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First record of the Indian golden-barred butterflyfish, *Roa jayakari* (Norman, 1939) (Family: Chaetodontidae) from the east coast of India

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A single specimen of *Roa jayakari* measuring total length 85.3 mm weighing 15.3 g was collected from trawl bycatch of a multiday trawler of Visakhapatnam fishing harbour. Morphometric and eristic characters of the recorded specimen are described and discussed. Present occurrence of this species is the first record from east coast of India that is range extension of its known distribution within Indian Ocean.

[Keywords: East coast of India, First record, *Roa jayakari*, Range extension]

Introduction

Butterflyfishes belongs to family Chaetodontidae which is a widespread, diverse family of marine percoids with representatives on virtually all coral reef systems and in all tropical seas[1, 2, 3]. There are about 131 valid species belongs to family Chaetodontidae distributed in World oceans and about 28 species have been reported from Indian waters[4, 5]. Small Indo-Pacific genus *Roa* has four species (*Roa jayakari, R. modesta, R. australis* and *R. excelsa*) and as a group they are often referred as the "modestus species complex" of the genus *Chaetodon*. Species of *Roa* had been previously assigned to the genus *Chaetodon*, but later the genus name was changed to '*Roa*' based on an unpublished cladistic analysis[2]. Later, *Roa* was recognised as the generic level based on Blum's analysis[3, 6]. *R. jayakari* is listed as least concern as per IUCN red list status in view of its wide distribution, presumed large population and no apparent major threats[7]. Prior to the discovery of the specimen reported in this paper, the distribution range of *R. jayakari* was believed to be in the northwestern Indian Ocean to the Red Sea in the depth range of 33 to 274 m[8]. This species has earlier been photographed at a depth of 180 m in the Red sea[6] and has already been recorded from west coast of India [9, 10]. This is the first description of the species from east coast of India.

Materials and Methods

On 5th January 2013, a single specimen (Fig.1) was collected from trawl bycatch of a multiday trawler operating at a depth of 50 to 60 m (18°39′26.23″N, 84°37′54.79″E) about 190 km north of Visakhapatnam fishing harbour (Fig. 1). Specimen was identified as *Roa jayakari* [8]. Measurements were taken with digital vernier caliper to the nearest 0.1 mm and expressed as percentage of standard length (SL). Morphometric and meristic data of present specimen were compared with the data of paratype of *R. jayakari* (TL 125 mm) reported from southwest coast of India [9]. Identified specimen was initially fixed in 10% formaldehyde and later preserved in 70% ethanol after thorough washing. Specimen was deposited in the marine museum of Visakhapatnam regional centre of CMFRI.

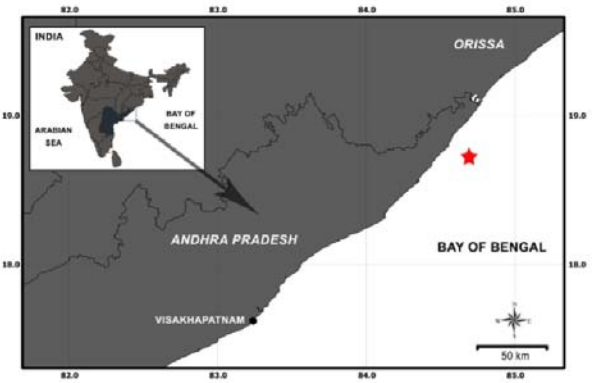

Fig.1 Capture location of *Roa jayakari* (red star), north of Visakhapatnam

Results and Discussion

Material Examined: *Roa jayakari,* 69.2 mm SL, 15.3 gm TW (Multiday bottom trawl, 18°39′26.23″N, and 84°37′54.79″E) coll. P.R. Behera, 5th January 2013.

Fin Formula: Dorsal fin XI, 22; Anal fin III, 17; Pectoral 15; Ventral I, 5; Lateral-line scales 40.

Description

The body is disc shaped and strongly compressed (depth 73.69 % in SL). Body and head are covered with large ctenoid scales, gradually becoming smaller on nape and snout, extending far into the median fins; head profile is concave (head length (HL) 44.79 % in SL); snout moderately long, (length 31.93% in head length) ; eye diameter slightly greater than length of snout (diameter 32.25% in HL); interorbital distance is narrow (distance 11.56 % in HL); origin of dorsal fin is high above posterior end of head, the fin base is long, its spinous section is deeply incised and the base is almost horizontal, curving gradually downward from last few spines to caudal peduncle with soft section strongly angled downward and the posterior margin of the fin is vertical; anal fin directly below soft section of dorsal fin thus mirroring its shape; ventral fin with an auxiliary scale, strong spine and filamentous first soft ray; lateral line dips at a blunt angle posteriorly and ends below posterior part of the soft dorsal; caudal peduncle is moderately deep, (depth 11.56% in SL). Caudal fin truncated. Details of morphometric measurements of *R. jayakari* are presented (Table 1).

