

Records of *Spottobrotula mahodadi* (Ophidiiformes: Ophidiidae) and *Hapalogenys bengalensis* (Perciformes: Hapalogenyidae) from the Andaman Sea, with a Note on the Fresh Coloration of *S. mahodadi*

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Two specimens of *Spottobrotula mahodadi* Cohen and Nielsen, 1978 (Ophidiiformes: Ophidiidae), collected from the Andaman Sea, northeastern Indian Ocean, represent the second record of the species, previously known only from the holotype, also from the Andaman Sea. The fresh coloration of *S. mahodadi* is described for the first time. In addition, a single specimen of *Hapalogenys bengalensis* Mohapatra, Ray, and Kumar, 2013 (Perciformes: Hapalogenyidae) previously known only from its type locality off West Bengal, India (northern Bay of Bengal), was collected from the Andaman Sea and represents the first record of the species for that region.

Key Words: first record, distribution, morphology, Indian Ocean, Thailand.

Introduction

Records of *Spottobrotula mahodadi* Cohen and Nielsen, 1978 (Ophidiidae) have not been verified since the original description by Cohen and Nielsen (1978) on the basis of only the holotype collected off Barren Island (Andaman Islands) in the Andaman Sea. The Arabian Sea specimen referred to that species by Cohen and Nielsen (1982) was subsequently described as a new species, *Spottobrotula mossambica* Nielsen, Schwarzhans, and Uiblein, 2014. Similarly, no additional specimens of *Hapalogenys bengalensis* Mohapatra, Ray, and Kumar, 2013 [Hapalogenyidae; family placement following Mohapatra *et al.* (2013)] are known since the original description based on 14 specimens collected off West Bengal, India in the northern Bay of Bengal. Two specimens of *S. mahodadi* and a single specimen of *H. bengalensis* were collected from the Andaman Sea and are reported herein as the second and first records, respectively, of those species from that region.

Materials and Methods

Methods of counts and measurements generally followed Nielsen *et al.* (1999, 2014) for *Spottobrotula* and Iwatsuki *et al.* (2000) for *Hapalogenys*. Counts of the median-fin rays and vertebrae were based on X-ray photographs. Otolith morphology of *Spottobrotula* could not be checked because the specimens were in poor condition. Standard length is

abbreviated as SL. The distribution map was prepared using Quantum GIS 2.2 (Quantum GIS Development Team 2014), with data from ETOPO1 (Amante and Eakins 2009) and GSHHG (Wessel and Smith 1996). All specimens examined in this study are deposited in the Kagoshima University Museum (KAUM), Kagoshima; and the Thailand Natural History Museum (THNHM), Pathum Thani, including a sample of *Hapalogenys merguensis* Iwatsuki, Satapoomin, and Amaoka, 2000 [KAUM-I. 33394, 119.4 mm SL, Andaman Sea (obtained at fishing port at Bang Rin, Mueang Ranong, Ranong Province, Thailand), bottom trawl].

Spottobrotula mahodadi Cohen and Nielsen, 1978
(Figs 1, 2; Table 1)

Material examined. KAUM-I. 33115, 308.6 mm SL, Andaman Sea (obtained at fish market at Mahachai, Samut Prakan Province, Thailand), bottom trawl; THNHM-F 13331, 267.6 mm SL, Andaman Sea (obtained at fishing port at Bang Rin, Mueang Ranong, Ranong Province, Thailand), bottom trawl.

