valid (Regan 1940, Dôtu 1957, Shiogaki & Dotsu 1976, Okiyama 2001, Akihito *et al.* 2002, Chen *et al*. 2008, Kanagawa *et al*. 2011), and there are still over 20 undescribed species of the genus (Suzuki & Shibukawa 2004).

During our additional field survey for marine fishes from several island sites of Matsu, Lienchiang County, Taiwan (Fig. 1), some of the unusual gobies from these islands turned to light. The aim of this paper is to describe the two new species of marine gobies belonging to the *Luciogobius* genus. A brief comparison with the related species will also be addressed.

Accepted by S.-C. Wang: 8 Nov. 2024; published: 10 Dec. 2024

Licensed under Creative Commons Attribution-N.C. 4.0 International https://creativecommons.org/licenses/by-nc/4.0/

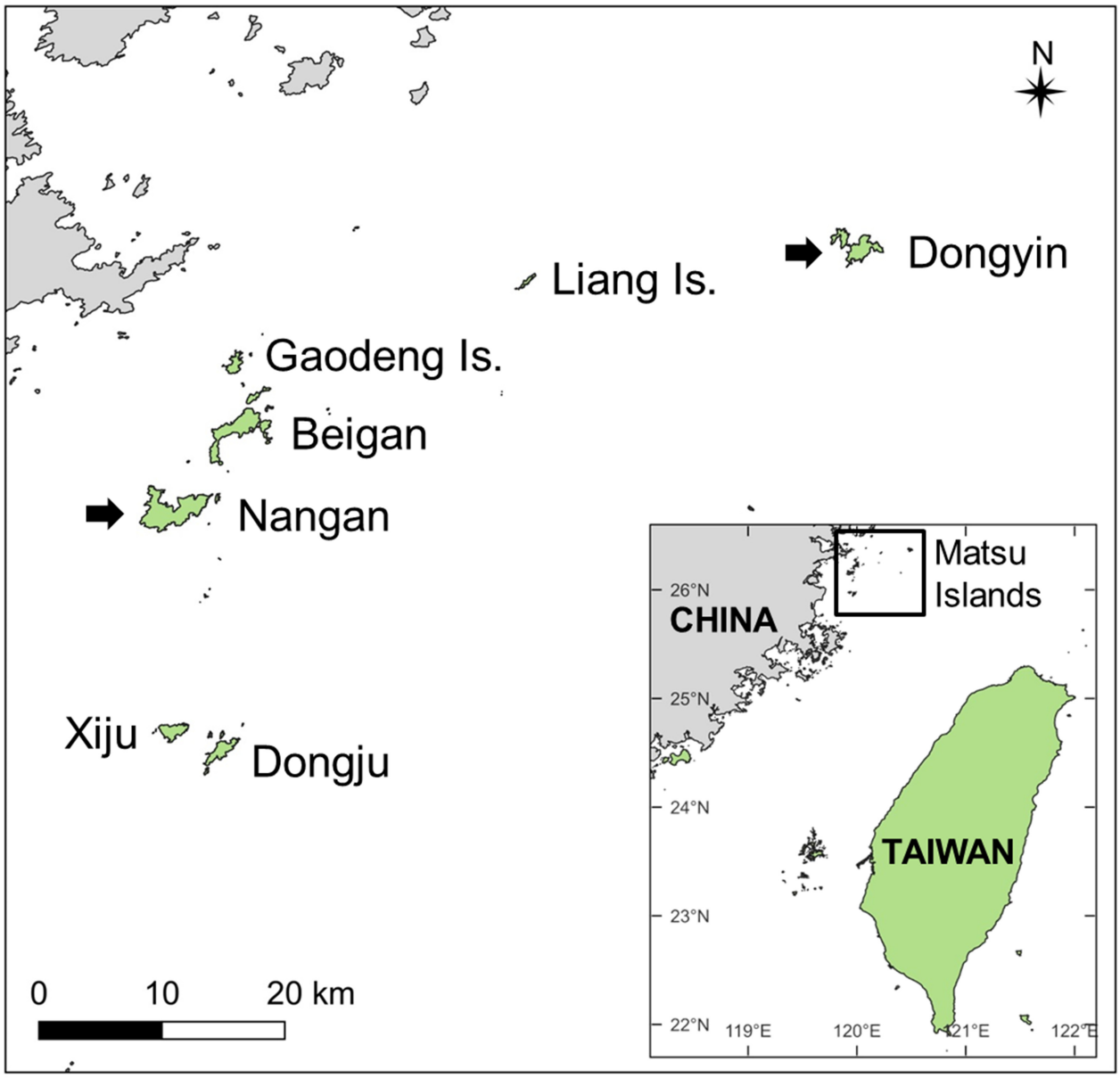

FIGURE 1. Matsu Islands of Taiwan. Arrows indicate the collecting sites of fish in this study.

