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Chlorurus rhakoura, a new species of parrotfish (Perciformes: Labroidei: Scaridae) from Sri Lanka

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Abstract

Chlorurus rhakoura, a new species of parrotfish, is described from nine specimens, 251-442 mm in standard length, from Sri Lanka. It is very similar to *C. oedema* (Snyder), known from Okinawa to Indonesia, and *C. cyanescens* (Valenciennes) from Mauritius to East Africa. The three share the following characters: a bulbous fleshy protuberance on forehead of adults, 3 median predorsal scales, 2 rows of scales on cheek, and 15 pectoral rays. *Chlorurus rhakoura* differs primarily in having strongly exserted caudal rays, giving the fin a ragged appearance, and in having a longer penultimate anal-fin ray.

Introduction

While diving off Trincomalee, Sri Lanka in 1975, the senior author speared two specimens of a very dark parrotfish with a prominent protuberance on the forehead and a ragged caudal fin. The specimens were deposited at the Bishop Museum where they were tentatively identified as *Scarus oedema* (Snyder, 1909; illustrated by Snyder, 1912), a species known from Okinawa (the type locality), Philippines, and Indonesia. All characters of the Sri Lanka specimens seemed consistent with those of *S. oedema* except for the strongly exserted rays of the caudal fin, resulting in the ragged appearance of the posterior margin.

In his review of the parrotfishes (family Scaridae), Schultz (1958) made *Scarus oedema* the type species of a new subgenus, *Ypsiscarus*, because of its "high forehead" and only 3 median predorsal scales. In a later paper on controversial genera and species of parrotfishes, Schultz (1969) elevated *Ypsiscarus* to a genus.

Lal Mohan and Ghandi (1976) recorded *Ypsiscarus oedema* from a single male specimen, 480 mm in standard length, taken by gill net at Hare Island on the Indian side of the Gulf of Mannar. Their illustration shows a strongly rounded caudal fin with a smooth posterior margin, hence not consistent with the two specimens from nearby Sri Lanka or *Scarus oedema* as illustrated by Schultz

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(1958: pl. 8, fig. D) and Masuda et al. (1984: pl. 215, fig. K) which show a smooth and very slightly rounded caudal fin. We speculate that Lal Mohan and Ghandi may have drawn the caudal fin with an even margin in the assumption that the ragged edge was the result of damage from capture in a gill net.

De Bruin, Russell and Bogusch (1995: 303) mentioned the presence of *Scarus oedema* (Snyder) in Sri Lanka but without giving any reference to specimens or literature.

Bellwood (1994) recognized *Chlorurus* Swainson, 1839 as a valid genus of the Scaridae; he listed its junior synonyms as *Pseudoscarus* Bleeker, *Xanothon* Smith, and *Yspsicarus* Schultz. He reclassified *Scarus oedema* in *Chlorurus*, along with 13 other species with strong, broadly exposed dental plates and a bluntly rounded head or with a large hump on the head.

In 1993, the junior author visited Sri Lanka to take underwater photographs of fishes. Noting the unusual head shape and ragged caudal fin of a somber-hued parrotfish, he photographed it and sent the photographs to the senior author. This rekindled the question of the status of this unusual scarid. In 1995 the junior author made another visit to Sri Lanka, took more underwater photographs, and collected one large male specimen. We then asked Rohan Pethiyagoda of the Wildlife Heritage Trust of Sri Lanka if he would be able to obtain additional material of this species. He elicited the help of David Claasz who speared six adult specimens from Wellawatte Reef off Colombo. These were sent via the Australian Museum to the Bishop Museum.

We have determined that the Sri Lanka specimens represent a new species which we describe here as *Chlorurus rhakoura*.

Materials and methods

Type specimens were deposited in the Australian Museum, Sydney (AMS); the Natural History Museum, London (BMNH); Bernice P. Bishop Museum, Honolulu (BPBM); J.L.B. Smith Institute of Ichthyology, Grahamstown (RUSI); and United States National Museum of Natural History, Washington, D.C.

