Epigonus draco, a New Species of Deepwater Cardinalfish (Perciformes: Epigonidae) from the Western Pacific

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A new epigonid fish, *Epigonus draco* n. sp., is described on the basis of six specimens (88.8–160.1 mm in standard length: SL) collected from the Philippines, Solomon Islands, and Vanuatu in the Western Pacific. This species belongs to a subgroup of *Epigonus*, known as the “*Epigonus constanciae* group,” whose members have a pungent opercular spine, more than 40 pored lateral-line scales (47–49 to the end of the hypural + 3–4 on the caudal fin), and VII–I, 10 dorsal-fin rays. The new species is distinguished from other congeners of the group in having the following combination of characters: absence of a maxillary mustache-like process, absence of ribs on the last abdominal vertebra, total gill rakers 22–23; pyloric caeca 7–9; pectoral-fin rays 19–20; scales below lateral line 9; vertebrae 10 + 15; uppermost margin of pectoral-fin base lower than horizontal line through center of eye; proximal radial of first anal-fin pterygiophore slender; and mouth cavity black. In addition, *Epigonus chilensis* Okamoto, 2012 is rediagnosed based on specimens from near its type locality.

Key Words: *Epigonus constanciae* group, *Epigonus draco*, *Epigonus chilensis*, opercular spine, Philippines, Solomon Islands, Vanuatu, Chile, new species, rediagnosis.

Introduction

Since the 1990s, 12 species of the deepwater cardinalfish genus *Epigonus* Rafinesque, 1810 have been described from the Pacific, Atlantic, and Indian Oceans by many ichthyologists (e.g., McCosker and Long 1997; Ida *et al.* 2007; Krupp *et al.* 2009; Okamoto and Motomura 2013; Parin *et al.* 2012). Of these, Okamoto *et al.* (2012) and Okamoto and Aungtonya (2013) considered *Epigonus merleni* McCosker and Long, 1997 and *Epigonus trunovi* Parin and Prokofiev in Parin *et al.*, 2012 to be junior synonyms of other congeners. The genus currently comprises 35 valid species divided into four species groups: the *E. constanciae* group (17 species: Okamoto 2012; Okamoto and Aungtonya 2013); the *E. oligolepis* group (five species: Okamoto and Motomura 2011); the *E. pandionis* group (nine species: Okamoto and Motomura 2013); and the *E. telescopus* group (four species: Abramov 1992; Okamoto *et al.* 2012).

Recently, while investigating material of *Epigonus* from the Western Pacific deposited in the California Academy of Sciences and the French Muséum national d'Histoire naturelle, the author found six specimens with features that did not agree with those of any known species of this genus. In the present report, a new species belonging to the *E. constanciae* group is described based on these specimens.

Materials and Methods

Meristic and morphometric methods followed Mayer (1974) and Okamoto (2011). The number of missing later-

al-line scales was estimated by counting scale pockets. The number of pored lateral-line scales on the caudal fin is represented as “+*n*”. The first caudal vertebra is defined as the first vertebra bearing a distinct hemal spine. Measurements were made with calipers to the nearest 0.1 mm. Terminology and formula of the supraneural bones follow Mabey (1988) and Ahlstrom *et al.* (1976), respectively. Counts of supraneurals, vertebrae, and ribs were taken from radiographs. The term “maxillary mustache-like process” is used for a lateral process on the maxillary head (see Okamoto 2011: fig. 3; Okamoto 2012: fig. 2). The number of pyloric caeca and sex were determined by dissection of the right side of the abdomen. Standard length is abbreviated as SL. Institutional abbreviations for the depositories of the material examined are: CAS (California Academy of Sciences, San Francisco); CSIRO (Commonwealth Scientific and Industrial Research Organization, Marine and Atmospheric Research, Australian National Fish Collection, Tasmania); FAKU (Fish Collection of Kyoto University, Maizuru Fisheries Research Station, Kyoto); FUMT (Department of Fisheries, University of Tokyo); MNHN (Muséum national d'Histoire naturelle, Paris); PMBC (Phuket Marine Biological Center, Phuket); and USNM (Smithsonian Institution National Museum of Natural History, Suitland).

