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First record of *Grammonus robustus* (Ophidiiformes: Bythitidae) from Indian waters

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This is the first record of Grammonus robustus *from Indian waters. Five specimens measuring 132–233 mm standard length were collected from the by-catch landed by a deep sea trawler from waters 150 to 200 m deep off the Tuticorin coast in the Gulf of Mannar. The detailed morphometric and meristic characters are compared to known* G. robustus *material.*

Keywords: Bythitidae, *Grammonus robustus*, Indian waters, first record, Gulf of Mannar, trawl by-catch

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INTRODUCTION

Brotulas are viviparous ophidiform fish found in tropical and subtropical regions of all oceans. They are easily recognized by the single pelvic fin ray, position of the anterior nostril near the upper lip, low number (rarely more than six) of long rakers on the anterior gill arch and the lack of basibranchial tooth patches. The Bythitidae contains 51 genera and 209 species (Nielsen *et al.*, 1999; Eschmeyer & Fong, 2013). The species of *Grammonus* are partly scaled, with a high head, vertical expansion on the posterior margin of the maxilla and edentate palatines (Nielsen & Prokofiev, 2010; Froese & Pauly, 2013). The genus *Grammonus* holds 11 valid species and most species of the genus are marine cave dwellers and therefore caught rarely in fishing gears. *Grammonus robustus* is found on soft bottoms and the known distribution range is limited to the Red Sea and Gulf of Aden (Klausewitz & Uiblein, 1995), the Philippines (Smith & Radcliffe, 1913 in Radcliffe, 2013), Japan (Masuda *et al.*, 1984), possibly South Africa, the East China Sea (Nielsen *et al.*, 1999) and Australia (Anon, 2014). This is the first record of *G. robustus* from Indian waters. The only other species of this genus from India is *G. ater*, which has been reported from the west coast (Venu, 2013).

MATERIALS AND METHODS

Five specimens measuring 132.6–233.9 mm standard length (SL) were collected from the by-catch landed by a commercial deep-sea trawler at Tuticorin fisheries harbour during January 2013 (Figure 1). The specimens were caught approximately 35–40 km east off Tuticorin fisheries harbour (8.795°N and 78.632°E) from the Gulf of Mannar (Bay of Bengal) at depths of 150 to 200 m (Figure 2). The specimens were identified as *G. robustus* based on the available taxonomic literature (Nielsen *et al.*, 1999; Nielsen, 2007; Nielsen & Prokofiev, 2010; Froese & Pauly, 2013). Measurements and counts followed the method of Nielsen *et al.* (1999).

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Fig. 1. *Grammonus robustus* (standard length 233 mm) caught off Tuticorin, Gulf of Mannar, India.

RESULTS

SYSTEMATICS

Order OPHIDIIFORMES
Family BYTHITIDAE
Subfamily BYTHITINAE
Genus *Grammonus* Gill, 1896
Species *Grammonus robustus* Smith & Radcliffe, 1913

SYNONMYS

Grammonus robustus, Smith & Radcliffe, 1913 in Radcliffe 1913: 168, Pl. 13 (figure 4), *Proceedings of the United States National Museum* 44; between Cebu and Leyte, 10°38′00″N 124°13′08″E, the Philippines, Albatross Station 5409, depth 189 fathoms. Holotype (unique): Unites States National Museum (USNM) 74149;
Oligopus robustus (Smith & Radcliffe, 1913) in Cohen, 1964, 116: 10–11, *Proceedings of the United States National Museum*;

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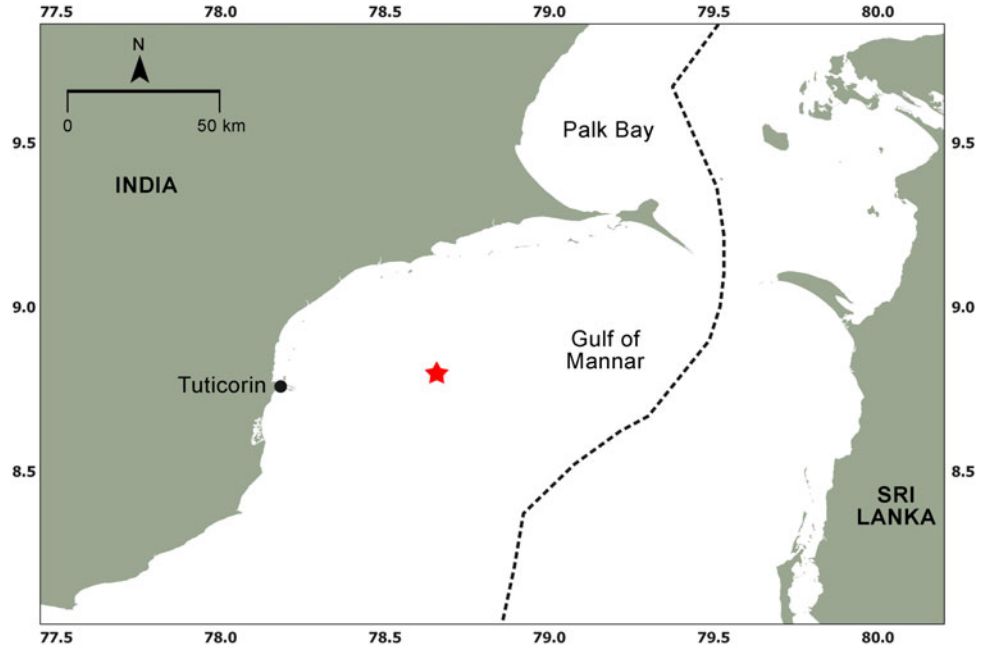


Fig. 2. Capture location of *Grammonus robustus* (red star) from the Gulf of Mannar (dotted line indicates maritime boundary of India and Sri Lanka).

