

Seven new species of the triplefin fish genus *Helcogramma* (Tripterygiidae) from the Indo-Pacific

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Abstract

Eleven species, including seven new species, are recognized in the *Helcogramma fuscopinna* species complex, a monophyletic group within the genus *Helcogramma* (herein determined to be feminine in gender). A pale-bodied subgroup includes *H. aquila* (Batan Islands), *H. nigra* n. sp. (Papua New Guinea, Solomon Islands, Vanuatu, and Rotuma Island), and *H. cerasina* n. sp. (Tonga Islands and Vatoa Island, Fiji). The other members of the complex include *H. nesion* n. sp. (Ogasawara and Izu Islands and southern Shikoku Island, Japan), *H. inclinata* (*H. habena* is a junior synonym; Batan Islands, Pratas Reef, Taiwan, and Ryukyu Islands), *H. fuscopinna* (western Indian Ocean), *H. desa* n. sp. (Cuyo Islands, Philippines and Vietnam), *H. albimacula* n. sp. (western Luzon to Apo Island, Philippines), *H. lacuna* n. sp. (western Thailand), *H. vulcana* (Indonesia), and *H. randalli* n. sp. (Komodo Island and Bali, Indonesia). With the description of these seven new ones, there are now 30 species recognized in the genus *Helcogramma*.

Zusammenfassung

Elf Arten, darunter sieben neue, werden als dem *Helcogramma fuscopinna* Komplex zugehörig anerkannt. Hierbei handelt es sich um eine monophyletische Gruppe innerhalb der Gattung *Helcogramma* (darin als weibliches Geschlecht bestimmt). Eine blass gefärbte Untergruppe schließt die folgenden Arten ein: *H. aquila* (Batan Inseln), *H. nigra* n. sp. (Papua-Neuguinea, Salomon Inseln, Vanuatu und Rotuma-Insel), und *H. cerasina* n. sp. (Tonga Inseln und Vatoa Insel, Fidschi). Die anderen Mitglieder dieses Komplexes sind: *H. nesion* n. sp. (Ogasawara und Izu Inseln, sowie südliche Shikoku Insel, Japan), *H. inclinata* (*H. habena* ist hier ein jün-

geres Synonym; Batan Insel, Pratas Riff, Taiwan und Ryukyu Inseln), *H. fuscopinna* (westlicher Indischer Ozean), *H. desa* n. sp. (Cuyo Inseln, Philippinen), *H. lacuna* n. sp. (westliches Thailand), *H. vulcana* (Indonesien) und *H. randalli* n. sp. (Komodo Insel und Bali; Indonesien). Mit der Beschreibung dieser sieben neuen Arten werden nunmehr 30 Arten in der Gattung *Helcogramma* anerkannt.

Résumé

Onze espèces, comprenant sept espèces nouvelles, sont regroupées dans le complexe d'espèces *Helcogramma fuscopinna*, un groupe monophylétique dans le genre *Helcogramma* (mot de genre féminin comme précisé ici). Un sous-groupe au corps pâle comprend *H. aquila* (îles Batan), *H. nigra* n. sp. (Papouasie Nouvelle-Guinée, îles Salomon, Vanuatu et île Rotuma) et *H. cerasina* n. sp. (îles Tonga et île Vasta, Fidji). Les autres membres du complexe comprennent *H. nesion* n. sp. (îles Ogasawara et Izu et sud de l'île Shikoku, Japon), *H. inclinata* (*H. habena* est un synonyme plus récent; îles Batan, récif de Patras, Taiwan, et îles Ryukyu), *H. fuscopinna* (ouest de l'Océan indien), *H. desa* n. sp. (îles Cuyo, Philippines et Vietnam), *H. albimacula* n. sp. (de l'ouest de Luzon jusqu'à l'île Apo, Philippines), *H. lacuna* n. sp. (ouest de la Thaïlande), *H. vulcana* (Indonésie) et *H. randalli* n. sp. (île Komodo et Bali, Indonésie). Avec la description de ces 7 nouveaux venus, il y a à présent 30 espèces reconnues dans le genre *Helcogramma*.

Sommario

Nel complesso monofiletico *Helcogramma fuscopinna* del genere *Helcogramma* (qui riconosciuto come di genere femminile) si identificano undici specie, di cui sette nuove. Il gruppo cosiddetto dalla livrea chiara include *H. aquila* (Isole Batan), *H. nigra* n. sp. (Papua Nuova Guinea, Isole Solomone, Vanuatu e Rotuma) e *H. cerasina* n. sp. (Isole Tonga, Vatoa e Fiji). Gli altri membri del complesso includono

H. nesion n. sp. (Isole Ogasawara e Izu e Isola Shikoku meridionale, Giappone), *H. inclinata* (*H. habena* è un sinonimo; Isole Batan, Pratas Reef, Taiwan, e Isole Ryukyu), *H. fuscopinna* (Oceano Indiano occidentale), *H. desa* n. sp. (Isole Cuyo, Filippine e Vietnam), *H. albi-macula* n. sp. (dalla costa occidentale dell'Isola di Luzon fino all'Isola Apò, Filippine), *H. lacuna* n. sp. (Tailandia occidentale), *H. vulcana* (Indonesia), e *H. randalli* n. sp. (Isole di Komodo e Bali, Indonesia). Con la descrizione di queste sette nuove specie, il genere *Helcogramma* contiene ora in tutto 30 specie.

Introduction

The triplefin fishes of the genus *Helcogramma* McCulloch and Waite, 1918, occur in high-energy littoral areas on shallow rock and coral reefs throughout the Indo-Pacific and in the south Atlantic at Ascension and St. Helena Islands. These are cryptic fishes, seldom seen by divers, but the breeding males of most species exhibit brilliant colours in contrast to the drab female pigmentation.

In a revision of the genus *Helcogramma*, Hansen (1986) recognized 12 species, including four new species, and provided a key to their identification. Six additional species of *Helcogramma* have been described since Hansen's revision (Williams and McCormick, 1990, Fricke and Randall, 1992, Randall and Clarke, 1993, Fricke, 1994, 1997). Fricke (1994), in reviewing the Tripterygiidae of the south-west Pacific, recognized *Helcogramma gymnauchen* (Weber, 1909) as a valid species, distinct from *Helcogramma hudsoni* (Jordan and Seale, 1906). Fricke (1997) recognized 23 nominal species as valid in the genus *Helcogramma* and discussed seven undescribed species based on our data, which we made available to Fricke for use in his book (at the time of Fricke's study, an earlier version of the Williams and Howe paper was in press, in a journal that ceased to be published before our paper appeared in print). Fricke (1997) used our scientific names as the common names for the undescribed species to minimize confusion in the future. Six of the undescribed species mentioned by Fricke and an additional new species discovered since 1997, all belonging to the *Helcogramma fuscopinna* species complex, are described herein. The "safra" triplefin will be described separately.

Recent collections of fishes taken from a number of different areas in the western Pacific and on the western coast of Thailand contain representatives of seven undescribed species in the *Helcogramma fuscopinna* species complex. Holleman (1982) described *H. fuscopinna* as occurring from South Africa to Taiwan and extended the range to Japan based on specimens not listed in his material examined. Williams and McCormick (1990) restricted the geographic range of the true *H. fuscopinna* to the western Indian Ocean, described *H. aquila* and *H. habena* from the

northern Philippines, the Taiwan region and the Ryukyu Islands, and discussed five additional undescribed species in the complex. Fricke (1997) determined that the holotype of *Enneapterygius inclinatus* Fowler, 1946, is a senior synonym to *H. habena*. Randall and Clark (1993) described one of the undescribed species, an Indonesian member of the *H. fuscopinna* species complex, as *H. vulcana*. As a result of our examination of recently collected specimens and of previously unidentified specimens from museum collections around the world, we recognize a total of 11 species in the *Helcogramma fuscopinna* complex.

Monophyly for the 11 species comprising the *H. fuscopinna* species complex is supported by the presence of a stripe of micromelanophores on a pale background (neon blue in life) angling posterodorsally from the jaw symphyses, beneath the eye, and onto the opercle. Adult males of all species of the complex uniquely share this stripe. In this paper we describe seven new species of *Helcogramma* and compare them with the four previously described species in the complex. There are now 31 named species of *Helcogramma* recognized as valid.

There has been confusion about the gender of the generic name *Helcogramma*. Hansen (1986: 343) stated that the gender of *Helcogramma* was feminine. Fricke (1997: Appendix 1) treated *Helcogramma* as having neuter gender. The neuter gender is based on the assumption that the name was originally derived from the Greek neuter noun *gramma*, meaning written letter. Although McCulloch and Waite (1918) did not provide an etymology for the generic name *Helcogramma*, they distinguished their new genus from *Tripterygion* on the basis of the lateral line running downward from the shoulder and lacking the secondary series of incised scales posteriorly. Thus the generic name is derived from a combination of the Greek *helco*, meaning wounded, in reference to the lack of the posterior lateral line scales, and the feminine Greek noun *gramme*, meaning line, which is latinized to the feminine *gramma*, referring to the distinctive lateral line. Therefore the name *Helcogramma* is feminine and all adjectival species epithets combined with it must have feminine endings to agree in gender.

Methods

Institutional codes follow Leviton *et al.* (1985): AMS – Australian Museum, Sydney; BPBM – Bernice P. Bishop Museum; CAS – California Academy of Sciences; USNM – National Museum of Natural Sciences, Smithsonian Institution. Counts and measurements generally follow Hansen (1986). Counts of vertebrae and associated elements and median fin rays were taken from radiographs. The first caudal vertebral centrum is the centrum with a haemal spine, which frequently has a well-developed fork ventrally, positioned immediately anterior to or in contact with the first anal fin pterygiophore (rarely a weakly-devel-

oped haemal spine may occur on the centrum anterior to this one, but it is not associated with the first anal fin pterygiophore).

Lateral body scales are often missing, requiring careful examination of specimens to detect scale pockets. All specimens have a naked area laterally along the base of the first 1-3 dorsal fin spines. Nape scales, when present, are small, embedded and are either arranged in one or two rows across the midline of the nape, or are positioned just ventrolateral to the base of the first dorsal fin spine in a small, isolated patch consisting of 1-4 scales separated by a naked area from the remaining body scales posteriorly. Partial drying of the skin in advance of the base of the first dorsal fin spine facilitates detection of the scales or scale pockets.

Although the number of cephalic sensory pores increases with increasing body size (Hansen, 1986:318), the pores of the mandibular series are relatively constant in number, particularly the symphyseal pores, and are listed as a formula following Williams and McCormick (1990): right dentary + symphyseal + left dentary.

Pectoral fin ray counts are presented as a formula starting with the most dorsal ray: unbranched rays + branched rays + unbranched rays = total rays (the one or two most dorsal rays are usually unbranched).

Elements of the three dorsal fins are presented as a formula: number of spines in first fin, number of spines in second fin + number of pterygiophores without spines or rays, number of segmented rays in third fin. The number of pterygiophores without a spine is determined by examination of radiographs. In most blennioids, the last dorsal fin spine shares a pterygiophore with the first segmented ray. The Tripterygiidae are unique among blennioids in having lost the last dorsal spine (Holleman, 1982), resulting in a pterygiophore bearing only the first segmented ray. The count of the number of pterygiophores without a spine does not include the pterygiophore bearing the first segmented dorsal fin ray.

Key to species in the *Helcogramma fuscopinna* species complex

The following key should be used in conjunction with the key to the species in the genus *Helcogramma* provided by Hansen (1986: 328). Specimens of the eleven species of the *Helcogramma fuscopinna* species complex will key to Hansen's couplet 7a based on the absence of a flap-like extension on tip of upper lip and the presence of a small (sometimes minute) orbital cirrus on each eye. Hansen's couplet 7a should be changed to:

"7a. Males and most females greater than 22.0 mm SL with a stripe of tiny chromatophores (iridescent blue in life) across upper lip and over opercle surrounded by larger, darker pigment spots; mandibular pore series 4-11 + 1-10 + 4-12 ..."

Specimens with these characteristics may be identified to species in the following key.

- 1a. Symphyseal mandibular pores 3-10..... 2
- 1b. Symphyseal mandibular pores 1-24
- 2a. Second dorsal fin with XV spines; one or two rows of scales cross nape anterior to base of first dorsal fin spine
.....*Helcogramma inclinata*
- 2b. Second dorsal fin with XIII or XIV spines; nape naked anterior to base of first dorsal fin spine....
.....3
- 3a. Second dorsal fin with XIII spines; third dorsal fin with 11 segmented rays
.....*Helcogramma aquila*
- 3b. Second dorsal fin with XIV spines; third dorsal fin with 10 segmented rays
.....*Helcogramma lacuna* n. sp.
- 4a. Nape scales present on dorsal midline anterior to base of first dorsal fin spine (sometimes embedded and difficult to discern)5
- 4b. Nape naked anterior to base of first dorsal fin spine7
- 5a. Symphyseal mandibular sensory pore position with one pore, mandibular pore formula usually 4+1+4*Helcogramma randalli* n. sp.
- 5b. Symphyseal mandibular sensory pore position with two pores, mandibular pore formula 4 or 5+2+4 or 56
- 6a. Pale (red in life), oblong blotch over basal portion of most ventral pectoral fin rays; mandibular pores usually 4+2+4.....
.....*Helcogramma albimacula* n. sp.
- 6b. No pale blotch over most ventral pectoral fin rays; mandibular pores usually 5+2+5.....
.....*Helcogramma desa* n. sp.
- 7a. Second dorsal fin with XIII spines; caudal vertebrae 26*Helcogramma nigra* n. sp.
- 7b. Second dorsal fin with XIV or XV spines; caudal vertebrae 27-298
- 8a. Second dorsal fin with XV spines; pale (red in life), oblong blotch over basal portion of most ventral pectoral fin rays ..*Helcogramma vulcana*
- 8b. Second dorsal fin with XIV spines; no pale blotch over basal portion of most ventral pectoral fin rays9
- 9a. Small isolated patch of scales present on either side of nape, each patch bordered posteriorly by naked area; precaudal vertebrae 10.....
.....*Helcogramma nesion* n. sp.
- 9b. No isolated patch of scales present on either side of nape, scales beneath naked nape forming continuous rows to caudal base; precaudal vertebrae 1110
- 10a. Segmented anal fin rays 21; last ribs on vertebral centrum 10.....*Helcogramma fuscopinna*
- 10b. Segmented anal fin rays 20; last ribs on vertebral centrum 12 ...*Helcogramma cerasina* n. sp.