Standard length (SL) is measured from the most anterior median point of the upper dental plate to the base of the caudal fin (end of hypural plate). Head length and snout length are taken to the same anterior point, the former to the posterior end of the opercular flap and the latter to the fleshy edge of the orbit. Body depth is measured from the origin of the pelvic fins vertically to the base of the dorsal fin; body width is the greatest width immediately posterior to the gill opening just above the base of the pectoral fins. Orbit diameter is the greatest fleshy diameter, and interorbital width the least fleshy width. Caudal-peduncle depth is the least depth, and caudal-peduncle length the horizontal distance from a vertical at the rear base of the anal fin to the caudal-fin base. Fin spine and ray lengths are taken from the base of these elements to their tips without straightening the rays.

Pectoral-ray counts include the upper rudimentary ray. Counts of scales in the two rows on the cheek are made as indicated in Figure 5 of Schultz (1958).

Data in parentheses refer to paratypes. Proportional measurements in the text are rounded to the nearest 0.05.

Chlorurus rhakoura, new species

Figures 1-4; Table 1

Chlorurus sp. Anderson, 1996: 60, color fig. (Sri Lanka).

Holotype. BPBM 18792, female, 251 mm SL, Sri Lanka, Trincomalee, off Lively Rocks, 20 m, spear, J.E. Randall, 3 April 1975 (photograph taken).

Paratypes. BPBM 27184, 352 mm SL, Sri Lanka, Hikkaduwa, about one-half mile offshore, rocky bottom, 12 m, spear, J. E. Randall, 24 February 1975 (photograph taken; head and caudal fin saved); AMS I-37146-001, 3: 373-442 mm SL, Sri Lanka, off Colombo, Wellawatte Reef, 6°55′N, 79°50′E, 5-10 m, spear, D. Claasz, 17 December 1995; BMNH 1996.10.29.1, 276 mm SL; RUSI 53857, 322 mm SL, USNM 343041, 347 mm SL; all with same data as AMS specimens; BPBM 37312, 420 mm SL, Sri Lanka, Dickwella, 5 m, spear at night, R.C. Anderson, 22 January 1995.

Diagnosis

A species of *Chlorurus* with 15 pectoral rays; 3 median predorsal scales; 2 rows scales on cheek, the upper row with 7 and the lower row with 5 or 6 scales; adults with a prominent fleshy protuberance on forehead; premaxillary dental plate of adults with 1 or 2 (usually 2) short, laterally-projecting teeth; caudal fin with strongly exserted rays, giving the posterior margin a ragged appearance; penultimate soft rays of dorsal and anal fins prolonged; posterior margin of pectoral fins scalloped; adults dark gray-brown, the scales of body with a dull blue-green cast and very dark purplish edges; or deep blue, the scales of