Grammonus robustus Smith & Radcliffe, 1913 in Nielsen J.G., Cohen D.M., Markle D.F. and Robins C.R. (1999), 125: 178 pp.

DESCRIPTION

Body short, deep and posteriorly compressed; head broad, depressed anteriorly and arched posteriorly; snout short and circular; mouth large and oblique. Scales present on the head and body. Mostly cycloid, scale rows are very irregular, overlapping and loosely stacked. Opercle with short concealed spine (in most of the examined specimens spines were covered by skin). Preopercle with no prominent spines as observed in opercle. Lateral line doubled; dorsal one (1st one bending downward) originates somewhat above the hidden opercular spine and ending above middle of dorsal fin or just behind the vent. Ventral one (2nd one bending upward) originates before the vent and forms midline of body to caudal fin. Dorsal and anal fins joined caudal. Dorsal fin originates behind the pectoral fin base and anal fin starts below 30–34th dorsal fin rays. Ventral fins with single ray each, originating close to the level of posterior margin of preopercle.

Dentition

Premaxilla and dentaries with small and numerous pointed teeth (resembles granular teeth forms). Palatines edentate. Vomer with small, loosely-set pointed teeth.

Gill arch

First gill arch total 19; developed long rakers 3 and plate-like rakers 16; three developed gill rakers interspaced with one plate-like raker. First one in angle of the gill arch, i.e. 6th raker where the upper branch ends. Other two are in the lower branch which forms the 8th and 10th rakers.

Colour

Body, head and eyes dark brown; dorsal and anal fins brown anteriorly and dark brown posteriorly. Pectoral base dusky brown, and pelvic and pectoral fins are dark brown.

DISTRIBUTION AND BIOLOGY

The gut contents of the examined specimens were mostly empty except single female specimen which contained deep-sea shrimps, *Metapaenopsis andamanensis*. The examined specimens included a single mature female (egg diameter range from 525–598 μ) and four males that were either mature or maturing. Biological observations are summarized in Table 1. In addition, other deep-sea species present in the by-catch included various deep-sea shrimps (*Metapenaeopsis andamanensis*, *Aristeus alcocki*, *Penaeopsis jerryi*, *Solenocera hextii*, *Heterocarpus woodmasoni*, *H. gibbosus* and *Plesionika spinipes*), snake mackerals (*Lepidocybium flavobrunneum*, *L. flavobrunneum*, *Ruvettus pretiosus*, *Gempylus serpens*,

Table 1. Biological observations[#] of *Grammonus robustus*.

Sl. No.	Total length (mm)	Weight (g)	Sex (M/F)	Gonad condition	Gonad weight (g)	Egg size (μ)	Gut content
1	252.07	285	F	Fully matured	4.02	525–598	Full of *Metapaenopsis andamanensis* (2.01 g)
2	229.96	200	M	Fully matured	3.52	–	Fully digested
3	210.5	202	M	Fully matured	3.02	–	Fully digested
4	200.51	180	M	Fully matured	2.15	–	Fully digested
5	147.42	140	M	Partly matured	1.86	–	Empty

[#], except total length all the observations were taken from formalin preserved specimens.

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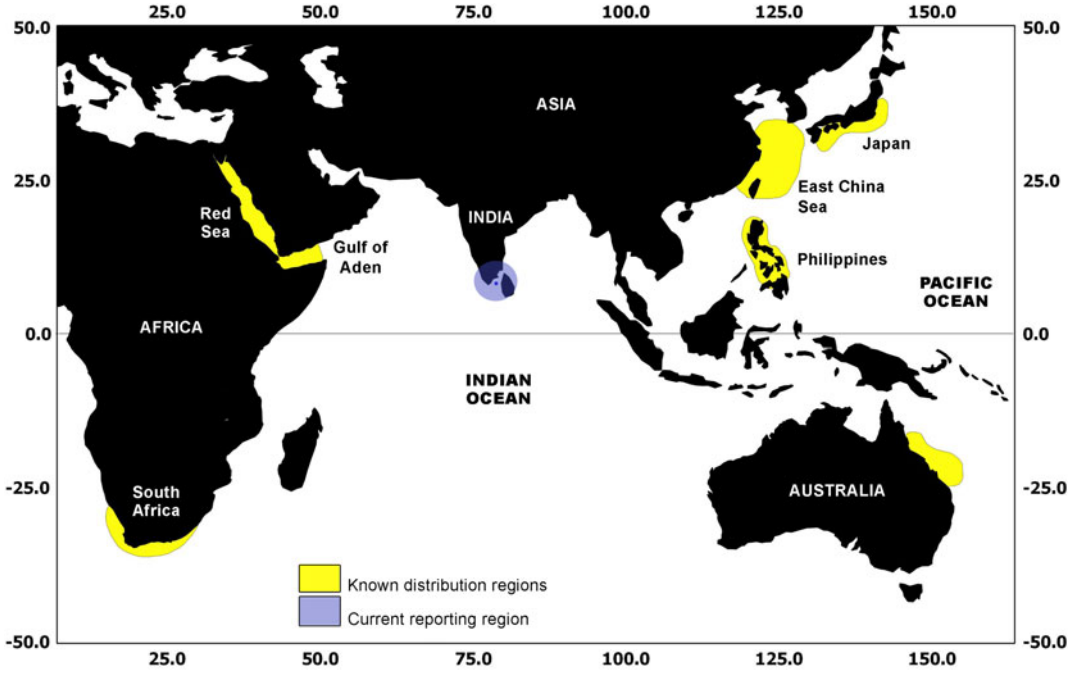


