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Review of the fish genus *Epinnula* Poey (Perciformes: Gempylidae), with description of a new species from the Pacific Ocean

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Abstract

The gempylid fish genus *Epinnula* is reviewed and two species are recognized. The type species *E. magistralis* is considered restricted to the western Atlantic Ocean and a new species from the Pacific Ocean is described. The new species, *Epinnula pacifica* **sp. nov.**, can be distinguished from *E. magistralis* by 17 or 18 dorsal-fin rays (vs. 15 or 16 in *E. magistralis*), 15 or 16 anal-fin rays (vs. 13 or 14), 247–268 total scales on lower lateral line (vs. 285–330), a deeper body, relatively high dorsal fin as reflected by the relatively long fin spines and rays, longer dorsal-fin and anal-fin bases, longer pectoral fin, and longer pelvic fin and pelvic spine.

Key words: Taxonomy, teleostei, *Epinnula*, Pacific, new species

Introduction

Poey (1854) established the new genus and new species *Epinnula magistralis* based on a single specimen of about 98 cm TL collected from Havana, Cuba. Goode & Bean (1896) reported another specimen collected from Caribbean Sea. Since then, the species has rarely been mentioned and most records were reported from the Pacific Ocean. *Epinnula orientalis* Gilchrist & von Bonde, 1924 was described, although the species was later assigned to a newly established genus, *Neoepinnula* Matsubara & Iwai, 1952.

Kamohara (1938a) reported two specimens collected from Japan and noticed that, compared to descriptions of *E. magistralis,* his specimens have a greater number of dorsal- and anal-fin rays, a shorter snout, and a very long pelvic fin, which reaches nearly to the anus. Matsubara & Iwai (1952) reported a third specimen collected from Owase, Mie, Japan. They stated that this specimen is somewhat different from the one reported by Kamohara (1938a) in having 16 instead of 17 anal-fin rays and a longer pelvic fin. Grey (1953) proposed that the Atlantic and Pacific populations may represent different species or subspecies.

Ho & Yee (2012) reported a specimen collected from northeastern Taiwan, and Parin & Kotlyar (1991) reported a juvenile collected from the northeastern Indian Ocean; Stewart (2015) reported a 415 mm specimen from the New Zealand waters, and Hata & Motomura (2016) reported 2 large specimens (710 & 750 mm SL) collected from Japan. However, because there are few specimens in collections, the confusion between Atlantic and Pacific populations remained. With the suspicion that these populations might represent two different species, the first author made direct comparisons and confirmed that the western Pacific population represented a different and undescribed species. A review of the genus and detailed descriptions of the two species are provided.

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Methods and materials

Standard length (SL) and head length (HL) are used throughout. Methods for taking measurements followed Hubbs & Lagler (1958), except for that caudal fin length, which is measured from the base of the fin to the tip of upper lobe, and the caudal fin fork, which is the caudal-fin length minus length of its shortest ray at the middle. Caudal peduncle length is measured from the end of anal-fin base to the origin of lower lobe of the caudal fin. Numbers of lateral-line scales are counted in three parts: (1) the upper lateral line is the total number of scales, including those on caudal-fin base; (2) the vertical part of lower lateral line is counted from the junction of the upper branch to the lower angle near the lower base of the pectoral fin (right above the insertion of pelvic fin); and (3) the horizontal part of lower lateral line is counted from the lower angle near the base of pectoral fin to the end, including those scales on the caudal-fin base. Curatorial procedures for newly collected specimens followed Motomura & Ishikawa (2013). Institutional codes followed Eschmeyer (2017).

Family Gempylidae

Epinnula Poey, 1854

Epinnula Poey, 1854:369 (type species: *Epinnula magistralis*; by original designation and monotypy). Collette *et al.*, 1984:600. Nakamura in Masuda *et al.*, 1984:226. Parin & Kotlyar, 1991:137. Nakamura & Parin, 1993:26. Parin & Nakamura, 2003:1814.

Diagnosis. Members of Gempylidae with a deep and compressed body; entire body covered with minute imbricated scales. Several fangs either fixed or depressible, on anterior portion of upper jaw. Vomer without teeth. Palatine with single row of small conical teeth. Lateral line bifurcating beneath anterior part of spinous dorsal; upper lateral line continuing roughly parallel to dorsal profile to base of caudal fin; lower lateral running vertically to lower base of pectoral fin and then along the lower body profile to base of caudal fin. Dorsal fin inserted above upper angle of gill opening; two dorsal fins close to each other with a deep notch between the fins. Pelvicl fin well-developed, fin spine and rays well developed. Finlets and keels absent on tail. Gill raker at angle of first gill arch T-shaped, with smooth inner surface. Pyloric caeca 7–11. Epineurals 2. Dorsal fin XV–XVI, I, 15–18, anal fin III, 13–17, pectoral fin 15 or 16, and pelvic fin I, 5.

Description. Body deep, slender and laterally compressed; deepest at level of pelvic fin, gradually narrowing to caudal peduncle; dorsal profile of body straight, ventral slightly convex; body depth at pelvic-fin base 3.7–4.6 in SL. Head moderately large, 2.9–3.3 in SL; head triangular in lateral view; dorsal profile of head broadly curved and straight behind the eye or evenly straight. One or two small spines on lower angle of preopercle. Snout triangular, broadly pointed anteriorly. Mouth large, rear end of maxilla reaches level of eye center or nearly so; lower jaw extends anterior to upper jaw; several fangs, either fixed or depressible, at anterior portion of upper jaw, single row of smaller compressed teeth on upper jaw, alternating fixed and depressed ones; a pair of large canines near tip of lower jaw, exposed externally when mouth closed; single row of scattered compressed teeth on lower jaw, teeth larger than those on upper jaw; vomerine teeth absent; a single row of conical teeth on each palatine.

Two dorsal fins close to each other with a deep notch between the fins; first dorsal-fin relatively high, 4th to 7th spines longest, its origin above upper end of gill opening; second dorsal fin about same height as first dorsal or slightly higher, a slight concavity at middle portion of the fin. Pectoral fin originating at level of second dorsal-fin spine, moderately long, straight dorsally, rounded ventrally and posteriorly, the 4th or 5th ray longest, rays gradually shorter ventrally. Ventral fin originating at level of 5th dorsal-fin spine, very large in juveniles, small in adults. Anal fin slightly smaller than second dorsal fin, its origin at posterior one-third of body. Finlets absent from caudal peduncle; caudal fin deeply forked, upper lobe slightly larger than lower lobe.

Body scales cycloid, small and deciduous, covering most parts of head and maxilla, small naked areas on anterior snout and premaxilla; most of lower jaw naked. First dorsal fin naked, scales on base of other fins. Lateral line scales slightly larger than body scales, upper lateral line beginning above upper end of gill opening, running roughly parallel to dorsal profile of body, then gradually descending from origin of second dorsal fin to base of caudal fin; lower lateral line originating from the upper lateral line at about level of 5th to 6th dorsal-fin spine, its vertical portion wave-shaped, its horizontal portion running parallel to lower body profile, then gradually rising from middle of body to base of caudal fin.

Fresh and preserved body color generally dark gray with all fins darker.

Size. To about 1 m TL.

Etymology. The name *Epinnula* refers to the lack of spinules [referred to as finlets herein].

Remarks. Poey (1854) defined the genus as "*first dorsal fin continuous, extending to the second dorsal fin, the second terminates without spinules; ventral fin present on abdomen; second lateral line similar to coselete [girdle], but without difference in the size of scales; no keel or membranous crest on caudal peduncle; teeth pointed and compressed, anterior ones larger and canines; no teeth on vomer and palatine; not many pyloric caeca.*" He suggested that the genus *Epinnula* "*should be placed between Thyrsites and Gempylus [under the family Gempylidae], to which it resembles in having extension of the first dorsal to the second, the naked caudal peduncle [e.g. lack of finlets], the teeth on the jaws, and the low number of pyloric caeca.*"

The "second [dorsal fin] terminates without spinules" likely infers the lack of finlets in this genus. Moreover, there is single row of teeth on palatine in all specimens examined and “no teeth on palatine” as stated by Poey (1854) is apparently a mistake.