Description. Meristics and measurements expressed as percentages of SL shown in Table 1. Body robust and oblong, well compressed posteriorly, with pointed caudal fin; lateral line slightly upwardly curved above pectoral fin, reaching caudal-fin base; anus just before anal-fin origin. Head moderately large, its length 4.2–4.3 in SL; snout blunt, slightly protruding beyond upper jaw; mouth moderately large, maxilla expanded posteriorly, with slightly concave posterior margin, extending beyond vertical through pos-

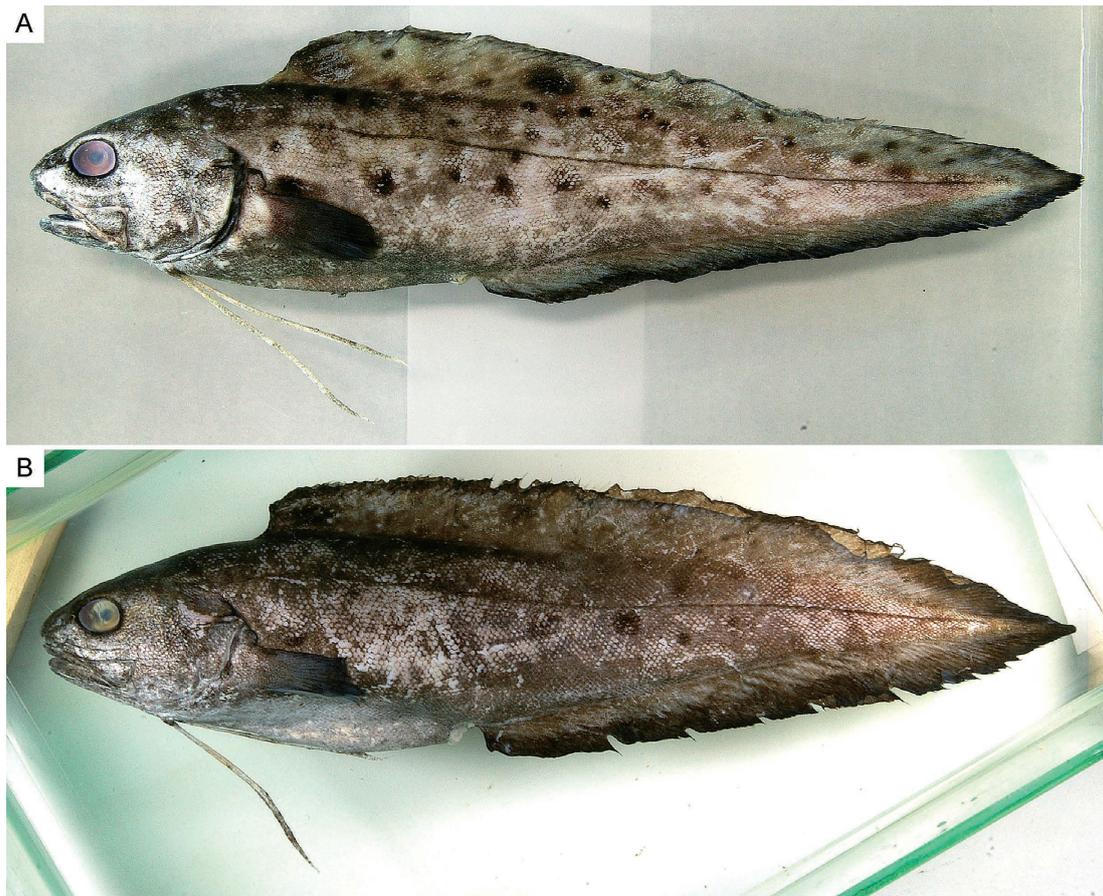


Fig. 1. Fresh specimens of *Spottobrotula mahodadi* from the Andaman Sea. A, THNHM-F 13331, 267.6 mm SL; and B, KAUM-I. 33155, 308.6 mm SL.

