Halichoeres zulu, a new labrid fish from South Africa

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Abstract. *Halichoeres zulu* is described as a new species of labrid fish from inshore on rocky bottom or shallow reefs of KwaZulu-Natal, South Africa from four specimens, 79–135 mm standard length. Formerly misidentified as the similar *H. nebulosus*, a common sympatric species that ranges to the western Pacific (here extended to Palau), it differs in colour and in attaining a larger size. It is also a close relative of *H. margaritaceus*, a widely distributed Pacific and eastern Indian Ocean species. Although sharing a unique colour pattern on the cheek, it differs from *H. margaritaceus* in body colouration, a strongly modal count of 14 compared to 13 pectoral rays, and in reaching larger size.

Keywords: taxonomy, Labridae, *Halichoeres*, new species, South Africa

INTRODUCTION

The labrid fish genus *Halichoeres* Rüppell is the largest of the wrasse family, with 70 species (Parenti & Randall, 2000). It is well represented in all tropical and subtropical seas. Barber & Bellwood (2005) published a phylogenetic molecular study of the genus. From a genetic standpoint, *Halichoeres* should be divided into several genera, but morphological characters are lacking to make this practicable.

Randall & Smith (1982) reviewed the genus *Halichoeres* for the western Indian Ocean, recognizing 15 species, six of which were described as new. They reported that seven of the species range to the Pacific Ocean. One of the widely distributed species, *H. nebulosus* (Valenciennes), with a type locality of Bombay, has been confused with two other species in the western Pacific. Kuiter & Randall (1981) differentiated the three in a paper entitled, "Three look-alike Indo-Pacific labrid fishes, *Halichoeres margaritaceus*, *H. nebulosus* and *H. miniatus*."

In May of 2002, the second author collected a specimen of *Halichoeres* measuring 79 mm in standard length from shallow water at Umhlanga Rocks, near Durban, that seemed different from any of the species known for the western Indian Ocean. It is most similar to the female of *H. nebulosus*, as illustrated in Randall & Smith (1982: Plate 4 C) and Smith & Heemstra (1986: Plate 99, Fig. 220), sharing the large pink area on the abdomen, two black spots on the head behind the eye, and the same oblique banded pattern of the dorsal and anal fins, with two black spots in the dorsal. He sent the specimen to Phillip C. Heemstra at the South African Institute for Aquatic Biodiversity in Grahamstown. Although the life colour of the fish was somewhat faded, Heemstra photographed it (Fig. 1 A), and deposited the specimen in the SAIAB fish collection.

In 2008, the second author took an aquarium photograph (Plate 1 A) at the uShaka Marine World in Durban of what he believed to be a male-female pair of the same species. He sent the photo to the first author, who noticed the similarity of the colour pattern of the head to the Pacific species, *H. margaritaceus* (Valenciennes), in particular the elongate green horseshoe-shaped mark on the cheek. Plate 1 B and C are underwater photographs of a female and male of *H. margaritaceus* taken in Taiwan, which show this pattern on the cheek. In *H. nebulosus*, there is a boomerang-shaped pink mark on the cheek surrounded by pale green (Plate 1 D and E show a male and female of *H. nebulosus* from Mauritius, and Plate 1 F an aquarium photo of a male at uShaka Marine World).

Knowing that the unidentified *Halichoeres* is not rare in KwaZulu-Natal, we inquired if there are specimens in the large SAIAB fish collection identified only to genus or misidentified as *H. nebulosus*. Two adult male specimens were found. Neither had been photographed when fresh, so the second author waited for a calm day, enlisted the aid of three other divers, captured a large male with the use of a fence net, and took a specimen photograph (Plate I G). He also obtained aquarium photos of a female and a male (Plate 1 H and I) at uShaka Marine World in Durban, and an underwater photograph of a large male (Plate 1 J).

We conclude from the colour differences from both *H. nebulosus* and *H. margaritaceus* that the KwaZulu-Natal wrasse is a new species, which we describe here.

MATERIALS AND METHODS

Type specimens of the new species are deposited in the South African Institute for Aquatic Biodiversity, Grahamstown (SAIAB).