***Helcogramma albimacula* n. sp.**

(Figs. 1, 2)

Helcogramma fuscipinna Holleman, 1982: 115 (in part).

Helcogramma sp. 4 Williams and McCormick, 1990: 1029.

Helcogramma sp. 1 Fricke, 1997: 383.

Holotype: USNM 273934 (male, 34.9 mm SL), Philippine Islands, Apo Island, opposite west end of Chanos Pond, 9° 4' 30" N, 123° 16' 24" E, depth 0-2.5 m, collected by L. Knapp and collaborators, 18 May 1979, collected with rotenone, field number: LK 79-20.

Paratypes: AMS I.35024-001 (2: 26.9, 30.4), BPBM 36434 (2: 31.2, 33.5), CAS 81761 (2: 30.9, 25.4), and USNM 315775 (42: 25.5-37.8), all collected with holotype.

Nontype specimens: USNM 222316 (7), Philippine Islands, Apo Island, west side about 1/3 km north of south end, 9° 4' 25" N, 123° 16' 5" E, depth 0-6 m, collected by V. G. Springer and collaborators, 6 June 1978, collected with rotenone, field number: SP-78-34. USNM 222344 (5), Philippine Islands, Apo Island, southern tip, 9° 4' 15" N, 123° 16' 20" E, depth 0-6 m, collected by V. G. Springer and collaborators, 7 June 1978, collected with rotenone, field number: SP-78-35. USNM 227806 (2), Philippine Islands, Sombbrero Island, Batangas (south-east corner), 13° 42' N, 120°

49' E, collected by C. J. Ferraris, 30-31 January 1980. USNM 227809 (3), Philippine Islands, Sombbrero Island, Batangas (east side of large boulder), 13° 42' N, 120° 49' E, depth 0 - 5 m, C. J. Ferraris, 23 April 1980. USNM 227810 (5), Philippine Islands, Sombbrero Island, Batangas (south-east corner), 13° 42' N, 120° 49' E, collected by C. J. Ferraris, 30 January 1980. USNM 227811 (6), Philippine Islands, Sombbrero Island, Batangas (north-east corner, pred. boulder), 13° 42' N, 120° 49' E, depth 0 - 2 m, collected by C. J. Ferraris, 23 April 1980. USNM 230387 (18), Philippine Islands, Caban Island, Batangas, rocky shoreline, 13° 42' N, 120° 50' E, depth 0 - 1 m, collected by C. J. Ferraris, 25 April 1980. USNM 230389 (19), Philippine Islands, Caban Island, Batangas, rocky shoreline, 13° 42' N, 120° 50' E, 0 - 1 m, C. J. Ferraris, 25 April 1980. USNM 230390 (17), Philippine Islands, Sombbrero Island, Batangas (north-east corner), 13° 42' N, 120° 49' E, depth 0 - 2 m, collected by C. J. Ferraris, 23 April 1980. USNM 230392 (15), Philippine Islands, Sombbrero Island, Batangas (north-east corner), 13° 42' N, 120° 49' E, depth 0 - 2 m, collected by C. J. Ferraris, 23 April 1980. USNM: 230393 (1), Philippine Islands, Sombbrero Island, Batangas (east side of large boulder), 13° 42' N, 120° 49' E, 0 - 5 m, C. J. Ferraris, 23 April 1980. USNM 343042 (73), Philippine Islands, Guimaras Island, Pulang Duta, Sinabsapan, small cove lined with lava rock and rocky boulders, 10° 34' 45" N, 122° 30' 30" E, depth 0 - 4 m,

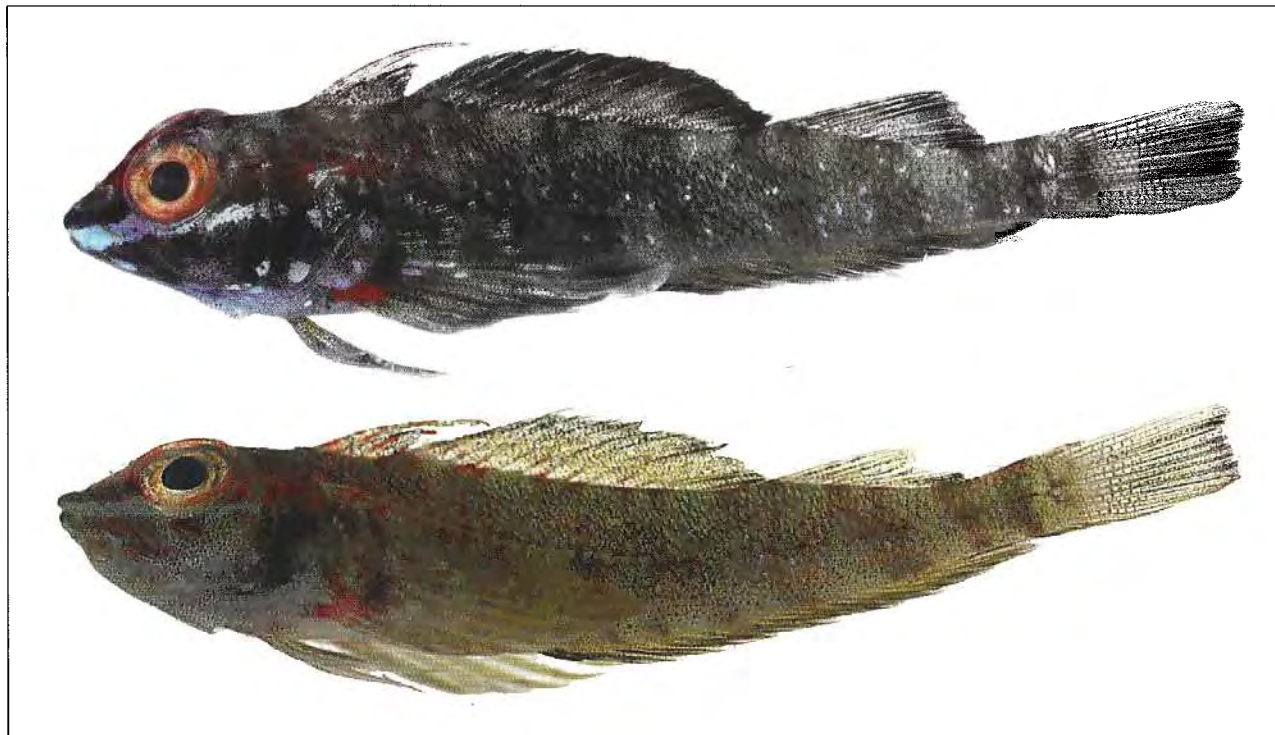


Fig. 1. *Helcogramma albimacula*. Top: USNM 343042, 34.4 mm SL male, Guimaras Island, Philippines. Bottom: USNM uncat., 25.9 mm SL male, Maestre de Campo Island, Philippines. Photos by J. T. Williams.



Fig. 2. *Helcogramma albimaculata*, underwater photograph taken off Luzon, Philippines. Photo by E. O. Murdy.

collected by J.T. Williams and collaborators, 24 September 1995, collected with rotenone. USNM 343043 (11), Philippine Islands, Guimaras Island, Aro Beach, cove just south of town of Buyo, 10° 37' 20" N, 122° 32' 15" E, depth 0 - 3 m, J. T. Williams and collaborators, 24 September 1995, collected with rotenone. USNM uncat. (15), Philippine Islands, Maestre de Campo Island, off east coast of Mindoro Island, rocky shore at Mahaba Point, 12° 55.93' N, 121° 41.01' E, depth 0 - 4 m, collected by J. T. Williams and collaborators, 28 May 2000, collected with rotenone.

Diagnosis

A species of *Helcogramma* (*sensu* Hansen, 1986) with 2 symphyseal mandibular sensory pores, second dorsal fin spines usually XIV (two of 80 specimens with XIII and 11 with XV), third dorsal fin segmented rays 10 -11, last ribs on vertebral centrum 10, vertebrae modally 10+27=37, pored lateral line scales modally 19 or 20, nape scales present, males with dusky anal fin, both sexes with distinctive pale (red in life), oblong streak over lowest pectoral fin ray bases, adult males with first dorsal fin spine elongate, reaching base of fourth to sixth spine of second dorsal fin when depressed.

Description

Dorsal fin rays III,XIV+1,10 or 11 (two of 80 specimens with XIII and 11 with XV; one specimen with 2 free pterygiophores and 12 with none); anal fin rays I,20-21 (two with 22); pectoral fin rays 1 or 2 + 6 to 8 + 7 or 8 = 15 to 17 (usually 1+8+7=16 or 2+7+7=16); pelvic fin rays 1,2; segmented caudal fin rays 13, 9 branched; procurrent caudal fin rays 9-11 dorsally, 8-10 ventrally; vertebrae 10+27=37 (one of 74 with 9+27=36, 11 with 10+26=36, four with 10+28=38, one with 11+27=38); last ribs on vertebral centrum 10 (four of 73 on centrum 11); last epineural(s) on vertebral centrum 11-12 (one of 78 with epineurals on centrum 11, two with epineurals on centrum 12); pored lateral

line scales 17-26 (modally 19 or 20); orbital cirri present (usually minute); sensory pores in the mandibular series typically 4+2+4=10 (value range: 4 to 6 + 1 or 2 + 4 or 5 = 9 to 13); nape crossed with one or two rows of scales (only scale pockets remain on some); body scales ctenoid, scales below lateral line and immediately posterior to pectoral fin base about twice as large as those on remainder of body; head, pectoral fin base, belly, and first dorsal fin base naked; adult males with first dorsal fin spine elongate, when depressed reaching base of fourth to sixth spine of second dorsal fin. The largest specimens examined are 42.2 mm SL for males and 36.1 mm SL for females (see Table I).

Colour when live: (based on photographs of fresh specimens collected by the senior author at Guimaras and Maestre de Campo Islands, Philippines, and underwater photographs taken by E.O. Murdy at Batangas Province, Philippines; Figs. 1-2): males with top of head and anterior portion of body red, stripe beneath eye and spots on pectoral fin base iridescent blue; iris red with narrow yellow ring encircling pupil; pectoral fin with brilliant red splotch covering bases and proximal portion of four or five most ventral rays, iridescent yellow chromatophores scattered along middle portion of rays, remainder of fin heavily pigmented with melanophores; alternating red and white spots extend length of first dorsal fin spine, remainder of fin reddish or dusky; second dorsal fin dusky with distal half yellowish, other vertical fins dusky or black; pelvic fin heavily pigmented with melanophores with yellowish tint basally; posterior portion of body brown with about seven broad, irregular, dark bars on body from base of first dorsal fin to base of caudal fin, body with tiny iridescent yellow chromatophores scattered over nape, iridescent blue and green chromatophores scattered along body.

Females with head mottled with brown, white and iridescent yellow colour; streak below eye and spots on head and pectoral fin base iridescent blue; pectoral fin

Table I. Counts for selected characters for species of the *Helcogramma fuscipinna* complex.