Materials & methods

All type specimens of the new species were collected by a hand-net in intertidal waters. All counts and measurements were taken from specimens preserved in 70% ethanol. Morphometric methods follow Miller (1988), and meristic methods follow Akihito *et al.* (1984), Chen and Shao (1996), and Chen and Kottelat (2005). The terminology of cephalic sensory canals and free neuromast organs (sensory papillae) is from Wongrat and Miller (1991), based on Sanzo (1911).

The type specimens are deposited in the Pisces collection at the National Taiwan Ocean University, Keelung (NTOUP). Meristic abbreviations: A, anal fin; C, caudal fin; D1, and D2, 1st and 2nd dorsal fins, respectively; P, pectoral fin; V, pelvic fin; and VC, vertebral count. All fish lengths are standard length (SL).

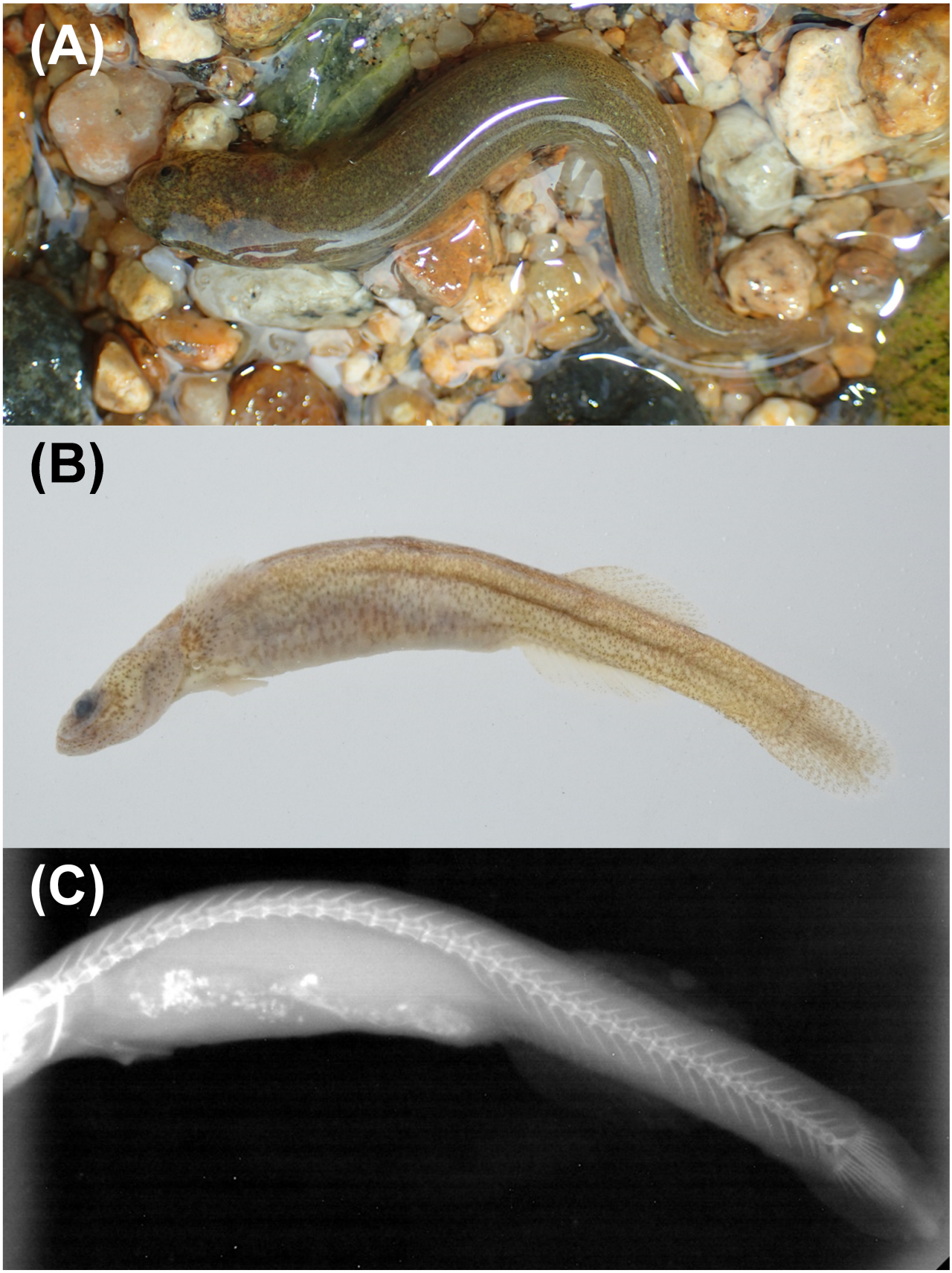

FIGURE 2. *Luciogobius matsuensis* **n. sp.**, holotype, 37.7 mm SL, Nangan Island, Matsu Islands, Taiwan. (A) live, (B) preserved, and (C) X-ray photos.

Systematics

***Luciogobius matsuensis* n. sp.**
(Figs. 2–4)
[New English name: Matsu earthworm goby]
[Chinese name: 馬祖竿鯊]

Materials examined

Holotype. NTOUP-2023-05-306, 37.7 mm SL, Zhuluo, Nangan Island, Matsu Islands, Lianjiang County; coll. C.L. Lee, 2 March, 2023.