Lengths given for specimens are standard length (SL), the straight-line distance from the median anterior point of the upper lip to the base of the caudal fin (posterior end of hypural plate). Head length (HL) is measured from the same anterior point to the posterior end of the opercular membrane, and snout length from the same point to the fleshy edge of the orbit. Body depth is the greatest depth from the base of the dorsal spines; body width is the greatest width measured just posterior to the gill opening. Orbit diameter is the greatest fleshy diameter, and interorbital width the least bony width. Caudal-peduncle depth is the least depth; caudal-peduncle length is measured horizontally from the rear base of the anal fin to the caudal-fin base. Predorsal, preanal, and prepelvic lengths are from the front of the upper lip to the origin of the respective fins. Lengths of fin spines and soft rays are measured from where they emerge from the contour of the body to their tips. Pectoral-ray counts include the very short unbranched upper ray. Lateral-line scale counts do not include the single pored scale on the base of the caudal fin. Suborbital sensory pores are counted from behind the middle of the orbit to below the bony anterior edge of the orbit. When there is a pore at the base and at the tip of a radiating sensory canal, only one pore is counted. Gill-raker counts were made on the first gill arch. Only the total count is given (it is difficult to determine which raker is at the angle in many species of labrid fishes).

Table I gives the measurements of the new species as percentages of the standard length. Proportional measurements in the text are rounded to the nearest 0.05. Data in parentheses in the description refer to the paratypes.

Fig. 1. Male and female of *Halichoeres zulu*, uShaka Marine World, Durban (D. R. King).

Halichoeres zulu, sp. nov.

(Fig. 1, Plate 1 A, G–J; Tables 1-2)

Holotype. SAIAB 83176, male, 135 mm, South Africa, KwaZulu-Natal, off Umhlanga Rocks, 29°43′31.775′ S, 31°5′23.02″ E, rocky substratum, 1 m, fence net, D. R. King, T. Kay, J. Haxton and G. Leisgang, 27 March 2009.

Paratypes. SAIAB 43793, male, 116 mm, KwaZulu-Natal, Six-Mile Reef (now Adlam's Reef), 27°37′30″ S, 32°39′24″ E (10 km south Jesser Point, Sodwana Bay), top of inner reef with encrusting algae, bedrock, stones and sand, 2 m, rotenone, R. W. Winterbottom, M. S. Christensen, and G. S. Butler, 26 July 1976; SAIAB 28252, male, 121 mm, KwaZulu-Natal, off Scottburgh, 30°16′45″ S, 30°45′30″ E, R. W. Jones, 4 December 1988; SAIAB 82005, female, 79 mm, KwaZulu-Natal, Umhlanga Rocks, 29°43′32″ S, 31°5′23″ E, off rocky shore, 1 m, hand net, D. R. King, March 2002.

Diagnosis. Dorsal rays IX, 11; anal rays III, 11; pectoral rays 14 (rarely 13); lateral-line scales 26; head naked (no small scales on opercle or behind eye); narrow median dorsal zone of nape naked; median prepelvic scales 7, the anterior third of chest naked; tubule branches on lateral-line scales 3–5; suborbital pores 11–15; gill rakers 19–21; body depth 2.95–3.6 in SL; caudal fin slightly rounded, 1.4–1.45 in HL. Colour of female in alcohol pale tan, the scales on upper two-thirds of body, posterior to pectoral fins, with brown centres, those below soft portion of dorsal fin and in lowermost row dark brown; three broad dusky bars on chest and abdomen, fading ventrally; a black spot shaped like an inverted comma on opercular flap at upper end of gill opening; a dark brown spot of near-pupil size usually present behind upper part of orbit; an oblique dusky band on snout; an elongate, dark-edged, horseshoe-shaped band across cheek and opercle; dorsal fin with oblique brown bands, a small black spot on first membrane, and an ocellated black spot between second and fourth dorsal soft rays; rays of caudal fin with small dark spots; male with the same basic colour pattern, but most markings darker; black spot anteriorly on dorsal fin and oblique bands in spinous portion of fin lost; a wavy dark band basally on anal fin with a pale spot at base of each membrane. Females mainly pink or lavender-pink in life, with narrow pale green bands, a bright red stripe on nape, extending below base of spinous portion of dorsal fin, and a row of small dark brown spots on side of body above anal fin; males with deep pink and bright green bands on head, the body with alternating wavy stripes of bright green and purplish red.

Description. Dorsal rays IX, 11; anal rays III, 11; all dorsal and anal rays branched, the last to base; pectoral rays 14 (one paratype 13 on one side), uppermost rudimentary, second unbranched; pelvic rays I, 5; principal caudal rays 14, the upper and lower unbranched; upper and lower procurrent caudal rays 5; lateral-line scales 26, (plus 1 pored scale on caudal-fin base); scales above first lateral-line scale to base of first dorsal spine 3.5; scales above lateral line to base of ninth dorsal spine 2.5; scales below lateral line to base of first anal spine 9.5; circumpeduncular scales 20; gill rakers 21(21, except one paratype with 19); branchiostegal rays 5; vertebrae 25.