Locality	2nd Dorsal-fin spines				Blank pterygiophores		3rd Dorsal-fin rays				Anal-fin segmented rays				Ribs				Epineurals							Precaudal vertebrae			Caudal							
	XIII	XIV	XV	XVI	0	1	2	9	10	11	12	19	20	21	22	23	9	10	11	12	11	12	13	14	15	16	17	18	19	20	21	9	10	11	25	26
<i>H. neston</i>																																				
Japan, Izu Islands	-	12	2	-	1	13	-	-	-	13	1	1	12	1	-	-	14	-	-	-	-	5	2	5	1	-	-	-	-	-	-	-	13	-	-	-
Ogasawara Islands	-	7	1	-	1	7	-	-	-	8	-	-	7	1	-	-	8	-	-	-	-	-	7	1	-	-	-	-	-	-	-	-	8	-	-	-
<i>H. inclinata</i>																																				
Taiwan	-	5	39	2	5	39	2	4	22	17	-	-	22	21	-	-	43	-	-	-	-	15	20	7	1	-	-	-	-	-	-	-	43	-	-	-
Batan Island	-	8	34	1	1	28	3	-	32	10	-	2	36	4	-	-	42	-	-	-	-	10	21	8	3	-	-	-	-	-	-	-	43	-	-	1
Apo Island	-	-	1	-	-	1	-	-	1	-	-	-	1	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-	
<i>H. fuscipinna</i>																																				
Seychelles	-	14	-	-	-	14	-	1	2	11	-	1	13	-	-	-	14	-	-	-	-	-	8	4	-	-	-	-	-	-	-	-	14	-	-	13
South Africa	-	2	-	-	-	2	-	-	1	1	-	-	2	-	-	-	2	-	-	-	-	-	1	1	-	-	-	-	-	-	-	2	-	-	1	
<i>H. albimacula</i>																																				
Apo Island	1	28	3	-	4	27	1	-	11	21	-	16	10	-	-	-	26	-	-	-	1	18	11	2	-	-	-	-	-	-	-	26	-	-	1	22
Batangas Prov.	1	39	8	-	8	40	-	-	31	17	-	28	18	2	-	-	43	4	-	-	1	11	23	10	-	-	-	-	-	-	-	46	1	-	10	37
<i>H. desa</i>																																				
Cuyo Islands	-	25	3	-	1	27	-	-	13	15	-	10	18	-	-	-	21	6	-	-	-	1	8	18	1	-	-	-	-	-	-	28	-	-	8	
Nhatrang, Vietnam (females)	-	2	-	-	-	2	-	-	2	-	-	-	2	-	-	-	2	-	-	-	-	2	-	-	-	-	-	-	-	-	-	2	-	-	1	
Ilot du Sud, Vietnam (males)	-	7	-	-	-	6	1	-	2	4	1	-	7	-	-	-	1	6	-	-	1	5	1	-	-	-	-	-	-	-	-	7	-	-	-	
<i>H. lacuna</i>																																				
Thailand, Similan Is.	1	4	-	-	-	4	1	-	4	1	-	5	-	-	-	-	5	-	-	-	-	3	2	-	-	-	-	-	-	-	-	5	-	5	-	
<i>H. vulcanica</i>																																				
Indonesia	-	6	31	1	-	8	-	-	4	33	1	-	10	27	1	-	6	-	-	-	-	5	3	-	-	-	-	-	-	-	-	12	-	-	-	
<i>H. nigra</i>																																				
New Guinea	12	2	-	-	2	11	1	-	6	7	1	9	3	1	-	-	13	-	-	-	1	7	4	1	-	-	-	-	-	-	-	13	2	10	1	
Rotuma	12	-	-	-	1	11	-	-	10	2	-	3	9	-	-	-	12	-	-	-	-	1	4	5	1	-	-	-	-	-	-	12	-	9	3	
<i>H. cerasinca</i>																																				
Vatua	-	-	2	-	1	1	-	-	2	-	-	-	1	-	1	-	-	2	-	-	-	2	-	-	-	-	-	-	-	-	-	2	-	-	1	
Tonga	-	46	4	-	4	42	4	-	4	46	-	1	47	1	-	-	2	45	-	-	-	3	16	25	3	1	1	1	1	-	-	50	-	2	47	
<i>H. aquilina</i>																																				
Batan Is.	12	1	-	-	1	12	-	-	13	-	-	3	10	-	-	-	13	-	-	-	-	9	3	-	1	-	-	-	-	-	-	13	1	12	-	
<i>H. randalli</i>																																				
Komodo Is.	1	7	3	-	2	9	-	-	9	2	-	2	8	-	1	-	-	-	11	-	-	-	3	1	1	3	2	-	-	-	11	-	-	1		

with reddish splotch covering bases and proximal portion of three or four most ventral rays; iris blotched with red and yellow; body tan with irregular brown bars, iridescent blue spots scattered along body; pelvic fins yellowish; vertical fins tan.

Colour in alcohol: Adult males have the lower half of head, branchiostegal membranes, and area of body anterior to pelvic fin base densely covered with melanophores; head with upper half dusky, lower half black, narrow diagonal band of micromelanophores on a pale background extending from symphysis of lower jaw, across upper jaw, beneath eye, and posteriorly onto opercle; pectoral fin dusky with oval pale streak over bases of 2-5 most ventral pectoral fin rays; roughly triangular black blotch positioned centrally over pectoral fin base and out onto rays, two or three pupil-sized pale areas (micromelanophores on a pale background) within basal black blotch; body dusky with six or seven faint double bars between pectoral fin base and caudal fin; belly with scattered melanophores; all fins dark.

Adult females with two or three broad, irregular bars on head (no dorsoventrally bi-coloured pattern as seen in mature males); body dusky with broad, irreg-

ular double bars on body from pectoral fin base to caudal fin; pale streak ventrally on base of pectoral fin resembling that described for males; dorsal and anal fins dusky with faint, irregular striping.

Etymology

The specific epithet is a combination of the Latin "albus," meaning white, and "macula," meaning spot. The name refers to the pale spot on the ventral part of the pectoral fin base of preserved specimens and is treated as a noun in apposition.

Geographic distribution

Helcogramma albimacula is known only from the Philippines. It has been taken at Apo Island, Panay Island, Guimaras Island, Maestre de Campo Island, and at Caban and Sombrero Islands, Batangas Province, (Fig. 4). *Helcogramma albimacula* was not collected on the main island of Mindoro during a survey of the shorefishes of Mindoro Island (conducted in 2000 by the senior author and others) or in the Cuyo Islands to the west (where only *H. desa* was taken by V. G. Springer in 1978 during a fish survey of the Cuyo group), but is the only member of the species

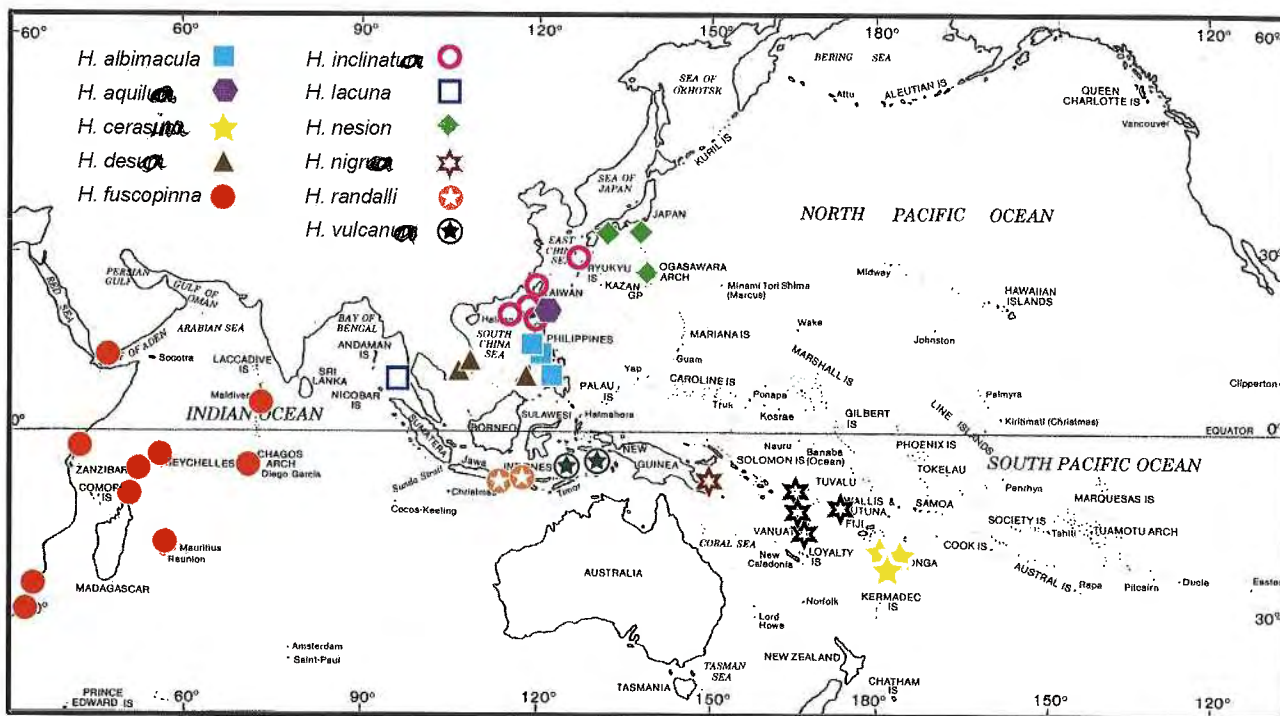


Fig. 4. Geographic distribution of the species of the *Helcogramma fuscipinna* species complex.

***Helcogramma aquila* Williams and McCormick, 1990 (Fig. 3)**

Helcogramma aquila Williams and McCormick, 1990: 1021 (Type locality: Batan Island).

Diagnosis

A species of *Helcogramma* (*sensu* Hansen, 1986) with 5-8 symphyseal mandibular sensory pores, second dorsal fin spines XIII (one specimen with XIV), last ribs on vertebral centrum 11, vertebrae 11+26=37 (one specimen with 11+25=36), 26-31 pored lateral line scales, nape without scales, and male anal fin translucent with dusky margin.

Remarks

Life colours are unknown and a complete description of the colour in alcohol is provided in Williams and McCormick (1990). The species name was derived from the Latin adjective, *aquilus*, meaning blackish. As the genus *Helcogramma* has a feminine gender (based on the Greek feminine noun *gramme*), the adjectival specific epithet was changed to *H. aquila* to agree in gender with the generic epithet. *Helcogramma aquila* is endemic to the Batanes Islands, northern Philippines (Fig. 4).

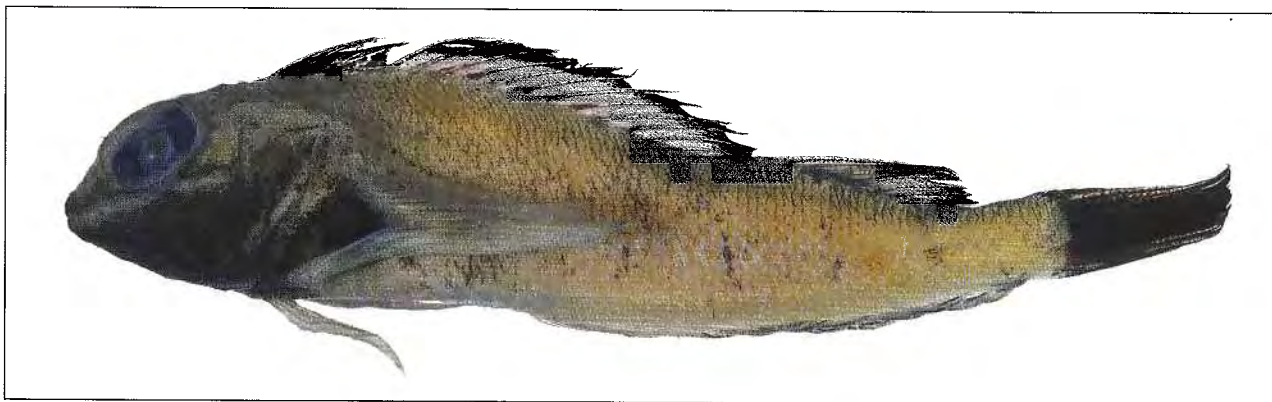


Fig. 3. *Helcogramma aquila*, preserved male holotype, 39.7 mm SL, Batan Island, Philippines, USNM 298405. Photo by J. T. Williams.

***Helcogramma cerasina* n. sp.**

(Fig. 5, 6)

Helcogramma sp. 3 Williams and McCormick, 1990: 1026.

Helcogramma sp. 2 Fricke, 1997: 389.

Holotype: USNM 329714, male (41.7 mm SL), Tonga Islands, Eua, fringing reef at base of cliff on north-west shore, spur and groove right in the surge zone, 21° 18' 15" S, 174° 26' 20" W, 0-10.5 m (0-35 ft.), collected by J. T. Williams *et al.*, 3 Nov. 1993, collected with rotenone, field number: JTW 93-18.

Paratypes: USNM 287093, female, 34.5 mm SL, Fiji Islands, Vatoa Island, a sand-lined depression with caves and crevices, close to surf break, 19° 48' S, 178° 15' W, 4.5 m (15 ft)-9 m (30 ft), collected by A. D. Lewis, 14 June 1986, collected with rotenone, field number: VGS 86-A. USNM 262029, female, 26.6 mm SL, Fiji Islands, Vatoa Island, lee side, 19° 49' 30" S, 178° 15' W, depth 11-12 m, collected by A. D. Lewis and collaborators, collected with rotenone. USNM 329713 (117, 10.2-43.0 mm SL), collected with holotype.

Diagnosis

A species of *Helcogramma* (*sensu* Hansen, 1986)

with 1-2 symphyseal mandibular sensory pores, second dorsal fin spines XIV-XV (typically XIV), last ribs modally on vertebral centrum 12, vertebrae modally 11+27=38, 23-29 pored lateral line scales, nape without scales, and males with anal fin red in life becoming translucent in preservative.

Description

Dorsal fin rays III, XIV to XV + 0 to 2, 10 to 11 (six of 52 specimens with XV); anal fin rays I, 19-22; pectoral fin rays 1+8+7 = 16 (one of 52 with 1+7+8=16); pelvic fin rays I, 2; caudal fin rays 13, 9 branched; procurrent caudal fin rays 9-11 dorsally, 9-11 ventrally; vertebrae 11+26 to 28=37 to 39 (two specimens each with 11+26=37 and 11+28=39); last ribs modally on vertebral centrum 12 (two with last ribs on 11th); last epineural(s) on vertebral centrum 15-21 (one each with 19, 20, and 21); pored lateral line scales 23-29; orbital cirri present (may be minute); sensory pores in the mandibular series 6 to 8+1 to 2+6 to 8 = 13 to 16 (modally 6+2+6=14; two symphyseal pores, when present, often partially connected); nape naked; body scales ctenoid, scales below anterior portion of lateral line and immediately behind pectoral fin about twice as large as those on remainder of body; no scales on head, nape, pectoral fin base, belly, or first dorsal fin



Fig. 5. *Helcogramma cerasina*, male, 40.0 mm SL, Eua Island, Tonga, USNM 329713. Photo by J. T. Williams.

