

***Tomiyamichthys tanyspilus*, a New Species of Gobiid Fish from Indonesia**

John E. Randall^{1,*} and I-Shiung Chen²

¹Bishop Museum, 1525 Bernice St., Honolulu, HI 96817-2704, USA

²Institute of Marine Biology, National Taiwan Ocean University, Keelung 202, Taiwan

(Accepted May 4, 2007)

John E. Randall and I-Shiung Chen (2007) *Tomiyamichthys tanyspilus*, a new species of gobiid fish from Indonesia. *Zoological Studies* 46(6): 651-655. The gobiid fish *Tomiyamichthys tanyspilus* sp. nov., symbiotic in a burrow with an alpheid shrimp, is described from a male-female pair collected from silty sand in 4 m at Flores, Indonesia. It is characterized by the 2nd dorsal and anal rays 1,12; pectoral rays 17 or 18; scales cycloid, 78-80 in the longitudinal series; no predorsal or prepectoral scales; no preopercular canal; a lanceolate caudal fin, longest in male, 48.6% standard length; body green dorsally in life with numerous blackish spots smaller than pupil, and a midlateral row of 5 large elongate black spots, the last on caudal-fin base followed by a blackish middle streak into fin. An explanation is given for regarding *Flabelligobius* Smith, 1956 as a junior synonym of *Tomiyamichthys* Smith, 1956. <http://zoolstud.sinica.edu.tw/Journals/46.6/651.pdf>

Key words: Taxonomy, Shrimpgoby, *Tomiyamichthys*, New species, Indonesia.

The Gobiidae is the most speciose family of teleost fishes (Miller 1993, Nelson 2006). Within the Indo-Pacific region there are species of 13 genera of gobiid fishes that live symbiotically with shrimp of the genus *Alpheus*. The shrimp excavates and maintains the burrow, while the goby serves as the sentinel, sheltering in the burrow when needed. Two of the genera of shrimpgobies, *Flabelligobius* (type species, *F. fourmanoiri* Smith) and *Tomiyamichthys* (type species, *Cryptocentrus oni* Tomiyama) were described in the same paper by Smith (1956). New species have recently been described in each genus: *T. alleni* Iwata, Ohnishi and Hirata, 2000 and *F. smithi* Chen and Fang, 2003. Shibukawa and Iwata provisionally placed *Tomiyamichthys* in synonymy with *Flabelligobius* in a poster presented at the Indo-Pacific Fish Conference in Taipei, Taiwan in May 2005. Shibukawa et al. (2005) followed the provisional generic synonymy made by Shibukawa and Iwata in the poster. However, Koichi Shibukawa (pers. comm.) has informed us that he and Akihisa Iwata

intend to select *Tomiyamichthys* as the senior synonym when they publish their revision of the genus. In the present paper, we therefore describe a new species of shrimpgoby from the Indonesian island of Flores in the genus *Tomiyamichthys*.

MATERIALS AND METHODS

Type specimens of the new species were deposited in the Bernice P. Bishop Museum, Honolulu, HI (BPBM). Comparative material of other species of *Tomiyamichthys* are from the Bishop Museum, the National Museum of Marine Biology and Aquarium, Pingtung, Taiwan (NMMB); National Taiwan Ocean University, Keelung, Taiwan (NTOU); and the South African Institute for Aquatic Biodiversity, Grahamstown, RSA (SAIAB).

Lengths of specimens are given as standard length (SL), measured from the median anterior point of the upper lip to the base of the caudal fin

*To whom all correspondence and reprint requests should be addressed. E-mail:jackr@hawaii.rr.com

(posterior end of the hypural plate); body depth was measured at both the origin of the pelvic fins and origin of the anal fin, and maximum body width at the origin of the pectoral fins; head length was taken from the upper lip to the posterior end of the opercular membrane, and head width over the posterior margin of the preopercle; orbit diameter is the greatest fleshy diameter; cheek depth is the shortest distance between the fleshy edge of the orbit and the edge of the upper lip; interorbital width is the least fleshy width; snout length was measured from the median anterior point of the upper lip to the nearest fleshy edge of the orbit; upper-jaw length is from the same anterior point to the posterior end of the maxilla; caudal-peduncle depth is the least depth, and caudal-peduncle length the horizontal distance between verticals at the rear base of the anal fin and the caudal-fin base; lengths of spines and rays were measured to their extreme bases (not where they emerge from the dorsal profile of the body); caudal- and pectoral-fin lengths are the length of the longest ray; pelvic-fin length was measured from the base of the pelvic spine to the tip of the longest pelvic soft ray. Morphometric data presented in table 1 are given as percentages of standard length.

