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NOTE

Range extension of parrotfishes *Scarus zufar* and *Chlorurus rhakoura* (Teleostei: Scarinae) to Bay of Bengal, Bangladesh

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The Bangladesh coastline of the northern Bay of Bengal in the Indian Ocean, is predominantly a turbid, shallow, brackish-water-dominated shore with mostly muddy and sandy substrata (Longhurst & Pauly 1987). However, about 25 km of the circa 700-km coastline is partly rocky, including the tiny, about 8 km^2, Zinjira Island (also called St. Martin's Island), which is composed of sedimentary continental rock. The island is located about 10 km south of the southeastern corner of mainland Bangladesh, bordering Myanmar (Fig. 1). The island contains intertidal and subtidal rocky reefs which support live coral and seaweed communities. A number of fishes associated with hard substrate on coral or rocky reefs aggregate in the area, particularly between November and May. From June to October, monsoon runoff from the neighboring Naff River makes the water brackish and highly turbid (Tomascik 1997), unfavorable for most reef-associated fishes. The ichthyofauna of this part of Bangladesh is poorly documented, other than fragmentary reports, without voucher specimens (Tomascik 1997).

We report the occurrence of two parrotfish species (family Labridae, subfamily Scarinae), *Scarus zufar* Randall & Hoover, 1995 and *Chlorurus rhakoura* Randall & Anderson, 1997 in the area, beyond the known range for both species. Since parrotfishes are frequently exported frozen to markets throughout Asia, we documented that the fishes were fresh and unloaded directly from the boats of local fishermen. Specimens were obtained at unloading to the market on Zinjira Island, about 20.6330°, 92.3295°, as well as after transfer to the market at Teknaf, Cox's Bazar, Bangladesh– the market's coordinates are 20.8683°, 92.3008°, but the fishes were obtained by gillnets set along the rocky shores around Zinjira Island. Specimens were fixed in 10% formalin and examined at the field laboratory of Institute of Marine Sciences, University of Chittagong, Cox's Bazar, Bangladesh. Morphometric and meristic characters in Table 1 follow Randall & Hoover (1995). The specimens were deposited in the fish collection of Marine Fisheries Survey Management Unit (MFSU), Department of Fisheries, Chattogram, Bangladesh.

Key words: fishes, ichthyology, Scaridae, Indian Ocean, biogeography, species range.

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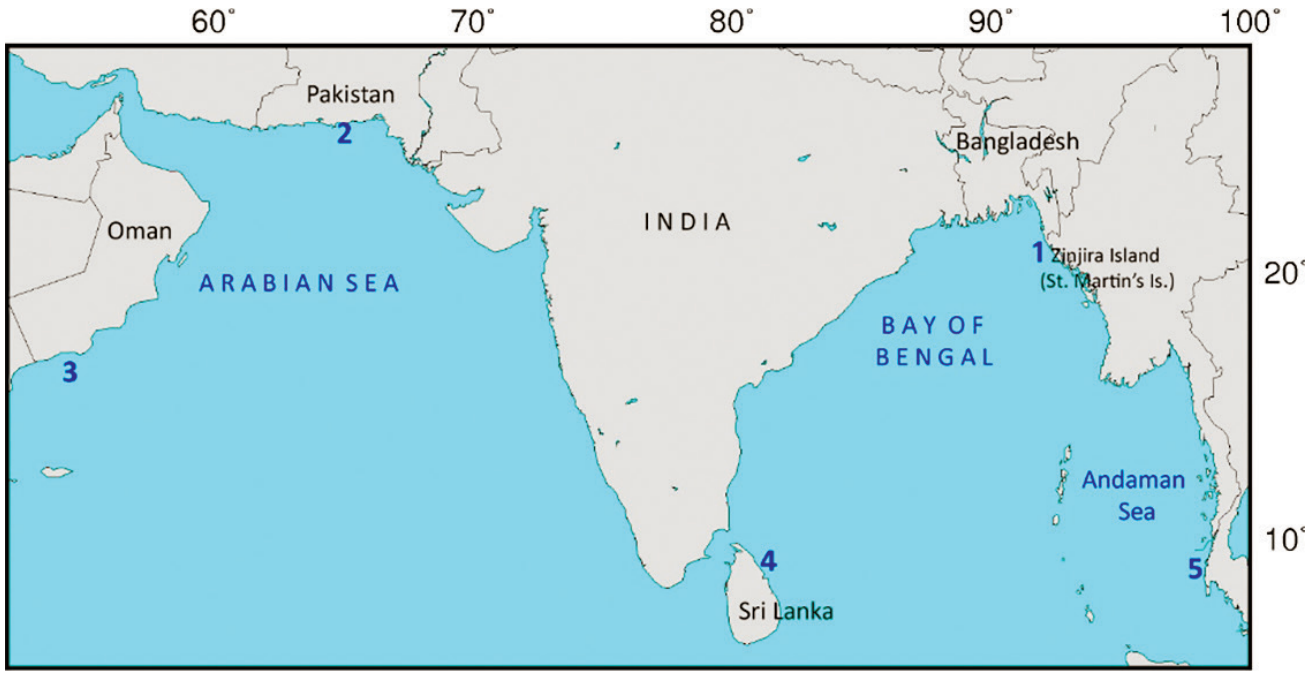

