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TAXONOMIC COMMENTS AND DISTRIBUTIONAL RECORDS FOR FLATFISHES (TELEOSTEI: PLEURONECTIFORMES) FROM THE ANDAMAN SEA OFF THAILAND

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ABSTRACT: During the Biodiversity of the Andaman Sea Shelf Project (BIOSHELF) conducted in 1996–2000, four species of flatfishes (Pleuronectiformes) were collected from the continental shelf of the Andaman Sea off Thailand, northeastern Indian Ocean: *i.e.*, the bothid, *Psettina variegata* (Fowler, 1934), two samarids, *Samariscus huysmani* Weber, 1913 and *Samariscus inornatus* (Lloyd, 1909), and the soleid, *Aseraggodes kaianus* (Günther, 1880). The present study represents the first records from waters off Thailand for these four species and the first record of *A. kaianus* from the Indian Ocean. Detailed descriptions are provided for *S. huysmani* and *S. inornatus* with notes on their diagnostic characters. *Samariscus macrognathus* Fowler, 1934 is recognized herein as a junior synonym of *S. huysmani*

Key words: *Aseraggodes*, BIOSHELF, Indian Ocean, *Psettina, Samariscus,* synonymy

INTRODUCTION

The order Pleuronectiformes (flatfishes) is composed of over 800 species belonging to 16 families (Campbell *et al.* 2019; Atta *et al.* 2022). Although pleuronectiform diversity is largest in the tropical Indo-West Pacific region (Munroe 2005; 2015; Campbell *et al.* 2019), the diversity of this group in this area is still underestimated due to limited and insufficient taxonomic or faunistic studies of the Indo-West Pacific pleuronectiform fishes. Therefore, further studies are needed to uncover their diversity (Hensley 1997; Munroe 2005; 2015; Nair and Gopalakrishnan 2014). Particularly, relatively few studies refer to pleuronectiform diversity in the northeastern Indian Ocean including the Andaman Sea (Norman 1927; Pokapunt *et al.* 1983; Devi 1999; Kawai *et al.* 2020; Pillai and Dutta 2024). The Andaman Sea, encircled by Myanmar, Malay Peninsula, Sumatra Island, and Andaman and Nicobar Islands, is the area showing high diversity of marine coastal fishes because of the endemism during the last glacial period, the location at the junction of Indian and Pacific oceans, and the presence of variable habitats (*e.g.*, Kimura and Satapoomin 2009; Satapoomin 2011; Vilasri *et al.* 2015).

During the Biodiversity of the Andaman Sea Shelf Project (BIOSHELF) conducted from 1996–2000 (see details in Aungtonya *et al.* 2000), four species of pleuronectiform fishes belonging to the bothid genus *Psettina* Hubbs, 1915, the samarid genus *Samariscus* Gilbert, 1905 and the soleid genus *Aseraggodes* Kaup, 1858 were collected from the continental shelf of the Andaman Sea off Phuket, Thailand by the R/V Chakratong Tongyai. The present study provides counts and measurements of the specimens and briefly discuss the diagnostic characters of the two species of *Samariscus*, which belong to a particularly taxonomically confused group of flatfishes.

MATERIALS AND METHODS

All specimens were caught in the Andaman Sea during the BIOSHELF Project (Fig. 1) and have been kept in 70% ethyl alcohol after fixation in 10% formalin. These specimens are deposited in the Reference Collection of Phuket Marine Biological Center, Phuket, Thailand (PMBC). Comparative materials are curated in the Natural History Museum, London, UK (BMNH), Laboratory of Marine Biology, Faculty of Sciences, Kochi University, Kochi, Japan (BSKU), Kyoto University, Kyoto and Maizuru, Japan (FAKU), National Museum of Natural History, Smithsonian Institution, Washington D.C., USA (USNM), Naturalis Biodiversity Center, Leiden, Netherlands (ZMA) and Zoological Survey of India, Kolkata, India (ZSI). We also incorporated the data from Hensley (1993) of a single specimen deposited in the Hebrew University of Jerusalem, Zoological Museum, Jerusalem, Israel (HUJ).

Methods of counts and measurements for species of Bothidae Smitt, 1892 and Samaridae Jordan and Goss, 1899 mainly follow those of Hubbs and Lagler (1958), while those for species of Soleidae Bonaparte, 1833 follow methods of Randall and Desoutter-Meniger (2007). Snout lengths of species of Bothidae and Samaridae were measured from the anterior tip of the ocular-side upper jaw to the anterior margins of both the upper and lower orbits, respectively. Upper and lower orbit lengths of species of Bothidae and Samaridae were measured as the horizontal diameter of each orbit, respectively. All dorsal- and anal-fin rays were counted individually. Standard and head lengths are abbreviated as SL and HL, respectively. Counts of gill rakers of Bothidae were expressed as the number of gills rakers on the upper + lower limbs. Vertebral counts were determined from radiographs and are expressed as the number of abdominal + caudal vertebrae. All measurements were made to the nearest 0.1 mm with digital calipers and divider. Terminology of sensory pores on the head of species of Samaridae follows that of Voronina (2009a). A map of sampling localities with bathymetric imagery (Fig. 1) was made by GMT 5.4.5 using data from ETOPO1 (Amante and Eakins 2009). Abbreviation in parentheses after PMBC accession number: L, larger specimen; S, smaller specimen.

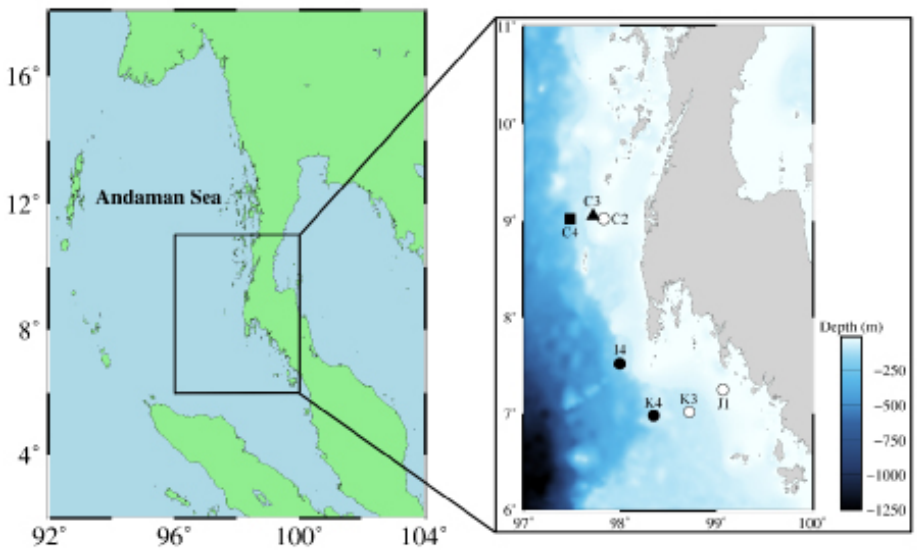

Figure 1. Map illustrating sampling localities where specimens were collected in the Andaman Sea off Thailand with the station numbers of BIOSHELF Project. Triangle: *Psettina variegata*; open circle: *Samariscus huysmani*; closed circle: *Samariscus inornatus*; rectangular: *Aseraggodes kaianus.*

TAXONOMIC ACCOUNTS

Family Bothidae Smitt, 1892
Genus *Psettina* Hubbs, 1915
Psettina variegata (Fowler, 1934)

Fig. 2

Bothus (*Crossobothus*) *variegatus* Fowler 1934: 365, fig. 89 (original description; type locality: Philippines and southern China).