Epinnula magistralis **Poey, 1854**

Common name: Domine

Figures 1A–B, 2A, 3; Tables 1–2

Epinnula magistralis Poey, 1854:369, pl. 32, figs. 3–4 (original locality: Havana, Cuba). Günther, 1860:349; Goode & Bean, 1896:198, pl. 57, fig. 211; Jordan & Evermann, 1896:880. Parin & Nakamura, 2003:1817 (in part).

Neotype (herein designated). USNM 391434 (820 mm SL), 25°56.814'N, 79°18'W, north of Bimini, Bahamas, western Atlantic Ocean, hook and line, 472–488 m, coll. R. Schatman, 18 Dec. 1995.

Non-types. USNM 37238 (1, 426 mm SL), Caribbean Sea, western Atlantic Ocean, 1885, coll. United States Fish Commission. UF 34950 (1, 348 mm SL), Virgin Island, 8 miles south of St. Thomas, Caribbean Sea, western Atlantic Ocean, 176 m, 26 Oct. 1981, coll. R. Heagey. UF 233577 (1, 147.5 mm SL), sta. 2457, 23°34.5'N, 79°07'W, Great Bahama Bank, southwest of Andros Island, Bahamas, western Atlantic Ocean, 457.2 m, 40-ft trawl, coll. M/V *Silver Bay*, 5 Nov. 1960.

Diagnosis. A species of *Epinnula* differing from the only congener in having dorsal-fin XV–XVI, I, 15–16; anal-fin III, 13–14; snout long, length 2.5–3.0 in HL; eye small, diameter 4.1–4.5 in HL; dorsal fin low, first dorsal-fin spine 3.4–5.8 in HL, longest second dorsal-fin ray 3.0–3.5 in HL; pectoral fin short, 2.0–2.1 in HL; pelvic fin short, 3.7–4.7 in HL; origin of anal fin behind that of second dorsal fin; scales on upper lateral-line 196–227, on vertical part of lower lateral line 83–98, on horizontal part of lower lateral line 201–237.

Description. Morphometric and meristic data are given in Tables 1 and 2, respectively. Data below are provided for the neotype, followed by range for the three other specimens, except where indicated.

Dorsal-fin XV, I, 16 (XVI, I, 16 in 147.5 mm specimen; XVI, I, 16 in 348 mm specimen; XV, I, 15 in 426 mm specimen); anal fin III, 13 (1 with III, 13; 2 with III, 14); pectoral fin 15; pelvic fin I, 5; branchiostegal rays 7; vertebrae 16+16=32 (n=2). Scales on upper lateral line 214 (left side)/227 (right side) (196–225); on vertical part of lower lateral line 96/98 (83–86), and on horizontal part of lower branch of lateral line 237/232 (201–228+); number of pyloric caeca unknown, but appeared to be only a few.

Body rather deep and strongly compressed, body depth at pelvic-fin base 4.6 (4.5–5.6) times in SL, body width at pelvic-fin base 10.6 (9.7–10.6) in SL. Head moderately large, 3.2 (2.9–3.2) in SL. Upper profile of head gradually elevated from the tip of snout, then nearly straight to origin of dorsal fin. Snout bluntly conical. Mouth terminal and large, lower jaw slightly projecting beyond tip upper jaw; maxillary extends to a vertical of midpoint of eye.

Eye large and round, its diameter 2.5 (2.5–2.8; 3.0 in 147.5 mm specimen) times in HL; interorbital slightly concaved, one low longitudinal ridge on each frontal, least bony width 5.2 (4.9–7.1) in HL, least fleshy width 3.9 (3.9–4.7) in HL. Snout length 1.8 (1.5–1.8, 1.2 in 147.5 mm specimen) times eye diameter. Two nostrils, both at about level of middle of eye; anterior nostril rounded, directed forward; posterior nostril a vertical slit.

Front of mouth roof with 2 (2–3) fixed and 3 (3) large depressible fangs; upper jaw with 16 (15–19) blade-like teeth, widely spaced, anterior 3 (3–4) and posterior 3 (3–4) teeth fixed, others alternating fixed and depressible ones; lower jaw with a pair of canine-like teeth at front, entirely exposed when mouth closed; lower jaw with 7 or 8

(7–11) fixed blade-like teeth, the first one smallest, gradually larger posteriorly (some depressible teeth may present alternating with the fixed teeth, judging from the holes remaining in UF 34950); vomer toothless; single row of 10 or 12 (10–15) small conical teeth on palatines.

Angle of preopercle armed with 2 small but rather pungent spines; lower margin of preopercle smooth; opercle strengthened by 2 obscure ridges, not ending in spines.

