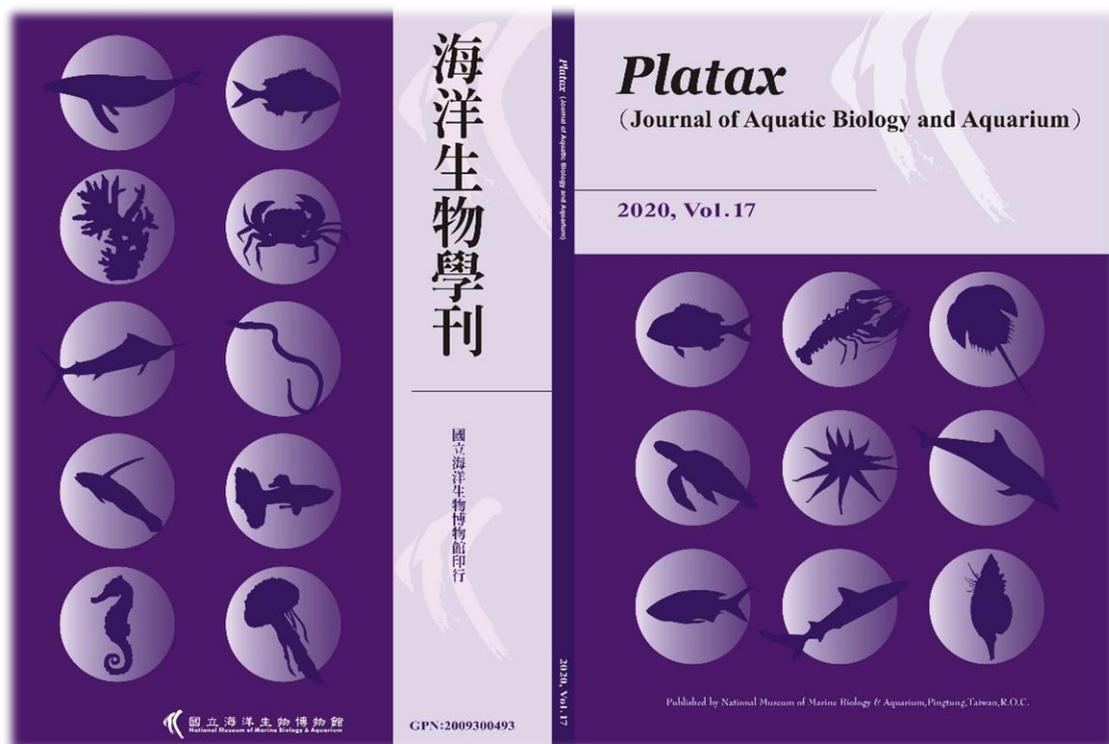


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## First record of the Blackfringe bigeye *Pristigenys refulgens* (Perciformes: Priacanthidae) from Taiwan

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### Abstract

The distribution of the priacanthid, *Pristigenys refulgens* was confirmed in Taiwan on the basis on three specimens collected in local markets. *P. refulgens* was distinguished from congeners by the black edges presented on the soft portions of the dorsal, anal, and caudal fins. It also possessed X, 11 and III, 10 dorsal and anal-fin elements, respectively.

**Keywords:** Bigeye, Biodiversity, Ichthyology, Priacanthidae, Taiwan

### Introduction

The bigeye genus *Pristigenys* Agassiz, 1835 was originally described from Eocene fossils from Italy. Although Starnes (1988) recognized only four species in the genus, Iwatsuki et al. (2012) later made a compelling argument to separate the widely distributed Indo-Pacific species *Pristigenys refulgens* (Valenciennes, 1862) from *Pristigenys nipponia* (Cuvier, 1829). Although both species are similar in appearance, their meristic counts are different, and *P. refulgens* has a prominent black margin along the caudal fin (as well as the soft

portions of the dorsal and anal fins).

