Fishes of the genus *Helcogramma* (Blennioidei: Tripterygiidae) in the Western Indian Ocean, including Sri Lanka, with descriptions of four new species.

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Abstract. Fifteen species of the tripterygiid fish genus *Helcogramma* are recognised from the Western Indian Ocean (including Sri Lanka and the southeastern coast of India). *Helcogramma shinglensis* Lal Mohan is recognised as a valid species and four species are described as new: *Helcogramma alkamr*, which is similar to *H. chica* Rosenblatt, is known from the Comoro Islands, the Seychelles and Mauritius; *Helcogramma serendip*, apparently confined to Sri Lanka and possibly a sibling species to *H. alkamr; Helcogramma ememes* from the Seychelles and the East African coast, which is similar to *H. hudsoni* Schultz, and *Helcogramma rharhabe*, one of the *H. obtusirostre* complex of species, and which appears confined to the east coast of Africa from northern Mozambique to East London. Diagnoses of the other Western Indian Ocean species and a key are provided.

Keywords: taxonomy, Tripterygiidae, *Helcogramma*, new species, Western Indian Ocean

INTRODUCTION

The genus *Helcogramma* McCulloch & Waite 1918 has been revised only once, by Hansen, in 1986. Subsequent studies on tripterygiid fishes have been regional (e.g. Fricke 1994 & 1997), have described new species (e.g. Fricke & Randall 1992; Randall & Clark 1993), or dealt specifically with the *Helcogramma fuscopinna* complex (Williams & McCormick 1990; Williams & Howe 2003). Hansen recognised 12 species, describing four as new. She also synonymised many nominal species, several as *Helcogramma obtusirostre* (originally described by Klunzinger from the Red Sea), a species which she considered to occur widely in the Indo-West Pacific Ocean. Williams and McCormick (1990) recognised that *H. fuscopinna* is a complex of at least eight species. Fricke (1994, 1997) described a further three new species for the genus. This study recognises 15 species from the Western Indian Ocean of which four are described as new, bringing the total number of species in *Helcogramma* to some 35.

Notwithstanding Fricke's record of variations of 4, 5 or even 6 in counts of fin spines or rays in a single species, this review shows little morphometric variation in *Helcogramma* species. At most, fin elements will vary by 3, and then the number of counts off the norm (mode) are generally very low. Lateral-line scale counts do show greater variation in some species. This study also shows that several species have fin-element counts that do not separate them from each other. It was this factor, I believe, that encouraged Hansen to synonymise a number of species as *Helcogramma obtusirostre*. However, individuals from different areas can be separated on the basis of colour pattern (see e.g. Williams & Howe 2003; Holleman 2006). In the Western Indian Ocean there are three species that can be ascribed to the *Helcogramma obtusirostre* complex. There are additional species in the Western Pacific Ocean-as well as one in the Southern Atlantic-that can also be ascribed to this complex.

METHODS

All measurements were made with pin dial calipers under a binocular microscope and are given in millimeters to a single decimal place. Ratios are calculated as the number of times a given measured length is contained in either the standard length or the head length. The measurement of head profiles, as measured in Holleman (1982), are fairly 'crude', but serve to indicate differences in skull structure. All counts were made under a microscope, including vertebrae, which were counted from radiographs. Pectoral-fin ray and lateral-line counts were made on the left side. Specimens on rare occasion have lost or gained a single ray in one of the pectoral fins. If the count was not as expected, the right side was counted, and if "normal", recorded; if not, the "non-normal" count was recorded. The counts are given, from the dorsalmost fin ray, as number of undivided rays, number of divided rays, number of undivided rays, e.g. 2, 7, 7. The numbers of divided and undivided rays were found to be remarkably consistent for most species.

Body scales of tripterygiid fishes are deciduous and often missing. If the last lateral-line scale on the left side was not followed by an ordinary body scale, the right side's scales were counted. If neither side was complete, the count was not recorded. Most species of *Helcogramma* have a naked area laterally along the base of the first and often the second dorsal fins. In species in which the body scales do not extend to the base of these fins, the scales decrease in size and become very thin as they approach the fin bases. They are best seen

Table 1. Selected characters of WIO species of *Helcogramma*; usual/modal counts are given in parenthesis.

Species	Second & third dorsal fins	Anal fin	Pectoral fins	Lateral line	Total lateral scales	Mandibular pores	Vertebrae	Nape	Ht. D1 cf D2
alkamr WIO islands n = 174	XIII–XIV + 10–11	19– 20	16: 1, 8, 7	19–25 (mode 21) few with 19 or 23–24	36–39 (37–38)	5 + 1 + 5 (⅔) 6 + 1 + 6 (⅓)	10 + 25–26	naked	<½
billi Sri Lanka n = 5	1XIII–XIV + 10–11 (XIII + 10)	17–20 (19)	16: 2, 7, 7	27–33 (mode 30)	38–39	2–3 + 1 + 2–3	10 + 25–26	scaled	>½ ♂ <½ ♀
elliotti SE India n = 6	XIII + 9–10 (XIII + 9)	18–19 rarely 20	16: 1, 8, 7	33–37† (34–35)	36–38 (38)	5–7 + 3–5 + 5–7	10 + 24–25	naked	= ♂ < ♀
ememes E. Africa, Seychelles n = 83	XII –XIV + 9–11	18–20 (19)	15: 1, 7, 7 or 1, 8, 6 or 2, 7, 6	19–23 (21)	36–38 (37)	4–7 + 3 + 4–7 (rarely 7)	10 + 24–27 (26)	naked	~ ½
fuscopinna WIO n = 137	XIII–XV + 10–12 (XIV + 11)	19–22 (21)	17: 1, 9, 7 seldom 16	22–30	38–40 (39–40)	5–8 + 1–2 + 5–8 (rarely 8)	10 + 27 rarely 26–28	naked	= ♂ < ♀
**larvata* Maldives n = 1	XI–XII + 8–9 (XII + 8–9)	16–18	15: 4, 4, 7	20–22	32–35	2–3 + 1 + 2–3	10 + 24–25	naked	½ - ⅔
**maldivensis* Maldives n = 1	XII–XIV + 9–11 (XIII + 10)	18–22 (22)	15: 3, 6, 6	13–21 usually 16–17	36–37	3 + 2 + 3	10 + 25–26	naked	~ ½
microstigma Comores to Inhaca n = 27	XII–XIV + 10–11	18–20 (19–20)	15: 2, 6, 7 or 16: 2, 7, 7	24–31 (27–28)	37–38	4 + 1 + 4 rarely 3 + 1 + 3	11 + 23–25 (24)	partly scaled	> ♂ = ♀
obtusirostre Red Sea and Oman n = 20	XII–XIII + 9–10 rarely XII spines or 9 rays	18–19 (19)	16: 2, 7, 7	20–23 (21–22)	36–38 (37–38)	4 + 1 + 4	10 + 25–26	naked	~ ½
rharhabe East London to Bazaruto n = 236	XII–XIV + 10–11 (XIII + 10)	18–20 rarely 18 or 20	16: 1, 8, 7 sometimes 15	20–31 (mode 24)	37–38 (38)	5 + 1 + 5	10 + 24–25	naked	~ ½
rosea Sri Lanka to Phuket n = 42	XI–XIVI + 10–12 rarely 10	18–20 (20) rarely 18	16: 2, 7, 7	23–29 usually 25–27	36–38 usually 37	3–4 + 1 + 3–4	11 + 24–26 (25)	scaled	> ♂ = ♀
serendip Sri Lanka n = 26	XIII + 10	18–19 (19)	16: 2, 7, 7	20–22 (21)	36–39 (38)	4 + 1 + 4	10 + 25 rarely 26	naked	< ½
shinglensis SE India n = 20	XIII + 10	19–20 (19)	16: 1, 8, 7 sometimes 15	21–24	37–38	4–6 + 3 + 4–6	10 + 24–25	naked	~ ½
steinitzi Red Sea and Oman n = 35	XII–XIV + 10–12 (XIII + 11) (JER 10–12)	**19–21 (20)	16: 2, 7, 7 (both Clark & Randall have 15–17)	21–27	**37–42 R Sea 38–40 Oman	3 + 1–2 + 3	11 + 24–25	scaled	= ♂ < ♀
striata Sri Lanka and east n = 57	XIII–XV + 10–12 (XIII or XIV + 11- see Table 7)	†19–23 (20–22) (WIO 19–20)	16: 3, 6, 7 or 2, 7, 7 usually	†14–20 (WIO 17–18)	38–39 (39)	3 + 2 + 3	10 + 25–27	scaled	~½

* Counts from Fricke & Randall, 1992
** Counts from Clark, 1979 and J E Randall, 1992
† Counts from Hansen, 1986
n = number of specimens examined in this study

stained with Cyanine Blue (Saruwatari et al. 1997). Nape scales, when present, and only on the side of the nape, are also best seen when stained with Cyanine Blue. Few tripterygiid species have scales in the predorsal midline. It was found that for species which do not have a fully scaled nape, such as *Helcogramma microstigma*, the number of transverse scale rows increases with increasing size of the fish. This means that while scales above the lateral line may not extend to the base of the second dorsal fin in apparently immature (smaller) specimens, they may do so in larger, presumably mature specimens, such as darkly pigmented males. The nape would then be referred to as scaled, and the extent of the scalation noted. Transverse scale counts are not given for the species in this study. Total lateral scales were counted as a continuation of the lateral line to the base of the caudal fin. Tripterygiids have from 0-3 rows of scales of varying size on the base of the caudal fin. These are not included in the count but noted separately.

Williams & McCormick (1990) derived a method of representing dorsal element counts from radiographs which included the number of pterygiophores without a spine between the second and third dorsal fins, 0 being the condition where the first pterygiophore supporting a segmented ray does not support a spine. I do not follow this method, but indicate the number of "free" pterygiophores; i.e. carrying neither a spine nor a segmented ray. This number generally varies between 0 and 2 and is not consistent for a species. The method of counting vertebrae follows Holleman (1982) and is the same as that of Williams & McCormick (1990). They are given as the number of precaudal + the number of caudal vertebrae, and includes the compound terminal centrum (not stated in Holleman, 1982).

Mandibular pore counts follow Hansen (1986), who found that the mandibular pore patterns of *Helcogramma* species were consistent for a species and often diagnostic. They have been found to be so in *Enneapterygius* Rüppell 1835, as well (Holleman, 2006), and they are given as number of pores in left hand canal + number of symphyseal pores + number of pores in right hand canal.

In describing colour patterns the terms "short bar" is used for darkly pigmented (unless otherwise stated) bars that extend from the dorsum to the lateral line or just below. The term "saddle" is used for lightly pigmented areas that are quite clearly defined and often rounded that extend from the dorsum down either side, much like the saddle on a horse's back.

A summary of selected characters and morphometric counts for the species is given in Table 1. The known distributions of the various species is shown in Fig. 1. The map is also marked with the biogeographic boundaries suggested in Santini & Winterbottom (2002), which gives some idea of the distribution of species in relation to different biogeographic areas.

Genus *Helcogramma* McCulloch & Waite

Helcogramma McCulloch & Waite 1918: 51; type species *H. decurrens* McCulloch & Waite 1918, by original designation.

Diagnosis. Small to medium-sized tripterygiid fishes with fusiform bodies, ranging in length from less than 28 mm SL (*Helcogramma chica*) to nearly 50 mm SL (*H. ellioti*). First dorsal fin with 3 spines; anal fin with a single, short spine, usually less than half the length of the first ray. Pelvic fins with one short, hidden spine and two simple, segmented rays, which may be joined by membrane for part of their length.

Mandibular canals with 1 or (rarely) 2 pores at the symphysis, or 3–5 pores arranged symmetrically about the symphysis, and 2–8 on either side along the dentaries. Exposed posterior margin of post-temporal bones with fine serrations.

Body with ctenoid scales; nape naked or scaled; abdomen and pectoral fin-bases always naked. Head always without scales. Lateral line continuous, of 14–35 pored scales, running in a upwardly concave curve from the post-temporal to mid-body and extending to below the second dorsal fin or to the base of the caudal fin. Base of caudal fin with 0–3 rows of scales.

Orbital cirrus absent in some species, if present simple to palmate. Anterior nasal cirri simple to palmate, on posterior margin of a short tube.

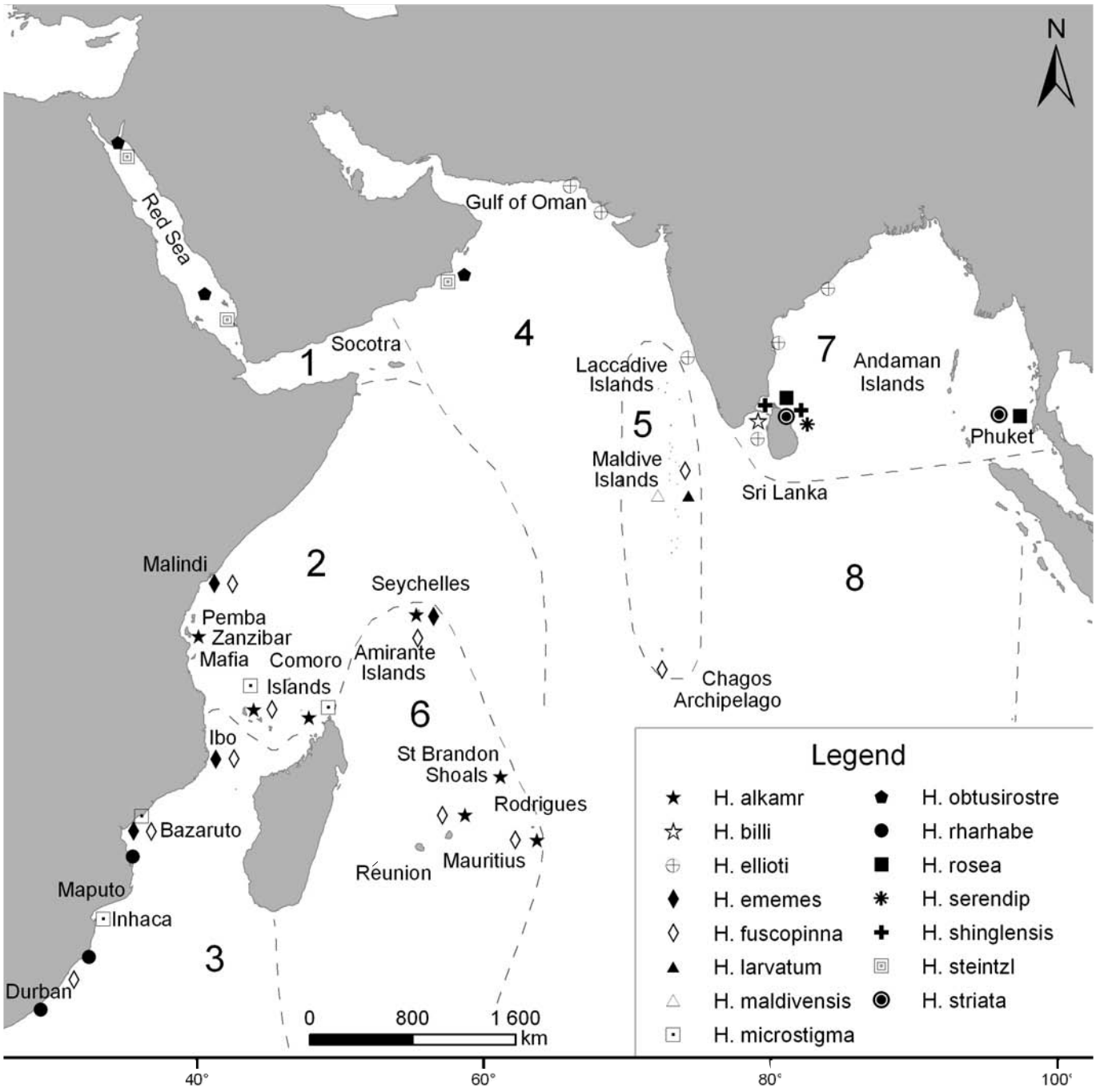

Fig. 1. Known distributions of Helcogramma species in the Indian Ocean. The biogeographic areas marked are demarcated as follows: 1 - Red Sea and Gulf of Aden, delimited by a line from eastern Yemen to Socotra to north-eastern Somalia; 2 - Somali Basin, bounded by Socotra in the north, the Comoro Islands and northwest Madagascar in the South, the Carlsburg Ridge in the northeast and the Mascarene Plateau in the southeast; 3 - Natal Basin - lying between Africa and Madagascar and bounded by the Comoro Islands in the north and the Madagascar Ridge in the southeast; 4 - Arabian Basin - bounded by the Socotra and the Carlsburg Ridge in the southwest and the eastern margin of the Arabian Basin (Laccadive Ridge); 5 - Chagos Plateau, including the Chagos Bank and the Chagos - Laccadive Ridge; 6 - Mascarene Plateau - bounded by Madagascar and the Farquhar Group in the west, the Saya de Malha Bank in the east and the Southwest Indian Ridge in the south; 7 - Andaman Basin - bounded by India and Sri Lanka in the west, by the Malay Peninsula in the east and the northern margin of the Ceylon Plain in the south; 8 - East Indian Basin - delimited by Sri Lanka to the northwest, Chagos-Laccadive Ridge in the west, the northern tip of Sumatra to the northeast and the Investigator Ridge to the east (after Santini & Winterbottom 2002).

Other sources:
The Times Atlas and Encyclopaedia of the Sea, ed. Alistair Cooper. 1983. Times Books, London.
The Times Atlas of the World. 1987. Times Books, London.

KEY TO THE WESTERN INDIAN OCEAN SPECIES OF *HELCOGRAMMA*

Where possible, characters have been selected from both males and females. Where this is not possible the colour characters used are those of mature males. The live colours of four of the fifteen species are unknown, and preserved colour patterns are used for those species.