Epigonus draco n. sp.

[New English name: Dragon Deepwater Cardinalfish]
(Figs 1–2; Table 1)

Epigonus ctenolepis (not of Mochizuki and Shirakihara, 1983): Iwamoto and McCosker 2014: 291, fig. 122 (between Luzon and Mindoro Islands, Philippines).

Fig. 1. *Epigonus draco* n. sp. A, MNHN 2006-0589, holotype, 127.4 mm SL, Solomon Islands; B, CAS 235796, paratype, fresh specimen, 160.1 mm SL, Philippines (photographed by D. Catania).

Holotype. MNHN 2006-0589, 127.4 mm SL, male, 07°43'34"S, 158°29'24"E, Solomon Islands, 391–623 m depth, 25 October 2004, bottom trawl.

Paratypes. Five specimens. CAS 235796, 160.1 mm SL, male, 13°36'7"N, 120°23'2"E, between Luzon and Mindoro Islands, Philippines, 541–636 m depth, 1 June 2011. MNHN 2006-0063, two specimens, 110.0–145.0 mm SL, male and sex unknown, 8°41'16"S, 157°41'27"E, Solomon Islands, 786 m depth, 5 November 2004. MNHN 2012-0836, 128.1 mm SL, sex unknown, 15°41'31"S, 167°01'19"E, west of Malo Island, Vanuatu, 481 m depth, 17 September 2006. MNHN 2006-0684, 88.8 mm SL, male, same data as holotype.

Diagnosis. A species of *Epigonus* with the following combination of characters: dorsal-fin rays VII–I, 10; pectoral-fin rays 19–20; total gill rakers 22–23; pyloric caeca 7–9; pored lateral-line scales 47–49+3–4; scales below lateral-line 9; vertebrae 10+15; opercular spine present; maxillary mustache-like process absent; ribs absent on last abdominal vertebra; uppermost margin of pectoral-fin base lower than horizontal line through center of eye; proximal radial of first anal-fin pterygiophore slender; and mouth cavity black.

Description. Counts and measurements of holotype and paratypes given in Table 1. Body slender, laterally compressed, deepest at pectoral-fin base; nape not humped. Head large, slightly compressed. Maxillary mustache-like process absent. Snout short and round, length subequal to

interorbital width; two nostrils closely set at level of upper edge of pupil, anterior nostril without membranous tube, posterior nostril elliptical without dermal flap. Eye large, round, orbital diameter greater than postorbital length; bony rim of orbit raised above dorsal profile; interorbital region flat. Mouth large, terminal; gape oblique; posterior margin of maxilla extending to below anterior margin of pupil; lower jaw slightly projecting when mouth closed; anteriorly projecting teeth or nub-like structure absent on symphysis of lower jaw. Teeth minute, arranged in single row on maxilla and dentary, in two or three rows on symphysis of lower jaw; vomerine teeth present, forming broad triangular patch; palatine teeth present, arranged in one or two rows. Basihyal toothless. Opercular spine present, pungent, forming ridge (Fig. 2A); preopercular edges smooth. Origin of first dorsal fin above anterior part of pectoral fin; first dorsal-fin spine minute; third dorsal-fin spine longest. Spine of second dorsal fin short, thicker than first dorsal-fin's spines. First and second dorsal fins widely separated by gap longer than snout length; isolated dorsal-fin spine absent. Origin of anal fin below posterior portion of second dorsal-fin base; first anal-fin spine minute; second anal-fin spine short, about twice as long as second dorsal-fin spine. Posterior tip of pectoral fin not reaching vertical line drawn from anus. Upper margin of pectoral-fin base lower than horizontal line through center of eye (Fig. 5A). Caudal fin deeply forked. Anus located slightly anterior to

Table 1. Counts and measurements of *Epigonus draco* n. sp.

