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Helcogramma atauroensis, a new species of triplefin from Ataúro Island, Timor-Leste, eastern Indian Ocean (Teleostei: Tripterygiidae)

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Abstract

A new species of triplefin blenny, *Helcogramma atauroensis*, from Timor-Leste is described on the basis of eight specimens. The new species is characterized within the *H. steinitzi* species complex by having 14–15 second dorsal-fin spines, 9–11 third dorsal-fin rays, one symphyseal mandibular pore (total pores 9–11), the nape without scales, 19–23 tubular pored lateral-line scales, the head profile about 70º to horizontal, the first dorsal fin beginning above the preopercle, the anal fin in male red without melanophores, the female with six oblique bars, and a black pelvic fin in males. Revised keys to the *H. steinitzi* species complex and to all members of the genus in the western Pacific Ocean and Indo-Australian Archipelago are presented.

Key words: taxonomy, ichthyology, systematics, coral-reef fishes, Indo-Pacific Ocean, blennies, identification key.

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Introduction

Tripterygiid fishes (common name of triplefins or threefin blennies) are a group of mostly benthic-living blenniiform fishes (Nelson *et al*. 2016), characterized by having scales on the sides of the body and three dorsal fins. They inhabit cold, temperate, subtropical, and tropical sea shores and offshore islands and are usually associated with hard substrates. Most species live subtidally on rocky or coral reefs or in intertidal rock pools, while a few species occur deeper on the continental shelf and slopes down to at least 550 m depth. The use of intensive collecting techniques, such as rotenone collections, has revealed that Tripterygiidae comprises a speciose and abundant group of fishes. A total of 30 genera and at least 150 species is known worldwide. All species are small; the largest does not exceed 150 mm SL (*Blennodon dorsale* from New Zealand), while the smallest attains a maximum size of only 20 mm SL (Fricke 1997). The western and central Pacific species of the family were revised by Fricke (1997), who also provided a worldwide checklist which listed 30 valid genera and 140 valid species, 46 of which occur in the Indo-West Pacific.

The genus *Helcogramma* was originally described by McCulloch & Waite (1918), who designated *H. decurrens* McCulloch & Waite, 1918 as the type species. Fricke (1997: 370, 373) revised the western and central Pacific species and validated 22 species in the genus, distributed throughout the Indo-West Pacific and the southeastern Atlantic Oceans. *Helcogramma* is characterized by a continuous lateral line, curved downwards behind the operculum, with 7–39 tubular pored scales; a first dorsal fin with three spines; an anal fin with a single spine; a pelvic fin with I,2; the head scaleless; the dorsal and anal-fin bases usually with a scaleless strip; and five hypurals. Williams & Howe (2003) revised the *H. fuscopinna* species complex and described seven additional species. Holleman (2006) subsequently described two new species in the *H. steinitzi* species complex from the western Indian Ocean and Holleman (2007) revised the genus *Helcogramma* in the western Indian Ocean and described four new species. Chiang & Chen (2012) described *H. williamsi* from Taiwan, bringing the worldwide total to 36 species.

A new species of *Helcogramma* was discovered during recent fieldwork by the second author in Timor-Leste and is described in the present paper.

Materials and Methods

The holotype of the new species is deposited in the Western Australian Museum, Perth, Australia (WAM) and the Fish Collection of the Hebrew University, Jerusalem, Israel (HUJ). Comparative materials are listed after the Discussion. Abbreviations of museum collections follow Fricke & Eschmeyer (2017a).

Methods follow Fricke (1997); fin-ray counts follow Fricke (1983); values for the holotype presented first followed by the range for paratypes in parentheses. The starting point for length measurements is the middle of the upper lip. The standard length (measured from the tip of the upper lip to the middle of the urohyal/caudal-fin base) is abbreviated SL. The predorsal (1) length is measured from the middle of the upper lip to the base of the first spine of the first dorsal fin; the predorsal (2) length correspondingly to the base of the first spine of the second dorsal fin, and the predorsal (3) length to the base of the first ray of the third dorsal fin. The last ray of the third dorsal and anal fins is always divided at its base and counted as a single ray. Proportional measurements are expressed as thousandths of SL.

Species classification is based on Fricke (1997). Nomenclature follows Eschmeyer *et al*. (2017). References and journals are cited according to Fricke (2017) and Fricke & Eschmeyer (2017b).