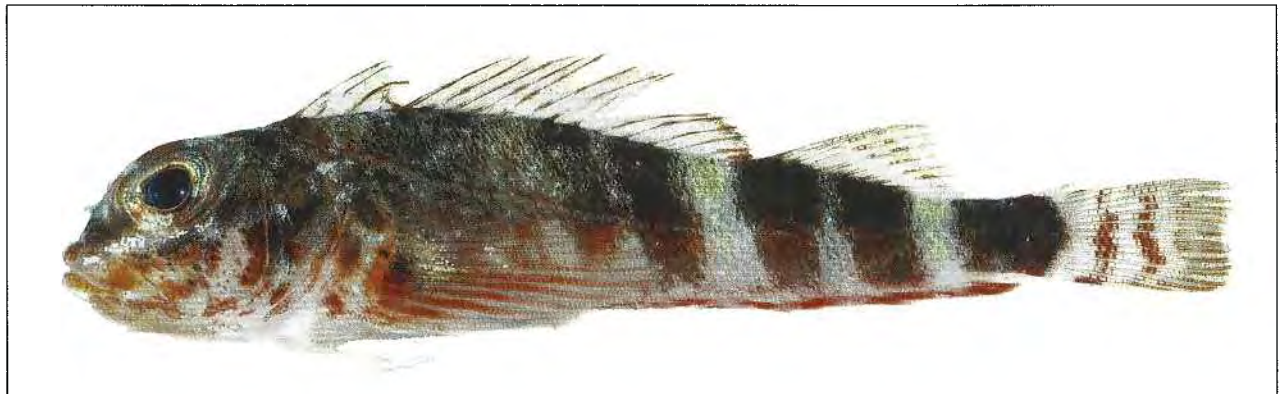


Fig. 6. *Helcogramma cerasina*, female, 34.1 mm SL, Eua Island, Tonga, USNM 329713. Photo by J. T. Williams.

base; first spine of first dorsal fin slightly longer than succeeding two. The largest specimens examined are 42.5 mm SL for males and 40.0 mm SL for females (See Table I).

Colour when live (Based on photographs of fresh specimens taken by the senior author in Tonga). Males with top of head and anterior portion of body red, stripe beneath eye and spots on pectoral base iridescent pale blue; iris red; pectoral fin with iridescent yellow streaks radiating posteriorly from posterior margin of half-moon shaped black basal spot, remainder of fin red; first dorsal fin and basal portion of second dorsal fin, red; pelvic and anal fins cherry red; posterior portion of body brown, becoming black on caudal peduncle, two pale bars, one each beneath posterior ends of second and third dorsal fins, with iridescent yellow chromatophores scattered in each bar, several iridescent yellow chromatophores scattered along dorsal half of head and body.

Females with head mottled with brown, white and iridescent yellow colour, streak below eye and spots on pectoral fin base iridescent blue; iris blotched with red and yellow; body with alternating brown and white bars, white bars profusely covered with iridescent yellow chromatophores; pelvic fins white; anal fin cherry red.

Colour in alcohol: Adult males with bi-coloured head, pale dorsally, dark ventrally, narrow diagonal band of micromelanophores on pale background extending from symphysis of lower jaw, across upper jaw, beneath eye, and posteriorly onto opercle, dark pigmentation of head extending posteriorly across pectoral fin base onto basal portion of central pectoral fin rays, where it forms half-moon shaped spot; pectoral fin base with three small, pale, vertically-aligned spots (often coalesced into slender bar); dark pigment on underside of head extending to point posterior to pelvic fin base, remainder of belly unpigmented; body pale to dusky anteriorly; posteriorly, background pale to dusky, overlaid with four narrow dark bars, first bar at centre of second dorsal fin, one at posterior end of second dorsal fin, one beneath anterior base of third dorsal fin, last beneath posterior end of third dorsal fin; pectoral fin pale except for dark spot, pectoral fin axil pale with diagonal streak of melanophores from dorsal portion of axil onto bases of 8th to 10th rays, counted from the most dorsal; first dorsal fin translucent with melanophores along fin elements, second dorsal fin pale to dusky basally with dark marginal band over about distal fourth of length of rays, caudal and third dorsal fins uniformly dark, anal fin translucent with small, dark, distal spots irregularly scattered along margin, pelvic fins translucent; black caudal fin sharply contrasting with pale body.

Preserved females and young males with melanophores irregularly scattered over head with faint, broken line of micromelanophores in stripe running beneath eye; body dusky with about four narrow dark bars, each bar extending from dorsal fin base to

anal fin base; dorsal and anal fins pale with faint swathes of small melanophores; caudal fin with roughly vertical columns of melanophores forming about three dusky bars with pale interspaces; pectoral fin pale with dark blotch over bases of median rays; pelvic fins pale.

Etymology

The specific epithet is derived from the Greek "cerasinus," meaning of cherry, and refers to the cherry-red colour of the anal fin. *Cerasina* is treated as a noun in apposition.

Geographic distribution

Helcogramma cerasina is known from the Tonga Islands, where it has been taken at Eua Island and the Vava'u group, and in the Fiji Islands at Vatoa Island (Fig. 4). It has been collected from rocky shore areas (Fig. 7) and rocky surge channels with sparse coral growth at depths down to nine metres.

Remarks

Williams and McCormick (1990) examined a single female specimen from Vatoa Island and recognized it as distinct (*Helcogramma* sp. 3) from other members of the *fuscopinna* species complex on the basis of its having the last ribs on the twelfth vertebral centrum. One additional specimen from Vatoa Island and a large series of specimens from Tonga exhibit the distinctive characters of the species and confirm Williams and McCormick's (1990) hypothesis that this form warrants recognition at the species level.

Helcogramma cerasina is distinguished from all other species in the *fuscopinna* species complex by having ribs on the twelfth vertebral centrum. All other species in the complex have the last ribs on centrum 10 or 11. The red pectoral, pelvic and anal fins easily distinguish fresh specimens from other members of the complex.

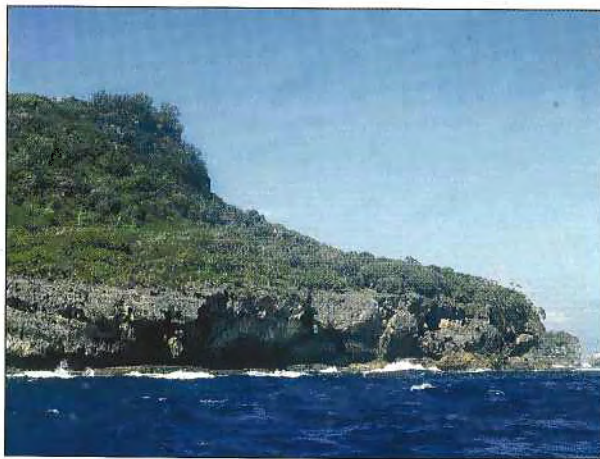


Fig. 7. Habitat at north end of Eua Island, Tonga, typical of where *Helcogramma cerasina* occurs. Photo by J. T. Williams.

***Helcogramma desa* n. sp.**

(Fig. 8, 9)

Helcogramma fuscopinna Holleman, 1982: 115 (in part).

Helcogramma sp. 3 Fricke, 1997: 391

Holotype: USNM 222317, male, 33.6 mm SL, Philippine Islands, Cuyo Islands, Cocoro Island, 10° 52' 54" N, 121° 12' 14" E, depth 0-3 m, Collected by V. G. Springer and collaborators, 26 May 1978, collected with rotenone, field number: SP-78-26.

Paratypes: AMS I.35025-001 (male, 32.7) collected with holotype. BPBM 36433 (female, 29.1), collected with holotype. USNM 222320 (18: 23.8-34.8), collected with holotype. USNM 222898 (5: 22.7-27.2), Philippine Islands, Cuyo Islands, Tagauayan Island, 10° 52' 54" N, 121° 12' 14" E, depth 0-2.4 m, collected by V. G. Springer and collaborators, 25 May 1978, collected with rotenone, field number: SP-78-25. ROM 73085 (30), Vietnam, Nha Trang Bay, Hon Mun Island, NE tip, huge boulders, caves, stones, 12° 10' 05.7" N, 108° 18' 43.7" E, depth 6-10 m, collected by R. Winterbottom and collaborators, 22 May 2002, collected with rotenone, field number: RW 02-17. ROM 73086 (40), Vietnam, Nha Trang Bay, Hon Mun

Island, E side, very large boulders, a few sand/rubble patches, 12° 10' 12.1" N, 109° 18' 27.1" E, depth 7 m, collected by R. Winterbottom, 2 May 2002, collected with rotenone, field number: RW 02-03.

Nontypes: CAS 48137 (2: 35.7, 44.6), Vietnam, Vicinity of Nha Trang, Binchang Bay (north shore), fringing coral reef with very narrow sandy trough behind it, along beach between two rocky headlands, 12° 21' 40" N, 109° 15' 38" E, depth 0-2 m, R. L. Bolin and collaborators, 24 February 1960, collected with rotenone. CAS 49736 (7: 36.9-43.5), Vietnam, South China Sea, W shore of Ilot du Sud (Cu Lao Thu), off southern tip of Poulo Cecir de Mer, 10° 29' 15" N, 108° 57' 30" E, depth 0-7 m, R.L. Bolin and collaborators, 10 March 1960, collected with rotenone. USNM 222323 (331, including 1 cleared and stained), Philippine Islands, Cuyo Islands, Putic Island, NW side, 10° 55' 05" N, 121° 02' 03" E, depth 0-4.6 m, V.G. Springer and collaborators, 22 May 1978, collected with rotenone, field number: SP-78-18. USNM 227744 (2: 31.0, 40.7), paratypes of *Helcogramma fuscopinna*, same data as USNM 222323.

Diagnosis

A species of *Helcogramma* (*sensu* Hansen, 1986) with 2 symphyisial mandibular sensory pores, second

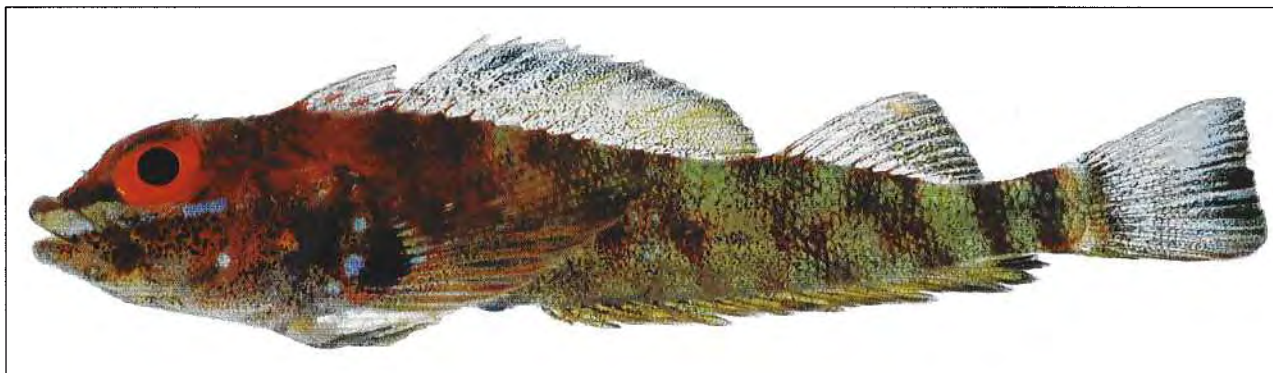


Fig. 8. *Helcogramma desa*, male, 40.0 mm SL, Nha Trang Bay, Hon Mun Island, Vietnam (ROM 73085). Photo by R. Winterbottom.

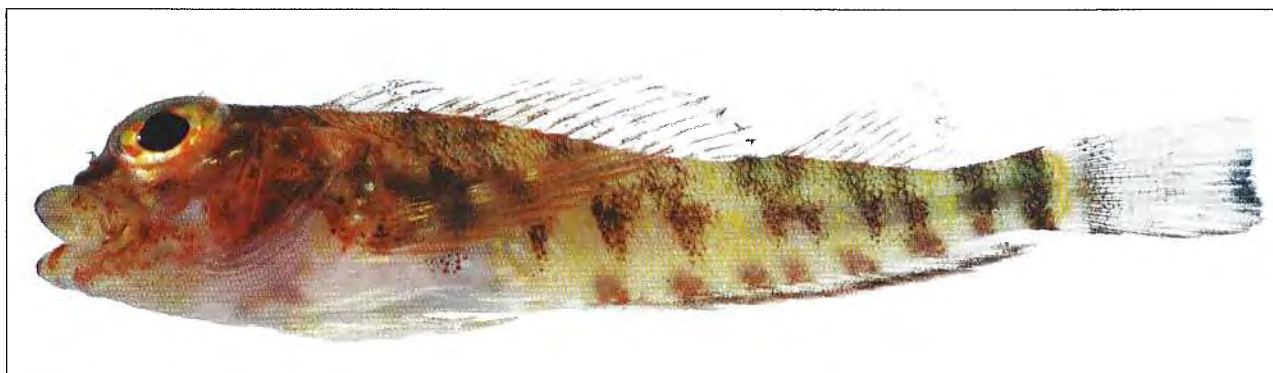


Fig. 9. *Helcogramma desa*, female, 40.0 mm SL, Nha Trang Bay, Hon Mun Island, Vietnam (ROM 73086). Photo by R. Winterbottom.

dorsal fin spines XIV (three specimens with XV), third dorsal fin segmented rays 10-11, last ribs on vertebral centrum 10-11, vertebrae modally 10+28=38, pored lateral line scales modally 22 or 23, nape scales present, males with dusky anal fin.

Description

Dorsal fin rays III, XIV+1, 10 to 11 (three of 37 specimens with XV; one specimen with 2 free pterygiophores and one with none; one with 12 segmented rays); anal fin rays I, 20-21 (ten of 37 with 20); pectoral fin rays 1+8+7=16 (one of 37 with 2+6+8=16); pelvic fin rays I, 2; caudal fin rays 13, 9 branched; procurrent caudal fin rays 9-12 dorsally, 7-10 ventrally; vertebrae 10+28=38 (nine of 37 with 10+27=37; two with 10+29=39); last ribs on vertebral centrum 10 or 11 (22 on centrum 10, fourteen on centrum 11); last epineural(s) on vertebral centrum 12-16 (one each with epineurals on centra 12 and 16); pored lateral line scales 21-26 (one each with 25 and 26); orbital cirri present (usually minute); sensory pores in the mandibular series typically 5+2+5=12 (ranging from 4 to 7+2+4 to 7 = 10 to 16; one with 3 symphyseal pores); nape crossed with one or two rows of scales (only scale pockets remain on some; no scale pockets evident on one specimen); body scales ctenoid, scales below lateral line and immediately posterior to pectoral fin base about twice as large as those on remainder of body; head, pectoral fin base, belly, and first dorsal fin base naked. The largest specimens examined are 43.5 mm SL for males and 44.6 mm SL for females (see Table I).