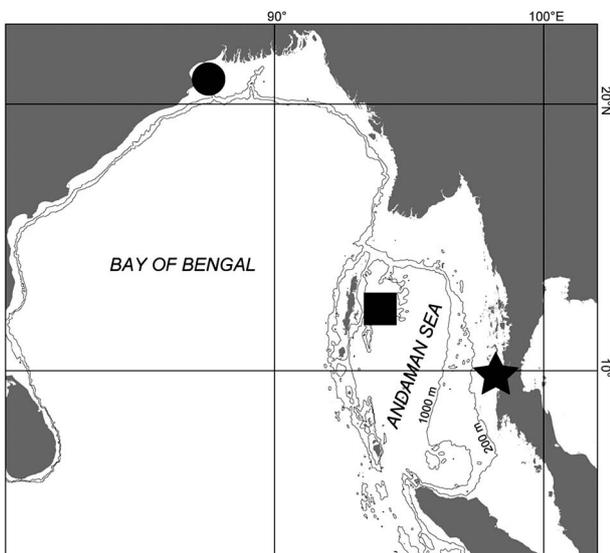


Fig. 2. Map showing previously known records of *Spottobrotula mahodadi* (square) and *Hapalogenys bengalensis* (circle); and location of Bang Rin, Ranong Province, Thailand where the present specimens of the two species were obtained without precise collection locality details (see Remarks for *S. mahodadi*) (star). Note: one specimen of *S. mahodadi* was obtained at a fish market in Mahachai, near Bangkok without precise locality details, but it was considered to be from the Andaman Sea.

terior margin of orbit; lower jaw slightly protruding beyond tip of upper jaw; lips with numerous papillae; eyes moderately large, orbit diameter smaller than snout length, snout length 1.3 times orbit diameter; anterior nostril located at approximate midpoint of straight line between anterior margin of eye and snout tip, with very short raised rim and small skin flap; posterior nostril a simple pore just in front of eye. Both jaws with narrow teeth bands of *ca.* 5–7 rows of small, pointed conical teeth anteriorly, width of teeth band decreasing posteriorly; palatine with moderately long teeth band of *ca.* 7 irregular rows of small pointed teeth, width of teeth band decreasing posteriorly; vomerine teeth band subtriangular with posterior margin deeply concaved, its anterior tip broad and rounded, with many small, conical teeth; an elongate median tooth patch on basibranchial. Opercle with a short strong spine, its tip not reaching posterior margin of gill cover; no spines on preopercle. Anterior gill arch with a small knob and 3 short robust rakers on upper limb, a long raker at angle, 6 or 7 long rakers on lower limb, and 7 small knobs on hypobranchial segment; longest raker slightly shorter than longest gill filament. Infraorbital pores 6, comprising 3 large slit-shaped anterior pores and 3 very small posterior pores; supraorbital pore single; mandibular pores 6; lower preopercular pore single. Head and body, including maxilla, covered with overlapping, elongate cycloid scales; small cycloid basal scales extending onto almost

Table 1. Meristics and morphometrics of *Spottobrotula mahodadi* from the Andaman Sea, expressed as percentages of SL.

	Present study		Nielsen <i>et al.</i> (2014)
	KAUM-I. 33115	THNHM-F13331	Holotype
Dorsal-fin rays	107	105	104
Caudal-fin rays	9	9	8
Anal-fin rays	81	81	78
Pectoral-fin rays	30	30	30
Pelvic-fin rays	2	2	2
Pseudobranchial filaments	40	29	35
Long rakers on anterior gill arch	10	10	11
Total gill rakers	18	17	16
Dorsal-fin rays before level of anal-fin origin	27	27	30
Scale rows between dorsal-fin origin and lateral line	18	18	18
Precaudal vertebrae	16	16	15
Total vertebrae	58	58	56
SL (mm)	308.6	267.6	216
Head length (% SL)	23.0	23.7	22.0
Body depth at anal-fin origin	18.4	18.1	19.0
Upper-jaw length	11.8	12.1	10.5
Posterior height of maxillary	2.9	3.0	2.7
Diameter of eye window	4.8	5.3	4.6
Interorbital width	6.2	5.6	5.7
Postorbital length	13.2	13.2	12.5
Pre-pelvic-fin length	15.0	16.4	17.5
Pre-anal-fin length	45.8	44.2	43.5
Pre-dorsal-fin length	24.3	25.2	24.0
Pelvic-fin base to anal-fin origin	32.9	29.8	28.0
Pectoral-fin length	13.5	13.8	12.0
Pelvic-fin length	24.4	26.7	22.5