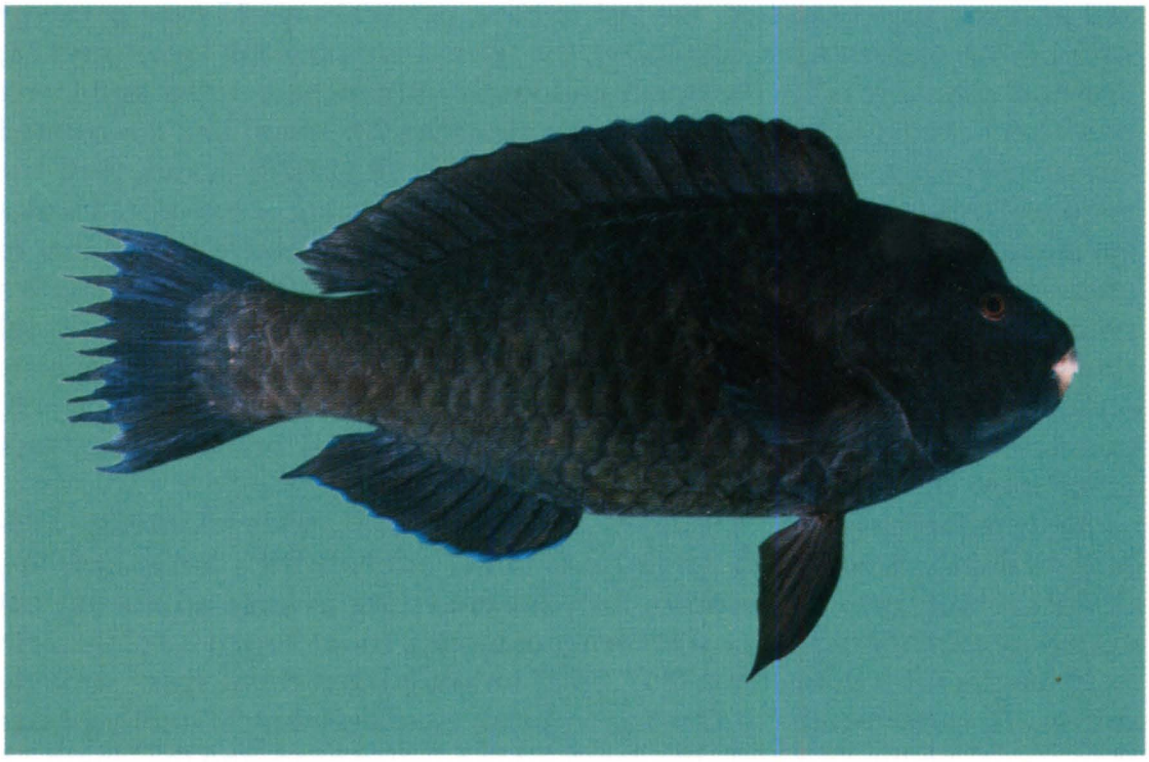

Figure 1. Holotype of *Chlorurus rhakoura*, BPBM 18792, female, 251 mm SL, Trincomalee, Sri Lanka (J.E. Randall).

