

## A New Sinistral Flounder, *Engyprosopon kushimotoensis*, from Kushimoto, Kii Peninsula (Pleuronectiformes: Bothidae)

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**Abstract** A specimen of the genus *Engyprosopon*, washed ashore recently on a beach by a typhoon, is compared with its congeners and described as new to science. The new species compares well with other members of the genus, all of which share serrated gill rakers, uniserial teeth on the upper jaw, and a small number of gill rakers. It differs from all previously described species in having an extremely narrow interorbital width, a long pectoral fin on the right side and combinations of its proportional measurements and counts. A key to 7 species known from waters of Japan is provided.

**Key words:** *Engyprosopon kushimotoensis* sp. nov., key, Bothidae, Japan.

While undertaking a taxonomic review of the genus *Engyprosopon*, we came across an unusual specimen of the genus, found by the third author on Sabiura beach in front of Kushimoto Aquarium, Kii Peninsula, following a typhoon. The specimen, characterized by having an extremely narrow interorbital space and a long pectoral fin on the blind side, could not be identified with any of the 27 recognized species of *Engyprosopon* (Fowler, 1934; Norman, 1934; Amaoka and Imamura, 1990; Hensley and Suzumoto, 1990; Quero and Golani, 1990; Amaoka *et al.*, 1993; Amaoka and Mihara, 1995; Amaoka and Séret, 2005a, 2005b). The species is herein described as new to science. A key to Japanese species is also provided.

The holotype and only known specimen is deposited at the National Museum of Nature and Science (NSMT). Methods for making counts and measurements follow those of Hubbs and Lagler (1958) and Amaoka *et al.* (1993). Scale definitions follow those of Roberts (1993). Measurements were made with dial calipers and dividers to the nearest 0.1 mm. Vertebral counts were made and the caudal skeleton examined from radiographs. Type material of the following

species were examined: *E. latifrons*, *E. longipterum*, *E. natalensis*, *E. rostratum*, *E. sechellensis*, and *E. septempes* (for catalogue numbers and locality data, see Amaoka *et al.*, 1993). Institutional abbreviations follow Leviton *et al.* (1985) except for the Kushimoto Marine Park Center (KMPC).

*Engyprosopon kushimotoensis* sp. nov.

(New Japanese name: Kushimoto-darumagarei)

(Figs. 1–4)

**Holotype.** NSMT-P 76957 (formerly KMPC-030810-10), male, 58.9 mm SL, Kushimoto, Nishimuro-gun, Wakayama Prefecture, washed ashore by typhoon, 3 August 2003.

**Diagnosis.** A species of the genus *Engyprosopon* distinguished from congeners in having uniserial teeth on the upper jaw, a small number of serrated gill rakers (0+7), an extremely narrow interorbital width (7.76 in head length), and a long pectoral fin on the blind side (1.81 in head length).

**Description.** Counts and proportional measurements are given in Table 1. The following morphometrics are expressed in percent of SL: head length 27.7; body depth 51.4; snout length

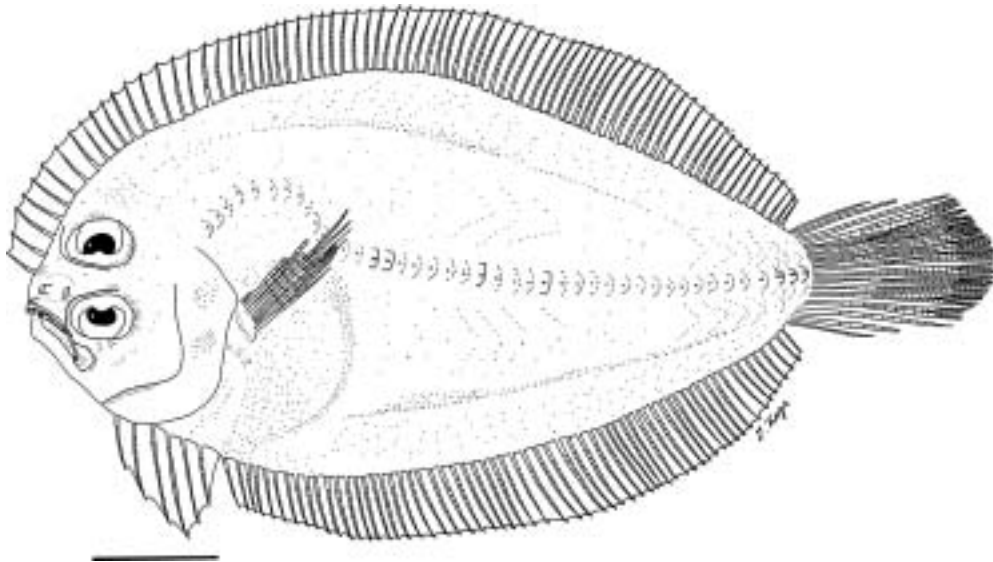


Fig. 1. *Engyprosopon kushimotoensis* sp. nov., holotype, NSMT-P 76957, male, 58.9 mm SL, from Kushimoto, Wakayama Prefecture, Japan. Scale indicates 10 mm.