entire surface of dorsal and pectoral fins, and about basal half of anal and caudal fins; lips, ventral surface of lower jaw, pectoral axilla, and branchiostegal membrane without scales. Dorsal-fin origin above pectoral-fin base; anal-fin origin clearly anterior to mid-body, situated below base of 28th or 31st dorsal-fin ray; caudal fin connected with dorsal and anal fins. Pectoral fin moderately large with rounded contour; a prominent skin flap above its base. Pelvic-fin base situated below preopercle, rays thick, extremely long, extending beyond a vertical through pectoral-fin tip but clearly not reaching anus when depressed, with numerous small papillae distally.

Fresh coloration (Fig. 1). Head and body entirely greyish-white or pale brown (head silvery-white in THNHM-F 13331 due to missing scales); anterodorsal body and dorsal head blackish; anus whitish; lateral line with blackish tinge. Body with about 26 (THNHM-F 13331) or 10 (KAUM-I. 33115; partially faded due to missing scales) rounded dark brown to black spots, their size slightly smaller than orbit diameter, irregularly scattered on upper two-thirds of body, including *ca.* 7 spots along dorsal-fin base in THNHM-F 13331 (condition unconfirmed in KAUM-I. 33115). Iris dark yellow in KAUM-I. 33115, dark red in THNHM-F 13331 (most likely bloodied); orbit rim blackish marginally. Ground color of dorsal, anal, and caudal fins greyish-white or pale brown. Dorsal fin with *ca.* 13 (THNHM-F 13331) or 7 (KAUM-I. 33115) dark brown to black spots, including a large spot (slightly larger than orbit diameter) on anterior-

most portion of fin close to fin origin, similar sized spot at level of mid-body, remaining smaller spots being scattered irregularly. Posteriormost portion of dorsal fin, caudal fin and entire anal fin with broad black margin, its width one third of fin height on anterior portion of anal fin. Pectoral fin black. Pelvic-fin rays white, with slight blackish tinge. In preserved condition, head, body and fins becoming darker; spot marking clearly retained.

Remarks. The present specimens are clearly identified as *Spottobrotula* in having the following diagnostic characters proposed by Nielsen *et al.* (1999, 2014): dorsal-fin origin situated before the third vertebrae; the head and body fully scaled; the pelvic fins with two rays in each bound together with tough skin; no spines on the preopercle; an opercular spine short, not reaching the posterior margin of the opercle; a prominent skin flap above base of the pectoral fin; 10 prolonged gill rakers on the anterior gill arch; 29 or 40 pseudobranchial filaments; a single median basibranchial tooth patch; granular teeth present on the palatines; 16 precaudal vertebrae; dorsal part of the head and body with rather large dark spots; and the dorsal fin with about two large black blotches.

In their review of *Spottobrotula*, Nielsen *et al.* (2014) recognized three species, *S. mahodadi*, *S. mossambica*, and *S. persica*, describing the latter two as new. The present specimens were identical with *S. mahodadi*, having the following diagnostic characters described by Nielsen *et al.* (2014): pelvic fins located below the preopercle (versus below the end

of the upper jaw in *S. mossambica* and *S. persica*); pre-pelvic-fin length 15.0%–16.4% SL (17.5% SL in holotype) (versus 10.5%–13.0% SL in *S. mossambica*; 13.0%–14.0% SL in *S. persica*); scale rows between the dorsal-fin origin and lateral line 18 (versus 14 or 15 in both species); and pectoral-fin rays 30 (versus 23–26; 23 or 24, respectively). Moreover, specific dark spots on the sides of the body extending onto the dorsal fin of the present specimens matched that feature of the *S. mahodadi* holotype (versus a broad dark band from the eye to behind the pectoral fin and three black ocelli on the dorsal fin in *S. mossambica*; and no black markings on the head or body in *S. persica*) (Cohen and Nielsen 1978; Nielsen *et al.* 2014). Some minor meristic and morphometric differences found between the present specimens and the holotype of *S. mahodadi* are simply due to limited material (Table 1). Nielsen *et al.* (2014) also regarded the numbers of long rakers on the anterior gill arch and pseudobranchial filaments as diagnostic for the species of *Spottobrotula*, *viz.*, 10 (present specimens) or 11 (holotype) gill rakers, and 29 or 40 (present specimens) and 35 (holotype) pseudobranchial filaments in *S. mahodadi*; 9–11 and 30–42, respectively, in *S. mossambica*; and 10–12 and 32–35, respectively, in *S. persica*, but the ranges of these counts clearly overlap.