Paratypes.—NTOUP-2023-05-307, 2 specimens, 28.1–39.0 mm SL, Zhuluo, Nangan Island, Matsu Islands, Lianjiang County; coll. C.L. Lee, 2 March, 2023.

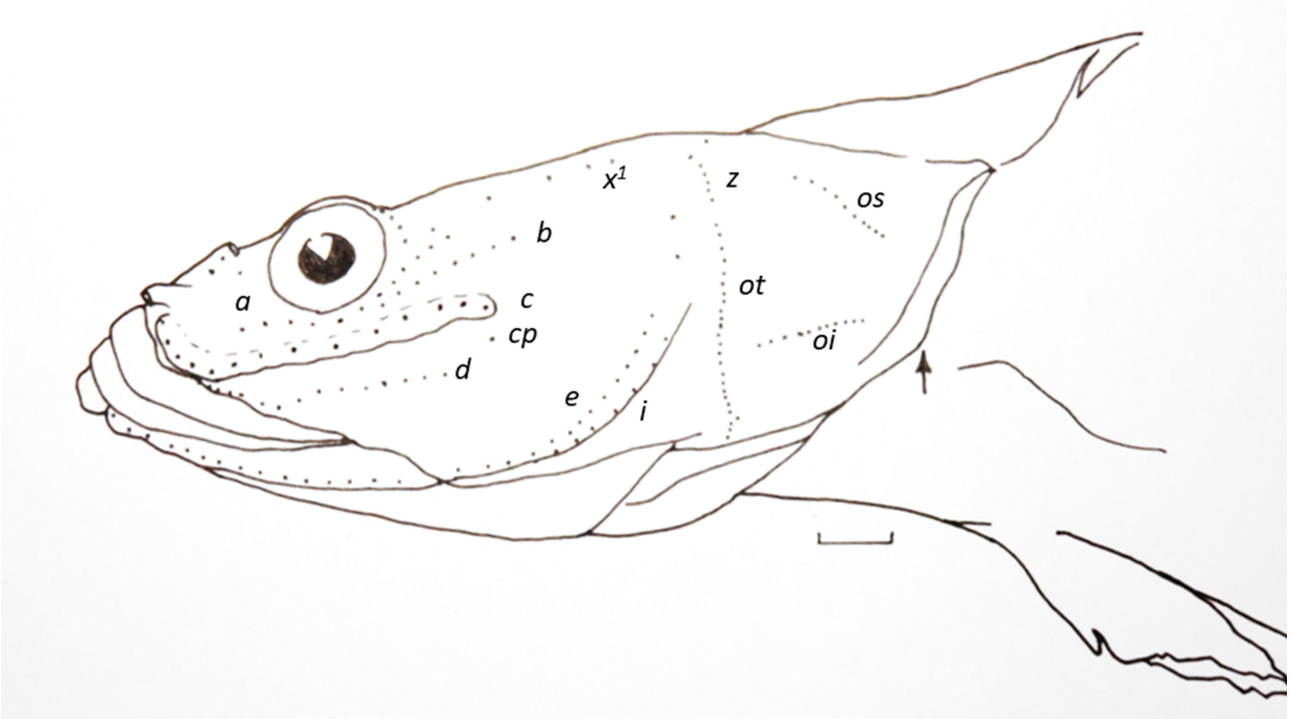

FIGURE 3. Head lateral-line system of *Luciogobius matsuensis* **n. sp.**, holotype, 37.7 mm SL, Nangan Island, Matsu Islands, Taiwan (bar = 1 mm, the arrow shows the ventral terminal of the gill opening).

Diagnosis

Luciogobius matsuensis can be well distinguished from all other congeneric species by the following unique combination of features: (1) second dorsal fin rays: I/12 and anal fin rays: I/12; (2) pectoral fin rays modally 16 and with one upper, very short free soft ray; (3) vertebral count: 17 + 20–21 = 37–38; and (4) specific coloration: second dorsal fin translucent with tiny brown spots; caudal fin with many tiny brown spots; anal fin pale yellow and translucent, spotless, and darker in its rays; and pectoral fin creamy yellow with anterior 2/3 region with tiny brownish to black spots.

Description

Body very slender, cylindrical anteriorly, and somewhat compressed posteriorly (all morphometric data is shown in Table 1). Head flat and depressed. Cheek slightly fleshy. Eye moderately small. A horizontal dermal fold on upper part of cheek and below orbit.

TABLE 1. Morphometry of two new *Luciogobius* species from the Matsu Islands, Taiwan.

