

# A new species and three new records of gobiid fishes from the Red Sea

by

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**ABSTRACT.** - *Tomiyamichthys dorsostigma* is described as a new species of goby from two specimens collected in the Gulf of Aqaba. It was first identified as *T. fourmanoiri* Smith, 1959, known from one specimen from Madagascar. It differs in having a longer head, the penultimate dorsal soft ray longest, longer paired fins, and in colour pattern. *T. dorsostigma* is more similar to another closely related species, *T. smithi* (Chen & Fang, 2003), differing in colour pattern and the high number of 120-125 scales in longitudinal series. The sand-dwelling, shallow-water gobiid fishes *Macrodontogobius wilburi*, *Papillogobius melanobranchus*, and *Vanderhorstia ornatissima* are reported as first records for the Red Sea. Diagnoses, colour photographs, notes on ecology, and comparisons with similar species are provided. *Psilogobius randalli*, previously known from two specimens from the Gulf of Aqaba, was recently photographed at Marsa Alam, southern Egypt.

**RÉSUMÉ.** - Une nouvelle espèce et trois nouveaux signalements de Gobiidae en mer Rouge.

*Tomiyamichthys dorsostigma* est une nouvelle espèce de gobie décrite à partir de deux spécimens récoltés dans le golfe d'Aqaba. Cette espèce fut pour la première fois identifiée comme *T. fourmanoiri* Smith, 1959, connu à partir d'un spécimen de Madagascar. Il en diffère en ayant une tête plus longue, l'avant-dernier rayon de la nageoire dorsale le plus long, de plus longues nageoires paires et par sa coloration. *T. dorsostigma* est plus semblable à une autre espèce proche *T. smithi* (Chen & Fang, 2003), mais en diffère par sa coloration et un nombre élevé d'écailles (120-125) en séries longitudinales. Les gobies inféodés aux zones sableuses et peu profondes, *Macrodontogobius wilburi*, *Papillogobius melanobranchus* et *Vanderhorstia ornatissima*, sont aussi reportés comme nouvelles signalisations de la mer Rouge. Les diagnoses, les photographies couleur, des notes sur l'écologie et la comparaison avec des espèces semblables sont fournies. Enfin, *Psilogobius randalli*, auparavant connu à partir de deux spécimens du golfe d'Aqaba, a été récemment photographié à Marsa Alam en Egypte méridionale.

Key words. - Gobiidae - Red Sea - Taxonomy - New species - New records.

The Gobiidae is the largest family of marine fishes, with 247 genera and 1604 valid species (Eschmeyer and Fricke, 2011). It is also well represented in freshwater habitats. Goren (1979) made the first compilation of gobiid fishes of the Red Sea, reporting 44 species. Dor (1984) increased the number to 86 in a checklist of the fishes of the Red Sea. This was reduced in an updated list by Goren and Dor (1994) to 83 species. However, a new checklist by Golani and Bogorodsky (2010) raised the number of Red Sea Gobiidae to 110. They included the four species of the present paper (the species of *Tomiyamichthys* then identified as *T. fourmanoiri* Smith, 1956) by listing the specimens by museum number and noting that this study is in preparation. A paper by Shibukawa *et al.* (2010) added the goby *Ancistrogobius yanoi* Shibukawa, Yoshino & Allen, 2010 to the Red Sea fish fauna; therefore the total number of Red Sea species of the family is now 111.

Comparison of the holotype of *Flabelligobius fourmanoiri* Smith 1956 from Madagascar, now reclassified in

*Tomiyamichthys*, to two specimens from the northern Red Sea has revealed the latter as representing a new species, which is described here. Specimens of three other gobiids, one each in the genera *Macrodontogobius*, *Papillogobius*, and *Vanderhorstia*, are shown to be new records for the Red Sea.

The new species of *Tomiyamichthys* and *Vanderhorstia ornatissima* Smith, 1959, type locality Mozambique, live in symbiotic association with alpheid shrimps. The monotypic *Macrodontogobius wilburi* Herre, 1936, type locality Palau, is a shallow-water species living on sand in the vicinity of coral reefs. *Papillogobius melanobranchus* (Fowler, 1934), type locality Bali, was collected by shrimp trawl in 10 m from a silty sand bottom in the Gulf of Suez, curiously discovered in the Mediterranean before the Red Sea (Kovačić and Golani, 2007). In addition, we extend the range of the shrimpgoby *Psilogobius randalli* (Goren & Karplus, 1983), previously known from two specimens from the Gulf of Aqaba, to the southern Red Sea coast of Egypt.

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## MATERIALS AND METHODS

The specimens for this study are deposited in the Bernice P. Bishop Museum, Honolulu (BPBM); Prirodoslovni Muzej Rijeka, Rijeka, Croatia (PMR); and National Museum of Natural History, Smithsonian Institution, Washington, DC (USNM). Recent Red Sea material was collected and underwater photos taken by the first author during field trips beginning 2005. Lengths of specimens are given as standard length (SL). The following publications were helpful in the preparation of this paper: Akihito *et al.* (1984), Chen and Fang (2003), Gill (1993), Gill and Miller (1990), Goren (1979), Goren and Karplus (1983), Iwata *et al.* (2007), Larson and Lim (2005), Larson and Murdy (2001), Murdy (1985), Murdy and Hoese (1985), Randall and Chen (2007), Randall and Goren (1993), Smith (1956, 1959), and Smith and Heemstra (1986). Some specimens were stained in 2% KMnO<sub>4</sub> solution for 20 s and 0.3% H<sub>2</sub>SO<sub>4</sub> solution for 20 s for better examination of sensory papillae. Morphometric and meristic methods follow Miller (1988a). Terminology of the lateral-line system follows Sanzo (1911) and Miller (1986). Dorsal pterygiophore formula was calculated according to Birdsong *et al.* (1988). In the description of the new species, data in parentheses apply to the paratype. Proportional measurements are rounded to the nearest 0.05.