1a Body with longitudinal lines or lines of dots and dashes 2
1b Body without lines or similar markings 3

2a Nape naked; pectoral-fin rays 15; body with 3 broken, pale, longitudinal stripes, one from top of head below second dorsal fin, one from posterior margin of eye to dorsal base of caudal fin, and one just below midline; both sexes reddish in life with white stripes and spots. .....*H. maldivensis* (Maldives)
2b Nape scaled; pectoral-fin rays 16; body with 3 longitudinal stripes, one from top of head to dorsal base of caudal fin, one from posterior margin of eye to mid-caudal-fin base, and one broad stripe below lateral line, with 6–7 spots between the lowermost two stripes. Both sexes reddish in life with bluish stripes and spots .....*H. striata* (Sri Lanka and eastwards)

3a Origin of first dorsal fin over posterior margin of preopercle, first two dorsal-fin spines closer together than half the distance between spines 2 and 3, fin triangular and same height or taller than second dorsal fin, membrane between first two dorsal-fin spines with many micro-melanophores, males in real life. 4
3b Origin of first dorsal fin behind posterior margin of preopercle; first dorsal fin not as above, usually lower than second, spines more evenly spaced 6

4a Anal fin with melanophores on entire fin; interorbital relatively broad, mean 15 in head length; pale saddles at end of second and third dorsal fins yellow or pink in life; LL usually with more than 25 tubed scales.....5
4b Anal fin with melanophores along margin only, interorbital relatively narrow, mean16.6 in head length; pale saddles at end of second and third dorsal fins white in life; LL usually with fewer than 25 tubed scales .....*H. steinitzi* (Red Sea and Oman)

5a Orbital cirrus pointed, about half pupil diameter; head profile relatively blunt, about 70°; pale (yellow in life) saddles without micromelanophores at ends of second and third dorsal fins *H. microstigma* (Comoro Islands, northern Madagascar, south to Bazaruto)
5b Orbital cirrus short, as wide as long, head profile relatively sharp, about 60˚; pale (pink in life) saddles with micromelanophores at end of second and third dorsal fins .....*H. rosea* (Sri Lanka and Andaman Sea)

6a Pectoral-fin rays 15–16; anal fin rays <21; second dorsal fin spines usually <14, third dorsal fin rays usually <11 7
6b Pectoral rays 17; anal fin usually with 21 rays; dorsal fins usually III + XIV + 11;, large males with line of micro-melanophores from upper lip, below eye to opercle; in life males orange-pink with dark to black median fins, line below eye blue-white .....*H. fuscopinna* (WIO)

7a Symphyseal mandibular pores 3 or more 8
7b Symphyseal mandibular pores 1-2 10

8a Lateral-line scales <25, not to base of caudal fin 9
8b Lateral-line scales 33–37, running to caudal-fin base; mandibular pores 5–7 + 3-5 + 5–7; nape naked; in life males with red and blue-black head, dark blue ocellus on pectoral fin base and body reddish to orange, dorsal fins reddish, anal fin blue or dark .....*H. ellioti* (Sri Lanka, SW India)

9a Body of males with melanophores below lateral midline, with 2–3 broad bands above midline; peduncle entirely covered with melanophores, lower half of head black; in life top of head and nape to middle of second dorsal fin red, pelvic fins red .....*H. shinglensis* (Sri Lanka, SE India, Laccadives)
9b Body without dark pigment, only scattered melanophores; head below eye and bases of pectoral and pelvic fins with many melanophores; median fins without pigment except black spots on membrane between first two dorsal fin spines; in life brown with 3 narrow, white, slanted bands from dorsum to midline .....*H. ememes* sp. nov. (east coast of Africa, Seychelles)

10a Mandibular pores 2–3 + 1–2 + 2–3 11
10b Mandibular pores 4–6 + 1 + 4–6 12

11a Nape naked; lateral–line pored scales 21–22; second dorsal–fin spines 11–12 (usually 12); anal–fin rays 16–18 .....*H. larvata* (Maldives)
11b Nape scaled; lateral–line pored scales 28–33; second dorsal–fin spines 13; anal–fin spines 19–20 ....*H. billi* (Sri Lanka and eastwards)

12a Mandibular pores 4 + 1 + 4. 13
12b Mandibular pores 5–6 + 1 + 5–6 14

13a Body of mature males nearly all black with 2–3 pale narrow streaks from dorsum to lateral midline; median fins dark to black; in life bases first and second dorsal fins yellowish–green, eye red, snout green, anterior dorsum reddish; blue line from corner of mouth to posterior margin of pre–opercle .....*H. obtusirostre* (Red Sea, Oman)
13b Body of males pale with 7–8 clusters of melanophores along midline, head below eye black, colour stopping abruptly between isthmus and ventral fin base; fine cirri on frontal behind eyes .....*H. serendip* sp. nov. (Sri Lanka)

14a Body of males nearly black with 3–4 pale narrow streaks from dorsum to midline, dorsal fins with dark margins, anal fin densely covered with melanophores, upper lip dark in centre, with clear halfmoon–shaped patches either side; in life with 6–7 silvery white spots along mid–side, blue line from corner of mouth to posterior margin of opercle, with bright crimson on upper lip on either side .....*H. rharhabe* sp.nov. (east coast of Africa – East London, South Africa to Bazaruto, Mozambique)
14b Body of males pale with scattered melanophores and 7–8 clusters of melanophores along mid–side, head below eyes black, colour continuing onto pectoral and ventral fin bases *H. alkamr* sp. nov. (Comoro Islands, Seychelles, Mauritius)

SPECIES ACCOUNTS

Helcogramma alkamr sp. nov.

Figs. 1 & 2, Plate 1

Helcogramma chica non Rosenblatt in Schultz 1960: 294–297, fig. 114; Hansen 1986 (in part).

Holotype. ROM 73734; 27.5 mm SL male; Mayotte, French Territory Community, north coast of Isle Malandzamuzatsinsi (12° 40′ 19″ S, 44° 03′ 26″ E); intertidal – depth, 1m; coral rock and rubble with sand patches and algae; collected R. Winterbottom et al., 17 November 1988; field number RW 88–21.

Paratypes. **Mauritius**: AMS 42910–001 (5: 23.1–26.4 mm); SAIAB 70665 (23: 11.0–26.8 mm). **Comoro Islands**: BMNH 2004.1.6.11–15 (5: 19.9–25.7 mm); ROM 73735 (16: 15.6–26.5 mm) & ROM 73736 (23: 14.1–25.8 mm); USNM 375015 (5: 21.5–25.6 mm); USNM 228984 (7: 28.3–36.5 mm). **Seychelles**: SAIAB 70664 (26.0 & 29.7 mm); USNM 228973 (5: 24.6–28.6 mm), and USNM 261389 (38: 20.8–31.4 mm), Aldabra Atoll. **St Brandon Shoals**: SAIAB 1915 (5: 21.8–28.3 mm); USNM 222359 (6: 25.8–31.8 mm). **Tanzania**: USNM 222365 (20: 16.1–27.0 mm), Latham Island. **Madagascar**: USNM 382859 (3: 19.7–27.8 mm), Nosy Bé.

DIAGNOSIS. A medium–sized species of *Helcogramma*, less than 40 mm SL, with low first dorsal fin, naked nape, males brown in life with red–brown bars from dorsum to lateral midline, with small white spots along lateral midline, and usually 5 + 1 + 5 mandibular pores.

DESCRIPTION. Dorsal fins III + XIII–XIV + 10–11; anal fin I,19–20 (rarely 17 or 18, usually 19 rays – Table 2); pectoral fins 16: usually 1, 8, 7. Lateral line 19–25 (mode 21) pored scales, ending below the junction of the second and third dorsal fins; total lateral scales 36–39 (usually 37 or 38). Vertebrae 10 + 25–26 (rarely 24–1 of 15 counts); 0 (rarely 1) free pterygiophore between second and third dorsal fins. Mandibular pores 4–5 + 1 + 4–5 (usually 5 + 1 + 5; 6 + 1 + 6 for St Brandon Shoals specimens) (Fig. 2b). Head length 3.2–4.1 (3.7) in SL; eye 2.4–3.4 (2.9), maxilla 2.0–2.6 (2.3) in head length; snout short, profile blunt, 63–78° (71°).

Nape naked, but with patches of scales above first few lateral–line scales; 2–3 rows of scales on base of caudal fin; scales do not extend to bases of first and second dorsal or anal fins; no scales on underside of caudal peduncle. Posterior margin of eye with small spines on edge of frontal bones (Fig. 2c). First dorsal

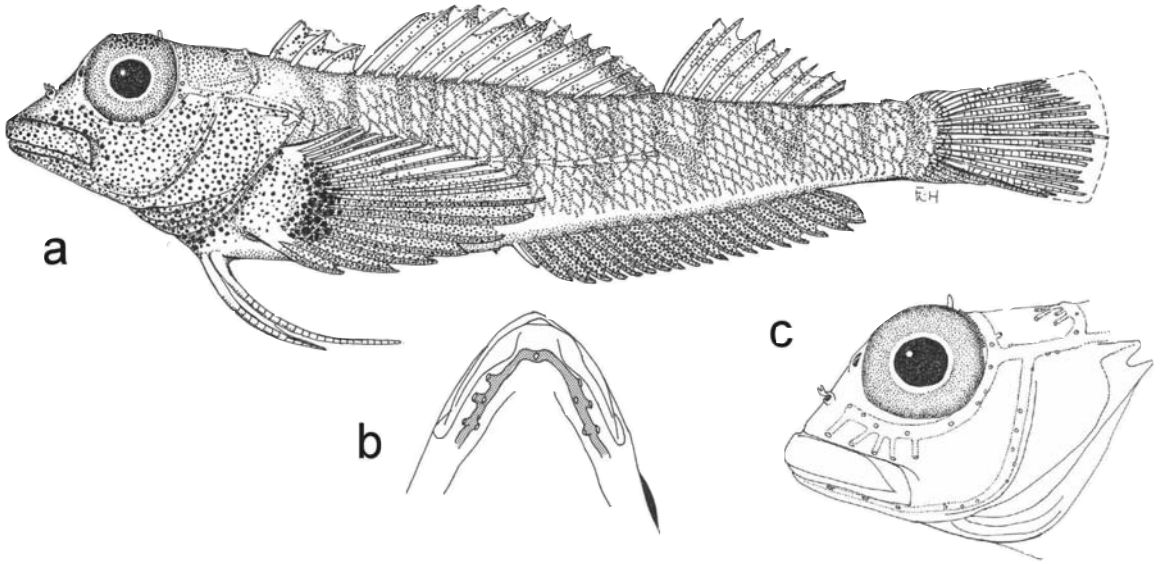

Fig. 2. *Helcogramma alkamr*. **a**, holotype, ROM 73734, male, 27.5 mm SL, Mayotte, Comore Islands; **b**, mandibular pores; **c**, head showing small spines on posterior margin of eye.

fin less than half height second dorsal fin. Pelvic fins united by membrane for length of shorter, half length of longer ray, longest ray reaching about half distance to vent. Labial folds moderate. Broad patch of teeth in front of both jaws, single row at sides, with row of enlarged teeth inside middle of upper jaw, both outside and inside middle of lower jaw. Maxilla reaches vertical through anterior of orbit; orbital cirrus small and pointed. Interorbital width a little less than pupil diameter.

Live colour. Males (from photograph of a male from the Comoros by R. Winterbottom) with pale brown body with pairs of reddish–brown short bars from dorsum to lateral mid–line, with many small white spots between. Along mid–line series of dark brown blotches with smaller bluish–white spots between. Body below midline pinkish. Dark brown band at base of caudal peduncle. Head spotted with red–brown and black, darker below lower margin of eye. Eye red and pale gold. Pale blue line from corner of mouth onto preopercle. Pectoral–fin base and base of lower fin rays darkly spotted with black, interspersed with pale blue and brown. Pelvic fins pink. First dorsal fin with pink and black spots; second with four narrow bands of pink and black spots; third similar but lighter. Caudal fin without colour; anal fin grey.

Females (from a photograph of a female from the Seychelles by Phil Heemstra) with creamish body with six pairs of semi–bars, those below first two dorsal fins tending to coalesce, darkest pair across peduncle, and those below end of second and third dorsal fins extending to anal–fin base. Head whitish with brown spots and orange blotches, darkest on top and on opercle; snout brown; orange and silver–white. First dorsal fin with orange on middle of membrane between first two spines and black spots on middle of other membranes; second dorsal fin with bands of orange and black spots similar to males; third dorsal fin pale orange bands. Anal fin with orange along margin with black on the membranes. Caudal fin with pinkish– orange marks in centre and along margin. Lower rays of pectoral fins pale orange distally and brown at base, membranes immaculate; pelvic fins white.

Colour in alcohol. Males: head with evenly–spaced melanophores and dark brown 'rosettes' from upper lip, below eye, onto pectoral–fin base throat and extending to base of pelvic–fin. Top of head, interorbital and snout with smaller melanophores. Some body scales with small melanophores on scale margins, pigmentation heaviest above midline, giving some suggestion of broad bands which may join on the midline to form V– or Y–shapes (as illustrated), but often only form a series of 8 clusters of spots along the side from beneath the pectoral fin onto the caudal peduncle, darkest anteriorly. Pectoral fin with dark to black half–moon or triangle, apex extending from base of rays one–quarter length of central rays; lower (undivided) rays with many, small melanophores on elements and membranes. First dorsal fin with scattered melanophores, darkest on margin; second dorsal fin with brown spots anteriorly and black spots posteriorly, fin darkest along the margin; third dorsal fin with scattered melanophores, forming 3 indistinct rows on some specimens. Anal fin evenly and densely spotted with melanophores, those on elements smaller and more dense than on membranes. Pelvic–fin rays distally with a line of small melanophores on outer edges of rays.

Females with 6 or 7 brown semi–bars on body above midline, 1 to 3 or 4 below second dorsal fin, 5 and 6 below third dorsal fin, 1 or 2 on caudal peduncle,

forming 8–10 brown blotches along midside. Top of head and interorbital with small melanophores, opercle and pectoral–fin base with scattered melanophores, small cluster of melanophores below eye and line of small spots from eye onto upper lip. First dorsal fin with small melanophores on membrane between first two spines; second dorsal fin with scattered spots; third dorsal and caudal fins immaculate. Anal fin with line of small melanophores on distal half of rays. Pectoral–fin rays brown at the base and with small melanophores on lower, undivided rays that suggest 2 or 3 broad bands.

DISTRIBUTION (Fig. 1). *Helcogramma alkamr* is currently known from the Comoro Islands, northern Madagascar, Zanzibar, Seychelles, St Brandon Shoals, Mauritius and Rodrigues.

ETYMOLOGY. 'al–Kamr' or al–Qumr is the original Arabic name for Madagascar (*Jazirat al–Qumr*), which became transferred to the Comoro Islands by the historian Ahmad Ibn Mãjid in the 15th century. Today Comorians accept this is the origin of the name for their islands and from it the English name is derived. The specific epithet is used as a noun in apposition.

COMPARISONS. The blue line running from the corner of the mouth onto the preopercle suggests that *Helcogramma alkamr* is one of the *H. obtusirostre* species group. Further investigation is, however, required to confirm this.

In the Comoro Islands *H. alkamr* occurs sympatrically with *H. microstigma*, in the Seychelles with *H. ememes* and in both localities with *H. fuscopinna*. *H. alkamr* lacks the blue–white line under the eye characteristic of *H. fuscopinna*, and the tall first dorsal fin of *H. microstigma*, with micro–melanophores on the membrane between the first two spines. It can be distinguished from *H. ememes* by having 16 vs 15 pectoral–fin rays and a single symphyseal mandibular pore vs 3 in *H. ememes*.

REMARKS. Both males and females from the Comoro and Seychelles Islands are more heavily pigmented than specimens from Mauritius, which have only a few scattered spots on the body. The lower pectoral–fin rays of Comoro Islands males are less pigmented than in Mauritius males, while the caudal fin of Mauritius males often has a narrow black stripe at the base, absent in males from the Comoro Islands. The body bars of Comoro Islands females and the blotches along the body are much more distinct than in females from Mauritius. Furthermore, specimens from the Comoro Islands predominantly have 25 caudal vertebrae, while those from Mauritius have 26 (Table 2).

These differences may be the result of local environmental differences: the specimens from the Comoro Islands were collected in turbid water, one collection in less than 3m in depth and another in 0–20m depth, amongst coral rock and rubble with some sand, while those from Mauritius were collected in clear water, 3–5m in depth, in a high energy tidal environment amongst large boulders and coral heads.

Table 2. Counts for *H. alkamr* sp. nov. from different localities.

	D2 spines			D3 rays		Anal-fin rays				*Caudal vert.					Lateral line scales						
	12	13	14	10	11	17	18	19	20	24	25	26	27	28	19	20	21	22	23	24	25
Latham Is, Tanzania n=21		9	12	15	6			21			1	17	2		1	2	10	3			
Comoro Islands n=29		12	17	20	9	1	3	22	3		1	19	5			8	15	4	1		
Nosy Be, Madagascar n=5			5	1	4		1	2	2						1		1		1		1
Seychelles n= 45		17	28	27	18		3	39	2		2	15	1		1	2	17	13	7	3	
Mauritius n=25	1	3	17	3	18			10	10			6	18	1		4	7	5			
St Brandon Shoals n=12		7	5	1	11			6	6				7				4	6	2		

* Counts of 25 (26 for Mauritius) caudal vertebrae usually the result of 2 fused vertebrae

Helcogramma billi Hansen
Figs. 1 & 3

Helcogramma billi Hansen 1986: 329, fig. 10 (Sri Lanka).

DIAGNOSIS (Partially from Hansen 1986). Dorsal fins III + XIII–XIV + 9–11 (usually III + XIII + 10–11); anal fin I,17–20 (usually 19–20 rays); pectoral fins 16: 2, 7, 7. Lateral line 27–33 (usually 30) tubed scales ending below middle of third dorsal fin; total lateral scales 38–39. Vertebrae 10 + 25–26; 1 free pterygiophore between second and third dorsal fins. Mandibular pores 2–3 + 1 + 2–3 (Fig. 2b) Head length 3.4 in SL; eye 2.8, maxilla 2.2 in head length.

Nape scaled; no scales on base of caudal fin; scales do not extend to base of anal fin anteriorly. Pelvic fins united by membrane for 2/3 length of shorter ray, longest ray reaching vent. First dorsal fin half height of second, higher than second in males from the Comoro Islands (see REMARKS below). Maxilla reaches vertical through middle of pupil; orbital cirrus a small, rounded flap.

Live colour. Not known.

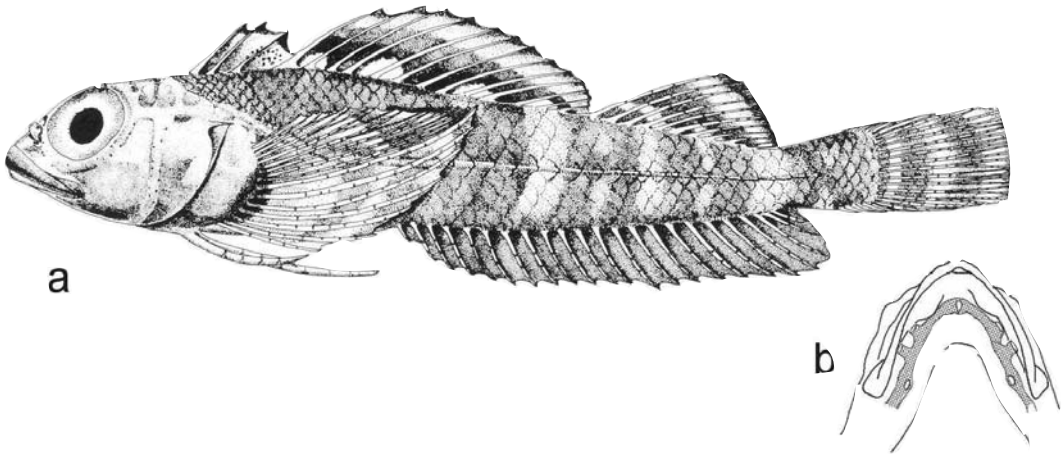

Fig. 3. *Helcogramma billi.* **a**, paratype, USNM 222368, male, 31.0 mm SL, Trincomalee, Sri Lanka (from Hansen 1986); **b**, mandibular pores.