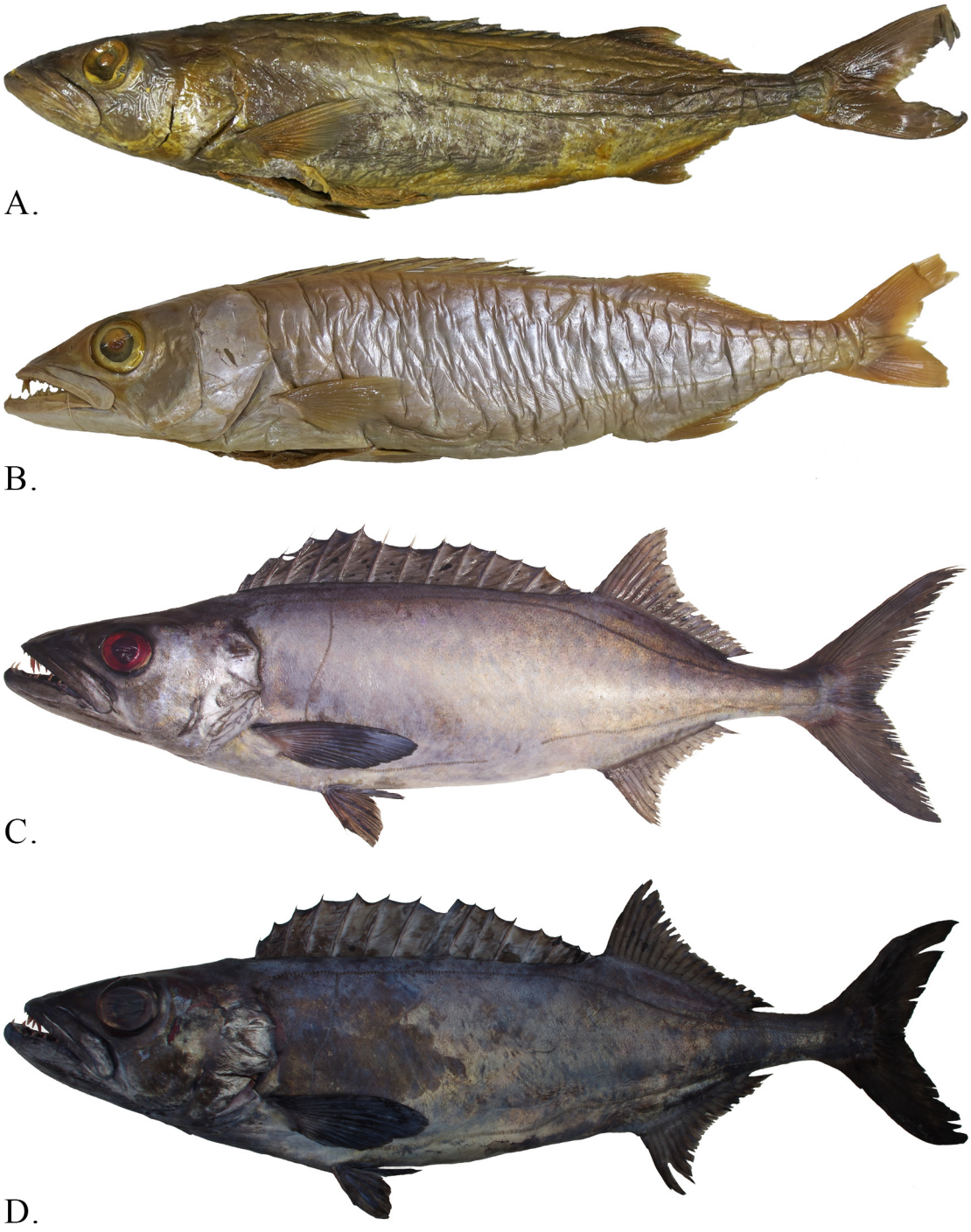

FIGURE 1. A. *Epinnula magistralis*, neotype, USNM 391434, 820 mm SL, preserved. B. *Epinnula magistralis*, USNM 37238, 426 mm SL, non-type, preserved. C. *Epinnula pacifica* **sp. nov.**, holotype, KAUM-I. 72269, 710 mm SL, fresh. D. *Epinnula pacifica* **sp. nov.**, paratype, KAUM-I. 51544, 750 mm SL, fresh. Not to scale.

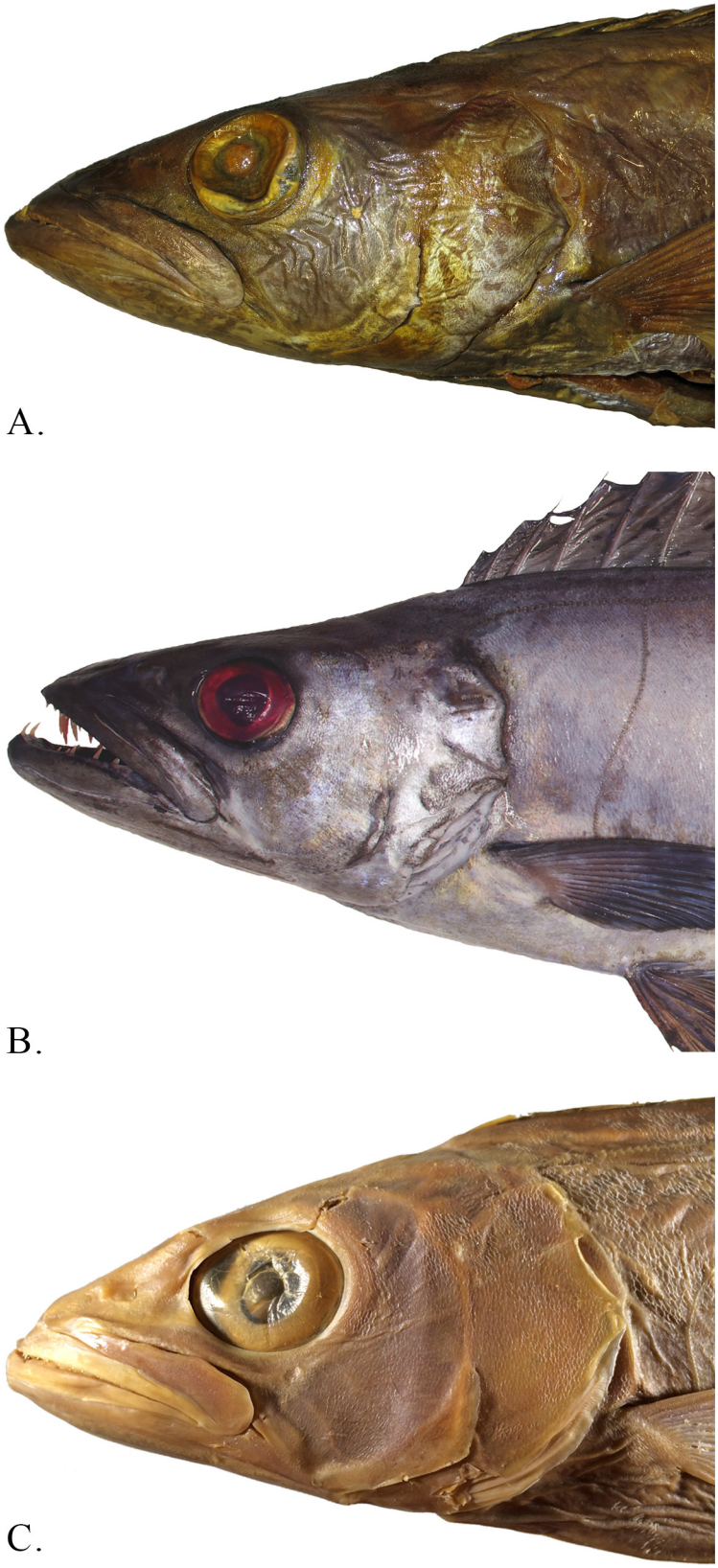

FIGURE 2. Lateral view of head. A. *Epinnula magistralis*, neotype, USNM 391434, 820 mm SL B. *E. pacifica* **sp. nov.**, holotype, KAUM-I. 72269, 710 mm SL. C. *E. pacifica* **sp. nov.**, paratype, BPBM 25938, 334 mm SL. Not to scale.

TABLE 1. Morphometric measurements of *Epinnula magistralis* Poey, 1854, as expressed in percentage of standard length (SL) and head length (HL). D=dorsal-fin. * indicates the neotype.

	UF 233577	UF 34950	USNM 37238	USNM 391434*		UF 233577	UF 34950	USNM 37238	USNM 391434*	
Standard length (mm)	147.5	348	426	820		147.5	348	426	820	
		%SL			Mean		%HL			Mean
Body depth	22.4	21.9	21.6	22.0	22.0	64.5	67.0	66.7	70.0	67.0
Body width	9.6	10.3	9.6	9.4	9.7	27.7	31.4	29.5	30.0	29.6
Head length	34.7	32.7	32.4	31.3	32.8	100.0	100.0	100.0	100.0	100.0
Snout length	11.7	11.6	11.4	12.6	11.8	33.6	35.4	35.2	40.1	36.1
Eye diameter	9.6	7.6	7.3	7.0	7.9	27.7	23.2	22.6	22.3	24.0
Interorbital width (bony)	5.1	4.6	6.6	6.0	5.6	14.6	14.1	20.5	19.1	17.1
Interorbital width (fleshy)	7.7	7.0	7.9	8.0	7.6	22.1	21.4	24.4	25.4	23.3
Upper jaw length	15.3	15.0	14.6	16.0	15.2	43.9	46.0	45.3	51.0	46.5
Caudal peduncle depth	5.6	6.1	6.7	5.2	5.9	16.0	18.5	20.6	16.7	18.0
Caudal peduncle length	8.7	9.5	9.3	9.3	9.2	25.0	29.0	28.7	29.6	28.1
Predorsal length	26.1	25.5	25.8	27.2	26.2	75.2	77.9	79.8	86.8	79.9
Preanal length	74.7	73.3	68.1	69.4	71.4	-	-	-	-	-
Prepelvic length	42.9	41.7	39.9	40.9	41.3	-	-	-	-	-
1st D base length	50.5	44.9	45.1	42.3	45.7	-	-	-	-	-
1st D spine length	10.1	5.7	5.5	5.8	6.8	29.1	17.4	17.1	18.6	20.6
2nd D spine length	12.7	6.7	7.2	5.6	8.0	36.5	20.4	22.1	17.9	24.2
3rd D spine length	14.1	-	8.5	-	11.3	40.6	-	26.2	-	33.4
4th D spine length	14.6	10.1	9.3	6.7	10.2	42.2	31.0	28.7	21.5	30.9
5th D spine length	15.3	-	9.5	7.9	10.9	43.9	-	29.4	25.3	32.9
6th D spine length	14.7	10.0	9.8	7.7	10.6	42.4	30.6	30.4	24.5	32.0
7th D spine length	15.1	10.7	9.5	7.1	10.6	43.6	32.8	29.3	22.8	32.1
8th D spine length	14.4	9.9	9.0	7.0	10.1	41.6	30.1	27.8	22.5	30.5
9th D spine length	13.8	9.2	8.8	6.9	9.7	39.6	28.1	27.1	22.1	29.2
10th D spine length	12.7	9.1	7.8	6.7	9.1	36.5	27.7	24.0	21.4	27.4
2nd D base length	16.6	17.4	18.2	15.6	16.9	47.9	53.2	56.1	49.8	51.7
2nd D spine length	5.3	4.5	1.1	2.8	3.4	15.2	13.8	3.3	8.9	10.3
Longest 2nd D ray length	11.8	10.8	10.2	8.8	10.4	34.0	33.0	31.4	28.2	31.6
Pectoral-fin length	16.5	15.3	15.0	15.7	15.7	47.7	46.7	46.5	50.2	47.8
Pelvic-spine length	14.2	6.1	5.0	4.4	7.4	41.0	18.6	15.4	14.1	22.3
Pelvic-fin length	14.2	8.4	8.8	6.7	9.6	41.0	25.8	27.2	21.5	28.9
Anal-fin base length	14.6	-	15.7	12.8	14.4	42.2	0.0	48.5	40.8	32.9
Longest anal-fin ray length	11.7	8.9	9.9	7.3	9.5	33.8	27.2	30.5	23.3	28.7
3rd anal-fin spine length	3.9	3.2	2.7	1.2	2.8	11.3	9.8	8.3	3.9	8.3
Caudal-fin length	22.4	24.3	22.6	24.0	23.3	64.5	74.4	69.8	76.7	71.3
Caudal-fin fork depth	14.0	17.7	15.4	16.7	16.0	40.4	54.1	47.6	53.3	48.9