Species	*Luciogobius matsuensis* **n. sp.**		*Luciogobius dongyinensis* **n. sp.**
	Holotype	Paratype (n=2)	Holotype
Standard length (mm)	37.7	28.1–39.0	58.2
All in % of SL			
Head length	21.8	19.4–23.1	18.9
Snout to 2nd dorsal origin	69.2	66.2–70.8	64.6
Snout to anus	64.7	61.1–61.2	61.7
Snout to anal fin origin	65.5	62.6–63.7	63.7
Prepelvic length	22.8	22.7–27.0	20.1
Caudal peduncle depth	8.2	7.8–9.3	20.3
Caudal peduncle length	18.0	18.2–22.8	6.5
2nd dorsal fin base	18.0	18.9–19.9	17.4
Anal fin base	19.9	17.8–19.4	18.4
Caudal fin length	17.0	16.7–18.5	14.9
Pectoral fin length	13.5	12.4–13.2	7.7
Pelvic fin length	7.4	7.1–8.2	4.5
BD at pelvic fin origin	8.2	8.5–8.6	7.6
BD at anal fin origin	8.8	9.2–9.3	7.7
BW at anal fin origin	5.3	5.0–6.3	4.3
Pelvic fin origin to anus	36.3	37.4–40.6	44.8
All in % of HL			
Snout length	26.8	29.2–31.2	30.9
Eye diameter	17.1	11.7–12.3	14.5
Cheek depth	14.6	20.8–21.5	15.5
Postorbital length	62.2	56.9–71.4	60.8
HW in maximum	50.0	52.5–54.5	55.5
HW in upper gill-opening	37.8	40.0–48.1	42.7
Bony interorbital width	25.6	21.5–28.6	29.1
Lower jaw length	43.9	38.5–39.0	39.1

Snout flat and short. Anterior nasal opening as a protruded, horizontal short tube and posterior nasal opening as a round hole. Interorbital region rather wide, about two times of eye diameter. Mouth oblique, maxillary extending to vertical of rear margin of orbit. Lower jaw more prominent compared to upper jaw. Teeth rather minute, with about 4 rows of tiny conical teeth, with outer rows larger in both jaws. Tongue somewhat pointed, but anterior tip bilobed. Gill-opening rather restricted, extending merely slightly below lower margin of pectoral base. Anus located in posterior half of body. Vertebral count 17 + 20–21 = 37–38.

***Fins*.** D2 I/12, A I/12, P 16. D1 absent. D2 with middle one third portion of rays longest. A shape similar to D2. Both first spines in D2 and A relatively short. A origin in front of D2 origin. D2 origin inserted vertical between 2nd and 3rd branched rays of A. Both rear tips of D2 and A far from procurrent rays of C when depressed. P rounded, and its length about equal to postorbital length. P with a short, free soft ray on upper margin near upper basal region. C rounded. V as a round sucking disc with complete frenum and rather small, somewhat larger than orbit but smaller than snout length.

***Scales*.** Both body and head entirely naked without any scales.

FIGURE 4. Pectoral fin pigmentation of *Luciogobius matsuensis* **n. sp.**, holotype, 37.7 mm SL, Nangan Island, Matsu Islands, Taiwan (bar = 1 mm).

Head lateral-line system

Head canals: whole head lacking any canal and head pores.

Sensory papillae: series of infraorbital sensory papillae, all representing a typically longitudinal pattern. Row *a* long and extending to snout, which upward to surrounded eye diameter in interorbital region. Row *b* rather long, starting above middle of dermal ridge. Row *c* mainly below dermal fold and rather long. A single *cp* located below rear Row *c*. Row *d* slightly shorter than row *c*. Row *f* paired only as two papillae. Opercle with three rows *ot*, *os*, and *oi*. Rows *os* and *ot* well separated. Rows *z* as a single vertical row. Other papillae are shown in detail in Fig. 3.

Coloration when fresh

Body and head light creamy yellow to yellowish brown background. Head and body with many tiny brownish to blackish melanophores. Second dorsal fin translucent with tiny brown spots. Caudal fin with many tiny brown spots. Anal fins pale yellow and translucent, spotless, and darker in their rays. Pectoral fin creamy yellow with anterior 2/3 region with tiny brownish to black spots (Fig. 4). Pelvic fin whitish.

Distribution

Till present, this species is only known from the Matsu Islands, Lianjiang County of Taiwan. It is an intertidal species on the island.

Etymology

The specific name, *matsuensis*, refers to the type locality from the Matsu Islands, Taiwan.

Remarks

The current new species, *Luciogobius matsuensis* **n. sp.**, is rather similar to *Luciogobius ryukyuensis* Chen *et al*., 2008 by having a lower count of pectoral fin rays with one free ray above the pectoral fin compared to any other congeneric species. However, it can be well distinguished from *Luciogobius ryukyuensis* by the following features: (1) fin rays: second dorsal fin rays I/12 vs. I/11; anal fin rays I/12 vs. I/11; and (2) vertebral count: anterior region as abdomen vertebrae always 17 vs. 16.

Luciogobius matsuensis **n. sp.** can also be distinguished from *Luciogobius guttatus* Gill, 1859 by the following combination of features: (1) pectoral fin rays 16 vs. 18–19; and (2) anal fin rays I/12 vs. I/13.