Colour in alcohol. Body of males with 5 darkish 'H'–shaped bars which form a series of darker spots along midline. Occiput, head below eyes to pelvic– and pectoral–fin bases evenly covered with small melanophores. First dorsal fin membrane between first and second spines dark; second dorsal fin with thin black margin, a clear stripe beneath, and irregular black marking along middle (Hansen, 1986: 329: to form "4 distinct clear areas basally on fin elements 2, 5, 9 and 11."); third dorsal fin irregularly banded; anal–fin membranes dark, uniformly spotted with black. Pectoral fins with dark brown half moon at base of middle rays and with 3 broad, chevron–shaped, brownish bands, first in middle of fin, last at tips of rays, second between them; pelvic–fin rays dark; caudal fin with 2–3 dark vertical bands.

Females and juveniles less heavily pigmented and with little or no pigment on head below eyes.

Distribution (Fig. 1). *Helcogramma billi* is currently known only from Sri Lanka, although the species may be more widespread. It was not recorded from the Maldives by Fricke & Randall (1992), but may be found in the Andaman Islands, an area whose shore fishes are not well known.

Comparisons. There are six Western Indian Ocean species of *Helcogramma* with a scaled nape: *H. billi, H. maldivensis, H. rosea, H. striatum, H. steinitzi* and *H. microstigma.* ***H. billi*** can easily be distinguished from *H. maldivensis* and *H. striatum* as these two species are very distinctly striped, while *H. steinitzi* has fewer lateral–line scales (21–27, mean 25 vs 27–33, mean 30 for *H. billi*) and *H. steinitzi* does not occur sympatrically with *H. billi*. However, *H. billi* and *H. rosea* do occur sympatrically, but can be separated on mandibular pore counts and colour pattern–see under *H. microstigma*.

Material examined. **Sri Lanka**: SAIAB 30432 (21.0 & 22.3 mm) and SAIAB 30433 (3: 25.2–27.3 mm).

Helcogramma ellioti (Herre)

Figs. 1 & 4. Plate 1

Helcogramma ellioti (Herre 1944: 49) (Madras Coast, India); Lal Mohan 1968: 124; Shamsul Hoda 1983: 41, fig. 1; Hansen 1986: 335 (in part: India and Sri Lanka). *Helcogramma indicus* Talwar & Sen 1971: 249, fig. 1 (Cape Comorin, South India).

Diagnosis (Partially from Hansen, 1986). Dorsal fins III + XIII + 9–10; anal fin I, 18–20 (usually 18 rays); pectoral fins 16: 1, 8, 7. Lateral line 33–37 pored scales ending close to or at the base of the caudal fin; total lateral scales 36–38 (usually 38). Vertebrae 10 + 24–25; 1 free pterygiophore between second and third dorsal fins. Mandibular pores 5–7 + 3–5 + 5–7 (Figs. 4c & d). Head length 3.3–3.7 (3.5) in SL; eye 2.6–3.0 (2.8) in head length; maxilla 2.2–2.4 (2.3) in head length.

Nape and belly naked, scales do not extend to base of anal fin; 1 row of scales on base of caudal fin. Pelvic–fin rays united by membrane for half length of shorter ray, longest ray reaching about 3/4 distance to vent. First dorsal fin of males same height as second, about height of second in females. Mouth reaches vertical through middle of pupil; orbital cirrus flat and palmate.

Live colour (from colour photograph by J.E. Randall). Body of males grey–brown with three pale saddle–like areas, first below middle and second below end of second dorsal fin, third below end of third dorsal fin; belly pink; top of head dark brownish, becoming red at level of eye, a bright white area on the "shoulder" above the pectoral–fin base. Head below level of eye, black and blue, colour not extending to pelvic–fin base; branchiostegal membranes blue and black; narrow, blue line from hind end of maxilla onto preopercle; eye, snout, interorbital and area behind eye deep red. First dorsal fin pale yellow with red spots on membrane behind third spine; second dorsal fin mostly translucent with pale blue basally; third dorsal

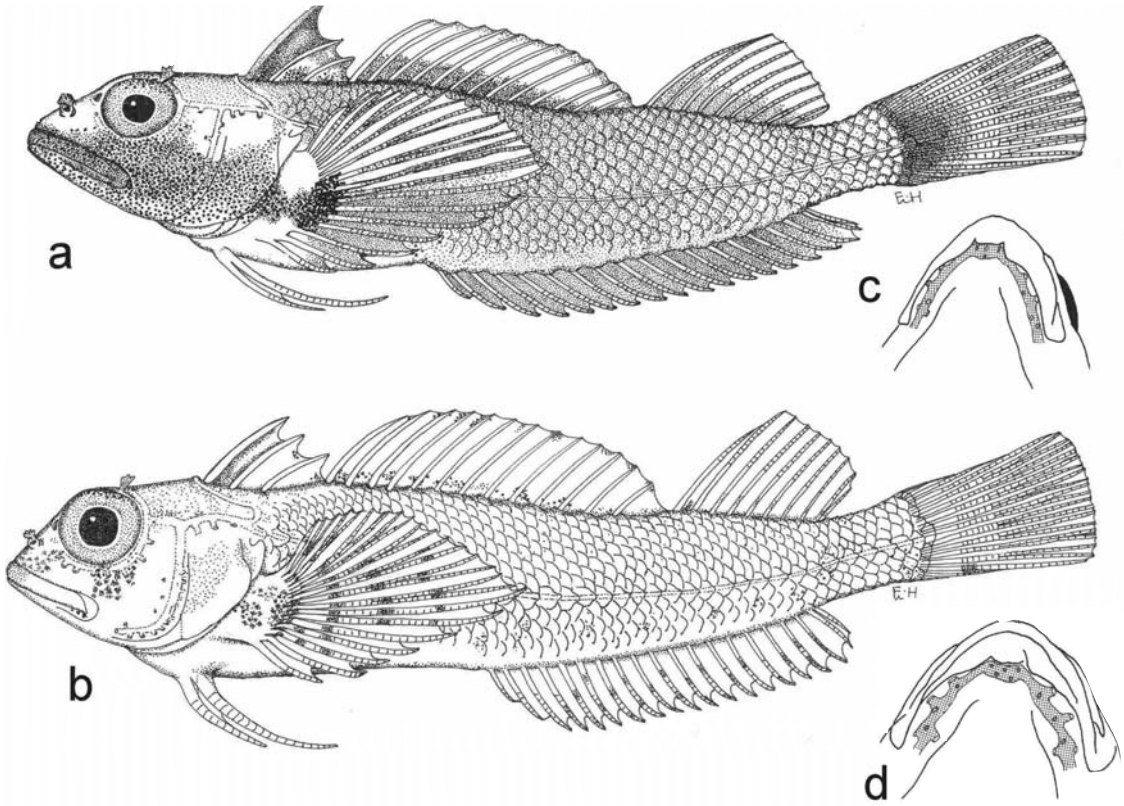

Fig. 4. *Helcogramma ellioti*. **a**, SAIAB 30431, male, 29.3 mm SL, Hikkaduwa, Sri Lanka; **b**, female, 28.0 mm SL; **c & d**, mandibular pores.

fin mostly pale blue with white distally on anterior rays. Anal fin pale blue–grey. Pectoral fins with deep blue ocellus surrounded by black at base of middle rays, with crimson above and below and blue and black on base of fin, rays with irregular darker and paler bars. Pelvic–fin base and rays crimson; caudal fin pale blue–grey.

Females with whitish body with brown marks forming oblique semi–bars and blotches from dorsum to below lateral midline. Head below eye white with brown and red spots, above darker with brown blotches and a brown line from corner of eye onto upper lip; eye pale gold. First dorsal fin pale anteriorly brown, posteriorly translucent; second and third dorsal translucent with pale gold and white marks. Anal fin white with narrow brown marks on rays forming oblique bars. Upper, divided rays of pectoral fins banded light brown and pale gold, lower, undivided rays gold with dark brown marks on rays. Pelvic fins white; caudal fin translucent with white at base of rays and bright white line at margins of hypural plates.

Colour in alcohol. Body of males, except belly, with even scatter of melanophores. Lower portion of head from upper lip, below eye and onto opercle and branchiostegal membranes dark grey to black; isthmus and pelvic–fin base immaculate. Top of head with fine spots; snout immaculate; oval, unpigmented area behind eye which extends onto the upper portion of opercle. Pectoral–fin base with dark triangular mark, apex posterior, with a circular, black spot at base of middle rays. Fin clear above and below spot, below which the rays are dusky and above which they are spotted with small melanophores. First dorsal–fin membrane between spines 1 and 2 dusky; second dorsal fin with basal dark band and thin, dark band along margin; third dorsal fin with dusky basal band; anal fin dusky; diffuse dark area at base of caudal fin.

Females with diffuse dark bars on body; top of head, cheeks, snout and opercles with scattered melanophores, area below eye, including maxilla, immaculate; first dorsal–fin membrane between first two spines dusky; second dorsal fin with faint basal and marginal bands; third dorsal, anal and pectoral fins banded, colour on elements only; caudal fin with narrow, clear band basally and dusky area postero–dorsally, colour only on rays.

DISTRIBUTION (Fig. 1). The species has been recorded from either side of the Indus Delta in tide pools on the Karachi and Gujerat coasts, from Kerala, Sri Lanka and the east and northeast coasts of India.

COMPARISONS. *Helcogramma ellioti* occurs sympatrically with *H. billi , H. rosea, H. serendip* and *H. shinglensis*. Like *H. billi, H. ellioti* has a long lateral line that extends onto the caudal peduncle, but has a naked nape, scaled in *H. billi. H. ellioti* and *H. shinglensis* have similar live colours, with an ocellus on the pectoral–fin base and red above the eyes and blue–black below (in

males). *H. shinglensis* has fewer tubed lateral–line scales–21–24, vs 34–35 for *H. ellioti* and a lower first dorsal fin. *H. ellioti* is quite different in colour to *H. rosea* and lacks the micro–melanophores on first dorsal fin of *H. rosea*. *H. ellioti* can be distinguished from *H.serendip* by its long tubed lateral line-33–37 scales vs 20–22 for *H. serendip*.

Remarks. In her revision of the genus Hansen (1986: 336) states that *H. ellioti* has a mandibular pore pattern of 3 + 1 + 3, which is surely in error. The holotype (SU 38840) has a pore pattern of 6 + 4 + 6, and a paratype (SU 38841) of 6 + 4 + 7 (Catania, pers. comm.) However, the pore pattern of one or more as yet undescribed species (previously misidentified as *H. ellioti*) from the Western Pacific Ocean has a pore pattern of 3–4 + 1 + 3–4. As Hansen considered the Western Pacific specimens to be *H. ellioti*, and this would explain her incorrect description.

H. ellioti, together with *H. obtusirostre* and *H. rharhabe* (and possibly *H. alkamr*) belong to a complex, which includes several species in the Western Pacific Ocean and one in the South Atlantic. These species share at least one putative synapomorphy–a blue line that runs from the lower lip, through the corner of the mouth to the hind margin of the preopercle in mature males.

The above three species can be separated from each other on the basis of colour (*H. rharhabe* has a crimson patch on the upper lip, absent in the other two species), and by mandibular pore patterns (*H. ellioti* has 3–5 symphyseal mandibular pores vs 1 only for the other two species).

Material examined. **Sri Lanka**: SAIAB 30434 (31.6 mm); SAIAB 30431 (3: 28.0–31.0 mm); USNM 276540 (26.8 & 27.1 mm),

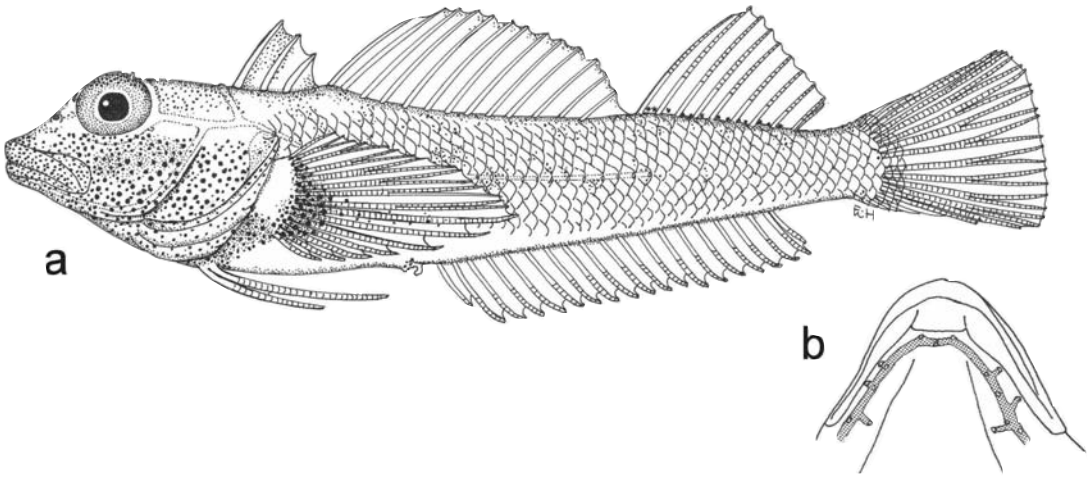

Fig. 5. *Helcogramma ememes*. **a**, holotype, SAIAB 70605, male, 28.9 mm SL, Ibo Island, Mozambique; **b**, mandibular pores.

***Helcogramma ememes* sp. nov.**
Figs. 1 & 5, Plate 1

Holotype. SAIAB 70605, 28.9 mm SL male, Ibo Island, Mozambique (12°24′ S, 40°34′ E); collected by J. L. B. Smith, August, 1951.

Paratypes. **Mozambique**: BMNH 2004.1.6.7–8 (26.8 & 29.2 mm), Ibo Island; ROM 73756 (28.8 & 30.2 mm), SAIAB 70739 (39.1 mm) and SAIAB 7449 (14: 22.1–29.1 mm), Bazaruto Island; SAIAB 30398 (23.8 mm), Baixo Pinda; SAIAB 30401 (14: 17.1–33.1 mm) and USNM 375016 (4: 25.3–27.0 mm), Ibo Island; SAIAB 4274 (29.5 mm), Porto Amelia. **Seychelles**: ROM 73757 (4: 22.9–27.4 mm), SAIAB 30417 (19: 17.9–24.1 mm), AMS 42920–001 (3: 19.3–21.3 mm) and BMNH 2004.1.6.9–10 (24.0 & 29.1 mm), all from Mahé; BPBM 39290 (20.2 & 20.8 mm), Aride; SAIAB 30406 (4: 24.5–26.2 mm), La Digue; SAIAB 54500 (23.4 & 26.6 mm), Isle Cousine. **Kenya**: SAIAB 30407 (26.5 & 26.8 mm) and SAIAB 30409 (4: 21.6–24.1 mm), Malindi.

Diagnosis. A medium to large species of *Helcogramma* with three symphyseal mandibular pores, low first dorsal fin and lateral line that ends anterior to or below junction of second and third dorsal fins. Males brown in life with three narrow white saddle marks on body and with lower half of head black.

Description. Dorsal fins III + XIII–XIV + 10–11 (2 of 78 with XII D2 spines and 5 of 72 with 9 rays), usually III + XIII + 10; anal fin I,18–20 (4 of 78 with 20 rays), usually 19 rays; pectoral–fin rays usually 15: 1, 7, 7 for east coast of Africa, 1, 8, 6 or 2, 7, 6 for Seychelles. Tubed lateral–line 19–23, mode 21; total lateral scales 36–38, transverse scales 9/7. Vertebrae 10 + 24–27 (usually 25; 1 with 24 and 1 with 26 of 8 counts);1 free pterygiophore between second and third dorsal fins.

Table 3. Counts for *H. ememes* sp. nov. from different localities.

Locality	D2 spines			D3 rays			Anal fin rays			Lateral line scales					Pectoral-fin rays			**Caudal vertebrae					Free pter.	
	12	13	14	9	10	11	18	19	20	19	20	21	22	23	1,7,7	1,8,6	2,7,6	n	24	25	26	27	0	1
Seychelles n=28*		23	5	2	25		13	12	2	2	8	8	4	3	1	13	9	12	1	2	9		4	8
Malindi n=13	1	8	1		5	2		4	1		1	2	2		8			6		1	4	1		
Ibo Island n=14		14		1	12	1	3	11		1	2	3	3		9	1		7			6	1		7
Porto Amelia n=1		1			1			1							1			1				1	1	
Baixo Pinda n=1		1			1			1							1			1			1			1
Bazaruto n=16	1	14	1	1	15		2	14		3		6	2	2	13	1		1			1			1

* One aberrant specimen with 8 D3 rays and 17 anal-fin rays
** count of 24 result of 3 fused vertebrae
† Most common arrangement; a few specimens have 2,6,6 2,6,7 1,8,7 or 1,7,8 rays
pter. pterygiophore

Table 4. Morphometric data for *H. ememes* sp. nov. from different localities.

Locality	SL/Head length			Head length/eye diameter			Head length/maxilla length		
	Range	Mean	SD	Range	Mean	SD	Range	Mean	SD
Seychelles n=28	3.6-4.2	3.9	0.17	2.3-3.4	3.0	0.25	2.3-3.3	2.5	0.27
Malindi n=11	3.3-3.9	3.6	0.16	2.6-3.0	2.9	0.16	2.3-2.6	2.4	0.10
Ibo Island, Porto Amelia, Baixo Pinda n=16	3.4-4.0	3.6	0.15	2.7-3.1	3.0	0.13	2.2-2.6	2.3	0.11
Bazaruto n=16	3.4-3.8	3.5	0.09	2.6-3.3	2.9	0.17	2.2-2.5	2.4	0.08

Mandibular pores 4–7 + 3 + 4–7 (rarely 7 pores; Fig. 5b). Head length 3.6–4.2 (3.9), Seychelles, or 3.3–4.0 (3.6), east coast of Africa; eye 2.3–3.4 (3.0) in head length; maxilla 2.2–3.3 (2.4) in head length (see Table 3).

Nape naked; body scales do not extend to base of second dorsal or anal fins; ventral surface of caudal peduncle with thin scales. Two scale rows at base of caudal fin. First dorsal fin low, about half height of second. Pelvic–fin rays united by membrane for half length of shorter ray, longest ray reaching vent in males, about 20% shorter in females. Maxilla reaches vertical through anterior of pupil. Orbital cirrus small and pointed, often with micro–melanophores.