Helcogramma atauroensis, n. sp.

Red-anal Triplefin

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Figures 1–3; Table 1.

Holotype. WAM P.34562-003, 27.7 mm SL, male, Timor-Leste, Ataúro Island, Fatuu, 8°08.442' S 125°36.737' E, 3 m depth, Mark Erdmann, St. TL-16-002, 25 June 2016.

Paratypes. HUJ 20649, 1 male (31.6 mm SL) and 1 female (26.6 mm SL), same data as the holotype; WAM P.34562-001, 25.3–28.3 mm SL, 4 males and 1 female, same data as the holotype.

Diagnosis. A species of the *Helcogramma steinitzi* species complex with first dorsal fin beginning above preopercle, 14–15 second dorsal-fin spines, 9–11 third dorsal-fin rays, one symphyseal mandibular pore (total pores 9–11), 19–23 tubular pored lateral–line scales, head profile about 70º to horizontal, nape without scales, males with a red anal fin without melanophores and black pelvic fins, females with six oblique bars.

Description. D1 III [III]; D2 XIV [XIV–XV]; D3 ix,1 [viii–x,1]; A I,xix,1 (total 21) [I,xviii–xxii,1 (total 20–24)]; P1 ii,7,viii (total 17) [ii,7–8,vii–viii (total 16–18)]; P2 I,ii [I,ii]; C (vi),ii,9,ii,(v) [(v–vi),ii,9,ii,(iv–v)]. Scale rows 40 [38–40]. Transverse scale rows 5 + 7 [5 + 6–7]. Tubular pored lateral–line scales 19–22 [20–23]. Mandibular pore formula 5 + 1 + 5 (total pores 11) [4–5 + 1 + 4–5 (total pores 9–11)].

Proportional Measurements (in thousandths of SL): head length 260 (264–302); head profile relatively blunt, about 70° to horizontal. Eye diameter 126 (111–130). Supraorbital tentacle present, simple, very small, pointed, its length 4 (3–4). Interorbital distance 29 (27–36). Preorbital length 50 (57–67). Upper jaw length 141 (120–144). Posttemporal lateral-line branch crescent–shaped. Nape without scales. Body depth 228 (180–217). Body width 152 (141–171). Scales ctenoid. Lateral line reaching back to level of end of second or beginning of third dorsal fin. A narrow scaleless strip just below first and second dorsal-fin bases and anal-fin base. Caudal-peduncle length 97 (98–137). Caudal-peduncle depth 87 (76–83). Maximum observed size 31.6 mm SL.

First dorsal fin relatively low, beginning over posterior end of preopercle; first spine 116 (106–130), second spine 112 (106–123), third spine 94 (94–111). Predorsal (1) length 249 (218–273). First spine of second dorsal fin 126 (129–154), fifth spine 139 (133–158). Predorsal (2) length 350 (332–375). First ray of third dorsal fin 166 (152–182), fifth ray 105 (101–119). Predorsal (3) length 729 (673–711). Anal fin beginning below vertical through 6–7th membrane of second dorsal fin (below 11th (11–12th) lateral-line pore). Anal spine 54 (58–73); first anal ray 65 (63–89), fifth ray 72 (70–92). Preanal-fin length 495 (462–511). Pectoral fin reaching about to