Psettina variegata: Amaoka and Larson 1999:1075, figs. 2B, 3E, 3F, table 2 (western Australia); Amaoka and Ho 2019: 207, fig. 9F, tables 12, 13 (southern Taiwan); Psomadakis *et al.* 2019: 592, fig. 421 in pl. 55 (Myanmar).

Diagnosis. Dorsal-fin rays 97–101; anal-fin rays 75–82; ocular-side pectoral-fin rays 11–13; lateral-line scales 75–77; gill rakers on 1st gill arch of ocular side 0–2 + 7–8; teeth uniserial on all jaws; ocular-side scales with long slender ctenii; body slender, its depth 36.9–43.3% SL; dark blotches along dorsal

and ventral margins on ocular side of body extending to dorsal- and anal-fin bases, respectively; three large dark blotches on ocular-side lateral line; single, large, dark blotches on ocular-side pectoral fin and on center of caudal fin (based on Fedorov and Foroshchuk 1988; Amaoka and Larson 1999; Amaoka and Ho 2019).

Material examined. PMBC 37889, 1 specimen, 87.4 mm SL, male, St. C3, 9°00′N 97°43′E to 9°03′N 97°43′E, 81 m depth, otter trawl, 20 Apr. 1996, coll. by S. Bussarawit and C. Aungtonya.

Description of Andaman Sea specimen. Meristic features: dorsal-fin rays 98; anal-fin rays 76; pectoral-fin rays 12 on ocular side, 9 on blind side; pelvic-fin rays 6 on both sides; caudal-fin rays 17; lateral-line scales 76; gill rakers 0 + 8 on first gill arch on both sides; vertebrae 10 + 29.

Measurements (% SL): HL 28.1 on ocular side, 29.1 on blind side; body depth 38.7; snout length 7.5 to upper orbit, 5.9 to lower orbit; upper orbit length 9.9; lower orbit length 9.7; upper eye diameter 9.0; lower eye diameter 8.6; interorbital width 0.7; length of ocular-side upper jaw 9.9, blind-side upper jaw 10.0; length of ocular-side lower jaw 13.2, blind-side lower jaw 14.1; length of ocular-side pectoral fin 18.9, blind-side pectoral fin 8.7; length of both pelvic fins unmeasured due to damage; length of ocular-side pelvic-fin base 6.9, blind-side pelvic-fin base 3.9; caudal peduncle depth 10.3.

Measurements (in SL or HL): HL 3.6 in SL on ocular side, 3.4 in SL on blind side; body depth 2.6 in SL; snout length 3.8 in HL to upper orbit, 4.8 in HL to lower orbit; upper orbit length 2.8 in HL; lower orbit length 2.9 in HL; upper eye diameter 3.1 in HL; lower eye diameter 3.3 in HL; interorbital width 40.9 in HL; length of ocular-side upper jaw 2.8 in HL, blind-side upper jaw 2.9 in HL; length of ocular-side lower jaw 2.1 in HL, blind-side lower jaw 2.1 in HL; length of ocular-side pectoral fin 5.3 in SL, blind-side pectoral fin 11.6 in SL; length of both-sides pelvic fin unmeasured due to damage; length of ocular-side pelvic-fin base 14.6 in SL, blind-side pelvic-fin base 25.7 in SL; caudal peduncle depth 9.7 in SL.

Distribution. *Psettina variegata* is distributed in the western Pacific (Philippines, southern China and southern Taiwan) and the eastern Indian Ocean (Myanmar and northwestern Australia) at depths of 126–136 m (Fowler 1934; Amaoka and Larson 1999; Hensley and Amaoka 2001; Amaoka and Ho 2019; Psomadakis *et al.* 2019), including the Andaman Sea off Thailand at a depth of 81 m (present study).

Remarks. *Psettina variegata* was previously unknown from waters off Thailand (*e.g.*, Punpoka 1964; Suvatti 1981; Monkolprasit *et al.* 1997; Amaoka and Larson 1999; Satapoomin 2011). Accordingly, the present study represents the first record of *P. variegata* from waters off Thailand.

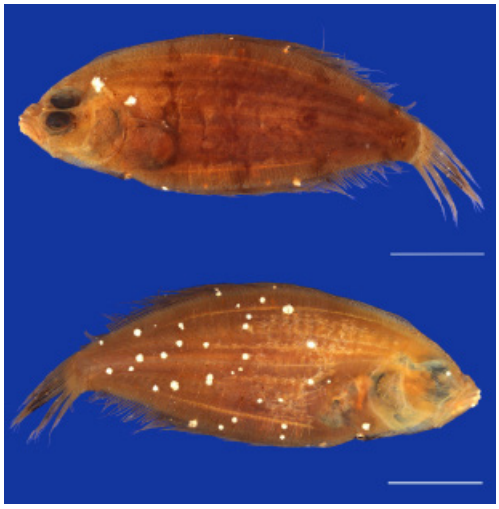

Figure 2. *Psettina variegata*, PMBC 37889, 87.4 mm SL, male, Andaman Sea off Thailand. Upper, ocular side; lower, blind side. Scale bars 20 mm.

Family Samaridae Jordan and Goss, 1889
Genus *Samariscus* Gilbert, 1905
***Samariscus huysmani* Weber, 1913**
Figs. 3–5; Table 1

Samariscus huysmani Weber, 1913: 420, fig. 6 in pl. 6 (original description; type locality: Java Sea, Indonesia); Norman 1927: 47 (Gulf of Martaban, Andaman Sea off Myanmar); Hoese and Bray 2006: 1840 (Australia); Diaz de Astarloa *et al.* 2013: 245, table 1 (in part; Java Sea); Psomadakis *et al.* 2019: 594, fig. 425 in pl. 55 (Myanmar).