	Holotype	Paratypes (n=5)
Standard length (mm)	127.4	88.8–160.1
Counts		
Dorsal-fin rays	VII-I, 10	VII-I, 10
Anal-fin rays	II, 9	II, 9
Pectoral-fin rays	20	19–20
Pored lateral-line scales	49+4	47–49+3–4
Scales above lateral line	3	3
Scales below lateral line	9	9
Gill rakers	6+17=23	6+16–17=22–23
Pyloric caeca	8	7–9
Vertebrae	10+15	10+15
Measurements (% standard length)		
Head length	32.4	33.0–34.4
Head width	16.5	16.0–18.6
Head height	16.8	16.6–18.6
Body depth	17.2	15.3–18.3
Body width	15.3	13.6–18.6
Caudal-peduncle depth	8.8	8.1–9.1
Caudal-peduncle length	24.2	23.2–25.6
Orbital diameter	14.0	13.7–17.6
Interorbital width	7.3	7.0–8.4
Postorbital length	10.9	11.0–11.9
Upper-jaw length	10.4	11.1–12.9
Lower-jaw length	14.9	13.7–15.3
Snout length	7.7	7.0–8.4
Pre-1st dorsal-fin length	36.3	36.8–39.6
Pre-2nd dorsal-fin length	60.8	59.9–63.5
Pre-pectoral-fin length	32.4	34.5–36.7
Pre-pelvic-fin length	35.7	35.9–37.3
Pre-anus length	55.4	54.8–57.8
Pre-anal-fin length	66.8	66.3–69.0
1st spine length on 1st dorsal-fin	3.0	2.2–3.0
2nd spine length on 1st dorsal-fin	12.6	12.3–13.7
3rd spine length on 1st dorsal-fin	broken	13.9–14.2
2nd dorsal-fin spine length	broken	5.7–6.2
1st anal-fin spine length	2.4	1.5–2.6
2nd anal-fin spine length	6.5	5.9–7.2
Pelvic-fin spine length	10.6	9.5–11.6
1st dorsal-fin base	12.1	9.8–12.9
2nd dorsal-fin base	10.2	8.3–10.2
Anal-fin base	8.8	9.0–9.5
Pectoral-fin length	12.9	14.4–15.8
Pelvic-fin length	14.3	13.2–16.6

vertical line through origin of second dorsal fin. Ribs absent on last abdominal vertebra (Fig. 2B). Supraneural bones three (0+0/0+2/1+1/1). Scales deciduous, weakly ctenoid except for pored lateral-line scales (cycloid), covering whole body except area anterior to rim of orbit and surfaces of jaws; scales also present on bases of second dorsal, anal, and caudal fins; series of pored lateral-line scales complete, 3–4 pored scales on caudal fin. No trace of luminous organ around belly or visceral organ.

Color when fresh (Fig. 1B). Body and all fins uniformly dark-brown with dark-edged scale pockets forming a reticulate pattern on skin (skin of trunk damaged). Head light brown, and opercle silvery-white.

Fig. 2. *Epigonus draco* n. sp., MNHN 2006-0589, holotype, 127.4 mm SL. A, opercular region (arrow pointing to pungent opercular spine); B, radiograph of abdomen (arrow pointing to last abdominal vertebra, bearing no ribs).

Color in alcohol (Fig. 1A). Body and all fins uniformly light-brown with dark-edged scale pockets forming a reticulate pattern on skin. Snout dark-brown; opercular region, posterior half of tongue, and mouth cavity black.

Distribution. The holotype and paratypes were collected from the Philippines, the Solomon Islands, and Vanuatu in the Western Pacific (Fig. 3) at depths of 391–786 m.

Etymology. The specific name, *draco*, is a Latin noun (meaning “dragon”) referring to the slender body and distinct scale pattern on the body surface of the new species.