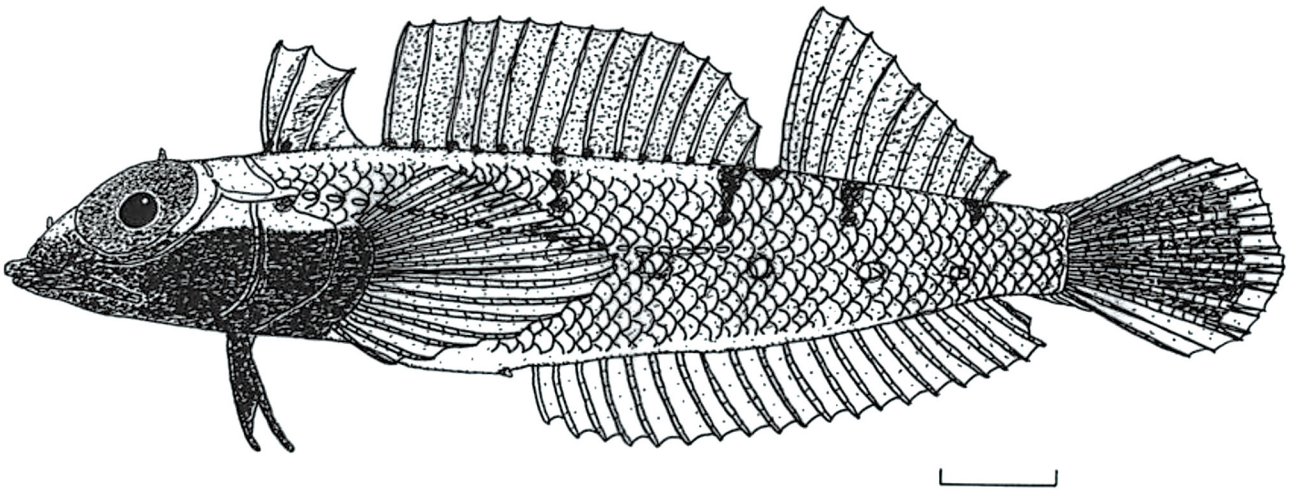

Figure 1. *Helcogramma atauroensis*, WAM P.34562-003, holotype, male, 27.7 mm SL, Fatuu, Ataúro Island, Timor-Leste (scale indicates 3 mm).

Figure 2. *Helcogramma atauroensis*, fresh photograph, male, Fatuu, Ataúro Island, Timor-Leste (M.V. Erdmann).

base of fourth anal-fin membrane. Pectoral-fin length 235 (235–288). Prepectoral-fin length 321 (301–340). First ray of pelvic fin 112 (122–141), second ray 119 (144–187). Prepelvic-fin length 206 (187–237). Caudal-fin length 206 (176–234).

Color in life. (Figs. 2 & 3) Head and body pale greenish, translucent; vertebral column visible through body, dark red with two white blotches. Male with four dorsal short, brown, vertical bars covered with fine melanophores; female with about nine such bars, some double. A series of brown blotches along sides of body below lateral line, interspersed with 6–7 pale whitish to bright-yellow spots. Lower sides of head, cheeks, and pectoral-fin base in male black, in female with a series of three brown blotches. Dorsal parts of head and eyes bright blue with reddish brown lines. First and second dorsal fins in females translucent, spines reddish; in males a small dark blotch at base of each spine, fin membranes covered with fine melanophores. Third dorsal fin translucent in female, membranes covered with fine melanophores in male. Anal fin red in male, translucent with six oblique reddish brown bars in female. Pelvic fin silvery white in female, black in male. Pectoral fin translucent, basal parts of central rays silvery white. Caudal fin translucent, central fin rays reddish brown, central parts of fin in male covered with fine melanophores.