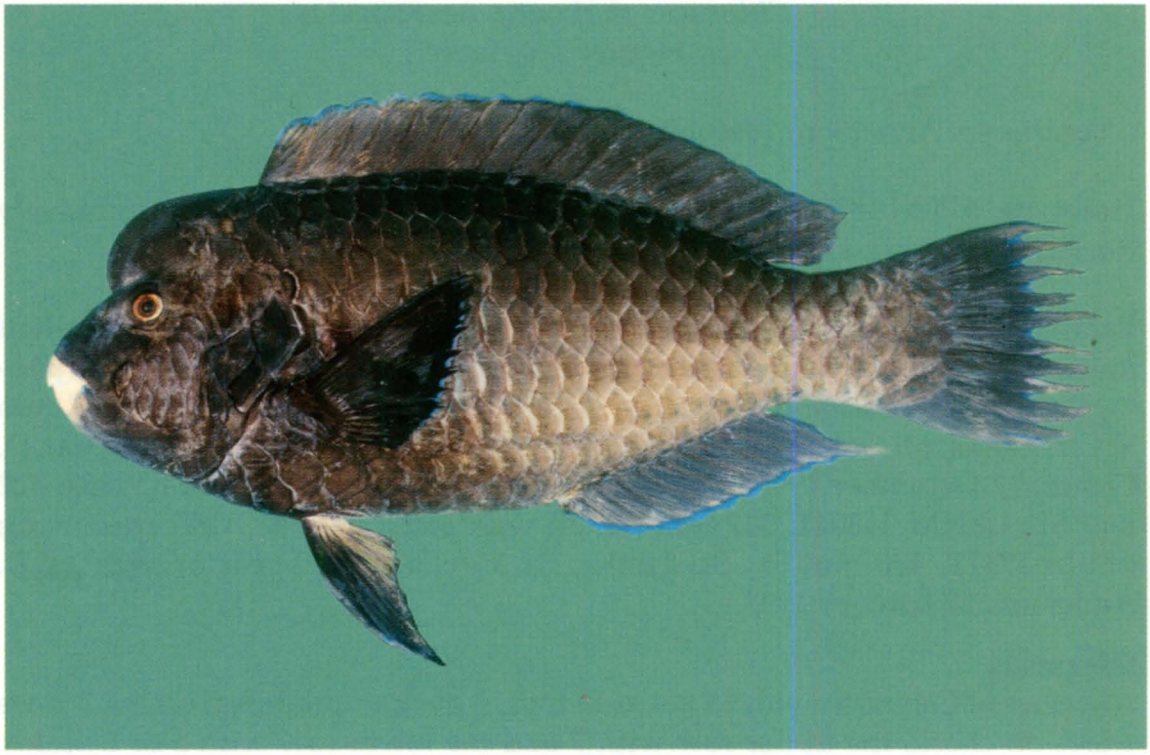

Figure 2. Paratype of *Chlorurus rhakoura*, BPBM 27184, female, 352 mm SL, Hikkaduwa, Sri Lanka, head and caudal fin saved (J.E. Randall).

body green with a narrow orange-red bar at base; margins of dorsal and anal fins bright blue.

Description

Dorsal rays IX,10; anal rays III,9 (first spine very small and slender); all dorsal and anal soft rays branched, the last to base; pectoral rays 15 (one paratype with 14), the uppermost rudimentary, the second unbranched; pelvic rays I,5; principal caudal rays 13, the upper and lower unbranched; upper and lower procurrent caudal rays 6; longitudinal scale series 23; lateral line interrupted but overlapping, the dorsoanterior part with 19 (19-20) scales, and the peduncular part with 5 (5-6) scales; lateral line continuing as two pored scales on caudal-fin base, the posterior scale enlarged; scales above lateral line to origin of dorsal fin 1.5; scales below lateral line to origin of anal fin 6; median predorsal scales 3, the most posterior strongly notched in front of first dorsal spine and largely covered by second scale in large specimens; median prepelvic scales 4; circumpeduncular scales 12; gill rakers small and slender, 44 (35-49); pseudobranchial filaments 40 (352-mm paratype with 44); branchiostegal rays 5; vertebrae 25.

Body moderately deep, the depth 2.6 (2.35-2.5) in SL; body width 2.25 (2.25-2.65) in depth; head length 2.8 (2.7-2.8) in SL; adults with a large, bulbous, fleshy protuberance on forehead, forward-projecting in large adults but not extending anterior to a vertical at corner of mouth; snout length 2.3 (2.0-2.2) in head length; orbit diameter 7.75 (7.7-9.2) in head; interorbital space strongly convex, the least width 3.0 (2.9-3.2) in head; caudal-peduncle depth greater than caudal-peduncle length, the depth 2.3 (2.1-2.4) in head, and the length 2.6 (2.65-2.9) in head.

Table 1. Proportional measurements of type specimens of *Chlorurus rhakoura*, expressed as percentages of the standard length. Holotype, (a) BPBM 18792;and 7 paratypes, (b) BMNM 1996.10.29.1; (c) RUSI; (d) USNM 343041; (e) AMS I–37146–001; (f) AMS I–37146–001; (g) BPBM 37312; (h) AMS I–37146–001.