In addition to these species, *P. meyeri* can also be found in the Indo-West Pacific (Iwatsuki et al., 2012), with *P. refulgens* having the widest distribution (documented in both the Indian & Western Pacific Oceans). All three species have been documented (Koeda & Ho, 2019) in Taiwan, though a detailed description of *P. refulgens* was previously lacking; we sought to remedy this knowledge dearth herein.

### Materials & materials

Standard length (SL) is used

throughout. Methods for taking counts and measurements and terminology followed Iwatsuki et al. (2012) and Starnes (1988), and the description format follows Fernandez-Silva & Ho (2017). Features were measured by common or digital calipers. The new specimens were deposited in the Pisces Collection of National Marine Museum of Biology and Aquarium, Pingtung (NMMB-P). Comparative specimens were obtained from Academia Sinica, Taipei, Taiwan (ASIZP).

## Results

*Pristigenys refulgens* (Valenciennes, 1862)

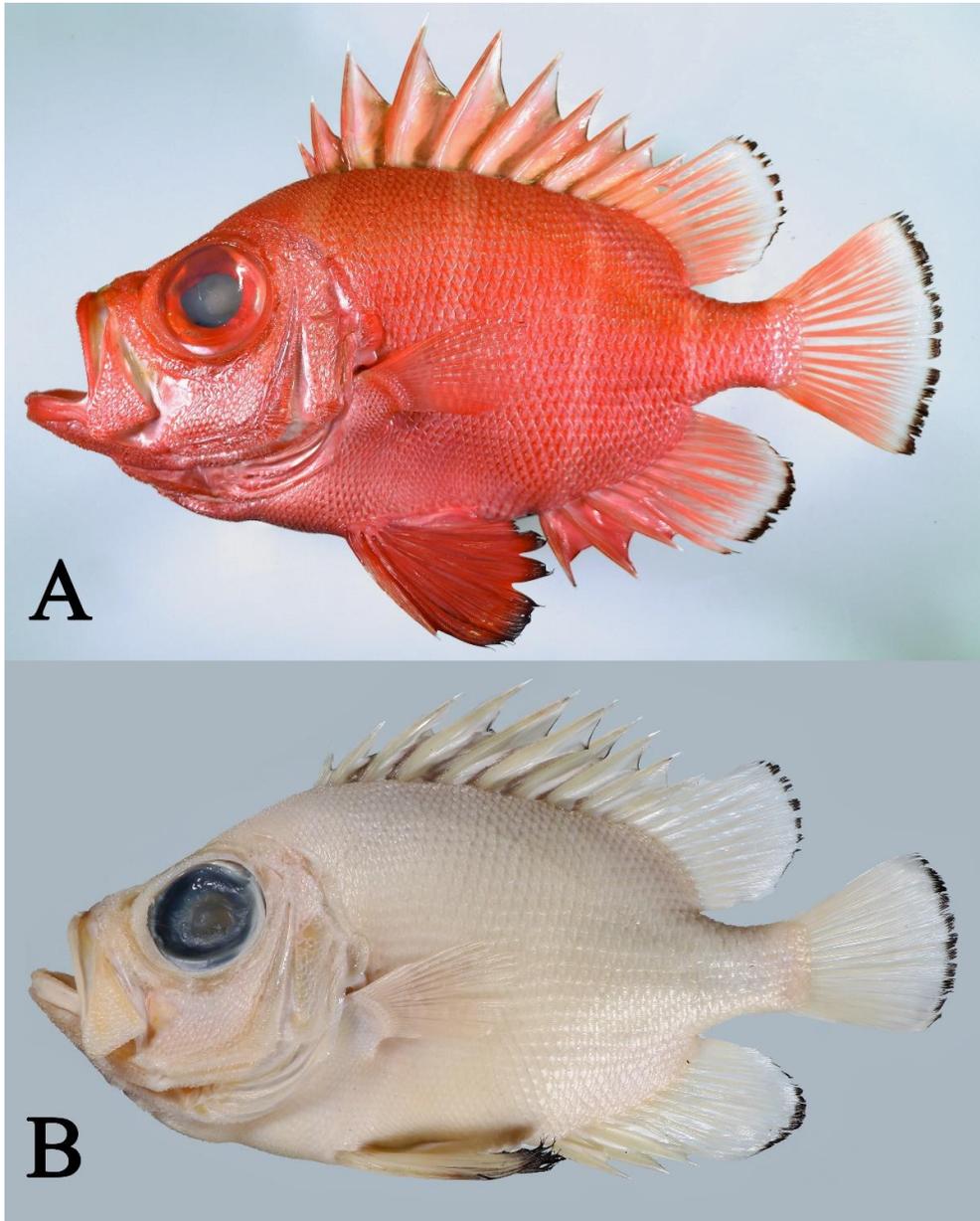
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Figs. 1 & 2; Tab. 1