The count of scales in the longitudinal series was made from above the base of the pectoral fin, where the most-anterior scales are found, to the base of the caudal fin; scales in transverse series were counted from the origin of the anal fin anterodorsally to the base of the 1st dorsal fin; gill rakers were counted on the 1st gill arch, those on the upper limb are listed first; rudiments are included in the counts.

The terminology of the cephalic sensory canals and free neuromast organ (sensory papillae) is from Wongrat and Miller (1991), based on Sanzo (1911).

The length given for specimens is SL. Proportional measurements in the text are rounded to the nearest 0.05. Data in parentheses in the description of the new species refer to the paratype.

***Tomiyamichthys tanyspilus* sp. nov.**

(Table 1; Figs. 1-4)

Holotype: BPBM 34093, ♂, 49.4 mm, Indonesia, Flores, east end of Maumere Bay, inshore from wreck of Japanese warship, dark silty sand with some *Halophila*, 4 m, spear, J.E. Randall, 17 Sept. 1988.

Paratype: BPBM 40416, ♀, 40.2 mm SL, same data as for holotype.

Diagnosis: Dorsal and anal soft rays 12; pectoral rays 17 or 18; longitudinal scale series 78-80; scales cycloid; no predorsal or prepectoral scales; body elongate, depth at pelvic-fin origin 6.7-7.3 in SL; head small, length 3.85-4.0 in SL; no preopercular sensory canal; gill membranes attached to isthmus without a free fold across; gill opening extending forward to below middle of preopercle; about anterior 1/3 of 1st gill slit closed by membrane; 1st 4 dorsal spines filamentous in male; caudal fin lanceolate, longer in male, 2.05 in SL; body in life green dorsally, with numerous blackish spots smaller than pupil, a midlateral row of 5 large elongate black spots, the last on caudal-fin base

Table 1. Proportional measurements of type specimens of *Tomiyamichthys tanyspilus* as percentages of the standard length

	Holotype	Paratype
	BPBM 34093	BPBM 40416
Sex	male	female
Standard length (mm)	51.0	40.2
Body depth at pelvic-fin origin	13.7	14.9
Body depth at anal-fin origin	11.6	12.9
Body width at pectoral-fin base	9.6	9.9
Body width at anal-fin origin	6.3	7.5
Head length	24.9	26.0
Head width	10.7	10.9
Snout length	5.8	5.7
Orbit diameter	6.1	6.7
Cheek depth	1.5	1.6
Interorbital width	2.0	1.9
Upper-jaw length	10.0	10.3
Caudal-peduncle depth	6.1	8.0
Caudal-peduncle length	12.6	13.6
Predorsal length	29.6	29.8
Length to 2nd dorsal-fin origin	51.0	53.2
Preanal length	53.5	56.8
Prepelvic length	26.2	29.5
Base of dorsal fins	56.6	57.0
First dorsal spine	21.4	19.4
Second dorsal spine	27.5	20.6
Third dorsal spine	29.6	20.4
Fourth dorsal spine	16.1	15.7
Spine of 2nd dorsal fin	8.3	9.3
Longest dorsal ray	15.7	14.9
Base of anal fin	33.5	31.3
Anal spine	7.9	7.2
Longest anal ray	15.6	14.8
Caudal-fin length	48.6	36.9
Pectoral-fin length	21.4	21.5
Pelvic spine length	9.8	9.9
Pelvic-fin length	21.8	21.6

followed by a blackish median streak into fin.