Table 1: Morphometric characters of *Roa jayakari* from Visakhapatnam, east coast of India

Morphometric measurements	mm	% of SL
Standard length	69.20	—
Head length	30.99	44.79
Inter orbital width**	3.58	11.56
Eye diameter**	9.99	32.25
Snout length**	9.89	31.93
Body depth	50.99	73.69
Spinous dorsal fin base length	33.99	49.13
Soft dorsal fin base length	23.99	34.68
Dorsal fin spine length (1st)	5.99	8.67
Dorsal fin spine length (2nd)	10.09	14.59
Dorsal fin spine length (3rd)	18.99	27.45
Dorsal fin spine length (4th)	20.09	29.04
Dorsal fin soft ray length (1st)	7.49	10.83
Length of pectoral fin	22.99	33.23
Length of ventral fin	20.99	30.34
Length of ventral fin spine	18.99	27.45
Length of anal fin base	24.99	36.12
Length of anal fin spine (1st)	7.99	11.56
Length of anal fin spine (2nd)	16.99	24.56
Length of anal fin spine (3rd)	13.99	20.23
Length of anal fin soft ray	13.99	20.23
Caudal peduncle length	2.99	4.33
Caudal peduncle depth	7.99	11.56
Caudal fin height	12.99	18.78

Colour in fresh specimen

The fresh specimen is having three vertical dark brown bands, *viz.* (1) about pupil-width, from dorsal origin through eye and over cheek; (2) from below 3rd and 5th dorsal spines, narrowing gradually and reaching to middle of abdomen; and (3) from below last three dorsal spines towards caudal peduncle, narrowing and continuing onto anal fin to the end of its first soft ray. All fin spines are white in colour; second dorsal fin spine membrane is with black pigmentation; two broader white bands occur on the body. The anterior broader band commences from the dorsal fin origin crossing the opercle and further broadens below while the other broad band starts from about the 7th and 8th dorsal spine and runs down to the anal spines. Caudal fin clear with pale ochre basally; soft part of pelvic fin is brown to dusky ochre with black margin and tip. A white edged dark round ocellus slightly larger than the eye diameter is present in between 2nd and 7th ray of soft dorsal fin. Pelvic fin is blackish in colour.

Colour in formalin preserved

The colour of specimen is uniformly pale brown except a white edged round ocellus on soft dorsal fin. Dark brown vertical band of the specimen have strongly faded in formalin. The present specimen was easily recognised and identified by the presence of a white edged dark round ocellus on the soft rayed section, mostly black second spine and the shape of the spinous section straight from the 4th to last spine in dorsal fin (Fig. 2).

Morphomeristic characteristic of the present specimen is in concurrence with most of the characters with the representatives described from Arabian Sea [9]. But slight variation was observed in the case of snout length, body depth, head length, eye diameter and interorbital width as compared to the paratype which may be due to different geographic location (Table 2).

Fig. 2 *Roa jayakari* (Norman, 1939), 85.3 mm TL from Visakhapatnam

Table 2: Comparative morphometric and meristic of *Roa jayakari*

Parameters	Arabian Sea, off Kerala (George and Dayanandan, 1966)	Present specimen
Dorsal fin	XI, 22	XI, 22
Anal fin	III, 17	III, 17
Pectoral fin	15	15
Ventral fin	I, 5	I, 5
Pored lateral line scale	—	40
Caudal fin	—	18
Total length (mm)	125	85
Body depth in standard length	1.4	1.35
Head length in standard length	2.3	2.22
Eye diameter in head length	3.4	3.1
Snout length in head length	3.0	3.13
Interorbital width in head length	4.1	3.87

It has reported that there are significant differences in morphometric instead of meristic characters among four species of the Indo-Pacific genus *Roa*[11]. Morphometric differences are mainly attributed to complicate growth changes within the known geographical regions. The morphometric features that are clearly different among species in large specimens do not necessarily differ in small individuals as the proportional changes with growth may increase in one species and decrease in another. However, colour is markedly different among species. Present specimen is often confused with *R. modesta* as these two species share similar marking pattern in the dorsal fins and has a white-edged round ocellus on the soft-rayed section and also has black second spine. However, the shape of the spinous section differs; the profile is evenly round in *R. modesta*, where as its virtually straight from the 4th to last spine in *R. jayakari*. *R. modesta* differs from other three congeners in having a ventral broadening of the second dark band. *R. australis* and *R. excelsa* share an elongated black spot on the soft dorsal fin and the black colouration of the second dorsal fin spine but differ greatly in the width and colour of their dark bands. In *R. australis*, the bands are narrow and do not extend dorsally into the spines, whereas in *R. excelsa*, the bands are very broad dorsally and almost cover all the dorsal fin spines, only leaving a small gap of white between the 6th and 8th spine. Detailed comparative statement of counts and measurements of *R. modesta*, *R. excelsa* and *R. australis* with the present specimen was given (Table 3).