5.9; upper eye diameter 9.0; lower eye diameter 9.2; interorbital width 3.6; upper jaw length on ocular side 11.9, on blind side 12.1; lower jaw length on ocular side 14.9, on blind side 15.1; caudal peduncle depth 12.2; pectoral fin length on ocular side 18.7, on blind side 15.3; pelvic fin length on ocular side 12.1, on blind side 11.9; base of pelvic fin on ocular side 10.2, on blind side 3.4; length of longest dorsal fin ray 15.3; length of longest anal fin ray 16.1; length of mid-caudal fin ray 23.6.

Body oval, depth somewhat more than half length of body, greatest depth slightly anterior to mid-body; dorsal and ventral contours gently arched. Caudal peduncle deep, depth less than 25% body depth.

Head large, length more than 25% SL; dorsal profile gently arched, with a slight concavity anterior to the interorbital area. Snout long, slightly protruding, length about 70% of eye diameter. A prominent rostral spine present near tip of snout just dorsal to tip of upper jaw. Eyes large, diameter more than 80% of upper jaw length; lower eye placed slightly in advance of upper eye. Orbital spine absent. Interorbital bone highly elevated, narrow, and deeply concave, width less than 50%

of eye diameter. Nostrils on ocular side situated slightly ventral to midline, between and somewhat anterior to eyes; anterior nostril tubular, with a flap directed posteriorly; nostrils on blind side small, placed below origin of dorsal fin, similar in shape to those on ocular side.

Mouth large, opening oblique; maxilla extending posteriorly to vertical through mid-point of lower eye; anterior tip of upper jaw projecting beyond tip of lower jaw, when mouth closed. Teeth on upper jaw sharp, uniserial, some at anterior tip of jaw enlarged; lower jaw teeth uniserial, nearly equal in size and spacing to lateral teeth of upper jaw. Scales deciduous, large; ocular-side scales ctenoid, with short, peripheral ctenii on central posterior margin; scales cycloid on blind side (Fig. 3A). Gill rakers on lower limb of first arch short, serrated, with few spines; gill rakers absent on upper limb (Fig. 3B).

Pectoral fin of ocular side short, slightly less than 70% of head length; pectoral fin of blind side long, length about 82% of that of ocular side. Anteriormost ray of pelvic fin of ocular side inserted at tip of isthmus, fourth pelvic-fin ray of ocular side opposite to first ray of blind-side pelvic fin. Tip of isthmus at vertical through mid-