Comparison. *Epigonus draco* n. sp. belongs to the *E. constanciae* group defined by Okamoto (2012). The *E. constanciae* group is distinguished from the other three species groups of the genus (the *E. oligolepis* group, the *E. pandionis* group, and the *E. telescopus* group) in having a pungent opercular spine, more than 40 pored lateral line-scales, and VII-I, 8–10 dorsal-fin rays. Besides *E. draco*, this species group comprises 17 species as well (Okamoto 2012; Okamoto and Aungtonya 2013): *E. affinis* Parin and Abramov, 1986; *E. atherinoides* (Gilbert, 1905); *E. chilensis* Okamoto, 2012; *E. constanciae* (Giglioli, 1880); *E. crassicaudus* de Buen, 1959; *E. ctenolepis* Mochizuki and Shirakihara, 1983;

Table 2. Frequency distribution of total gill rakers in four similar species of *Epigonus constanciae* group.

	20	21	22	23	24	25	26
<i>E. draco</i> n. sp.			1	5			
<i>E. atherinoides</i>	3	5	1	1			
<i>E. ctenolepis</i>					1	2	
<i>E. occidentalis</i>					1	31	6

Fig. 3. Collection localities of *Epigonus draco* n. sp. (solid stars). Fig. 4. Lateral view of proximal radial of first anal-fin pterygiophore. A, *Epigonus draco* n. sp., holotype, MNHN 2006-0589, 127.4 mm SL; B, *E. ctenolepis*, holotype, FUMT-P 1567, 98.0 mm SL.

E. elegans Parin and Abramov, 1986; *E. heracleus* Parin and Abramov, 1986; *E. lenimen* (Whitley, 1935); *E. machaera* Okamoto, 2012; *E. marimonticolus* Parin and Abramov, 1986; *E. mayeri* Okamoto, 2011; *E. occidentalis* Goode and Bean, 1896; *E. pectinifer* Mayer, 1974; *E. robustus* (Barnard, 1927); *E. thai* Prokofiev and Bussarawit in Parin et al., 2012;

Fig. 5. Position of uppermost margin of pectoral-fin base in three similar species of *Epigonus constanciae* group. A, *E. draco* n. sp., paratype, MNHN 2006-0063, 145.0 mm SL; B, *E. atherinoides*, FUMT 1570, 133.3 mm SL; C, *E. occidentalis*, USNM 393865, 140.2 mm SL.

and *E. waltersensis* Parin and Abramov, 1986. *Epigonus draco* is most similar to *E. ctenolepis* in having a small number of gill rakers (Table 2), lacking a pair of ribs on the last abdominal vertebra and a maxillary mustache-like processes, and having the upper margin of pectoral-fin base lower than a horizontal line through the center of the eye, but differs in having nine scales below the lateral line (vs 12–14 scales in *E. ctenolepis*), a more slender proximal radial of the first anal-fin pterygiophore (Fig. 4), and a black mouth cavity (vs paler).

Although *E. draco* n. sp. is similar to *E. atherinoides* and *E. occidentalis* in lacking a pair of ribs on the last abdominal vertebra and a maxillary mustache-like processes, the former differs from the latter two in having the uppermost margin of the pectoral-fin base lower than a horizontal line through the center of the eye (Fig. 5A) (vs subequal to the center of the eye in *E. atherinoides* and *E. occidentalis*: Fig. 5B, C, respectively). Furthermore, *E. draco* differs in the counts of pyloric caeca (7–9 vs 12–15 in *E. atherinoides*) and

Table 3. Comparison of selected characters among 18 species of the *Epigonus constanciae* group (modified from Okamoto 2012).