Live colour (based on a colour slide by J. E. Randall of a male and female from the Seychelles). Head of males below eyes with densely packed melanophores, which extend to posterior margin of opercle and to base of pelvic fins; above reddish with scattered melanophores. Eye orange–red, lower lip with some white. Body mid–brown with three narrow, white and pink saddles, extending to midline, the first below middle of second dorsal fin, second below end of second dorsal fin and third below end of third dorsal fin. Below midline a series of six or more rounded, white blotches of varying size, interspersed by diffuse darker brown areas with melanophores; belly white. First dorsal fin transparent, with some brown on spines and a white mark on membrane between first two spines; second and third dorsal fins transparent with brown and white marks on spines. Caudal fin largely translucent, cream at base with three red–brown marks, one dorsally, one centrally and one ventrally. Anal–fin membranes translucent, rays pink with fine melanophores. Pectoral–fin bases with a yellow blotch centrally, with white marks above and black and blue pigments below; proximal portion of central rays with an oval of dense melanophores, rays pink above and with red spots below the black, distal portion of fin transparent. Pelvic fins pink.

Females with dull, olive–green body with brown and white marks dorsally and a series of six or more rounded, white blotches of varying size below midline, interspersed with brown blotches. Head below level of eye white with brown marks, above darker olive green with brown marks, eye yellowish. All fins transparent with white marks, but pectoral fin bases and proximal portion of rays with brown and white marks.

Colour in alcohol. Males retain the melanophores on the lower portion of the head and to bases of pelvic and lower part of pectoral fins. Top of head with small melanophores. Small melanophores on body suggest bands and form loose clusters along midline. Some specimens have a small saddle of melanophores at posterior end of third dorsal fin. Pectoral fins with a black 'D'–shaped cluster of melanophores proximally. First dorsal fin with brown spots on membrane between first two spines.

Females with scattered clusters of brown spots on body, mostly along anterior lateral midside. Top of head , below eye and opercle with small brown spots; line of brown to black spots from each eye onto upper lip. First dorsal fin with a few black or brown spots on membrane between first two spines, spines with black spots; second, third and caudal fins with thin brown or black line along each element; caudal fin with thin brown band at base and brown or black lines along rays; pectoral fin with four irregular brownish bands, pigment on rays only.

Etymology. The name is taken from the initials of Margaret Mary Smith, often called MMS. When I was a graduate student in the mid–1970s Margaret brought me into the J. L. B. Smith Institute, of which she was then Director, for two years on "soft money". Thus started my interest in fishes and fish taxonomy. I learned only recently that she in fact paid me out of her own pocket. In gratitude I am pleased to be able to name one of "my" little fishes in her memory and for her generosity. Many of the specimens of this species were collected by Margaret and J. L. B. Smith in the 1960s. The specific name is used as a noun in apposition.

Distribution (Fig. 1). The species has been recorded from the Seychelles and various localities along the east coast of Africa between Malindi, Kenya (3°14'S) and Bazaruto, Mozambique (21°38'S).

Comparisons. *Helcogramma ememes* occurs sympatrically with *H. alkamr* and *H. fuscopinna* in the Seychelles and on the east coast of Africa its range overlaps that of *H. rharhabe* at Bazaruto. *H. ememes* can be distinguished from *H. alkamr* by its symphyseal pores, 3 vs 1 in the other two species (see REMARKS below also). It can be distinguished from *H. fuscopinna* by the absence of the blue–white line below the eye of males and large females of that species.

The fin element, scale and pore counts of *H. ememes* are identical to those of *H. shinglensis*, which is known only from Sri Lanka and SE India, but the latter species lacks scales on the ventral surface of the peduncle and males have a completely different colour pattern–see under *H. shinglensis*.

Remarks. There are what may be significant differences between the specimens from the Seychelles and the east coast of Africa: those from the Seychelles have a smaller head than the specimens from the coast – mean 3.9 in SL vs 3.6 in SL and have a different pectoral–fin configuration (Table 3). While both have 15 rays, those from the Seychelles generally have the lowermost 6 rays undivided, whereas those from the coast have the lowermost 7 undivided. From the tripterygiid material I have examined over the years, this character is fairly consistent for a species. However, in all other characters examined, specimens from the two areas appear to be the same and, until live colour for east African material is available, they are considered as one and the same species.

H. alkamr and *H. ememes* males are very similar in colour and may be sibling species. They differ in that *H. ememes* lacks the blue line below the eye of *H. alkamr*; and *H. ememes* has 3 distinct white and pink saddle marks whereas *H. alkamr* has only lighter areas with white spots between short, brown bars. They also differ in mandibular pore pattern and in pectoral–fin ray counts: 16 for *H. alkamr* and 15 for *H. ememes*.

Helcogramma fuscopinna Holleman

Figs. 1 & 6; Plate 1

Helcogramma fuscopinna Holleman 1982: 115, fig. 4 (in part KwaZulu–Natal, South Africa); Hansen 1986: 337 (in part); Williams & McCormick 1990: 1020; Williams & Howe 2003:163.

Diagnosis (from Holleman 1982 and Williams & McCormick 1990). Dorsal fins III + XIII–XV + 10–12 (usually XIV+11); anal fin I, 19–21 (usually 21 rays); pectoral fins 17: usually 1, 9, 7. Lateral line 22–30 tubed scales ending below the anterior half of the third dorsal fin; total lateral scales 38–40 (usually 39–40)–see Table 5 for geographic variation. Vertebrae 10 + 27 (rarely 26 or 28); 1 free pterygiophore between second and third dorsal fins. Mandibular pores 5–8 + 1–2 + 5–8 (Fig. 6b). Head length 3.1–3.7 (3.4) in SL; eye 2.6–3.4 (2.9) in head length; maxilla 2.0–2.4 (2.1) in head length.

Nape naked, scales do not extend to bases of first two dorsal and anal fins; single row of scales on base of caudal fin. Pelvic fin rays united by membrane for half length of shorter ray, longest ray nearly reaching vent. First dorsal fin of males about 4/5 height of second, slightly shorter in females. Mouth reaches vertical through middle of pupil; orbital cirrus simple.

Live colour. Males with orange–pink body, scales with row of small melanophores along posterior margin; small, dusky rosettes scattered over body, generally more densely below midline. Darkly pigmented specimens (mature males) with 5 or 6 grey–white blotches stippled with small melanophores above and below midline, which may produce faint, vertical banding or narrow, dusky triangular marks, apex up, along the ventral half of body. Head with broad, black band stretching from mouth, below eye, onto opercle and pectoral–fin base; throat without colour but with densely spaced melanophores extending to belly, along anal fin and to base of caudal peduncle; distinct blue–white line with very fine stipples from upper lip, running below eye onto opercle. First dorsal fin darkly speckled to nearly black; second dorsal dark to black, often with darker margin, third dorsal with dark to black; anal fin uniformly dark to black; pelvic fins finely stippled, darker basally; ventral rays of pectoral

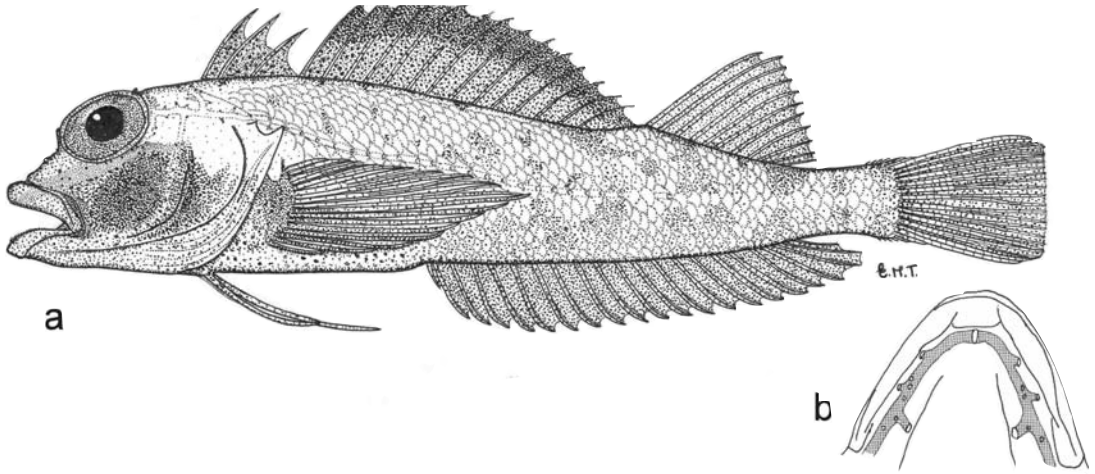

Fig. 6. *Helcogramma fuscopinna*. **a**, holotype, SAIAB 954, male, 37.6 mm SL, Sodwana Bay, South Africa; **b**, mandibular pores.

fins dark; caudal fin with uneven dark markings, mostly on membranes.

Females and immature specimens range from pale pinkish–orange with few melanophores to paler versions of large males, but without the heavy black on lower half of face. Large females also with blue–white line with micro–melanophores below eye.

Colour in alcohol. All colour is lost in preservative except the melanophores, the patterning on the body, the dark fins and line of fine stipples below the eye of males remaining distinctive. Females have no markings except for a few scattered brown spots and two small clusters just below the last elements of the second and third dorsal fins, and a line of micro–melanophores below the eye in large females.

DISTRIBUTION (Fig. 1). *H. fuscopinna* is known from the east coast of Africa from central KwaZulu–Natal to Kenya, Comoro Islands, Seychelles, Maldives, Chagos Archipelago, Mauritius and Rodrigues. It has not been recorded from Oman, Sri Lanka or India.

COMPARISONS. *Helcogramma fuscopinna* is the only member of the *H. fuscopinna* complex that occurs in the Western Indian Ocean. Mature males and large females can easily be distinguished from all other species by the blue–white line extending from the middle of the upper lip, below the eye and onto the opercle, which, in preservative, shows as a band of micro–melanophores. Individuals of all sizes also have generally uniform dark to black median fins not found in any other species.

REMARKS. *Helcogramma fuscopinna* is one of a complex of 11 species described by Williams & McCormick (1990) and Williams & Howe (2003) which occurs throughout the Indo–Western Pacific Ocean.

New material examined. **Mauritius**: SAIAB 70669 (44: 21.2–35.2 mm) and SAIAB 70672 (35: 15.8–37.3 mm). **Rodrigues**: SAIAB 70047 (18: 14.3–34.7 mm) and SAIAB 70245 (6: 27.9–33.9 mm). **Mozambique**: SAIAB 50596 (34: 23.4–35.6 mm), Malongane.

Table 5. Counts for *H. fuscopinna* from different localities.

Locality		D2 spines			D3 rays			Anal-fin rays				Lateral line scales											
		13	14	15	10	11	12	19	20	21	22	22	23	24	25	26	27	28	29	30	Mean	Mode
St Brandon Shoals	n=12		11	1	1	11			4	7			1	2	5	2	1				25	25
Mauritius	n=25	1	24		1	21	2		6	19			3	5	5	8	1		1		25	26
KwaZulu-Natal	n=51	2	47	2	10	41		1	11	36		3	6	12	9	3	1	1			24	24
Southern Mozambique	n=18	5	13		2	16			3	14	1		4	4	3	3	2	1		1	25	–
Bazaruto	n=6		6		3	3			1	5					2	1					25	25
Pinda	n=1	1				1				1					1						25	25
Mafia	n=12		12			1	11		2	10			1	4	3	2					25	24
Shimoni	n=5		4	1		5			1	4		1			2	1	1				25	25

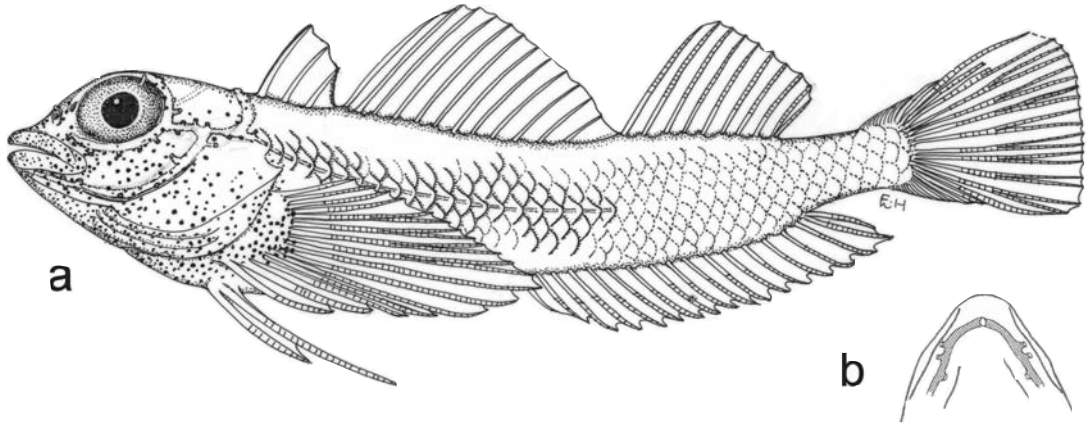

Fig. 7. *Helcogramma larvata*. **a**, paratype, BPBM 34519, 19.1 mm SL, North Male atoll, Maldive Islands; **b**, mandibular pores.

Helcogramma larvata Fricke & Randall
Figs. 1 & 7

Helcogramma larvata Fricke & Randall 1992: 6, figs. 5 & 6 (North Male Atoll, Maldives)

Diagnosis (from Fricke & Randall 1992). Dorsal fins III + XI–XII + 8–9; anal fin I,16–18; pectoral fins 15: 1, 7, 7. Lateral line 20–22 pored scales, ending below the first two rays of the third dorsal fin ; total lateral scales 32–35. Vertebrae 10 + 24–25. Mandibular pores 2–3 + 1 + 2–3 (Fig. 7b). Head length 3.5 in SL; eye 2.7, maxilla 2.1 in head length (derived from Fricke's measurements).

Nape and belly naked, scales do not extend to bases of first two dorsal and anterior of anal fins. Pelvic fin rays united by membrane for half the length of the shorter ray, longest ray reaching second to last ray of second dorsal fin. First dorsal fin half height of second. Maxilla reaches vertical through anterior margin of pupil; orbital cirrus small.

Live colour. Not known.

Colour in alcohol. "Head and body pale, lower sides of head in male dark, with light blotch below eye and two light blotches on pectoral–fin base; female with a few dark spots on side of head. Fins pale, except distal margin of the third D1 membrane in the male dusky." (Fricke & Randall 1992: 8).

Distribution (Fig. 1). Known from only four specimens from North Male Atoll, Maldives.

Comparisons. The species occurs sympatrically with *H. maldivensis*, from which it can readily be distinguished by colour, the latter species being striped, and with *H. fuscopinna*, which has dark fins and a blue–white line below the eye.

Material examined. BPBM 34510 (19.1 mm), Paratype, North Male Atoll, Maldives.

Helcogramma maldivensis Fricke & Randall
Figs. 1 & 8, Plate 1

Helcogramma maldivensis Fricke & Randall 1992: 9, figs. 7 & 8, plate 1 (Maldives).
Helcogramma striata Hansen 1986 (in part: Maldives)

Diagnosis (from Fricke & Randall 1992). Dorsal fins III + XII–XIV + 9–11 (usually III + XIII + 10); anal fin I,17–21; pectoral fins 15: usually 3, 6, 6 (SAIAB paratype 2, 6, 7). Lateral line 13–21 (usually 16–17) tubed scales, ending below first two rays of third dorsal fin ; total lateral scales 36–38 (usually 38). Vertebrae 10 + 25–26; 1 free pterygiophore between second and third dorsal fins. Mandibular pores 3 + 1–2 + 3 (Fig. 8b – Fricke & Randall record 3 + 2 + 3). Head length 3.4 in SL; eye 2.4, maxilla 2.3 in head length.

Nape scaled, belly naked, scales do not extend to bases of first dorsal and anterior of anal fins; 2 rows of scales on base of caudal fin. Pelvic–fin rays united by membrane for half length of shorter ray, longest ray reaching 5th from last ray of second dorsal fin. First dorsal fin half height of second. Maxilla reaches vertical through anterior margin of pupil; no labial flaps. Orbital cirrus absent.

Live colour. (From colour photograph by J. E. Randall.) Males with reddish–pink body, lower third light gray; sides with 3 lines of bluish–white dots or streaks which anteriorly form stripes, first running from first dorsal–fin spine to below centre of third dorsal fin, second from posterior margin of eye to upper base of caudal fin, third from top of pectoral–fin base to ventral side of caudal peduncle, dividing red upper part of body from grey lower part. Head reddish with small blue–white spots on snout and cheeks, lips orange–red, throat and isthmus white. Dorsal, anal and caudal fins carmine, colour on elements only, except for first dorsal fin which has white on the membrane between first two spines; pelvic and pectoral fins white.

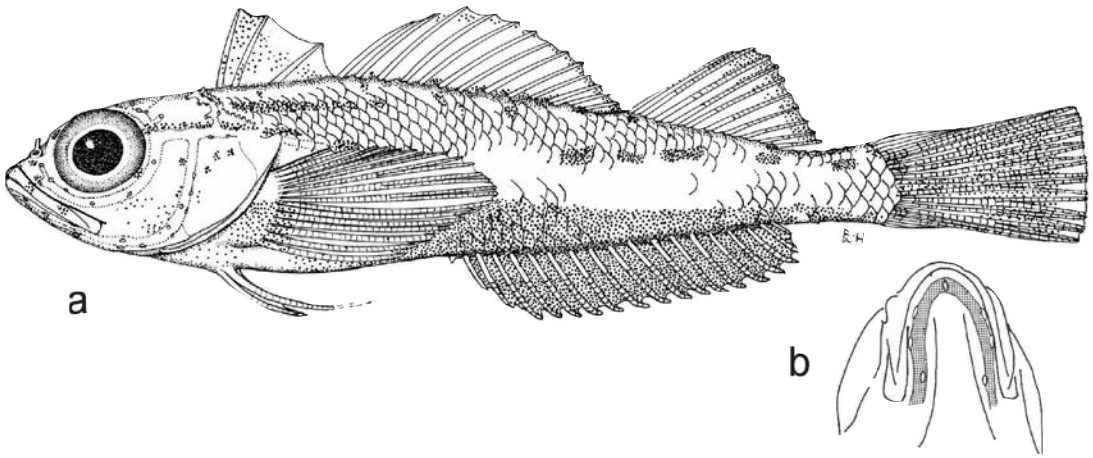

Fig. 8. *Helcogramma maldivensis*. **a**, paratype, SAIAB 36705, male, 20.3 mm SL, North Male atoll, Maldive Islands; **b**, mandibular pores.

Females lighter in colour than males, white ventrally, and lack the spots and stripes. Fins translucent.

Colour in alcohol. The colour fades to a pale straw, except for spots and stripes of males which become dark grey and are composed of micro–melanophores.

DISTRIBUTION (Fig. 1). *Helcogramma maldivensis* is currently known only from the Maldive Islands.

COMPARISONS. See under *H. larvata* above.

REMARKS. *Helcogramma maldivensis* is very similar to, and probably most closely related to *H. striata*, from which it differs in colour pattern (*H. striata* has three longitudinal bluish–white lines extending from base of caudal fin onto the head and is blue–green ventrally) and fewer pectoral–fin rays (15 for *H. maldivensis* vs. 16 for *H. striata*), and total lateral scales (36–37 for *H. maldivensis* vs. 38–39 for *H. striata*).