Body depth progressively greater with growth, 2.95 (3.0–3.6) in SL; body moderately compressed, the width 2.2 (2.3–2.5) in body depth; head length 3.1 (3.0–3.1) in SL; snout length 2.65 (2.75–2.8) in HL; orbit diameter 6.2 (5.45–6.0); interorbital space convex, the least width 5.9 (5.4–5.7) in HL; caudal-peduncle depth 1.9 (2.05–2.1) in HL; caudal-peduncle length 2.65 (2.7–2.8) in HL.

Mouth terminal to slightly inferior, a little oblique, and small, the upper-jaw length 3.25 (3.1–3.3) in HL; a pair of strong, jutting, canine teeth anteriorly in jaws, the lower pair fitting inside upper when mouth closed; upper canines more projecting and slightly flaring, about a pupil diameter in length; side of jaws with a row of eight or nine progressively smaller, stout, conical teeth, ending at corner of mouth with a larger, forward-projecting tooth; side of jaws anteriorly with one to two rows of small nodular teeth. Tongue slender, triangular, and sharply pointed, nearly reaching rear base of teeth anteriorly in jaws; lips large and fleshy, the curving labial flap on side of lower jaw a pupil width at its greatest depth. Gill rakers short, the longest at angle about two-fifths length of longest gill filaments.

Anterior nostril a very small, pointed tubule, two-thirds orbit diameter anterior to middle of eye; posterior nostril an oblique slit, two-thirds pupil diameter dorsoposterior to anterior nostril, well-protected by an anterior hemispherical flap. Suborbital pores 12 (11–15); cephalic sensory pores of smallest paratype 23 from front of snout, passing above nostrils, encircling orbit and ending above corner of mouth (pores counted after staining; double pores considered as one); pores of preopercular-mandibular series 16.

Scales cycloid; lateral line continuous, deflected downward below last two dorsal soft rays to straight peduncular part; lateral-line scales with 3 to 5 branching tubules that end in a pore; scales on nape small, progressively smaller and more embedded anteriorly, reaching forward to a vertical one-half orbit diameter behind eye; no scales in a narrow median dorsal zone on nape; scales of prepelvic area and on chest angular, the largest about one-half height of largest body scales, becoming progressively smaller and more embedded ventroanteriorly; a diamond-shaped naked patch on isthmus as large as eye; no scales on base of dorsal, anal, and paired fins, except for a pointed scale, one-half orbit diameter in length midventrally at base of pelvic fins (a small rounded scale at base of this scale on smallest paratype); basal third of caudal fin with four to five approximately vertical rows of scales, progressively smaller posteriorly.

Origin of dorsal fin above first lateral-line scale, the predorsal length 3.2 (3.15–3.35) in SL; dorsal spines progressively longer, the first 4.25 (4.05–5.15) in HL, and the ninth 3.15 (2.95–3.0) in HL; first dorsal soft ray longest, 2.4 (2.35–2.55) in HL; origin of anal fin below base of first dorsal soft ray, the preanal length 1.8 in SL; first anal spine very slender and short, 11.1 (9.9–10.1) in HL; third anal spine 3.5 (3.7–3.85) in HL; first and second anal soft rays longest, 2.55 (2.5–2.7) in HL; caudal fin slightly rounded, and short, 1.4 (1.4–1.45) in HL; third pectoral ray longest,1.6 (1.55–1.65) in HL; origin of pelvic fins below midbase of pectoral fins, the prepelvic length 3.15 (3.05–3.15) in Sl: pelvic fins short, not reaching anus, 1.6 (1.5–1.8) in HL (clearly shortest in female).

Table 1. Proportional measurements of type specimens of *Halichoeres zulu* as percentages of Standard Length.