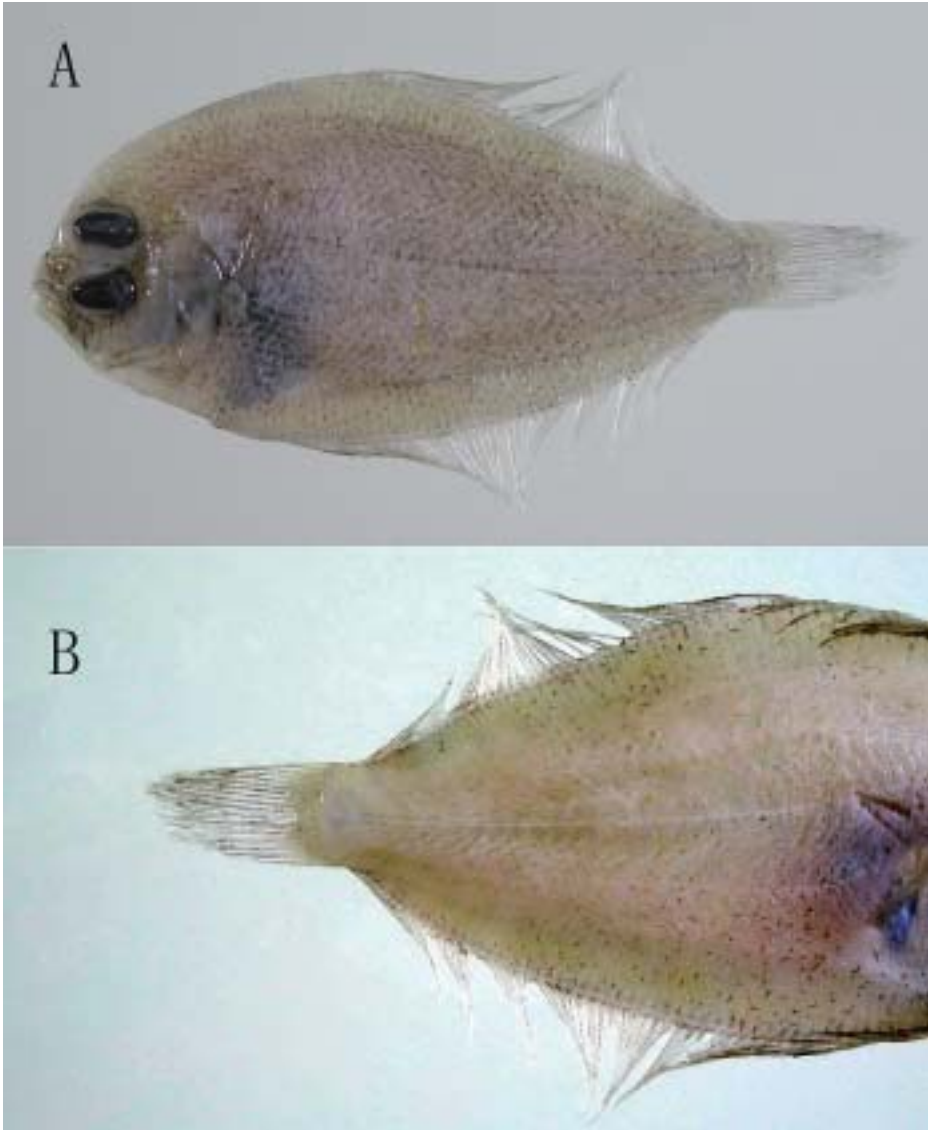


Fig. 2. *Engyprosopon kushimotoensis* sp. nov., holotype, NSMT-P 76957, male, 58.9 mm SL, from Kushimoto, Wakayama Prefecture, Japan. A: ocular-side body; B: blind-side trunk (B).

point of lower eye. Three upper- and lowermost rays of caudal fin simple, remaining caudal rays branched.

**Coloration in alcohol:** Ground color on ocular side grayish brown; posterior half of upper jaw and area around eyes somewhat darker than remaining surface; ground color on blind side with dark traces on body, head pale yellow. All fins on ocular side grayish with traces of darker

spots.

**Sexual dimorphism:** The presence of a rostral spine and dark pigmentation on the blind-side body (Figs. 1–2) are sexually dimorphic features that characterize males of other members of the genus *Engyprosopon*. The holotype and only known specimen of *Engyprosopon kushimotoensis* is a male.

**Etymology.** Named for the type locality,

Table 1. Comparison of morphometric and meristic characters between *E. kushimotoensis* and related species. Highlighted features in Table are discriminative characters between *E. kushimotoensis* and the other species. All data based on type specimens. M = male, F = female, O = ocular side, B = blind side, HL = head length.