Species	Maxillary mustache-like process	Ribs on last AV	Gill rakers (total)	Vertebrae (AV+CV)	D2 rays	Pyloric caeca	Distribution
<i>E. affinis</i>	Absent	Absent	30–33	10+15	I, 9	8–10	eastern Central Atlantic
<i>E. atherinoides</i>	Absent	Absent	20–23	10+15	I, 10	12–15	western NP, Hawaiian Is., Nazca and Sala y Gomez Ridges
<i>E. chilensis</i>	Blunt	Present	28–31	11+14	I, 8–10	6–8	off Chile
<i>E. constanciae</i>	Sharp-pointed	Absent	30–35	10+15	I, 9	6–8	eastern Atlantic, Mediterranean
<i>E. crassicaudus</i>	Absent	Present	31–34	11+14	I, 9	6–7	off Chile
<i>E. ctenolepis</i>	Absent	Absent	24–25	10+15	I, 9–10	9–11	Japan
<i>E. draco</i> n. sp.	Absent	Absent	22–23	10+15	I, 10	7–9	WP (Philippines, Solomon Islands, and Vanuatu)
<i>E. elegans</i>	Absent	Present	30–33	10+15	I, 9	6–8	Nazca Ridge (eastern South Pacific)
<i>E. heracleus</i>	Absent	Present	28–32	11+14	I, 9	7–9	New Zealand
<i>E. lenimen</i>	Blunt	Present	28–34	11+14	I, 9	6–9	Australia, New Zealand
<i>E. machaera</i>	Blunt	Present	28–30	11+14	I, 9	7	New Zealand
<i>E. marimonticolus</i>	Absent	Absent ^a	29–32	10+15	I, 10	12–14	western Indian Ocean
<i>E. mayeri</i>	Sharp-pointed	Present	29–31	10+15	I, 9	5	eastern Central Atlantic
<i>E. occidentalis</i>	Absent	Absent	24–26	10+15	I, 10	8–10	Caribbean Sea, Gulf of Mexico, western Atlantic
<i>E. pectinifer</i>	Sharp-pointed	Present	26–30	10+15	I, 9	5–7	Japan, Emperor Seamounts, Australia, western Atlantic
<i>E. robustus</i>	Blunt	Present	30–32	11+14	I, 9	6–7	Indo-Pacific Ocean
<i>E. thai</i>	Absent	Absent	27	10+15	I, 10	12	Andaman Sea
<i>E. waltersensis</i>	Absent	Present	32	10+15	I, 9	6	western Indian Ocean

AV abdominal vertebrae, CV caudal vertebrae, D2 2nd dorsal fin, NP North Pacific, WP Western Pacific. ^a Rarely present, but reduced.

gill rakers [22–23 (mode 23) vs 24–26 (mode 25) in *E. occidentalis*; Table 2]. *Epigonus atherinoides* is distributed in the Western Central Pacific: the Philippines, the Kyushu-Palau Ridge, and Hawaiian Islands (Mochizuki and Shirakihara 1983; Mochizuki 1984, 1990), whereas *E. occidentalis* has been reported from the Caribbean Sea and Gulf of Mexico in the Western Atlantic (Mayer 1974).

Epigonus thai is so far known only from the holotype collected from the Andaman Sea. Recently, Okamoto and Aungtonya (2013) revealed that the original description of *E. thai* did not accurately report several important diagnostic characters, and they moved the species from the *E. oligolepis* group (*sensu* Okamoto and Motomura 2011) to the *E. constanciae* group. *Epigonus thai* is similar to the new species in lacking the maxillary mustache-like process as well as ribs on the last abdominal vertebra; however, the former differs in having higher counts of gill rakers (27 vs 22–23 in *E. draco* n. sp.) and pyloric caeca (12 vs 7–9).

Epigonus draco n. sp. can be distinguished from the remaining 13 species of the group in having fewer gill rakers (22–23 vs 28 or more in the others; Table 3).

