Zootaxa 5189 (1): 204–221
https://www.mapress.com/zt/

Article

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

https://doi.org/10.11646/zootaxa.5189.1.19
http://zoobank.org/urn:lsid:zoobank.org:pub:DDDB8C91-9AD8-47F9-A88E-331E510DA29B

Redescription of *Chelidoperca barazeri*, with a revised key and literature review to species of *Chelidoperca* in Taiwan (Perciformes: Serranidae)

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Abstract

Chelidoperca barazeri Lee, Lee, Matsunuma & Chen, 2019 is redescribed based on two sub-adult types and 12 additional non-types specimens collected from the type locality and southwestern Taiwan, respectively. The identification of the additional specimens were supported by morphological and/or molecular approaches. *C. barazeri* is characterized by the following combination of characters: three scale rows between lateral line and base of 6th dorsal-fin spine; pored lateral-line scales 34–37, modally 36; modally 2+7 developed gill rakers on the upper and lower limb; soft dorsal fin with series of large yellow spots; and the anal-fin with a yellow margin. *C. barazeri* is most similar to *C. tosaensis* and can be distinguished from *C. tosaensis* by: relatively less pored lateral line scales, 34–37 (vs. 37–43, modally 39); anal-fin without series of spot; penultimate and the last dorsal- and anal-fin rays in adult not elongated (vs. well elongated in adults); presence of a faint and discontinuous stripe formed by clusters of melanophores along the mid-lateral body when preserved (vs. without or very indistinct). Furthermore, six species of *Chelidoperca* are confirmed occurring in the Taiwanese water by literature reviews. A key to *Chelidoperca* from the Taiwanese water is provided.

Key words: Taiwan, morphology, DNA barcoding

Introduction

Chelidoperca Boulenger, 1895 is a genus of small perch-like fishes distributed mostly within the Indo-West Pacific, except for *Chelidoperca africana* Cadenat, 1960 which occurs in the tropical eastern Atlantic (Heemstra & Anderson, 2016). Currently, 19 nominal species were recognized (Tang & Ho, 2021), whereas about ten species were described in recent decade which shows no sign of decreasing (Lee *et al*., 2019; Matsunuma & Motomura, 2016; Matsunuma *et al*., 2018, 2020; Ogino *et al*., 2019; Psomadakis *et al*., 2021; Tang & Ho, 2021). Members of *Chelidoperca* mostly inhabit sandy mud bottoms in coastal and offshore areas, including remote seamounts or banks at depths ranging from ca. 40–400 m (Lee *et al*., 2019, Psomadakis *et al*., 2021). Some species were rarely captured due to their special and remote habitat and distribution, therefore they were described based on very limited specimens, juveniles or even solo holotype (e.g., *Chelidoperca margaritifera* Weber, 1913, *Chelidoperca barazeri* Lee, Lee, Matsunuma & Chen, 2019). As a result, additional information to understand the variation of species are needed.

In Taiwan, six species of *Chelidoperca* were recognized (Tang & Ho, 2021), including a recently described species, *Chelidoperca formosa*. Matsunuma *et al*. (2019) reported *Chelidoperca santosi* Williams & Carpenter, 2015 from Taiwan, the East China Sea and Japan based on voucher specimens from these regions. Another four species from southern or southwestern Taiwan were examined and listed in Koeda & Ho (2019): *Chelidoperca hirundinacea* (Valenciennes, 1831), *Chelidoperca pleurospilus* (Günther, 1880), *Chelidoperca stella* Matsunuma & Motomura, 2016 and *Chelidoperca tosaensis* Matsunuma, Yamakawa & Williams, 2018.

Recently, the first author (CNT) collected a number of specimens which were morphologically identical to the *C. tosaensis* reported by Koeda & Ho (2019). However, a detailed examination on morphology and DNA

 Accepted by H.-C. Ho: 8 Jul. 2022; published: 23 Sept. 2022

barcoding analysis revealed that these specimens represent the first record of *Chelidoperca barazeri* Lee *et al*., 2019 in Taiwan.

Chelidoperca barazeri Lee *et al*., 2019 was originally described from two sub-adult individuals collected at Papua New Guinea. Lee *et al*. (2019) suggested a re-description based on adult individuals is required. With the twelve additional sub-adult and adult specimens of *C. barazeri* collected from Taiwan, the identifications were supported by morphological and/or molecular data, we herein formally re-describe the species based on the additional and the type specimens. In the present study, a key and a literature survey to species of *Chelidoperca* in the Taiwanese water were also provided.

Methods and Materials

Methods of counts, measurements and terminology generally follow Matsunuma & Motomura (2016) and Tang & Ho (2021). Measurements were taken by a 150 mm digital caliper, recorded to the nearest 0.1 mm. Standard length (SL) and the head length (HL) were used throughout. Plot of numbers of head serrae were provided based on data obtained in this study, Lee *et al*. (2019) and Matsunuma *et al*. (2018); those obtained in this study and Matsunuma *et al*. (2018), the counts included both sides of specimens, except Lee *et al*. (2019) that only the count from right sides were recorded. Osteological characters were determined by X-ray radiographs. Abdomens of the specimens are opened near the anal position to observe the gonads to determine the sex of the specimen when possible. Specimens were deposited at: the Kagoshima University Museum, Ichthyology, Kagoshima, Japan (KAUM-I); the Pisces Collection of Kindai University, Nara, Japan (KUN-P); the Pisces Collection of National Museum of Marine Biology & Aquarium, Pingtung, Taiwan (NMMB-P). Type specimens of *Chelidoperca barazeri* (n=2) from the ichthyological collections of the National Taiwan University Museum, Taipei (NTUM) were examined. Morphometric characters of the type specimens were measured again by the first author, except for the length of fin spines and rays that were damaged therefore the original proportions were retained.

Genetic analysis. Pieces of muscle above the anal fin or pelvic fin of the right side of body were taken from specimens and preserved in 95% ethanol at -20˚C prior to the DNA extraction. DNA extractions were using GeneMark Easy Tissue & Cell Genomic DNA Purification kit or the DNeasy Blood & Tissue Kit (QIAGEN) following the manufacturer's protocol. A barcode fragment of the mitochondrial cytochrome c oxidase subunit I gene (*COI*) gene was amplified by using the universal primer pair FishF1 (5'TCAACCAACCACAAAGACATTGGCAC3') and FishR1 (5'-TAGACTTCTGGGTGGCCAAAGAATCA3') or FishR2 (5' ACTTCAGGGTGACCGAAGAATCAGAA3') (Ward *et al.,* 2005), polymerase chain reaction also followed the protocols from Ward *et al*. (2005).

The software MEGA7 (Kumar *et al*., 2016) was adopted to align the *COI* sequences and compute pairwise genetic distances with the Kimura-2-parameter (K2P) model (Kimura, 1980). The length of the aligned dataset of *COI* sequences for comparison and phylogenetic analysis was 615 bp after trimmed. RAxML-HPC2 on XSEDE (8.2.12) (Stamatakis, 2014) available from the CIPRES Science Gateway (Miller *et al*., 2010) was applied for the phylogenetic analysis. The phylogenetic analysis was conducted based on the *COI* dataset using the maximum likelihood method (ML) with the GTR+G nucleotide substitution model. Nodal support was assessed with bootstrapping (Felsenstein, 1985) under the ML criterion, based on 1000 pseudoreplicates. *Centropristis striata* (Linnaeus, 1758), *Paralabrax clathratus* (Girard, 1854) and *Serranus cabrilla* (Linnaeus, 1758) were chosen as the outgroups of *Chelidoperca* to root the phylogenetic tree. The result of ML analysis was transferred to tree topology by FigTree v1.4.3.

COI sequences generated in this study were deposited in NCBI Genbank. *Chelidoperca barazeri* (n=7): ON797433–ON797439 and *C. stella* (n=4): ON817275–ON817278. Several *COI* sequences of *Chelidoperca* spp. and the outgroup taxa were retrieved from Genbank and the Barcode of Life Data System (BOLD System) for the phylogenetic analysis, including *C. barazeri* (n=2, types): MK988040–988041; *C. stella* (n=9): MK988072–MK988078, MW448363–MW448364; *C. tosaensis* (n=5): MF597699, 597717, MK988079–988081; *C. microdon* (n=1): MK988060; *C. pleurospilus* (n=1): MK988068; *C. striata* (n=1): BCOLL419-08; *P. clathratus* (n=1): GU440445; *S. cabrilla* (n=1): MK879788.

TAXONOMY

Family Serranidae

Chelidoperca Boulenger, 1895

Key to *Chelidoperca* found in Taiwanese waters

The following data are based on our examination on Taiwanese specimens (Table 2 & 3; also Tang & Ho, 2021: Table 4).

1A. Three scale row between the lateral line to the base of 6th dorsal-fin spine **2**
1B. Four scale rows between the lateral line to the base of 6th dorsal-fin spine **4**
2A. Pored lateral-line scale (LLS) 43–44; cheek scales rows 6–7; without red ocellus on opercular membrane when fresh; two black spots present at each side of snout (when fresh and preserved) . . . . . ***C. santosi***
2B. LLS 34–37; cheek scale rows 4–5; a red ocellus present on the opercular membrane when fresh; no spot at snout when fresh (or faint cluster of melanophores when preserved) **3**
3A. Scales present on dentary and angular surface of lower jaw; pelvic fin with 3–4 yellow oblique yellow line when fresh . . . . . ***C. stella***
3B. Scales present on dentary surface of lower jaw only; pelvic fin without line or spot . . . . . ***C. barazeri***
4A. LLS 35–38 (rarely 38); cheek scale rows 4–5; uppermost tip of the caudal fin reddish . . . . . ***C. formosa***
4B. LLS 41–44; cheek scale rows 6–7; uppermost tip of the caudal fin not reddish **5**
5A. Body rather pinkish-red; a dark reddish blotch at mid-body; two transverse series of white spots midlaterally; dentary region scaled. . . . . ***C. hirundinacea***
5B. Body rather orange-red; a series of transverse black blotches (usually 5) midlaterally on body; dentary region not scaled . . . . . ***C. pleurospilus***

Chelidoperca barazeri Lee, Lee, Matsunuma & Chen, 2019

Figures 1–3, 5–6; Tables 1–3

Chelidoperca barazeri Lee, Lee, Matsunuma & Chen, 2019: fig. 7; supplementary figs. 1A, 2A–B, 3A (type locality: Gazelle Channel, New Ireland, Bismarck Sea).