**Material examined.** NMMB-P33529, 217.2 mm SL, purchased from Keelung fish market, captured off Suao, Eastern Taiwan, 24 Mar. 2020, coll. C.-N Tang. NMMB-P33642, 212.8 mm SL,



**Fig. 1.** Fresh coloration of *Pristigenys refulgens*, NMMB-P33529, 217.2 mm SL, off Suao, Yilan, northern Taiwan.



**Fig. 2.** Fresh (A) and preserved (B) condition of *P. refulgens*, NMMB-P34703, 196.4 mm SL.

purchased from Fugang Fishing Port, Taitung, Eastern Taiwan, 26 Feb. 2020, coll. Y.-C. Chen. NMMB-P34703, 196.4 mm SL, purchased from Fugang Fishing

Port, on 15 May 2020.

**Comparative materials.** *Prictigenys nipponia*: ASIZP55365, 110 mm SL, Daxi, Yilan, Taiwan, 10 Aug. 1979.

**Tab. 1.** Morphometric data of two *Pristigenys* species collected from Taiwan.

Standard length (SL; mm)	<i>P. refulgens</i>		<i>P. nipponia</i>	
	196.4–217.8 (n=3)		67.2–168.1 (n=5)	
	% SL	SD	% SL	SD
Body depth	51.4–53.5	1.1	53.1–56.7	1.6
Body width	23.2–25.1	1.1	22.2–26.7	1.8
Head length	39.6–41.0	0.8	39.2–40.0	0.3
Snout length	9.7–10.5	0.4	7.0–9.5	1.1
Horizontal bony orbit length	18.9–20.6	0.8	19.5–21.8	1.0
Bony interorbital width	7.7–9.0	0.7	9.1–9.5	0.2
Upper jaw length	22.5–24.0	0.8	20.8–22.8	0.8
Maxilla width	9.2–9.8	0.3	9.6–10.2	0.3
Caudal peduncle length	14.1–15.0	0.5	13.7–15.9	1.1
Caudal peduncle depth	12.3–12.9	0.3	11.9–13.4	0.6
Predorsal length	34.6–38.5	2.0	34.4–37.7	1.2
Preanal length	71.6–77.0	2.7	71.8–74.3	1.2
Prepelvic length	48.7–51.1	1.2	44.5–48.2	1.4
Dorsal fin base length	56.8–58.9	1.2	59.5–62.1	1.0
1st dorsal fin spine	7.3–8.1	0.4	8.0–12.5	1.7
2nd dorsal fin spine	12.5–15.0	1.3	14.5–18.5	1.5
3rd dorsal fin spine	20.7–20.8	0.0	23.5–28.7	2.2
Longest dorsal fin spine	25.7–27.1	0.8	26.3–29.7	1.4
Last dorsal fin spine	15.9–17.4	0.8	16.4–18.5	0.9
1st dorsal-fin soft ray	23.4–23.9	0.3	23.3–25.3	0.8
longest dorsal-fin soft ray	23.4–24.6	0.6	24.0–25.6	0.6
Anal-fin base length	24.3–27.1	1.4	26.7–29.3	1.0
1st anal-fin spine	12.7–13.4	0.4	14.0–18.5	1.6
2nd anal-fin spine	16.4–17.9	0.8	18.1–21.6	1.2
3rd anal-fin spine	17.6–18.7	0.6	19.5–21.8	0.9
1st anal-fin soft ray	22.4–25.0	1.3	25.9–28.3	0.9
Longest anal-fin soft ray	23.0–25.0	1.0	26.8–28.7	0.8
Caudal fin length	25.6–27.9	1.3	26.9–29.9	1.2
Pectoral fin length	24.5–25.8	0.7	22.7–25.6	1.2
Pelvic-fin spine	20.6–23.2	1.4	23.2–29.0	2.2
Pelvic-fin length	29.0–33.8	2.4	33.8–38.5	1.8