Material examined: SAIAB 36705 (20.6 mm), Paratype, North Male, Maldives.

Helcogramma microstigma Holleman
Figs. 1 & 9, Plate 1

Helcogramma microstigma Holleman 2006: 92, figs. 1, 2 & 5 (Bazaruto Island, Mozambique)

DIAGNOSIS. Dorsal fins III + XIII + 10–11; anal fin I, 18–20 (usually 19–20 rays); pectoral fins 15–16: 2, 6, 7 or 2, 7, 7. Lateral line 24–30 (usually 27–28, rarely 24 or 30) tubed scales, ending below middle of third dorsal fin; total lateral scales 37–38; transverse scales 9/7. Vertebrae 11 + 23–25 (24; 1 of 17 with 23, and 1 with 25); 1 free pterygiophore between second and third dorsal fins. Mandibular pores 4 + 1 + 4 (rarely 3 + 1 + 3) (Fig. 9c) Head narrow and elongated, its length 3.1–3.6 (3.4) in SL; eye 2.6–3.1 (2.9), maxilla 2.1–2.5 (2.2) in head length; interorbital width about $^{2}/_{3}$ pupil diameter.

Nape scaled, but scales not to base of first dorsal fin anteriorly; 2 or 3 rows of scales on base of caudal fin; scales on underside of caudal peduncle; scales do not extend to base of anal fin anteriorly. Pelvic–fin rays united by membrane for two–thirds length of shorter, half length of longer ray, longest ray nearly reaching vent. Origin of first dorsal fin over posterior margin of preopercle, fin of males triangular with first spine taller than second dorsal fin, in females slightly shorter than second, in both sexes first two spines closer together than second and third spines. Maxilla reaches past vertical through anterior margin of pupil. Inner margin of upper lip crenulate; lower labial folds narrow (Fig. 9c). Broad patch of teeth in both jaws in front, with single row of enlarged teeth on outer margin, continuing to side of jaw. Orbital cirrus simple and pointed, in length about half of pupil diameter.

Live colour. (Based on freshly preserved material.) Males dark pink with three orange blotches at base of second dorsal fin and three at base of third dorsal fin. Dark pink blotches along midside and eight dark pink spots along anal–fin base; belly white. Head slate–grey to black below eye, with orange spots above. Membrane between first two dorsal–fin spines orange and black, remainder of first dorsal fin black (see preserved colour below); second dorsal fin black and orange basally; third dorsal fin similar but paler. Anal fin black with orange along rays corresponding to colour on body. Caudal fin pinkish with orange at base of rays. Pectoral fins with orange on middle and upper rays; pelvic fins without colour. Females very similar to males but lack the black on the head and median fins, and have a narrow dark bar across the caudal peduncle, at the base of the caudal fin.

Colour in alcohol. Males: body with irregular groups of melanophores suggestive of banding above lateral midline; cluster of few melanophores around vent.

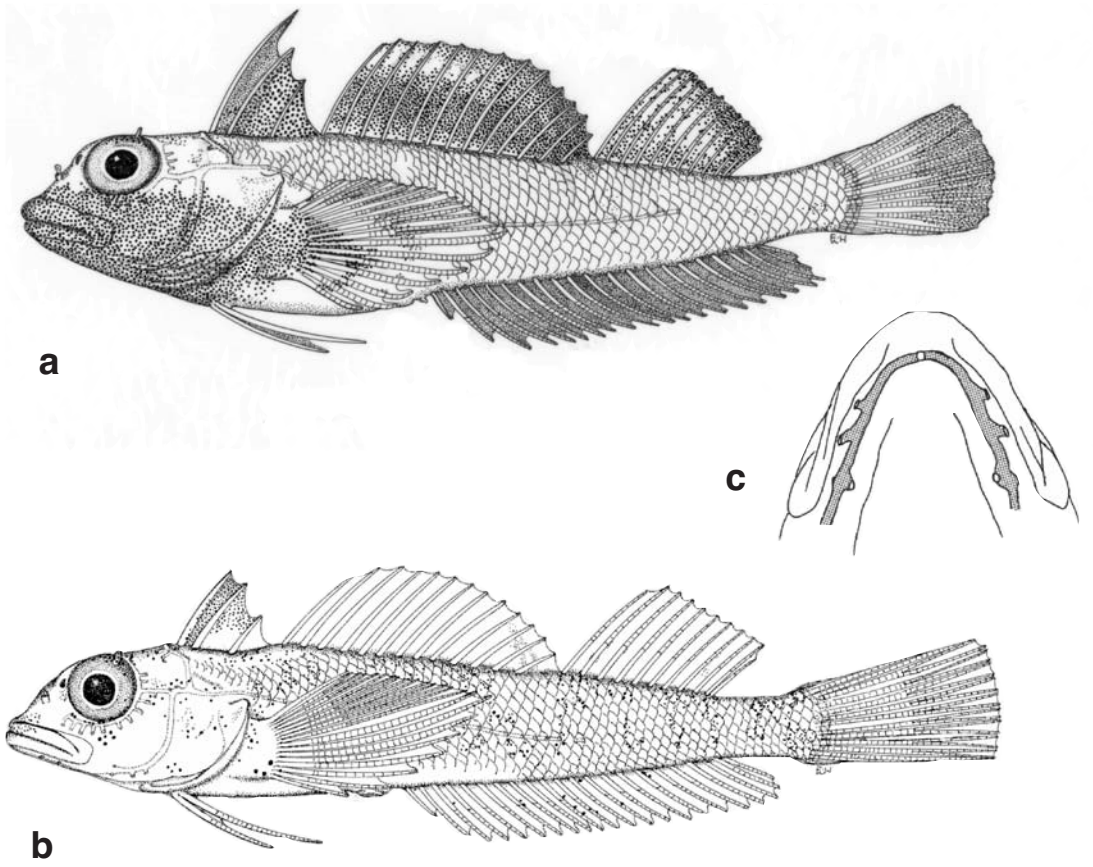

Fig. 9. *Helcogramma microstigma*. **a**, holotype, SAIAB 73754, male, 29.0 mm SL; **b**, paratype, SAIAB 73753, female, 27.9 mm SL, both from Bazaruto Island, Mozambique; **c**, mandibular pores.

Head below eyes with dense and evenly spread melanophores extending to base of pectoral–fin rays and along throat to base of pelvic fins. Top of head with few, small melanophores, interorbital area immaculate. First dorsal fin evenly marked with densely packed melanophores, those on membrane between first two spines very small; basal half of second dorsal fin black, followed by a paler band and with a black band along margin; third dorsal fin similar. Distal third of caudal fin spotted with melanophores. Anal fin black with many small and evenly spread melanophores on both rays and membranes. Pelvic–fin membrane of large males with cluster of small melanophores in middle. Pectoral–fin membranes with some spotting.

Females with banding on body more obvious, patches of melanophores extending to below midline. Large individuals with narrow dark bar across caudal peduncle at base of caudal fin. Scattered melanophores on head and a small cluster on lower pectoral–fin base. First dorsal fin membrane between first two spines as for males, with many micro–melanophores, but not as dark.

Distribution (Fig. 1). The species is known from the Comoro Islands, northern Madagascar, and Bazaruto and Inhaca Islands, Mozambique.

Comparisons. *H. microstigma* occurs sympatrically with *H. alkamr, H. ememes* in the Comoro islands and with *H. fuscopinna* in the Comoro Islands and along the east coast of Africa and northern Madagascar. The species can be distinguished from all of these by its tall first dorsal fin with micro–melanophores on the membrane between the first two spines.

Remarks. *Helcogramma microstigma* is a member of the *H. steinitzi* species group that also includes *H. rosea* (see below), which share a tall first dorsal fin with the first two spines set close together and the membrane between them with micro–melanophores. The three species occur in geographically separate areas (see Holleman 2006).

Note. The key and illustration (Fig. 1) given in Holleman 2006 are incorrect. In the key the presence or absence of micromelanophores on the saddles at the end of the second and third dorsal fins was inverted and should read as in the key above (p. 53). Fig. 1 shows an orbital cirrus of about half eye diameter instead of about half pupil diameter, as shown in Fig. 9 above.

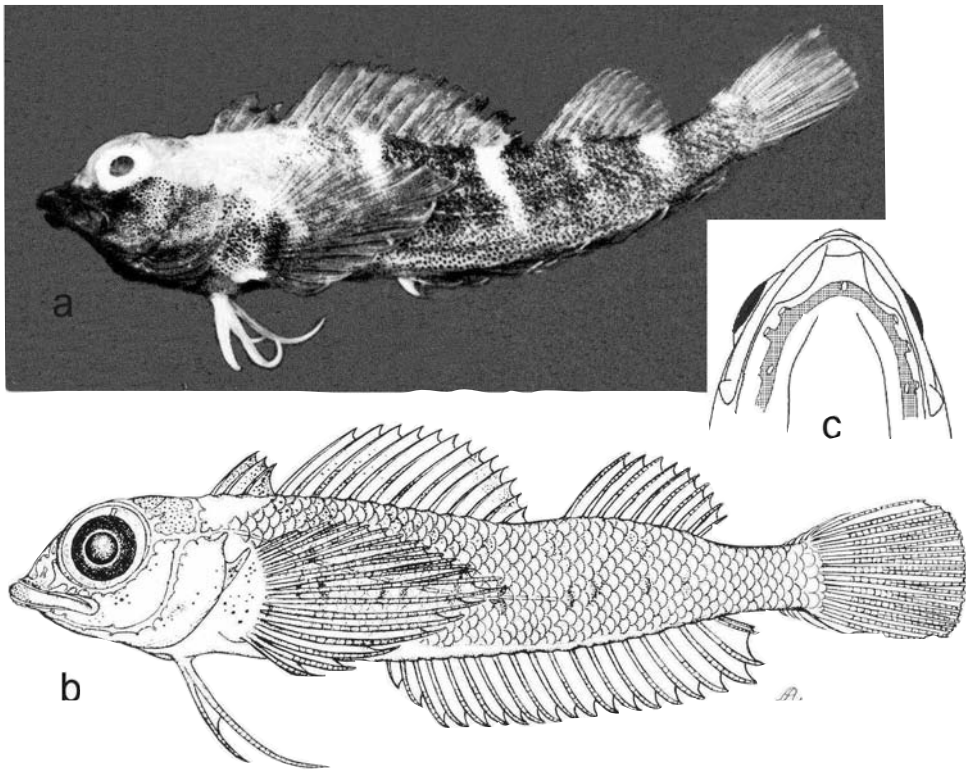

Fig. 10. *Helcogramma obtusirostre*. **a**, male, 37.9 mm SL; **b**, HUJ 64/36b, female, 21.9 mm SL, Elat, Red Sea (a & b from Clark, 1979); **c**, mandibular pores.

***Helcogramma obtusirostre* (Klunzinger)**
Figs. 1 & 10, Plate 2

Tripterygium obtusirostre Klunzinger 1871: 498 (Red Sea).
Helcogramma obtusirostre Clark 1979: 85, figs. 3e, 7 & plate 1; Holleman in: Smith & Heemstra 1986: 757; Randall 1995: 309, fig. 872.
Helcogramma obtusirostris Hansen 1986: 341 (in part: Red Sea – see Note on nomenclature);
Helcogramma trigloides (non Bleeker) Marshall 1952: 242 (Gulf of Aqaba)
non *Helcogramma shinglensis* Lal Mohan 1971: 219, fig. 1 (Gulf of Mannar, India)
non *Helcogramma ascensionis* Lubbock 1980: 294, fig. 2 (Ascension Island, S Atlantic)

DIAGNOSIS. Dorsal fins III + XII–XIII + 9–10 (rarely with XII spines or 9 rays); anal fin I, 18–19 (usually 19); pectoral fins 16: usually 2, 7, 7. Lateral line 20–23 (usually 21–22) tubed scales, ending below junction of second and third dorsal fins; total lateral scales 36–38 (usually 37–38); transverse scales 7/5. Vertebrae 10 + 25–26; 1 free pterygiophore between second and third dorsal fins. Mandibular pores 4 + 1 + 4 (Fig. 10c). Head length 3.3–3.7 (3.5) in SL; eye 2.6–3.2 (2.8), maxilla 2.2–2.6 (2.4) in head length.

Nape and belly naked; scales do not extend to bases of first dorsal and anterior of anal fins; 2 rows of scales on base of caudal fin. Pelvic–fin rays united by membrane for half shorter ray, longest ray reaching vent. First dorsal fin half height of second. Maxilla reaches vertical through centre of pupil; orbital cirrus small and simple.

Live colour. (From colour photograph by J. E. Randall.) Body of males mottled greenish with darker interconnecting areas, with 4 narrow, pale saddle marks extending from base of dorsal fins to midline, 2 below second dorsal fin, 2 below third dorsal fin; series of paler spots along midline; dorso–anteriorly suffused with dull red; belly pink. Head dark, black below eye and to branchiostegal membrane; bright blue stripe extends from lower lip across cheek, broadly edged with black above and below. Pectoral–fin base with red spot above and below, the lower one with blue above and anterior; pelvic fins dark pink proximally; first dorsal fin dusky with some orange, darkest on the margin, and with small black spot at base of membrane connecting first and second dorsal fins; second dorsal fin dusky with dull orange band basally; third dorsal fin dusky; caudal fin dusky; anal fin dark, with an even cover of melanophores.

Females dull green, the dark areas forming a zig–zag pattern down the body, on a pale green background; body pale ventrally. Head dorsally dark green, ventrally pale; median fins with light sprinkling of melanophores, first dorsal fin with small black spots as in males, base third dorsal and entire anal fins white.

Colour in alcohol.
Body of adult males heavily pigmented with melanophores, except for nape and area above pectoral–fin base and 3 or 4 pale, narrow saddles extending from dorsum to midline or below. Head below level of eye, including lips, heavily stippled with melanophores, which extends to pelvic–fin base and belly. Pectoral–fin base with melanophores except for clear area at lower edge. Charcoal to black half–moon of melanophores at base of pectoral–fin rays; lower rays dusky. Dorsal fins dusky, third the least dark; anal fin dusky to black; caudal fin dusky, pelvic fins without pigment.

Females largely unpigmented, except for scattered melanophores dorsally on body, in small clusters along midside, on first and second dorsal fins and on the pectoral fin base.

Distribution (Fig. 1). *Helcogramma obtusirostre* is known from the Red Sea, Yemen and Oman.

Comparisons. This species occurs with only one other species of the genus, *H. steinitzi*, which is generally larger and red in colour, has a first dorsal fin as tall as the second (half the height in *H. obtusirostre*, and mature males are black) and has 4 + 1 + 4 mandibular pores vs 3 + 1–2 + 3 for *H. steinitzi. H. obtusirostre* also has a blue stripe from the corner of the mouth onto the preopercle, which is absent in *H. steinitzi*.

Remarks. Hansen (1986) synonymised several species with *H. obtusirostre* as they are generally impossible to separate on fin and scale counts, including *H. ascensionis, H. shinglensis* and *H. trigloides*. She also included material from southern Africa as *H. obtusirostre*, following Holleman (1978, unpublished data). Close examination of specimens and photographs of *H. ascensionis* determined that it was not conspecific with the southern African species–described as new below–and that the southern African species was not conspecific with *H. obtusirostre*. There are colour differences between the three species. However, they also share a blue stripe that runs from the corner of the mouth onto the preopercle. These three species belong to a species complex that includes *H. ellioti, H. trigloides* and *H. fuscipectoris*, and possibly additional species from the Western Pacific. *H. shinglensis* differs from *H. obtusirostre* in mandibular pore pattern and is here recognised as a valid species, together with *H. ascensionis* (see also under *H. shinglensis*).

Material examined. **Red Sea**: HUJ 9188 (10: 21.0–25.9 mm) and HUJ 9189 (10: 17.2–24.3 mm), Dahlak Archipelago.

Helcogramma rharhabe sp. nov.
Figs. 1 &11; Plate 2

Holotype: SAIAB 70740, 35.6 mm SL male; Sheffield Beach, KwaZulu–Natal, South Africa; open gully with corralines, 0–3 m depth; collected R. Winterbottom & R. E. Stobbs, 4 September 1974; field number RW 74–22.

Paratypes. **South Africa**: MNHN 2006–1693 (6: 31.0–37.4 mm); ROM 73759 (3: 34.2–32.5 mm); SAIAB 55017 (17: 25.9–36.9 mm); USNM 375019 (3: 30.5–31.6 mm), all ex SAIAB 32404 from Coffee Bay, Eastern Cape; AMS 42930–001 (6: 22.4–34.8 mm); BMNH 2004.1 6.1–6 (6: 27.5–36.0 mm); BMNH 2004.1.6.10–16 (7: 19.4–33.0 mm); ROM 73758 (6: 24.5–36.9 mm); SAIAB 70754 (18: 17.5–35.0 mm); WAM P32852–001 (ex SAIAB 32407) (6: 24.5–36.9 mm); USNM 375017 (6: 21.8–36.7 mm); all same collection as Holotype; ROM 73760 (5: 22.6–33.0 mm); SAIAB 70752 (25: 19.0–32.0 mm); USNM 375018 (5: 21.3–33.8 mm), Sodwana Bay, KwaZulu–Natal. **Mozambique**: SAIAB 70746 (20: 13.8–31.0 mm), Punto Milibangalala; SAIAB 7438 (19.6 & 27.2 mm), Ilha do Bazaruto.

Diagnosis. A medium to large species of *Helcogramma* with a naked nape, 5 + 1 + 5 mandibular pores, males with a bright blue streak from corner of mouth onto

Table 6. Counts for *H. rharhabe* from different localities.