Chelidoperca tosaensis not of Matsunuma *et al*., 2018: Koeda & Ho, 2019: 668, figs.1–2 (Ke-tzu-liao, southwestern Taiwan, misidentification).

Type series. NTUM15639, holotype, 32.2 mm SL; NTUM15635, paratype, 32.0 mm SL, sta. CP4262, 2˚4’S, 151˚07’E, 150–160m. Gazelle Channel, New Ireland, Bismarck Sea, R/V Alis, French beam trawl, MADEEP expedition, 25 Apr. 2014. **Non-type specimens.** All from southwestern Taiwan: KAUM–I. 115150, 65.2 mm SL, 115151, 45.6 mm SL, Ke-tzu-liao, Kaoshiung, southwestern Taiwan, coll. by K. Koeda *et al*., bottom trawl, 8 May 2018; KUN-P 55609, 57.8 mm SL, 55610, 40.9 mm SL, 55611, 59.0 mm SL, off Kaoshiung, southwestern Taiwan, coll. by H.-C. Ho, bottom trawl, 16 Sept. 2019; NMMB-P35231 (*CO1*: ON797433), 53.1 mm SL, 35232 (*CO1*: ON797434), 50.8 mm SL, Ke-tzu-liao, Kaoshiung, southwestern Taiwan, ca. 100m, bottom-trawl, 24 Jan. 2021, coll. by C.-N. Tang; NMMB-P35233 (*CO1*: ON797435), 67.7 mm SL, 35234 (*CO1*: ON797436), 66.1 mm SL, 35235 (*CO1*: ON797437), 64.4 mm SL, 35236 (*CO1*: ON797438), 59.6 mm SL, 35237 (*CO1*: ON797439), 54.1 mm SL; Ke-tzu-liao, Kaoshiung, southwestern Taiwan, ca. 100m, bottom-trawl, 31 Jan. 2021, coll. by C.-N. Tang.

Diagnosis. A species of *Chelidoperca* distinguished from congeners by the following combination of characters: three scale rows between lateral line and base of 6th dorsal-fin spine (two full-sized plus a dorsalmost half-sized scales); pored lateral-line scales 34–37 (modally 36); scale rows in longitudinal series 35–39 (modally 38); developed gill rakers 1–2+7–8 (modally 2+7); cheek scale rows 4–7 (modally 5); dentary surface of lower jaw naked; interorbital region with a single row of cycloid scales extend to or slightly beyond the mid-orbit level; outermost row of teeth of the upper jaw enlarged, antrorse and caniniform; outermost row of teeth of the lower jaw at the lateral side near symphysis with ca. 3–4 enlarged antrorse canines, innermost row of teeth enlarged and caniniform; penultimate and the last dorsal- and anal-fin rays in adult not elongated; a red ocellus on opercular membrane between the spines; soft dorsal fin with series of large yellow spots; anal fin with a yellow margin; caudal fin with yellow spots along the basal-half median fin rays; and the presence of a faint and discontinuous stripe formed by clusters of melanophores along the mid-lateral body when preserved.

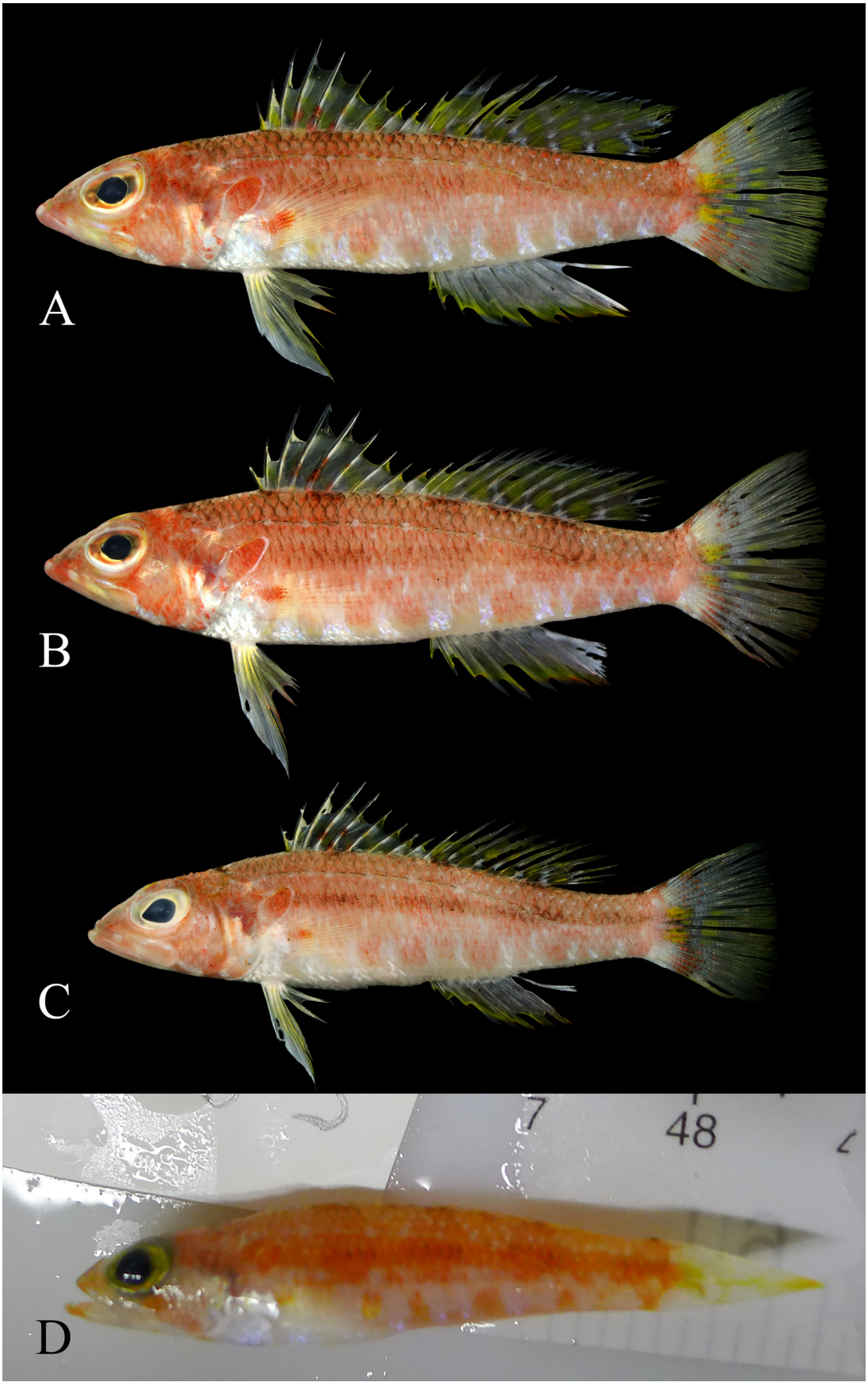

FIGURE 1. Fresh specimens of *Chelidoperca barazeri*. A. NMMB-P35233, 67.7 mm SL, male. B. NMMB-P35235, 64.4 mm SL, female. C. NMMB-P35231, 53.9 mm SL, female. D. the paratype, NTUM15636, 32.0 mm SL (photo by W.-J. Chen's Lab), subadult.