Colour in life: Life colours (based on photographs of fresh specimens taken by R. Winterbottom in Vietnam; Figs. 8, 9): males with top of head and anterior portion of body red, stripe beneath eye and spots on pectoral fin base iridescent blue; iris red with narrow yellow ring encircling pupil; pectoral fin with black spot covering proximal portion of central eight or nine rays, iridescent yellow chromatophores and melanophores scattered along middle portion of rays on ventral half of fin, distal portion of uppermost rays translucent; alternating red and white spots extend length of first dorsal fin spine, remainder of fin with reddish spots on rays and yellowish chromatophores on membranes; second dorsal fin with distal half dusky, yellowish wash over central portion posterior to about sixth spine, third dorsal translucent basally, distal two-thirds dusky; caudal fin dusky with black area over distal portion of central rays; anal fin dusky yellow; pelvic fin dusky; posterior portion of body with about seven broad, irregular dark bars alternating with pale interspaces from base of first dorsal fin to base of caudal fin, iridescent blue and green chromatophores scattered along body.

Females with head mottled with red, white and iridescent yellow colour; narrow streak below eye yellowish; spots on pectoral fin base iridescent blue; pec-

toral fin with alternating yellowish and brownish bars, with distal shafts red and membranes translucent; iris blotched with red and yellow; body cream coloured with irregular brown and yellow bars; pelvic fins yellowish; dorsal fins translucent with scattered red spots on ray shafts; caudal fin similar to male, anal fin with reddish brown marginal stripe.

Colour in alcohol: Adult males with head and body covered with melanophores; head only slightly bi-coloured in appearance with upper half dusky, lower half slightly darker, narrow diagonal band of micromelanophores on a pale background extending from symphysis of lower jaw, across upper jaw, beneath eye, and posteriorly onto opercle; pectoral fin dusky with half-moon shaped black blotch positioned centrally over pectoral fin base and out onto rays, two or three pupil-sized pale areas (micromelanophores on a pale background) positioned vertically on pectoral fin base; body dusky with seven or eight faint, irregular bars between pectoral fin base and caudal fin; belly with scattered melanophores; all fins dusky.

Adult females with two or three broad, irregular bars on head (no dorsoventrally bi-coloured pattern as seen in mature males); body mottled with irregular double bars on body from pectoral fin base to caudal fin; dorsal and anal fins dusky with faint, irregular striping.

Etymology

The specific epithet is derived from the Latin "*desa*," meaning neglected. The name refers to the fact that this species has been overlooked in previous studies of the group. The name is treated as a noun in apposition.

Geographic distribution

Helcogramma desa is known from the Cuyo Islands in the Philippines and from Vietnam. It is likely that the disjunct distribution of *H. desa* is a collecting artefact, and that it occurs in the intervening geographic areas. Collections from the intermediate areas are needed to confirm its presence there. *Helcogramma desa* is apparently replaced by *H. albimacula* in the Philippines to the east of the Cuyo Islands, as recent collecting at Mindoro, Panay, and Guimaras Islands contained only *H. albimacula* specimens. Specimens have been collected from exposed coasts among coralline and rocky boulders and in surge channels to a depth of about seven metres.

Remarks

Holleman (1982) examined two specimens (USNM 227744) of *Helcogramma desa* from Putic Island and designated them as paratypes of his *Helcogramma fuscopinna*. He commented (1982: 120) that these two specimens differed from the Apo Island specimens (= *H. albimacula*) by their "considerably lighter" pigmentation. Holleman chose not to recognize any of the Philippine specimens as distinct species, citing

the need for additional material. Hansen (1986: 339) also commented on the geographic variation among populations, and suggested the possibility that "further study will indicate that some of the populations merit nomenclatural recognition."

Specimens from each of the two geographically disjunct populations exhibit interpopulational variation in two characters. The Cuyo Islands specimens have modally fewer ribs (last ribs on centrum 10) and more epineurals (modally 14 or 15) than the specimens from Vietnam with modally 11 and 13, respectively. Although the two populations show modal differences for these characters, there is complete overlap in rib counts and extensive overlap for epineural counts. Apart from these characters, specimens from the two populations have the same characteristics and colour pattern and currently are not recognizable as distinct species.

The presence of scales across the nape distinguishes *H. desa* from all members of the *fuscopinna* species complex except *H. inclinata*, and *H. albimacula*. *Helcogramma desa* differs from *H. inclinata* in having 2 symphyseal mandibular pores (versus 5 or more) and fewer than 26 lateral line scales (versus 26-35). It is most readily distinguished from *H. albimacula* by the absence of a distinctive pale (red in life)

blotch on the bases of the most ventral pectoral fin rays (present in *H. albimacula*). Adult male *H. albimacula* have the first dorsal fin spine elongate (versus first spine of first dorsal fin not extending posteriorly beyond base of second or third spine of second dorsal fin of *H. desa*).

***Helcogramma fuscopinna* Holleman, 1982**
(Figs. 10, 11, 12)

Helcogramma fuscopinna Holleman, 1982: 115 (type locality: Sodwana Bay, South Africa).

Diagnosis

A species of *Helcogramma* (*sensu* Hansen, 1986) with 1 symphyseal mandibular sensory pore (one of 16 specimens examined with 2), second dorsal fin spines XIV, third dorsal fin segmented rays 11 (one with 9, three with 10), last ribs on vertebral centrum 11, vertebrae 11+27=38 (one each with 26 and 28 caudal vertebrae), pored lateral line scales modally 24 (range 23-26), nape scales absent, males with dusky anal fin.

Remarks

Helcogramma fuscopinna is endemic to the Western



Fig. 10. *Helcogramma fuscopinna*, male, 29.4 mm SL, Chagos Archipelago, ROM 38782. Photo by R. Winterbottom.

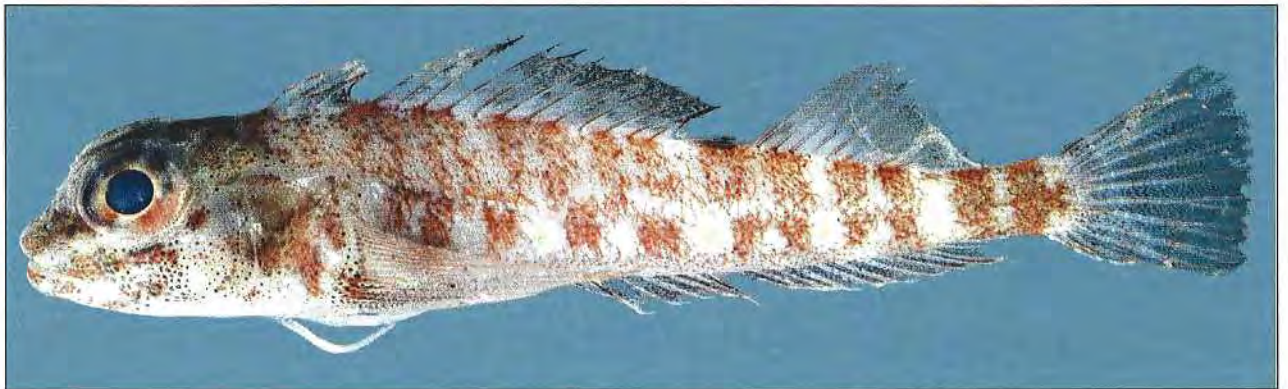


Fig. 11. *Helcogramma fuscopinna*, female, 24.5 mm SL, Chagos Archipelago, ROM 38784. Photo by R. Winterbottom.

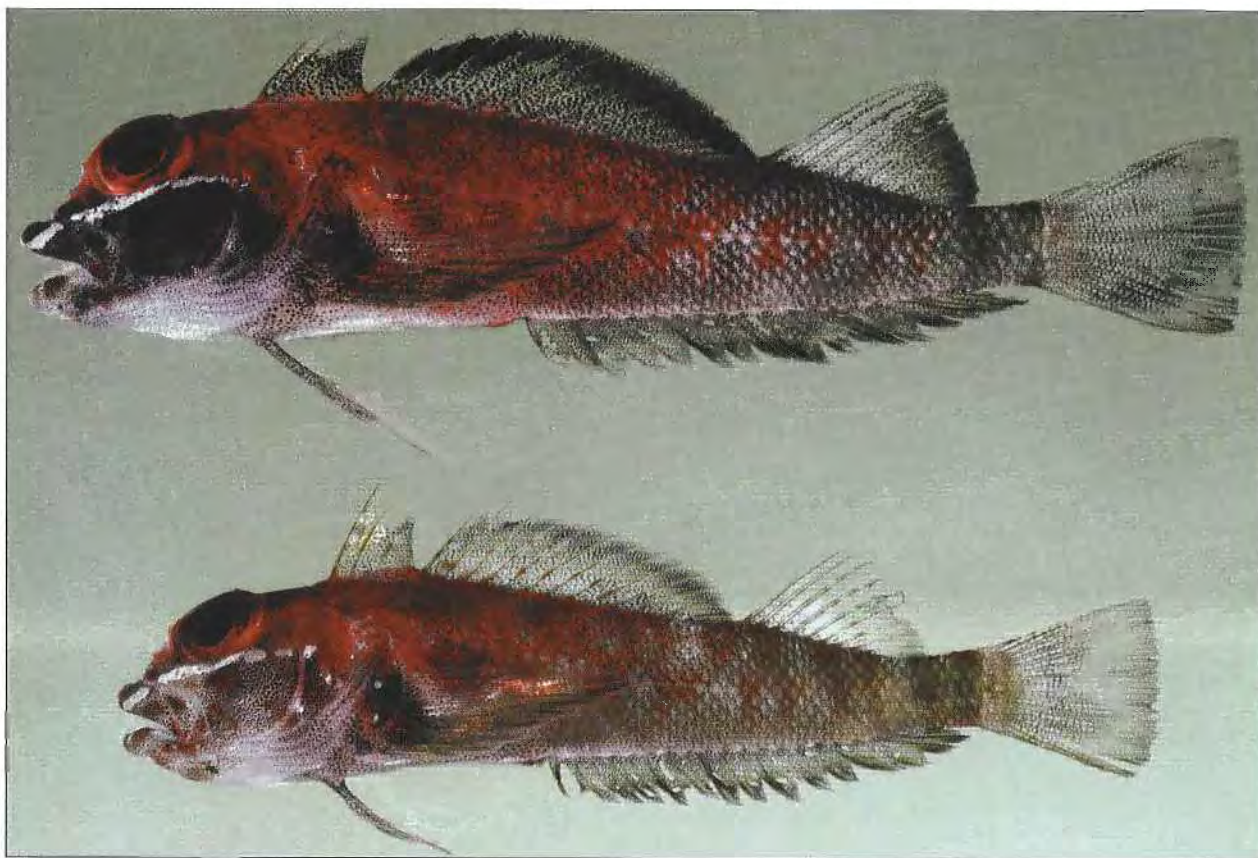


Fig. 12. *Helcogramma fuscopinna*, male (above), 41 mm SL, and female (below), 35 mm SL, both taken at Natal, South Africa. Photo by J. E. Randall.

Indian Ocean where it is known to occur from South Africa to Yemen in the west and eastward to the Maldives and Chagos Islands and Mauritius. Although Williams and McCormick (1990) restricted the distribution of *H. fuscopinna* to the western Indian Ocean, Fricke and Randall (1992) incorrectly stated that it occurred from the western Indian Ocean to Taiwan and New Guinea in the Pacific Ocean. They apparently overlooked the Williams and McCormick publication. The eastern Indian Ocean and Pacific Ocean populations referred to by Fricke and Randall (1992) represent distinct species described herein.

***Helcogramma inclinata* (Fowler, 1946)**

Enneapterygius inclinatus Fowler, 1946: 190 (Type locality: Aguni Shima, Ryu Kyu Islands).

Helcogramma fuscopinna Holleman, 1982: 115 (in part).

Helcogramma habena Williams and McCormick, 1990: 1026 (Type locality: Batan Islands, Philippines).

Diagnosis

A species of *Helcogramma* (*sensu* Hansen, 1986)

with 5-10 symphyseal mandibular sensory pores, second dorsal fin spines XV (13 of 90 specimens examined with XIV and 3 with XVI), third dorsal fin segmented rays 10-11 (four with 9), last ribs on vertebral centrum 10, vertebrae 10+28 to 29=38 to 39 (one each with 10+27=37 and 10+30=40), pored lateral line scales modally 28 (ranging from 26 to 35), nape scales present, males with dark anal fin.

Remarks

Hansen (1986) placed *Enneapterygius inclinatus* in the synonymy of *H. hudsoni*. Fricke (pers. comm.) recognizes *H. habena* as a junior synonym of *H. inclinata*. The senior author has re-examined data from the holotype of *Enneapterygius inclinatus* and concurs with Fricke. The high number of mandibular sensory pores and the XV second dorsal fin spines of the *Enneapterygius inclinatus* holotype fit the diagnosis of *H. habena*. We recognize *H. inclinata* as a senior synonym to *H. habena*. During a recent visit to the University of the Ryukyus by the senior author, numerous adult specimens from the vicinity of the type locality were examined. These specimens confirmed the identity of this population as *H. inclinata*.

Shen and Wu (1994: 20) provide a colour photograph of a freshly-killed specimen from Taiwan. The senior author has examined specimens that extend the geographic range (Fig. 4) of *H. inclinata* westward to Pratas Reef, South China Sea (CAS 66814), and provide the first record for its occurrence at Maybag Island, Babuyan Islands, Philippines (USNM 317987).