Locality	D2 spines			D3 rays		Anal-fin rays				Lateral line scales										
	12	13	14	10	11	17	18	19	20	20	21	22	23	24	25	26	27	28	Mean	Mode
Transkei - Coffee Bay (31°59'S) n=39	6	31	3	22	16		3	33	3				4	9	4	7	5	3	25	24
Mid-KZN - Chaka's Rocks (29°30'S) n=22		20	1	14	7		2	20		1	1	2	4	5	3	2	2	2	24	24
N. KZN - Six Mile Reef (27°38'S) n=20		16	4	13	7	1	1	18				5	7	2	2	1	1		23	23
S. Moz. - Ponta do Ouro (26°51'S) n=3	1		2		3			2	1				1		1					
- Ponta Milibangalala (26°25'S) n=20	1	16	3	15	5			20			1	4	7	4	2				23	23
- Inhaca Island (26°00'S) n=17		15	2	11	6		2	15			2	3	7	2		2			23	23
N. Mozambique - Zavora (24°25'S) n=11	1	9	1	6	5		2	7	2		2	3	2			1*			23	22
- Bazaruto (21°40'S) n=3		3		2	1			3				2		1					23	22

* Counted as 24+blank+1=26
KZN KwaZulu-Natal

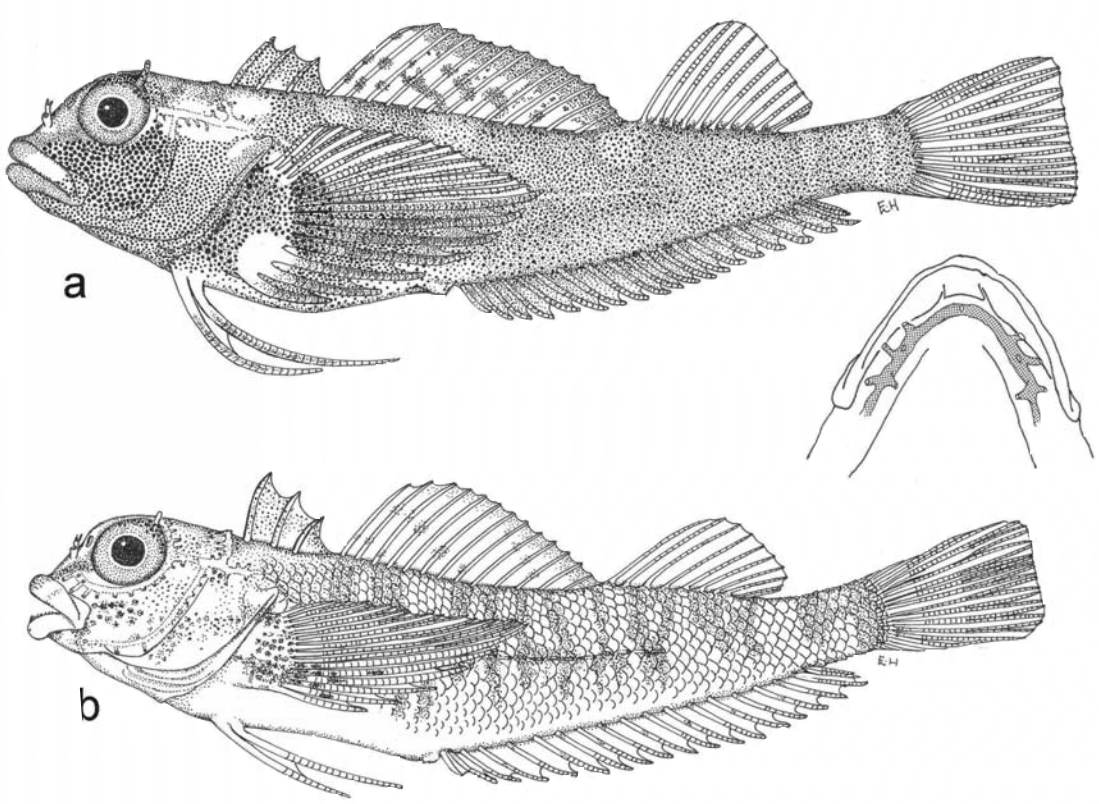

Fig. 11. *Helcogramma rharhabe*. **a**, holotype, SAIAB 70740, male 35.6 mm SL, Sheffield Beach, Kwazulu–Natal, South Africa; **b**, paratype, SAIAB 55017, female, Coffee Bay, E. Cape, South Africa; **c**, mandibular pores.

pre–opercle and crimson marks either side on upper lip, black in the centre.

DESCRIPTION. Dorsal fins III + XII–XIV + 10–11 (usually III + XIII + 10); anal fin I, 19 (rarely with 18 or 20 rays); pectoral fins 15–16: usually 1, 8, 7. Lateral line 21–31 tubed scales (mean dependent on locality – see Table 5), usually ending below junction of second and third dorsal fins; total lateral scales 37–38 (usually 38). Vertebrae 10 + 24–25; 1 free pterygiophore between second and third dorsal fins. Mandibular pores 5 + 1 + 5 (Fig. 11c). Head length 3.3–3.7 in SL; eye 2.6–3.2, maxilla 2.2–2.6 in head length–see Table 6 for geographic variation.

Nape and belly naked; scales do not extend to bases of first dorsal and anterior of anal fins; 2 rows of scales on base of caudal fin. Pelvic–fin rays united by membrane for 1/2 length of the shorter ray, longest ray reaching anterior margin of vent or mid–vent. First dorsal fin half height of second. Maxilla reaches vertical through anterior margin of pupil; orbital cirrus small and simple.

Live colour. Entire body of mature males heavily and evenly spotted with black and some dark red, except for 4 pale streaks extending from base of dorsal fin to latreal midline, the first below middle of second dorsal fin, second below junction of second and third dorsal fins, third below middle of third dorsal fin and the last streak below end of third dorsal fin, and 6 or 7 bright, silvery–white spots just below midline. The saddle marks and spots below the midline may become entirely obscured in very heavily pigmented specimens. Belly pale with fine melanophores. Head below eye black, with bright blue–white streak extending from lower lip, through corner of mouth onto preopercle; upper lip with crimson red patch on either side, black in the centre and blue at corner of mouth; area above upper lip and interorbital green; top of head reddish to black, with many small melanophores. Throat blue and black. First dorsal fin with gold and black spots on membrane between first two spines and along margin of other membranes; second dorsal fin hyaline with brown to black margin and dark red, black and white scattered irregularly on the membranes and spines; third dorsal fin with red along edges of rays and a grey margin; caudal fin mostly without pigment, some red and black on lowermost 2–3 rays. Anal fin evenly covered with red and black spots; base of pelvic fins crimson; pectoral fin base with red spots above and below at base and with bright blue above and anterior to lower spot, and black half–moon to triangular blotch, apex posterior on base of cental rays; base of upper 3–4 rays red, of lower 2 rays with crimson spot; other rays dusky.

Females pale green dorsally, some scales edged in brown, forming pairs of semi–bars that are extensions of bars on dorsal fins. Body below midline transparent with black semi–bars with interspersed white spots. Head brown–green above, whitish below, with

scattered melanophores. Dorsal fins with alternating irregular pale and dark bars, the colour confined to the elements. Caudal fin transparent with whitish band at base of rays; anal fin with some melanophores along the edges of the rays. Pelvic fins whitish; pectoral fins with irregular dark brown, white and greenish bands.

Colour in alcohol. All colour fades; relatively newly preserved males have dark brown bodies with an overlay of many melanophores, with 4 pale streaks and white spots below lateral line. Head with unpigmented spots on either side of upper lip and otherwise covered variously with scattered melanophores above eye and dense spotting below eyes, throat and to pelvic–fin base. An oval area around base and proximal half of pelvic fins with no pigment, distal half with fine spotting. Dorsal fins with margin of small melanophores and irregularly banded with brown; third dorsal fin without pigment; anal fin covered with brown and black spots. In heavily pigmented specimens the first two dorsal fins are entirely covered with brown and black spots. Pectoral–fin bases with clear semi–circles above and below, rays irregularly banded with brown and black spots. In time the brown and white pigments also disappear.

Females retain very little colour, initially only the white spots below the midline and eventually only scattered melanophores, which may give some suggestion of irregular half–bars.

Etymology. In the Eastern Cape, South Africa, the species is sometimes known as "hotlips" on account of its crimson upper lip. It is, however, named "rharhabe", after the eldest son of Phalo, paramount chief of amaXhosa. In c. 1750 Rharhabe and his father quelled an uprising by Rharhabe's half–brother, Gcaleka, and subsequently lead a break–away group which Rharhabe ruled as paramount chief from 1775 to 1787 (Owen, 1994). The name is to be treated as a noun in apposition.

Distribution (Fig. 1). *Helcogramma rharhabe* is common to abundant in tide pools and the shallow sub–tidal zone from East London, South Africa (33° S) to Ilha do Bazaruto, Mozambique (21°40′ S). In KwaZulu–Natal, South Africa, as many as 1 000 individuals have been collected from a single, large pool. Two specimens, females, from Shimoni, Kenya, (4°37′ S) may be referable to the species, but are in poor condition and, until additional material is available, the northernmost limit is considered to be Bazaruto.

Comparisons. *H. rharhabe* occurs together with *H. fuscopinna* throughout most of its range, and with *H. alkamr* along the coast of Mozambique. Male *H. rharhabe* have partially red lips and a blue stripe from the corner of the mouth onto the preopercle, whereas the distinctive blue stripe of male *H. fuscopinna* runs from the middle of the upper lip, below the eye and onto the opercle. These two species can also be separated by second dorsal–fin count: a norm of 13 spines vs 14 for *H. fuscopinna*. Male *H. rharhabe* can be distinguised from *H. alkamr* by body colour, black vs brown for the latter species.

Non–type material examined. **Mozambique**: SAIAB 7434 (3: 24.2–33.8 mm); SAIAB 7441 (3: 30.8–35.1 mm); SAIAB 7443 (10: 24.6–34.5 mm), Inhaca Island; SAIAB 7433 (32.4 mm), Maputo Bay; SAIAB 50681 (6: 13.8–28.0 mm), Ponta do Ouro. **South Africa**: SAIAB 32431 (20: 21.0–33.0 mm), Six Mile Reef, KwaZulu–Natal; SAIAB 32393 (28: 18.9–37.2 mm), Chaka's Rocks, KwaZulu–Natal; SAIAB 32394 (23: 28.6–39.1 mm); SAIAB 55017 (16: 25.9–36.9 mm), Coffee Bay, Eastern Cape.

Helcogramma rosea Holleman

Figs. 1 & 12, Plate 2

Helcogramma rosea Holleman 2006: 95, figs. 3–5 (Phuket, Thailand)

Diagnosis. Dorsal fins III + XIII + 11 (rarely 10 rays); anal fin I, 18–20 (rarely 18, usually 20 rays); pectoral–fin rays 16: usually 2, 7, 7. Lateral–line tubed scales 23–29 (usually 25–27); total lateral scales 36–38 (usually 37). Vertebrae 11 + 24–26 (25; 1 of 32 with 26), 0 or 1 free pterygiophores between second and third dorsal fins. Mandibular pores 3–4 + 1 + 3–4 (Fig. 12c); pore on inside of ramus small and absent in about 60% of specimens examined). Head length 3.1–4.0 [3.3] in SL; eye 2.8–3.4 [3.1], maxilla 2.0–2.3 [2.2], snout 3.1–3.9 [3.5], in head length; head profile fairly blunt, 56–62° [60°].

Nape scaled, but scales do not extend to base of first dorsal fin anteriorly; 2–3 rows of scales on base of caudal fin; scales on underside of caudal peduncle; scales do not extend to base of anal fin anteriorly. Pelvic–fin rays united by membrane for half length of longer ray, longer ray extends nearly to vent in males, about 80% of distance in females. Origin of first dorsal fin over posterior margin of preopercle, fin of males males triangular, with first spine equal in height to second dorsal fin, in females first 2 dorsal–fin spines subequal, and fin about 80% height of second dorsal fin; first two spines closer together than half distance between second and third spines. Maxilla reaches vertical through centre of pupil. Broad patch of teeth in front of both jaws, narrowing to single row on either side; vomer and palatines with patches of teeth. Orbital cirrus small, triangular and rounded, a little longer than wide.

Live colour: (from photographs by R. Winterbottom). Males with red body and three small, yellow saddles, first below anterior of second dorsal fin, second below

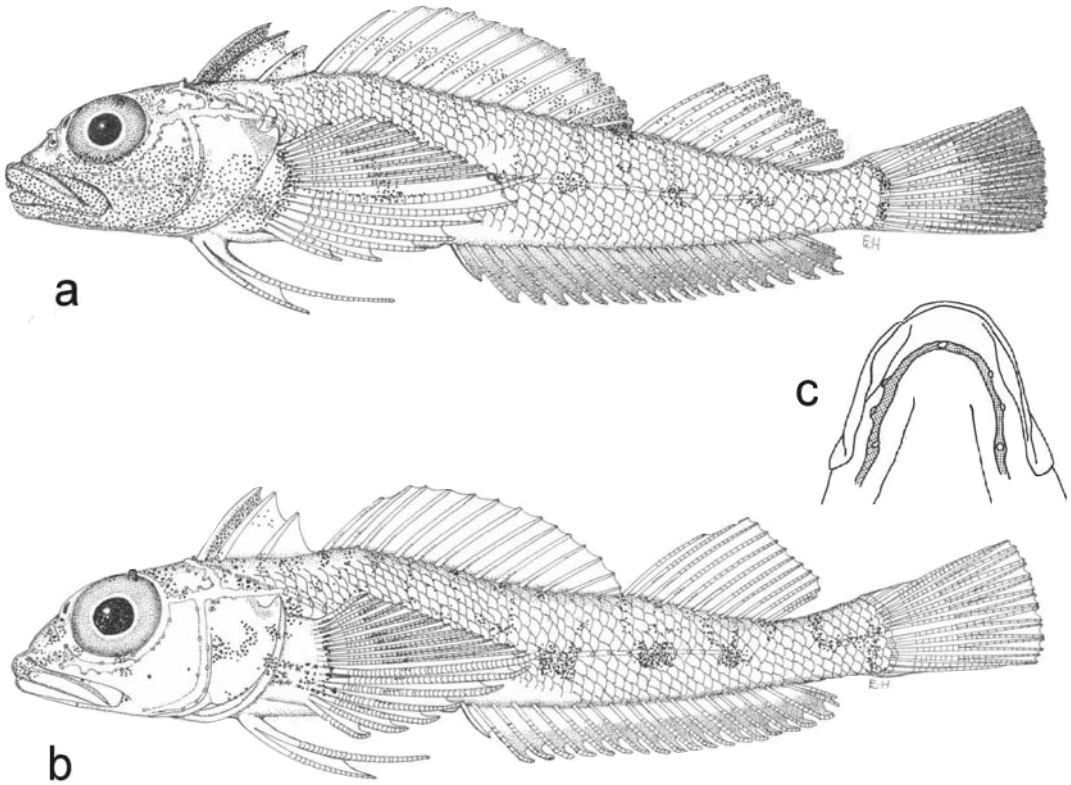

Fig. 12. *Helcogramma rosea*. **a**, holotype, ROM 76679, male, 34.4 mm SL; **b**, paratype, ROM 76680, female, 27.6 mm SL, both from Phuket, Thailand; **c**, mandibular pores.

end of second dorsal fin and third below end of third dorsal fin, with line of yellow dots and dark brown dashes along lateral line and narrow dark bar across the peduncle; belly spotted red. Head reddish above, dark brown behind eyes and to posterior edge of opercle, pale with dark spots below eyes, to pelvic–fin base; dark–brown, oblique bar from lower margin of eye with pale blue anterior to and below eye, and bright yellow spot immediately behind eye. Iris red with yellow spots, nasals and centre of upper lip brown. First dorsal fin pale with brown and red spots; second with red spots basally and brownish margin; third with red spots basally and red and black along margin. Caudal fin mostly deep pink with small black spots antero–ventrally. Anal fin spotted with red and black, the black darkest along margin. Pectoral–fin base brown with two pale blue spots at centre and at lower edge, fin entirely red with three pale "bars", colour on rays only. Pelvic fins pale, red basally.

Females with light cream body, greenish above lateral line, with series of chocolate brown blotches along lateral line, pairs of brown "saddle" marks, three below second dorsal fin, two below third dorsal fin and one on peduncle, last half–pair forming narrow bar across peduncle; anal fin with seven subcutaneous, brown blotches along base. Head, nasals, upper lip, preopercle and opercle mottled brown and cream, pale cream below eye with some brown marks. First dorsal fin with brown, second and third with brown on spines and rays roughly corresponding to "saddles" on dorsum. Caudal fin pale with a little colour along the rays; anal fin with spots along margin, colour on rays only.

Colour in alcohol: Males with pale body with clusters of melanophores along midline, last forming a narrow bar across caudal peduncle; scattered melanophores above midline, with groups of micro–melanophores where yellow saddles are in life; cluster of small melanophores adjacent and posterior to genital papillae. Head with scattered melanophores on top and in interorbital area; closely and evenly spaced melanophores below eye, which continue onto the anterior of belly, either side of pelvic–fin base, and onto pectoral–fin base, where colour is darkest at base of central rays. First dorsal fin with closely spaced micro–melanophores on membrane between first two spines, other membranes with few large spots; second dorsal fin with broad band of melanophores along middle of fin narrow band along margin; third similar to second, but lighter. Anal fin with many small melanophores on membranes and rays, darker along the margin in smaller specimens, evenly spread across entire fin in large specimens. Pectoral fins with rows of micro–melanophores on some rays, suggestive of two bars across fin.

Mature females are very similar in colour to males, melanophores on dorsum suggestive of short bars with clusters along midline and series of subcutaneous spots along base of anal fin. Head with few melanophores, most notably clusters on upper lip either side of symphysis, and semicircular cluster,

open anteriorly, on opercle. First dorsal fin as in males; second and third with small melanophores on elements, continuous with short bars on body. Pectoral–fin base with two clusters of melanophores, one dorsally and one ventrally on base.

Distribution (Fig. 1). The species is known from Sri Lanka and the Andaman Sea.

Comparisons. *Helcogramma rosea* occurs sympatrically with several other *Helcogramma* species at Sri Lanka, and can be distinguished from them by its tall first dorsal fin with the close–set first two dorsal–fin spines with micro–melanophores on the membrane between them.

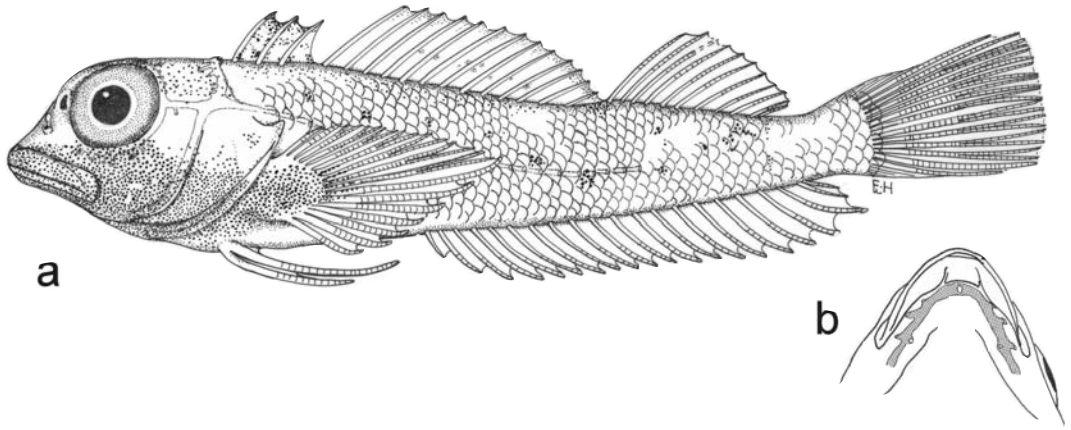

Fig. 13. *Helcogramma serendip*. **a**, holotype, SAIAB 73755, male, 21.8 mm SL, Trincomalee, Sri Lanka; **b**, mandibular pores.