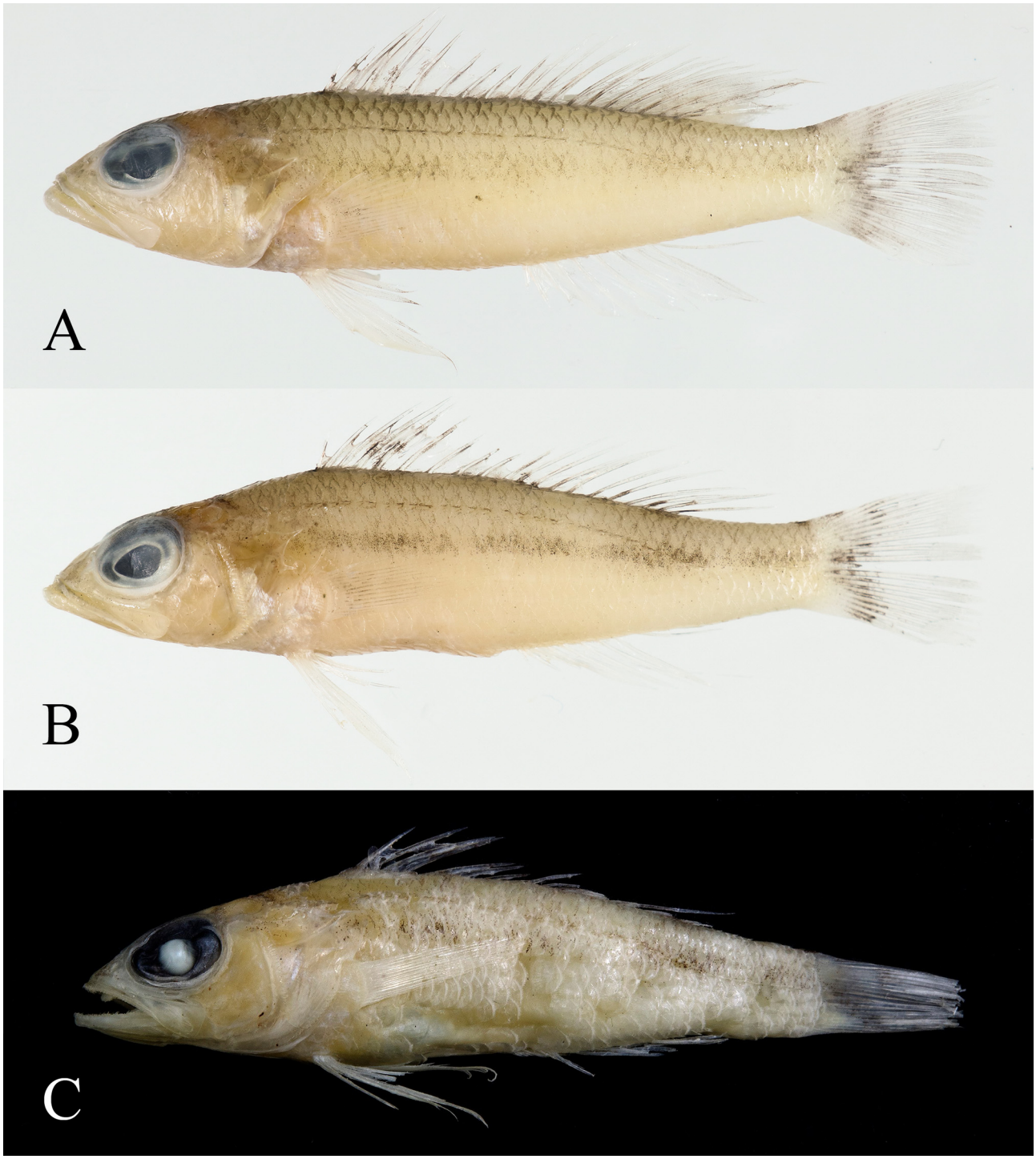

FIGURE 2. Preserved condition of *Chelidoperca barazeri*. A. NMMB-P35233, 67.7 mm SL. B. NMMB-P35231, 53.9 mm SL. C. the holotype, NTUM15639, 32.2 mm SL (photo by M.-Y. Lee).

Description. The following values are provided for the holotype with the paratype and non-types in parentheses.

Dorsal-fin elements X, 10; anal-fin elements III, 6; caudal fin slightly rounded, total caudal-fin rays - (30–33), principal rays - (9+8), branched rays - (8+7); upper/lower procurrent caudal-fin rays -/- (6–9/6–7). Scale rows above lateral line to the dorsal-fin origin 3 (3–4); scale rows below lateral line 9 (9–10); cheek scale rows 4 (4–7); pre-dorsal-fin scale rows 7 (6–8); circumpeduncular scales 17 (17–18).

First gill arch with 17 (15–18) total rakers, including 3 (3–5) (rudimentary) +2 (1–2) (developed) rakers on the upper limb and 7 (7–8) (developed)+5 (2–5) (rudimentary) rakers on the lower limb. Pseudobranchial

filaments 12 (11–18). Branchiostegal rays 7. Vertebrae 10 (precaudal)+14 (caudal)= 24; supraneurals 3; formula for the configuration of supraneural spines and anterior dorsal pterygiophores 0/0/0+2/1+1/1; ribs present on the 3rd vertebrate to the 10th. Terminal dorsal pterygiophore in interneural space 16; terminal anal pterygiophore in interhaemal space 4.

TABLE 1. Morphometric data and count of head serrae of *Chelidoperca barazeri* and two similar species. Means of head serrae were recorded to nearest integer. Data for comparison were adopted from Matsunuma *et al.* (2018). Data sources: A. Present study; B. Matsunuma *et al.* (2018). HT= holotype; D= dorsal; A= anal.

Data source	*C. barazeri*		*C. tosaensis*	*C. stella*	
	A		B	A, B	
	HT (types and non-types) (n=14)		HT (types and non-types) (n=76)	Types and non-types Mean (Range) (n=37)	
Morphometric					
Standard length (mm SL)	32.2 (32.0–67.7)	**SD**	82.8 (29.3–92.8)	24.2–83.1	**SD**
Body depth	24.8 (22.1–26.9)	1.2	24.0 (22.8–27.1)	25.1 (22.3–28.3)	1.1
Body depth at anal origin	22.7 (21.3–24)	0.8	23.9 (21.0–25.2)	23.0 (21.2–24.8)	0.9
Body width	18.6 (16.6–20.1)	1.0	19.5 (17.4–21.8)	17.3 (14.3–20.9)	1.6
Head length	38.8 (37.1–38.8)	0.6	37.6 (35.2–40.1)	37.1 (34.5–40.7)	1.5
Head width	13.4 (12.2–14.7)	0.7	13.5 (12.4–15.0)	13.1 (12.2–14.1)	0.6
Snout length	6.8 (5.9–8.2)	0.6	8.7 (6.9–9.1)	7.7 (6.8–8.7)	0.4
Orbit diameter	13.7 (11.2–14.1)	0.9	11.2 (10.4–13.6)	11.7 (9.7–14.5)	1.3
Bony Interorbital width	2.5 (2.3–2.9)	0.2	3.3 (2.3–3.3)	3.2 (2.4–3.9)	0.3
Internasal width	5.7 (4.9–5.9)	0.3	6.1 (5.4–6.7)	5.7 (5.2–6.5)	0.3
Upper-jaw length	16.8 (16.0–18.0)	0.6	17.7 (16.3–19.0)	18.0 (16.1–19.3)	0.8
Lower-jaw length	18.0 (17.2–18.9)	0.5	19.1 (17.4–20.3)	19.1 (17.8–20.2)	0.7
Maxilla depth	4.7 (4.1–5.3)	0.3	4.7 (4.0–5.8)	5.0 (4.0–5.7)	0.5
Postorbital length	19.6 (18.8–20.1)	0.4	19.4 (17.6–20.6)	19.0 (17.9–20.2)	0.7
Suborbital depth	1.0 (1.0–1.8)	0.3	2.1 (0.9–2.5)	1.4 (0.6–2.0)	0.3
Interopercular-spine width	5.0 (4.8–6.3)	0.5	6.0 (4.8–6.7)	5.5 (2.1–6.6)	0.7
Predorsal length	38.2 (35.3–38.2)	1.0	36.6 (33.6–39.7)	36.3 (34.0–40.6)	1.5
Preanal length	61.5 (60.0–63.1)	1.1	61.0 (58.7–67.2)	62.1 (57.5–66.9)	2.1
Prepelvic length	32.6 (30.7–34.7)	1.1	32.6 (30.5–35.9)	33.8 (30.4–37.4)	1.4
1st D-fin spine	6.0 (4.4–7.4)	1.0	7.1 (5.5–8.2)	6.2 (3.9–8.3)	0.9
2nd D-fin spine	10.6 (7.7–12.1)	1.2	11.5 (8.5–14.1)	11.0 (8.0–13.9)	1.5
3rd D-fin spine	15.1 (12.9–16.4)	0.9	15.5 (12.6–17.1)	15.2 (11.5–18.5)	1.5
4th D-fin spine	16.3 (14.4–18.6)	1.1	16.1 (14.0–17.8)	16.0 (14.0–18.0)	1.2
5th D-fin spine	14.9 (13.7–17.0)	1.1	14.4 (12.9–17.1)	14.8 (12.6–17.1)	1.2
6th D-fin spine	13.3 (11.2–14.3)	0.9	12.9 (11.3–14.9)	12.8 (10.4–14.7)	1.2
7th D-fin spine	11.0 (8.5–11.8)	1.0	11.0 (9.5–12.8)	10.8 (9.0–12.9)	1.0
8th D-fin spine	8.9 (6.1–10.0)	1.0	9.6 (7.7–11.5)	8.8 (6.6–10.5)	0.8
9th D-fin spine	8.3 (5.7–8.8)	1.0	9.5 (7.3–11.1)	8.1 (6.8–9.7)	0.7
10th D-fin spine	8.5 (7.4–9.9)	0.8	10.0 (8.4–11.5)	9.1 (6.3–10.5)	1.0

.....Continued on the next page

TABLE 1. (Continued)