ASIZP64912, 133 mm SL, Donggang, Pingtung, Taiwan, 14 Aug. 2004. ASIZP70167, 142 mm SL, Daxi, 20 Mar. 2005. ASIZP70444, 124 mm SL, Daxi, 1 Dec. 2001. ASIZP71099, 168 mm SL, Donggang, 26 May 2008. ASIZP74474, 67 mm SL, Daxi, 5 Jan. 2000.

**Description of newly obtained specimens.** Dorsal-fin elements X, 11; anal-fin elements III, 10; pectoral-fin rays 18–19; pelvic-fin elements I, 5; pored lateral line scales 32–35; scale rows between the origin of the dorsal fin and lateral line 10–11; scales above the middle pectoral-fin with 33–40 fine spinules on the posterior margin; scale rows between the origin of the anal fin and lateral line 26–28; total gill rakers 25–26, 7–8 on upper limb and 18 on lower limb; vertebrae 10 precaudal+13 caudal = 23. Body deep, compressed, and ovate in lateral profile. Body depth at the 4<sup>th</sup> dorsal-fin spine 1.9 in SL. When the mouth is closed, the upper end of the lower jaw is at about the same level as the midline of the body. Body thick, its width 4.0–4.3 in SL. Caudal peduncle moderate, its length and depth 2.6–2.9 and 3.1–3.3 in HL respectively.

Head large, its length 2.4–2.5 in SL, dorsal profile gradually rising to the origin of the dorsal fin. Head profile slightly convex. Eyes very large, eye diameter 2.0–2.1 in HL; interorbital space moderately

broad and flattened, its width 4.6–5.2 in HL; snout short, smaller than the eye, its length 3.8–4.1 in HL. Mouth large, strongly oblique; maxilla broad posteriorly and relatively exposed; posterior end of maxilla below the anterior half of eye; lower jaw upturned, strongly projecting. Upper jaw length 1.7–1.8 in HL. Two nostrils close to each other, located close to the eye at its center margin; anterior nostril small and rounded, with a posterior fleshy rim covering the entire nostril when fully folded anteriorly; posterior nostril large, with a transverse slit, its height about a fourth of the eye diameter. Dentary, premaxilla, vomer, and palatine with small conical teeth. Outer part of premaxilla with enlarged conical teeth.

Posterior margin of the opercle with two spines, the upper one blunt and the lower one triangular and pointed. Small serrae on posterior and lower margins of the preopercle. Fine serrae on the posterior and ventral margin of the preopercle, serrae at the angle of the preopercle enlarged; inner edge of preopercle with tiny serrae; suborbital bone edging with large and fine serrae. Lower sections of the posterior margins of the subopercle and the interopercle smooth or with very weak serration, mostly covered by membranes. A deep notch on the posterior portion of the interopercle covered by the preopercular spine; a narrow gap between

the subopercle and interopercle

Dorsal fin originating above the upper end of the gill slit, its base 1.7–1.8 in SL; dorsal-fin spine strong; first dorsal-fin spine short, its length 5.0–5.4 in HL; second dorsal-fin spine 2.7–3.2 in HL; third dorsal-fin spine 1.9–2.0, fourth dorsal-fin spine longest, 1.5 in HL; first dorsal-fin rays and second dorsal-fin ray approximately the same in length and longest, 1.7 in HL. Length of pectoral fin 1.6 in HL, base oblique with upper end beneath the origin of the dorsal fin. Pelvic fin long, 1.2–1.4 in HL, inserted beneath or slightly anterior to the pectoral fin, attached to the abdomen by a broad membrane along and beyond the entire length of the innermost ray.