TABLE 2. Meristic data of two *Epinnula* species in this study. LL=lateral-line. * indicates the primary type of each species.

E. magistralis	UF 233577	UF 34950	USNM 37238	USNM 391434*	
Standard length (mm)	147.5	348	426	820	Range
Dorsal-fin rays	XV, I, 16	XVI, I, 16	XV, I, 16	XV, I, 15	XV-XVI, I, 15-16
Anal-fin rays	III, 14	III, 14	III, 13	III, 13	III, 13-14
Pectoral-fin rays	15;15	15;15	15; 15	15;15	15-15
Pelvic-fin rays	I, 5	I, 5	I, 5	I, 5	I, 5
Caudal-fin rays	17	17	17	17	17
Scales in upper LL (anterior)	15;22	26;25	22;27	22;21	15-27
Scales in upper LL (posterior)	181;177	205;200	176;177	192;206	176-200
Scales in upper LL (total)	196;199	231;225	198;204	214;227	196-233
Scales in lower LL (vertical)	84;86	85;83	84;84	96;98	84-96
Scales in lower LL (horizontal)	201;209	217;233	218+;228+	237;232	201-237
Scales in lower LL (total)	285;295	302;316	302;312+	325;330	285-330

***E. pscifica* sp. nov.**	BSKU 4409	NSMT-P62524	TFRI 21307	BPBM 25938	NMMB-P16629	BPBM 28876	BPBM 30623	KAUM-I72269*	KAUM-I51544	
Standard length (mm)	212	219	326	334	335	425	477	710	750	Range
Dorsal-fin rays	XV, I, 18	XVI, I, 18	XVI, I, 18	XVI, I, 18	XV, I, 18	XVI, I, 18	XVI, I, 17	XVI, I, 18	XVI, I, 18	XV-XVI, I, 17-18
Anal-fin rays	III, 16	III, 16	III, 16	III, 16	III, 16	III, 15	III, 16	III, 16	III, 16	III, 15-16
Pectoral-fin rays	15;16	16;16	15;15	15;15	15;15	15;15	15;15	15;15	15;15	15-16
Pelvic-fin rays	I, 5	I, 5	I, 5	I, 5	I, 5	I, 5	I,5	I, 5	I, 5	I, 5
Caudal-fin rays	17	17	17	17	17	17	17	17	17	17
Scales in upper LL (anterior)	20;20	21;23	16;20	19;22	22;19	19;22	18;23	19;19	20;-	16-23
Scales in upper LL (posterior)	165;174	173;164	182;182	171;174	165;175	176;176	200;186	188;189	167;-	165-200
Scales in upper LL (total)	185;194	194;187	198;202	190;196	187;194	195;198	200;186	207;208	187;-	185-208
Scales in lower LL (vertical)	67;68	78;77	78;74	79;78	75;75	ca.70;67	66;70	69;-	81;-	66-81
Scales in lower LL (horizontal)	180;182	197;196	184;183	181;189	188;184	178;191	192;187	199;196	172;-	172-199
Scales in lower LL (total)	247;250	265;273	262;257	260;267	263;259	248;258	258;257	268;-	253;-	247-268

Lateral-line origin above upper end of gill opening, running backward to point of bifurcation beneath between fifth and sixth dorsal spines; upper lateral line running directly backward about parallel to dorsal contour of body to base of middle caudal-fin ray; lower branch running nearly vertically behind middle of pectoral-fin base, then downward and slightly backward to above origin of pelvic fin, and finally along lower contour of body to base of middle caudal-fin ray.

Head and body mostly covered by small imbricate scales, except for lips, lower jaw, anterior half of snout and maxilla and branchiostegal membrane, which are scaleless.

Base of spinous part of dorsal fin about 2.4 (2.4–2.7; 3.0 in 147.5 mm SL specimen) of soft part; base of soft dorsal-fin about as long as that of anal fin and preceded by a weak spine anteriorly; anal fin opposite soft dorsal, with 3 spines, the first inserted vertically below first soft dorsal-fin ray; margins of soft dorsal and anal fins shallowly but widely concave.

Pectoral fin rather short, 2.0 (2.0–2.2) in HL, extending to below eighth dorsal-fin spine in neotype. Pelvic fin inserts below middle of pectoral fin, long (2.4 in HL) in 147.5 mm specimen, gradually becoming very short in adults (4.7 in HL in neotype); the fin extending to about vertical of tip of pectoral fin in neotype and to about half way between its origin and origin of anal fin in 147.5 mm specimen; pelvic-fin spine as long as longest ray in 147.5 mm specimen (2.4 in HL), and very short in neotype (7.1 in HL). Caudal fin deeply forked, upper lobe of caudal fin 1.3 (1.3–1.4; 1.7 in 147.5 mm specimen) in HL.

Gill rakers small, mostly embedded under the skin, forming many broad, roundish, plates, each armed with 3 or 4 sharp cusps distally and few spines on the surface; 1 or 2 small rakers, armed with small spines alternating with larger rakers; raker at angle of first gill arch T-shaped, with about one third of its entire length exposed; its inner surface not armed with spines.

Coloration. Fresh color unknown. When preserved, body uniformly grayish to yellowish brown; ventral side of body pale or bright white.

Distribution. Known only from the Caribbean Sea off Cuba (original type locality), Bahamas (neotype locality) and Virgin Islands (Fig. 3). Bathymetric range 176–488 m. The species is most likely mesopelagic.