Samariscus macrognathus Fowler, 1934: 343, fig. 97 (original description; type locality: West off Luzon Island); Voronina and Suzumoto 2017: 8 (comparative materials; Solomon Islands).

Diagnosis. Dorsal-fin rays 68–75; anal-fin rays 54–58; pectoral-fin rays 5; lateral-line scales 68–77; vertebrae 9 + 29–31; two nostrils on blind side; mouth oblique; upper jaw extending posteriorly below anterior 1/3 of lower eye; ocular-side pectoral fin longer than head, extending posteriorly to middle of body in small specimens, but not reaching middle of body in large specimens; many small ring-like spots scattered on ocular side of head and body; no ocelli on ocular side of body (based on Weber 1913; Weber and de Beaufort 1929; Norman 1934; present study).

Materials examined. PMBC 38419, 1 specimen, 73.5 mm SL, male, St. C2, 9°00′N 97°48′E to 9°01′N 97°50′E, 70 m depth, otter trawl, 17 Feb. 1998, coll. by S. Bussarawit and C. Aungtonya; PMBC 38420, 1 specimen, 89.0 mm SL, male, St. J1, 7°15′N 99°03′E to 7°15′N 99°04′E, 43–40 m depth, Agassiz trawl, 27 Feb. 2000, coll. by C. Aungtonya and V. Vongpanich; PMBC 38421(L), 1 specimen, 79.5 mm SL, female, PMBC 38421(S), 1 specimen, 52.6 mm SL, sex unknown, St. K3, 7°00′N 98°41′E to 7°01′N 98°43′E, 83–81 m depth, Agassiz trawl, 29 Feb. 2000, coll. by C. Aungtonya and V. Vongpanich.

Comparative materials. *Samariscus huysmani*: USNM 228534, 104.0 mm SL, female, Carigara Bay, Samar Sea, Philippines, 60–65 m depth; ZMA.PISC.109.324, holotype, 79.5 mm SL, male, Java Sea, Indonesia, 88 m depth.

Samariscus macrognathus: USNM 93088, holotype, 43.9 mm SL, sex unknown, west off Luzon Island, 82 m depth.

Description of Andaman Sea specimens. Counts and measurements (% SL) are listed in Table 1.

Measurements (in SL or HL): HL 4.1–4.8 in SL on ocular side, 3.9–4.6 in SL on blind side; body depth 2.4–2.5 in SL; snout length 3.9–4.1 in HL to upper orbit, 4.3–4.9 in HL to lower orbit; upper orbit length 3.2–3.6 in HL; lower orbit length 3.3–3.6 in HL; interorbital width 17.1–25.3 in HL; length of ocular-side upper jaw 2.0–2.4 in HL, blind-side upper jaw 2.3–2.7 in HL; length of ocular-side lower jaw 1.6–1.9 in HL, blind-side lower jaw 1.7–2.0 in HL; pectoral-fin length 1.8–3.4 in SL; length of ocular-side pelvic fin 5.6–6.6 in SL, blind-side pelvic fin 7.3–9.1 in SL; length of ocular-side pelvic-fin base 15.4–17.3 in SL, blind-side pelvic-fin base 17.0–22.4 in SL; caudal peduncle depth 6.5–7.4 in SL; length of middle caudal-fin ray 3.7–4.3 in SL.

Body laterally compressed, moderately elongate (Fig. 3). Head moderately large, its dorsal profile acutely sloping anteriorly. Eyes dextral, small, not covered by scales except dorsal part of lower eye with a few scales; eyes separated by narrow, scaly bony ridge; anterior margins of upper and lower orbits nearly on same vertical line. Two nostrils on each side of head, short tubes on ocular side, minute tubes on blind side. Supraorbital canal pores two on ocular side, above nostrils; single on blind side, above anterior nostril. Mouth oblique; maxilla extending posteriorly below anterior 1/3 of lower eye; teeth in bands anteriorly, arranged in one or two rows posteriorly on both premaxillae; no teeth on maxillae; teeth in bands on both lower jaws. Vomer and palatine toothless. Gill rakers on 1st arch of both sides short, slightly serrated on their outer and inner edges. Scales ctenoid on ocular side of head and body; ctenoid, weakly ctenoid or cycloid on blind side of head and anterior half of body, ctenoid or weakly ctenoid on blind side of posterior half of body; snout, jaws and fins scaleless, except basal regions on both sides of caudal fin with a few scales. Lateral line straight on ocular side, absent on blind side. Anterior dorsal-fin rays not prolonged, not separated from following rays. Anal-fin origin slightly posterior to anus. Ocular-side pectoral fin

long, its fin rays extending posteriorly to middle of body in specimen whose size equals 52.6 mm SL; moderately long, but not reaching middle of body in specimens larger than 73.5 mm SL; no pectoral fin on blind side. Pelvic fins small and sub-symmetrical; membrane of ocular-side pelvic fin connected to anal fin. All dorsal-, anal-, pectoral- and pelvic-fin rays simple. Caudal fin moderately short, rounded; all caudal-fin rays bifurcated, except two dorsalmost and ventralmost fin rays simple. Anus on midventral line, between pelvic and anal fins. Urogenital papilla on ocular side, just above anal-fin origin.

Color after fixation. Body light brown on both sides; five and four faint brown ring-like blotches along dorsal and ventral margins on ocular side of body, respectively; small, brown, ring-like spots scattered on ocular side of head, body and dorsal-, anal-, caudal- and pelvic-fin membranes; single, small, brown spot on ends of dorsal and anal fins; no blotches or spots on blind side. Ocular-side pectoral fin dark brown, except white on proximal and distal parts.

Distribution. *Samariscus huysmani* is distributed off Java and Bali islands (Indonesia), Australia, Solomon Islands and Gulf of Martaban (Andaman Sea off Myanmar) at depths of 88–122 m (Weber 1913; Norman 1927; Hensley 2001; Hoese and Bray 2006; Voronina and Suzumoto 2017), off the Philippines at depths of 60–82 m and the Andaman Sea off Thailand at depths of 43–81 m (present study).