*Tomiyamichthys dorsostigma*, new species

(Figs 1, 2)

## Material examined

Holotype, USNM 399267, male, 58.0 mm, Red Sea, Egypt, Gulf of Aqaba, Fjord, 18 km south of Eilat, O. Gon, multiprong spear, 5 Aug. 1976. Paratype, BPBM 21861, 46.2 mm, male, Red Sea, Gulf of Aqaba, Egypt, west coast, 3 km north of Nuweiba, sand bottom near fringing reef, 8 m, multiprong spear, J.E. Randall 20 Jul. 1976.

## Diagnosis

Dorsal rays VI + I,12; anal rays I,12; pectoral rays 17; scales cycloid, partially to complete embedded, nonimbricate, not in regular rows, about 120-125 in longitudinal series; head naked; body elongate, the depth at anal-fin origin 7.75-7.9 in SL, and compressed; head length 3.55-3.6 in SL; eye extending little above dorsal profile of head; orbit diameter 4.35-4.45 in head length; gill opening reaching forward to below rear margin of preopercle; first dorsal spine longest, 3.0-3.15 in SL, twice length of longest dorsal soft ray; caudal fin slightly pointed, longer than head length; pelvic fins fully united, nearly reaching anus, 3.45-3.5 in SL, the frenum well developed. Colouration of freshly collected specimens (Fig. 1): pale grey with a series of 14 dark brown

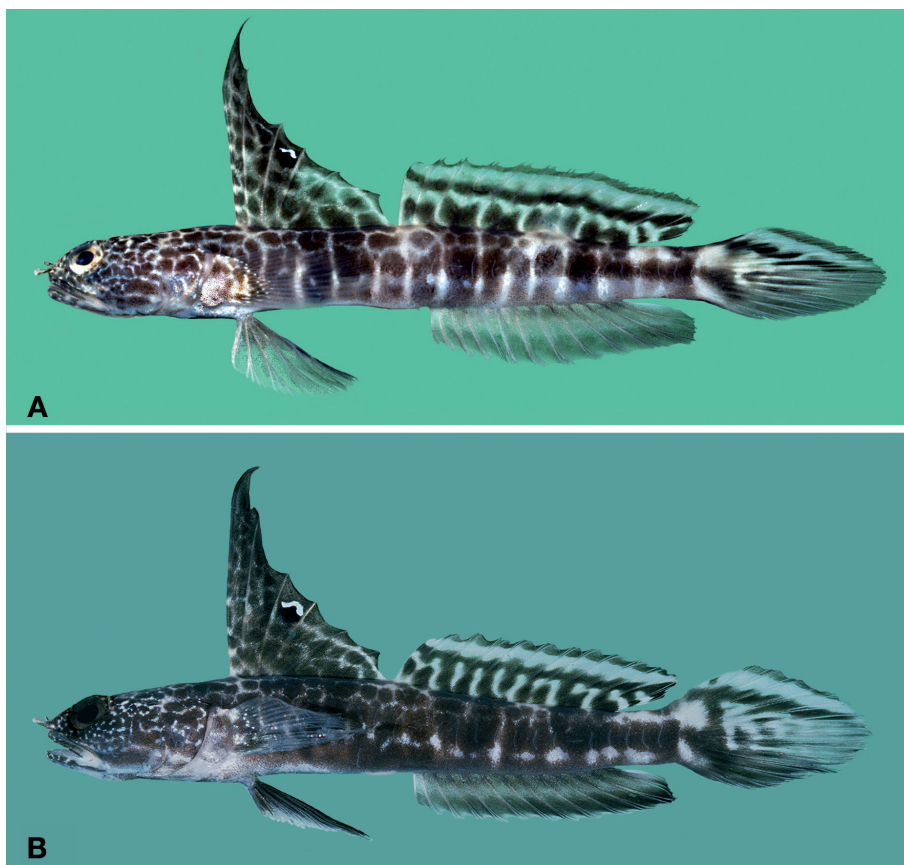


Figure 1. - *Tomiyamichthys dorsostigma* n. sp. **A**: Holotype, USNM 399267, 58.0 mm SL, Gulf of Aqaba, Red Sea; **B**: Paratype, BPBM 21861, 46.2 mm SL, Gulf of Aqaba, Red Sea (Photos J.E. Randall).

bars on body, much wider than pale interspaces and broken into one or two spots dorsally; head with irregular, close-set, dark brown spots of variable size, generally smaller anteriorly; first dorsal fin with close-set, dark brown spots, larger posteriorly; third membrane of first dorsal fin with a curved white mark on a large black spot near margin; second dorsal fin whitish with a blackish margin, a middle dark brown stripe, and a row of large, dark brown, bilobed spots along base; dorsal part of caudal fin with an oblique, blackish-edged, bluish white band.