***Luciogobius dongyinensis* n. sp.**

(Figs. 5–7)
[New English name: Dongyin earthworm goby]
[Chinese name: 東引竿鯊]

Material examined

Holotype. NTOUP-2023-05-305, 58.2 mm SL, Beiao, Dongyin Island, Matsu Islands, Lianjiang County, coll. W.Y. Zhang, 21 March, 2024.

Diagnosis

Luciogobius dongyinensis can be distinguished from all other congeneric species by the following unique combination of features: (1) second dorsal fin rays: I/16 and anal fin rays I/16; (2) pectoral fin rays modally 14 and with three upper, very short free soft rays; (3) vertebral count: 18 + 23= 41; and (4) specific coloration: a long infraorbital deep brown stripe below eye; a long deep brown stripe above and along upper jaw; pectoral fin with many small patches of melanophores except posterior, distal 1/5 region; and caudal fin brown with many light rounded spots.

Description

Body very slender, cylindrical anteriorly and somewhat compressed posteriorly (all morphometric data is shown in Table 1).

Head flat and depressed. Cheek slightly fleshy. Eye small. A horizontal dermal fold with papillae row on upper part of cheek and below orbit.

Snout flat and short. Anterior nasal opening as a protruded, horizontal short tube and posterior nasal opening as a round hole. Interorbital region rather wide. Mouth oblique and large, maxillary extending beyond middle vertical of orbit. Lower jaw more prominent compared to upper jaw. Teeth rather minute, with 4–5 rows of tiny conical

teeth, with outer rows larger in both jaws. Tongue somewhat pointed, but anterior tip bilobed. Gill-opening rather restricted, extending merely slightly below lower margin of pectoral base. Anus located in posterior half of body. Vertebral count 18 + 23 = 41.

***Fins*.** D2 I/16, A I/16, P 14. D1 absent. D2 with middle one third portion of rays longest. A shape similar to D2. Both first spines in D2 and A relatively short. A origin in front of D2 origin. D2 origin inserted vertically between 1st and 2nd branched rays of A. Both rear tips of D2 and A far from procurrent rays of C when depressed. P rounded and its length much shorter than postorbital length. P with three free soft rays on upper margin near upper basal region. C elliptical. V as a round sucking disc with complete frenum and rather small.