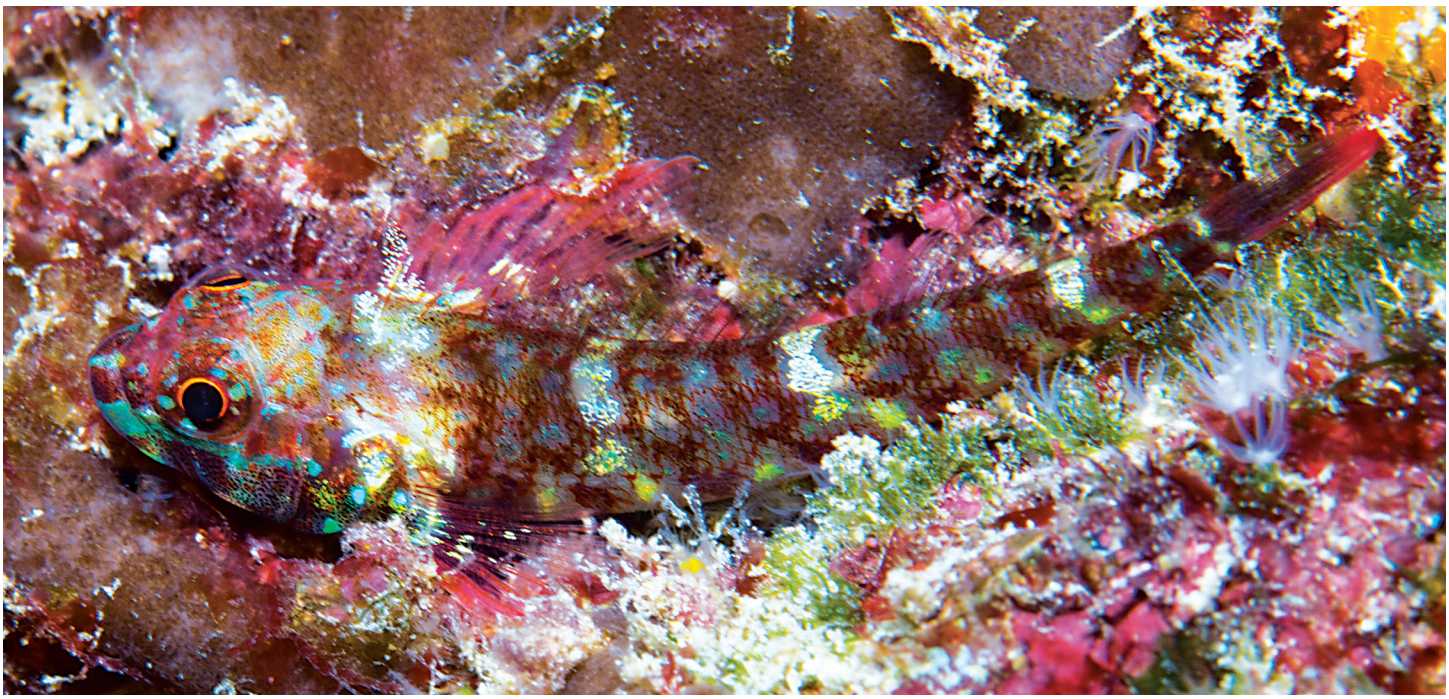

Figure 3. *Helcogramma atauroensis*, underwater photograph of male in typical habitat at type location, Fatuu, Ataúro Island, Timor-Leste (M.V. Erdmann)

TABLE 1

Helcogramma atauroensis, n. sp., holotype and paratypes
(actual measurements in mm)

	Holotype	Paratypes						
	WAM P.34562-003	WAM P.34562-001					HUJ 20649	
Sex	male	male	male	male	male	female	male	female
Standard length	27.7	28.3	27.8	27.7	26.9	25.3	31.6	26.2
Caudal-fin length	5.7	5.5	5.9	5.4	6.3	4.5	6.3	4.6
Predorsal (1) length	6.9	7.1	7.2	7.0	7.1	6.9	6.9	6.7
Predorsal (2) length	9.7	9.4	9.6	9.7	10.1	9.2	10.7	9.7
Predorsal (3) length	20.2	19.9	19.7	19.3	18.1	18.0	22.0	18.3
Preanal length	13.7	13.2	13.1	13.6	13.1	12.5	14.6	13.4
Prepelvic-fin length	5.7	5.9	5.7	5.8	5.9	6.0	5.9	5.7
Prepectoral-fin length	8.9	9.0	9.2	8.6	8.7	8.6	9.5	8.7
Head length	7.2	7.9	7.9	7.3	7.2	7.1	8.7	7.9
Body depth	6.2	5.3	5.4	6.0	5.3	5.3	5.7	5.4
Body width	4.2	4.0	4.3	4.5	4.6	3.8	4.6	4.0
Orbit diameter	3.5	3.5	3.2	3.6	3.2	3.2	3.5	3.3
Preorbital length	1.4	1.7	1.6	1.6	1.8	1.7	1.8	1.7
Bony interorbital	0.8	0.9	0.8	1.0	0.9	0.9	1.0	0.7
Supraorbital tentacle length	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Caudal peduncle length	2.7	3.0	3.7	3.0	3.4	2.8	3.1	3.6
Caudal peduncle depth	2.4	2.3	2.3	2.2	2.2	2.1	2.4	2.1
Upper-jaw length	3.9	3.8	3.6	4.0	3.4	3.4	3.8	3.2
Length of first spine of first dorsal fin	3.2	3.0	3.2	3.1	3.4	3.3	2.0+	3.3
Length of second spine of first dorsal fin	3.1	3.0	3.1	3.0	3.3	3.1	2.0+	3.1
Length of third spine of first dorsal fin	2.6	2.7	2.7	2.7	3.0	2.6	1.9+	2.7
Length of first spine of second dorsal fin	3.5	4.0	3.6	3.8	4.0	3.9	4.2	3.6
Length of fifth spine of second dorsal fin	3.6	4.1	3.7	3.9	4.1	4.0	4.3	3.8
Length of first ray of third dorsal fin	4.6	4.4	4.8	4.7	4.9	4.6	4.8	4.4
Length of fifth ray of third dorsal fn	2.9	3.1	3.2	3.1	3.2	3.0	3.2	2.9
Length of anal-fin spine	1.5	1.7	1.9	1.6	1.8	1.5	2.3	1.9
Length of first anal-fin ray	1.8	1.8	2.1	2.0	2.0	1.9	2.8	2.3
Length of fifth anal-fin ray	2.0	2.0	2.2	2.2	2.1	2.1	2.9	2.4
Pectoral-fin length	6.5	6.9	7.3	6.5	6.8	7.3	8.0	7.3
Length of first pelvic-fin ray	3.1	3.8	3.4	3.8	3.3	3.3	3.9	3.7
Length of second pelvic-fin ray	3.3	4.8	4.1	4.0	4.8	4.1	5.9	4.5