Differences of the numbers of fin rays, gill rakers, pseudobranchial filaments, and the vertebrae between the present specimens and the holotype of *S. mahodadi* (Table 1) are most likely due to limited number of materials. These meristic characters, except for the caudal-fin rays, are considerably variable for the congener, *S. mossambica* (based on 14 specimens) (Nielsen *et al.* 2014). Differences of the number of dark spots on the body and median fins among the present specimens and the holotype of *S. mahodadi* are tentatively regarded as the intraspecific variations. Examination of more specimens is necessary to determine what factors (*e.g.*, the body size and sex), if any may be related to such morphological differences in *S. mahodadi*.

Spottobrotula mahodadi was originally described by Cohen and Nielsen (1978) on the basis of the holotype collected off Barren Island (Andaman Islands), Andaman Sea (Fig. 2). Cohen and Nielsen (1982) subsequently recorded an additional specimen collected off Oman (Arabian Sea), later followed by Manilo and Bogorodsky (2003), who listed *S. mahodadi* in their checklist of fishes of the Arabian Sea. However, Nielsen *et al.* (2014) recently re-identified the Omani specimen as a new species, *S. mossambica*. Accordingly, the present specimens of *S. mahodadi* from the Andaman Sea represent only the second valid record of the species.

Color photographs of the present specimens taken prior to preservation enabled the fresh coloration of *S. mahodadi* to be described for the first time. The original description of the species was based solely on the preserved holotype. In fresh condition, with the exception of the above-mentioned differences in dark markings, *S. mahodadi* is clearly distinguished from *S. mossambica* by its uniformly dark-brownish body and fins, whereas the latter species has yellowish-brown median fins and a light grey head with pale rose jaws (Nielsen *et al.* 2014: fig. 7b). The fresh coloration of *S. per-*

sica remains unknown.

The present specimen, THNHM-F 13331, collected by bottom trawl and obtained at a fish landing port in Mueang Ranong, Ranong Province, Thailand, lacks precise locality details (Fig. 2). The fishing boats from Ranong Province operate both in Thai and Thai-Myanmar boundary waters and some of them can operate in Myanmar water concessions (Panjarat 2008). Although the other specimen, KAUM-I. 33155, was obtained at a local fish market at Mahachai near Bangkok, also without precise collection locality details, it was apparently of Andaman Sea origin, according to a local fish seller. The holotype of *S. mahodadi* was collected at a depth of *ca.* 40 m (Nielsen *et al.* 2014). The present specimens lack collection depth data, but the major fishing grounds for demersal fishes are at depths of less than 100 m along the Andaman Sea coast of Thailand (Chullasorn 1998).

Hapalogenys bengalensis Mohapatra, Ray, and Kumar, 2013
(Figs 2, 3; Table 2)

Material examined. KAUM-I. 33393, 122.8 mm SL, Andaman Sea (obtained at fishing port at Bang Rin, Mueang Ranong, Ranong Province, Thailand), bottom trawl.