Fishes of the genus *Epigonus* have a total of 25 vertebrae, with abdominal and caudal vertebral counts of either 10+15 or 11+14 (e.g., Abramov 1992; Parin and Abramov 1986; Okamoto *et al.* 2011; Okamoto 2012). *Epigonus draco* belongs to the former group with 10+15 vertebrae and is thus distinguished from the six other species that have 11+14, viz., *E. chilensis*, *E. crassicaudus*, *E. heracleus*, *E. lenimen*, *E. machaera*, and *E. robustus* (see Table 3).

In addition to the above-mentioned *E. atherinoides* and *E. pectinifer* of the *E. constanciae* group, *E. cavaticus* Ida, Okamoto and Sakaue 2007, *E. denticulatus* Dieuzeide 1950, and *E. lifouensis* Okamoto and Motomura 2013 are distributed in the Western Pacific. These three species belong to the *E.*

pandionis group defined by Okamoto and Motomura (2013) and can be easily distinguished from *E. draco* in lacking an opercular spine.

Remarks. In their list of deep-water fishes collected in 2011 in the Verde Island Passage in the Philippines, Iwamoto and McCosker (2014) identified a single specimen of the present genus as *E. ctenolepis*. This specimen was reexamined and described as a paratype (CAS 235796) of *E. draco* n. sp. in this study. *Epigonus ctenolepis* is a rare species, recorded only from off the Pacific coast of Japan (Mochizuki and Shirakihara 1983; Okamoto and Fukui 2011).

The shape of the proximal radial of the first anal-fin pterygiophore of *E. draco* distinguishes this species from *E. ctenolepis* (Fig. 4). This character is also useful for distinguishing species of other percoid fishes, e.g., those in the family Acropomatidae (e.g., Yamanoue and Matsuura 2002, 2004; Okamoto 2014).

Selected characters based on Okamoto (2012) and the distributions of the 18 species of the *E. constanciae* group, including the new species described herein, are compared in Table 3. Of these species, *E. chilensis* was originally described from five specimens (166.3–208.3 mm SL) collected off Chilean Patagonia, at depths of 315–340 m (Okamoto 2012). In the present study, six additional specimens (151.7–186.6 mm SL) of *E. chilensis* collected from near the type locality were found among specimens of the genus deposited in Kyoto University's Maizuru Fisheries Research Station (FAKU). On the basis of these latter specimens and the original description, *E. chilensis* is re-diagnosed herein as having the following combination of characters: a pungent opercular spine; ribs on the last abdominal vertebra; a toothless tongue; a blunt maxillary mustache-like process; a minute tubercle on the symphysis of the lower jaw (not

formed at $<ca.$ 170 mm SL); the pelvic-fin base located posterior to a vertical drawn from the origin of the pectoral fin; total gill rakers 28–30; vertebrae 11+14; pored lateral-line scales 46–49+4–6; dorsal-fin rays VII–I, 8–10 (mode 9 soft rays); pectoral-fin rays 16–18; pyloric caeca 6–8; body depth 24.2–31.7% SL; orbital diameter 12.4–15.6% SL; lower-jaw length 12.7–14.4% SL; and second anal-fin-spine length 15.9–21.3% SL.