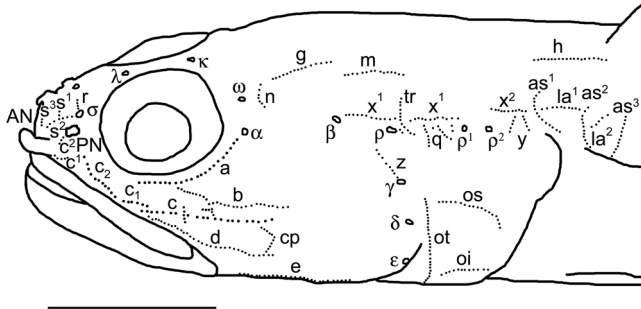


Figure 2. - *Tomiyamichthys dorsostigma* n. sp., cephalic sensory papillae and pores, USNM 399267. AN, PN, anterior and posterior nostrils; terminology of the lateral-line system follows Sanzo (1911) and Miller (1986). Scale = 5 mm (Drawing M. Kovačić).



Figure 3. - *Tomiyamichthys smithi* (Chen & Fang, 2003), underwater photograph, Semporna, Sabah, Malaysia (Photo S. Wong).



Figure 4. - *Tomiyamichthys latruncularius* and *Alpheus bellulus*, Gulf of Aqaba, Red Sea (Photo J.E. Randall).

## Description

Dorsal-fin rays VI + I,12; anal-fin rays I,12; all dorsal and anal soft rays branched, the last to base; pectoral-fin rays 17, the uppermost and lowermost unbranched; pelvic-fin rays I,5, all rays branched, the fifth rays joined medially; pelvic spines joined near tips with a well-developed frenum; branched caudal rays 14; upper procurrent caudal rays 2, the posterior segmented; lower procurrent caudal rays 3, the posterior 2 segmented; scales very small, cycloid, nonimbricate, and in irregular and often incomplete, near-vertical rows, the longitudinal series about 120-125; transverse scale rows about 27; no scales on head, nape, and none on prepectoral and prepelvic areas or fins; gill rakers 2+5; pseudobranch with 7 short fleshy lobes; vertebrae 10 + 16 = 26, including urostyle; dorsal pterygiophore formula 3-221100.

Body elongate, the depth at pelvic-fin origin 7.25 (6.75) in SL; body depth at anal-fin origin 7.9 (7.75) in SL; body compressed, the width 1.25 (1.4) in body depth; head length 3.6 (3.55) in SL; snout short, the length 4.6 (4.4) in head length; eye moderately large, the fleshy orbit diameter 4.45 (4.35) in head length; eye extending only slightly above dorsal profile of head; bony interorbital width 13.8 (12.8)

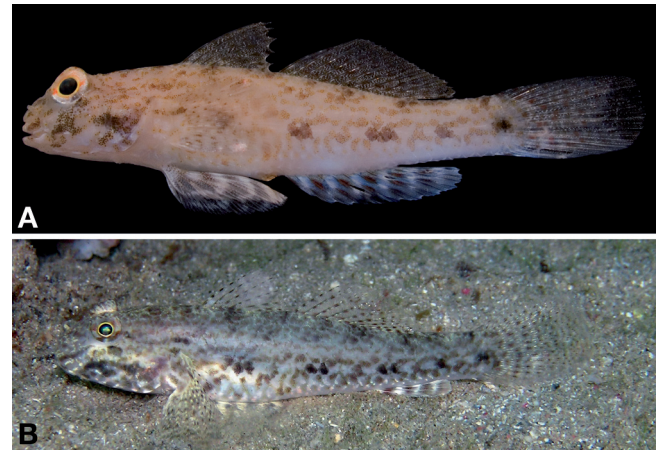


Figure 5. - *Macrodonogobius wilburi* Herre, 1936. **A:** Freshly collected specimen, PMR 2217, 33.9 mm SL, 5 km south from Hamata, Egypt. **B:** Underwater photograph from Utopia Beach, El Quseir, Egypt (Photos S.V. Bogorodsky).



Figure 6. - *Favonigobius melanobranchus* (Fowler, 1934), freshly collected specimen, PMR 2218, male, 45.5 mm SL, Gulf of Suez (Photo S.V. Bogorodsky).



in head length; caudal-peduncle depth 3.15 (3.1) in head length; caudal-peduncle length 2.25 (2.35) in head length.

Mouth large, the maxilla reaching or extending slightly posterior to a vertical at posterior edge of orbit, the upper-jaw length 2.3 (2.35) in head length; lower jaw slightly projecting when mouth closed; front of upper jaw with two recurved canine teeth on each side, separated by a symphyseal gap greater than space taken by two adjacent anterior canines; side of upper jaw with a row of 18 progressively smaller incurved teeth; two inner rows of incurved, nearly sessile teeth at front of upper jaw, six of which are enlarged, narrowing to a single row posteriorly on side of jaw; a pair of moderate, slightly recurved canines at front of lower jaw, one on each side, fitting between pair of canines on each side of upper jaw when mouth closed; a recurved canine on side of lower jaw about one-fourth distance back (the largest tooth in jaws), soon followed by a second canine nearly as large; about three rows of strongly recurved, nearly sessile teeth anteriorly in lower jaw medial to canines, the second row enlarged, this row becoming the most lateral on side of jaw posterior to the two canines; tongue rounded.