Remarks. Among 20 valid species of *Samariscus*, the following combination of characters of the present specimens is closest to those of *S. huysmani*: dorsal-fin rays 69–75; anal-fin rays 54–58; pectoral-fin rays 5; lateral-line scales 68–72; mouth oblique; many small ring-like spots present and ocelli absent on ocular side of head and body (vs. 68–72, 55–57 and 5 rays, 70–75 scales, mouth oblique, ring-like spots present and ocelli absent in *S. huysmani*) (*e.g.*, Weber 1913; Weber and de Beaufort 1929; Norman 1934; Voronina 2009b; Kawai *et al.* 2011). However, the pectoral fin of the smallest present specimen [PMBC 38421(S), 52.6 mm SL] is much longer than that of the other present specimens and that reported in previous descriptions: *i.e.*, pectoral fin extending posteriorly to middle of body in PMBC 38421(S) vs. not reaching middle of body in the other present specimens and in previous descriptions (Weber 1913; Weber and de Beaufort 1929; Norman 1934; present study). We considered these differences as an intraspecific variation of a single species because the graph with plots of the pectoral-fin length of the present specimens, single non-type (USNM 228534) and the holotype (ZMA.PISC.109.324) suggests that relative length of this feature tends to decrease with growth (Fig. 4). Therefore, we identified the present specimens as *Samariscus huysmani.*

Samariscus macrognathus Fowler, 1934 was considered to be different from *S. huysmani* in having four pectoral-fin rays, and a very long pectoral fin extending to the middle of the body (vs. five pectoral-fin rays and short pectoral fin not reaching middle of body in *S. huysmani*) (*e.g.*, Fowler 1934; Quéro *et al*. 1989; Hensley 1993). However, we found the holotype of *S. macrognathus* (USNM 93088) has five pectoral-fin rays (Table 1). Also, the length of the ocular-side pectoral fin of the holotype is within the range of lengths observed for *S. huysmani* (Fig. 4; Table 1). Additionally, the holotype of *S. macrognathus* morphologically resembles that of *S. huysmani* in meristic features (dorsal-fin rays 68, anal-fin rays 54, pectoral-fin rays 5 and lateral-line scales ca. 70 in the holotype of *S. macrognathus* vs. 68–75, 54–58 and 5 rays and 68–77 scales in *S. huysmani*, respectively), in having an oblique mouth, and having small rings scattered on the ocular side of the body (Weber 1913; Weber and de Beaufort 1929; Fowler 1934; present study; Fig. 5; Table 1). Therefore, we regard *S. macrognathus* as a junior synonym of *S. huysmani.*

Samariscus huysmani was previously known from the Java Sea, Solomon Islands, Australia and Myanmar (*e.g.*, Norman 1927; 1934; Hoese and Bray 2006; Voronina and Suzumoto 2017; Psomadakis *et al.* 2019). Accordingly, the present study represents the first record of this species from waters off Thailand. Additionally, the holotype of *S. macrognathus* (USNM 93088) and a single non-type specimen (USNM 228534) represent the first record of *S. huysmani* from the Philippines, which represents the northernmost record for this species.

Table 1. Counts and measurements of *Samariscus huysmani*.

Locality	Andaman Sea				Java Sea	Philippines	
	PMBC 38419	PMBC 38420	PMBC 38421(L)	PMBC 38421(S)	ZMA.PISC. 109.324 (Holotype)	USNM 93088 (Holotype of *S. macrognathus*)	USNM 228534
	male	male	female	sex unknown	male	sex unknown	female
SL (mm)	73.5	89.0	79.5	52.6	79.5	43.9	104.0
Counts							
Dorsal-fin rays	69	71	72	75	71	68	71
Anal-fin rays	54	56	57	58	56	54	57
Pectoral-fin rays	5	5	5	5	5	5	5
Pelvic-fin rays on ocular side	5	5	5	5	5	5	5
Pelvic-fin rays on blind side	5	5	5	5	5	5	5
Caudal-fin rays	16	16	16	16	16	16	16
Lateral-line scales	72	68	71	72	74	ca. 70	77
Vertebrae	9 + 30	9 + 30	9 + 30	9 + 30	9 + 30	9 + 31	9 + 31
Measurements (% SL)							
HL on ocular side	24.3	21.0	21.3	24.0	20.4	24.1	25.7
HL on blind side	25.2	22.0	22.4	25.5	21.1	25.1	26.8
Body depth	40.7	39.6	42.2	41.4	39.6	42.8	42.5
Snout length to upper orbit	6.1	5.3	5.3	5.9	5.4	4.9	5.2
Snout length to lower orbit	5.0	4.6	4.4	5.6	4.4	5.2	4.4
Upper orbit length	7.1	5.8	6.4	7.5	5.9	8.1	6.9
Lower orbit length	6.8	6.0	6.4	7.2	5.9	7.6	6.9
Interorbital width	1.1	1.2	1.2	1.0	1.0	1.8	1.6
Length of ocular-side upper jaw	10.1	9.2	10.5	10.9	8.7	12.5	7.0
Length of blind-side upper jaw	9.0	8.2	9.2	9.6	7.5	–	5.6
Length of ocular-side lower jaw	12.8	12.5	13.7	14.8	11.8	15.1	10.6
Length of blind-side lower jaw	12.4	11.4	12.6	13.6	11.2	14.2	9.5
Pectoral-fin length	36.4	29.1	29.9	55.5	24.9	43.0	32.7
Length of ocular-side pelvic fin	16.1	17.9	15.2	16.3	16.3	17.5	–
Length of blind-side pelvic fin	13.7	12.8	11.1	11.0	11.6	11.2	–
Length of ocular-side pelvic-fin base	5.8	6.5	6.0	6.5	6.3	4.9	6.1
Length of blind-side pelvic-fin base	4.5	4.6	4.9	5.9	5.4	4.0	4.7
Caudal peduncle depth	14.7	15.5	13.9	13.5	14.4	14.6	13.3
Length of middle caudal-fin ray	25.7	26.7	23.6	23.1	–	–	24.8

–: unmeasured due to damage.

Figure 3. *Samariscus huysmani*, PMBC 38421(L), 79.5 mm SL, female, Andaman Sea off Thailand. Upper, ocular side; lower, blind side. Scale bars 20 mm.

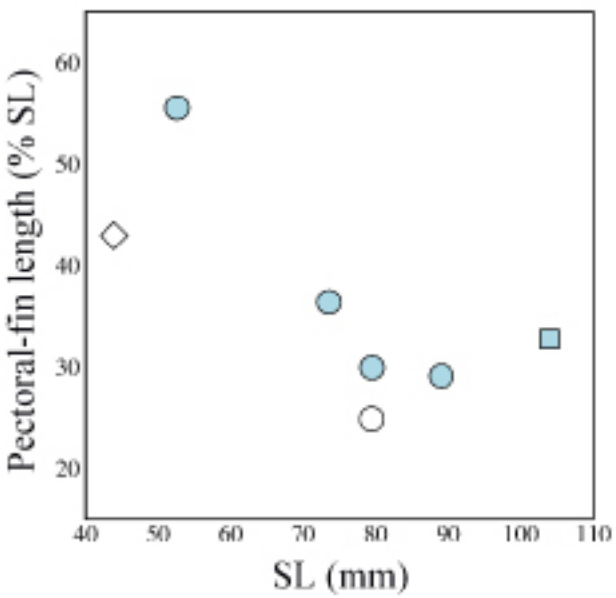

Figure 4. Pectoral-fin length (% SL) of *Samariscus huysmani*. Closed circle: non-type specimens from Andaman Sea; open circle: holotype of *S. huysmani* from Java Sea (ZMA.PISC.109.324); square: non-type specimen from Philippines (USNM 228534); diamond: holotype of *Samariscus macrognathus* from Philippines (USNM 93088).