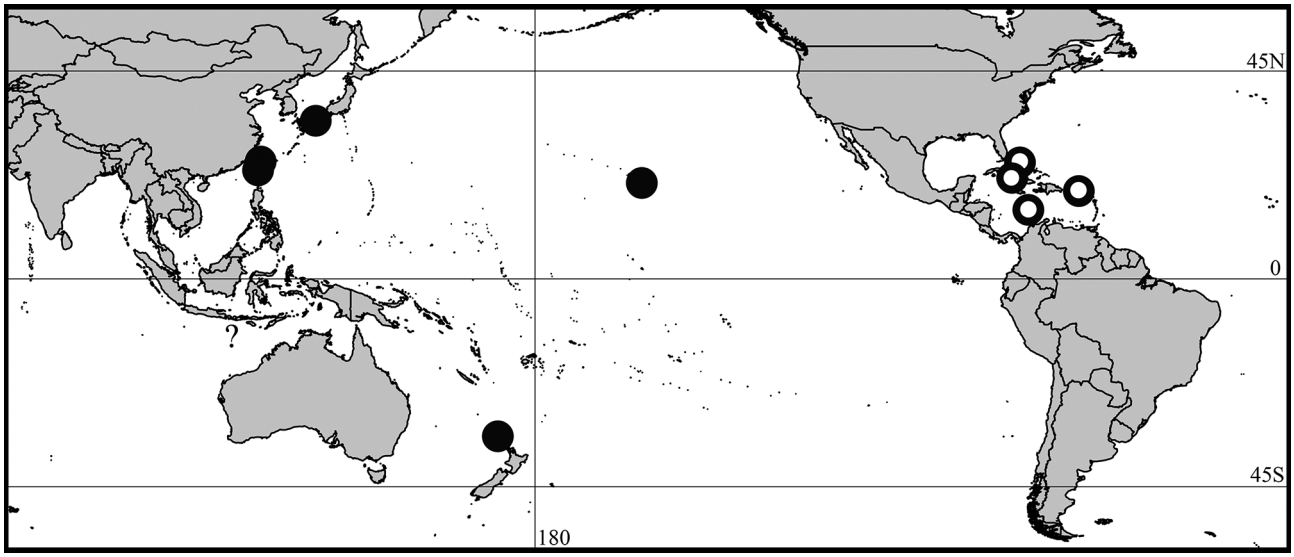

FIGURE 3. Distribution map of known records of *Epinnula magistralis* (open dots) and *Epinnula pacifica* **sp. nov.** (solid dots). One dot may represent more than one record. Question mark means unidentified record (juvenile).

Etymology. The specific name *magistralis* meaning master or great, and may refer to its large size, based on Poey (1854). The common name, Domine, also means master or lord.

Remarks. *Epinnula* was previously recognized as a monotypic genus and now comprises two distinct species. Because there is no extant type specimen, the proposal of a neotype for the type species *Epinnula magistralis* is justified. Accordingly, a specimen (USNM 391434, 820 mm SL) from north of Bimini, Bahamas, is herein proposed as the neotype.

The records reported from the western Pacific Ocean are now recognized as a different species that is described below. The status of the only Indian Ocean record, reported by Parin & Kotlyar (1991; question mark in

distribution map, Fig. 3), has not been confirmed, but it may also belong to the new species. See below for detailed comparison of *E. magistralis* to the new species.

Although there are several specimens recorded as this species in collections (e.g., UF & TU), examination on these specimens by the first author or colleagues has revealed only few that can be confirmed as *E. magistralis*, while others are misidentifications of other gempylids.

Some growth changes were observed in the four specimens examined. The head length shows negative allometric growth, the smallest specimen with head length 34.7% SL, whereas the largest specimen is 31.3% SL. The eye is relatively large in the smallest specimen (9.6% SL) and relatively small in the largest specimen (7.0% SL), and snout length is 1.5–1.8 times eye diameter in 3 larger specimens, whereas in the smallest specimen it is only 1.2 times eye diameter. The length of dorsal-fin spines also appears to become gradually shorter with growth.

Epinnula pacifica **sp. nov.**

Figures 1C–D, 2B–C, 3, 4A–D; Tables 2–4
New English name: Pacific Domine

Epinnula magistralis (not of Poey): Kamohara, 1938a:48, pl. 3, fig. 3; 1938b: 20; 1940: 93, fig. 43. Matsubara & Iwai, 1952:198. ?Parin & Kotlyar, 1991:1004. ?Nakamura & Parin, 1993:26. Mundy, 2005:499. Ho & Yee, 2012:62. Stewart, 2015:1605. Hata & Motomura, 2016:11.

Holotype. KAUM-I.72269, 710 mm SL, off Taira Island, Tokara Islands, Kagoshima Prefecture, Japan, long line, purchased from market, 4.7 kilograms when fresh, 27 Apr. 2015, coll. H. Hata.

Paratypes. BPBM 25938, 334 mm SL, assumed from Hawaiian Islands (gift from Hawaii Institute of Marine Biology), no other data. BPBM 28876, 425 mm SL, Hawaiian Islands (gift from Maeda fish market, collected by vessel *Shirley Y*), 12–13 Feb. 1983. BPBM 30623, 477 mm SL, Lanai side, Penguin Bank, off Molokai, Hawaiian Islands, 283 m, hook and line, 3 Feb, 1995, coll. R. Yamashiroya. BSKU4409, 312 mm SL, Mimase fish market, Kochi City, 26 Dec. 1954. FRIP21307, 326 mm SL, Cheng-gong, Taitung, SE Taiwan, bottom gill net, 18 Aug. 2005. KAUM–I.51544, 750 mm SL, off Yoron Island, Amami Islands, Kagoshima Prefecture, Japan, line fishing, 29 Oct. 2012 (half dissected). NMMB-P16629, 335 mm SL, Nan-fang-ao, NE Taiwan, ca. 300 m, 11 Mar. 2011, coll. H.-C. Ho. NSMT-P62524, 219 mm, Odawara, Kanagawa Prefecture, Honshu, Japan.

Diagnosis. A species of *Epinnula* differing from its only congener in having dorsal-fin XV–XVI, I, 17–18; anal-fin III, 15–16; longest second dorsal-fin ray 2.3–2.9 in HL; pectoral fin long, 1.5–1.8 in HL; pelvic fin short, 1.4–3.2 in HL; origin of anal fin behind that of second dorsal fin; scales on upper lateral-line 185–208, on vertical part of lower lateral line 66–81, on horizontal part of lower lateral line 172–199.

Description. Morphometric and meristic data of the type series are provided in Tables 2–4, respectively. The following data are provided for the holotype, followed by range of all types, except where indicated.

Dorsal fin XVI, I, 18 (2 paratypes with XV, I, 18, 1 with XVI, I, 17); anal fin III, 16; pectoral fin 15 (1 paratype with one side and 1 with both sides 16); pelvic fin I, 5; branchiostegal rays 7; vertebrae 16+16=32. Scales on upper lateral line 207 (right side) or 208 (left side) (185–202 in paratypes); scales on vertical part of lower lateral line 69 (66–81); scales on horizontal part of lower lateral line 196 or 199 (172–197); pyloric caeca 11 (7–11, n=3).

Body rather deep and strongly compressed, body depth at pelvic fin base 4.0 (3.7–4.4) times in SL, body width at pelvic-fin base 9.7 (8.5–10.5, 15.2 in 212 mm specimen) in SL. Head moderately large, head length 3.2 (3.1–3.3) in SL. Dorsal profile of head slightly elevated before anterior nostril, then nearly straight to origin of dorsal fin. Snout bluntly conical Mouth terminal and large, lower jaw slightly projecting beyond tip of upper jaw; maxillary extends to slightly anterior to a vertical of midpoint of eye.

Eye large and round, its diameter 4.8 (4.3 in 750 mm specimen, 3.3–4.0 in others) times in HL; interorbital slightly concaved, with 2 or 4 low longitudinal ridges on each frontal; less bony space width 5.2 (5.4 in 750 mm specimen, 5.3–6.6 in others) in HL, less fleshy width 4.3 (3.6–4.6) in HL. Snout length 1.8 (1.1–1.8) times of eye diameter (1.5–1.8 in two largest specimens, 1.1–1.4 in others). Two nostrils, both at about level of middle of eye; anterior nostril rounded, directed forward; posterior nostril a vertical slit.