Figure 1. Map of northern Indian Ocean with collection localities: 1) Zinjira Island, Bangladesh; 2) Pakistan by Psomadakis et al. (2015); 3) type location of *Scarus zufar;* 4) type location of *Chlorurus rakhoura*; 5) Thailand by Satapoomin (2009).

Scarus zufar Randall & Hoover, 1995

Material examined. MFSU 2019-5020–21, 235–245 mm SL, gill-netted from off Zinjira Island, northern Bay of Bengal, Bangladesh; obtained on Zinjira Island, at landing, 2 February 2019; MFSU 2019-5022, 195 mm SL, same data, 4 April 2019.

Diagnosis. Identified as a species of *Scarus*, having dorsal-fin elements IX,10; anal-fin elements III, 9; pectoral-fin rays 15; longitudinal scale series 23, lateral line scales 20+6; scales above lateral line 1½, below 6; median predorsal scales 4; median prepelvic scales 4; circumpeduncular scales 12. No teeth on sides of dental plates, upper dental plate three-fourths covered by lip, lower plate three-fourths exposed; caudal fin of adults truncate with produced lobes.

Figure 2. *Scarus zufar*, initial phase, MFSU 2019-5020, 245 mm SL. Zinjira Island, Bangladesh, Bay of Bengal (M.E. Hasan).

TABLE 1

Proportional measurements of *Scarus zufar* and *Chlorurus rhakoura* as percentages of the standard length

compared with Randall & Hoover (1995) and Randall & Anderson (1997)

	Scarus zufar		*Chlorurus rhakoura*	
	This study (n=3)	R & H (1995) (n=3)	This study (n=2)	R & A (1997) (n=8)
Standard length (mm)	195–245	316–393	280–320	251–442
Body depth	33.4–35.9	37.0–39.2	37.4–37.8	38.2–42.8
Body width	16.3–17.2	17.1–18.2	14.1–16.0	16.2–17.1
Head length	31.9–34.9	33.6–34.0	32.9–33.4	35.4–37.3
Snout length	12.6–14.6	15.1–16.3	14.6–14.8	15.3–18.1
Orbit diameter	5.1–5.3	4.1–4.6	4.1–4.3	4.0–4.7
Inter-orbital width	10.5–11.0	11.9–13.2	10.5–10.9	11.5–12.3
Upper dental plate	5.7–6.8	6.2–6.4	6.4–7.8	–
Caudal peduncle depth	12.5–12.9	13.6–14.1	13.3–14.5	15.3–17.2
Caudal peduncle length	14.5–16.6	13.5–14.1	14.4–17.1	13.0–13.7
Pre-dorsal length	33.8–37.3	35.8–36.2	32.5–34.4	35.4–39.9
Pre-anal length	59.2–61.5	64.2–65.8	61.3–61.6	64.2–67.1
Pre-pelvic length	34.6–35.7	33.8–35.4	33.8–35.5	35.0–37.5
Dorsal-fin base	53.9–55.6	57.2–60.8	57.0–57.6	56.5–61.7
First dorsal spine	9.3–10.3	9.2–10.9	11.4–11.6	10.3–12.2
Ninth dorsal spine	7.9–10.4	11.9–12.7	11.8–12.2	12.0–13.2
Longest dorsal ray	11.9–12.4	12.8–13.2	12.1–13.9	16.7–21.4
Anal-fin base	23.3–25.3	26.2–27.5	25.5–26.0	26.1–27.1
Second anal spine	6.4–7.9	8.2–8.9	7.1–7.2	–
Third anal spine	8.5–9.2	10.4–10.8	9.4–9.5	9.3–10.9
Longest anal ray	10.3–10.4	12.1–13.0	14.8–15.4	16.7–21.4
Caudal-fin length	19.5–25.7	25.0–26.9	22.6–27.2	27.2–33.3
Caudal concavity	1.3–6.9	3.5–6.3	–	–
Pectoral fin length	21.1–22.1	19.9–21.1	25.4–26.3	26.4– 29.3
Pelvic spine length	13.9–14.4	14.4–17.1	17.6–18.8	19.0–21.1
Pelvic fin length	16.3–17.4	17.2–19.1	21.8–25.9	23.8–29.4