Comparative material. *Epigonus chilensis*: FAKU 123285–123287, 3 specimens, 173.9–186.6 mm SL, 42°14'S, 74°55'W, off Chilean Patagonia, 29 December 1977; FAKU 123304–123305, 2 specimens, 151.7–183.0 mm SL, 48°32'S, 75°58'W, off Chilean Patagonia, 6 February 1978; FAKU 123333, 172.6 mm SL, 43°10'S, 75°00'W, off Chilean Patagonia, 30 December 1977. *Epigonus crassicaudus*: FAKU 123330–123332, 123334–123336, 6 specimens, 229.0–264.7 mm SL, 43°10'S, 75°00'W, off Chilean Patagonia, 30 December 1977. *Epigonus occidentalis*: USNM 270526, 62.6 mm SL, 11°02'03"N, 60°47'30"W, Trinidad and Tobago, 90 m depth, 22 September 1964; USNM 393863, 161.8 mm SL, 11°28'N, 74°67'W, off Colombia, Caribbean Sea, 823 m depth, 14 November 1970; USNM 393865, 2 specimens, 140.2–153.4 mm SL, 17°34'N, 62°42'W, north of St. John Is., U.S. Virgin Islands, 699 m depth, 5 June 1967. *Epigonus pectinifer*: USNM 395256, 90.7 mm SL, 27°76'N, 92°13'W, off Louisiana, U.S.A., 316 m depth, 21 October 2007. *Epigonus robustus*: CSIRO H 5375-02, 184.7 mm SL, 39°01'S, 46°32'E, southwestern Indian Ocean, 776–1017 m depth, 12 November 1999; CSIRO H 5398-01, 176.7 mm SL, CSIRO H 5398-02, 3 specimens, 190.4–197.2 mm SL, 39°01'S, 46°32'E, southwestern Indian Ocean, 712–1067 m depth, 13 November 1999; MNHN 1989-1136, 169.5 mm SL, 38°41'S, 77°41'E, Saint Paul Is., southern Indian Ocean, 1050–1110 m depth, 22 July 1986; MNHN 2004-2094, 167.4 mm SL, 31°11'S, 93°58'E, southern Indian Ocean, 552–1075 m depth, 4 July 2002; MNHN 2004-2432, 168.5 mm SL, 27°17'S, 87°21'E, southern Indian Ocean, sampling depth unknown, 2002. *Epigonus thai*: PMBC 26430, holotype, 59.2 mm SL, 6°44'N, 98°06'E, Andaman Sea, 303–313 m depth, 23 February 2000. In addition, other material of *Epigonus* was listed in Okamoto (2011, 2012) and Okamoto and Fukui (2011).

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References

- Abramov, A. A. 1992. Species composition and distribution of *Epigonus* (Epigonidae) in the world ocean. *Journal of Ichthyology* 32: 94–108.
- Ahlstrom, E. H., Butler, J. L., and Sumida, B. Y. 1976. Pelagic stromateoid fishes (Pisces, Perciformes) of the eastern Pacific: kinds, distribution, and early life histories and observations on five of these from the North-west Atlantic. *Bulletin of Marine Science* 26: 285–402.
- Ida, H., Okamoto, M., and Sakaue, J. 2007. *Epigonus cavaticus* (Teleostei: Perciformes), a new epigonid fish from Palau, western Central Pacific. *Ichthyological Research* 54: 131–136.
- Iwamoto, T. and McCosker, J. E. 2014. Deep-water fishes of the 2011 Hearst Philippine biodiversity expedition of the California Academy of Sciences. Pp. 263–332. *In*: Williams, G. C. and Gosliner, T. M. (Eds) *The Coral Triangle: the 2011 Hearst Philippine Biodiversity Expedition*. California Academy of Sciences, San Francisco.
- Krupp, F., Zajonz, U., and Khalaf, M. A. 2009. A new species of the deepwater cardinalfish genus *Epigonus* (Perciformes: Epigonidae) from the Gulf of Aqaba, Red Sea. *Aqua* 15: 223–227.
- Mabee, P. M. 1988. Supraneural and predorsal bones in fishes: development and homologies. *Copeia* 1988: 827–838.
- Mayer, G. F. 1974. A revision of the cardinalfish genus *Epigonus* (Perciformes, Apogonidae), with descriptions of two new species. *Bulletin of the Museum of Comparative Zoology* 146: 147–203.
- McCosker, J. E. and Long, D. J. 1997. A new species of the deepwater cardinalfish *Epigonus* (Perciformes: Epigonidae) from the Galápagos Islands. *Ichthyological Research* 44: 125–129.
- Mochizuki, K. 1984. Family Epigonidae. Pp. 146–147, pl. 133. *In*: Masuda, H., Amaoka, K., Araga, C., Uyeno, T., and Yoshino, T. (Eds) *The Fishes of the Japanese Archipelago*. Tokai University Press, Tokyo.
- Mochizuki, K. 1990. Apogonidae. Pp. 258–263. *In*: Amaoka, K., Matsuura, K., Inada, T., Takeda, M., Hatanaka, H., and Okada, K. (Eds) *Fishes Collected by the R/V "Shinkai Maru" around New Zealand*. Japan Marine Fishery Resources Research Center, Tokyo.
- Mochizuki, K. and Shirakihara, K. 1983. A new and rare apogonid species of the genus *Epigonus* from Japan. *Japanese Journal of Ichthyology* 30: 199–207.
- Okamoto, M. 2011. A new species of deepwater cardinalfish, *Epigonus mayeri*, from the eastern Central Atlantic, and redescription of *Epigonus heracleus* Parin and Abramov 1986 (Perciformes: Epigonidae). *Ichthyological Research* 58: 101–108.
- Okamoto, M. 2012. Two new species of the genus *Epigonus* (Perciformes: Epigonidae) from the South Pacific, with a definition of the *Epigonus constanciae* group. *Ichthyological Research* 59: 242–254.
- Okamoto, M. 2014. *Acropoma profundum*, a new species of lanternbelly (Teleostei: Perciformes: Acropomatidae) from the Solomon Islands. *Species Diversity* 19: 9–14.
- Okamoto, M. and Aungtonya, C. 2013. Re-examination of the holotype of *Epigonus thai* Prokofiev and Bussarawit: redescription and comparison with related species (Teleostei: Perciformes: Epigonidae). *Phuket Marine Biological Center Research Bulletin* 72: 49–53.
- Okamoto, M. and Fukui, A. 2011. Redescription of a rare deepwater cardinalfish, *Epigonus ctenolepis* Mochizuki and Shirakihara 1983, and comparison with related species (Perciformes: Epigonidae). *Ichthyological Research* 58: 388–392.
- Okamoto, M. and Motomura, H. 2011. *Epigonus carbonarius*, a new species of deepwater cardinalfish (Perciformes: Epigonidae) from the Marquesas Islands, with a redefinition of the *Epigonus oligolepis* group. *Ichthyological Research* 58: 155–160.