***Helcogramma lacuna* n. sp.**

(Figs. 13, 14)

Helcogramma fuscopinna Holleman, 1982: 115 (in part).
Helcogramma sp. 4 Fricke, 1997: 394.

Holotype: USNM 222902, 32.0 mm SL, female, Andaman Sea, Thailand, Goh Huyong, Similan Island, 1-4 m, 8° 29' N, 97° 39' E, members of the expedition on the "Te Vega" Cruise 2, station 78, 3 Nov. 1963, collected with rotenone.

Paratypes: USNM 329750 (2: 24.6 and 27.0), collected with holotype. WAM P.26507-016 (2: 32.7 and 34.8), Andaman Sea, Thailand, Similan Islands, Ko Similan, 8°

40' N, 97° 38' E, collected by G. Allen and R. Steene, 13 Feb. 1979, collected with rotenone. BMNH 1983.3.25.1107 (1: 30.6), Thailand, Phuket Is., Laem Sai off Kata Beach, 3 m, large *Porites* boulders and scattered small corals, collected by R. Lubbock and N. Polunin, 20 March 1977, collected with rotenone.

Diagnosis

A species of *Helcogramma* (*sensu* Hansen, 1986) with 3-7 symphyseal mandibular sensory pores, second dorsal fin spines XIV (one of five specimens examined with XIII), third dorsal fin segmented rays 10 (one with 11), last ribs on vertebral centrum 11, vertebrae 11+26=37, pored lateral line scales modally 25, nape scales absent, males with dusky anal fin.

Description

Dorsal fin rays III,XIV+1,10 (one of five specimens with XIII spines and 2 free pterygiophores; one with 11 third dorsal rays); anal fin rays I,20; pectoral fin rays 1+9+7=17 (one with 1+8+7=16); pelvic fin rays 1,2; caudal fin rays 13, 9 branched; procurrent caudal fin rays 9 dorsally, 9 ventrally; vertebrae 11+26=37; last ribs on vertebral centrum 11; last epineural(s) on ver-



Fig. 13. *Helcogramma steinitzi* male, 34.5 mm SL, Phuket, Thailand. Photo by R. Winterbottom.



Fig. 14. *Helcogramma steinitzi* female, 28.0 mm SL, Phuket, Thailand. Photo by R. Winterbottom.

tebral centrum 14-15; pored lateral line scales 25 (of five specimens, one each with 21 and 27); orbital cirri present (usually minute); sensory pores in the mandibular series typically $7+5+7=19$ (value range: 7 or $8+3$ to $7+7=17$ to 21); nape scales absent; body scales ctenoid, scales below lateral line and immediately posterior to pectoral fin base about twice as large as those on remainder of body; head, pectoral fin base, belly, and first dorsal fin base naked. The largest specimens examined are 34.8 mm SL for males and 32.0 mm SL for females (see Table I).

Colour when live: (Based on photographs taken by R. Winterbottom of fresh dead specimens (as no live specimens were available) collected off Phuket, western coast of Thailand): top of head and anterior portion of body reddish, stripe beneath eye and two spots on pectoral base iridescent pale blue; ventral half of head below stripe with scattered melanophores on pale background; iris mottled with yellow and red; iridescent yellow chromatophores clustered in group behind eye and over dorsal half of opercle; pectoral fin reddish with three narrow pale bars; first dorsal fin and basal portion of second dorsal fin red; pelvic fin whitish; anal fins black, reddish near base; posterior portion of body red, with three pale bars, one beneath fourth to fifth second dorsal fin spines and one each beneath posterior ends of second and third dorsal fins, each bar with scattered iridescent yellow chromatophores; series of seven brown blotches alternate with white spots along lateral midline of body from behind pectoral fin to caudal peduncle; narrow brown bar encircles peduncle immediately anterior to base of reddish caudal fin; second and third dorsal fins reddish basally and distally with yellowish streak in middle of fins; first dorsal fin reddish basally, dusky distally.

Females with head mottled with brown, white and iridescent yellow colour; iris blotched with brown and yellow; body with alternate brown and white bars, white bars with central streak of iridescent yellow chromatophores; pectoral fins translucent with three vertical yellow streaks, two brown blotches on base; pelvic fins white; anal fin translucent with dusky distal margin; first dorsal fin with yellowish membrane between first and second spines; remaining fins dusky.

Colour in alcohol: In preservative, adult males with head and body dusky, covered with small melanophores; head only slightly bi-coloured in appearance with upper half dusky, lower half slightly darker, narrow diagonal band of micromelanophores on a pale background extending from symphysis of lower jaw, across upper jaw, beneath eye, and posteriorly onto opercle; pectoral fin dusky with half-moon shaped black blotch positioned centrally over pectoral fin base and out onto rays, two or three pupil-sized pale areas (micromelanophores on a pale background) positioned vertically on pectoral fin base;

body dusky with seven or eight faint, irregular bars between pectoral fin base and caudal fin; scales on dorsal half of body with pale centres and dark distal margins; belly with scattered melanophores; all fins dusky, first and second dorsal fins with dark distal margins, anal fin uniformly dark.

In preservative, adult females generally pale to dusky with scattered melanophores, head with irregular bar of melanophores beneath posteroventral edge of eye; body with faint, barely discernible, irregular bars on body; all fins pale with scattered melanophores.

Etymology

The specific epithet is from the Latin *lacuna* meaning cavity, cavern, or hollow. The name refers to holes in the rocky reefs inhabited by all members of the *fuscopinna* complex and is treated as a noun in apposition.

Geographic distribution

Helcogramma lacuna is known only from the Similan Islands and off Phuket, Thailand, in the Andaman Sea (Fig. 4). This is the only species of the *fuscopinna* species complex occurring in the Eastern Indian Ocean. Specimens have been collected at depths of 1-7 m. Winterbottom (pers. comm.) collected specimens from coral patch reef habitats with sand channels at depths down to seven metres off Phuket, Thailand.

Remarks

Holleman (1982) examined two specimens (WAM P.26507-016) of *Helcogramma lacuna* from Ko Similan, Similan Islands, and designated them as paratypes of his *Helcogramma fuscopinna*, but did not comment further on these two specimens. Hansen (1986) did not examine the WAM paratypes or the USNM specimens (she may have been unaware of the USNM specimens), which were incorrectly identified and catalogued in 1980 as *Helcogramma steinitzi*.

The presence of 3 to 5 (usually more than 3) symphyseal pores in the mandibular series distinguishes *Helcogramma lacuna* from all species of *Helcogramma* except *H. hudsoni*, *H. inclinata*, and *H. aquila*. *Helcogramma lacuna* differs from *H. hudsoni* in having typically 20 anal fin rays (versus 19) and in colour pattern (*H. hudsoni* lacks the micromelanophore stripe under the eye). *Helcogramma lacuna* differs from *H. inclinata* in having XIV second dorsal fin spines (versus XV), no nape scales (versus present) and caudal vertebrae 26 (versus 28-29). *Helcogramma lacuna* differs from *H. aquila* in having XIV second dorsal fin spines (versus XIII), caudal fin not contrasting markedly with body pigmentation (versus caudal fin black, contrasting with pale body), and typically 10 third dorsal fin rays (versus 11).

***Helcogramma nesion* n. sp.**

(Fig. 15)

Helcogramma sp. 5 Fricke, 1997: 395.

Holotype: USNM 329645 (male: 47.2 mm SL), Japan, Izu Islands, Miyake-jima, Igaya Bay, depth 5-10 m, collected by P. E. Hadley, 15 July 1977, collected with rotenone.

Paratypes: BPBM 35294 (8: 33.8-39.6), Ogasawara Islands, Chichi-jima, Ishi-ura, crevice with ledges and caves, depth 8-10 m, collected by J. E. Randall, R. L. Pyle, H. Ida, and H. Terashima, 2 June 1992, collected with rotenone. USNM 222324 (6: 44.5-49.0), collected with holotype. USNM 222329 (2: 16.1, 36.9), Japan, Izu Islands, Miyake-jima, Igaya pipeline, depth 5-10 m, P. E. Hadley, 13 July 1977, collected with rotenone. USNM 222330 (2: 41.6, 46.0), Japan, Izu Islands, Miyake-jima, Igaya Bay, depth 3-5 m, collected by P. E. Hadley, 15 July 1977, collected with rotenone. USNM 222331 (1: 45.0), Japan, Izu Islands, Miyake-jima, Igaya, depth 5-6 m, P. E. Hadley, 12 July 1977, collected with rotenone. USNM 222332 (2:

42.4, 49.2), Japan, Izu Islands, Miyake-jima, Igaya pipeline, depth 7 m, collected by P. E. Hadley, 15 June 1977. USNM 222346 (1: 39.0), Japan, Izu Islands, Miyake-jima, depth 5 m, L. Cuyvers, 13 July 1977, collected with rotenone.

Non-type material: USNM 329646 (1 specimen cleared and stained; same data as USNM 329645). USNM 329647 (3 specimens cleared and stained; same data as USNM 222330).

Diagnosis

A species of *Helcogramma* (*sensu* Hansen, 1986) with 1-2 symphyseal mandibular sensory pores, second dorsal fin spines XIV, third dorsal fin segmented rays 11, last ribs on vertebral centrum 10, vertebrae 10+28 or 29=38 or 39, pored lateral line scales typically 25 to 27, nape scales absent, small isolated patch of scales on either side of nape, each patch surrounded by naked area.

Description

Dorsal fin rays III, XIV+1, 11 (three of 22 specimens with XV; two specimens with no free pterygiophores;

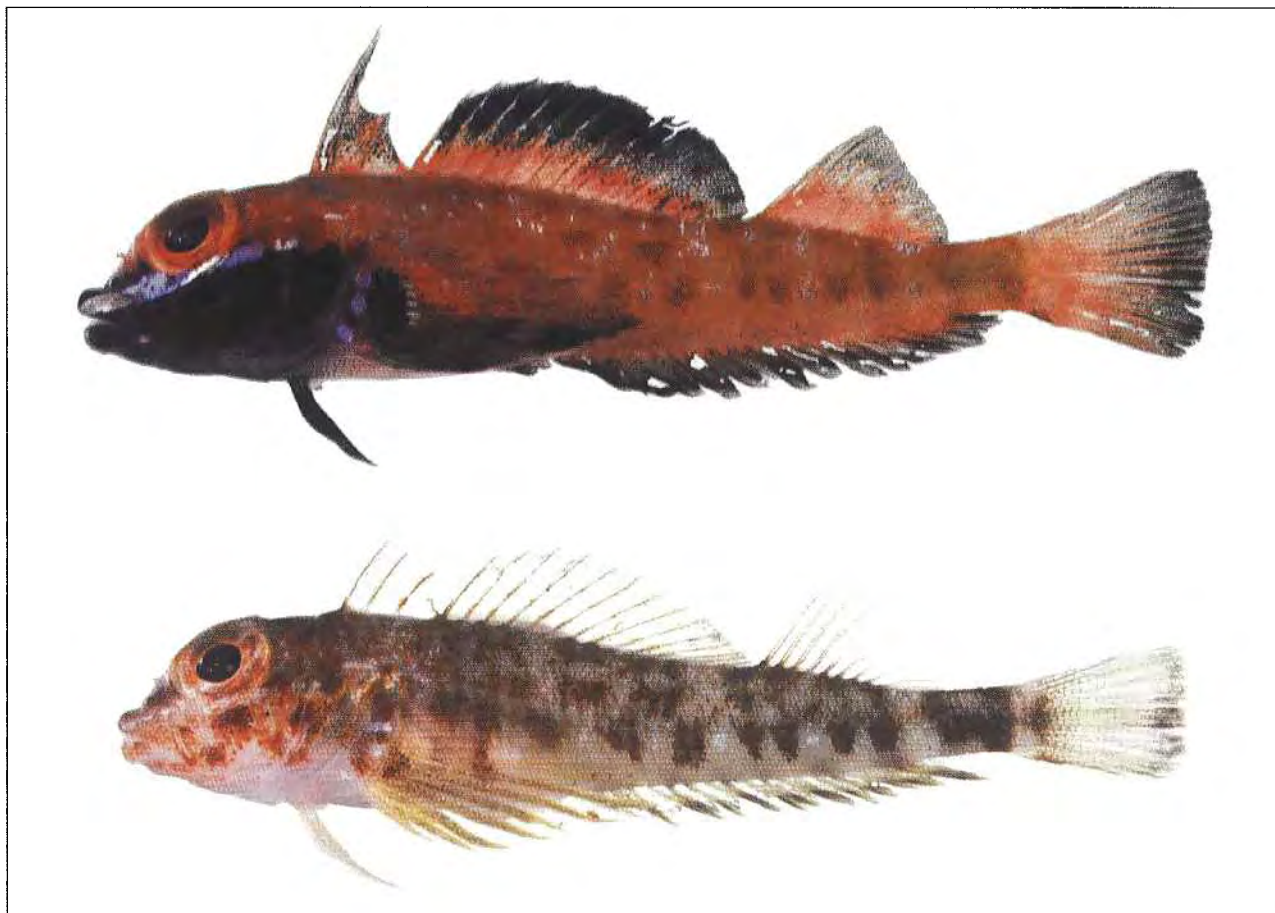


Fig. 15. *Helcogramma nesion*, male (above), 37 mm SL, and female (below), 39 mm SL, both taken at Chichijima, Ogasawara Is., 8-10 m, 2 June 1992, J. E. Randall. Photo by J. E. Randall.

one with 12 rays); anal fin rays 1,21 (one of 22 with 20, two with 22); pectoral fin rays 1+8+7=16 (one of 22 each with 1+7+7=15 and 8+8=16); pelvic fin rays 1,2; caudal fin rays 13, 9 branched; procurrent caudal fin rays 9-10 dorsally (one of 22 with 7), 9-10 ventrally (one of 22 with 7); vertebrae 10+28=38 (three of 22 with 10+29=39); last ribs on vertebral centrum 10; last epineural(s) on vertebral centrum 13-15 (one of 21 with epineurals on centrum 16); pored lateral line scales 25-29 (of 21, one each with 23 and 33); orbital cirri present (usually minute); sensory pores in the mandibular series typically 6+2+6=14 (value range: 5 to 9+1 to 2+4 to 8=13 to 17; one each with 5+2+4=11 and 8+2+8=18); nape without scales, small isolated patch of scales on either side of nape, each patch surrounded by naked area; body scales ctenoid, scales below lateral line and immediately posterior to pectoral fin base about twice as large as those on remainder of body; head, pectoral fin base, belly, and first dorsal fin base naked. The largest specimens examined are 49.2 mm SL for males and 46.0 mm SL for females (See Table I).