	Holotype	Paratypes		
	SAIAB 83176	SAIAB 82005	SAIAB 43793	SAIAB 28252
Standard length (mm)	135	79	116	121
Sex	male	female	male	male
Body length	34.2	27.8	29.7	33.2
Body width	15.5	11.2	11.8	14.4
Head length	32.3	33.2	33.6	32.3
Snout length	12.2	11.8	12.2	11.6
Orbit diameter	5.2	6.1	5.6	5.5
Interorbital width	5.5	5.7	5.9	6.0
Upper-jaw length	9.9	10.0	10.9	9.8
Caudal-peduncle length	17.1	16.3	16.0	15.9
Caudal-peduncle depth	12.2	12.4	12.4	12.5
Predorsal length	31.1	31.6	31.7	29.8
Preanal length	55.2	55.6	55.9	56.1
Prepelvic length	31.8	32.9	31.5	31.7
Base of dorsal fin	63.2	58.3	58.0	61.7
First dorsal-fin spine	7.6	7.7	6.5	8.0
Ninth dorsal-fin spine	10.3	11.3	11.1	10.9
Longest dorsal-fin ray	13.4	14.2	13.2	13.8
Base of anal fin	34.4	32.3	32.7	34.2
First anal-fin spine	2.9	3.3	3.4	3.2
Third anal-fin spine	9.2	8.9	8.7	8.5
Longest anal-fin ray	12.7	13.4	12.5	12.7
Caudal-fin length	23.2	23.9	23.5	23.1
Pectoral-fin length	20.1	19.9	20.5	20.7
Pelvic-fin spine length	12.4	11.6	11.6	12.2
Pelvic-fin length	20.1	18.2	19.0	21.4

Table 2. Pectoral-fin ray counts[1] of four species of *Halichoeres* .

Species	12	13	14	15
H. margaritaceus		101	7	
H. miniatus	2	44	1	
H. nebulosus		2	104	2
H. zulu		1	7	

[1]Counts were made of fin rays on both sides, and include rudimentary upper ray.

Colour of male holotype in alcohol: centres of scales on upper half of body dark brown, except for row of scales above lateral line and below the spinous portion of the dorsal fin, with only the upper half dark brown (of these, the fourth and ninth scales, and the scales above, nearly free of dark pigment); a pale band of about one-half scale height above upper edge of pectoral fin, narrowing posteriorly to middle of body; three dark bars of two to four scales in width extending ventrally from this pale band, the first two below pectoral fin and broadening below on abdomen, the third also broader ventrally where centred on anus; remaining ventral half of body pale with a longitudinal series of six dark blotches from dark centres of two to five scales; prepectoral area and chest covered by a large triangular dark brown area that gradually fades ventrally; ventral part of head with an elongate, horseshoe-shaped pale band, the open end anterior (upper free end at corner of mouth and the lower on throat; a pale band from side of upper lip to eye; two pale bands extending posteriorly from eye, the upper curving around a large vertically elongate black spot behind and above upper half of eye, continuing as pale band anteriorly on body above lateral line; second pale band posterior to eye expanding as it reaches a large black spot, shaped like an inverted comma, posteriorly on opercular flap adjacent to upper end of gill opening; nape with a middorsal pale band; spinous portion of dorsal fin pale, the soft portion with a wavy horizontal brown band near middle of fin, with a dark band extending below on each membrane, and containing a large black spot between third and fourth soft rays; anal fin with a wavy dark band on basal two-fifths of fin, enclosing a small pale spot at base of each membrane; upper two and lower two principal rays of caudal fin pale; scaled basal central part of caudal fin dark brown, the remainder of rays with a series of 5 or 6 small dark spots, smaller posteriorly; paired fins pale. Colour of holotype when fresh as in Plate 1 G.

Colour of female paratype in alcohol pale tan, the scales on upper two-thirds of body, posterior to pectoral fin, with brown centres, those below soft portion of dorsal fin and in lowermost row dark brown; three broad dusky bars on chest and abdomen, fading ventrally; a black spot shaped like an inverted comma on opercular flap at upper end of gill opening; a dark brown spot of near-pupil size usually present behind upper part of orbit; an oblique dusky band on snout; an elongate, dark-edged, horseshoe-shaped band across cheek and opercle, the open end anterior; dorsal fin with oblique brown bands, a small black spot on first membrane, and an ocellated black spot between second and fourth dorsal soft rays; rays of caudal fin with small dark spots; paired fins pale. Colour of female paratype after several days on ice shown in Plate 1 A.

Etymology. We name this species for the indigenous people of the Province of KwaZulu-Natal, South Africa.

Remarks. This species is described from four specimens from KwaZulu-Natal, collected over a span of 31 years, suggesting that it is rare. The explanation for the paucity of specimens is partly due to its misidentification as *Halichoeres nebulosus*, but also to its usual shallow-water habitat off exposed rocky shores, where it is difficult to collect, as well as being very elusive.