Color in preservative. Males with body yellowish brown, four dorsal vertical series of dark gray spots, sides of body below lateral line with a series of six dark gray spots; eye golden; head with a black mask below eye reaching from tip of snout to pectoral-fin base; dorsal fins yellowish brown, densely covered with fine melanophores, base of each spine of first and second dorsal fin with a dark gray spot; anal fin pale, entirely without melanophores; caudal fin dark gray, outer margins lighter; pelvic fins black, pectoral fins translucent. Females with body yellowish brown, seven dorsal brown double bars, sides of body below lateral line with a series of three simple and four double brown bars; eye golden; preorbital with a dark brown streak from tip of snout to anterior margin of orbit, head also with a suborbital and an opercular brown spot; dorsal fins yellowish brown, base of each spine of first and second dorsal fin with a dark gray spot; anal fin pale, with six oblique bars; caudal fin dark gray with two lighter vertical bars; pelvic fins yellowish, pectoral fins translucent.

Etymology. The new species is named for the type location, as a feminine adjective in the genitive case.

Distribution. The new species is known only from the type locality at Ataúro Island, Timor-Leste, in the Ombai Strait between the islands of Timor and Wetar. It was collected on a shallow coral reef at 3 m depth.

Comparisons. *Helcogramma atauroensis* n. sp. is a member of the *H. steinitzi* species complex, characterized by the position of the first dorsal fin above the preopercle (compared to well behind the preopercle in other species complexes). The other species in the complex comprise *H. microstigma* (Comores, Madagascar, and Mozambique), *H. rosea* (Sri Lanka to Andaman Sea), and *H. steinitzi* (Red Sea to Persian Gulf). The four species are found in widely separated allopatric ranges in the Indian Ocean (Fig. 4).

Helcogramma atauroensis can be distinguished from these three congeners by the anal-fin coloration (red without melanophores in males, with six oblique bars in females vs. with melanophores in males and without oblique bars in females) and the black pelvic fin in males (vs. white). It further differs from *H. microstigma* by having 14–15 spines in the second dorsal fin (vs. 13), 19–23 lateral–line scales (vs. 24–30), and its head profile of about 70º to the horizontal (vs. about 50º). It is also distinguished from *H. rosea* by having 14–15 spines in the second dorsal fin (vs. 13), 19–23 lateral–line scales (vs. 23–29, usually 25–27). The new species also differs from *H. steinitzi* in its mandibular–pore formula of 4–5 + 1 + 4–5 (vs. 3 + 1 + 3), and its head profile of about 70º to the horizontal (vs. about 45º). The species of the *H. steinitzi* species complex are compared in Table 2 and in the key.