	Holotype	**Paratypes**					
Sex	(a) female	(b) female	(c) female	(d) female	(e) female	(f) female	(g) male	(h) male
Standard length (mm)	251	276	322	347	373	384	420	442
Body depth	38.2	40.4	41.8	41.1	42.7	40.5	39.9	42.8
Body width	16.9	16.8	18.6	17.1	17.0	17.0	16.7	16.2
Head length	35.5	35.4	37.3	35.8	36.7	36.8	36.0	36.7
Snout length	15.3	16.1	17.8	17.5	17.3	17.7	17.6	18.1
Orbit diameter	4.7	4.6	4.5	4.3	4.1	4.1	4.0	4.0
Interorbital width	11.7	11.6	12.3	11.9	12.2	11.5	11.9	11.8
Caudal-peduncle depth	15.3	15.9	17.2	16.9	15.8	17.0	15.2	16.8
Caudal-peduncle length	13.5	13.0	13.7	13.4	13.2	13.0	13.6	12.6
Predorsal length	36.2	35.4	37.9	38.0	38.4	38.6	37.7	39.9
Preanal length	66.0	67.1	65.8	66.5	64.2	64.1	66.5	64.9
Prepelvic length	36.6	36.9	36.4	36.8	35.6	35.0	37.4	37.5
Dorsal-fin base	58.0	58.5	60.8	56.5	61.5	61.7	60.4	58.3
First dorsal spine	11.8	11.3	11.4	11.2	11.9	12.2	12.0	10.3
Ninth dorsal spine	12.4	12.4	12.4	12.6	12.0	13.2	12.8	12.3
Longest dorsal ray	14.6	14.4	16.4	15.9	15.3	16.9	16.7	18.2
Anal-fin base	27.0	26.1	26.8	27.1	26.6	26.4	26.1	27.6
Third anal spine	9.9	10.0	9.8	10.3	9.3	9.7	10.9	9.8
Longest anal ray	16.8	16.7	18.6	17.6	17.3	18.5	20.7	21.4
Caudal fin length	27.2	27.5	28.9	30.2	30.7	32.8	31.0	33.3
Pectoral-fin length	27.4	26.4	29.3	27.5	27.4	28.8	27.2	27.5
Pelvic-spine length	20.2	19.6	19.8	19.1	19.5	21.1	20.9	19.0
Pelvic-fin length	25.0	23.8	26.2	26.3	27.4	29.4	27.2	28.2

Mouth slightly inferior, the gape angling upward about 12° to horizontal axis of body; dental plates with a median suture, the upper plate overlapping lower; surface of dental plates smooth except near margin where slightly nodular, the margin crenulate; lips covering only about one-fourth of dental plates; no laterally projecting teeth on dental plates of holotype (the smallest of the type specimens), but all paratypes with one or two teeth posteriorly on side of upper dental plate (when two, the more anterior is largest and closer to margin of plate); teeth of pharyngeal bones of 352-mm paratype exposed but not removed; each upper pharyngeal bone with a longitudinal row of 11 ridged molariform teeth set at an angle and interlocking medially with teeth of other side; the single lower pharyngeal bone elliptical (exposed surface 25 mm long and 15 mm wide) and concave with 15 anterior-posterior rows of ridged nodular teeth with five teeth in each transverse row except anteriorly where teeth heavily worn and in only three rows.

Nostrils very small, in front of center of eye, the anterior about an orbit diameter in front of eye, the posterior obliquely above and behind the anterior,

the internarial distance about equal to pupil diameter; anterior nostril with a low membranous rim and a short posterior flap (which does not cover all of nasal aperature when laid forward).

Scales large, cycloid, and flexible, the thin membranous posterior edge of some scales on body irregular; most anterior scale of first row on cheek anterior to a vertical at front edge of orbit; dorsal and anal fins naked except for a row of small scales, the distal third of which extend onto base of these fins; caudal fin with two vertical rows of large scales which extend nearly half way to posterior margin; paired fins naked, the pelvics with a midventral process of two scales behind fourth prepelvic scale, the more posterior scale pointed; lateral-line scales with numerous, irregularly branched, fine tubules.

Origin of dorsal fin above upper end of gill opening; first dorsal spine 3.0 (3.0-3.55) in head length; remaining spines progressively longer, the ninth 2.85 (2.8-3.0) in head; margin of spinous portion of dorsal fin stoutly fleshy; penultimate dorsal soft ray distinctly longest, 2.45 (2.0-2.45) in head; first anal spine slender and difficult to measure without dissection or by radiograph, about half length of second spine; second anal spine about three-fifths length of third spine; third anal spine 3.6 (3.3-4.05) in head; penultimate anal soft ray notably the longest, 2.1 (1.7-2.1) in head; caudal fin slightly rounded, 3.7 (3.0-3.65) in SL, with strongly exserted rays, the maximum indentation between ray tips and membrane at base 4.65 (2.5-4.5) in head; third pectoral ray longest, 1.3 (1.25-1.35) in head; posterior margin of pectoral fins scalloped, each ray tip more posterior than adjacent membranes; pelvic spine 1.75 (1.7-1.95) in head; pelvic fins 1.4 (1.25-1.5) in head.