We could find no meristic separation of *Halichoeres zulu* from *H. nebulosus*, and no difference in proportional measurements. Table 2 shows a strong modal separation of pectoral-ray counts of *H. nebulosus* and *H. zulu* from *H. margaritaceus* and *H. miniatus*.

There is a clear separation in the maximum size of *H. nebulosus* and *H. zulu*. The largest male of 50 specimens in 23 lots of *H. nebulosus* examined for the present study measures 86 mm SL, and Kuiter & Randall (1981: Fig. 5) illustrated one from Japan 96 mm SL. The three males of *H. zulu* range from 116 to 135 mm SL. In addition to the aforementioned cheek colour pattern, there is a difference in body colouration, that of *H. zulu* being primarily longitudinally banded, compared to a more barred pattern for *H. nebulosus*.

We also failed to find any difference in proportional measurements between *H. zulu* and *H. margaritaceus*. However, as in *H. nebulosus*, there is a difference in the maximum size attained. Kuiter & Randall reported the largest specimen of *H. margaritaceus* as 102 mm SL, collected from the Cocos-Keeling Islands, but one male from Lord Howe Island in a total of 94 specimens in 31 Bishop Museum lots from the Pacific measures 113 mm SL. The largest individuals of tropical marine fishes are usually found at locations of cooler sea temperature. Lord Howe Island lies at 32.5° S. Except for this lot and one from subtropical Pitcairn Island, the largest specimen is 86 mm SL (see Material examined below).

Although there is similarity in the cheek colouration of *H. zulu* and *H. margaritaceus*, the body colour pattern is clearly different, that of *H. zulu* more linear, as may be seen by comparing figures of the two species of Plate 1. Also, the dark pigmentation seen on the scales of the female of *H. margaritaceus* is on the edges of the scales (actually the edges of the scale pockets), whereas it is broadly on the scale centres in *H. zulu*. In addition, the ocellated black spot near mid-length of the dorsal fin is higher in the fin of *H. margaritaceus*.

The third of Kuiter & Randall's look-alike species of *Halichoeres*, *H. miniatus* (Valenciennes), is not easily confused with *H. zulu*. The upper two-thirds of the body of the female is dark grey or black with dull green scale centres; the male has dark red and green stripes following the scale rows, the green as series of spots posteriorly, overlaid by blackish bars on the posterior two-thirds of the body; both sexes have a large, irregular, circular pink mark on the cheek, and a black spot at the upper base of the pectoral fin. *H. miniatus* is distributed from Queensland, north through Indonesia and the Philippines to southern Japan.

Halichoeres zulu has been observed in the sea by the second author from northern Transkei to Banganek just south of the mouth of Kosi Bay near the northern end of KwaZulu-Natal, but it should range at least to southern Mozambique. It is generally found on rocky bottom or sand with scattered patches of reef at depths of 0.5 to 1.5 m. The pool where the male of Plate 1 I was photographed is almost closed to the sea at low tide. It is about 5 m long, 2 m wide, and 1.2 m deep.

MATERIAL EXAMINED

Halichoeres margaritaceus. **Indonesia:** Bali, BPBM 40579, 29 mm. **Taiwan:** BPBM 8659, 54 mm. **Palau:** Koror, BPBM 40964, 2: 64–66 mm. **Mariana Islands:** Guam: BPBM 139, 2: 76–78 mm; BPBM 140, 50 mm; BPBM 4578, 60 mm. **Coral Sea**, Chesterfield Islands: BPBM 33715, 4: 49–67 mm. **Lord Howe Island:** BPBM 14841, 2: 90–113 mm. **Kiribati:** BPBM 4581, 78 mm; Onotoa Atoll, BPBM 15338, 42 mm. **Marshall Islands:** Enewetak Atoll, BPBM 6284, 57 mm; BPBM 8062, 18: 45–81 mm; BPBM 8171, 86 mm; BPBM 8187, 64 mm; BPBM 12914, 2: 65 mm; BPBM 29033, 14: 39–85 mm. **Fiji:** Viti Levu, BPBM 5917, 2: 25–32 mm; Kadavu, BPBM 31150, 36 mm. **Tonga:** Tongatapu, BPBM 5674, 16: 28–71 mm; BPBM 5677, 5: 30–40 mm; BPBM 28923, 38 mm; BPBM 38030, 71 mm. **Samoa:** BPBM 5353, 2: 50–52 mm. **Line Islands:** Howland Island, BPBM 4579, 6: 20–30 mm; Kiritimati (Christmas Island), BPBM 4580, 68 mm; BPBM 4583, 78 mm; BPBM 37466, 83 mm. **Society Islands:** Tahiti, BPBM 8377, 53 mm; BPBM 13338, 80 mm; Moorea, BPBM 9348, 69 mm; BPBM 9352, 74 mm. **Pitcairn Island:** BPBM 16719, 103 mm.