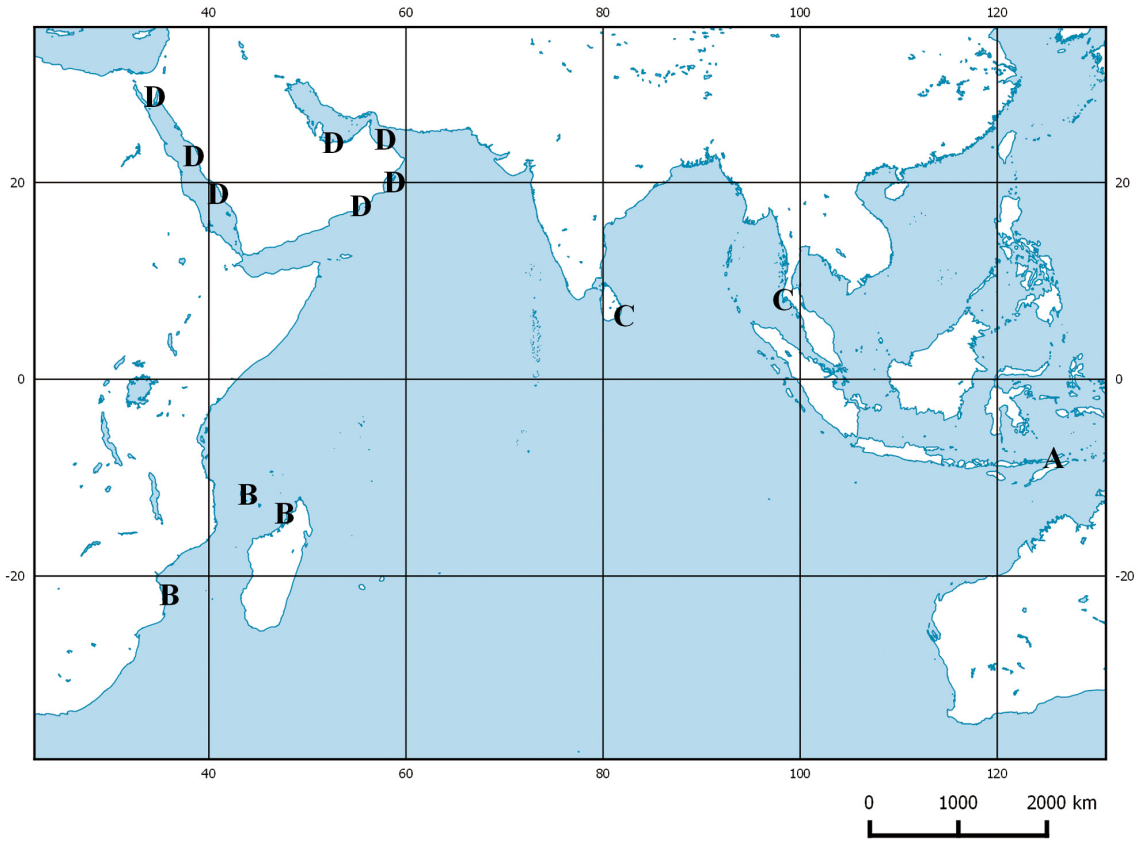

Figure 4. Geographic distribution of species of the *Helcogramma steinitzi* species complex: A) *H. atauroensis*, n. sp.; B) *H. microstigma*; C) *H. rosea*; D) *H. steinitzi.*

TABLE 2

Comparison of the species in the *Helcogramma steinitzi* species complex

	H. atauroensis	*H. microstigma*	*H. rosea*	*H. steinitzi*
D2 spines	XIV–XV	XIII	XIII	XII–XIV
Total D3 rays	9–11	10–11	10–11	10–12
Total A soft rays	18–23	18–20	18–20	19–21
Total P1 rays	16–18	15–16	16	15–17
Lateral-line scales	19–23	24–30	23–29 (usu.25–27)	21–27
Total lateral scale rows	38–40	37–38	36–38	37–41
Mandibular-pore formula	4–5 + 1 + 4–5	3–4 + 1 + 3–4	3–4 + 1 + 3–4	3 + 1 + 3
Head profile	ca. 70º	ca. 50º	ca. 60º	ca. 45º
Anal-fin coloration (male)	pale (red in life)	black	black	pale (red in life), distal dark band
Anal-fin coloration (female)	six oblique dark bars, with melanophores	pale, without bars	base pale, distal black, no bars	pale (red in life), with distal dark band
Pelvic fin coloration (male)	black	white	white	white

Key to the species of the *Helcogramma steinitzi* species complex (adapted from Holleman [2007])

1a. Anal fin entirely without melanophores (males) or with six oblique bars with melanophores (females); pelvic fin in males black (Timor-Leste) .....***H. atauroensis*, n. sp.**

1b. Anal fin with melanophores but without oblique bars; pelvic fin in males white 2

2a. Anal fin with melanophores along margin only; interorbital relatively narrow (mean 16.5 in head length); pale saddles at end of second and third dorsal fins white in life; usually fewer than 25 tubed lateral-line scales (Red Sea, Gulf of Oman, and Persian Gulf) .....***H. steinitzi***