Fig. 3. Known distribution range of *Grammonus robustus* from the world (yellow highlights) and present reporting from Indian waters (blue highlight).

Table 2. Comparison of morphometric and meristic counts of *Grammonus robustus* from Gulf of Mannar with the examined specimens.

	Present study (N = 5)	Japan and Philippines (N = 13) Nielsen (2007)	Gulf of Aden and Red Sea (N = 15) Nielsen (2007)	Gulf of Aden (N = 16) Klausewitz & Uiblein (1995)	Red Sea (N = 16–18) Klausewitz & Uiblein (1995)	(N = 28) Nielsen & Prokofiev (2010)
Standard length (mm)	132.62–233.9	105–207	52–117	89.08 ± 17.37	66.21 ± 27.06	85–207
Mean SL	188.7	120.9	–	89.08	66.21	92.4
In % SL						
Head length (HL)	27.55–32.34	27–29	28.5–35	27.3–32.1	24.1–33.9	–
Maximum head depth	19.01–23.95	24.5–29	21.5–30.5	16.6–20.6	18.4–22.9	–
Postorbital length	18.07–21.72	17.5–19.5	17.5–23	15.4–17.8	15.5–20.2	–
Eye diameter	3.89–4.83	3.2–3.8	4.2–5.8	4.6–6.1	3.3–5.9	–
Inter orbital width	6.86–9.03	6.9–7.6	5.9–7.2	5.1–6.7	4.8–6.5	5.9–7.6
Upper jaw length	15.84–17.42	14.5–16.5	15.5–19	11.3–16.3	10.3–18.1	–
Depth at anal fin origin	20.66–24.24	21–23.5	19–23	–	–	–
Pelvic fin length	12.00– 16.32	11.5–16.5	11.5–16.5	–	–	–
Preanal length	56.19–64.48	55–59	57–67	53.6–61.8	54–65.8	–
Predorsal length	33.65–39.49	–	–	34.9–39.1	32.3–41.1	32–39
Height of posterior maxilla	5.70–6.92	5.3–6.8	5.6–7.1	–	–	5.3–7.1
Meristic counts						
Dorsal fin rays	82–90	82–89	82–93	84–88	84–94	82–93
Anal fin rays	63–67	59–65	57–67	57–64	5864	57–67
Pectoral fin rays	24–25	24–25	24–25	23–26	25–28	24–25
Pelvic fin rays	1	1	1	–	–	–
Anterior anal fin ray below the dorsal ray no.	30–34	29–34	28–32	–	–	28–34

Neoepinnula orientalis and *Rexea prometheoides*) some ophidiiform fish species (*Neobythites multistriatus* and *N. stefanovi*), an un-identified houndshark, *Mustelus* spp., mantis shrimps *Oratosquilla* sp. and the gastropod mollusc *Biplex* spp.

DISCUSSION

Grammonus robustus has a restricted distribution (Figure 3) and the current report is the first record of *G. robustus* from Indian waters. In recent years, many new deep-sea species have been recorded from the exclusive economic zone of India (Bineesh *et al.*, 2010; 2012a, b; Kurup *et al.*, 2010; Akhilesh *et al.*, 2011, 2013; Ganga *et al.*, 2012; Zacharia & Kannan, 2012; Kannan *et al.*, 2013a, b; Rajool Shanis *et al.*, 2013; Venu, 2013). This can be attributed to the intensified deep sea exploratory studies and closer monitoring of by-catch of the deep sea fishery. The present records increase our understanding of the deep-sea fish diversity in the Gulf of Mannar and also present the largest ever recorded size of *G.*

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robustus (SL 188.7 ± 37.5 mm). The morphometric and meristic characters of present specimens (Table 2) were consistent with specimens reported from the Red Sea and Gulf of Aden (Klausewitz & Uiblein, 1995; Nielsen, 2007), Japan and the Philippines (Nielsen, 2007), and those reported by Nielsen & Prokofiev (2010).

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