Color of holotype in alcohol dark brown; dental plates white; membranes of median fins darker than rays; narrow margin of soft portion of dorsal and anal fins clear with a dark brown submarginal line; margin of spinous portion of dorsal fin gray; posterior margin of pectoral fins clear, often with a semicircular clear area at expanded tip of many of the rays.

Color when fresh, as shown in Figures 1 and 2, dark gray-brown, the margins of dorsal and anal fins bright blue.

Color in life as shown in Figure 3 (perhaps a female): dark gray-brown, the scales with a dull blue-green cast, the scale edges narrowly dark purplish red; a submarginal blue ring around eye except dorsoposteriorly; dental plates pale blue except for white edges (and algae basally on upper plate); fins dark purplish gray, the margins of the dorsal and anal bright blue (broad on spinous portion of dorsal); membranes at base of exserted caudal rays blue; posterior edge of pectoral fins blue, broadest on membranes. Color in life as shown in Figures 4 and 5 (presumed to be males): deep purplish blue, the scales of body green with a narrow orange-red bar at base; dental plates bluish white; fins dark purplish blue, the margin of spinous portion of dorsal broadly bluish white; margin of anal fin and soft portion of dorsal fin bright blue with a dark submarginal line; membranes at base of exserted caudal rays blue.

Etymology

This specific name for *Chlorurus rhakoura* is from the Greek *rhakos* for rag, and *oura* for tail, in reference to the ragged posterior margin of the caudal fin.