Figure 3. *Scarus zufar*, subadult MFSU 2019-5022, 195 mm SL, Zinjira Island, Bangladesh, Bay of Bengal (M.E. Hasan).

Color (Fig. 2): anterior part of body orange with a submarginal green band on each scale (a few scale rows behind head), gradually becoming broader posteriorly; snout reddish green with a blue-green margin on upper lip, bordered below by a narrow orange margin extending to eye; an irregular blue-green band on lower lip parallel to upper-lip band, extending unevenly below eye (a narrow orange band between two green bands); an oval blue-green spot behind eye; iris yellow or brownish yellow; a transverse blue-green band on chin; cheek and opercle orange; dental plates white; dorsal fin orange with a turquoise-blue margin, broader anteriorly; anal fin orange with three blue-green bands, and a turquoise-blue margin; caudal fin lobes turquoise-blue outside and orange inside; central part of caudal fin purplish blue with three alternating irregular red and blue-green vertical bands (in initial phase, 5 bars in terminal phase), upper and lower ends curving posteriorly; pectoral fins bright orange with a very narrow, green, upper margin; pelvic fins orange with a horizontal turquoise margin; a large, diffuse, circular area of light green or yellowish green on side of body between posterior part of dorsal and anal fins.

Subadult (Fig. 3) overall blue green with bases of scales brown, broader anteriorly and narrower posteriorly; dorsal body darker and ventral half becoming lighter gradually; snout greenish brown; upper-lip and lower-lip-

Figure 4. *Scarus zufar*, initial phase, about 27 cm SL, Pakistan coast (H.B. Osmany).

margin coloration similar to adults, but narrow band in between is light brown (instead of orange); pectoral fin light brown with darker base; cheek and opercle brownish; dorsal and anal fins with longitudinal band and outer margins as in adults, but inner part pale brown instead of orange; pelvic fin whitish with a turquoise margin; caudal fin overall brownish anteriorly with dark-blue outer lobes and three vertical turquoise blue bars; posterior portion of dorsal fin and caudal fin pale orange.

Comparisons and remarks. *Scarus zufar* is most similar in color pattern to *Scarus fuscopurpureus* (Klunzinger, 1871) from the Red Sea, Gulf of Aden, Oman, and the Arabian Gulf; and *Scarus russelii* Valenciennes, 1840, widespread elsehwere in the Indian Ocean from South Africa to Kenya, Madagascar, Mascarenes, Comoros, Seychelles, Chagos, Maldives and India, as well as to Andaman Islands and Sumatra (Randall & Hoover 1995, Randall, in press). However both differ from *S. zufar* in color pattern, and having the lower dental plate largely covered by the lip, having teeth on the sides of the dental plates, and usually 14 pectoral-fin rays (Randall & Hoover 1995, Randall, in press).

Described from Oman, where it is one of the most common parrotfishes (Randall, in press), *S. zufar* was considered endemic to Oman (Randall 1995), but later the range was extended across the Arabian Sea to Pakistan (Psomadakis et al. 2015) (Fig. 4). Our record extends the range well eastward into the Bay of Bengal. Randall (in press) noted it prefers rock or rocky sand substrates on exposed shores, rather than coral areas, which fits the reef character of Zinjira Island. Thus far, it has not been recorded from the rocky coasts between the Arabian Sea and Bay of Bengal (Manisseri et al. 2012, Yogesh Kumar et al. 2013, Joshi et al. 2016), or from Sri Lanka (De Bruin 1994, Rajasuriya 2013).