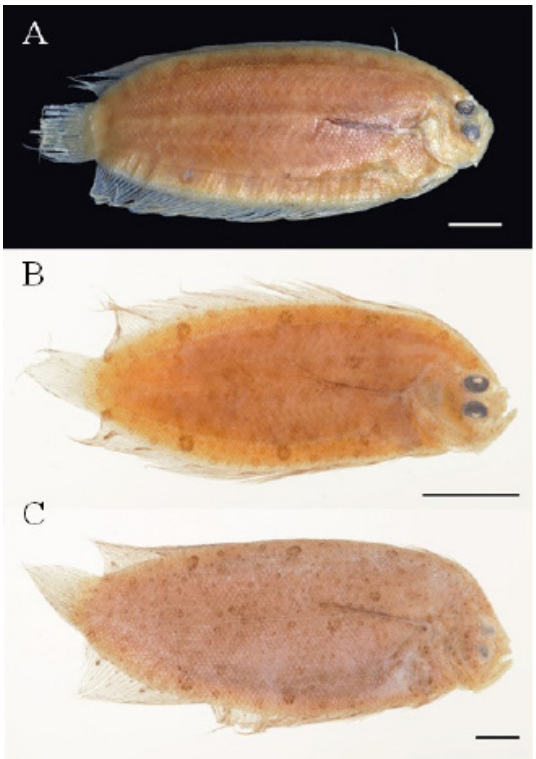

Figure 5. *Samariscus huysmani*. (A) ZMA.PISC.109.324, holotype, 79.5 mm SL, male, Java Sea; (B) USNM 93088, holotype of *S. macrognathus*, 43.9 mm SL, sex unknown, West off Luzon Island; (C) USNM 228534, 104.0 mm SL, female, Carigara Bay, Samar Sea, Philippines. Scale bars 10 mm.

***Samariscus inornatus* (Lloyd, 1909)**
Figs. 6–8; Table 2

Samaris inornata Lloyd,1909: 160, fig. 7 in pl. 148 (original description; type locality: Gulf of Aden, Arabian Sea).

Samariscus inornatus: Hensley 1993: 374, fig. 1 (Gulf of Aqaba, Red Sea).

Samariscus huysmani (not of Weber, 1913): Gloerfelt-Tarp and Kailola 1984: 279, unnumbered fig. (Indian Ocean off Java Island, Indonesia); Gloerfelt-Tarp and Kailola 2022: 287, unnumbered fig. (Indian Ocean off Java Island, Indonesia).

Diagnosis. Dorsal-fin rays 61–70; anal-fin rays 48–54; pectoral-fin rays 5; lateral-line scales 59–70; vertebrae 9–10 + 27–28; body deep, its depth 37.4–45.1% SL; head moderate, 22.6–25.9% SL; mouth slightly oblique; upper jaw not extending posteriorly below anterior 1/3 of lower eye; ocular-side lower jaw length 37.0–44.8% HL; two nostrils on blind side; ocular-side pectoral fin short, not reaching middle of body; many small black spots scattered on ocular side of head and body; no small ring-like spots or ocelli on ocular side of body; ocular-side pectoral fin with dark cross bands (based on Lloyd 1909; Norman 1927; 1934; Hensley 1993; present study).

Materials examined. PMBC 38422, 1 specimen, 82.1 mm SL, male, St. I4, 7°30′N 98°01′E to 7°31′N 98°00′E, 122–156 m depth, Agassiz trawl, 16 Feb. 2000, coll. by C. Aungtonya and V. Vongpanich; PMBC 38423(L), 1 specimen, 89.6 mm SL, male, PMBC 38423(S), 1 specimen, 87.2 mm SL, female, St. K4, 7°00′N 98°21′E to 6°59′N 98°21′E, 104–101 m depth, Agassiz trawl, 23 Feb. 2000, coll. by C. Aungtonya and V. Vongpanich.

Comparative materials. *Samariscus inornatus*: BMNH 1927.1.6.67, syntype, 79.7 mm SL, male, ZSI F2401/1, syntype, 93.5 mm SL, male, ZSI F2402/1, syntype, 101.9 mm SL, male, 13°36′N 47°32′E, Gulf of Aden, Arabian Sea, ca. 234 m

depth; BMNH 1984.1.1.108, 91.2 mm SL, male, 8°50′S 114°14′E, eastern Indian Ocean off Java Island, Indonesia.

Samariscus japonicus: BSKU 7772, 82.7 mm SL, male, BSKU 7773, 91.5 mm SL, male, Mimase fish market, Kochi, Japan; BSKU 42954, 73.6 mm SL, male, BSKU 43295, 54.1 mm SL, female, BSKU 43355, 43.1 mm SL, sex unknown, BSKU 87647, 92.1 mm SL, male, BSKU 87648, 91.3 mm SL, male, Tosa Bay, Kochi, Japan; FAKU 55084, 74.6 mm SL, female, Hamada fish market, Shimane, Japan; FAKU 58183, 81.5 mm SL, male, Sea of Japan off San-in district, Japan; FAKU 82899, 79.3 mm SL, male, FAKU 82900, 79.5 mm SL, male, FAKU 82901, 86.4 mm SL, male, East China Sea off Southwest coast of Fukue-jima Island, Goto Islands, Nagasaki, Japan; FAKU 82908, 82.6 mm SL, male, locality unknown.

Description of Andaman Sea specimens. Counts and proportional measurements (% SL) are listed in Table 2.

Measurements (in SL or HL): HL 3.9–4.1 in SL on ocular side, 3.7–3.9 in SL on blind side; body depth 2.2–2.4 in SL; snout length 4.3–5.0 in HL to upper orbit, 5.7–6.2 to lower orbit; upper orbit length 2.8–2.9 in HL; lower orbit length 2.9–3.2 in HL; interorbital width 27.8–32.8 in HL; length of ocular-side upper jaw 3.1–3.5 in HL, blind-side upper jaw 4.0–4.5 in HL; length of ocular-side lower jaw 2.3–2.4 in HL, blind-side lower jaw 2.5–2.7 in HL; pectoral-fin length 4.4–5.0 in SL; length of ocular-side pelvic fin 6.5–7.1 in SL, blind-side pelvic fin 8.9–11.2 in SL; length of ocular-side pelvic-fin base 17.0–19.8 in SL, blind-side pelvic-fin base 21.7–23.5 in SL; caudal peduncle depth 6.8–7.0 in SL; length of middle caudal-fin ray 3.9–4.3 in SL.