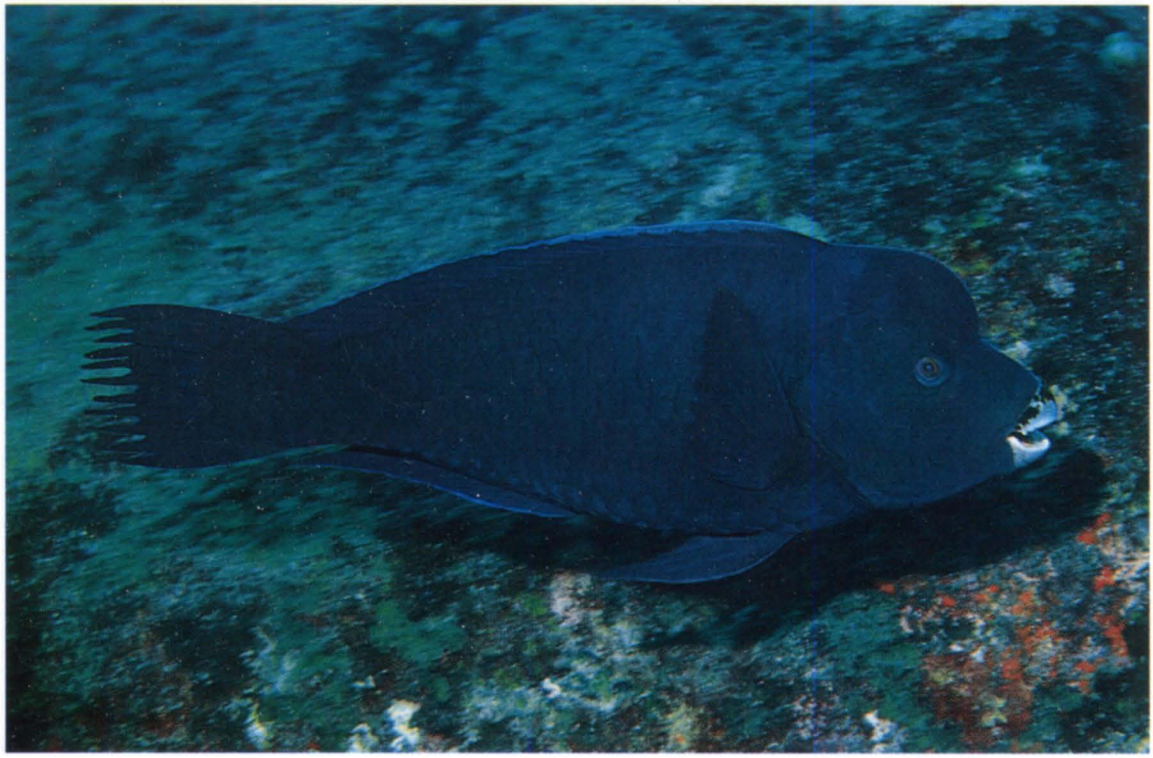

Figure 3. Underwater photograph of *Chlorurus rhakoura*, presumed female, Mirissa, Sri Lanka (R.C. Anderson).

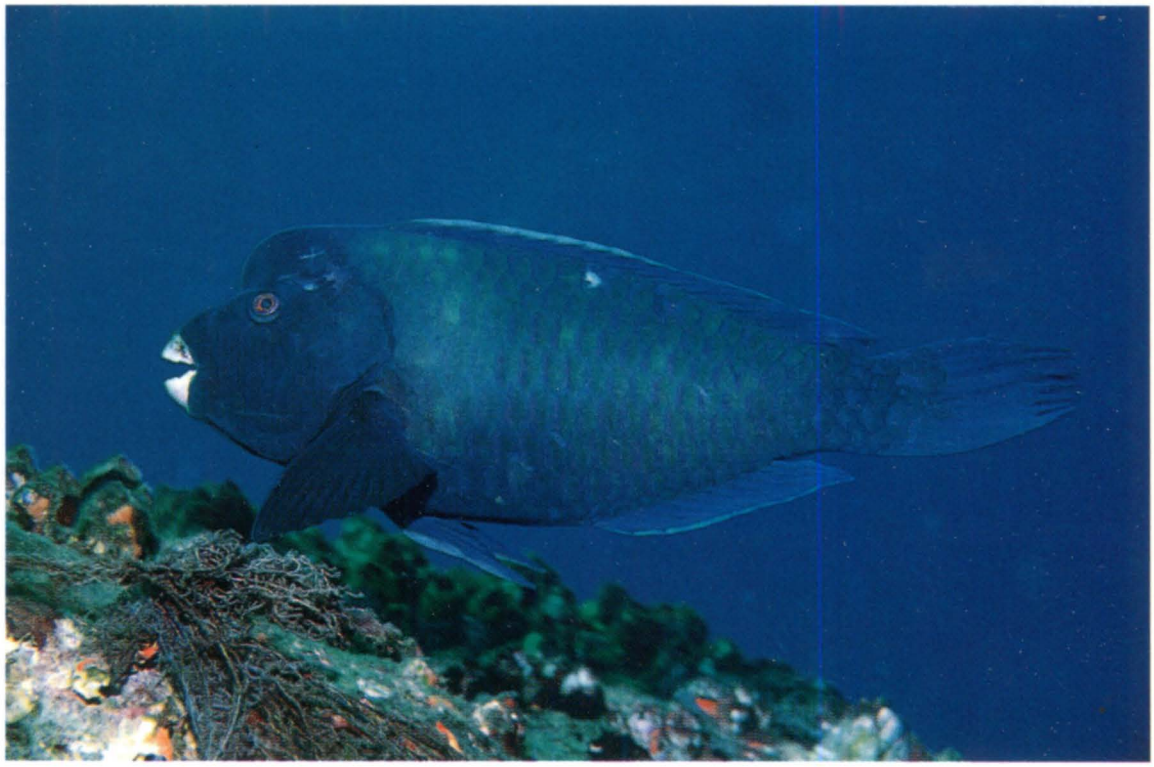

Figure 4. Underwater photograph of *Chlorurus rhakoura*, presumed male, Berwela, Sri Lanka (R.C. Anderson).

Figure 5. Underwater photograph of *Chlorurus rhakoura*, presumed male, Berwela, Sri Lanka (R.C. Anderson).