Anterior portion of upper jaw with 2 (2–4) large fixed and 2 (1–3) large depressible fang (some are missing or with small regenerating ones); upper jaw with 20 (15–25) blade-like teeth, widely spaced, alternating fixed and depressible ones; lower jaw with a pair of canine-like teeth at front, entirely exposed when mouth closed; lower jaw

with single row of 9 (7–9) widely-spaced, blade-like teeth, the first one smallest, gradually larger posteriorly; vomer toothless; single row of 13 (up to 15) small compressed teeth on palatines.

Angle of preopercle armed with 2 small but rather pungent spines; lower margin of preopercle with 2 weak triangular spines; opercle strengthened by 2 obscure ridges, not ending in spines.

Lateral-line origin above upper end of gill opening, running backward to point of bifurcation beneath the fifth dorsal-fin spine (slightly behind in some paratypes); upper lateral line running directly posteriorly about parallel to dorsal contour of body to base of middle caudal-fin rays; lower lateral line running nearly vertically down behind middle of pectoral-fin base, then downward and slightly backward to above origin of pelvic fin, and finally along lower contour of body to base of caudal fin (that of 477 mm specimen runs to caudal peduncle and joins the upper branch).

Head and body mostly covered by small imbricated scales, except for lips (premaxillae), lower jaw, anterior half of snout and maxillary and branchiostegal membranes, which are scaleless. Small scales on inter-radial membranes run to about 1/3 the height above the base of each fin.

Base of spinous part of dorsal fin 2.3 (2.1–2.4) times of soft part; base of soft dorsal fin about as long as that of anal fin and preceded by a weak spine; anal fin opposite soft dorsal, with 3 spines, the first inserted vertically below first soft dorsal-fin ray; margins of soft dorsal and anal fins shallowly but widely concave.

Pectoral fin rather short, 1.6 (1.5–1.8) in HL, extending to below membrane of eighth and ninth dorsal-fin spines. Pelvic fin inserts below middle of pectoral fin, extending to anterior fourth of distance between its origin to the origin of anal fin in two largest specimens, to midway of the distance in other most paratypes, beyond midway in 219 mm specimen; almost to the anus in a 188 mm SL specimen reported in Matsubara & Iwai (1952, specimen not examined); pelvic-fin spine shorter than the fin, broken in the holotype (5.3 in 750 mm specimen; 2.1–2.2 in two smallest specimens, 2.8–4.1 in other specimens) in HL. Caudal deeply forked, upper lobe of caudal fin 1.3 (1.1–1.4) in HL.

Gill rakers small, mostly embedded under the skin, forming many broad, roundish, plates, each armed with 3 or 4 sharp cusps distally and few spines on the surface; 1 or 2 small rakers, armed with small spines alternating those larger rakers; raker at angle of first gill arch T-shaped, with about one third of its entire length exposed; its inner surface not armed with minute spines.

Coloration. When fresh, body uniformly deep grayish with lateral sides silver white; all fins darker (Figs. 1C–D, 2B, 4D). Preserved coloration uniformly dark grayish or brownish, with fins slightly darker (Figs. 4B–C).

Etymology. The specific name *pacifica* is derived from the main distribution of the species, the Pacific Ocean.

Distribution. This species is represented by the type series collected from Hawaii, Japan and Taiwan. Also reported from New Zealand (Stewart, 2015). The holotype was collected by long line from unknown depth, one Hawaiian specimen was collected by hook and line at 283 m, and one specimen was collected by bottom trawl around 300 m.

Remarks. Kamohara (1938) first reported two specimens of *E. magistralis* collected from Japan, Matsubara & Iwai (1952) reported a third specimen collected from Japan, Ho & Yee (2012) reported one specimen from Taiwan, Hata & Motomura (2016) reported two large specimens from southern Japan, and Stewart (2015) reported specimen from New Zealand. All these records are recognized as representing the new species. One fish collected from Hawaii by an angler (Fig. 4D, specimen not retained) shows characters similar to *E. pacifica* **sp. nov.** and is thus considered as that species.

The teeth on jaws and palatines vary in number, which may be a result of damage or stage of tooth regeneration. There is a mixture of fixed and depressible teeth. BPBM 25938 has 6 well-developed fangs, 3 fixed and 3 depressed, at anterior portion of upper jaws, whereas others have 1–3 of each kind of teeth, except for NSMT-P62524 that has 4 fixed and 1 depressible teeth. Some specimens have relatively small fangs which may be attributed to tooth regeneration.

It is likely that the species typically has 6 fangs, either fixed or depressible, at the front of the roof of the mouth. Upper jaw with single row of alternating fixed and depressible teeth. Although the numbers of teeth vary, the total number of teeth is about 23–25 in all specimens (including the missing teeth usually seen as a hole). There are 2 larger, fixed fangs at front of lower jaw of all specimens. Lower jaw with a single row of 7–8 (typically 8) fixed, widely-spaced, blade-like teeth, the first one smallest, gradually increasing in size posteriorly. There is single row of 6–15 small, blade-like teeth on each palatine. The number of teeth on jaws and palatines does not show any trend with growth, and they seem to be easily lost and regrown.