***Scales*.** Both body and head entirely naked without any scales.

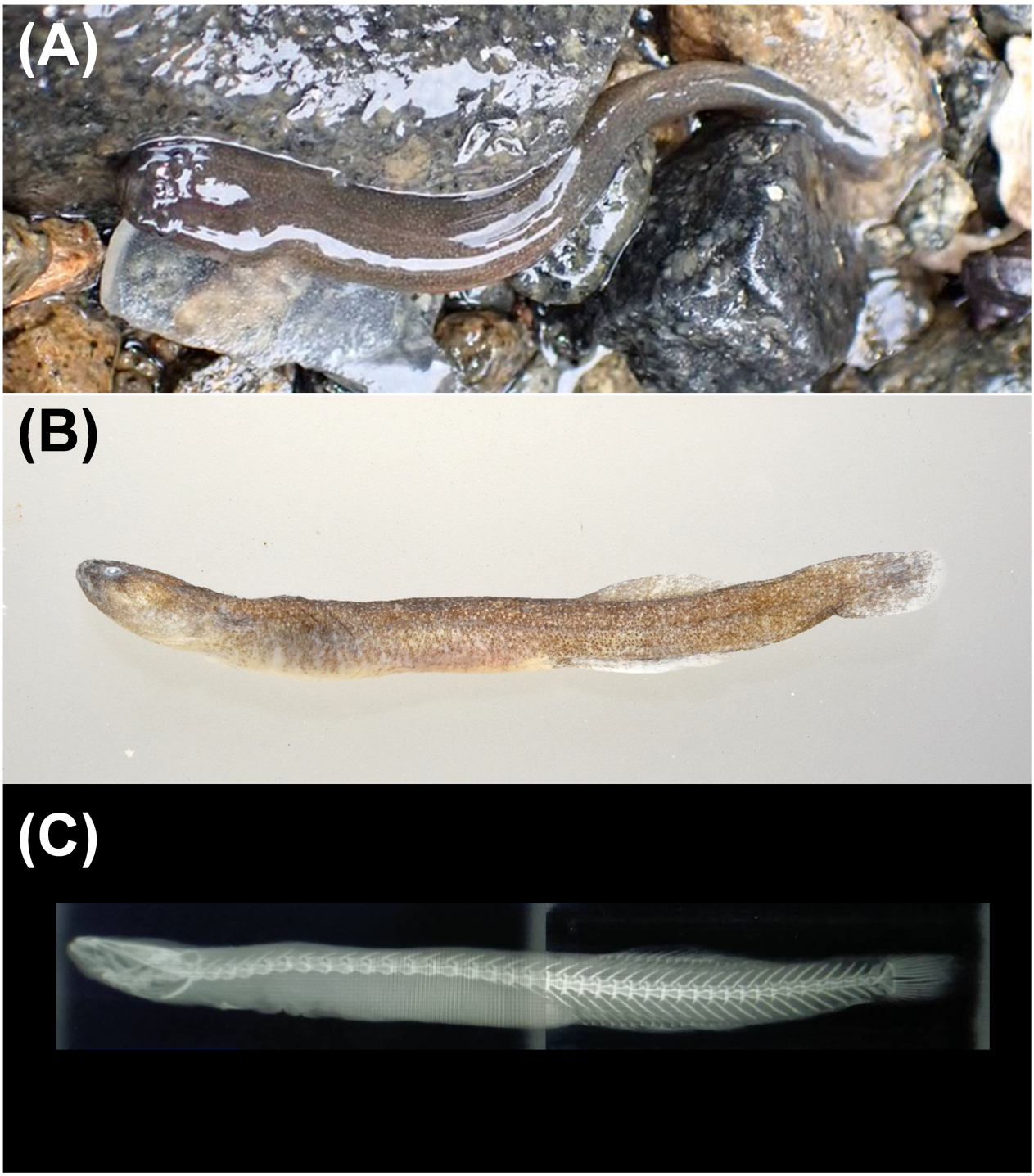

FIGURE 5. *Luciogobius dongyinensis* **n. sp.**, holotype, 58.2 mm SL, Dongyin Island, Matsu Islands, Taiwan. (A) live, (B) preserved, and (C) X-ray photos.

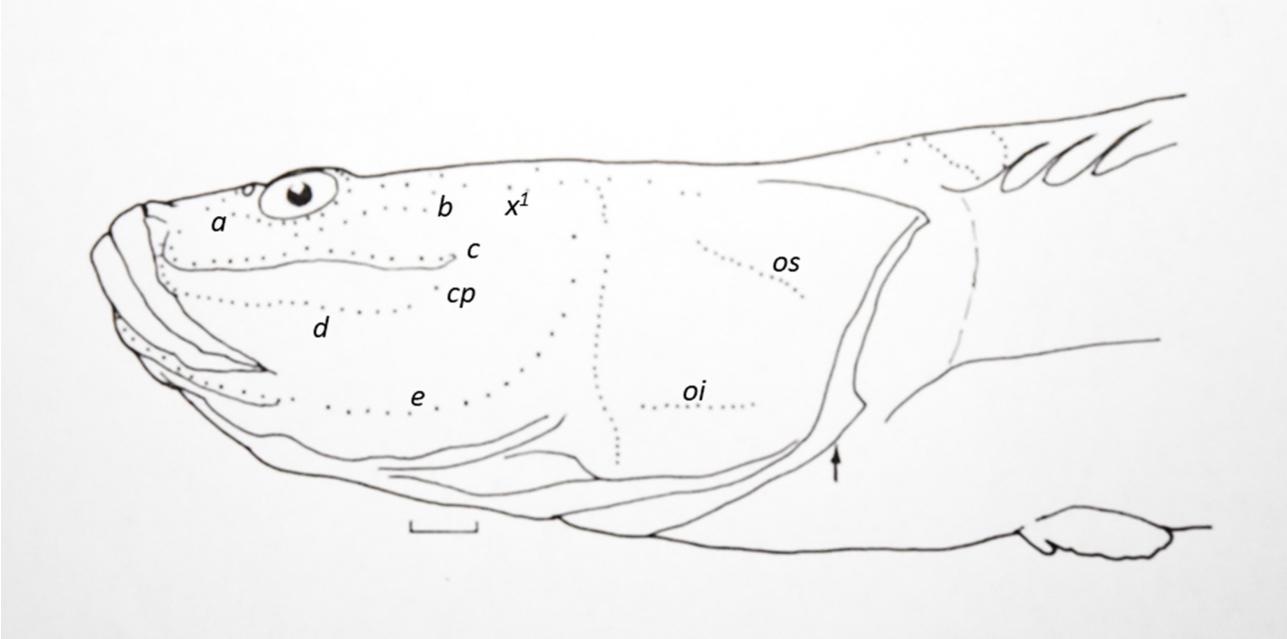

FIGURE 6. Head lateral-line system of *Luciogobius dongyinensis* **n. sp.**, holotype, 58.2 mm SL, Dongyin Island, Matsu Islands, Taiwan (bar = 1 mm, the arrow shows the ventral terminal of gill opening).

Head lateral-line system

Head canals: whole head lacking any canal and head pores.

Sensory papillae: series of infraorbital sensory papillae, all representing a typically longitudinal pattern. Row *a* long and extending to snout, which upward to surrounded eye diameter in interorbital region. Row *b* rather long starting above middle of dermal ridge. Row *c* mainly below dermal fold and rather long. A single *cp* located below rear Row *c*. Row *d* slightly shorter than row *c*. Row *f* paired only as two papillae. Opercle with three rows *ot*, *os*, and *oi*. Rows *os* and *ot* well separated. Rows *z* as single vertical row. Other papillae are shown in detail in Fig. 6.