Description: Dorsal rays VI + I, 12; anal rays I, 12; all dorsal and anal soft rays branched, the last to base; pectoral rays 17 (18), uppermost and lowermost unbranched; pelvic rays I, 5, branched, united as a disk, with a well-developed frenum; segmented caudal rays 17, middle 13 branched; upper and lower procurrent caudal rays 7 (6 or 7); longitudinal scale series 78 (80); transverse scale rows about 22; circumpeduncular scales 21; median prepelvic scales 12 (no scales on anterior part of isthmus); no scales on head, nape, or pectoral-fin base; scales cycloid, progressively larger posteriorly; no scales on fins except basally on caudal fin; gill rakers 3 + 10 (3 + 9).

Body elongate, depth at pelvic-fin origin 7.3 (6.7) in SL; depth at anal-fin origin 10.6 (7.75) in SL; body compressed, width at pectoral-fin base 1.45 (1.3) in body depth at pelvic-fin origin; head length 4.0 (3.85) in SL; head width 2.3 (2.4) in head length; snout length 4.3 (4.55) in head length; orbit diameter 4.1 (3.9) in head length; upper edge of eye extending slightly above dorsal

profile of head; cheek depth narrow, 16.5 (16.2) in head length; interorbital width 12.4 (13.7) in head length; caudal-peduncle depth 4.1 (3.25) in SL; caudal-peduncle length 2.0 (1.9) in SL.

Mouth oblique, forming an angle of about 40° to horizontal axis of body, with lower jaw slightly projecting; maxilla reaching a vertical through posterior edge of pupil, upper-jaw length 2.5 in head length; upper jaw with an outer row of about 15 well-spaced incurved canine teeth on each side, 3rd tooth from front of jaw largest; front of upper jaw medial to canines with 2 or 3 rows of inwardly projecting villiform teeth, narrowing to 1 more-erect row posteriorly in jaw; front of lower jaw with 3 well-spaced canine teeth on each side, the 3rd largest (its length about 1.5 in pupil diameter), recurved, and more posterior in jaw than largest tooth of upper jaw; front of lower jaw with about 3 irregular rows of inwardly projecting villiform teeth, some notably larger than others, narrowing to a single erect row along side of jaw; inner surface of lips papillose; tongue rounded.

Gill membranes attached to isthmus without a free fold across; gill opening extending forward to below middle of preopercle; about anterior 1/3 of 1st gill slit closed by membrane.

Posterior nostril adjacent to center of front edge of orbit, rounded, with a low rim; anterior nostril a short fleshy tube without a posterior flap, anteroventral to posterior nostril; internarial distance equal to diameter of anterior nostril.

Cephalic lateralis system shown in figure 1. Anterior oculoscapular canal commencing with terminal σ pore dorsal to each posterior nostril; nasal branches uniting at position of λ pore; single k pore posterior in interorbital region; ω and α pores more lateral behind eye, canal continuing posteriorly with β and ρ pores; no preopercular canal or posterior oculoscapular canal. Sensory papillae of cheek in 4 rows, a curving from below to behind orbit, b and c longitudinal with a ventral branch, cp , from c , and long row d beginning above upper lip below anterior nostril and extending posteriorly parallel to c ; horizontal opercular rows of os and oi sensory papillae joining vertical row of ot ; preopercular row labeled z , and longitudinal series of papillae on nape x^1 and x^2 , with tr indicating a short transverse branch; remaining symbols indicate patterns of papillae ventrally on head.

Origin of 1st dorsal fin over inner pelvic-fin base, predorsal length 3.4 (3.35) in SL; 1st dorsal spine 4.7 (5.15) in SL; longest dorsal spine (3rd in male, 2nd in female), 3.4 (4.85) in SL; 1st 4 dorsal spines filamentous in male (only tips free in