Body laterally compressed, elliptical, deepest at point in anterior 1/3 of body (Fig. 6). Head moderately large, its dorsal profile smoothly sloping anteriorly. Eyes dextral, small, not covered by scales, separated by narrow, scaly bony ridge; anterior margins of upper and lower orbits nearly on same vertical line. Two nostrils on each side of head; ocular-side anterior nostril a long tube longer than posterior nostril; blind-side anterior nostril antero-ventral to posterior nostril. Supraorbital canal pores two on ocular side, above nostrils; single on blind side, above posterior nostril. Mouth slightly oblique; maxilla not extending beyond anterior 1/3 of lower eye; teeth in bands on upper and lower jaws on both sides. Gill rakers on 1st arch of both sides very short, knob like, slightly serrated on their inner edge; scales cycloid except for a few ctenoid scales on blind side of head and anterior 1/3 of body, ctenoid on posterior 2/3 of body; snout, jaws and fins scaleless, except caudal fin with a few scales along its fin rays. Lateral line straight on ocular side, absent on blind side. Anterior dorsal-fin rays not prolonged, not separated from following rays; dorsal-fin membrane covering nostrils and supraorbital canal pore on blind side. Anal-fin origin just posterior to anus. Ocular-side pectoral fin short, its fin rays not reaching middle of body; no pectoral fin on blind side. Pelvic fins small and sub-symmetrical; membrane of ocular-side pelvic fin connected to anal fin; membrane of blind-side pelvic fin connected to anus. All dorsal-, anal-, pectoral- and pelvic-fin rays simple. Caudal fin moderately short, rounded; all rays bifurcated, except two dorsalmost and ventralmost fin rays simple. Anus on midventral line. Urogenital papilla on ocular side, just above anus.

Color after fixation. Body light brown on ocular side, pale on blind side; five or four dark blotches arranged in single row along dorsal and ventral margins on ocular side of body, respectively; many small black spots scattered on ocular side of head and body; no blotch or spot on blind side of head and body. Single brown blotch on ocular-side lower jaw. Dorsal and anal fins light brown with faint brown blotches arranged in single row along their basal regions, respectively; single black vertical band on posteriormost parts of dorsal and anal fins; single black spot between last faint blotch and vertical band on dorsal and anal fins; white distal margin on anterior to middle portions of dorsal and anal fins. Caudal fin black distally; two black spots on its basal region, each arranged in same vertical line. Pectoral fin pale with dark brown crossbands. Ocular-side pelvic fin light brown with single faint brown blotch; blind-side pelvic fin pale without blotches.

Distribution. *Samariscus inornatus* is distributed in the Gulf of Aden (Arabian Sea), the Gulf of Aqaba (Red Sea) and the eastern Indian Ocean off-Java Island at depths of 238–260 m (Lloyd 1909; Gloerfelt-Tarp and Kailola 1984; 2022; Hensley 1993; present study) and in the Andaman Sea off Thailand at depths of 101–156 m (present study).

Table 2. Counts and measurements of *Samariscus inornatus*.

Locality	Andaman Sea			Java Sea	Arabian Sea
	PMBC 38422	PMBC 38423(L)	PMBC 38423(S)	BMNH 1984.1.1.108	BMNH 1927.1.6.67 (Syntype)
	male	male	female	male	male
SL (mm)	82.1	89.6	87.2	91.2	79.7
Counts					
Dorsal-fin rays	70	70	70	66	70
Anal-fin rays	54	53	54	51	53
Pectoral-fin rays	5	5	5	5	5
Pelvic-fin rays on ocular side	5	5	5	5	5
Pelvic-fin rays on blind side	5	5	5	5	5
Caudal-fin rays	16	16	16	16	16
Lateral-line scales	68	63	67	70	68
Vertebrae	9 + 28	10 + 28	9 + 28	9 + 27	9 + 28
Measurements (% SL)					
HL on ocular side	24.4	25.4	25.9	25.1	25.7
HL on blind side	25.5	26.6	27.3	25.6	26.8
Body depth	40.8	42.6	45.1	41.8	42.5
Snout length to upper orbit	5.7	5.2	5.2	5.4	5.2
Snout length to lower orbit	4.3	4.4	4.2	4.3	4.4
Upper orbit length	8.7	8.9	9.0	8.6	8.2
Lower orbit length	7.7	8.3	9.0	8.4	7.6
Interorbital width	0.7	0.9	0.9	0.9	0.9
Length of ocular-side upper jaw	7.0	8.2	7.9	7.5	7.0
Length of blind-side upper jaw	5.7	6.7	6.3	6.7	5.6
Length of ocular-side lower jaw	10.0	11.0	11.4	11.3	10.6
Length of blind-side lower jaw	9.4	10.6	10.5	10.6	9.5
Pectoral-fin length	22.9	19.9	21.2	22.3	32.7
Length of ocular-side pelvic fin	15.4	14.3	14.1	12.2	–
Length of blind-side pelvic fin	11.3	9.6	8.9	10.1	–
Length of ocular-side pelvic-fin base	5.6	5.1	5.9	6.1	6.1
Length of blind-side pelvic-fin base	4.3	4.3	4.6	4.5	4.7
Caudal peduncle depth	14.7	14.4	14.8	14.8	13.3
Length of middle caudal-fin ray	25.8	24.5	23.1	23.0	24.8

–: unmeasured due to damage.

Figure 6. *Samariscus inornatus*, PMBC 38423(L), 89.6 mm SL, male, Andaman Sea off Thailand. Upper, ocular side; lower, blind side. Scale bars 20 mm.