Coloration when fresh

Body and head light creamy yellow to yellowish brown background. Head and body with small, tiny deep brown spots. A long, infraorbital deep brown stripe below eye. A long deep brown stripe above and along upper jaw. Belly yellowish with about 5 major brown cross bands anteriorly. Second dorsal fin brown with tiny white spots. Anal fin whitish or yellowish. Pectoral fin with many small patches of melanophores except posterior, distal 1/5 region (Fig. 7). Caudal fin brown with many light, rounded spots. Pelvic fin creamy white.

Distribution

Till present, this species is only known from the Dongyin Island, Matsu Islands, Lianjiang County of Taiwan. It is an intertidal species on the island.

Etymology

The specific name, *dongyinensis*, refers to the type locality from the Dongyin Island, Matsu Islands, Taiwan.

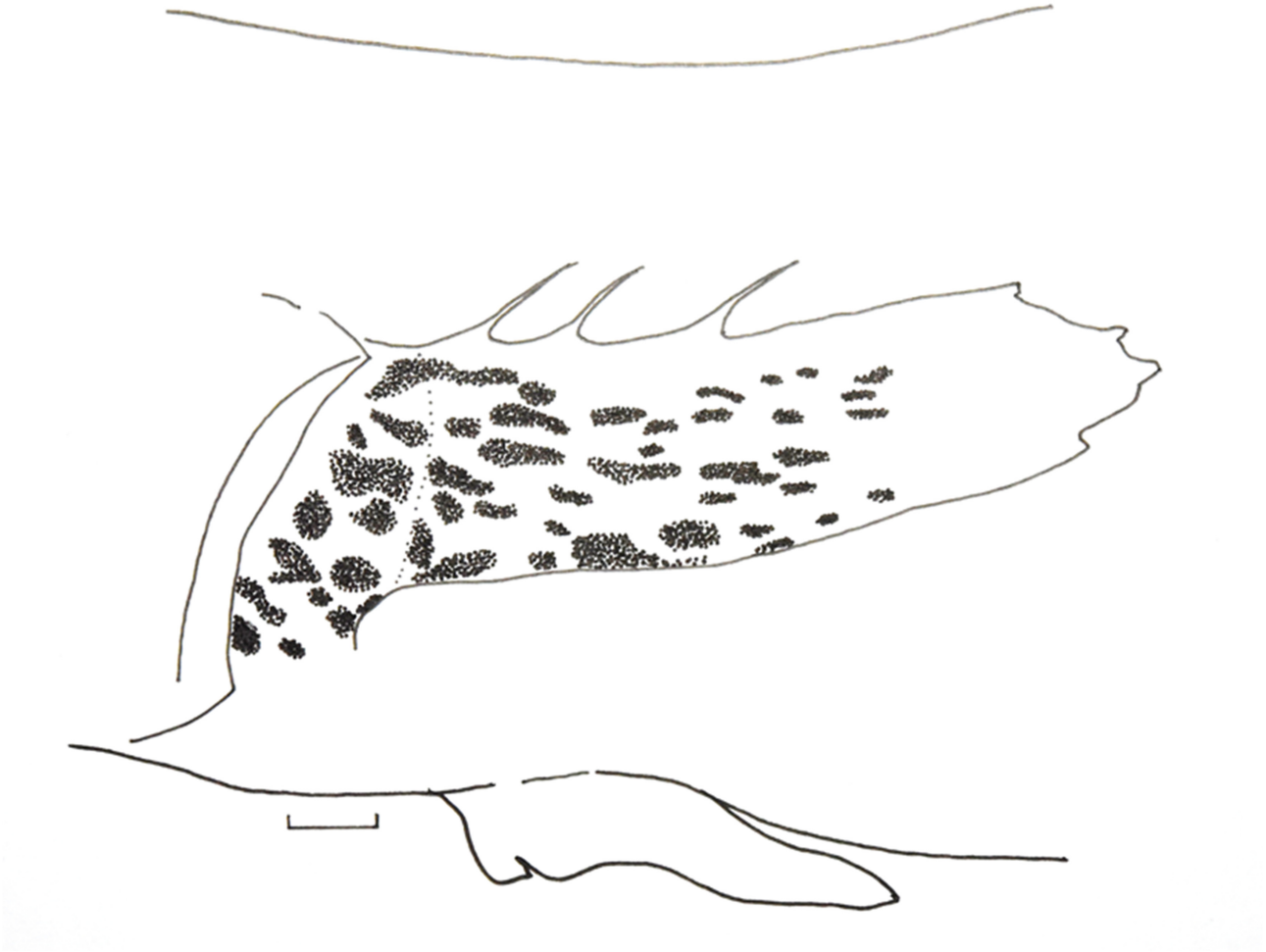

FIGURE 7. Pectoral fin pigmentation of *Luciogobius dongyinensis* **n. sp.**, holotype, 58.2 mm SL, Dongyin Island, Matzu Islands, Taiwan (bar = 1 mm).

Remarks

The current new species, *Luciogobius dongyinensis* **n. sp.**, is rather similar to *Luciogobius grandis* Arai, 1970 by having upper free rays of pectoral fin with 3–4 free rays above the pectoral fin compared to any other congeneric species.