Anal fin originating beneath the 7<sup>th</sup> to 8<sup>th</sup> dorsal-fin spine, its base 3.7–4.1 in SL; anal-fin spines strong; first anal-fin spine 3.0–3.1 in HL; second anal-fin spine, 2.3–2.4 in HL; third anal-fin spine 2.1–2.3 in HL; second anal-fin ray longest, 1.6–2.7 in HL. Soft portions of the dorsal and anal fins broadly rounded. Caudal fin rounded, its length 1.5 in HL.

Relatively large ctenoid scales on almost the entire body, including the maxilla, dentary and mandibular; the lowermost four branchiostegal rays with scales; scales absent from all fins (except the base of pectoral & caudal fins). Scales above the middle pectoral-fin with 33–40

fine spinules on the posterior margin. Lateral-line scales with a simple central tube, with openings directed upward.

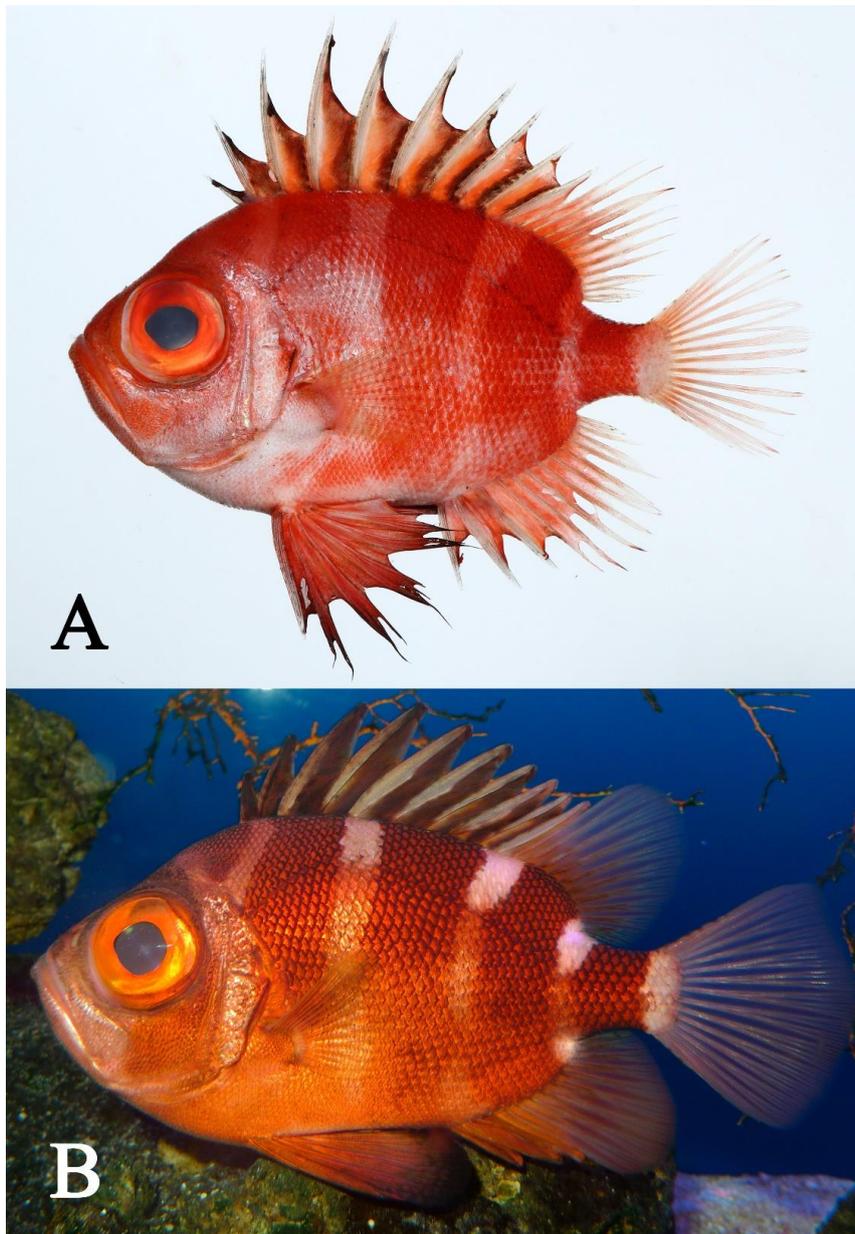
**Coloration.** Body, head, and iris generally reddish orange (Figs. 1 & 2A); pelvic fin crimson; dorsal, anal, and caudal fins faint reddish orange; membranes between dorsal fin spines dusky; edges of soft portions of dorsal, anal, and pelvic fins, and posterior edge of caudal fin, blackish; five complete, narrow white or pale bars along dorsum to the caudal peduncle (slightly oblique anteriorly). When preserved (Fig. 2B), body overall pale and white; edges of soft portion of dorsal, anal, pelvic, and caudal fins prominently black; melanophores on membranes between dorsal-fin spines.