Gill opening short, extending forward to posterior margin of preopercle; gill membranes broadly attached to isthmus with no free fold across; first gill slit open but small; gill rakers short.

Posterior nostril anterior to lower third of eye, oblique and narrowly oval, with a fleshy rim; anterior nostril lateral at front of snout with a short tube and a broad dorsoposterior flap as long as pupil diameter, expanded at tip.

Cephalic sensory pores and papillae as shown in figure 2. Mid-side of body posterior to anal-fin origin with 14 near-vertical rows of tiny, close-set, sensory papillae, the rows averaging about a pupil diameter in length; about 7 more rows anterior to axil of pectoral fin, but more obscure.

Scales very small, cycloid, nonimbricate, and in slightly irregular, sometimes incomplete, near-vertical rows; scales partially embedded posteriorly, fully embedded anteriorly, and not significantly smaller anteriorly; no scales on head, nape, prepectoral area, prepelvic area, or fins.

Origin of first dorsal fin over or very slightly anterior to origin of pelvic fins, the predorsal length 3.4 (3.5) in SL; first dorsal spine longest, 3.15 (3.0) in SL, twice length of longest dorsal soft ray; second dorsal spine 4.0 (3.9) in SL; posterior membrane of first dorsal fin ending at base of spine of second dorsal fin; spine of second dorsal fin 2.65 (3.0) in head length; penultimate soft ray of dorsal fin longest, 1.7 (1.85) in head length; origin of anal fin below base of second dorsal soft ray, the preanal length 1.75 (1.8) in SL; anal spine 4.3 (5.0) in head length; tenth and eleventh anal soft rays subequal and longest, 1.75 (1.9) in head length; caudal fin slightly pointed, a little longer than head length, 3.4 (3.45) in SL; base of pectoral fins vertical, distinctly anterior to origin of first dorsal fin; eleventh pectoral ray longest, reaching to

below origin of second dorsal fin, 4.0 (4.05) in SL; origin of pelvic fins below origin of first dorsal fin; pelvic spine 3.5 (3.45) in head length; pelvic fins fully joined, the fifth rays longest, 4.45 (4.3) in SL; pelvic frenum well developed to tips of pelvic spines.

Colour of holotype when fresh (Fig. 1A): body pale grey to whitish, with a series of 14 close-set, dark brown bars, much wider than pale interspaces, broken into one or two dark brown spots dorsally; second to seventh bars with an indistinct blue spot in lower third (also one on 11<sup>th</sup> bar); head with irregular, close-set, dark brown spots, smaller anteriorly, the reticulum separating spots on cheek and lower operculum pale blue; large spots on operculum posterior to maxilla coalesced to form two horizontal bands; first dorsal fin with close-set, dark brown spots, smaller on first two membranes; first dorsal spine crossed by seven white spots, progressively less distinct distally; third membrane of first dorsal fin with a curved bright white mark on upper edge of large black spot near margin of fin; second dorsal fin whitish with a blackish margin, a middle dark brown stripe, and a row of large, dark brown, bilobed spots along base; caudal fin dark brown to blackish, the rays pale bluish, with a broad bluish white submarginal band dorsally on posterior three-fourths of fin; anal fin dusky with a pale middle stripe; pectoral fins transparent with whitish rays; pelvic fins dusky with whitish rays.

### Etymology

The species is named *dorsostigma* in reference to the distinctive black and white spot distally on the third membrane of the first dorsal fin.

### Remarks

*Tomiyamichthys fourmanoiri* was originally described as the type species of the new genus *Flabelligobius* by Smith (1956). Randall and Chen (2007) described a new species of shrimpgoby from Indonesia in the genus *Tomiyamichthys*, following the advice of K. Shibukawa and based on his publication in preparation with A. Iwata that would place *Flabelligobius* in the synonymy of *Tomiyamichthys*. Among the specimens that Randall and Chen (2007) included in their comparative material was a Bishop Museum shrimpgoby identified as *T. fourmanoiri* from the Red Sea (BPBM 21861, 46.2 mm SL). At the request of Shibukawa, it was sent on loan to him in May 2006. It was finally returned on November 2010, enabling us to complete the manuscript for this paper. A second specimen of this species from the Red Sea was speared by O. Gon while diving with the third author in a narrow embayment of the Gulf of Aqaba 18 km south of Eilat (locally called the Fjord) in August 2006. This specimen is in better condition and was selected as the holotype for deposit in the U.S. National Museum of Natural History.

*Tomiyamichthys dorsostigma* was observed to live symbiotically in sand near fringing reef with an alpheid shrimp,

but the shrimp was not identified. No depth was recorded for the holotype, other than noting that it was shallow. The paratype was collected from 8 m.

In his description of *Flabelligobius fourmanoiri*, Smith (1956: 555) wrote, “the scaling is nowhere sufficiently regular for valid counts to be taken, but there are about 12-13 series across the middle of the body and about 125-130 scales from pectoral base to caudal base.” Chen and Fang (2003) described *Flabelligobius smithi* from Taiwan. They borrowed the holotype of *F. fourmanoiri* and counted the scales in longitudinal series as 94 and 98. In view of the different scale counts made by Smith and by Chen and Fang, we asked Ofer Gon of the South African Institute for Aquatic Biodiversity to also make a scale count of Smith’s holotype. He wrote, “It is practically impossible to get an accurate count. I counted several times with the fish wet and dry. I got about 110, but would not call it a reliable count. I would not trust the count of anyone, including Smith.” It is clear that scale counts of this species and related species cannot be regarded as a reliable diagnostic character.