Colour when live: (Based on Okamura and Amaoka, 1997: 560, as *H. fuscopinna*; and colour photographs taken by J. E. Randall of specimens from the Ogasawara Islands): body and top of head reddish, with red colour extending onto bases of all three dorsal fins and caudal fin; body with about eight to 12 brownish, midlateral blotches, each with discontinuous dorsal extensions connecting to brownish dorsal saddles positioned along bases of second and third dorsal fins; lower half of head black, iridescent blue stripe from snout tip to opercle; belly reddish; upper half of pectoral fin red, lower half black, black spot on pectoral fin base bordered posteriorly by narrow pale yellow bar, three iridescent blue spots on pectoral fin base; iris of eye orange red.

Life colours of females (based on colour photograph taken by J. E. Randall of specimens from the Ogasawara Islands): head and body mottled with brown blotches and irregular bars on cream coloured background, belly white; head with bluish white stripe from snout tip to opercle; pectoral fin base with two bluish white spots surrounded by brown blotches; lower half of pectoral fin yellow, iridescent yellow blotch on bases of central pectoral fin rays; dorsal half of body with scattered, iridescent blue speckles.

Colour in alcohol: In preservative (Hayashi, 2002: 1079; as *H. fuscopinna*), adult males with head strongly bi-coloured in appearance with upper half pale, lower half black from snout to pelvic fin base, narrow diagonal band of micromelanophores on a pale background extending from symphysis of lower jaw, across upper jaw, beneath eye, and posteriorly onto opercle; pectoral fin with three to five most dorsal rays pale, remainder black, with half-moon shaped black blotch positioned centrally over pectoral fin base and out onto rays, two or three pupil-

sized pale areas (micromelanophores on a pale background) positioned in vertical row on pectoral fin base; body with eight to 12 faint, irregular, broken bars on pale background between pectoral fin base and caudal fin; belly covered with melanophores; first and third dorsal fins dusky, second dorsal fin with distal half black and proximal half dusky; caudal fin with distal third black, proximal two-thirds dusky, narrow vertical band of melanophores at base of caudal fin; anal and pelvic fins black; skin around anus and gonopore black.

In preservative, adult females head pale with faint, irregular stripe of micromelanophores beneath eye (no dorsoventrally bi-coloured pattern as seen in mature males); body pale, mottled with irregular blotches and double bars on body from pectoral fin base posteriorly, terminating in broad H-shaped bar on caudal peduncle; pectoral fin pale, dark blotch positioned basally over central rays; pelvic fins pale; dorsal fin dusky; anal fin dusky with dark distal stripe.

Etymology

The specific epithet is from the Greek "*nesion*", meaning island. The name refers to the isolated island of scales on either side of the nape and is treated as a noun in apposition.

Geographic distribution

Helcogramma nesion is known only from Japan, where it has been collected at the Izu Islands, the Ogasawara Islands and Okino-shima at the southwestern tip of Shikoku Island (BSKU 84394-84396), Japan (Fig. 4). Specimens have been collected from exposed coasts among coralline and rocky boulders, from crevices and caves and in surge channels at depths ranging from 3 to 10 m.

Remarks

Holleman (1982) did not examine Japanese specimens, but he discussed (1982: 120) the specimens collected by P. Hansen from the Izu Islands. Hansen (1986: 339) commented on the geographic variation among populations and noted the dark male coloration, high lateral line scale counts and large size of specimens from the Izu Islands. She suggested the possibility that "further study will indicate that some of the populations merit nomenclatural recognition." Williams and McCormick (1990: 1020) stated that the Japanese specimens referred to by Hansen (1986) represented an undescribed species, but they incorrectly attributed it to the *Helcogramma ellioti* species complex.

The presence of an isolated patch of scales on either side of the nape distinguishes *Helcogramma nesion* from all other members of the *fuscopinna* species complex.

***Helcogramma nigra* n. sp.**

(Figs. 16, 17, 18)

Helcogramma sp. 1 Williams and McCormick, 1990: 1023 (Papua-New Guinea).

Helcogramma sp. 2 Williams and McCormick, 1990: 1026 (Rotuma, Fiji).

Helcogramma sp. 6 Fricke, 1997: 400.

Holotype: USNM 329281, male, 31.2 mm SL, Fiji Islands, Rotuma Island, north coast, ocean side of reef crest, about 100 m from shore, rock with some live coral on surface, 12° 30' N, 177° 05' E, depth 1-9 m, collected by V. G. Springer, G. D. Johnson, J.T. Williams, and J. Libbey, 9 May 1986, collected with rotenone, field number: VGS 86-4.

Paratypes: USNM 283420 (19: 15.6-32.7), AMS



Fig. 16. *Helcogramma nigra*, male, 31.9 mm SL, Vanuatu, Vanua Lava Is. Photo by J. T. Williams.



Fig. 17. *Helcogramma nigra*, male, 24.4 mm SL, Solomon Islands, Reef Island, showing variability in fin colouration. Photo by J. T. Williams.

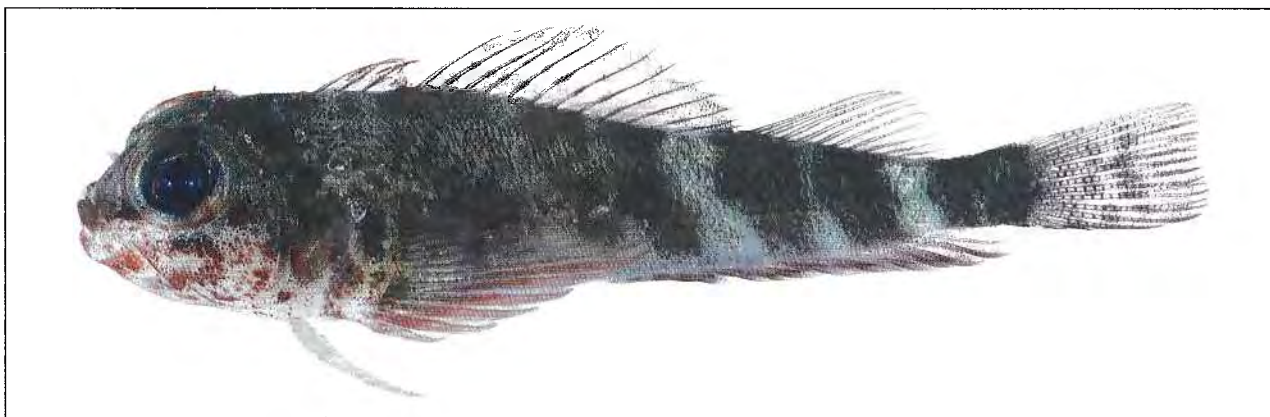


Fig. 18. *Helcogramma nigra*, female, 29.2 mm SL, Vanuatu, Vanua Lava Is. Photo by J. T. Williams.

I.35026-001 (1: 26.8), CAS 81762 (1: 29.2), and BPBM 36435 (1: 27.8), all collected with the holotype. USNM 283421, male, 33.5 mm SL, Fiji Islands, Rotuma Island, east side, just north of Afnaha Islet, rock and coral wall, dropping off from 6 to 14 m, 12° 30' N, 177° 05' E, depth 6-14 m, collected by V. G. Springer, G. D. Johnson, and J. T. Williams, 21 May 1986, collected with rotenone, field number: VGS 86-18.

Nontypes: USNM 222341 (7: 32.4-36.3) and USNM 222901 (7: 19.2-29.4), both lots from: New Guinea, E shore, NW of Gusaweta Kiriwina, Trobriand Islands, on exposed coral platform, 0-3.7 m, collected by B.B. Collette, 17 June 1970, collected with rotenone, field number: BBC-1522. USNM 344541, Vanuatu, Erromango, south-west side of Dillon's Bay, about 200 m before tip of Williams Point, narrow reef shelf at base of rocky cliff, deep surge channels and caves in high energy surge area of exposed rocky reef, collected by J. T. Williams, *et al.*, 26 May 1996, collected with rotenone, field number: JTW 96-9.

Diagnosis

A species of *Helcogramma* (*sensu* Hansen, 1986) with 1-2 symphyseal mandibular sensory pores, second dorsal fin spines XIII (two of 26 specimens with XIV), third dorsal fin segmented rays 10-12, last ribs on vertebral centrum 11, vertebrae modally 11+26=37 (value range: 11+25 to 27=36 to 38), pored lateral line scales modally 25 (value range: 23-29), nape scales absent, males with dorsal, caudal and anal fins dark.

Description

(see Table I): Dorsal fin rays III,XIII+1,10 to 11 (two of 26 specimens with XIV; three specimens with no free pterygiophores and one with 2; three with 12 rays in third dorsal fin); anal fin rays I,19-20 (one of 25 with 21); pectoral fin rays modally 1+8+7=16 (variation includes 0 to 1+8 to 9+6 to 8=15 to 16); pelvic fin rays I,2; caudal fin rays 13, 9 branched; procurrent caudal fin rays 9-11 dorsally, 9-11 ventrally; vertebrae modally 11+26=37 (two of 25 with 11+25=36; four with 11+27=38); last ribs on vertebral centrum 11; last epineural(s) on vertebral centrum 14-16 (of 24, one each with epineurals on centra 13 and 17); pored lateral line scales 23-29; orbital cirri present (usually minute); sensory pores in the mandibular series typically 6+1+6=13 (value range: 5 to 10+1 to 2+5 to 7=11 to 18; five with 2 symphyseal pores); nape naked; body scales ctenoid, scales below lateral line and immediately posterior to pectoral fin base about twice as large as those on remainder of body; head, pectoral fin base, belly, and first dorsal fin base naked. The largest specimens examined are 36.3 mm SL for males and 29.9 mm SL for females.

Colour when live: Life colours (based on photographs of fresh specimens taken at Rotuma Island and Vanuatu by the senior author) of males with head and body darkly coloured, lower half and underside of

head black, top of head, anterior portion of body and belly reddish black, stripe beneath eye and coalesced spots on pectoral base iridescent pale blue; iris reddish orange; pectoral fin with iridescent yellow streaks radiating posteriorly from posterior margin of half-moon shaped black basal spot, remainder of fin red; first dorsal fin and anterobasal portion of second dorsal fin mottled with red and black, remainder of these and third dorsal fin black; anal fin black; pelvic fins red; posterior portion of body with alternating reddish brown and dark olivaceous bars, caudal peduncle and caudal fin black.

Females with top of head dark, lower half of head mottled with reddish brown and white; interrupted streak below eye and spots on pectoral fin base iridescent blue; belly white; iris reddish; body with alternating brown and olivaceous bars; pelvic fins white; anal fin pale with ray tips reddish; pectoral fin with short, iridescent yellow streaks radiating posteriorly along central rays from posterior margin of irregularly shaped black basal blotch, remainder of fin red; dorsal and caudal fins tinted with reddish; caudal peduncle covered with broad black bar.

Colour in alcohol: Adult males with bi-coloured head, pale dorsally, dark ventrally, narrow diagonal band of micromelanophores on pale background extending from lower jaw symphysis, across upper jaw, beneath eye, and posteriorly onto opercle; dark pigmentation of head extending posteriorly across pectoral fin base onto basal portion of central pectoral fin rays, where it forms half-moon shaped spot; pectoral fin base with three vertically aligned, small, pale spots (micromelanophores on pale background; spots often coalescing into slender bar); dark pigment on underside of head extending posteriorly beyond pelvic fin base, remainder of belly with scattered melanophores; body pale to dusky anteriorly; posteriorly, background pale to dusky, overlaid with five narrow dark bars, first bar at anterior end of second dorsal fin, second at centre of second dorsal fin, third at posterior end of second dorsal fin, fourth beneath anterior base of third dorsal fin, fifth beneath posterior end of third dorsal fin; pectoral fin pale except for dark basal spot, pectoral fin axil pale or with scattered melanophores; first dorsal fin dusky with melanophores along fin elements, second dorsal fin pale to dusky basally with dark marginal band over about distal half or more of length of rays, third dorsal and caudal fins uniformly dark, anal fin dusky with dark distal margin, pelvic fins pale.

Preserved females and young males with melanophores irregularly scattered over head with faint, broken line of micromelanophores in stripe running beneath eye; body dusky with about four or five narrow dark bars, each bar extending from dorsal fin base to or almost to anal fin base, bars beneath posterior ends of second and third dorsal fins broader than others; dorsal and anal fins pale with faint



Fig. 19. Habitat at east side of Erromongo Island, Vanuatu, typical of where *Helcogramma nigra* occurs. Photo by J. T. Williams.

melanophores distally; caudal fin with two large, faint blotches centrally, distal margin pale; pectoral fin pale with scattered groups of melanophores over bases of median rays; pelvic fins pale.

Etymology

The specific epithet is from the Latin *nigra* meaning black. The name refers to the black fins of the males.

Geographic distribution

Helcogramma nigra is known (Fig. 4) only from the Trobriand Islands of Papua New Guinea, Santa Cruz Islands, Vanuatu, and Rotuma Island, Fiji. Specimens have been collected from exposed coasts (Fig. 19) among coralline and rocky boulders and in surge channels to a depth of about 14 m.