Remarks. The following combination of characters of the present specimens is very close to those of *S. inornatus* and *S. japonicus* among 20 valid species of *Samariscus*: *i.e.,* dorsal-fin rays 70; anal-fin rays 53–54; pectoral-fin rays 5; lateral-line scales 63–68; ocular-side pectoral fin very short, not reaching middle of body; and small ring-like spots and ocelli absent on ocular side of head and body in the present specimens vs. 61–70, 48–53 and 5 rays, 59–67 scales, pectoral fin very short, and small ring-like spots and ocelli absent in *S. inornatus* vs. 63–73, 47–57, 5, 49–ca. 65, very short and absent in *S. japonicus* (*e.g.*, Lloyd 1909; Norman 1934; Kamohara 1936; Matsubara and Takamuki 1951; Ochiai and Amaoka 1962; Hensley 1993). Among these two species, the length of the ocular-side lower jaw and the pectoral-fin coloration of the present specimens (2.3–2.4 in HL and dark crossbands present) are congruent with those of *S. inornatus* (2.2–2.7 in HL and present), but not with those of *S. japonicus* (1.9–2.1 in HL and absent) (Hensley 1993). Accordingly, we identified the present specimens as *Samariscus inornatus.* Although the number of anal-fin rays, lateral-line scales and length of ocular-side upper jaw of the present specimens (53–54, 63–68 and 3.1–3.5 in HL) are slightly different from those of the previous description of *S. inornatus* (48–53, 59–67 and 3.2–4.0 in HL: Hensley 1993), we regard these differences as intraspecific variation of *S. inornatus.*

We compared the morphology of *S. inornatus* with *S. japonicus* based on 5 and 13 specimens, respectively, and found that *S. inornatus* has many black spots on the ocular-side of head and body (Figs. 6, 7), while *S. japonicus* has less than 15 obscure brown spots on the ocular-side of head and body (Matsuura 1985: fig. 395; Yamada *et al*. 1995: fig. 293; Park *et al*. 2007: fig. 2; Tashiro 2020: fig. 6.6.c). It is also revealed that *S. inornatus* has fewer numbers of caudal vertebrae (27–28) and a larger head length (22.6–25.9% SL) compared with those of *S. japonicus* (28–30 and 19.5–23.6% SL, respectively) (Table 2; Fig. 8A). Additionally, as Hensley (1993) indicated, *S. inornatus* has a deeper body depth (% SL) and shorter length of the ocular-side lower jaw (% HL) than those of *S. japonicus*: body depth 37.4–45.1% SL and length of ocular-side lower jaw 37.0–44.8% HL in *S. inornatus* vs. 34.1–40.9% SL and 48.7–54.0% HL in *S. japonicus* (Fig. 8B, F). However, the length of the ocular-side lower jaw (% SL) overlaps widely between the two species: 10.1–11.4% SL in *S. inornatus* vs. 10.0–12.4% SL in *S. japonicus* (Fig. 8E). In addition, although Hensley (1993) suggested that the length of the ocular-side upper jaw is different between both species, we found that they overlap: 6.8–8.2% SL and 25.0–32.4% HL in *S. inornatus* vs. 5.8–8.4% SL and 29.6–35.7% HL in *S. japonicus*

(Fig. 8C, D). Therefore, we considered the coloration, number of caudal vertebrae, head length (% SL), body depth (% SL) and length of ocular-side lower jaw (% HL) as the valid diagnostic characters for separating *S. inornatus* and *S. japonicus*.

Lloyd (1909: fig. 7 in pl. 148) described the coloration of the ocular side of the syntypes of *S. inornatus* as "chestnut-brown with diffused blotches of sepia and dark grey". Although the distinctive spots are not preserved in one syntype (BMNH 1927.1.6.67: Fig. 7A), they are still preserved in two other syntypes (ZSI F2401/1 and ZSI F2402/1: Fig. 7B). Coloration of the ocular side of the present specimens (Fig. 6) and a comparative specimen (BMNH 1984.1.1.108; Fig. 7C) also resembles that of the syntypes described by Lloyd (1909). However, their coloration is different from that of the non-type specimen (HUJ 16980) described by Hensley (1993), whose ground color is grayish brown with faint black spots (Hensley 1993: fig. 1; Hensley and Amaoka 2022: unnumbered fig. in pl. 95). This suggests that *S. inornatus* varies in its ocular-side coloration.

Samariscus inornatus has previously been known from the Arabian Sea and the Red Sea (Lloyd 1909; Hensley 1993). Therefore, the present specimens represent the first records of this species from waters off Thailand and the eastern Indian Ocean. We also found another specimen of *S. inornatus* from the eastern Indian Ocean (BMNH.1984.1.1.108), which was collected from off Java Island and reported as *S. huysmani* by Gloerfelt-Tarp and Kailola (1984; 2022)

Family Soleidae Bonaparte, 1833
Genus *Aseraggodes* Kaup, 1858
***Aseraggodes kaianus* (Günther, 1880)**
Fig. 9

Solea kaiana Günther, 1880: 49, fig. C in pl. 2 (original description; type locality: Kai Islands, Indonesia).
Aseraggodes kaianus: Ochiai 1963: 32, pl.3 (southern

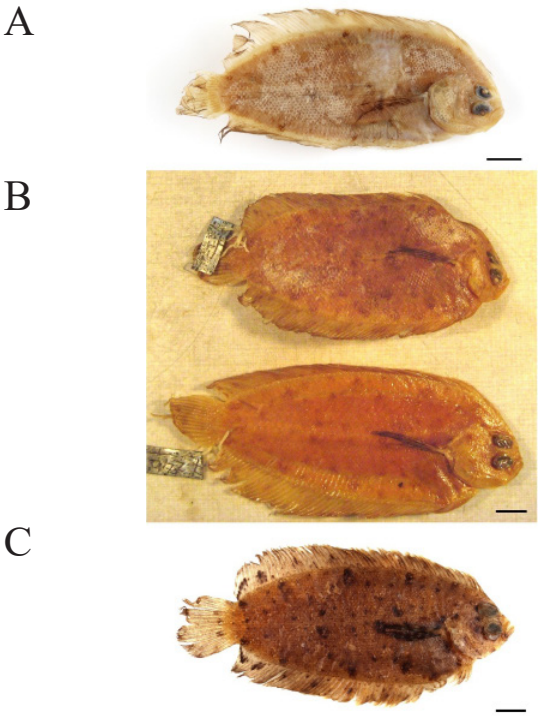

Figure 7. *Samariscus inornatus*. (A) BMNH 1927.1.6.6.7, syntype, 79.7 mm SL, male, Gulf of Aden; (B) ZSI F2401/1 (upper), syntype, male, 93.5 mm SL, ZSI F2402/1 (lower), syntype, male, 101.9 mm SL, Gulf of Aden; (C) BMNH 1984.1.1.108, 91.2 mm SL, male, off Java Island. Scale bars 10 mm.