***Helcogramma serendip* sp. nov.**
Figs. 1 & 13

Holotype: SAIAB 73755, male, 21.8 mm SL; near Fort Frederick, Trincomalee, Sri Lanka; rocky bottom (?); collected Hans Bath, 20 May 1982.

Paratypes. **Sri Lank**a: SAIAB 73756 (12: 17.3–23.2 mm), same collection as Holotype; USNM 385565 (23.5 & 24.2 mm), and USNM 228981 (3: 15.9–22.8 mm) Trincomalee; USNM 385567 (5: 17.6–19.5 mm), and USNM 228977 (5: 19.2–24.8 mm), Koddiyar Pattu.

Diagnosis. A small species of *Helcogramma*, less than 25 mm SL, with a low first dorsal fin, 4 + 1 + 4 mandibular pores and minute serrations on posterior margin of orbit and edges of occipital sensory canals.

Description. Dorsal fins III + XIII + 10; anal fin I, 18–19 (usually 19 rays); pectoral fins 16: usually 2, 7, 7. Lateral line 20–22 (mode 21) tubed scales, ending below the junction of the second and third dorsal fins; total lateral scales 36–39 (usually 38). Vertebrae 10 + 25 (1 of 12 with 25); 1 free pterygiophore between second and third dorsal fins. Mandibular pores 4 + 1 + 4 (Fig. 13b) Head length 3.3–3.9 (3.6) in SL; eye 2.5–3.0 (2.8), maxilla 2.1–2.8 (2.4) in head length; head quite blunt— 72–76° (74°).

Nape naked, but with patches of scales above first few lateral–line scales; two rows of scales on base of caudal fin; scales do not extend to base of anal fin anteriorly; no scales on underside of caudal peduncle. Posterior margin of eye with small serrations on edge of frontal bones; edges of sensory canals extending back from the one immediately behind the eye with fringe of minute serrations. First dorsal fin less than half height second dorsal fin. Pelvic–fin rays united by membrane for length of shorter, half length of longer ray, longest ray reaching about $^{4}/_{5}$ ths of distance to vent. Lower labial folds relatively large (Fig. 13C). Broad patch of teeth in front of both jaws, single row at sides, with row of enlarged teeth inside middle of upper jaw, both outside and inside middle of lower jaw. Maxilla reaches vertical through anterior of pupil. Small, pointed orbital cirrus present. Interorbital width about equal to pupil diameter.

Live colour. Not known
Colour in alcohol. Males with evenly–spaced melanophores from level of upper lip, below eyes and onto opercle and pectoral–fin base, where they form a triangle, apex posterior; pigment stops abruptly between isthmus and base of pelvic fin. Top of head and interorbital with small melanophores. Body with scattered melanophores above lateral midline and with 7–8 clusters on midline, from below pectoral fin to caudal peduncle, the darkest cluster anteriorly. First and second dorsal fins with black spots along margin; third dorsal fin unpigmented; anal fin with melanophores on membranes in band along middle of fin. Caudal and pelvic fins unpigmented.

Females with 7 'H'–bars along on body along midline, 1–4 below second dorsal fin, 5 and 6 below third fin and last across peduncle. Head, opercle and

pectoral–fin base with scattered melanophores; cluster of melanophores below eye and a stripe from corner of mouth onto upper lip. First dorsal fin with dark margin, other fins without pigment.

DISTRIBUTION (Fig. 1). The species is currently known only from Sri Lanka.

Etymology. The name is taken from the old Arabic name for Sri Lanka, 'Sarandib', or 'Serendip' in English, currently the only known locality of this species. It is also given in recognition of the way in which many new species are discovered—serendipitously. The specimens were amongst several lots collected by Hans Bath in 1982 and which he donated to SAIAB. The epithet is used as a noun in apposition.

COMPARISONS. See under *H. ellioti*.

REMARKS. *H. serendip* is very similar to *H. chica* Rosenblatt (1960), which is recorded from the Christmas, Cocos–Keeling Islands and eastwards to the Society Islands. *H. chica* lacks the orbital cirrus present in *H. serendip*. The mandibular pore pattern for *H. chica* is 3–4 + 1 + 3–4, while for *H. serendip* it is 4 + 1 + 4. The facial pigment of *H. chica* males as described by Hansen (1986: 331) and Fricke (1997: 423) appears identical to that of *H. serendip*, ending abruptly between the isthmus and the base of the ventral fins. A further similarity between *H. chica* and *H. serendip* is the "feeble development of spination along the path of the mucous canals of the frontals ..... " Schultz, 1960: 296), which I have described as a "fringe of minute serrations".

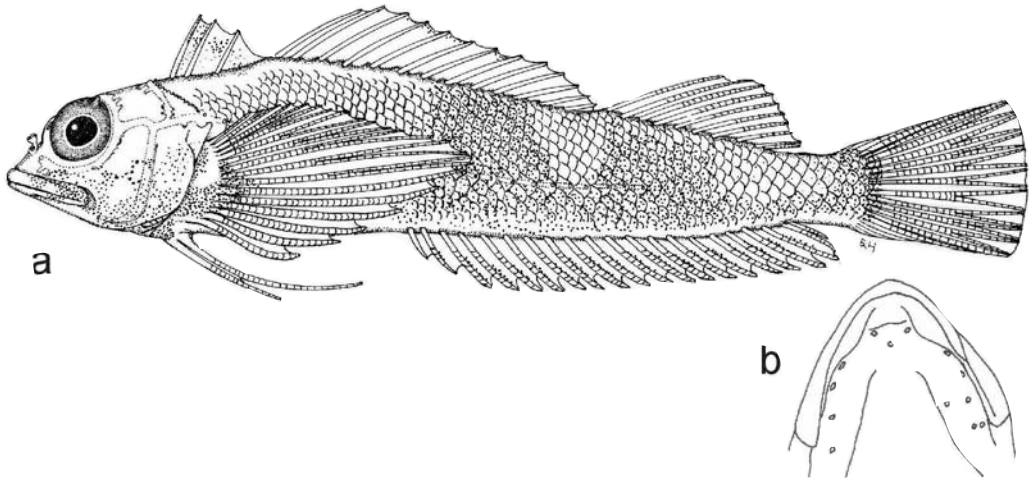

Fig. 14. *Helcogramma shinglensis*. **a**, male, SAIAB 30429, male, 26.9 mm SL, Trincomalee, Sri Lanka **b**, mandibular pores.

***Helcogramma shinglensis* Lal Mohan**
Figs. 1 & 14, Plate 2

Helcogramma shinglensis Lal Mohan 1971: 219, fig. 1 (Gulf of Mannar, India).
Helcogramma obtusirostris Hansen 1986: 341

DIAGNOSIS (The counts for Lal Mohan's four type specimens are given in squared parenthesis). Dorsal fins III + XIII + 10 [III + XII–XIII + 9]; anal fin I, 19–20 [I, 20]; pectoral fins 15–16 [15]: usually 1 + 8 + 7. Lateral line 21–24 [20–22] tubed scales, ending below the junction of the second and third dorsal fins; total lateral scales 37–38; transverse scales 10/5 [11/4]. Vertebrae 10 + 24–25; 1 free pterygiophore between second and third dorsal fins. Mandibular pores 4–6 + 3 + 4–6 (Fig. 14b). Head length 3.5–3.6 in SL; eye 2.7–2.8, maxilla 2.2–2.4 in head length.

Nape and belly naked; scales do not extend to bases of first dorsal and anterior of anal fins; scales on ventral surface of peduncle absent; 2 rows of scales on base of caudal fin. Pelvic–fin rays united by membrane for half the length of the shorter ray, longest ray reaching vent. First dorsal fin half height of second. Maxilla reaches vertical through centre of pupil; orbital cirrus small and pointed.

Live colour. Lal Mohan records that *H. shinglensis* and *H. ellioti* are very similar in colour. He describes the colour of males as follows: "Head with black pigments ventrally, body and orbits red, lower half of pectoral (base?) black, dorsal fin hyaline, nape to middle of second dorsal fin with red pigments, a vertical band at the origin of the second dorsal fin, another at the end of the third dorsal fin, caudal fin hyaline with greenish taint ventrally, pelvic fins red. In formalin colour fades, body light greenish interrupted with brown pigments, pectoral peduncle with blue blotch." (Ibid. p. 222). There are no known colour photographs of the species.

Colour in alcohol. Body of males posteriorly dark brown with many small, dark brown spots in coloured areas, anteriorly light brown with spots, with two prominent unpigmented "saddles", one below end of second dorsal fin, the second below end of third dorsal fin, extending across body; belly pale. Head below eye dark brown with darker spots, colour to pelvic–fin base, and onto pectoral–fin base; branchiostegal membranes dark brown; head above lower level of eye pale with small, light brown spots. First and second dorsal fins with spotted margins; third immaculate; anal fin with brown spots on distal half, on entire fin in dark males. Lower rays of caudal fin with some colour at base of rays. Pectoral–fin base with immaculate area above and below brown line, brown line confluent with very dark brown triangular mark at base of middle rays, apex posterior; lower, undivided rays with brown in dark males; pelvic fins without colour.

Body of females with scattered dark brown spots on upper half and light brown blotches that extend to below the lateral line, and light brown band with some dark spots across peduncle at caudal–fin base. Top of head with minute dark brown spots; opercle with dark brown spots and cluster below eye and on either side of centre of upper lip, spots extending to anterior rim of eye. First dorsal fin with dark brown spots on membranes; second with narrow band of dark brown spots along margin; third dorsal, caudal and anal fins without pigment. Pectoral–fin base with light brown blotches and a small cluster of dark brown spots at base of rays 8–10, with smaller spots on lower rays suggestive of banding.

Distribution (Fig. 1). The species has been recorded only from Sri Lanka and the Gulf of Mannar.

Comparisons. In southeast Indian waters *H. shinglensis* occurs sympatrically with four other *Helcogramma* species: *H.billi, H. rosea*, *H. serendip* and *H. ellioti*. It can be distinguished from the first three species by having 3 symphyseal mandibular pores vs only one, and from *H. ellioti* by fewer tubed lateral–line scales–21–24 vs 33–37 for *H. ellioti*.

Remarks. Hansen examined the types of *Helcogramma shinglensis* Lal Mohan (1971: 219), as well as specimens of *Helcogramma ascensionis* Lubbock (1980: 294) and synonymised these two species with *H. obtusirostre*. It is curious that, having found that the mandibular patterns of *Helcogramma* species were consistent for a species, she should have synonymised *H. shinglensis* (having examined the types) with *H. obtusirostre* when the former has a pore pattern of 4 + 3 + 4 cf. 4 + 1 + 4 for *H. obtusirostre*. I have not seen all the Indian Ocean specimens that Hansen looked at, but the specimens from the Seychelles, Comore Islands, Tanzania and St Brandon Shoals have all been identified as *H. alkamr*.

Material examined. **Sri Lanka**: SAIAB 30429 (26.9 mm); USNM 222306 (24.1 & 24.5 mm); USNM 222375 (26.9 mm); USNM 222379 (8: 24.1–21.0 mm), Trincomalee; USNM 228976 (4: 18.5–22.2 mm), and USNM 385566 (3: 15.9–22.8 mm), Kodiyar Pattu.

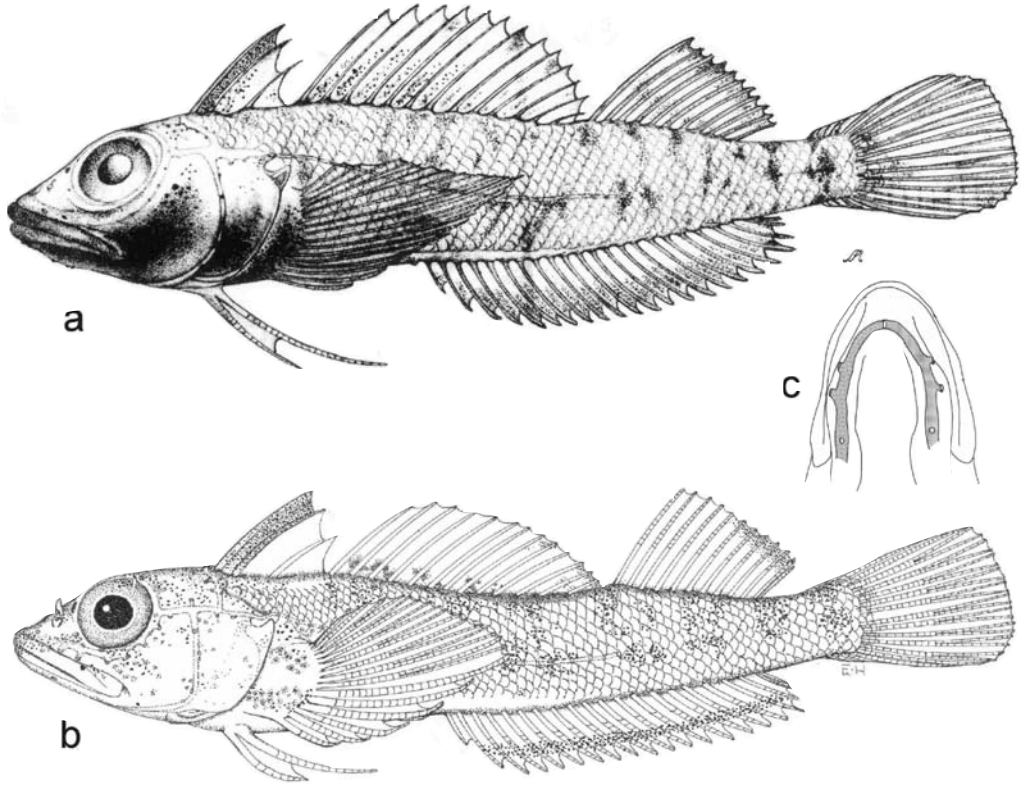

Fig. 15. *Helcogramma steinitzi.* **a**, paratype, ex USNM 205824 male, 36.5 mm SL (from Clark 1979) (first dorsal fin constructed from another specimen); **b,** paratype, ex USNM 205833, female, 29.5 mm SL, both from Aqaba, Red Sea; **c**, mandibular pores.

***Helcogramma steinitzi* Clark**
Figs. 1 & 15; Plate 2

Helcogramma steinitzi Clark 1980: 88, fig. 8, Pl. II–V (Red Sea); Hansen 1986: 347; Randall 1995: 310.

DIAGNOSIS (partially from Clark 1980 and Randall 1995). Dorsal fins III + XII–XIV + 10–12 (usually III + XIII + 10–11); anal fin I, 19–21 (usually 20); pectoral fins usually 15–17 (recorded by Clark and Randall; usually 16: 2, 7, 7). Lateral line 21–27 tubed scales, ending below first five rays of third dorsal fin; total lateral scales 38–40 (37–41, from Clark). Vertebrae: 11 + 24–25; 1 free pterygiophore between second and third dorsal fins. Mandibular pores 3 + 1 + 3 (Fig. 15c). Head length 3.0–3.5 in SL; eye 3.0–3.4, maxilla 2.0–2.1 in head length.

A large species, reaching nearly 60 mm SL. Nape scaled, belly naked, scales do not extend to base of first dorsal or anal fins; 1 or 2 rows of scales at base of caudal fin. Pelvic–fin rays united by membrane for half length of shorter ray, longer ray reaching vent. Origin of first dorsal fin over posterior margin of preopercle, fin triangular, in males first spine fin about as long as longest spine of second dorsal fin, in females a little shorter; first two spines set close together. Mouth large, maxilla reaching vertical through posterior of pupil; orbital cirrus minute.

Live colour (based on Randall 1995). Body of males dark red above lateral line, many scales outlined in black, paler red below lateral line, with white flecks and indistinct black markings forming a reticulated pattern, and with 8 dark blotches interspersed with white blotches along mid–side below lateral line; belly white. Head deep above lower level of eye dark red, below bluish–grey with many small melanophores, and a bluish streak below eye. First dorsal fin with red and black spots; second and third with red basal band with black spots and pale red marginal band, hyaline band between, with white on elements. Anal fin pale red, darker along margin; caudal fin pale red; pectoral fins red, bases dark grey with two oval, bluish marks, one above the other; pelvic fins pink.

Females with translucent greenish body, irregularly spotted with white, with large interconnecting red blotches, red and black spots on scale margins, forming a reticulated pattern; head greenish with numerous dark red spots and short bands, the darkest a diagonal band on the side of the snout.

Colour in alcohol. Males with head below eyes to pectoral fin base dark to black, body with scattered clusters of melanophores. First dorsal fin with micro–melanophores on membrane between first two spines, larger black spots on subsequent membranes, second with black spots on membranes basally and third and anal fin with dusky bands along margins.

Females with reticulated pattern of dark half–bars characteristic of the females of many species of the genus.

DISTRIBUTION (Fig. 1). *Helcogramma steinitzi* is known from the Red Sea, the coasts of Yemen and Oman and the Persian Gulf.

COMPARISONS. The only other species of *Helcogramma* that occurs sympatrically with *H. steinitzi, H. obtusirostre* has a smaller head (3.3–3.7 in SL vs 3.0–3.5 for *H. steinitzi*), a blunter snout, 18–19 anal–fin rays (usually 20 for *H. steinitzi*) and a lower first dorsal fin in males (about equal in height to the second for *H. steinitzi*). In life the males of the two species can be easily distinguished. Mature *H. obtusirostre* males are much darker than *H. steinitzi* males, often nearly black, with two distinctive pale, narrow saddles and a blue line from the corner of the mouth to the hind margin of the pre–opercle. *H. steinitzi* is compared to the other two species of the *H. steinitzi* species group under *H. microstigma*.

Material examined. **Red Sea**: HUJ 17628 (37.2 & 38.6 mm), Ras Burka, and HUJ 18280 (33.8 mm), Elat; USNM 205824 (7: 21.1–38.0 mm), USNM 205833 (17: 16.4–35.6 mm) and USNM 205791 (8: 20.5–25.2 mm), all paratypes from Aqaba.

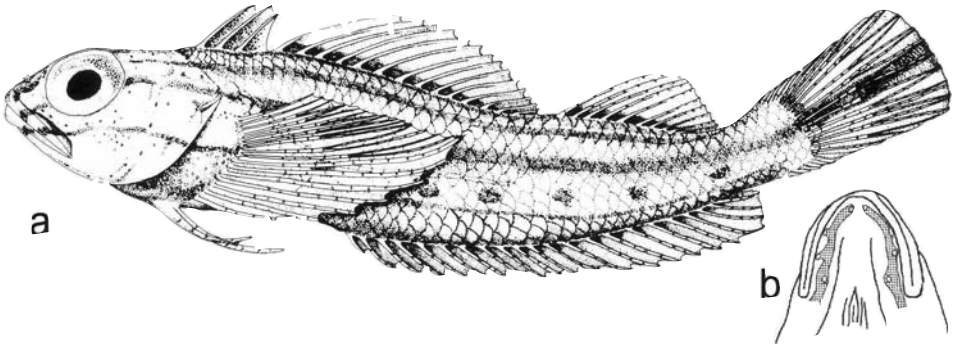

Fig. 16. *Helcogramma striata*. **a**, paratype, USNM 221916, male, 24.5 mm SL, Miyake–jima, Japan (from Hansen 1986.); **b**, mandibular pores.