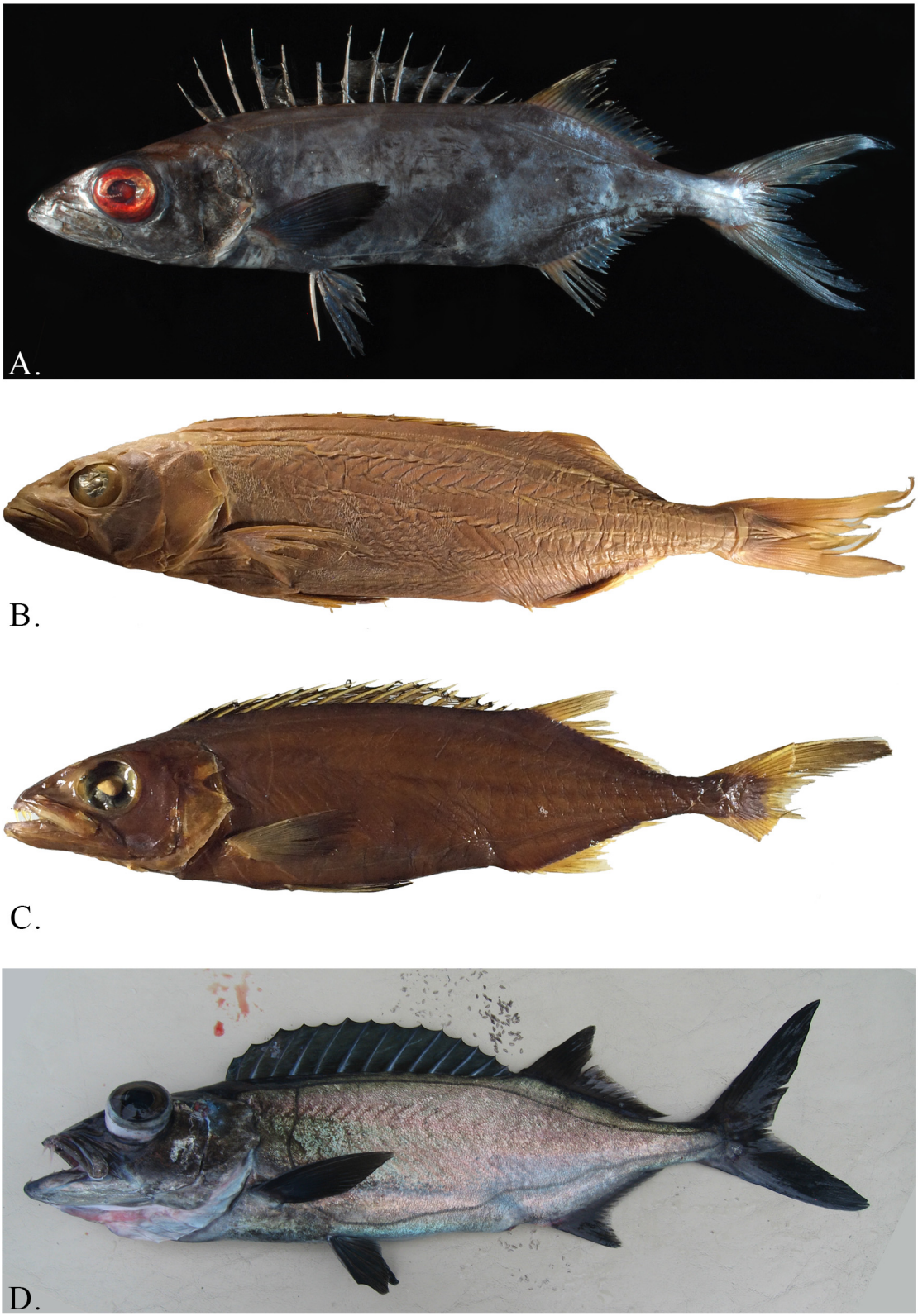

FIGURE 4. *Epinnula pacifica* **sp. nov.** A. Paratype, NMMB-P16629, 335 mm SL, fresh. B. Paratype, BPBM 25938, 334 mm SL, preserved. C. Paratype, NSMT-P62524, 219 mm, preserved. D. Fresh caught individual, from Hawaii, specimen not retained, photo by Steve Wozniak.

TABLE 3. Morphometric measurements of type series of *Epinnula pacifica* sp. nov., as expressed in percentage of standard length (SL). D=dorsal-fin. * indicates the holotype.

	BSKU 4409	NSMT-P62524	TFRI 21307	BPBM 25938	NMMB-P16629	BPBM 28876	BPBM 30623	KAUM-I72269*	KAUM-I51544	
Standard length (mm)	212	219	326	334	335	425	477	710	750	
			%SL							Mean
Body depth	24.4	25.6	24.5	25.4	22.8	27.3	24.5	25.2	23.5	24.8
Body width	6.6	10.0	9.5	10.8	10.9	11.8	10.7	10.3	-	10.1
Head length	30.2	30.6	32.5	31.7	31.3	32.0	31.7	31.5	32.4	31.6
Snout length	10.6	10.5	11.0	10.5	10.5	10.4	10.7	11.7	11.7	10.8
Eye diameter	7.6	8.2	8.6	7.8	9.5	8.5	9.0	6.6	7.6	8.1
Interorbital width (bony)	5.3	5.8	4.9	5.4	5.0	5.3	5.0	6.1	6.0	5.4
Interorbital width (fleshy)	7.3	7.7	7.1	7.3	8.7	7.8	7.1	7.3	7.5	7.5
Upper jaw length	12.9	13.3	14.1	14.1	14.3	14.7	14.7	15.3	15.8	14.4
Caudal peduncle depth	5.8	5.0	5.8	6.3	6.1	6.4	6.3	5.5	5.4	5.8
Caudal peduncle length	9.1	8.2	10.1	9.0	8.0	10.4	9.0	13.5	12.9	10.0
Predorsal length	22.9	24.2	25.8	25.4	27.2	27.3	26.3	27.8	27.9	26.1
Preanal length	67.8	69.5	67.2	72.5	67.5	74.1	72.3	72.0	74.8	70.9
Prepelvic length	39.5	39.4	39.9	39.8	39.9	42.1	40.3	40.8	41.7	40.4
1st D base length	48.3	48.6	45.4	48.2	42.7	45.6	43.6	43.2	40.6	45.1
1st D spine length	7.3	6.9	-	4.6	7.1	4.8	2.8	-	3.6	5.3
2nd D spine length	8.8	9.2	7.4	8.2	9.3	6.4	5.7	-	-	7.9
3rd D spine length	10.9	11.5	-	10.2	10.6	9.2	8.0	5.7	-	9.4
4th D spine length	11.9	12.4	10.7	11.2	11.6	10.6	10.3	7.6	8.2	10.5
5th D spine length	11.6	12.3	11.0	11.7	-	10.6	10.7	8.5	-	10.9
6th D spine length	12.0	11.3	11.3	11.1	-	11.1	10.3	8.2	8.4	10.5
7th D spine length	11.3	11.0	11.0	11.3	10.7	10.4	10.3	-	-	10.9
8th D spine length	10.8	10.9	10.7	10.5	-	10.1	9.6	-	-	10.4
9th D spine length	10.6	10.6	10.1	10.4	9.6	9.4	8.8	6.9	-	9.6
10th D spine length	9.6	9.3	9.2	9.6	8.9	8.7	8.4	6.4	-	8.8
2nd D base length	19.9	20.5	18.7	21.1	19.7	20.2	19.1	18.5	18.9	19.6
2nd D spine length	3.0	3.0	3.1	3.3	3.3	2.8	3.8	2.1	-	3.0
Longest 2nd D ray length	12.0	12.9	13.8	13.6	12.5	13.4	13.2	11.7	11.0	12.7
Pectoral-fin length	17.5	18.3	19.9	19.8	20.6	20.2	19.3	20.0	18.4	19.3
Pelvic-spine length	14.6	13.7	9.5	9.3	11.3	8.5	7.8	-	6.1	10.1
Pelvic-fin length	20.9	16.7	13.8	13.5	14.4	12.2	11.5	10.0	10.1	13.7
Anal-fin base length	19.0	20.0	18.7	19.5	18.1	16.9	17.8	16.1	15.5	18.0
Longest anal-fin ray length	9.7	10.4	12.0	11.5	10.7	11.1	9.9	9.9	9.6	10.5
3rd anal-fin spine length	3.3	3.4	3.4	2.8	2.8	3.1	1.7	1.6	2.3	2.7
Caudal-fin length	24.9	-	27.6	29.6	22.4	28.0	25.2	24.8	-	26.1
Caudal-fin fork depth	17.6	-	20.2	18.6	16.3	18.2	15.7	12.2	-	17.0

TABLE 4. Morphometric measurements of type series of *Epinnula pacifica* sp. nov., as expressed in percentage of head length (HL). D=dorsal-fin. * indicates the holotype.