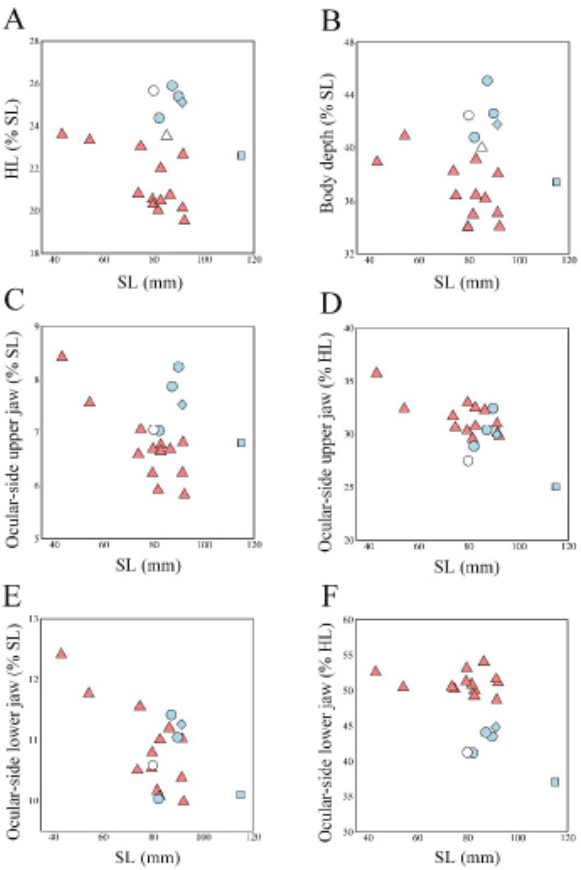

Figure 8. Measurements of *Samariscus inornatus* (SIN) and *S. japonicus* (SJA). (A) HL on ocular side (% SL); (B) body depth (% SL); (C) length of ocular-side upper jaw (% HL); (D) length of ocular-side upper jaw (% HL); (E) length of ocular-side lower jaw (% SL); (F) length of ocular-side lower jaw (% HL). Closed circle: non-type specimens of SIN from Andaman Sea; open circle: syntype of SIN from Arabian Sea (BMNH 1927.1.6.67); diamond: non-type specimen of SIN off Java Island (BMNH 1984.1.1.108); square: non-type specimen of SIN from Red Sea [HUJ 16980, data from Hensley (1993)]; closed triangle: non-type specimens of SJA from Japan; open triangle: holotype of SJA from Japan [data from Kamohara (1936)].

Japan); Shen and Lee 1981: 32 (southern Taiwan); Yamada et al. 1995: 51, 210, fig. 296 (Yellow Sea and East China Sea); Park *et al.* 2007: 77, fig. 2C (South Korea); Randall and Desoutter-Meniger 2007: 311, fig. 6 (Timor Sea and southern Japan).

Diagnosis. Dorsal-fin rays 65–71; anal-fin rays 48–50; lateral-line scales 73–76, including 10–12 anterior to upper end of gill opening; total vertebrae 35–37; dorsal-fin pterygiophores anterior to 4th neural spine 10–12; anterior margin of lower eye below anterior 1/3 of upper eye; anterior nostril short, not reaching lower eye when bent posteriorly; dorsal- and anal-fin rays simple, except last 8–18 rays branched; pelvic-fin membrane not connected to anal-fin membrane, or to urogenital papilla or anus; lateral line on ocular side of head unbranched; polygon-like brown blotches forming reticulated pattern on ocular side of head and body (based on Günther 1880; Ochiai 1963; Park *et al.* 2007; Randall and Desoutter-Meniger 2007; present study).

Material examined. PMBC 38424, 1 specimen,

male, 85.2 mm SL, St. C4, 9°00′N 97°31′E to 9°01′N 97°29′E, 110–164 m depth, Agassiz trawl, 2 Feb. 2000, coll. by C. Aungtonya and V. Vongpanich.

Description of Andaman Sea specimen. Meristic features: dorsal-fin rays 68 (last 16 rays branched); anal-fin rays 49 (last 12 branched); pelvic-fin rays 5 in both pelvic fins; caudal-fin rays 18; lateral-line scales 76 including 14 anterior to upper end of gill opening; scales above lateral line 18, below lateral line 19; vertebrae 10 + 25; dorsal-fin proximal pterygiophores anterior to 4th neural spine 12.

Measurements (% SL): HL 26.4 on ocular side; body depth 39.4; body width 5.8; preorbital length 6.5; snout length 7.6; upper eye diameter 3.6; lower eye diameter 3.8; interorbital width 2.4; length of blind-side upper jaw 7.0; length of ocular-side pelvic fin 10.8, blind-side pelvic fin 9.5; caudal peduncle depth 11.9; caudal peduncle length 1.7.

Measurements (in SL or HL): HL 3.8 in SL on ocular side; body depth 2.5 in SL; body width 17.3 in SL; preorbital length 4.0 in HL; snout length 3.5 in HL; upper eye diameter 7.4 in HL; lower eye diameter 7.0 in HL; interorbital width 11.0 in HL; length of blind-side upper jaw 3.8 in HL; length of ocular-side pelvic fin 9.3 in SL, blind-side pelvic fin 10.6 in SL; caudal peduncle depth 8.4 in SL; caudal peduncle length 60.0 in SL.

Distribution. *Aseraggodes kaianus* is distributed

Figure 9. *Aseraggodes kaianus*, PMBC 38424, 85.2 mm SL, male, Andaman Sea off Thailand. Upper, ocular side; lower, blind side. Scale bars 20 mm.

at the Kai Islands, in the Timor Sea, South China Sea, East China Sea, off southern Japan at depths of 128–236 m (*e.g.*, Ochiai 1963; Shen and Lee 1981; Yamada *et al.* 1995; Park *et al.* 2007; Randall and Desoutter-Meniger 2007) and the Andaman Sea off Thailand at a depth of 110–164 m (present study).

Remarks. The number of total vertebrae (35) of the present specimen is less than that (36–37) reported in previous descriptions of *A. kaianus* (Ochiai 1963; Park *et al.* 2007; Randall and Desoutter-Meniger 2007; Randall *et al.* 2013). However, this difference is considered to represent intraspecific variation because several congeneric species have similar ranges in this count (*e.g.*, 36–38 in *Aseraggodes nigrocirratus* Randall, 2005: Randall 2005; Randall *et al.* 2013). All other diagnostic characters (see Diagnosis) of the present Andaman Sea specimen (PMBC 38424) are consistent with those reported for *A. kaianus* in previous studies.

Aseraggodes kaianus has not been reported from waters off Thailand (*e.g.*, Punpoka 1964; Suvatti 1981; Monkolprasit *et al.* 1997; Satapoomin 2011) and was previously known only from western Pacific locations (*e.g.*, Park *et al.* 2007; Randall and Desoutter-Meniger 2007). Accordingly, the present study represents the first records of this species from Thailand and the Indian Ocean.

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