**Distribution.** According to Iwatsuki et al. (2012), *P. refulgens* occurs in South Africa, the Red Sea, Mascarene Islands, and India. In the Western Pacific, it occurs from Indonesia to Wakayama Prefecture of Japan. All Taiwanese *P. refulgens* specimens were caught off the east coast, and local fishermen mentioned that they commonly catch this species. Koeda & Ho (2019) documented *P. refulgens* based on a color photograph of a non-preserved individual taken in Donggang, Pingtung, Southern Taiwan. At present, then, *P. refulgens* has only been documented in Southern and Eastern Taiwan, though more intense sampling efforts must be

undertaken to fully understand its distribution about Taiwan.

**Remarks.** *Pristigenys refulgens* differs from *P. nipponia* (Figs. 3A, B) in

having prominent black margins on the dorsal, anal and caudal fins. The widths of the white vertical bars are narrower in *P. refulgens*, though vary with body size



**Fig. 3.** *Pristigenys nipponia*. A. uncatagued specimen, 88.9 mm SL, Daxi, Yilan, Taiwan; B. A captive (live) individual in Okinawa Churaumi Aquarium, Japan.



**Fig. 4.** *Pristigenys meyeri*, NMMB-P34711, 170.5 mm SL, off northern eastern Taiwan.

(Iwatsuki et al., 2012; our observation). Furthermore, Iwatsuki et al. (2012) found that *P. nipponia* has more spinules on the posterior margin of the body scales (22–37, vs. 33–40 in *P. refulgens*). However, our specimens of *P. refulgens* are much larger than these of *P. nipponia* examined by Iwatsuki et al. (2012; 67.2–168.1 mm SL), and it is likely that larger individuals will have more spinules on the body scales. The third species found in Taiwanese waters, *P. meyeri* (Fig. 4) can be readily distinguished from the former two by its meristic counts and coloration. There are

more dorsal-fin and anal-fin soft rays (generally X, 12 and III, 11, respectively), whereas both *P. refulgens* & *P. nipponia* have X, 11 and III, 10, respectively. *Pristigenys meyeri* has many narrow, red bars on the body, with numerous red spots between bars; whereas *P. refulgens* and *P. nipponia* are generally reddish orange and possess five vertical white or pinkish bars.

#### **Acknowledgements**

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**Tab. 2.** Meristic counts of two *Pristigenys* species collected from Taiwan.

	<i>P. refulgens</i> (n=3)	<i>P. nipponia</i> (n=6)
Dorsal-fin elements	X, 11	X, 11
Anal-fin elements	III, 10	III, 10
Pectoral-fin rays	18–19	18–19
Pelvic-fin elements	I, 5	I, 5
Scales above lateral line	10–11	11–12
Scales below lateral line	26–28	27–30
Pored lateral line scale	32–35	34–37
Gill rakers on upper limb	7–8	7–9
Gill rakers on lower limb	18	18–20
Total gill rakers	25–26	26–29
Number of spinules on scales	33–40	22–37

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