Remarks

The junior author observed two subadults of *Chlorurus rhakoura*, about 250 mm in total length, around rocks south of Pigeon Island off Nilaveli, Sri Lanka. Both had a slight bump on the forehead, but the caudal fin rays were not exserted.

Chlorurus rhakoura is one of a complex of three allopatric species of the Indo-Pacific region. The other two are *C. oedema* (Snyder, 1909), described from Okinawa, and later recorded from Luzon and Tampotana Island, Philippines (Fowler and Bean, 1928) and Sulawesi (Schultz, 1958); and *C. cyanescens* (Valenciennes in Cuvier and Valenciennes, 1840), described from Mauritius, but also known from Zanzibar (as *Pseudoscarus chloromelas* Playfair and Günther, 1867), Madagascar (Sauvage, 1891), and Natal (Randall and Bruce, 1983). These three parrotfishes all have a bulbous protuberance of the same shape on the forehead as adults, 3 median predorsal scales, 2 rows of scales on the cheek, and 15 pectoral rays. Few specimens of *C. cyanescens* and *C. oedema* have been reported in the literature.

As mentioned above, Schultz (1958) proposed the subgenus *Ypsiscarus* for *Scarus oedema*. Schultz (1969) elevated *Ypsiscarus* to a genus and added *S. ovifrons* Temminck and Schlegel (1846), a species he overlooked in his 1958 review. *Scarus ovifrons* does not have 3 median predorsal scales as Schultz assumed, but 6. Also the convexity on the head is different from that of *oedema*. It involves the snout as well as the forehead, forming a single large protuberance that extends anterior to the corner of the mouth in large adults. Schultz should have included *S. cyanescens* instead of *S. ovifrons* in *Ypsiscarus*; however, he mistakenly recorded 4 predorsal scales for *S. cyanescens*, and he illustrated a

subadult (a black and white copy of the color illustration of the holotype of *Pseudoscarus chloromelas* Playfair and Günther) which lacks the convexity of the forehead.

Chlorurus rhakoura differs from both *C. cyanescens* and *C. oedema* in having a caudal fin with strongly exserted rays, in contrast to a fin with a smooth margin. Also the caudal fin is longer as a result of the posterior extension of the caudal rays (caudal fin of *rhakoura* 3.0-3.7 in SL; of *oedema* and *cyanescens*, 4.05-4.7 in SL). In addition, the penultimate anal ray of *C. rhakoura* is very long, 1.7-2.1 in head length, compared to 2.6 for a specimen of *C. oedema* from Luzon (BPBM 36833, 236 mm SL) and 2.35 for the photograph of a 300-mm specimen in Masuda et al. (1984: pl. 215, fig. K). However, in the original description, Snyder (1909) recorded the posterior anal rays of the 450-mm holotype as about 2 in head. The penultimate anal ray of three specimens of *C. cyanescens* (RUSI 17553, 372 mm SL, from Natal; RUSI 40603, 2: 253-290 mm SL, from Madagascar) is contained 2.2-2.45 times in the head length. *Chlorurus rhakoura* is different in color from *C. cyanescens*, the latter deep blue, the scales posterior to the pectoral fin green with deep blue edges, the posterior margin of the caudal fin bright blue (see Randall and Bruce, 1993: pl. 1, fig. B; Smith and Heemstra, pl. 110, fig. 221.8); the caudal margin white in preservative.

Chlorurus rhakoura is known locally in Sinhalese as 'muli gireva' ('muli' refers to the hump on the head and 'gireva' means parrot). It occurs on inshore rocky reefs and is often seen in small schools.

Acknowledgments

We thank foremost Rohan Pethiyagoda and David Claasz for obtaining six of the nine type specimens of *Chlorurus rhakoura* at our request. We also thank Mark McGrouther and Sally Reader for shipment of type specimens from the Australian Museum, Phillip C. Heemstra for the loan of specimens of *C. cyanescens* from the J.L.B. Smith Institute of Ichthyology, Arnold Suzumoto for radiographs, and Robin W. Bruce and David R. Bellwood for review of the manuscript.

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