	<i>E. kushimotoensis</i>	<i>E. latifrons</i>	<i>E. longipterum</i>	<i>E. natalensis</i>	<i>E. rostratum</i>	<i>E. sechellensis</i>	<i>E. septempes</i>
Number of type specimens	1	5	7	2	33	1	28
SL (mm)	58.9	52.8–78.4	62.5–82.3	44.2–62.7	31.0–72.0	56.9	28.3–70.5
<b>Morphometric in SL:</b>							
Head length	3.61	3.41–3.88	3.38–3.55	3.71–3.75	3.23–3.60	3.56	2.92–3.47
Body depth	1.94	1.93–2.04	2.04–2.16	1.99–2.00	1.93–2.25	2.22	1.81–2.22
<b>Morphometrics in HL:</b>							
Snout length	4.66	4.06–4.39	4.19–4.78	4.45–4.92	3.93–4.69	4.57	3.83–4.67
Upper eye diameter	3.08	3.67–4.10	3.17–3.48	3.28–3.52	3.03–3.82	3.56	2.92–3.78
Lower eye diameter	3.02	3.69–4.10	3.11–3.51	3.28–3.52	3.20–3.90	3.64	2.92–3.76
Interorbital width (M)	7.76	2.60–3.62	3.07–3.47	6.56	2.59–5.08	3.72	2.71–10.50
Interorbital width (F)		5.29	3.75–6.22	9.94	4.83–22.75		7.29–16.8
Upper jaw length (O)	2.33	2.42–2.77	2.44–2.57	2.68–2.81	2.25–2.84	2.67	2.31–2.74
Upper jaw length (B)	2.3	2.45–2.77	2.44–2.53	2.60–2.68	2.23–2.76	2.67	2.31–2.73
Lower jaw length (O)	1.85	1.97–2.07	1.86–2.04	2–2.11	1.79–2.07	2.03	1.82–2.02
Lower jaw length (B)	1.83	1.82–2.02	1.82–1.96	1.90–2.01	1.69–1.95	1.95	1.71–1.99
Depth of caudal peduncle	2.26	2.17–2.52	2.60–2.86	2.27–2.32	2.16–2.68	2.5	2.21–2.98
Pectoral-fin length (O, M)	1.48	1.50–1.66	0.55–0.56	1.55	0.85–1.45	1.16	1.45–1.88
Pectoral-fin length (O, F)		1.59	0.87–1.01	1.67	1.43–1.65		1.45–1.88
Pectoral-fin length (B)	1.81	2.37–2.59	2.27–2.61	2.6	2.41–3.25	2.32	2.48–3.29
Pelvic-fin length (O, M)	2.3	1.43–2.06	3.10–3.17	2.56	1.48–2.24	1.98	1.23–2.23
Pelvic-fin length (O, F)		2.31	3.10–3.17		2.15–2.53		2.15–2.59
Pelvic-fin length (B)	2.33	2.32–2.77	2.71–3.20	2.82	2.38–3.06	2.5	2.14–3.16
Base length of pelvic-fin (O)	2.72	3.13–3.43	2.52–2.79	3.02	2.93–3.47	3.27	2.64–3.50
Base length of pelvic-fin (B)	8.15	7.1–9.05	8.19–11.28	7.87–8.45	8.00–10.11	8.89	7.17–10.53
Longest dorsal-fin ray	1.81	2.03–2.22	2.10–2.16	2.01	1.76–2.11	2.16	1.85–2.47
Longest anal-fin ray	1.72	2.03–2.20	2.09–2.37	1.97	1.72–2.11	2.16	1.82–2.33
Caudal-fin ray	1.17	1.38–1.47	1.20–1.37	1.31–1.32	1.15–1.33	1.26	1.25–1.53
<b>Counts:</b>							
Dorsal-fin rays	81	77–88	84–89	86–87	87–96	83	80–89
Anal-fin rays	62	59–65	64–69	63–65	67–76	62	60–68
Pectoral-fin rays (O)	11	11–13	10–11	11–12	11–14	12	11–13
Pectoral-fin rays (B)	9	8–9	9	9	7–10	9	7–10
Pelvic-fin rays (O)	6	6	6	6–7	6	6	7(6)
Pelvic-fin rays (B)	6	6	6	6	6	6	7(6)
Caudal-fin rays	3+11+3	2–3+11–12+2–3	3+10–11+3–4	3+11+3	2–3+11–13+2–3	3+12+2	2–3+11–13+2–3
Scales in lateral line	43	38–42	45–51	42	42–46	42	40–45
Gill rakers first arch	0+7	0+7–8	0+8–10	0+6	0+7–9	0+6	0+8–10
Vertebrae	10+25	10+24–26	10+24–25	10+25	10+25–26	10+25	10+24–25