Chlorurus rhakoura Randall & Anderson, 1997

Material examined. MFSU 2019-5017, 280 mm SL, gill-netted from off Zinjira Island, northern Bay of Bengal, Bangladesh; obtained at the Teknaf fish market, Cox's Bazar, 13 December 2018, where landed the morning after. MFSU 2019-5019, 320 mm SL, gill-netted from off Zinjira Island; obtained on Zinjira Island, at landing, 2 February 2019.

Diagnosis. Identified as a species of *Chlorurus*, having dorsal-fin elements IX,10; anal-fin elements III, 9; pectoral-fin rays 15; longitudinal scale series 23, lateral line scales 18–19+6; scales above lateral line 1½, below 6; median predorsal scales 3; median prepelvic scales 4; circumpeduncular scales 12; cheek scale rows 2, upper

Figure 5. *Chlorurus rhakoura*, MFSU 2019-5019, 320 mm SL, Zinjira Island, Bangladesh, Bay of Bengal (M.E. Hasan).

Figure 6. *Chlorurus rhakoura*, about 400 mm SL, specimen not retained, 22 November 2019, Zinjira Island, Bangladesh, Bay of Bengal (M.E. Hasan).

row with 7 and lower with 5 or 6 scales. Head and body moderately deep, adults with a large, bulbous, fleshy protuberance on forehead; dental plates broadly exposed, with non-granular surface, cutting edge irregular with short, laterally projecting teeth. Caudal-fin rays each exserted, ending as filaments, giving posterior margin a ragged appearance; penultimate soft rays of dorsal and anal fins prolonged.

Fresh color (Figs. 5 & 6): body overall dark grey-brown, scales on body with dull blue-green cast and dark purple edges, margins of dorsal and anal fins bright blue. Dental plates bluish white.

Comparisons and remarks. *Chlorurus rhakoura*, along with *Chlorurus oedema* (Snyder, 1909) and *Chlorurus cyanescens* (Valenciennes, 1840), form a complex of three allopatric species in the Indo-Pacific region (Randall & Anderson 1997, Allen & Erdmann 2012). They share three median predorsal scales, two rows of scales on the cheek, 15 pectoral-fin rays and a bulbous protuberance of similar shape on the forehead of adults (Randall & Anderson 1997). However, *C. rhakoura* differs from both *C. cyanescens* and *C. oedema* in color pattern and having a caudal fin with strongly exserted rays forming a ragged margin (vs. a smooth margin in other species), as well as long filamentous penultimate dorsal and anal-fin rays not present on other species (Figs. 5 & 6).

Chlorurus cyanescens is overall deep blue with the scales posterior to the pectoral fin green with deep-blue edges, and the posterior margin of the caudal fin bright blue. It was described from Mauritius, and is known from southwestern Indian Ocean, ranging from South Africa northwards up to Zanzibar, Tanzania and eastward to Madagascar, Mauritius, and Rodrigues (Randall & Anderson 1997, Randall, in press).

Chlorurus oedema is overall black with contrasting white exposed dental plates. It was described from Okinawa, and is distributed broadly in the Western Pacific, from western Indonesia (Kalimantan and Java), Brunei, Sabah and Sarawak in Malaysia, Philippines, Taiwan, and the Ryukyu Islands of Japan (Allen & Erdmann 2012).

Chlorurus rhakoura has not been previously documented from the northern Bay of Bengal; it was originally described by Randall & Anderson (1997) from Sri Lanka and subsequently listed there (Rajasurya 2013). Outside of the type locality of Sri Lanka, it has been reported from the Dampier region of Western Australia (Hutchins 2004), and the Andaman coast of Thailand (Satapoomin 2009), as well as from eastern Halmahera in Indonesia (Allen & Erdmann 2012). Reports from the Gulf of Mannar, India (Yogesh Kumar et al. 2013, Joshi et al. 2016), and Sri Lanka (De Bruin et al. 1994) of "*C. oedema*" almost certainly specimens of *C. rhakoura*. Surprisingly, Insacco & Zava (2017) document a batch of *C. rhakoura* from a fish market from Sicily, in the Mediterranean Sea, reportedly as a local introduced species, although the assurance by the salesman of being captured locally is suspect given the widespread illegal marketing of frozen parrofishes (J. Choat, pers. comm.).

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