Description. Meristics and measurements expressed as percentages of SL shown in Table 2. Body deep, moderately compressed; caudal peduncle short, low; lateral line curved upward above pectoral fin, extending slightly onto caudal fin. Head moderately large, 2.4 in SL; orbit moderately large, slightly greater than interorbital width; nasal pores in front of orbit, anterior nostril with low raised rim with posterior flap, posterior nostril simple rounded pore; mouth relatively small, posterior margin of maxilla reaching vertical through anterior margin of orbit; lips fleshy with numerous minute papillae, anterior portion of lower jaw with dense cluster of minute papillae; mandible with 5 pairs of small pores; posterior margin of preopercle moderately serrated; upper portion of opercle with 2 flattened spines, lower spine longer than upper spine; posterior tip of cleithrum exposed, with serrated margin possessing 3 minute spinous points; posterior margin of posttemporal exposed, being semicircular bony crest, with serrated margin possessing 9 minute spinous points. Both jaws with narrow bands of *ca.* 5 rows of large pointed conical teeth in anterior portion, bands becoming narrower posteriorly, teeth on outermost row generally about twice length of teeth on inner rows, but not forming canines; teeth absent on vomer and palatine; tongue broad, rounded. Head and body, including snout, covered with ctenoid scales, but maxilla, around nostrils, pectoral axilla, and branchiostegal membrane naked; ventral surface of lower jaw covered with ctenoid scales, small patch of few poorly developed ctenoid scales between two posteriormost mandibular pores; dorsal, anal, pectoral, and caudal fins with high scaly sheath. Dorsal-fin origin above upper origin of pectoral-fin base, with single notch between spinous and soft-rayed portions; spines robust, first spine shortest, fourth spine longest; membrane of spinous portion deeply incised; all soft rays branched, soft-rayed portion with rounded

contour. Anal-fin origin below first dorsal-fin soft ray base; first spine short, second spine very robust, longest, clearly longer than third spine (second spine length in 1.8 times longer than third spine); soft rays all branched, contour of soft-rayed portion somewhat angular posteriorly. Pectoral fin pointed, posterior tip of longest ray reaching vertical through last dorsal-fin spine base. Pelvic-fin spine robust, first soft ray long, filamentous, its tip just reaching first anal-fin spine base when depressed. Caudal fin rounded.

Fresh coloration (Fig. 3). Head and body dark silvery-grey, paler ventrally. Iris dull yellow. Three broad, oblique, longitudinal bronze stripes on side of body; uppermost stripe from nape (close to dorsal-fin origin) to upper caudal-fin base, through base of dorsal-fin soft-rayed portion and dorsal surface of caudal peduncle; middle stripe from nape to mid caudal-fin base; lowermost stripe indistinct from snout, across lower orbit and opercle to lower caudal-fin base, broadest above anal-fin base; stripes broadly intercon-

Table 2. Meristics and morphometrics of *Hapalogenys bengalensis*, expressed as percentages of SL.

Locality	Present study	Mohapatra <i>et al.</i> (2013)
	KAUM-I. 33393 Andaman Sea	Type series (<i>n</i> = 14) West Bengal, India
Dorsal-fin rays	XI, 14	XI, 14
Anal-fin rays	III, 8	III, 9
Pectoral-fin rays	18	17–19
Pored lateral-line scales	43	42–45
Scales above lateral line	7	7–8
Scales below lateral line	19	19–20
All gill rakers, including rudiments ¹	7+15	no data
Developed gill rakers ¹	7+13	7+11
SL (mm)	122.8	45.6–87.4
Body depth (% SL)	51.2	43.4–53.0
Body depth at anal-fin origin	42.4	38.7–46.1
Body width	20.0	13.7–18.0
Head length	41.0	36.6–43.4
Snout length	12.5	7.1–11.8
Eye diameter	12.4	10.4–12.8
Interorbital width	8.8	7.9–10.2
Suborbital depth	6.3	5.3–8.0
Upper-jaw length	14.7	13.6–15.2
Pre-dorsal-fin length	46.7	38.2–50.1
Pre-anal-fin length	73.5	65.1–74.2
Pre-pelvic-fin length	43.5	40.2–45.3
1st dorsal-fin spine length	5.5	5.4–9.1
2nd dorsal-fin spine length	broken	12.4–16.6
3rd dorsal-fin spine length	19.4	16.0–22.9
4th dorsal-fin spine length	23.9	23.5–26.5
5th dorsal-fin spine length	23.5	20.9–24.7
Last dorsal-fin spine length	7.6	6.6–12.4
1st dorsal-fin soft ray length	broken	11.5–16.3
2nd dorsal-fin soft ray length	broken	13.3–19.5
1st anal-fin spine length	6.7	6.6–8.7
2nd anal-fin spine length	20.1	17.1–21.2
3rd anal-fin spine length	11.4	10.4–14.8
1st anal-fin soft ray length	16.8	10.7–17.2
2nd anal-fin soft ray length	14.8	11.1–18.7
Longest pectoral-fin ray length ²	25.0	24.8–28.3
Pelvic-fin spine length ³	19.0	16.6–21.5
1st pelvic-fin soft ray length	31.3 (right side)	27.9–34.7
Caudal-fin length	26.7	22.6–33.7
Dorsal-fin base length	60.1	55.2–66.9
Anal-fin base length	17.0	15.9–20.8
Caudal-peduncle depth	12.4	12.2–15.3
Caudal-peduncle length	12.4	11.9–18.6