However, the new species, *Luciogobius dongyinensis* **n. sp.**, can be well distinguished from the endemic, Japanese *Luciogobius grandis* by the following features: (1) fin rays: second dorsal fin rays I/16 vs. I/15; anal fin rays I/16 vs. I/15; (2) presence of free rays: pectoral fin upper free rays 3 vs. 4; lower free rays 0 vs. 2; and (3) vertebral count 18 + 23 = 41 vs. 19 + 22 = 41.

Acknowledgements

The study was supported by grant numbers NAMR112007 and NAMR113007. We thank C.L. Lee, W.Y. Zhang, and H.Y. Chen for fish collecting and photographing in the wild, and H.E. Lee and Y.C. Yang for their help with the X-ray filming for all current specimens.

References

Akihito, P., Hayashi, M. & Yoshino, T. (1984) Suborder Gobioidei. *In*: Masuda, H., Amaoka, K., Araga, C., Uyeno, T. & Yoshino, T. (Eds.), *The fishes of Japanese Archipelagos.* Tokai University Press, Tokyo, pp. 236–289.

Akihito, Sakamoto, K., Ikeda, Y. & Sugiyama, K. (2002) Suborder Gobioidei. *In*: Nakabo, T. (Ed.), *Fishes of Japan with Pictorial Keys to the Species. 2nd Edition.* Tokai University Press, Tokyo, pp. 1139–1310, 1596–1619.

Arai, R. (1970) *Luciogobius grandis*, a new goby from Japan and Korea. *Bulletin of National Science Museum (Tokyo)*, 13, 199–206.

Chen, I-S. & Fang, L.S. (1999) *The Freshwater and Estuarine Fishes of Taiwan.* National Museum of Marine Biology and Aquarium Press, Pingtung, 296 pp.

Chen, I-S. & Kottelat, M. (2005) Four new freshwater gobies of the genus *Rhinogobius* (Teleostei: Gobiidae) from northern Vietnam. *Journal of Natural History*, 39, 1047–1429.
https://doi.org/10.1080/00222930400008736

Chen, I-S. & Shao, K.T. (1996) A taxonomic review of the gobiid fish genus *Rhinogobius* Gill, 1859, from Taiwan, with descriptions of three new species. *Zoological Studies*, 35, 200–214.

Chen, I-S., Suzuki T. & Senou H. (2008) A new species of gobiid fish, *Luciogobius* from Ryukyus, Japan (Teleostei: Gobiidae). *Journal of Marine Science and Technology*, 16 (4), 248–252.
https://doi.org/10.51400/2709-6998.2005

Chen, J.T.F. (1932) Note sur un nouveau poisson chinois appartenant au genre *Luciogobius. Bulletin du Museum National d'Histoire Naturelle (Série 2)*, 4, 648–650.

Dôtu, Y. (1957) A new species of a goby with a synopsis of the species of the genus *Luciogobius* Gill and its allied genera. *Journal of Faculty of Agriculture, Kyushu University*, 11, 69–76.
https://doi.org/10.5109/22676

Gill, T.N. (1859) Notes on a collection of Japanese fishes, made by Dr. J. Morrow. *Proceedings of the Academy of Natural Sciences Philadelphia*, 11, 144–150.

Kanagawa, N., Itai, T. & Senou H. (2011) Two new species of freshwater gobies of the genus *Luciogobius* (Perciformes: Gobiidae) from Japan. *Bulletin of Kanagawa Prefectural Museum (Natural History)*, 40, 67–74.

Miller, P.J. (1988) New species of *Corcyrogobius*, *Thorogobius*, and *Wheelerigobius* from West Africa (Teleostei: Gobiidae). *Journal of Natural History*, 22, 1245–1262.
https://doi.org/10.1080/00222938800770761

Okiyama, M. (2001) *Luciogobius adapel*, a new species of gobiid fish from Japan. *Bulletin of National Science Museum (Tokyo)*, 27, 141–149.

Regan, C.T. (1940) The fishes of the gobiid genus *Luciogobius* Gill. *Annals and Magazine of Natural History (Series 11)*, 5, 462–465.
https://doi.org/10.1080/00222934008527060

Sanzo, L. (1911) Distribuzione delle papille cutanee (organi ciatiforme) e suo valore sistematico nei gobi. *Mitteilungen der Zoologischen Station Neapel*, 20, 249–328.

Shiogaki, M. & Dotsu, Y. (1976) Two new species of the genus *Luciogobius* (Family Gobiidae) from Japan. *Japanese Journal of Ichthyology*, 23, 125–129.

Suzuki, T. & Shibukawa, K. (2004) Genus *Luciogobius. In*: Senou, H. (Ed.), *A photographic guide to the gobioid fishes of Japan.* Heibonsha Press, Tokyo, pp. 59–60.

Wongrat, P. & Miller, P.J. (1991) The innervation of head neuromast rows in eleotridine gobies (Teleostei: Gobiidae). *Journal of Zoology, London*, 225, 27–42.
https://doi.org/10.1111/j.1469-7998.1991.tb03799.x