*Tomiyamichthys dorsostigma* differs from *T. fourmanoiri* in having a longer head (3.55-3.6 in SL, compared to 3.85 in SL for *T. fourmanoiri*), the penultimate dorsal soft ray longest, compared to seventh ray for *T. fourmanoiri*, and the paired fins distinctly longer (pectoral fins 4.0-4.05 in SL, compared to 4.45 in SL for *T. fourmanoiri*; pelvic fins 4.3-4.45 in SL, compared to 5.25 in SL for *T. fourmanoiri*). Smith reported that the upper third of the body of *T. fourmanoiri* to the end of the dorsal fin is “virtually naked”, and the lower from the side along the anal fin with none or very few scales. By contrast, *T. dorsostigma* has scales in these areas, though partially embedded. There are also many differences in colour. The dark bars on the body of *T. fourmanoiri* do not continue ventrally; the first dorsal fin has curved dark bands instead of spots, and it lacks the unique black and white mark distally on the third membrane; the second dorsal and caudal fins lack the strong dark markings as seen on *T. dorsostigma*.

Fricke (1999: 511) reported *Flabelligobius fourmanoiri* as a new record for Mauritius from a specimen in the Muséum national d’Histoire naturelle in Paris (MNHN 1986-607) that was first described as a syntype of *Gobius albopunctatus* Valenciennes in Cuvier & Valenciennes. The third author examined this specimen. It is in very poor condition with nearly all scales missing and no papillae visible on the cheek. It has I,9 second dorsal and anal rays, the third to fifth spines of the first dorsal fin are subequal and longest, about half head length, and there seems to have been a large black spot distally on the fifth membrane of the first dorsal fin. It is easy to conclude that this specimen is not *Tomiyamichthys fourmanoiri*. It may be a species of *Cryptocentrus*.

*Tomiyamichthys dorsostigma* seems more closely related to *T. smithi* (Chen & Fang, 2003), described from Taiwan, and reported from Japan as *Flabelligobius* sp. 1 by Senou

*et al.* (2004: 289, 2 figs.) and as *T. smithi* by Shibukawa *et al.* (2005: 200, figs. 1C, 2D). We provide here an underwater photograph (Fig. 3) taken of *T. smithi* on muddy sand in 13 m at Semporna, Sabah, Malaysia by Stephen Wong for a comparison of the colour.

Chen and Fang recorded the number of scales in longitudinal series for *Tomiyamichthys smithi* as 64 to 72, and Shibukawa *et al.* as 93 and 96. Although, as mentioned, the number of scales in longitudinal series may not be a reliable differentiating character for species of *Tomiyamichthys*, our count of 120-125 scales for *T. dorsostigma* seems to be of sufficient magnitude to report as a difference from *T. smithi*.

The cephalic sensory system of *T. fourmanoiri* and *T. smithi* were well illustrated by Chen and Fang, and Shibukawa *et al.* also provided a drawing of the pores and papillae of the head of *T. smithi*. These two species and *T. dorsostigma* form a complex that is clearly distinct from other known species of the genus.

One other species of the genus *Tomiyamichthys* is known from the Red Sea, *T. latruncularius* (Klausewitz, 1974), described from the Gulf of Aqaba and known to range to Oman and the Maldives Islands. We illustrate this species here from an underwater photograph (Fig. 4) taken in the Gulf of Aqaba with its symbiotic alpheid shrimp. This goby is readily separated from *T. dorsostigma* by fewer dorsal and anal fin rays (9-10 and 8-9 respectively), only 49-50 scales in longitudinal series, deeper body (6.0-6.9 in SL), and very obviously in colour.

### *Macrodonogobius wilburi* (Fig. 5)

*Macrodonogobius wilburi* Herre, 1936: 279, pl. 1 (Koror, Palau).

#### Material examined

PMR VP 2217, 3: 30.4-33.9 mm, Egypt, 5 km south of Hamata, S. Bogorodsky, 18 Nov. 2008.

#### Diagnosis

Dorsal rays V + I,10; anal rays I,9; pectoral rays 15-17; scales in longitudinal series 27; predorsal scales 7 or fewer, extending to interorbital space; scales ctenoid, except cycloid on isthmus; cheek and operculum completely scaled, about three rows on cheek; cephalic sensory pores and papillae as illustrated by Akihito in Masuda *et al.* (1984: fig. 87); body depth more than 4.5 in SL (4.65-4.95 in present specimens); head depth more than 5.5 in SL (5.8-6.0 in present specimens); least depth of caudal peduncle more than 7.7 in SL (8.7-9.8 in present specimens); large recurved canine tooth present at bend in dentary; maxilla ending below anterior half of eye; gill opening extending slightly below pectoral-

fin base; no dorsal spines elongate; pelvic fin disc reaching origin of anal fin; pelvic frenum well developed; caudal fin rounded, 3.45-3.85 in SL; colour in life whitish grey, densely spotted with brown; dark brown to black double spots in midlateral row, the first pair beneath pectoral fin, and last at caudal-fin base; an irregular dark brown blotch under eye; membranes of dorsal fins with yellowish dots.