Data source	*C. barazeri* A		*C. tosaensis* B	*C. stella* A, B	
	HT (types and non-types) (n=14)		HT (types and non-types) (n=76)	Types and non-types Mean (Range) (n=37)	
1st D-fin soft ray	15.1 (12.9–18.1)	1.4	13.4 (13.0–15.7)	14.8 (12.7–17.1)	1.2
5th D-fin soft ray	15.6 (15.4–19.3)	1.3	18.2 (15.4–19.8)	15.7 (13.4–17.7)	1.1
Penultimate D-fin soft ray	18.5 (15.3–24.0)	2.4	24.6 (15.9–25.7)	20.0 (15.2–26.5)	2.9
Longest D-fin soft ray	18.6 (15.3–24.0)	2.3	24.6 (16.4–25.7)	20.3 (16.6–26.5)	2.8
1st A-fin spine length	3.8 (2.6–5.8)	0.9	6.1 (4.0–6.8)	4.2 (2.4–5.3)	0.7
2nd A-fin spine length	6.7 (5.9–9.1)	1.0	9.2 (6.8–9.2)	7.1 (5.3–8.3)	0.7
3rd A-fin spine length	10.1 (6.3–10.8)	1.4	10.6 (9.2–11.8)	9.9 (7.7–11.6)	1.0
1st A-fin soft ray	14.6 (11.5–15.6)	1.2	-- (13.3–16.7)	14.4 (11.2–16.5)	1.2
3rd A-fin soft ray	15.7 (14.7–17.8)	1.1	-- (16.7–20.2)	15.9 (13.5–18.4)	1.1
Penultimate A-fin soft ray	18.1 (16.0–22.0)	1.8	27.2 (18.2–26.4)	19.5 (15.1–27.1)	2.7
Longest A-fin soft ray	18.1 (16.0–22.0)	1.8	27.2 (18.2–26.4)	20.3 (16.1–27.1)	2.9
Pectoral fin length	26.4 (23.5–26.6)	1.0	27.2 (24.3–29.1)	26.2 (23.0–27.6)	1.2
Pelvic-fin spine length	14.4 (10.3–15.6)	1.7	13.0 (11.3–19.4)	14.3 (11.5–17.1)	1.5
Longest pelvic-fin ray length	27.9 (23.1–28.9)	2.2	27.6 (23.6–30.8)	28.1 (22.6–32.2)	2.3
Caudal-fin length	20.2 (20.2–28.8)	2.2	-- (24.8–28.9)	27.1 (22.4–29.6)	1.5
Middle caudal-fin length	19.9 (19.9–26.3)	1.7	25.7 (23.7–28.9)	24.2 (21.0–27.5)	1.3
Caudal-peduncle depth	12.4 (10.6–12.5)	0.6	12.1 (11.5–13.5)	11.9 (11.0–13.2)	0.5
Caudal-peduncle length	24.7 (22.2–25.8)	0.9	20.4 (18.4–23.3)	25.4 (23.7–28.1)	1.0
D-fin base length	49.2 (46.2–50.4)	1.3	50.9 (44.1–53.2)	48.0 (44.7–51.0)	1.6
A-fin base length	14.6 (14.6–17.0)	0.7	19.6 (15.3–20.3)	16.2 (14.1–18.5)	1.0
Pectoral-fin base length	5.6 (5.6–6.9)	0.4	6.8 (6.0–7.4)	6.3 (5.0–7.5)	0.5
Head serrae counts	mean (range)		mean (range)	mean (range)	
Preopercle serrae	29 (19–39)		30 (15–40)	36 (18–52)	
Interopercle serrae	9 (3–18)		10 (3–19)	8 (1–24)	
Subopercle serrae	15 (10–25)		11 (5–20)	21 (0–45)	
Posttemporal serrae	3 (2–4)		2 (2–7)	3 (1–8)	

Body elongated, cylindrical in section anteriorly, gradually becoming compressed posteriorly. Body depth and width 24.8% (22.1–26.9%) and 18.6% (16.6–20.1%) of SL, respectively. Head moderately large, its length 38.8% (37.1–38.8%) of SL, upper profile not steep. Snout moderately blunt, anterior margin forms an angle ca. 40–50° with the upper jaw, its length 17.6% (15.6–21.3%) of HL, shorter than the eye diameter. Eye moderately large, its diameter 35.2% (29.9–36.6%) of HL; bony interorbital width narrow, 6.4% (5.9–7.5%) of HL. Mouth large and slightly oblique, the upper-jaw length 43.2% (42.7–46.7%) of HL. Postorbital length 50.4% (49.5–53.4%) of HL; predorsal length 38.2% (35.3–38.2%) of SL; preanal length 61.5% (60.0–63.1%) of SL; prepelvic length 32.6% (30.7–34.7%) of SL; caudal peduncle relatively long, length 63.6% (57.5–68.6%) of HL, the least caudal peduncle depth 32.0% (27.8–33.0%) of HL.

Dorsal-fin origin above a vertical through pectoral-fin base, the first spine shortest, 16.4% (11.8–19.4%) of HL; fourth spine longest, 44.5% (38.9–48.5%) of HL, length of spine gradually reducing after the fourth; the ninth spine 22.6% (14.9–23.0%) of HL, the last (tenth) spine longer than the ninth, 23.2% (19.6–25.6%) of HL; all soft rays branched, generally subequal in length, not elongated or filamentous, the penultimate (ninth) ray longest, its length

50.4% (40.0–62.5%) of HL. Anal-fin origin below the base of the second dorsal-fin ray; the third spine longest, its length 27.5% (16.7–27.8%) of HL; all soft rays branched, not elongated, the penultimate (fifth) ray longest, its length 49.3% (42.2–57.3%) of HL. Pectoral fin with uppermost two rays unbranched, remaining rays branched, its posterior tip do not reach the level of anal-fin origin; its length 72.0% (61.4–72.0%) of HL. Pelvic-fin origin below the pectoral-fin base; the spine covered with skin, its length 39.3% (27.8–40.5%) of HL; all soft rays branched, the second longest and elongate, 76.0% (61.3–76.0%) of HL, expanded distally, its tip pointed, reaching the anus when appressed. Caudal fin slightly rounded, its length 52.0% (52.0–75.0%) of HL.

TABLE 2. Frequency distribution of selected meristic counts of three *Chelidoperca*, values obtained from Taiwanese specimens, except the values of type specimens or from the original description of *C. barazeri* and *C. tosaensis* were included. A superscript "H" indicates the count of the holotype.

	Dorsal-fin rays		Anal-fin rays			Pectoral-fin rays (left/right)					
	X, 9	X, 10	II, 7	III, 6	III, 7	14/15	15/14	15/15	15/16	16/15	16/16
C. barazeri		14[H]		14[H]			1	13[H]			
C. stella		39[H]		39[H]		2	1	29[H]			1
C. tosaensis	1	83[H]	1	82[H]	1	5		69[H]	5		1

	SR above LL			SR below LL					SR between LL & 6th D-spine	Circumpeduncular SR			
	3	4	5	8	9	10	11	12	3	16	17	18	19
C. barazeri	12[H]	2			13[H]	1			14[H]		3[H]	6	
C. stella	19[H]	5		3	12	7			37[H]	1	4	13	5[H]
C. tosaensis	18	39	1	1		24[H]	37	1	84[H]		8	47[H]	

	Predorsal-fin SR				Cheek SR				Total upper GR				Total lower GR						
	6	7	8	9	4	5	6	7	4	5	6	7	9	10	11	12	13	14	15
C. barazeri	3	5[H]	1		2[H]	7	2	1		7	7[H]			2	6[H]	6			
C. stella	5	11	4		2	13[H]			1	5	27[H]	6		2	11	10	12[H]	3	1
C. tosaensis	8	26	14	2	1	11	7	1	15	56	11[H]		1	11	31[H]	28	9	1	

	Upper developed GR			Lower developed GR			Total GR								
	1	2	3	6	7	8	14	15	16	17	18	19	20	-	23
C. barazeri	1	13[H]			12[H]	2		1	3	8[H]	2				
C. stella		39[H]		2	37[H]				4	10	8	13[H]	3		1
C. tosaensis	1	80[H]	1	6	71[H]	5	2	15	28	25[H]	18	1			

TABLE 3. Frequency distribution of counts of pored lateral-line scales of *Chelidoperca* spp., values were obtained from Taiwanese specimens, except *C. barazeri*, *C. stella* and *C. tosaensis*, the values were from the original description or other sources were included. Data source: **1.** Present study; **2.** Matsunuma *et al*. (2018); **3.** Tang & Ho (2021). A superscript "H" indicates the count donated from the holotype.

	pored lateral-line scales											
	33	34	35	36	37	38	39	40	41	42	43	44
C. barazeri[1]		1	3[H]	6	4							
C. formosa[3]			1	2[H]		1						
C. hirundinacea[1]									1	3	6	8
C. pleurospilus[1]									1	3	12	1
C. santosi[1]											5	2
C. stella[1, 2]	1	9[H]	15	3	1	1						
C. tosaensis[2]					4	16[H]	28	20	7	1		

Anterior nostrils situated at the middle of snout, its opening with a small rounded flap rising from the posterior rim (or short membranous tube); posterior nostril an elliptical opening at anterior border of eye. Opercle with two flat prominent spines, the upper spine slightly longer than the lower spine, interopercular-spine width 12.8% (12.8–16.3%) of HL; posterior edge to the angle of preopercle serrated, with 19/21 (19–39) well-developed serrae; upper distal edge of interopercle serrated, with 5/4 (4–18, one non-type without serrae on one side) weak, not well-developed serrae; lower distal edge of subopercle serrated, with 13/11 (10–25) weak serrae; posttemporal with a small bony crest with 2/2 (2–4) serrae tips at the beginning of the lateral line.