Helcogramma striata Hansen

Figs. 1 & 16; Plate 2

Helcogramma striata Hansen 1986: 349, fig. 18 (Miyake Jima, Japan, in part); Fricke 1994: 437.
Helcogramma striatum Fricke 1997: 480.

Diagnosis. Dorsal fins III + XIII–XIV + 10–12 (usually III + XIII + 11); anal fin I, 19–20 (usually 20 rays); pectoral fins 16: usually 2, 7, 7. Lateral line 17–18 (mostly 17) tubed scales, ending below the posterior end of the second dorsal fin; total lateral scales 38 or 39; transverse scales 11/10. Vertebrae 10 + 25–27; 1 free pterygiophore between second and third dorsal fins. (See table 7 for geographic variation). Mandibular pores 3 + 2 + 3 (Fig.16b). Head length 3.3–3.6 (3.5) in SL; eye 2.3–2.6 (2.5), maxilla 2.0–2.3 (2.2) in head length.

Nape scaled, belly naked, scales running to bases of dorsal and anal fins; 2–3 rows of small scales at base of caudal fin. Lateral line continues straight from lateral extrascapular without curve. First dorsal fin about half height of second. Eyes large, snout short, half length of maxilla; mouth down–turned and large, maxilla reaching vertical through mid–pupil. Both jaws with band of conical, slightly recurved teeth and larger, similar teeth, evenly spaced along outer and inner margins; vomer with curved band of relatively large teeth; palatines with long toothplates with large teeth. Orbital cirrus absent.

Live colour (from Hansen, 1986 and a colour photograph by David Grey). Body of males red dorsally, green to dark blue ventrally, with longitudinal bluish stripes on each side, running from snout to caudal peduncle: dorsal–most from top of head along the first and second scale rows to the top of the caudal peduncle; middle stripe from hind margin of eye onto caudal peduncle and along centre of caudal fin; ventral–most along level of bottom of eye, across opercle and pectoral–fin base, and along margin of dark ventrum. Midway between lower two stripes is a series of 6 or 7 green–blue spots. Belly whitish. Head above ventral–most stripe red with blue–white marks, lips red with stripes continuing onto them; throat white. First dorsal fin red with grey–blue spots on membranes; second and third dorsal fins with red elements and a blue–green band basally; caudal fin with red or rays and central blue stripe; anal fin uniformly dark blue; pectoral fins with pink rays; pelvic–fin rays red, membrane pink.

Females are identical in colour, but paler.

Colour in alcohol. While Hansen noted that there was no sexual dichromatism, there is some evidence in preserved specimens.

Males with three longitudinal series of brownish–black spots, the first extending from upper, posterior quadrant of eye to end of third dorsal fin, second from posterior margin of eye, along post–orbital sensory canal to upper caudal–fin base, and third series, a broad stripe extending from beneath lower half of pectoral fin to lower caudal peduncle and to base of anal fin. Between this stripe and below the one above it is a broad, immaculate stripe along the midside with 6–8 clusters of centrally–placed, evenly–spaced brown spots, from beneath pectoral fin to below third dorsal fin. Centre of belly immaculate. First dorsal fin with many small melanophores; second dorsal fin with basal band of brown spots and tiny spots on the fin membranes; third dorsal fin with narrower basal band and tiny spots on the fin membranes. Caudal fin with series of brown spots running along the centre; anal fin liberally covered with black and brown spots, except the tips of the rays, which are immaculate. Pectoral–fin base spotted, with brown spots along proximal portion of rays and tiny spots on membranes. Head with narrow stripe of spots from upper lip, below eye to edge of preopercle, and with patch of brown spots on the upper lip and snout and line of spots along margin of preopercle.

Females lack the broad, lower body band, having a narrow band of spots below the clear band. Large females may be finely spotted between this band and anal–fin base. The mid–body clusters also are smaller and may be absent in small/immature specimens.

Comparisons. In the Western Indian Ocean (*sensu lato*) *H. striata* occurs only in Sri Lanka, where it can be distinguished from all other *Helcogramma* species by its striped body.

Remarks. Although I have examined only about 20 specimens from two localities I have not found as wide a range of counts as recorded for this species by Fricke (1997: 488 & 489; see Table 7). However, the counts I have made separate the Western Indian Ocean and

Table 7. Counts for *H. striata* from different localities.

Locality	D2 spines			D3 rays			Anal fin rays				Caudal vertebrae			Lateral line scales					
	13	14	15	10	11	12	19	20	21	22	25	26	27	16	17	18	19	20	21
Sri Lanka n = 8	6	1		1	7		2	5			4	4			5	2			
Phuket, Thailand n = 38	35	3		8	29	1	*31	5			1	23	5	4	15	5	5		
Penghu Islands n = 11		10	1	2	9			2	8	1	1	4	5			1	4		4

One with 17 rays

Taiwanese material quite clearly, with a shift of 13 to 14 second dorsal–fin spines, 20 to 21 anal–fin rays and mean of 17 to a mean of 19 tubed lateral–line scales. While such differences are more than have been used to distinguish between other species in the genus (*Helcogramma obtusirostre* and *H. rharhabe*, for example), these seem to be locality dependent (environmentally determined?). For the present I accept these as a single species and not two species, one in the Indian Ocean and one in the Western Pacific, particularly as there appears no disparity in colour pattern between the populations. A more detailed investigation may prove otherwise.

Helcogramma striata is probably the sister species of *H. maldivensis*, from which it is distinguished by colour pattern and dorsal–fin ray counts: *H. striata* has a mode of 11 rays, *H. maldivensis* a mode of 10. It is interesting to note that while there is little sexual dichromatism in *H. striata*, possibly unique within the genus, *H. maldivensis* does show sexual dichromatism, with the males darker and more brightly coloured than the females.

DISTRIBUTION (Fig. 1).
Sri Lanka and eastwards, to Thailand, northern Australia, throughout Indonesia, to Japan and the Western Pacific Ocean to Kiribati.

Material examined. **Sri Lanka**: SAIAB 30430 (6: 19.7–23.7 mm) and SAIAB 30435 (17.2 & 20.3 mm), Trincomalee. **Thailand**: ROM 78140 (12: 17.5–22.9 mm); ROM 78142 (12: 8.8–21.5 mm); ROM 78143 (12: 16.0–22.4 mm); ROM 78146 (12: 18.0–24.7 mm), Phuket. **Taiwan**: SAIAB 35675 (11: 24.1–30.7 mm), Penghu Islands.

DISCUSSION

It is obviously not ideal to review the species of the Western Indian Ocean without including material from Indonesia and the Western Pacific Ocean, particularly when it is known that species closely related to ones in the Western Indian Ocean exist in the Western Pacific.

In their investigation into the historical biogeography of Indo–western Pacific coral reef fauna Santini & Winterbottom (2002) divided the region into a number of areas on the basis of the endemism exhibited by the taxa used in their study. They noted (2002:197)–as have Knowlton (1993) and Gill & Kemp (2002)–that little is known about the dispersal of the planktonic eggs and larvae of marine organisms, although this is changing rapidly, requiring a major rethink about larval fish dispersal–see Fisher et al. 2005 and references therein. Knowlton and Gill & Kemp (*op. cit*.) have challenged the concept of widespread Indo–Pacific shore fishes, stating that widespread species are a reflection of "current taxonomic practice and understanding" (*ibid.* p.165), and argue that many currently accepted widespread species are probably complexes of closely related species.

With but three exceptions–*Helcogramma larvata*, *H. striata* and *H. fuscopinna*– the dorsal and anal fin counts of the other 12 Western Indian Ocean species are almost identical, with 13–14 spines in the second dorsal fin, 9–11 rays (6 with 10 rays) in the third dorsal fin, and 18–20 (usually 19–20) rays in the anal fin (an exception of *H. maldivensis* with 22 rays). There is a concomittant similarity in vertebral counts and total lateral scale counts.

These findings do not substantiate Fricke's recording of variations of 4 and 5 (and sometimes as many as 7) dorsal–fin spine or ray, or anal–fin ray counts. For example he (1994: 416ff, 1997: 428ff) examined more than 200 specimens of *Helcogramma chica* from localities ranging from Thailand to Moorea and records ranges in counts of 12–16 second–dorsal fin spines (mode 14), 8–12 third–dorsal fin rays (mode 10) and 17–21 anal–fin rays (mode 19). These are greater variations than I (Holleman 2006) or Williams & McCormick (1990) or Williams & Howe (2003) have recorded for *any* tripterygiid species. Fricke's counts are clearly inaccurate.

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LITERATURE CITED

CLARK, E. 1979. Red Sea fishes of the family Tripterygiidae with descriptions of eight new species. *Israel Journal of Zoology*, **28**: 65–113.

FISHER, R., J. M. LEIS, D. L. CLARK & S. K. WILSON. 2005. Critical swimming speeds of late–stage coral reef fish larvae: variation within species, among species and between locations. *Marine Biology* **147**: 1201–1212.

FRICKE, R. 1994. *Tripterygiid Fishes of Australia, New Zealand and the Southwest Pacific Ocean (Teleostei)*. Koeltz Scientific Books, Königstein. ix, 585 pp.

FRICKE, R. 1997. *Tripterygiid Fishes of the Western and Central Pacific (Teleostei)*. Koeltz Scientific Books, Königstein. ix, 607 pp.

FRICKE, R. & J. E. RANDALL. 1992. Tripterygiid fishes of the Maldive Islands, with descriptions of two new species (Teleostei: Blennioidei). *Stuttgarter Beiträge zur Naturkunde Serie A (Biologie)* No. 484, 1–13.

GILL, A.C. & J. M. KEMP. 2002. Widespread Indo–Pacific shore fish species: a challenge for taxonomists, biogeographers, ecologists and fishery and conservation managers. *Environmental Biology of Fishes* **65**: 165–174.

HANSEN, P. E. HADLEY. 1986. Revision of the tripterygiid fish genus *Helcogramma*, including descriptions of four new species. *Bulletin of Marine Science* **38**(2): 313–354.

HERRE, A. C. W. T. 1944. New fishes from Johore and India. *Proceedings of the Biological Society of Washington* **57**:45–52.

HOLLEMAN, W. 1982. Three new species and a new genus of tripterygiid fishes (Blennioidei) from the Indo–West Pacific Ocean. *Annals of the Cape Provincial Museums* (Natural History) **14**(4): 109–137.

HOLLEMAN, W, 2006. Fishes of the *Helcogramma steinitzi* species group (Blennioidei: Tripterygiidae) from the Indian Ocean, with descriptions of two new species. aqua, *Journal of Ichthyology and Aquatic Biology* **11**(3): 89–104.

HUBBS, C.L. & K.F. LAGLER. 1958. Fishes of the Great Lakes Region. *Cranford Institute Scientific Bulletin* **26**: 1–213.

KLUNZINGER, C. B. 1871. Synopsis de fisches des Rothen Meeres. *Verhandlungenen der kaiserlich–königlichen zoolochish– botanischen Gesellenschaft in Wien* **21**: 441–668.

KNOWLTON, N. 1993. Sibling species in the sea. *Annual Review of Ecology and Systematics* **24**: 189–216.

LAL MOHAN, R. S. 1968. On a Collection of Blennies from Gujarat Coast with Some New Records. *Journal of the Marine Biological Association of India* **10**(1): 118–125.

LAL MOHAN, R. S. 1971. *Helcogramma shinglensis*, a new species of tripterygiid fish from Gulf of Mannar with a key to the fishes of the family Tripterygiidae of the eastern and central Indian Ocean. *Senckenbergiana Biologica* **52**(3/5): 219–223.

LUBBOCK, R. 1980. The shore fishes of Ascension Island. *Journal of Fish Biology* **17**: 283–303.

MARSHALL, N. B. 1952. The Manihine Expedition to the Gulf of Aqaba, 1948–49. *Bulletin of the Museum (Natural History), Zoology* **1**(8): 221–252.

MCCULLOCH, A.R. & E.R. WAITE. 1918. Some new and little known fishes from South Australia. *Records of the South Australian Museum* **1**(1): 39–78.

OWEN, D. R. 1994. *Ubukhosi neenkokeli*. Albany Museum, Grahamstown. 94 pp.

RANDALL, J. E. 1995. *Coastal Fishes of Oman*. University of Hawai'i Press, Honolulu. 439 pp.

RANDALL, J. E. & E. CLARK. 1993. *Helcogramma vulcana*, a new triplefin fish (Blennioidei: Tripterygiidae) from the Banda Sea, Indonesia. *Revue francaise d' Aquariologie* **20**(1): 27–32.

ROSENBLAFF, R. 1960. (Descriptions of new species of *Helcogramma*). In: Schultz, L.P. Fishes of the Marshall and Marianas Islands, Vol. 2. *United States National Museum Bulletin* 202: 1–438.

SANTINI, F. & R. WINTERBOTTOM. 2002. Historical biogeography of Indo–western Pacific coral reef biota: is the Indonesian region a centre of origin? *Journal of Biogeography* **29**: 189–205.

SARUWATARI, T., J. A. LOPEZ & T. W. PIETSCH. 1997. Cyanine Blue: a versatile and harmless stain for specimen observation. *Copeia* 1997(4): 840–841.

SHAMSUL HODA, S. M. 1983. First record of *Helcogramma ellioti* (Family : Tripterygiidae) from Pakistan. *Biologia* **29**(1): 41–46.

SPRINGER, V. G. 1968. Osteology and classification of the fishes of the family Blenniidae. *Bulletin of the United States National Museum* **248**: 1–80.

TALWAR, P. K. & T. K. SEN. 1971. On some fishes the Madras coast with description of a new species of the family Clinidae. *Records of the Zoological Survey of India* **65**(1–4): 243–251.

WILLIAMS, J. T. & J. C. HOWE. 2003. Seven new species of the triplefin genus *Helcogramma* (Tripterygiidae) from the Indo–Pacific. *aqua, Journal of Ichthyology and Aquatic Biology* **7**(4):151–176.

WILLIAMS, J. T. & C. J. MCCORMICK. 1990. Two new species of the triplefin fish genus *Helcogramma* (Tripterygiidae) from the Western Pacific Ocean. *Copeia* **1990**(4): 1020–1030.

PLATE 1

Helcogramma alkamr, ROM 73734, male (above), 27.5 mm SL, holotype, Mayotte, Comoro Islands (R. Winterbottom); female (below), 16 mm SL, Mahé, Seychelles (P. C. Heemstra).

Helcogramma fuscopinna, male (above), Anjouan, Comoro Islands (R. Winterbottom); female (below), 30.0 mm SL, Rodrigues (P. C. Heemstra).

Helcogramma ellioti, BPBM 27684, female (above), 30 mm SL; male (below), 33 mm SL, Kovalam, India (J. E. Randall).

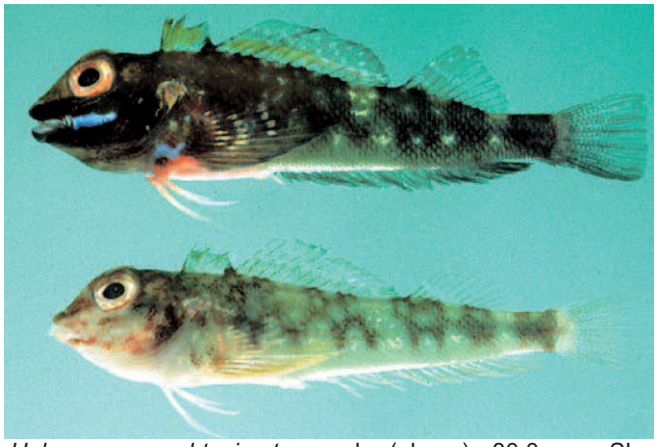
Helcogramma maldivensis, paratype, BPBM 32976, male, 27.6 mm SL, North Male Atoll, Maldive Islands (J. E. Randall).

Helcogramma maldivensis, ~ 30 mm TL, Maldive Islands (J. E. Randall).

Helcogramma ememes, BPBM 29290, male (above), 23 mm SL; female (below), 24 mm SL, Aride, Seychelles (J. E. Randall).

Helcogramma microstigma, ROM 73410, male, 31.3 mm SL, Comore Islands (R. Winterbottom).

PLATE 2

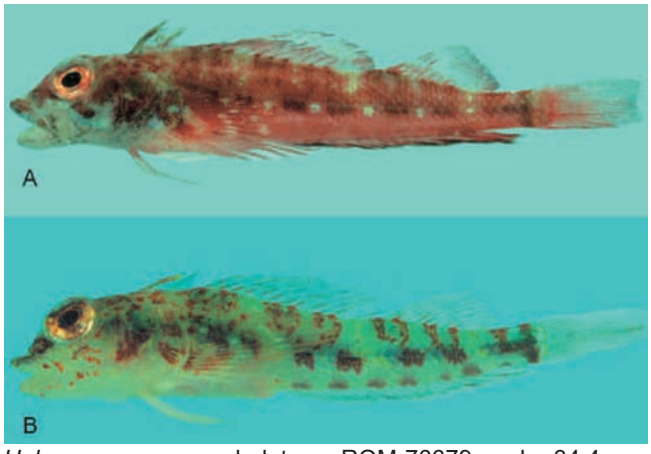


Helcogramma obtusirostre, male (above), 30.0 mm SL; female (below), 28.0 mm SL, Oman (J. E. Randall)

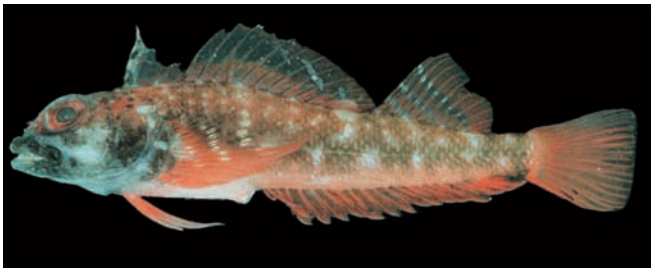
Helcogramma obtusirostre, male, Sharm el Sheik, Egypt (S. Bogordski).

Helcogramma obtusirostre, female, Sharm el Sheik, Egypt (S. Bogorodski).

Helcogramma rharhabe, male (above), 34 mm SL, (J. E. Randall); female (below), 31.0 mm SL, Sodwana Bay,



Helcogramma rosea, holotype, ROM 76679, male, 34.4 mm SL (above), and, paratype, ROM 76680, female, 27.6 mm SL (below),Phuket, Thailand (R. Winterbottom).



Helcogramma steinitzi, BPBM 35926, male, 33 mm SL, southern Oman, near Marbat (J. E. Randall).

Helcogramma steinitzi, female, ~45 mm TL, Masirah Island, Oman (J. E. Randall)

Helcogramma striata, WIO, locality unknown (D. Grey)

Helcogramma striata, Ogasarawa Islands, Japan (Yukihiko Otsuka)