### Remarks

*Macrodontogobius wilburi* ranges from the Seychelles to the Line Islands and Samoa Islands; in the western Pacific from southern Japan to New Caledonia; depth range 0-20 m (Murdy, 1985). Our Red Sea record is based on an underwater photograph from Utopia Beach (El Quseir, Egypt) and three specimens from a large lagoon 5 km south of Hamata in southern Egypt. This goby was found in the Red Sea in lagoons in sand and rubble areas not far from the shelter of coral or coral rock. It was observed at depths of 2-5 m.

The genus *Macrodontogobius* is monotypic. It is similar in morphology to *Exyrias*, a genus of four sand-dwelling species, one of which, *E. belissimus* (Smith, 1959), is known from the Red Sea. It is readily distinguished from *M. wilburi* by its large fan-like D1 with filamentous spines (*vs.* no filamentous spines in D1 in *M. wilburi*), deeper body, the depth 3.6-3.9 in SL (*vs.* 4.6-6.3 in SL in *M. wilburi*), and in colour. *Exyrias belissimus* is brown with numerous, small, scattered pale spots, and no distinct black spots on side of body.

*Macrodontogobius wilburi* may be confused underwater with *Ancistrogobius yanoi* Shibukawa *et al.*, 2010 or with *Istigobius decoratus* (Herre, 1927), both of which occur in similar sandy areas. The former was described as a new genus and species from specimens from the Western Pacific Ocean and a few from the Red Sea. The species of *Ancistrogobius* are similar in colour and have been previously misidentified as *M. wilburi* (as by Randall, 2005). *Ancistrogobius yanoi* is distinguished by having a spur-like spine directed ventrally from the preopercular margin, the third dorsal-fin spine elongate and filamentous, the first dorsal fin with a distal black blotch, and the white side of the abdomen mostly unspotted. *Istigobius decoratus* is best distinguished by colour. It has dark brown lines forming a honeycomb pattern on the head and body and lacks a dark blotch below the eye. Underwater photographs of *A. yanoi*, *E. belissimus* and *I. decoratus* may be found in Lieske and Myers (2004), Randall (2005), and Shibukawa *et al.* (2010).

### *Papillogobius melanobranchus*

(Fig. 6)

*Rhinogobius melanobranchus* Fowler, 1934: 82, figs. 24-25 (Bali).

### Material examined

PMR VP2218, 2: 39.5-45.5 mm, Gulf of Suez, S. Bogorodsky, 17 Apr. 2009.

### Diagnosis

Dorsal rays VI + I,8; anal rays I,8; pectoral rays 15-16; scales in longitudinal series 28; transverse scales 7; scales on body ctenoid, in 3 rows posteriorly, reaching forward to a line from end of opercle to origin of dorsal fin; head, predorsal area, and at least part of the prepelvic area naked anteriorly; cephalic sensory pores and papillae as illustrated by Kovačić and Golani (2007: fig. 7b): suborbital row *a* 1 absent; suborbital rows *a* and *c* transversely proliferated and disorganised; anterior-dorsal row *n* single and longitudinal; head length 4.5-4.6 in SL; snout with a moderately sloping profile; gill opening extending forward at least to middle of opercle; caudal fin rounded, shorter than head; pelvic fins forming a rounded disc, reaching anus; pelvic frenum well developed, with straight rear edge and without lateral lobes; pale greenish grey, heavily mottled with orange-brown; a midlateral row of blackish spots, largest at mid-base of caudal fin; vertical orange-yellow lines ventrally on body; median part of branchiostegal membranes blackish; basal two-thirds of dorsal and caudal fins with small dusky yellow spots on a greenish white reticulum; first dorsal fin with a yellowish margin and submarginal black band; a black spot at upper edge of caudal fin. Photographs for comparison of fresh male and female specimens collected from the Arabian Gulf are shown in Randall (1995).

### Remarks

*Papillogobius melanobranchus* is known from Natal and the Arabian Gulf to northern Australia, Papua New Guinea, and South China Sea (Hoese, 1986; Randall, 1995; Randall and Lim, 2000; Allen and Adrim, 2003; Hoese and Larson, 2006). It was recently recorded from the Mediterranean Sea in close vicinity to the Suez Canal (Kovačić and Golani, 2007). Therefore, the present finding in the Red Sea was expected and provides for the origin of the species in the Mediterranean. The Gulf of Suez specimens were collected by shrimp trawl at a depth of about 10 m on silty sand bottom.

The similar sand-goby *Papillogobius reichei* (Bleeker, 1853) was reported from the Red Sea by Goren (1989). The principal colour characters distinguishing these species are the presence of a black spot dorsally on the caudal fin of *P. melanobranchus* (absent in *P. reichei*), and the absence of orange lines on lower part of body of *P. reichei* (present in *P. melanobranchus*). *P. reichei* also has a single blackish spot at the base of the caudal fin (a double spot in *P. melanobranchus*), and white gill membranes in adult males (blackish in *P. melanobranchus*). Underwater photographs of *P. reichei* for comparison may be seen in Senou *et al.* (2004) and Larson and Lim (2005).





Figure 7. - *Vanderhorstia ornatissima* Smith, 1959, preserved specimen, USNM 339586, female, 44.3 mm SL, Zubayr Island, Yemen, Red Sea (Photo M. Kovačić).