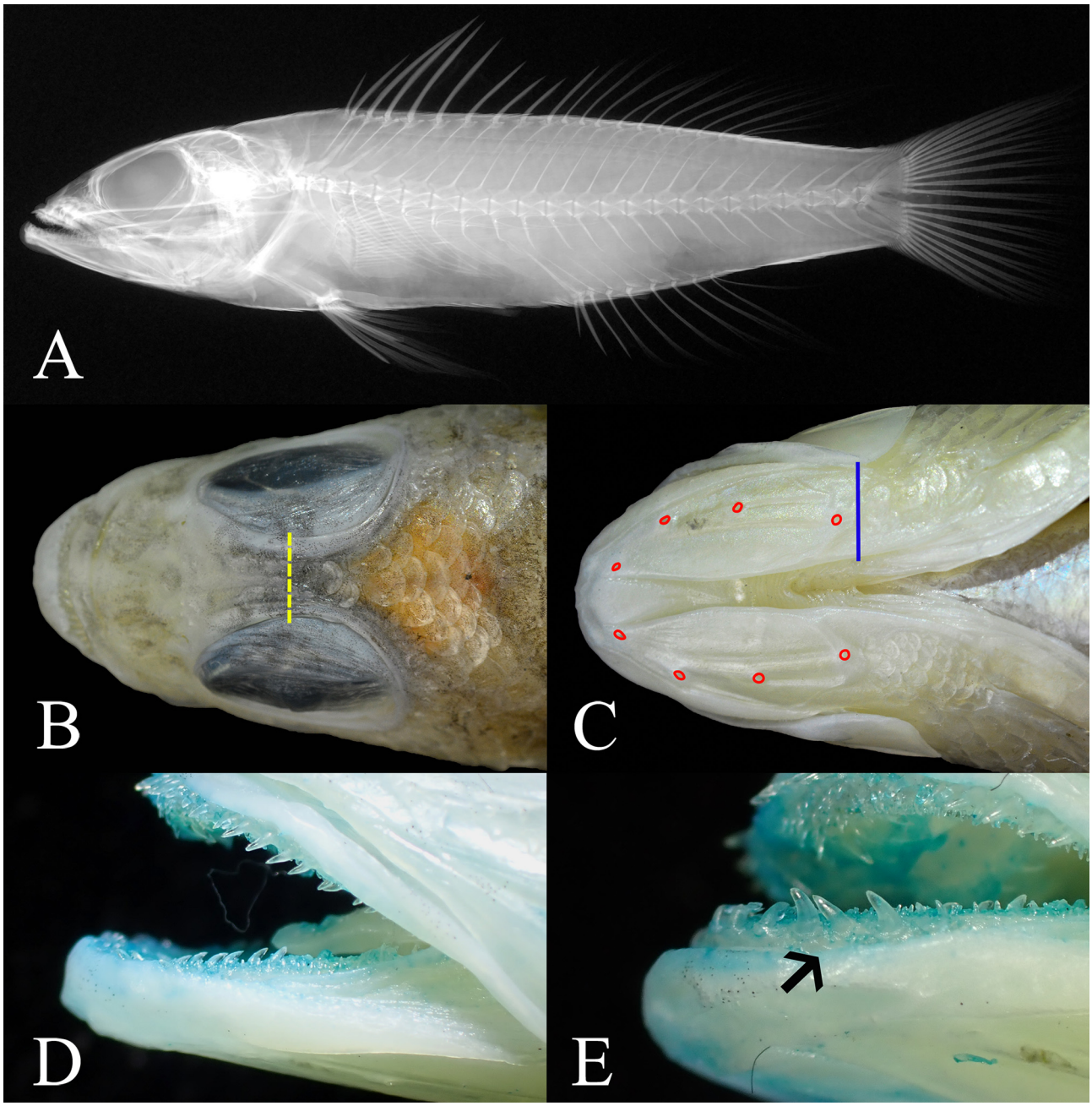

FIGURE 3. *Chelidoperca barazeri*, NMMB-P35233, 67.7 mm SL. A. Radiograph photo. B. The dorsal view of head, yellow line indicates the termination of scale pocket between the interorbital region. C. The ventral view of head, sensory pores (red circles) and the termination of angular scales (blue line) are indicated. D. Enlarged canines of the upper and lower jaw; E. Enlarged antrorse canines on the lower jaw (pointed by arrow).

Maxilla with a low lateral ridge along the median level; ventral part of maxilla with a low skin fold extended from the premaxilla; lower jaw slightly protruding beyond the upper jaw when the mouth is closed. Bands of small conical teeth and enlarged canines on both jaws, vomer and palatine bands, teeth bands tend to be broader in larger

specimens. The anterior (broadest) portion of tooth band on the upper jaw at symphysis with ca. 4–7 rows of small, sharp-tipped conical teeth, progressively longer towards the inner rows, the band becoming narrower posteriorly; outermost row of upper jaw with enlarged antrorse canines (Fig. 3D); anterior (broadest) portion of lower jaw at symphysis with ca. 3–4 rows of sharp-tipped conical teeth, progressively longer towards the inner rows, the outermost row of teeth at the symphysis stout and enlarged, the band becoming narrower posteriorly; the outermost row near symphysis at lateral side with ca. 3–4 enlarged antrorse canines (Fig. 3E), and enlarged canines along the innermost row. Vomer with a V-shaped band consisting ca. 3–5 rows of small conical teeth at broadest part, a few enlarged canines at posterior end of each sides. Palatine band consisting ca. 2–4 rows of small sharp-tipped conical teeth, the innermost row often enlarged.

Body generally covered with ctenoid scales, except for several regions with cycloid scales. Uppermost row of body scales along the dorsal-fin base about half size of the scales on body. Lateral line complete, slightly arched over pectoral fin and gradually descending, terminating at caudal-fin base. Pored lateral-line scales 35 (34–37). Scale rows in longitudinal series 37 (35–39). Pectoral fin with a scaly basal sheath. Scales absent on all rays and membranes of dorsal, anal and pelvic fins. Caudal fin with scaly basal sheath with ctenoid scales, scales extended to and covering one-third to half of the area from the fin base, scales on caudal fin ctenoid. Head generally covered with both ctenoid and cycloid scales; snout (including infraorbital), maxilla and ventral surface of dentary naked; ventral surface of the angular covered with ca. 2–4 (more rows in larger non-type specimen, fewer in small specimens) rows of cycloid scales, not extended onto the dentary; cheek (preopercle) possesses both cycloid and ctenoid scales (larger non-type specimens with more ctenoid scales on the upper two-third area); scales on interopercle cycloid; scales on subopercle and opercle ctenoid; scales on interopercular membrane cycloid; interorbital with a single row of cycloid scale reaching or slightly anterior to the mid-orbit level (some specimens were judged by scale pockets due to scale loss). Prepelvic area possess mainly cycloid scales, except scale in the vicinity of pelvic-fin base with few and weak ctenii.

A pair of interorbital canals with numerous small pores running along outer margin of interorbital region, diverging outward anteriorly, and reaching between anterior and posterior nasal pores. Lower jaw with four, non-paired large sensory pores on each side (Fig. 3C), the anteriormost pore near symphysis, followed by two pores along the sensory canal of the dentary surface, the last one located between the junction of dentary and angular.

Fresh coloration. Based on adult specimens from Taiwan (Fig. 1A–C). Body pinkish red, becoming paler ventrally. Upper body darker, scales above lateral line with dark brown edges. Several small shiny white spots scattering along and above the lateral line. A faint reddish stripe (ca. 1.5 scale in width) running horizontally along the body axis. Chest shiny white. Lateral body with ca. 9 whitish or iridescent vertical rectangular bars along the ventral profile. Head (snout and jaws) generally reddish pink. Premaxilla with a white spot at the anterior part, becoming pale yellow posteriorly. Maxilla pale red. Lower jaw with a white spot near the symphysis (present on both sides). A small iridescent white stripe extends posteroventrally from the posterior edge of maxilla to the anteroventral margin of preopercle. Iris yellow with dusky reddish pigments. Upper rim of eye reddish. Cheek and opercle not uniformly red, region posterior to the maxilla sometimes more reddish (may varies due to condition of specimens). Opercular membrane between the spines with a distinct red spot (red ocellus), with a translucent white margin.

Spinous dorsal-fin membrane translucent white, with several irregular yellow spots, the distal margin of membrane yellow. A small group of dark reddish spot (ca. 4–6) on the basal half of the 4th to 6th spine. Soft dorsal-fin membrane translucent white, with 2–3 rows of large yellow spot along the rays, upper distal margin translucent white. Anal fin translucent white with broad yellow margin, distal tip of soft rays sometimes reddish. Membrane between the branches of the last anal-fin ray creamy white, a pale yellow spot sometimes present on the mid-way. Caudal fin translucent white, becoming translucent yellow posteriorly. Two yellow spots near the base of the middle caudal-fin rays, a short vertical yellow bar at middle of the fin, several dusky reddish spots along dorsal and ventral margin. Pectoral fin yellow hyaline, an obvious reddish spot near the base of the middle rays. Pelvic fin with a creamy white anterior margin, remainder translucent yellow, distal tip of soft rays sometimes reddish.

Preserved coloration. Body pale white in general; upper body dusky, posterior field of scales with dark crescent in larger specimens (Fig. 2A). A faint, discontinuous stripe formed by clusters of melanophores along the mid lateral body (more obvious in smaller specimens, see Fig. 2A–B). Snout with a faint cluster of melanophores on each side. Dorsal fin with several irregularly clusters of melanophores along the base, spine and rays. Anal fin translucent white. Caudal fin dusky near the base. Pectoral fin base and distal tip of anal fin slightly dusky.

FIGURE 4. *Chelidoperca tosaensis*, the holotype, BSKU 53312, 82.8 mm SL, Kochi Prefecture, Japan (photographed by BSKU). A. fresh condition. B. preserved condition.