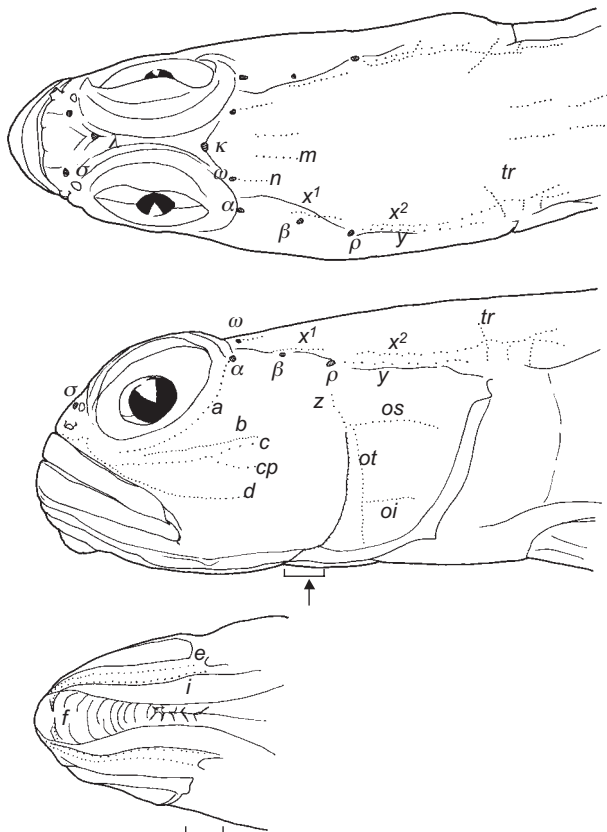


Fig. 1. Head of holotype of *Tomiyamichthys tanyspilus* showing sensory canals and papillae. For explanation of symbols, see discussion of the cephalic lateralis system in the description. Drawing by I-Shiung Chen.

female); last membrane of 1st dorsal fin nearly reaching origin of 2nd dorsal fin; spine of 2nd dorsal fin 3.0 (2.8) in head length; penultimate dorsal soft ray longest, 1.55 (1.75) in SL; origin of anal fin slightly posterior to base of 1st dorsal soft ray, pre-

anal length 1.85 (1.75) in SL; anal spine 3.15 (3.6) in head length; longest anal soft ray 6.4 (6.75) in SL; caudal fin lanceolate, nearly twice head length in male holotype, 2.05 (2.7 in female) in SL; pectoral fins moderately pointed, 10th ray longest, 4.7



Fig. 2. Holotype of *Tomiyamichthys tanyspilus*, male, BPBM 34093, 51.0 mm, Flores, Indonesia. Photograph by J.E. Randall.



Fig. 3. Male of *Tomiyamichthys tanyspilus* (not collected), Flores, Indonesia. Photograph by J.E. Randall.



Fig. 4. Male of *Tomiyamichthys tanyspilus* (not collected) with *Alpheus* cf. *rapacida*, Flores, Indonesia. Photograph by J.E. Randall.

(4.65) in SL; prepelvic length 3.8 (3.0) in SL; 5th pelvic soft ray longest, 4.6 (4.65) in SL.

Color of holotype in alcohol: Light brown, becoming paler on abdomen and ventrally on head; a midlateral series of 5 dark brown spots on body, about 3 times longer than high, 1st spot beneath outer part of pectoral fin, last at caudal-fin base; upper 1/2 of body and postorbital region of head with numerous small, brown spots; a dark brown spot of nearly pupil size at upper end of gill opening; cheek, opercle, and pectoral-fin base with prominent brown spots; membranes of dorsal and anal fins translucent; a triangular dark brown spot distally on 5th membrane of 1st dorsal fin adjacent to 5th spine, and a larger bilobed dark brown spot centered on outer 2/3 of 6th dorsal spine (spots not present in female paratype); dorsal spines alternately banded brown and pale, pale interspaces narrower; dorsal and anal soft rays becoming light brown distally; caudal fin with translucent membranes except for a brown streak along middle 3 rays and 2 membranes between that connect to a dark brown spot at midbase of fin; dark brown spot within brown streak about 2/3 eye diameter distance from basal spot; pectoral fins with translucent membranes and pale brown rays; pelvic fins with light brown rays, lateral membranes also light brown, but middle 3 membranes dark brown.

Color of holotype when fresh shown in figure 2. Figures 3 and 4 are underwater photographs of male individuals of this species taken in the vicinity of the holotype, the last with its symbiotic snapping shrimp partner, *Alpheus cf. rapacida*.

Etymology: This species is named *tanyspilus* from the Greek *tany* meaning long, and *spilus* for spot, in reference the elongate shape of the 5 mid-lateral dark brown spots on the body.