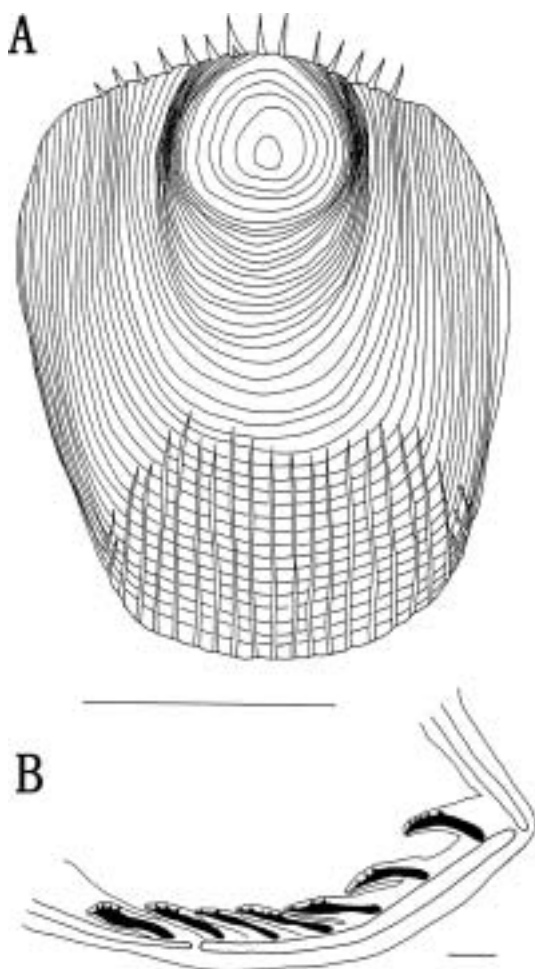


Fig. 3. A scale (A) and first gill arch (B) from ocular side in *Engyprosopon kushimotoensis* sp. nov. from the holotype, NSMT-P 76957, male 58.9 mm SL. Scales indicate 0.5 mm (above) and 1 mm (below).

Kushimoto, Wakayama Prefecture.

**Distribution.** Known only from Kushimoto, Wakayama Prefecture, Kii Peninsula.

**Comparison.** The new species is clearly a member of the genus *Engyprosopon*, having a divided caudal skeleton and showing sexual dimorphism in the rostral spine and body coloration on the blind side (Amaoka, 1969; Amaoka *et al.*, 1993; Hensley and Amaoka, 2001). The present description brings the number of recognized species of the genus to 27, all known from waters of the Indo-Pacific Ocean (Fowler, 1934; Nor-

man, 1934; Amaoka and Imamura, 1990; Hensley and Suzumoto, 1990; Quero and Golani, 1990; Amaoka *et al.*, 1993; Amaoka and Mihara, 1995; Amaoka and Séret, 2005a, 2005b).

The new species is most similar to *E. latifrons* (Regan, 1908); *E. longipterum* Amaoka, Mihara and Rivaton, 1993; *E. natalensis* (Regan, 1920); *E. rostratum* Amaoka, Mihara and Rivaton, 1993; *E. sechellensis* (Regan, 1908), and *E. septempes* Amaoka, Mihara and Rivaton, 1993, in having serrated gill rakers, a small number (fewer than 10) of gill rakers on the lower limb of the first gill arch, and in having uniserial teeth on the upper jaw (Table 1). It is easily separated from them, however, by the longer pectoral fin on the blind side (1.81 in head length vs more than 2.27 in these others), its narrower interorbital width (7.76 in head length vs 2.56–6.56, excepting for 2.71–10.50 in *E. septempes*), and many other characters as highlighted in Table 1.

In other ways, the new species resembles *E. rostratum* and *E. septempes* in having a longer upper jaw on the ocular side (2.33 in head length vs 2.25–2.84 and 2.31–2.74), a larger upper eye (3.08 in head length vs 3.03–3.82 and 2.92–3.78), and larger lower eye (3.02 vs 3.20–3.90 and 2.92–3.76), but it differs from *E. rostratum* in having a longer pelvic-fin base on the ocular side (2.72 vs 2.93–3.47), fewer dorsal and anal-fin rays (81 vs 87–96 and 62 vs 67–76), and a narrow interorbital width (7.76 vs 2.59–5.08) (Fig. 4). From *E. septempes*, *E. kushimotoensis* differs in having a shorter head (3.61 in SL vs 2.92–3.47), fewer pelvic-fin rays (6 vs 7, rarely 6), and gill rakers (0+7 vs 0+8–10), and a narrower interorbital width, when compared with male *E. septempes* of about equal size (Fig. 4).

**Key to Japanese *Engyprosopon* species.** To facilitate identifications of these similar species we provide a key to the 7 species of *Engyprosopon* known from Japanese waters.