¹rakers on upper limb + lower limb; ²“Longest pect-fin ray lgth [sic]” in Mohapatra *et al.* (2013); ³“Pectoral fin spine length” in Mohapatra *et al.* (2013).



Fig. 3. Fresh specimen of *Hapalogenys bengalensis* from the Andaman Sea. KAUM-I. 33393, 122.8 mm SL.

nected near level with end of dorsal-fin base and narrowly at caudal-fin base. Dorsal fin dark brownish, membrane between eighth spine and first soft ray tinged with black. Anal fin dark brownish. Pectoral fin pale brownish. Pelvic fin dark brownish, paler basally. Caudal fin pale grey, somewhat dusky distally. In preserved condition, coloration become darker; dark markings clearly retained.

Remarks. The present specimen matches well the original description and figure of *H. bengalensis* given by Mohapatra *et al.* (2013) in having the following diagnostic characters: anterior portion of lower jaw with dense cluster of numerous short papillae; 10 mandibular pores; 3 longitudinal stripes on side of body; first pelvic-fin soft ray filamentous, extremely long, its tip reaching the first anal fin spine base when depressed; and 7 scale rows above lateral line, 19 below lateral line. Although the present specimen differed slightly from the original description of *H. bengalensis* in having a fewer number of anal-fin soft rays, a greater number of gill rakers, and slightly greater body width and snout length (Table 2), these most likely represent intraspecific variations. Such variations especially for the body proportion are possibly represented size-related differences, since the present specimen (122.8 mm SL) is clearly larger than previously known specimens (45.6–87.4 mm SL).

Hapalogenys bengalensis is characterized in having three broad, oblique, longitudinal stripes on the side of the body (Figs 3, 4), distinguishing the species from the following members of the *Hapalogenys kishinouyei* complex, defined by having two to five longitudinal stripes on the body: *Hapalogenys kishinouyei* Smith and Pope, 1906 (five stripes), *H. dampieriensis* Iwatsuki and Russell, 2006 (four), and *H. filamentosus* Iwatsuki and Russell, 2006 (two) (Iwatsuki and Russell 2006; Mohapatra *et al.* 2013). Another congener, *H. merguiensis*, co-occurring with *H. bengalensis* in the Andaman Sea, is readily distinguished from the latter by having two oblique bands on the side of the body (Iwatsuki *et al.* 2000; Iwatsuki and Russell 2006; Fig. 4).

Hapalogenys bengalensis, originally described by Mohapatra *et al.* (2013) on the basis of 14 specimens collected off West Bengal, India, in the northern Bay of Bengal (Fig. 2), has not been recorded since the original description. The



Fig. 4. Fresh specimen of *Hapalogenys merguiensis* from the Andaman Sea. KAUM-I. 33394, 119.4 mm SL.

present specimen being the first record of the species from the Andaman Sea, in addition to being the largest known sample of the species at 122.8 mm SL.

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