2b. 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; usually more than 25 tubed lateral-line scales 3

3a. Orbital cirrus pointed, about half pupil diameter; head profile about 70° to horizontal; yellow saddles without melanophores at ends of second and third dorsal fins (SW Indian Ocean) .....***H. microstigma***

3b. Orbital cirrus short, as wide as long, head profile about 60° to horizontal; pink saddles with melanophores at end of second and third dorsal fins (Sri Lanka and Andaman Sea) .....***H. rosea***

Key to the species of the genus *Helcogramma* in the Indo-Australian Archipelago and the Western Pacific Ocean

This key works for all preserved male specimens, but only for some females; females of several species are difficult to distinguish without accompanying males. The key is artificial and does not necessarily represent species relationships.

1a. Head and body with two or three horizontal dark (blue in life) stripes (Andaman Sea to Line Islands and Fiji) ..... ***Helcogramma striata***

1b. Head and body without horizontal stripes 2

2a. First dorsal fin beginning over posterior end of preopercle 3

2b. First dorsal fin beginning behind posterior end of preopercle 4

3a. First dorsal-fin spines XIV–XV; anal fin without melanophores (males) or with six oblique bars with melanophores (females); pelvic fin in males black (Timor-Leste) ..... ***Helcogramma atauroensis*, n. sp.**

3b. First dorsal-fin spines XIII; anal fin with melanophores, but without oblique bars; pelvic fin in males white (Sri Lanka and Andaman Sea) ..... ***Helcogramma rosea***

4a. Sides of head in males with a horizontal white (blue in life) streak reaching from end of maxillary to upper end of preopercle, passing lower margin of eye (*Helcogramma fuscopinna* complex) 5

4b. Sides of head in males usually without a horizontal white streak; if (rarely) a streak present, it does not pass lower margin of eye 15

5a. Symphyseal mandibular pores 5–10 6

5b. Symphyseal mandibular pores 1–4 8

6a. Anal fin blackish in males (Philippines, Taiwan, and southern Japan) ..... ***Helcogramma inclinata***

6b. Anal fin pale in males 7

7a. Caudal fin black in males (northern Philippines and Marianas) ..... ***Helcogramma aquila***

7b. Caudal fin pale in males (reddish in life) (Andaman Sea) ..... ***Helcogramma lacuna***

8a. Nape scales present on dorsal midline anterior to base of first dorsal-fin spine 9

8b. No nape scales present on dorsal midline anterior to base of first dorsal-fin spine (small patches may be present on *H. nesion*) 11

9a. Single symphyseal mandibular pore (Lesser Sunda Islands, Indonesia) ..... ***Helcogramma randalli***

9b. Two symphyseal mandibular pores 10

10a. Males with pectoral fin with dusky (red in life) blotch covering bases and proximal portion of ventralmost 4–5 rays (Philippines and N. Sulawesi, Indonesia) ..... ***Helcogramma albimacula***

10b. Pectoral fin without dusky (red in life) blotch in males (Vietnam to Philippines) ..... ***Helcogramma desa***

11a. Total mandibular pores 6–9 (Banda Sea, Indonesia) ..... ***Helcogramma vulcana***

11b. Total mandibular pores 11–21 12

12a. Nape with small isolated patch of scales on each side (Bonin Islands, Japan) ..... ***Helcogramma nesion***

12b. Nape naked 13

13a. Anal fin dusky in males; sides of body with 7 brown blotches (Andaman Sea) ..... ***Helcogramma lacuna***

13b. Anal fin pale in males; sides of body without blotches 14

14a. Second dorsal-fin spines 13–14, mode 13 (Papua New Guinea, Vanuatu, to Fiji (only northern island of Rotuma)) ..... ***Helcogramma nigra***

14b. Second dorsal-fin spines 14–15, mode 14 (Tonga to Fiji (only southern island of Vatoa)) ..... ***Helcogramma cerasina***

15a. Symphyseal mandibular pores 3–9 (total pores 7–25) 16

15b. Symphyseal mandibular pores 1–2 (total pores 7–18)..... 18

16a. Orbital tentacle absent; tubular pored lateral-line scales 14–19 (Indonesia to Papua New Guinea, northern Australia and New Caledonia) ..... ***Helcogramma gymnauchen***