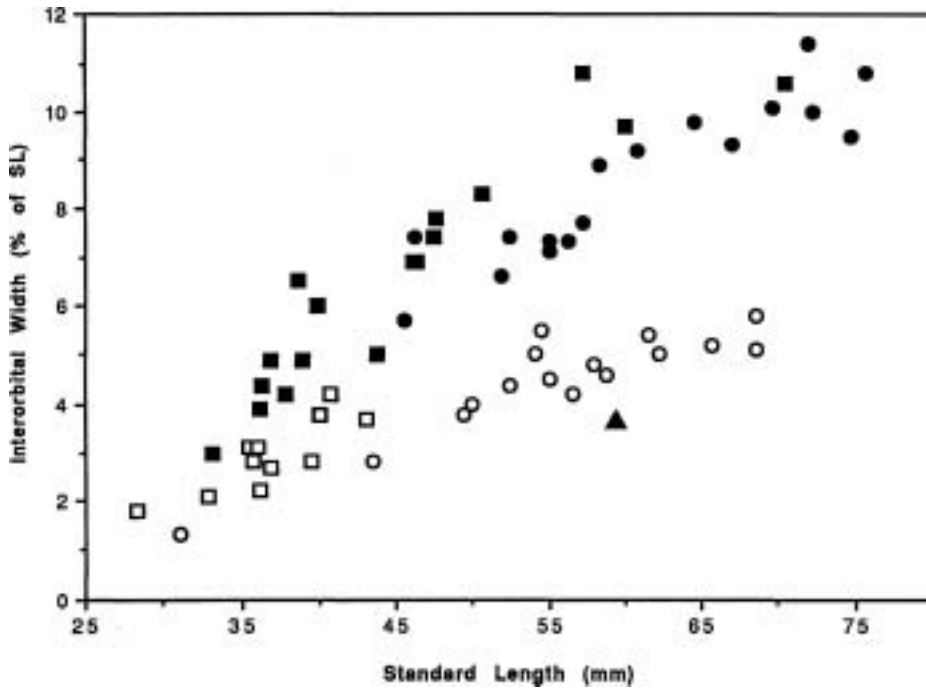


Fig. 4. Comparison of interorbital width in *Engyprosopon kushimotoensis* sp. nov., *E. rostratum* and *E. septempes*. ▲, male (holotype) of *E. kushimotoensis*; ○, males and ●, females of *E. rostratum*; □, male and ■, females of *E. septempes*.

**Key to Species of *Engyprosopon* in Japanese Waters**

- 1a. Distinct black blotch present at middle of upper- and lowermost rays of caudal fin . . . . . 2
- 1b. No black blotches present on caudal fin . . . . . 4
- 2a. Gill rakers on lower limb 13–18; some dark bands present at head margin anterior to interorbital region; strong ctenoid scales along head margin; a black blotch on caudal fin between 3rd and 6th rays counted from upper and lower margins of caudal fin, respectively . . . . . *E. xistrius*
- 2b. Gill rakers on lower limb 6–8; no dark bands or strong ctenoid scales present on margin of head; a black blotch on caudal fin between 2nd or 3rd and 4th rays counted from upper and lower margins of caudal fin, respectively . . . . . 3
- 3a. Body ovate, its depth more than 50% of SL; eye diameter longer than snout length; ocular side pectoral fin in males not elongated, its length about equal to or less than head length; a black blotch ranged between 3rd and 4th rays counted from upper and lower margins of caudal fin, respectively . . . . . *E. gandisquama*
- 3b. Body rather elongate, its depth less than 50% of SL; eye diameter about equal to or less than snout length; ocular side pectoral fin in males elongated and filamentous, usually with 2nd ray longer than head length; a black blotch ranged between 2nd and 4th rays counted from upper and lower margins of caudal fin, respectively . . . . . *E. multisquama*
- 4a. Posterior margin of all gill rakers on first arch serrated; pelvic fin with elongate ray and distinct black spots . . . . . 5
- 4b. Posterior margin of all gill rakers on first arch smooth; pelvic fin without elongate ray and distinct black spots . . . . . 6

- 5a. Eye small, upper eye diameter 7–8% of SL; interorbital width wide, 6.4–8.5% of SL (50–66 mm SL); upper jaw teeth in 2 rows; pelvic-fin ray in males elongated; males with pelvic-fin membrane with many black spots . . . . . *E. longipelvis*
- 5b. Eye large, upper eye diameter 9% of SL; interorbital width narrow, 3.6% of SL (59 mm SL); upper jaw teeth in 1 row; pelvic fin in males no elongated, no black spots on fin membrane. . . . . *E. kushimotoensis*
- 6a. Upper jaw teeth in 2 rows; ocular-side pectoral fin elongate, usually longer than head length; scales in lateral line 41–48 . . . . . *E. maldivensis*
- 6b. Upper jaw teeth in 1 row; ocular-side pectoral fin not elongate, shorter than head length; scales in lateral line 36–40. . . . . *E. hureaui*

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