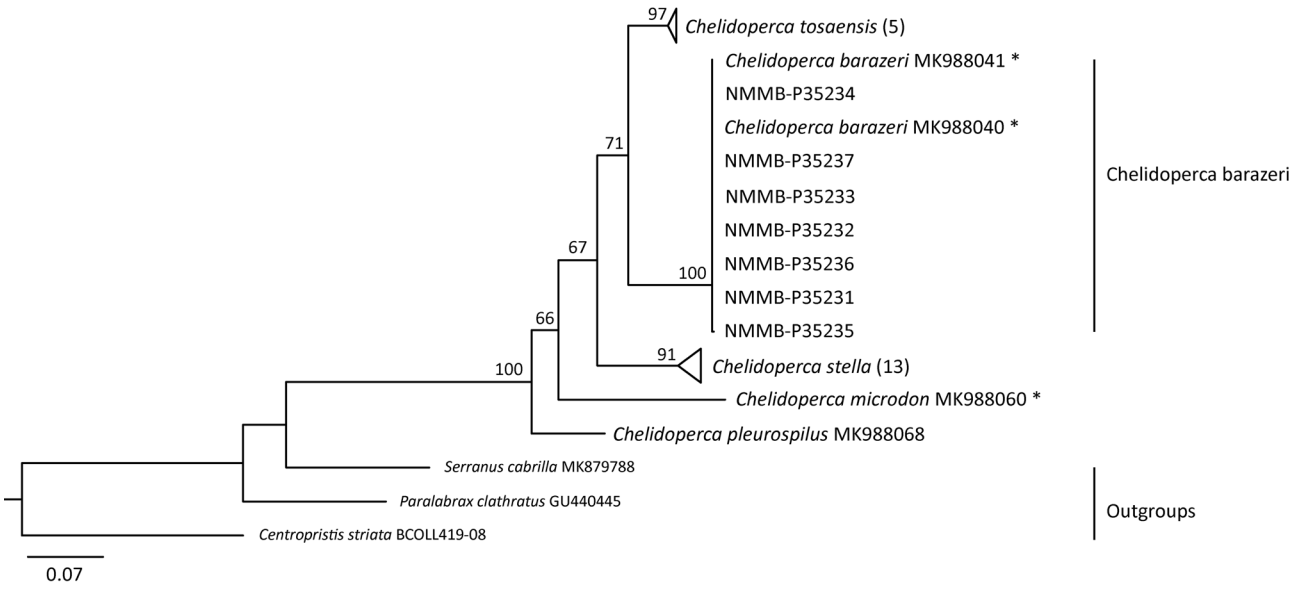

FIGURE 5. A maximum-likelihood phylogenetic tree constructed with GTR+G substitution model based on the COI dataset. Asterisks (*) indicated the type series. *Centropristis striata*, *S. cabrilla* and *P. clathratus* are chosen as the outgroups of *Chelidoperca*. Bootstrap value below 50% are not shown.

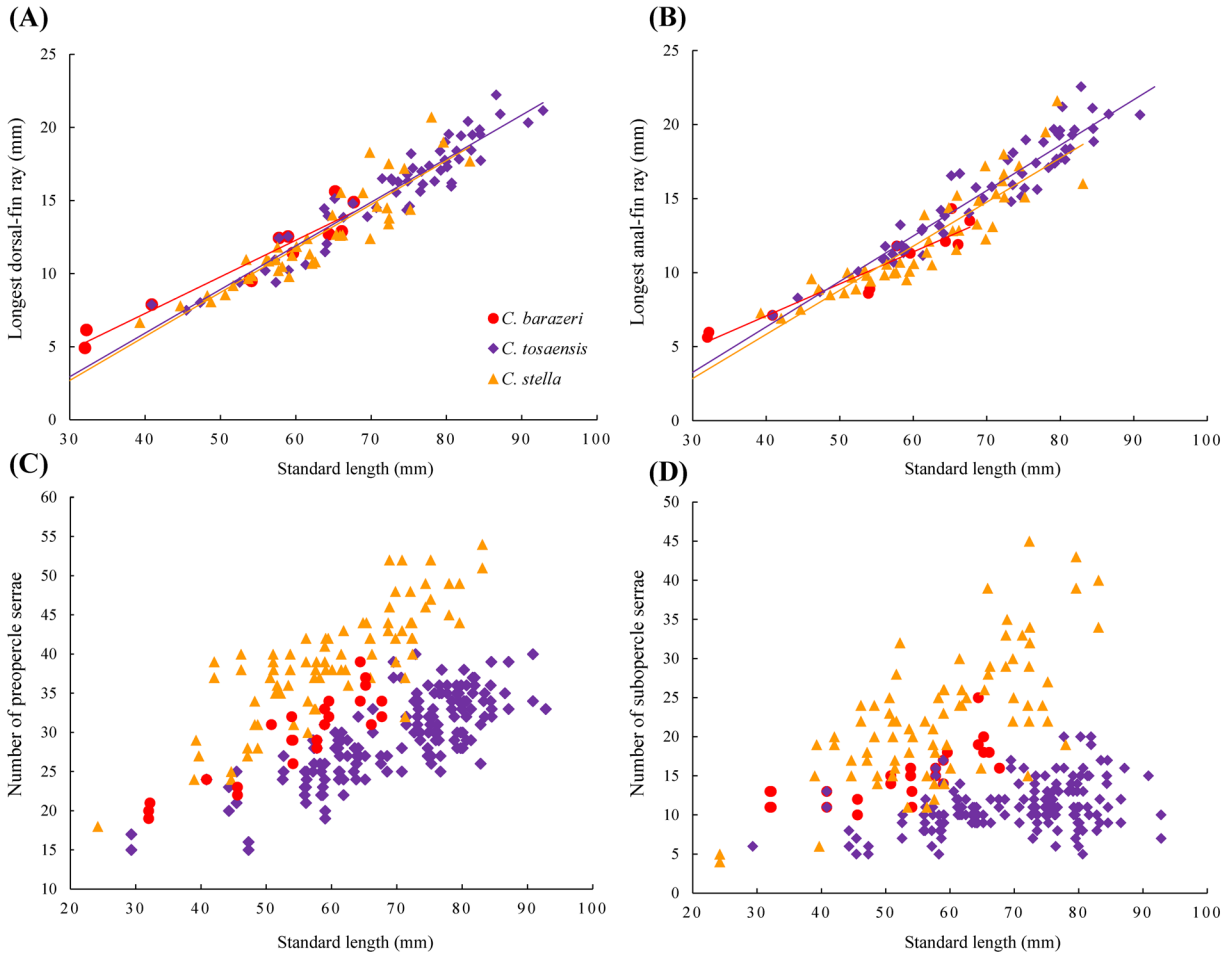

FIGURE 6. Relationship of A. length of the longest dorsal-fin ray, B. length of the longest anal-fin ray, C. number of preopercle serrae and D. number of subopercle serrae, respectively, to standard length of *C. barazeri* (red circles), *C. stella* (orange triangles) and *C. tosaensis* (purple rhombuses).

Distribution. *Chelidoperca barazeri* has only been recorded in its type locality, the Gazelle Channel of Bismarck Sea, Papua New Guinea (Lee *et al*., 2019), and newly recognized in southwestern Taiwan. It is predicted that *C. barazeri* is a widespread species in the western Pacific.

Ecology. *Chelidoperca barazeri* is a relatively shallow water species compare to its congeners. It was trawled from seamount and bands at depth 150–160 m in its type locality (Lee *et al*., 2019). In Taiwan, it is captured by bottom-trawl off southwestern Taiwan, the depth of the trawl operation is assumed to be rubble sandy bottom (topology of seafloor unknown) at depth ca. 100 m, judging from others by-catch species [*e.g.*, *Neomerinthe erostris* (Alcock, 1896), *Scorpaena miostoma* Günther, 1877].

Size. *Chelidoperca barazeri* is recognized as a relatively small species. The largest specimen examined is 67.7 mm SL, which is a mature male individual (NMMB-P35233, Fig. 1A) with developed testes, several smaller specimens are mature females with ripe ovaries (NMMB-P35231, Fig. 1C; NMMB-P35237).

Remarks. Phylogenetic analysis based on the *COI* dataset (Fig. 5) highly support the identification of *C. barazeri*. The K2P genetic distance within *C. barazeri* from Taiwan and its type locality (northern Papua Guinea) is relatively small, ranging from 0.0–0.2% within 9 specimens, compare to the mean interspecific distances ranging from 9.2–16.9% calculated from the same dataset. This result is also expected at the range of intraspecific variation (Ward *et al*., 2005; Holmes *et al*., 2009). In morphology, no significant difference was observed between the types and newly collected non-types in this study. In addition, *C. barazeri* is sister to *C. tosaensis* (Fig. 4) with medium support; their genetic distances are ranging from 8.8–10.0%. Compare to another morphologically similar species, *C. stella*, their genetic distances are ranging from 11.6–12.9%.

The fresh coloration of specimens of *C. barazeri* from type locality (Fig. 1D) and Taiwan (Fig. 1A–C) are similar in general, but different in a few details. Types of *C. barazeri* possess four irregular dark pinkish red bands extend from dorsal profile to mid-body, each with longitudinally rectangular reddish blotches, and an oblique red stripe extended from infraorbital to the anteroventral margin of the opercle. These two characters are not obvious in the Taiwanese specimens. However, the differences in coloration may due to geographical or ontogenetic variation, or even the condition of the fresh specimens. Preserved coloration of types and Taiwanese specimens without distinctive difference, all these specimens possess a discontinuous line on mid lateral body formed by clusters of melanophores, fainter in larger specimens (Fig. 2).