Gill and Miller (1990) described *Papillogobius punctatus* as a new genus and species from Western Australia and reclassified *Favonigobius melanobranchus* and *F. reichei* in *Papillogobius* based primarily on a unique pattern of the transverse suborbital rows *a* and *c*. However, the genus *Papillogobius* has not been used in checklists by Larson and Murdy (2001), Hoese and Larson (2006), and Larson *et al.* (2008). These authors were followed by Eschmeyer and Fricke (2011) in treating *Papillogobius* as a synonym of *Favonigobius*.

Goren (1978) described the new species *Silhouettea chaimi* from specimens collected at Eilat, Gulf of Aqaba. Miller (1988b) suggested reassigning this species to the genus *Acentrogobius* based on the cephalic lateralis system. However, the pattern of suborbital sensory papillae of *A. chaimi* presented by Miller more closely resembles the pattern of *Papillogobius* rather than that of the species of *Silhouettea* and *Acentrogobius*. In those species of *Acentrogobius* that have suborbital rows *a* and *c* developed, the pattern is clearly transverse. Among the species of *Papillogobius*, *A. chaimi* is most similar to *P. reichei* in morphology, meristics, and colouration. The relationships of the species placed in this complex of genera needs further investigation.

***Vanderhorstia ornatissima***  
(Figs 7-9)

*Vanderhorstia ornatissima* Smith, 1959: 192, pl. 10 C (Pinda, Mozambique).

**Material examined**

USNM 339586, female, 44.3 mm, Red Sea, Yemen, Zubayr Island, E. Clark, 30 Sep. 1967.

**Comparative material**

USNM 339582, four females, 24.0-41.3 mm, Seychelles, Anonyme Island near Mahé, J.E. Böhlke, 11 Feb. 1964.

**Diagnosis**

Dorsal rays VI + I,13; anal rays I,13; pectoral rays 17-20; longitudinal scale series 57-65; transverse scale rows 13-15; scales cycloid, larger posteriorly, becoming weakly ctenoid

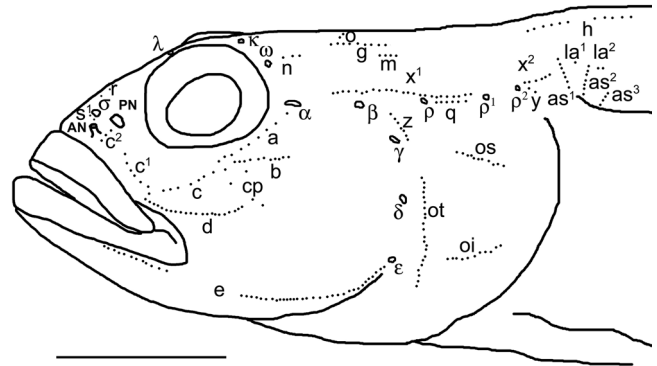


Figure 8. - *Vanderhorstia ornatissima*, cephalic sensory papillae and pores, USNM 339586. AN, PN, anterior and posterior nostrils; terminology of the lateral-line system follows Sanzo (1911) and Miller (1986). Scale = 3 mm (Drawing M. Kovačić).



Figure 9. - *Vanderhorstia ornatissima*, underwater photograph, Shams Alam reef, southern Egypt (Photo S.V. Bogorodsky).



Figure 10. - *Vanderhorstia delagoae* (Barnard, 1937), underwater photograph, Sharm Abhur, N of Jeddah, Saudi Arabia (Photo J.E. Randall).



Figure 11. - *Psilogobius randalli* (Goren & Karplus, 1983), underwater photograph, Brayka Bay, Marsa Alam, Egypt (Photo S.V. Bogorodsky).

posterior to anterior third of second dorsal fin; chest and abdomen scaled; head and nape naked; gill raker 2-3 + 7-9; body depth 5.7-6.5 in SL; head and body moderately compressed; head length 3.7-4.15 in SL; eye 3.85-5.55 in head length, equal to snout length; mouth oblique, the lower jaw projecting; maxilla reaching to below posterior half of eye; tongue truncate; gill opening extending forward to below posterior margin of preopercle; third ray of the first dorsal fin prolonged and filamentous, 2.3-2.7 in SL; caudal fin pointed, 2.6-3.3 in SL; pectoral fins 1.2 times head length; pelvic fins reaching anus; pelvic frenum large; colour in life pale greenish grey dorsally, white ventrally, with numerous blue dots; three longitudinal rows of dusky yellow blotches, one dorsal, one lateral, and one on side of abdomen; blotches bordered by blue lines that continue ventrally as parallel blue and yellow lines, except posteriorly where they encircle blotches; head with oblique rows of short yellow dashes bordered on each side by blue; an oblique dark brown dash on cheek; base of pectoral fins with two small, well-separated, dark brown spots.

#### Remarks

While preparing an updated checklist of the Red Sea fishes, the first author found a specimen identified as *Vanderhorstia ornatissima* listed for the Red Sea in the database of the fish collection of the U.S. National Museum of Natural History. It was collected by Eugenie Clark at Zubayr Island in the southern Red Sea off Yemen in 1967. This record was overlooked in the checklists of Red Sea fishes by Dor (1984) and Goren and Dor (1994). Jeffrey T. Williams examined the specimen, confirmed that the third dorsal spine is elongate, and sent it on loan to the second author who made the photograph of figure 7 and the drawing of figure 8.