	BSKU 4409	NSMT-P62524	TFRI 21307	BPBM 25938	NMMB-P16629	BPBM 28876	BPBM 30623	KAUM-I72269*	KSUM-I51544	
Standard length (mm)	212	219	326	334	335	425	477	710	750	
					%HL					Mean
Body depth	80.8	83.6	75.5	80.2	72.8	85.3	77.5	80.0	72.5	78.7
Body width	21.9	32.8	29.2	34.0	34.8	36.8	33.8	32.7	-	32.0
Snout length	35.2	34.3	34.0	33.0	33.4	32.4	33.8	37.1	36.1	34.4
Eye diameter	25.3	26.7	26.4	24.5	30.2	26.5	28.5	21.0	23.5	25.8
Interorbital width (bony)	17.7	18.9	15.1	17.0	15.9	16.5	15.9	19.4	18.5	17.2
Interorbital width (fleshy)	24.2	25.0	21.7	23.1	27.8	24.3	22.5	23.2	23.1	23.9
Upper jaw length	42.7	43.4	43.4	44.3	45.7	46.0	46.4	48.6	48.8	45.5
Caudal depth	19.1	16.4	17.9	19.8	19.6	19.9	19.9	17.5	16.7	18.5
Caudal length	30.2	26.8	31.1	28.3	25.6	32.4	28.5	42.9	39.8	31.7
Predorsal length	75.9	78.8	79.2	80.2	86.9	85.3	83.1	88.3	86.1	82.6
1st D spine length	24.1	22.5	-	14.6	22.6	15.1	8.9	-	11.1	17.0
2nd D spine length	29.2	30.0	22.6	25.9	29.8	19.9	17.9	-	-	25.0
3rd D spine length	36.1	37.6	-	32.1	33.9	28.7	25.2	18.1	-	30.2
4th D spine length	39.4	40.5	33.0	35.3	37.1	33.1	32.5	24.1	25.3	33.4
5th D spine length	38.4	40.1	34.0	36.8	-	33.1	33.8	27.0	-	34.7
6th D spine length	39.8	37.0	34.9	34.9	-	34.6	32.5	26.0	25.9	33.2
7th D spine length	37.5	35.9	34.0	35.6	34.1	32.4	32.5	-	-	34.5
8th D spine length	35.8	35.6	33.0	33.0	-	31.6	30.5	-	-	33.3
9th D spine length	35.2	34.6	31.1	32.7	30.7	29.4	27.8	21.9	-	30.4
10th D spine length	31.7	30.4	28.3	30.2	28.5	27.2	26.5	20.3	-	27.9
2nd D base length	65.9	66.8	57.5	66.5	62.9	63.2	60.3	58.7	58.3	62.2
2nd D spine length	9.8	9.8	9.4	10.4	10.4	8.8	11.9	6.7	-	9.7
Longest 2nd D ray length	39.8	42.2	42.5	42.9	39.8	41.9	41.7	37.1	34.0	40.2
Pectoral-fin length	58.0	59.6	61.3	62.3	65.6	63.2	60.9	63.5	56.8	61.2
Pelvic-spine length	48.3	44.7	29.2	29.2	36.2	26.5	24.5	-	18.8	32.2
Pelvic-fin length	69.4	54.5	42.5	42.5	46.1	38.2	36.4	31.7	31.2	43.6
Anal-fin base length	63.0	65.1	57.5	61.3	57.8	52.9	56.3	51.1	47.8	57.0
Longest anal-fin ray length	32.2	33.8	36.8	36.3	34.2	34.6	31.1	31.4	29.6	33.3
3rd anal-fin spine length	11.1	11.0	10.4	9.0	9.0	9.6	5.3	5.1	7.1	8.6
Caudal-fin length	82.5	-	84.9	93.4	71.3	87.5	79.5	78.7	-	82.5
Caudal-fin fork depth	58.3	-	62.3	58.5	51.9	57.0	49.7	38.7	-	53.8

Discussion

The following meristic values show differences in the two species of *Epinnula* (Table 2). There are 15 or 16 spines (mostly 15) and 1 spine with 15 or 16 rays (mostly 16) in first and second dorsal fin, respectively, of *E. magistralis*; whereas there are 15 or 16 spines (mostly 16) and 1 spine with 17 or 18 (mostly 18) rays in *E. pacifica* **sp. nov.** There are 3 spines and 13 or 14 rays in the anal fin of *E. magistralis*; whereas there are 3 spines and 15 or 16 (mostly 16) rays in that of *E. pacifica* **sp. nov.** The total number of scales in the upper lateral line is slightly more (196–231) in *E. magistralis* compared to that of *E. pacifica* **sp. nov.** (185–207), with overlap. The scales in the lower lateral line are more numerous in *E. magistralis* (84–96 in vertical part, 201–237 in horizontal part and 284–333 in total) compared to those of *E. pacifica* **sp. nov.** (65–81, 172–199 and 253–273, respectively), with no overlap. Thus the number of scales of the lower lateral line can be used to separate these two species.

Some interspecific differences and intraspecific growth trends in proportional measurements were noticed. The following observations are based on all specimens examined by us. These specimens are either smaller than 500 mm SL or larger than 700 mm SL, and the values may well change when more specimens become available, especially of *E. magistralis*.

The body is slightly deeper in *E. pacifica* **sp. nov.** (22.8–24.8% SL) than in *E. magistralis* (21.6–22.4% SL). The head is slightly shorter in *E. pacifica* **sp. nov.** (30.2–32.5 SL) than in *E. magistralis* (31.3–34.7% SL), the later showing a negative trend with growth. The length of upper jaw in slightly smaller in *E. pacifica* **sp. nov.** when compared to similar-sized specimens of *E. magistralis*, but the values for specimens larger than 400 mm SL are similar.

The snout length is relatively short in specimens of *E. pacifica* **sp. nov.** (10.4–11.7% SL, 32.4–37.1% HL) compared to those of *E. magistralis* (11.4–12.6% SL, 33.6–40.1% HL); snout length of larger specimens in both species are larger than for the smaller specimens. The eye is relatively small in the smallest and two larger specimens of *E. pacifica* **sp. nov.** (6.6–7.6% SL or 21.0–25.3% HL) and slightly larger in the rest (8.2–9.0% SL or 24.5–30.2% HL), whereas in *E. magistralis* the smallest specimen has the relatively largest eye (9.6% SL or 27.7% HL), which measurement gradually decreases in the largest specimen (7.0% SL or 22.3% HL) and also shows a negative trend with growth. The ratio of snout length/eye diameter is 1.1–1.4 in specimens <500 mm SL in *E. pacifica* **sp. nov.** and 1.5–1.8 in two larger specimens; whereas it is 1.2 in the smallest specimen of *E. magistralis*, gradually becoming larger in the largest specimen (1.8); both species show a positive trend with growth for this character.

The mean values of lengths of all dorsal fin spines are somewhat larger in *E. pacifica* **sp. nov.** than those of *E. magistralis*. The length of first dorsal-fin base and lengths of all dorsal-fin spines show a slightly negative trend in both species. The length of second dorsal-fin base is clearly longer in *E. pacifica* **sp. nov.** (18.5–21.1% SL) than that in *E. magistralis* (15.6–18.2% SL), at all sizes. The ratio of length of first dorsal-fin base/length of second dorsal-fin base is 2.1–2.4 in *E. pacifica* **sp. nov.**, with a slightly negative trend with growth; whereas that in *E. magistralis* is 2.5–3.0.

The longest second dorsal-fin ray is longer in *E. pacifica* **sp. nov.** (11.0–13.8% SL or 34.0–42.9% HL) than in *E. magistralis* (8.8–11.8% SL or 28.2–34.0% HL); and shows a negative trend with growth in both species. The pectoral-fin length is longer in *E. pacifica* **sp. nov.** (17.5–20.6% SL or 56.8–65.7% HL) than in *E. magistralis* (15.0–16.5% SL or 46.5–50.2% HL). The pelvic fin and its spine are longest in the smallest specimens in both species and shortest in the largest specimens, showing a negative trend with growth in both species.

The anal-fin base is longer in *E. pacifica* **sp. nov.** (15.5–20.0% SL or 47.8–65.1% HL) than in *E. magistralis* (12.8–15.7% SL or 40.8–48.5% HL); the value is smallest in largest specimens of both species.

The longest anal-fin ray is relatively short in the smallest and largest specimens of *E. pacifica* **sp. nov.** and slightly longer in other specimens; whereas in *E. magistralis* this ray is longest in the smallest specimen and shortest in the largest specimen.

The length of third anal-fin spine is relatively long in smaller specimens of both species and short in larger specimens, showing a negative trend with growth.

In summary, the following morphometric proportions are relatively consistent and can be used to separate the two fishes at all sizes: body depth (3.7–4.4 in SL in *E. pacifica* **sp. nov.** versus 4.5–4.6 in *E. magistralis*); length of second dorsal-fin base (4.7–5.4 versus 5.5–6.4 in SL); longest ray of the second dorsal fin (e.g., the height of the fin) (2.3–2.9 versus 2.9–3.5 in HL); length of the anal-fin base (1.5–2.1 versus 2.1–2.4); longest ray of the anal fin (e.g., the height of the fin) (2.7–3.4 versus 3.0–4.3 in HL).

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