Table 3: Comparative statement of counts and measurements of *Roa modesta, Roa excelsa, Roa australis* with the present specimen

Characters	*Roa modesta*	*Roa excelsa*	*Roa australis*	Present specimen
Meristic characters				
Dorsal fin	XI, 22	XI, 21-22	XI,19-23	XI,22
Anal fin	III, 17	III, 16-17	16-18	III,17
Pectoral fin	13 -14	14	13-16	15
Pelvic fin	—	—	—	I,5
Caudal fin	—	—	—	17
Lateral Iine scales	39 - 41	37 - 40	37-46	40
Morphometic characters				
Standard length (mm)	51.5-97 as % SL	94-105 as % SL	69.5-119 as % SL	69.2 as % SL
Body depth	66.5-73.2	61.0-67.0	63.6-75.0	73.69
Spinous dorsal fin base length	36.2-38.8	40.1-36.4	35.8-42.0	49.13
Soft dorsal fin base length	35.3-40.8	33.9-31.1	31.7-42	34.68
Dorsal fin spine length(1st)	9.3-6.4	7.0-7.7	8.8-6.2	8.67
Dorsal fin spine length(2nd)	22.3-15.9	15.0-17.3	21.0-13.4	14.59
Dorsal fin spine length(3rd)	30.6-23.4	33.9-36.5	35.4-21.3	27.45
Dorsal fin spine length(4th)	33.7-26.3	26.5-32.6	37.1-25.6	29.04
Dorsal fin soft ray (1st) length	23.4-19.5	16.6-21.2	23.9-17.6	10.83
Length of pectoral fin	30.2-26.3	28.8-33.6	36.2-29.4	33.23
Length of pelvic fin	30.2-37.8	33.0-29.9	38.1-27.5	30.34
Length of pelvic fin spine	22.3 -25.8	26.0-23.6	30.2-20.3	27.45
Length of anal fin base	36.0-41.8	30.6-32.6	31.2-37.4	36.12
Length of anal fin spine (1st)	9.7-11.9	13.2-12.1	13.7-9.3	11.56
Length of anal fin spine (2nd)	18.7-19.6	30.0 -27.1	28.1-21.8	24.56
Length of anal fin spine (3rd)	19.6 -21.9	17.2 -20.8	23.0 -18.9	20.23

Length of anal fin soft ray	—	—	—	20.23
Head length	40.9-31.5	34.9-37.1	42.0-36.1	44.79
Caudal peduncle length	4.6-5.5	4.2-4.9	6.4-4.6	4.33
Caudal peduncle depth	12.0-13.3	10.2-11.1	11.3-14.1	11.56
Caudal fin height	—	—	—	18.78
Inter orbital width**	22.7-27.8	25.3-21.7	19.6-27.3	11.56
Eye diameter**	30.8-32.6	33.6-32.5	36.1-30.1	32.25
Snout length**	32.7-32.5	29.3-34.5	34.6-28.2	31.93

Distribution pattern of four species of the genus *Roa* are differed widely. *R. jayakari* was distributed in the northwestern Indian Ocean from the west coast of India to the Red Sea[8]. The *R. australis* is restricted to northwest shelf of Western Australia and the Arafura Sea[11] whereas *R. excelsa* is occurs along the coast of Hawaiian Island and Guam[5]. Species *R. modesta* is known from subtropical waters of Japan, ranging south into the China seas, Taiwan and the Philippines[5].

The species has been recorded earlier from Quilon of Kerala[9] and Maharashtra[10] in west coast of India. Present report adds to our knowledge of species diversity of Chaetodontidae from the Bay of Bengal and it assumes that the Bay of Bengal contains as many species as the entire western Indian Ocean. During recent years, great numbers of new fish species have been described and recorded from the east coast of India[12, 13&14]. Present specimen has been recorded for the first time from off Visakhapatnam, east coast of India. Record of this species off Visakhapatnam is a new addition to the list of butterfly fishes from the east coast of India.

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