Remarks: *Tomiyamichthys tanyspilus* is presently known only from Maumere Bay, Flores, but it should be expected in habitat of silty sand elsewhere in Indonesia.

The following 8 other species are known in the genus *Tomiyamichthys*: *T. alleni* Iwata, Ohnishi and Hirata, *T. fourmanoiri* (Smith), *T. lanceolatus* (Yanagisawa), *T. latruncularius* (Klausewitz), *T. oni* Tomiyama, *T. praealta* (Lachner and McKinney), *T. russus* (Cantor), and *T. smithi* (Chen and Fang). *Tomiyamichthys tanyspilus* is separable from all the above except *T. fourmanoiri*, *T. latruncularius*, and *T. smithi* in having 12 dorsal and anal soft rays (the others with 9-11). It is variously distinguished from the remaining 3 species by lacking a preopercular sensory canal, having a high longitudinal scale count of 78-80, and having a strongly lanceolate caudal fin.

Comparative Material

Tomiyamichthys alleni, BPBM 32098, 29.8 mm, Flores, Indonesia (paratype); NTOU P-2005-08-650, 37.6 mm, Bali, Indonesia.

Tomiyamichthys fourmanoiri, BPBM 21861, 47 mm, Gulf of Aqaba, Red Sea; SAIAB 276, 71.9 mm, Nosy Bé, Madagascar (holotype).

Tomiyamichthys lanceolatus, BPBM 36769, 40 mm, Flores, Indonesia.

Tomiyamichthys latruncularius, BPBM 33314, 2: 20-29 mm and BPBM 33348, 24 mm, Jana I., Persian Gulf; BPBM 34400, 42 mm, North Malé Atoll, Maldives Is.

Tomiyamichthys oni, BPBM 35190, 57 mm, Chichi-jima, Ogasawara Is.; NTOU P-2005-04-194, 38 mm, Bali, Indonesia.

Tomiyamichthys praealta, BPBM 34405, 32 mm, North Malé Atoll, Maldives Is.

Tomiyamichthys smithi, NMMB P 1905, 95.2 mm (holotype); NMMB P 1906, 95.8 mm and NMMB P 1907, 97.9 mm (paratypes), all from off Tongkang, southwestern Taiwan.

Acknowledgments: We thank Arthur Anker for providing the name of the symbiotic snapping shrimp that lives with *Tomiyamichthys tanyspilus*. The 2nd author is grateful for the partial grant support (NSC 95-2923-B-019-MY2) of the National Science Council, Taipei for his research on gobioid fishes.

REFERENCES

- Chen IS, LS Fang. 2003. A new marine goby of genus *Flabelligobius* (Teleostei: Gobiidae) from Taiwan. *Ichthyol. Res.* **50**: 333-338.
- Iwata A, N Ohnishi, T Hirata. 2000. *Tomiyamichthys alleni*, a new species of Gobiidae from Japan and Indonesia. *Copeia* **2000**: 771-776.
- Miller PJ. 1993. Grading of gobies and disturbing of sleepers. *NERC News* **27**: 16-19.
- Nelson JS. 2006. *Fishes of the world*, ed. 4. Hoboken, NJ: J Wiley, xix + 601 pp.
- Sanzo L. 1911. Distribuzione delle papille cutanee (organi ciati-forme) e suo valore sistematico nei gobi. *Mitt. Zool. Stn. Neapel* **20**: 249-328.
- Shibukawa K, T Suzuki, H Senou, K Yano. 2005. Records of three shrimp-goby species (Teleostei, Perciformes, Gobiidae) from the Ryukyu Archipelago, Japan. *Bull. Natl. Sci. Mus. Tokyo Ser. A* **31**: 191-204.
- Smith JLB. 1956. An interesting new gobioid fish from Madagascar, with a note on *Cryptocentrus oni* Tomiyama, 1936. *Ann. Mag. Nat. Hist.* **12**: 150-152.
- Wongratana P, PJ Miller. 1991. The innervation of head neuro-mast rows in eleotridine gobies (Teleostei: Gobiidae). *J. Zool. Lond.* **225**: 27-42.