The second author obtained a loan of four Seychelles specimens of *V. ornatissima* from the US National Museum of Natural History to compare with the Red Sea specimen from Zubayr Island in the southern Red Sea. Of the proportional measurements, only the body depth is different (5.3 in SL, compared to 5.7-6.5 for the Seychelles specimens), but this might be related to its larger size (the Seychelles specimens measure 24.0-41.3 mm SL, and the Red Sea one is 44.3 mm SL). Measurements of head length and pectoral-fin length are marginally different. The count of 55 scales in longitudinal series seems significantly different to the one count of 65 given by Smith for the holotype of *V. ornatissima*. We asked Ofer Gon to count the scales of the Smith's holotype and his six paratypes (which included one from the Seychelles) at the South African Institute for Aquatic Biodiversity. He responded that Smith's scale count seems correct, and he was able to make counts of about 55, 57, and 60 for three of the paratypes.

The first author took an underwater photograph of a shrimpgoby at Shams Alam, Egypt on 16 July 2006 (Fig.

9) that we identify as *Vanderhorstia ornatissima* from comparison with photographs from the Chagos Archipelago in Winterbottom and Emery (1986: 67, fig. 99), the Maldives in Allen and Steene (1987: pl. 114, fig. 8), confirmed by Randall and Goren (1993: 25), and Indonesia (Hayashi and Shiratori, 2003: fig. on p. 154). It should be noted that the last-mentioned colour figure is in a book entitled *Gobies of Japanese Waters*, but the locality for the figure is given as Indonesia (in Japanese). The pattern of Smith's painting of the holotype compares well with the figures just mentioned, but the colours are too vivid; the ground colour is too green, the purple markings should be blue, and the red spots and narrow bars should be yellow.

Some identifications as *V. ornatissima* from the Pacific apply to other species (Randall, 2005: 559).

Four other species of *Vanderhorstia* are known for the Red Sea: *V. delagoae* (Barnard, 1937), *V. ambanoro* (Fourmanoir, 1957), *V. mertensi* Klausewitz, 1974, and *V. opercularis* Randall, 2007. Of the four, *V. delagoae* is the most similar to *V. ornatissima*, differing in having the fifth dorsal spine longest and only slightly prolonged, in contrast to the very elongate third spine of *V. ornatissima*. It differs in colour in having denser and smaller dark blotches on the body and many oblique, blue-edged, yellow streaks (Fig. 10). Debelius (1998) reported *Vanderhorstia ornatissima* from the Red Sea from two underwater photographs; however, we readily reidentify these as *V. delagoae*.

#### *Psilogobius randalli*

(Fig. 11)

*Tomiyamichthys randalli* Goren & Karplus, 1983: 27, figs. 1-4 (Gulf of Aqaba).

#### Diagnosis

Dorsal rays VI + I, 10; anal rays I, 9; pectoral rays 16; longitudinal scale series 63-65; transverse scale rows 18; scales ctenoid on caudal peduncle, cycloid anteriorly; body moderately elongate, the depth 6.0-6.2 in SL; head length 3.3 in SL; eye extending above dorsal profile of head; mouth large and oblique, the maxilla extending posterior to eye; conical teeth in three to four rows in upper jaw and four to six in lower jaw, the teeth of outer row largest, none as canines; gill opening extending forward to below posterior margin of preopercle; first dorsal fin higher than body depth, the second and third spines elongate (third longest); caudal fin almost as long as head; body greenish grey, mottled with dark brown, shading to whitish grey on abdomen; a midlateral series of dark brown blotches on body as large as eye; anterior part of body with 6 narrow vertical light lines; scattered bright blue dots on head and body; a dark brown blotch on opercle.



A small species, the largest specimen measured 29.4 mm SL and 38.0 mm TL.

### Remarks

Goren and Dor (1994: 66) reclassified *Tomiyamichthys randalli* in the genus *Psilogobius* Baldwin, followed by Iwata *et al.* (2000: 775). This endemic Red Sea goby was described from two specimens from Marsa Morach, Gulf of Aqaba. It was recently photographed by the first author (Fig. 11) in Brayka Bay, Marsa Alam, Egypt at a depth of 2 m on a silty sand substratum, the first record outside the Gulf of Aqaba. It was observed to live in symbiosis with a snapping shrimp, within a dense population of another shrimp-associated goby, *Vanderhorstia delagoae*. It was difficult to approach.

Species of five other genera of shrimp-associated gobies are known from the Red Sea: *Amblyeleotris*, *Cryptocentrus*, *Ctenogobiops*, *Tomiyamichthys* and *Vanderhorstia*. The species could be distinguished underwater from other shrimpgobies principally by the row of dark spots along the side of the body and the anterior series of pale vertical lines.

### DISCUSSION

The new species and three new records of gobiid fishes of the present paper raise the total number of species of the family for the Red Sea to 111. This represents 10% of the total known Red Sea fish fauna. Of the native Red Sea gobies, 16 (18%) are endemic, 24% extend their range into the western Indian Ocean, and 60% are widespread Indo-Pacific species. Two eastern Mediterranean gobies have colonized the Red Sea, but they are restricted to the Suez Canal. Fifty-nine species of gobies are recorded from the Mediterranean Sea (Kovačić and Golani, 2007). It is not surprising that the smaller Red Sea should have nearly twice the number of gobies as the Mediterranean, in view of its being a province of the very rich Indo-Pacific fish fauna. We expect that more new records of gobiid fishes will be documented for the Red Sea, especially in the southern part that has not been fully explored.

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