Remarks

Hansen (1986) examined three specimens (USNM 222341; of 7 specimens in the jar) of *Helcogramma nigra* from New Guinea and referred to them as *H. fuscopinna*. She commented (1986: 339) that the males from New Guinea and East Africa were inter-

mediate in pigmentation, but she did not discuss the low number of second dorsal fin spines (XIII) recorded in her Table 1a for the New Guinea specimens. She did suggest (1986: 339) the possibility that "further study will indicate that some of the populations merit nomenclatural recognition."

Williams and McCormick (1990: 1026) recognized the distinctness of the New Guinea and Rotuma specimens and referred to them as *Helcogramma* sp. 1 and 2, respectively. They commented on the disjunct geographic distribution of the known specimens and the need for material from the intervening areas. Specimens recently collected by the senior author at Vanuatu partially fill the geographic distributional gap and conform to our current definition of *Helcogramma nigra*. Examination of specimens from New Guinea, Vanuatu and Rotuma reveals no distinguishing characteristics that support the recognition of more than one species. We conclude that specimens from these areas are referable to the same species, yet we note the possibility that some of these forms may be shown to be specifically distinct in the future. To avoid the possibility of future confusion, we designate types only from Rotuma Island and exclude the New Guinea and Vanuatu specimens from the type series.

The low number (XIII) of second dorsal fin spines distinguishes *Helcogramma nigra* from all members of the *fuscopinna* species complex except *H. aquila*, from the Batan Islands, northern Philippines. *Helcogramma nigra* differs from *H. aquila* by having 1 or 2 symphysial mandibular pores (versus 5-8).

Helcogramma randalli n. sp.

(Figs. 20, 21, 22)

Holotype: USNM 366861, male, 32.2 mm SL, Indonesia, Komodo Island, south-east end at Three Rocks, 08° 48' 18" S, 119° 24' 48" E, depth 5-6 m, J. E. Randall, 11 September 2000, collected with rotenone.

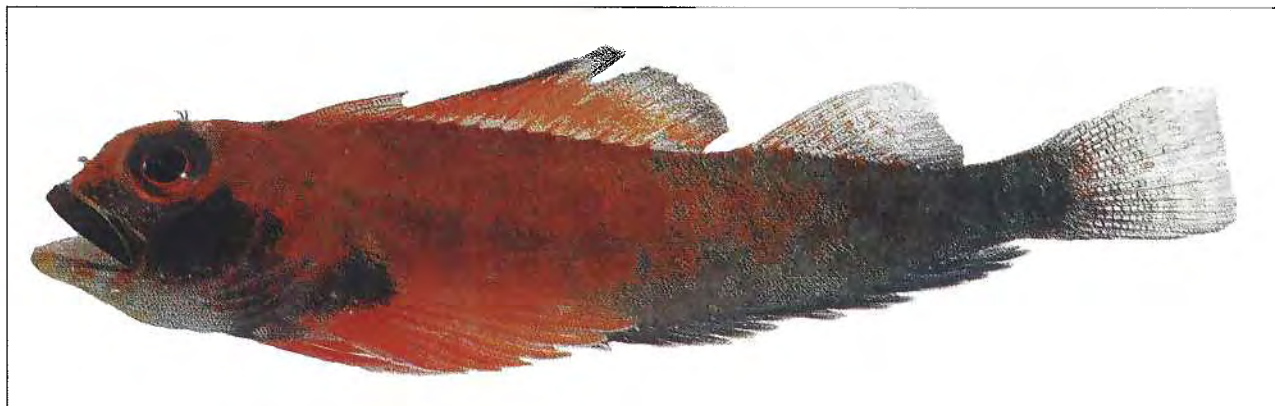


Fig. 20. *Helcogramma randalli*, male, S. Komodo Island, right side photographed, image has been reversed. Photo by J. E. Randall.

Paratypes: USNM 363778 (8: 22.1-37.0 mm SL), collected with holotype. BPBM 39284 (2: 24.3, 32.2 mm SL), Indonesia, Komodo Island, south end at Torolangoi Bay, rocks at surge zone, 08° 21' S, 119° 25' 30" E, depth 6 m, J. E. Randall, 9 October 1999, collected with rotenone.

Diagnosis

A species of *Helcogramma* (*sensu* Hansen, 1986) with 1 symphyseal mandibular sensory pore, second dorsal fin spines XIV-XV (one of 11 specimens with XIII), third dorsal fin segmented rays 11-12, last ribs

on vertebral centrum 12, vertebrae modally 10+28=38 (value range: 10+27 to 29=37 to 39), pored lateral line scales modally 22 or 23 (value range: 22-25), nape scales present, male with third dorsal, caudal and anal fins dark and posterior half of body dark.

Description

Dorsal fin rays III,XIV+1,11 (one of 11 specimens with XIII and three with XV; two specimens with no free pterygiophores; two with 12 rays in third dorsal fin); anal fin rays I,20 (two of 11 with 19 and one with 22); pectoral fin rays 1+8+7=16 (one of 11 specimens with



Fig. 21. *Helcogramma randalli*, male photographed underwater at S. Komodo Island, right side photographed, image has been reversed. Photo by J. E. Randall.



Fig. 22. *Helcogramma randalli*, female photographed underwater at S. Komodo Island. Photo by J. E. Randall.

1+9+7=17 on one side); pelvic fin rays 1,2; caudal fin rays 13, 9 branched; procurrent caudal fin rays 10-11 dorsally, 9-11 ventrally; vertebrae modally 10+28=38 (one of 11 with 10+27=37; one with 10+29=39); last ribs on vertebral centrum 12; last epineural(s) on vertebral centrum 16-20; pored lateral line scales 22-25; orbital cirri present (usually minute); sensory pores in the mandibular series typically 4+1+4=9 (value range: 4 to 5+1+4 to 5=10 to 11); nape scaled; body scales ctenoid, scales below lateral line and immediately posterior to pectoral fin base about twice as large as those on remainder of body; head, pectoral fin base, belly, and first dorsal fin base naked. The largest specimens examined are 32.2 mm SL for males and 37.0 mm SL for females (see Table I).

Colour when live: (Based on photographs of living specimens taken by R. H. Kuitert at Bali and photographs of living and fresh specimens taken by J. E. Randall at Komodo Island): males with lower half and underside of head black, top half of head bright red; anterior portion of body and belly reddish with dark red blotches or black with tiny blue iridescent speckling; stripe beneath eye and spots on pectoral base iridescent pale blue; top of head with scattered small blue spots; iris red with small blue spots along dorsal portion; pectoral fin with iridescent yellow streaks radiating posteriorly from posterior margin of half-moon shaped black basal spot, remainder of fin and areas of pectoral base above and below black spot bright red on holotype or black on Bali males; first dorsal fin and anterobasal portion of second dorsal fin red, distal third of each fin dusky to black, third dorsal fin dusky to black with about five diagonal streaks of small reddish spots (Bali males with all fins dusky to black); anal fin black; pelvic fins red; posterior third of body posterior to a roughly diagonal line from anus to end of second dorsal fin dark brown with dark red (anteriorly) or darker brown (posteriorly) pupil-sized blotches arranged in a checkerboard pattern continuing onto base of caudal fin, caudal fin dusky with about 5 irregular, narrow, brownish red bands (caudal fin of Bali males uniformly dusky).

Females with head mottled with yellowish or reddish brown spots and bars on a whitish or olivaceous background, top of head with scattered small blue spots continuing onto anterior half of body as blue speckling; interrupted diagonal streak below eye and spots on pectoral fin base iridescent blue; belly white; iris reddish with small blue spots arranged in a ring around the pupil; body with brown pupil-sized spots in a checkerboard pattern on mottled brown and white background (Bali females with alternating brown and whitish bars); pelvic fins translucent; anal fin pale with ray tips reddish; pectoral fin with short, iridescent yellow streaks radiating posteriorly along central rays from posterior margin of irregularly shaped black basal blotch, remainder of fin red; dorsal and caudal fins tinted with reddish; caudal peduncle covered with broad black bar.

Colour in alcohol: In preservative, adult males with bi-coloured head, pale dorsally, dark ventrally, narrow diagonal band of micromelanophores on pale background extending from lower jaw symphysis, across upper jaw, beneath eye, and posteriorly onto opercle, dark pigmentation of head extending posteriorly across pectoral fin base onto basal portion of central pectoral fin rays, where it forms a half-moon shaped black spot; pectoral fin base with about four vertically aligned, small, pale spots (micromelanophores on pale background); dark pigment on underside of head extending posteriorly to pelvic fin base, remainder of belly with scattered melanophores anteriorly, pale posteriorly; body pale with dusky reticulations anteriorly, becoming uniformly brown on posterior third of body with densest melanophores on ventral half of body beginning at anus and continuing posteriorly; pectoral fin pale except for dark basal spot, pectoral fin axil pale; first dorsal fin dusky with melanophores along fin elements, second dorsal fin pale basally with dark marginal band over about distal third of length of rays, third dorsal, caudal, and anal fins uniformly dark; pelvic fins pale.

Preserved females with reticulate pattern of melanophores over head and dorsal half of body, ventral half of head and body pale; head with distinct line or with faint, broken line of micromelanophores in stripe running beneath eye; first dorsal pale with small melanophores distally; second dorsal fin similar to that of males; third dorsal fin pale or with scattered dusky spots; caudal fin pale or with about five narrow dark bars on fin; anal fin pale with scattered blotches of melanophores distally; pectoral fin pale with scattered groups of melanophores over bases of median rays; pelvic fins pale.

Etymology

The species is named in honour of John E. Randall, who collected all of the known specimens and provided underwater and fresh photographs of specimens of this and other species.

Geographic distribution

Helcogramma randalli is known (Fig. 4) only from Komodo and Bali Islands of Indonesia. Specimens have been collected from exposed coasts among coralline and rocky boulders to a depth of about six metres.

Remarks

The last ribs being borne on the 12th vertebral centrum distinguishes *Helcogramma randalli* from all members of the fuscopinna species complex except *H. cerasina*, from Vatoa and Tonga. *Helcogramma randalli* differs from *H. cerasina* by having nape scales (versus absent) and having 10 precaudal vertebrae (versus 11).

***Helcogramma vulcana* Randall and Clark, 1993** (Fig. 23, 24)

Helcogramma sp. 5 Williams and McCormick, 1990: 1020 (Indonesia).

Helcogramma vulcana Randall and Clark, 1993: 27 (Type locality: Gunung Api, Indonesia)

Diagnosis

A species of *Helcogramma* (*sensu* Hansen, 1986) with 1 symphyseal mandibular sensory pore, second dorsal fin spines XV (six of 38 with XIV, one with XVI), third dorsal fin segmented rays 10-12, last ribs on vertebral centrum 10 (one of seven on 9), vertebrae modally 10+29=39 (three of 12 with 10+28=38), pored lateral line scales modally 21 (value range: 19-23), nape scales absent, mandibular pores 4+1+4=9 (one of seven with 3+1+4=8), males with dorsal, caudal and anal fins dark, both sexes with distinctive pale (red in life), oblong streak over lowest pectoral fin ray bases, first spine of first dorsal fin of males not elongate.

Remarks

Randall and Clark (1993) named the species after "the Latin *Vulcanus*, the god of fire, in reference to the volcanic localities." Randall and Clark used the name as an adjective and modified the ending to agree with the feminine generic epithet *Helcogramma*. *Helcogramma vulcana* is endemic to the Banda Sea, Indonesia (Fig. 4).

Phylogenetic relationships

As discussed by Williams and McCormick (1990), monophyly for the 11 species comprising the *H. fuscipinna* species complex is supported by the presence of a stripe of micromelanophores on a pale background extending posteriorly from the jaw symphyses, beneath the eye, and onto the opercle. The micromelanophore stripe is iridescent blue in life and is uniquely shared by adult males, and most females, of all 11 species in the complex. Williams and McCormick (1990) recognized two distinct species assemblages within the *fuscipinna* complex, the *H. aquila* group and the *H. habena* (= *H. inclinata*) group. The *H. aquila* group is tentatively accepted as a monophyletic group, but the *H. inclinata* subgroup is not currently diagnosable by a uniquely derived character, resulting in an unresolved polytomy for the relationships among the remaining seven species.

The *H. aquila* group comprises three species, *H. aquila*, *H. nigra*, and *H. cerasina*, associated in an unresolved trichotomy. They share the derived character of a black caudal fin that contrasts markedly with a pale body in preservative. Williams and McCormick (1990) stated that the dark distal margin on the second dorsal fin is also derived for the group, but this character is found in several *Helcogramma* species

outside the group and apparently is not informative for assessing phylogenetic relationships within the *H. fuscipinna* complex.

Helcogramma albimacula and *H. vulcana* are related as sister taxa by a synapomorphic colour-pattern character, an elongate red streak on the base of the most ventral pectoral fin rays. Relationships among this sister group and the remaining six species (*H. desa*, *H. fuscipinna*, *H. inclinata*, *H. lacuna*, *H. nesion*, and *H. randalli*) are unresolved.

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Fig. 23. *Helcogramma vulcana*, top: male, 36 mm SL; bottom: female, 35 mm SL, both taken at Gunung Api, Indonesia. Photo by J. E. Randall.



Fig. 24. *Helcogramma vulcana*, underwater photograph taken off Gunung Api, Indonesia. Photo by J. E. Randall.

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Errata

Table 1 and Figure 4 – neuter endings on adjectives should be changed to feminine (*aquila, cerasina, desa, inclinata, nigra, vulcana*).

Figures 13 and 14 are photographs of a male and female in the *Helcogramma steinitzi* complex and are not *H. lacuna*. The life coloration of *H. lacuna* is unknown. The section on “Colour when live” (page 166) applies to *H. steinitzi*, not *H. lacuna*.