Halichoeres nebulosus. **Red Sea:** BPBM 9301, 70 mm; Egypt, BPBM 19841, 2: 38–52 mm. **South Africa:** KwaZulu-Natal, BPBM 21694, 46 mm; SAIAB 43782, 3: 43–86 mm. **Bassas da India:** SAIAB 48984, 2: 70–82 mm. **Seychelles:** Cosmoledo Group, Assumption Island, SAIAB 43796, 2: 61–84 mm; Mahé, BPBM 22936, 3: 44–56 mm; Cocos Island, BPBM 21626, 3: 47–70 mm. **Mauritius:** BPBM 22929, 2: 54–80 mm; SAIAB 43781, 85 mm. **Maldive Islands:** North Malé Atoll, BPBM 32996, 2: 58–67 mm. **India:** Kerala, BPBM 27677, 51 mm. **Sri Lanka:** BPBM 18760, 83 mm. **Andaman Sea:** Thailand, Similan Islands, Ko Miang, BPBM 22811, 3: 45–62 mm. **Western Australia:** Dampier Archipelago, Kendrew Island, BPBM 17402, 8: 23–80 mm. **Indonesia:** Bali, BPBM 20911, 53 mm; BPBM 20925, 3: 45–54 mm; BPBM 20939, 4: 50–75 mm. **Philippines:** Cebu, BPBM 22083, 63 mm; BPBM 22120, 3: 50–68 mm. **Palau**: Koror, BPBM 40965, 2: 60–64 mm

RANGE EXTENSION FOR *Halichoeres nebulosus*. The two specimens of *H. nebulosus* listed above from Palau represent the first record for any island of Oceania. They were taken by spearing from the island of Koror by Luiz A. Rocha, Matthew T. Craig, and Brian W. Bowen on 24 October 2006.

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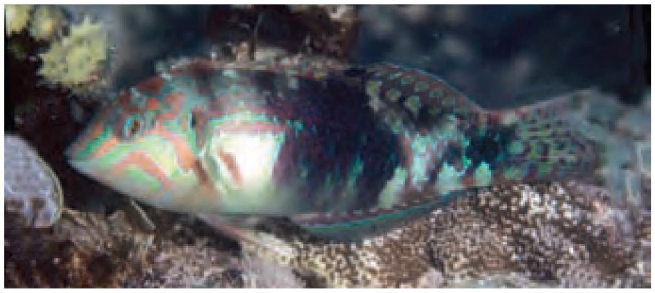
PLATE 1

A. Paratype of *Halichoeres zulu*, SAIAB 82005, female, 79 mm SL, KwaZulu-Natal (P. C. Heemstra).

B. Underwater photo of female of *Halichoeres margaritaceus*, Taiwan (J. E. Randall).

C. Underwater photo of male of *Halichoeres margaritaceus*, Taiwan (J. E. Randall).

D. Underwater photo of female of *Halichoeres nebulosus*, Mauritius (J. E. Randall).



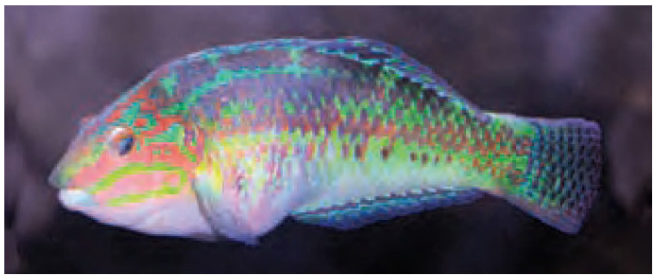
E. Underwater photo of male of *Halichoeres nebulosus*, Mauritius (J.E. Randall).

F. Photo of male of *Halichoeres nebulosus*, uShaka Marine World, Durban (D. R. King).

G. Holotype of *Halichoeres zulu*, SAIAB 83176, male, 135 mm SL, KwaZulu-Natal (D. R. King).

H. Photo of female of *Halichoeres zulu*, uShaka Marine World, Durban (D. R. King).

I. Underwater photo of female of *Halichoeres zulu*, in a rock pool with *Caulerpa* sp., KwaZulu-Natal (D. R. King).



J. Photo of large male of *Halichoeres zulu*, uShaka Marine World, Durban (D. R. King).