16b. Orbital tentacle present; tubular pored lateral-line scales 20–40 17

17a. Males with a narrow horizontal suborbital white streak; transverse scales 9–10 + 9–10 (Andaman Sea and Taiwan to Vanuatu) ..... ***Helcogramma trigloides***

17b. Males without a narrow horizontal suborbital white streak; transverse scales 6–7 + 7–8 (Vanuatu to American Samoa) ..... ***Helcogramma hudsoni***

18a. Supraorbital tentacle present 19

18b. Supraorbital tentacle absent 22

19a. Males with posterior half of body, including caudal and anal fins, black (Solor, Indonesia) ..... ***Helcogramma solorensis***

19b. Males without black posterior half of body 20

20a. Males with long fleshy protuberance on upper lip (Andaman Sea to Philippines and Vanuatu) ..... ***Helcogramma rhinoceros***

20b. Males without protuberance on upper lip 21

21a. Body dusky in males (reddish in life), with about 4 whitish saddles; pelvic fin pale (Red Sea and Oman) .. ***Helcogramma obtusirostris***

21b. Body plain grayish or pale in males, no saddles; pelvic fin blackish in males (widespread western Pacific) ***Helcogramma williamsi***

22a. Tubular pored lateral-line scales 34–38 (New Caledonia to Solomon Isl.) ...***Helcogramma novaecaledoniae***

22b. Tubular pored lateral-line scales 12–28 23

23a. Anal fin with 4 black blotches (Malaysia to Japan, south to Indonesia and Vanuatu) ..... ***Helcogramma fuscipectoris***

23b. Anal fin either pale or dark, without black blotches 24

24a. Males with blackish anal fin and 8–10 brown body bars (Andaman Sea east to Philippines and Solomon Islands) .....***Helcogramma springeri***

24b. Males without dark anal fin and body bars 25

25a. Total mandibular pores 10–17; upper jaw length more than 120 (Malaysia to Micronesia and Tonga) ..... ***Helcogramma capidata***

25b. Total mandibular pores 7–9; upper jaw length less than 115 26

26a. Males with a black face mask reaching to nape, leaving preorbital and most of prepectoral region whitish; preanal-fin length 475–543 (Nusa Tenggara, Indonesia) .....***Helcogramma kranos***

26b. Males with black mask restricted to lower half of head, leaving nape whitish; preanal-fin length 445–478 (Andaman Sea, Cocos Keeling and Christmas Islands, Japan south to Papua New Guinea, east to Palau, Marshall, and Society Islands) .....***Helcogramma chica***

Comparative material (*H. randalli* and the species of the *H. steinitzi* species complex):

Helcogramma microstigma Holleman, 2006: ROM 73409 (5 paratypes), Comores; 73410 (1 paratype), Comores; ROM 76683 (2 paratypes), Comores.

Helcogramma randalli Williams & Howe, 2003: SMF 35955 (11, 14.6–28.0 mm SL), Indonesia, Komodo region, S. Rinca Island, yellow wall, 08º47.077' S 119º40.449' E, 1–4 m depth, Mark Erdmann, St. MVE-16-043, July 2016.

Helcogramma rosea Holleman, 2006: ROM 76679 (holotype), Andaman Sea, Thailand; ROM 76680 (1 paratype), Andaman Sea, Thailand.

Helcogramma steinitzi Clark, 1980: USNM 205787 (holotype), Gulf of Aqaba, Egypt; HUJ 17628 (2), Gulf of Aqaba, Egypt; HUJ 18280 (1), Gulf of Aqaba, Israel; SMNS 22556 (1), Gulf of Aqaba, Egypt; USNM 205788 (2 paratypes), Gulf of Aqaba, Egypt; USNM 205789 (3 paratypes), Gulf of Aqaba, Egypt; USNM 205790 (4 paratypes), Gulf of Aqaba, Egypt; USNM 205781 (11 paratypes), Gulf of Aqaba, Egypt; USNM 205792 (6 paratypes), Gulf of Aqaba, Egypt; USNM 205824 (7 paratypes), Gulf of Aqaba, Egypt; USNM 205826 (1 paratype), Red Sea, Eritrea; USNM 205828 (1 paratype), Red Sea, Eritrea; USNM 205830 (1 paratype), Red Sea, Eritrea; USNM 205832 (1 paratype), Red Sea, Eritrea; USNM 205833 (17 paratypes), Gulf of Aqaba, Egypt.

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