- Okamoto, M. and Motomura, H. 2013. Two new species of deepwater cardinalfish from the Indo-Pacific, with a definition of the *Epigonus pandionis* group (Perciformes: Epigonidae). *Ichthyological Research* 60: 301–311.
- Okamoto, M., Bartsch, P., and Motomura, H. 2012. *Epigonus merleni*, a junior synonym of *Epigonus macrops* (Actinopterygii: Perciformes: Epigonidae). *Species Diversity* 17: 123–126.
- Okamoto, M., Motomura, H., and Asahida, T. 2011. Redescription of a poorly known deepwater cardinalfish, *Epigonus affinis* (Actinopterygii: Perciformes: Epigonidae), and comparison with related species. *Species Diversity* 16: 85–92.
- Parin, N. V. and Abramov, A. A. 1986. Materials for a revision of the genus *Epigonus* Rafinesque (Perciformes, Epigonidae): species from the submarine ridges of the southern East Pacific and preliminary review of the “*Epigonus robustus* species-group”. *Transactions of the P. P. Shirshov Institute of Oceanology* 121: 173–194. [In Russian]
- Parin, N. V., Prokofiev, A. M., and S. Bussarawit. 2012. Two new species of the genus *Epigonus* (Perciformes: Epigonidae) from the Atlantic and Indian oceans. *Journal of Ichthyology* 52: 239–243.
- Yamanoue, Y. and Matsuura, K. 2002. A new species of the genus *Acropoma* (Perciformes: Acropomatidae) from the Philippines. *Ichthyological Research* 49: 21–24.
- Yamanoue, Y. and Matsuura, K. 2004. A review of the genus *Malakichthys* Döderlein (Perciformes: Acropomatidae) with the description of a new species. *Journal of Fish Biology* 65: 511–529.