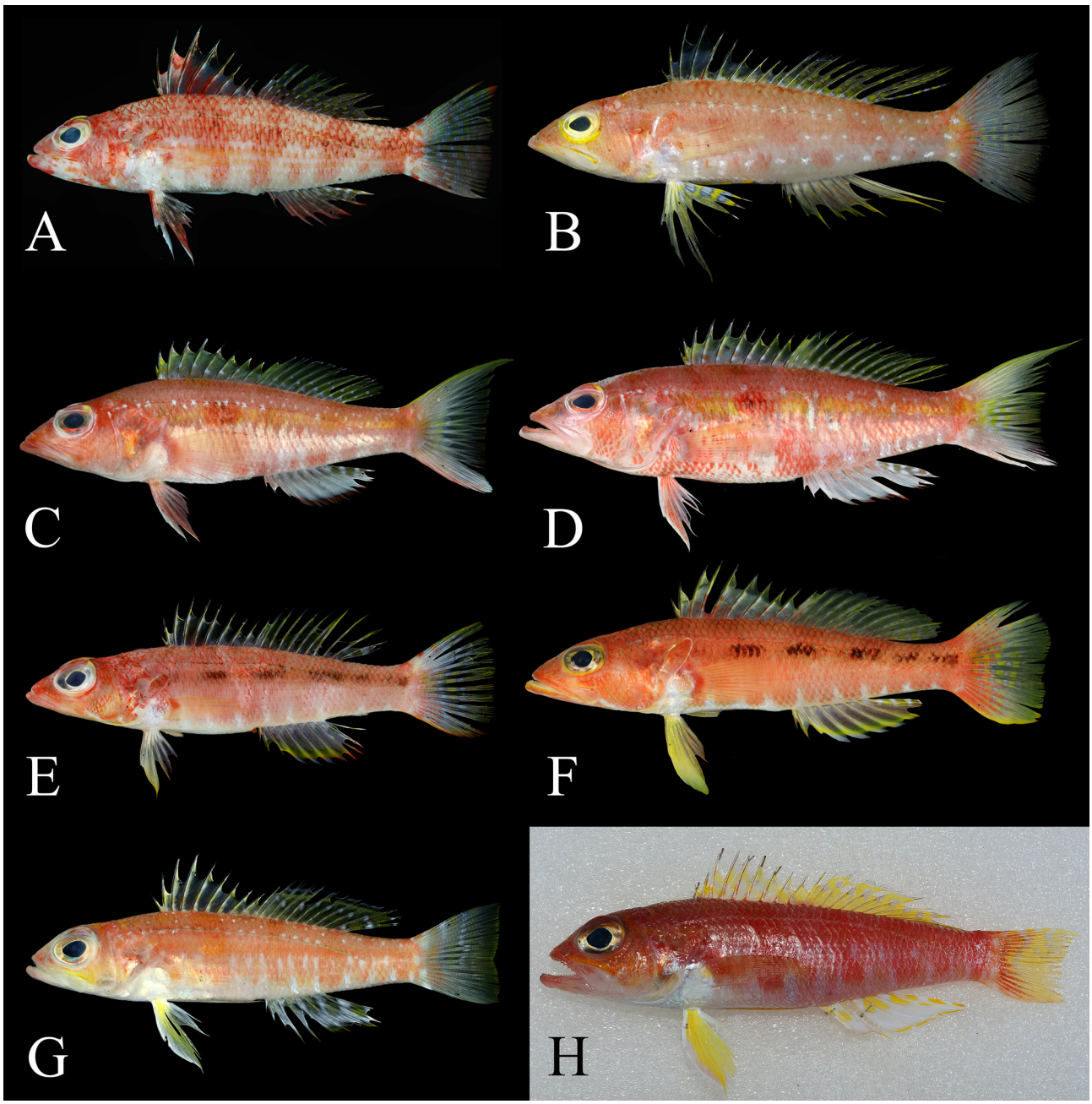

FIGURE 7. Remaining *Chelidoperca* spp. occur in Taiwanese water. *Chelidoeperca formosa*: A. NMMB-P34816, paratype, 57.0 mm SL, off Ke-tzu-liao, Kaoshiung. C. stella: B. NMMB-P35208, 79.6 mm SL, off Donggang, Pingtung. *C. hirundinacea*: C. NMMB-P35228, 113.8 mm SL, off Donggang, Pingtung; D. NMMSTP-002346 (to be registered), 145.0 mm SL, Daxi, Yilan. *C. pleurospilus*: E. NMMB-P35645, 68.0 mm SL, Daxi, Yilan; F. NMMB-P35353, 134.9 mm SL, Chienchen Fishing Port, Kaoshiung. *C. santosi*: G. NMMB-P35225, 60.0 mm SL, Chienchen Fishing Port, Kaoshiung; H. NMMB-P35226, 96.0 mm SL, off Kaoshiung.

DISCUSSION

Comparison with congeners

Among congeners, *C. barazeri* is similar to *C. tosaensis* and *C. stella* morphologically, whereas the latter one is sister with *C. barazeri* (Lee *et al*., 2019; this study). The three species are relatively small in size and share overlapped morphometric proportions, their body color are generally reddish pink and possess a red ocellus on the opercular membrane. Moreover, they share the following diagnostic characters: scale rows between lateral line and base of 6th dorsal-fin spine 3; oblique cheek scale mostly rows 4–5; developed gill rakers 2+7 modally (upper+lower limb).

Chelidoperca barazeri is most similar to *C. tosaensis*. Except the aforementioned characters, they share similar squamation pattern on head. Both species have scales on ventral surface of angular but dentary naked; interorbital with a single row of cycloid scale reaching or slightly anterior to the mid-orbit level (see Matsunuma *et al*., 2018: fig. 2). However, *C. barazeri* can be separated from *C. tosaensis* by the following characters: less pored lateral-line scales on *C. barazeri*, 34–37, modally 36 (vs. 37–42, modally 39, on *C. tosaensis*); all sensory pores on dentary surface single [vs. the 2nd and 3rd with two minute pore opening (Matsunuma *et al*., 2018: fig 2b)]; scales above lateral line with dark margins and a faint, discontinuous line on mid lateral body formed by clusters of melanophores after preserved (Fig. 2) (vs. none of these is clear, Fig. 4B); anal fin without series of yellow spots (vs. yellow spots scattered over posterior half of the fin); caudal fin without column of spots (vs. with ca. 3 irregular columns of yellow spot alternating with columns of whitish spot (Fig. 4A). Moreover, *C. barazeri* has relatively more preopercle serrae and subopercle serrae (Fig. 6C–D) than *C. tosaensis*, 19–39 and 11–25, respectively (vs. 19–40 and 5–20, respectively). Morphometric proportions between *C. barazeri* and *C. tosaensis* mostly overlapped, except for the length of the longest ray of dorsal and anal fin (Fig. 6A–B). The longest dorsal-fin ray (the 9th) of *C. barazeri* is slightly shorter, 15.3–24.0% of SL (vs. 16.4–25.7% in *C. tosaensis*); longest anal-fin ray (5th) of *C. barazeri* is not elongated and much shorter, 16.0–22.0% of SL (vs. 18.2–26.4%).

Chelidoperca barazeri can readily be separated from *C. stella* by (based on Taiwanese specimens): scales on ventral surface of angular but dentary naked in *C. barazeri* (vs. scales present on both angular and dentary surface in *C. stella*); all sensory pores on dentary surface single [vs. the 2nd or 2nd and 3rd with two minute pore opening (Matsunuma & Motomura, 2016: fig 3)]; shiny white spots along and above lateral line, irregularly distributed (vs. ca. 3 longitudinal rows of shiny white spots on lateral body; pelvic fin translucent yellow with anterior margin white (vs. ca. 3–4 oblique yellow line, with white spots in between on pelvic fin). Furthermore, *C. barazeri* has a narrower bony interorbital width, 2.3–2.9% of SL (vs. 2.4–3.9% in *C. stella*); longest dorsal-fin ray (9th) of *C. barazeri* are shorter, 15.3–24.0% of SL (vs. 16.6–26.5%); and longest anal-fin ray (5th) 16.0–22.0% of SL (vs. 15.1–27.1%) (also see Fig. 5A–B). In addition, the number of head serrae relative to standard length can separate *C. barazeri* and *C. stella* but slightly overlapped in several occasions (Fig. 6A–B), based on types and non-types specimens (Matsunuma & Motomura, 2016; Matsunuma *et al*., 2018; Lee *et al*., 2019; this study). *C. barazeri* has relatively fewer preopercle serrae and subopercle serrae, 19–39 and 11–25 (vs. 18–54 and 4–45 in *C. stella*, respectively).

Chelidoperca barazeri can readily separate from the remaining congener by counts of lateral line or scale rows between lateral line and the base of 6th dorsal-fin spine. *Chelidoperca barazeri* has a relatively fewer count of lateral line scales, 3 (two full-sized plus one uppermost half sized), whereas *C. africana* (mentioned by Psomadakis *et al*., 2021), *Chelidoperca cerasina* Ogino, Lee, Chen & Matsunuma, 2019, *Chelidoperca flavolineata* Matsunuma, Tan & Peristiwady, 2019, *C. hirundinacea*, *Chelidoperca lecromi* Fourmanoir, 1982, *Chelidoperca maculicauda* Bineesh & Akhilesh, 2013 and *C. pleurospilus* have 4 (3 full-sized plus 1 half-sized). For those congeners that have 3 scale rows between lateral line and base of 6th dorsal-fin spine, excluded *C. stella* and *C. tosaensis* that have aforementioned, *C. barazeri* can be distinguished from them by having fewer number of lateral line scales (35–37), whereas *Chelidoperca flavimacula* Psomadakis, Gon & Htut, 2021, *Chelidoperca margaritifera* Weber, 1913, *Chelidoperca myathantuni* Psomadakis, Gon & Htut, 2021, *Chelidoperca leucostigmata* Lee, Lee, Matsunuma & Chen, 2019, *Chelidoperca occipitalis* Kotthaus, 1973, *Chelidoperca santosi* have 42–45 lateral line scales (Table 3). For *Chelidoperca microdon* Lee, Lee, Matsunuma & Chen, 2019 that has only 3 full-sized scales between lateral line and base of 6th dorsal-fin spine, *C. barazeri* can also be separated from it by the number of lateral line scales (35–37 vs. 42).

Records of *Chelidoperca* in Taiwan

To summarize, 6 species of *Chelidoperca* were confirmed occurring in the Taiwanese water by literature survey. A list of records and a diagnostic key of *Chelidoperca* species in Taiwan were provided with comments.

Chelidoperca barazeri Lee, Lee, Matsunuma & Chen, 2019 (Figs. 1, 2, 3)

Chelidoperca tosaensis not of Matsunuma, Yamakawa & Williams, 2018: Koeda & Ho, 2019: 668 (misidentification)

Remarks. The specimens of *C. tosaensis* reported by Koeda & Ho (2019) were re-identified as *C. barazeri* by the authors. The record of *C. tosaensis* should be removed from the ichthyofauna of Taiwan at present. However, judging from the current distribution of *C. tosaensis*, from southern Japan, to Philippines and Papua New Guinea (Matsunuma *et al*., 2018; Lee *et al.*, 2019), it is possible that *C. tosaensis* occurred in Taiwan as well.

Chelidoperca formosa Tang & Ho, 2021 (Fig. 7A)

Remarks. A new species described from southwestern Taiwan recently. A relatively rare species in Taiwanese water, no specimens were further collected after the description.

Chelidoperca hirundinacea (Valenciennes, 1831) (Figs. 7C–D)

Chorististium lunulatum (not of Guichenot, 1863): Shen, 1984: 37
Chelidoperca hirundinacea: Lee, 1990: 68; Lee in Shen *et al*., 1993: 296, 687; Shen & Wu, 2011: 360; Shao *et al*., 2008: 247; Senou, 2013: 759; Koeda & Ho, 2019: 665, fig.; Matsunuma & Tashiro, 2020: 155.

Remarks. Shen (1984) reported *Chorististium lunulatum* (=*Liopropoma lunulatum*) from Taiwan. However, the figure has clear diagnostic characters of *C. hirundinacea* and is thus re-identified as *C. hirundinacea*. This is one of two species that commonly collected from southwestern and northeastern Taiwan.

Chelidoperca pleurospilus (Günther, 1880) (Figs. 7E–F)

Chelidoperca hirundinacea (not of Valenciennes in Cuvier & Valenciennes, 1831): Shen, 1984: 37 (misidentifition)
Chelidoperca pleurospila: Koeda & Ho, 2019: 666
Chelidoperca pleurospilus: Shen & Lin, 1984: 10; Lee, 1990: 68; Lee in Shen *et al*., 1993: 296, 687; Chen, 2003: 64; Shen & Wu, 2011: 360; Shao *et al*., 2008: 247; Senou, 2013: 759; Matsunuma & Tashiro, 2020: 150.

Remarks. This is one of two species that commonly collected from around Taiwan.

Chelidoperca santosi Williams & Carpenter, 2015; (Figs. 7G–H)

Chelidoperca santosi: Matsunuma *et al*., 2019: 1.

Remarks. This species is collected only from off southwestern Taiwan. Matsunuma *et al*. (2019) reported 3 specimens (NMMB-P21104, 22803, 23108) collected from off Dong-gang, Kaoshiung and Tainan, southwestern Taiwan which represented the first record of Taiwan. In this study, we collected and examined 7 additional specimens from off southwestern Taiwan.

***Chelidoperca stella* Matsunuma & Motomura, 2016; (Fig. 7B)**

Chelidoperca stella: Matsunuma *et al*. 2018; Koeda & Ho, 2019: 667

Remarks. Matsunuma *et al*. (2018) reported 2 specimens (NMMB-P22749) collected from off Kaoshiung, southwestern Taiwan, which represented the first record of Taiwan. In this study, we collected 11 additional specimens from this region. This species occasionally occurs as bycatch from the bottom-trawling fisheries from southwestern Taiwan.

Acknowledgement

We thank K. Koeda for collecting and donating specimens of *C. barazeri*. The first author thanks Dr. H.-C. Ho (NMMBA) for providing helps in all his early works, Professor T.-Y. Liao and T.-K. Chou (National Sun-Yat-Sen University, NSYSU) for the support and help in genetic work when he was staying in their lab in 2021, Professor W.-J. Chen (National Taiwan University) for providing access to examine the type specimens, M.-Y. Lee for providing photographs of type specimens of *C. barazeri* and reviewing the manuscript before submission, W.-C. Huang (NSYSU) and Y.-M. Huang's family for the help in specimen collections, Y.-C. Chen for providing specimens of comparative species, and the curatorial assistance from C.-H. Chan (NMMBA) and S.-C. Wang (NMMST). The second author thanks H. Motomura (KAUM) and P. Pruvost, R. Causse, Z. Gabsi, C. Ferrara and P. Béarez (National Museum of Natural History, France) for providing an opportunity to examine specimens; and H. Endo (BSKU) for providing photograph of *C. tosaensis*. This study is partly supported by The National Museum of Marine Biology & Aquarium, Pingtung, Taiwan; National Museum of Marine Science and Technology, Keelung, Taiwan; and JSPS KAKENHI Grant Number 21K14905 (for second author).

Comparative materials

Chelidoperca formosa: NMMB-P34815, 66.2 mm SL, off Ke-tzu-liao, Kaohsiung, bottom trawl, 04 September 2020, coll. C.-N. Tang. NMMB-P34816, 57.0 mm SL, off Ke-tzu-liao, Kaohsiung, bottom trawl, 04 September 2020. NMMB-P34817, 62.4 mm SL; NMMSTP002345, 51.8 mm SL, 04 September 2020.

Chelidoperca hirundinacea: NMMB-P8043, 117.0 mm SL, Fang-sang, Pingtung, Taiwan, 17 June 2004; NMMB-P12056, 99.0 mm SL, Donggang, Pingtung, Taiwan, 18 February 2011; NMMB-P13876, 147.0 mm SL, Donggang, Pingtung, Taiwan, 15 December2010; NMMB-P21201, 121.0 mm SL, Donggang, Pingtung, Taiwan, 2 April 2014; NMMB-P22748, 107.0 mm SL, Donggang, Pingtung, Taiwan, 29 October 2014; NMMB-P25650, 5 specimens, 77.0–93.5 mm SL, Donggang, Pingtung, Taiwan, 8 January 2017; NMMB-P25823, 107.0 mm SL, Donggang, Pingtung, Taiwan, 6 February 2017; NMMB-P31622, 99.0 mm SL, Donggang, Pingtung, Taiwan, 30 August 2017; NMMB-P34248, 92.2 mm SL, Donggang, Pingtung, Taiwan, 15 May 2020; NMMB-P34807, 146.0 mm SL, Daxi, Yilan, Taiwan, 27 October 2020; NMMSTP002346, 145.0 mm SL, Daxi, Yilan, 5 Mar 2021; NMMSTP002407, 2 specimens, 110.8–111.0 mm SL, Ke-tzu-liao, Kaohsiung, 20 Feb 2021; NMMB-P35220, 96.0 mm SL, Ke-tzu-liao, Kaohsiung, 7 Feb 2021; NMMB-P35228, 113.8 mm SL, Donggong, Pingtung, 25 Feb 2021; NMMB-P08395, 90.0 mm SL, Donggong, Pingtung, 16 Mar 2005.

Chelidoperca pleurospilus: NMMB-P5080, 123.2 mm SL, Donggang, Pingtung, Taiwan, 21 March 1979; NMMB-P22888, 3 specimens, 101.4–120.0 mm SL, Ke-tzu-liao, Kaohsiung, 21 January 2015; NMMB-P32909, 2 specimens, 115.7–121.0 mm SL, Changhua, Taiwan, 16 February 2019; NMMB-P32895, 4 specimens, 88.5–117.0 mm SL, Donggang, Pingtung, Taiwan, 1 April 2019; NMMB-P34808, 114.0 mm SL, Keelung, Taiwan, 30 October 2020; NMMB-P35235, 7 specimens, 114.4–134.9 mm SL, Chienchen, Kaoshiung, Taiwan, 4 Apr 2021. NMMB-P35645, 68.0 mm SL, Daxi, Yilan, Taiwan, 27 Apr 2021.

Chelidoperca santosi: NMMB-P32900, 4 specimens, 85.0–88.8 mm SL, off Donggang, Pingtung, Taiwan, 1 April 2019; NMMB-P33014, 81.0 mm SL, off Donggang, Pingtung, Taiwan, 13 March 2019; NMMB-P35225, 60 mm SL, Chienchen Fishing Port, 06 Feb 2021; NMMB-P35226, 96 mm SL, off Kaoshiung, 23 Jan 2021.

Cheildoperca stella: NMMB-P28979, 69.8 mm SL, Donggang, Pingtung, Taiwan, 18 March 2018; NMMB-

P28980, 74.4 mm SL, Donggang, Pingtung, Taiwan, 18 March 2018; NMMB-P30590, 61.5 mm SL, Donggang, Pingtung, Taiwan, June 2017; NMMB-P34068, 72.3 mm SL, Donggang, Pingtung, Taiwan, 4 September 2019; NMMB-P34811, 75.2 mm SL, Donggang, Pingtung, Taiwan, 27 September 2020; NMMB-P34812, 83.1 mm SL, Ke-tzu-liao, Kaohsiung, 4 September 2020; NMMB-P35208, 79.6 mm SL, Donggang, Pingtung, Taiwan, 23 Jan 2021; NMMB-P35324, 4 specimens, 59.1–78.0 mm SL, Ke-tzu-liao, Kaohsiung, 20 Feb 2021. Other 17 specimens from Thailand, Vietnam, Philippines and Taiwan (39.0–72.3 mm SL) listed in Matsunuma and Motomura (2016) and Matsunuma *et al.* (2017). KUN-P 55612, 51.4 mm SL, off Kaohsiung, Taiwan, 16 Sept. 2019; MNHN 2008-1466, 24.2 mm SL, Vanuatu, 15°32′24″S, 167°14′16.8″E, 12 Oct. 2006; MNHN 2008-1473, 53.4 mm SL, Vanuatu, 15°32′24″S, 167°14′16.8″E, 12 Oct. 2006; MNHN 2010-0712, 1 of 2 specimens, 57.6 mm SL, MNHN 2010-0714, 39.7 mm SL, Vanuatu, 15°24′00″S, 167°13′31″E, 19 Sept. 2006; MNHN 2014-0928, 2 of 5 specimens, 46.2–51.1 mm SL, Solomon Islands, 10°26′00″S, 161°28′00″E, 23 Sept. 2007.

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