



## Two new species of the genus *Chelidoperca* (Perciformes: Serranidae) from the Andaman Sea, eastern Indian Ocean

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### Abstract

Two new species of the genus *Chelidoperca* are described from specimens collected in 2015 and 2018 from the Andaman Sea, off the coast of Myanmar during trawl bottom surveys conducted by the R/V *Dr. Fridtjof Nansen*. *Chelidoperca myathantuni* **sp. nov.** is described based on 15 specimens (74.3–129.5 mm SL) from 101–185 m depth, which can be distinguished from all congeners by the following combination of characters: 3 (2 full-sized plus 1 half-sized) scale rows between lateral line and middle of spinous dorsal-fin base; 42–44 (modally 44) pored lateral-line scales; 16 pectoral-fin rays; interorbital scales extending to mid-orbit level; scales on ventral surface of lower jaw restricted to the angular (not extending onto the dentary); enlarged caniniform teeth on the upper jaw; side of body with longitudinal dashed black stripe; dorsal fin pale yellow with reddish pigment mostly restricted at base of spines and rays. *Chelidoperca flavimacula* **sp. nov.** is described based on eight specimens (49.7–70.7 mm SL) from 84–131 m depth, which can be distinguished from all congeners by the following combination of characters: 3 (2 full-sized plus 1 half-sized) scale rows between lateral line and middle of spinous dorsal-fin base; 42–45 (modally 42) pored lateral-line scales; 9–10 (modally 10) scale rows below the lateral line; 6 predorsal scales; 16–17 (modally 16) circumpeduncular scales; 5 scales rows on cheek; interorbital scales extending to mid-orbit level; anal fin with yellowish distal margin and three or four rows of bright yellow spots over its proximal half.

**Key words:** *Chelidoperca myathantuni* **sp. nov.**, *Chelidoperca flavimacula* **sp. nov.**, taxonomy, R/V. *Dr. Fridtjof Nansen*, trawl surveys, Myanmar

### Introduction

*Chelidoperca* Boulenger is a genus of small marine fishes, commonly known as perchlets. They inhabit sandy mud bottoms on continental shelves and slopes in coastal and offshore areas, including remote seamounts/banks, at depths ranging from ca. 40–400 m mostly in the tropical Indo-West Pacific (Senou 2013; Matsunuma *et al.* 2016; Matsunuma & Motomura 2016; Lee *et al.* 2019; Ogino *et al.* 2019). Members of the genus *Chelidoperca* are characterized by having a slender, elongate body, mostly pale pink colouration, and usually X, 10 dorsal-fin rays, III, 6 anal-fin rays, and two strong flattened opercular spines (Matsunuma *et al.* 2017; Lee *et al.* 2019; Matsunuma *et al.* 2020). The genus includes 16 nominal species: *Chelidoperca hirundinacea* (Valenciennes in Cuvier and Valenciennes), *Chelidoperca pleurospilus* (Günther), *Chelidoperca investigatoris* (Alcock), *Chelidoperca margaritifera* Weber, *Chelidoperca africana* Cadenat, *Chelidoperca occipitalis* Kotthaus, *Chelidoperca lecromi* Fourmanoir, *Chelidoperca maculicauda* Bineesh & Akhilesh in Bineesh *et al.*, *Chelidoperca santosi* Williams & Carpenter, *Chelidoperca stella* Matsunuma and Motomura, *Chelidoperca tosaensis* Matsunuma, Yamakawa & Williams, *Chelidoperca barazeri* Lee, Lee, Matsunuma & Chen, *Chelidoperca leucostigmata* Lee, Lee, Matsunuma & Chen, *Chelidoperca microdon* Lee, Lee, Matsunuma & Chen, and *Chelidoperca cerasina* Ogino, Lee, Chen & Matsunuma; *Chelidoperca flavolineata* Matsunuma, Tan & Peristiwady (Matsunuma *et al.* 2020).

The EAF-Nansen Programme of FAO in cooperation with the Myanmar government conducted a series of ecosystem surveys (2013, 2015 and 2018) in Myanmar's EEZ using the Norwegian R/V *Dr. Fridtjof Nansen* to obtain biological and environmental data from the surveyed area and identify local species diversity. Among the outputs deriving from these surveys are several publications/reports, including the production of an FAO marine species identification guide for fishery purposes (Psomadakis *et al.* 2019). Included in the guide are 15 species new to science and a conspicuous number (=51) of undescribed and possibly undescribed fish species. Among them are two new perchlets included in the guide as *Chelidoperca* sp. A and *Chelidoperca* sp. B which could not be morphologically associated with any known species. The two new species are formally described herein and comparisons made with similar congeners from the Indo-Pacific region.

## Materials and methods

Methods of counting and measuring largely follow Matsunuma *et al.* (2017), being taken from the left side whenever possible, except for counts of pectoral-fin rays and head serrae (counted on both sides). We follow Matsunuma *et al.* (2020) in referring to the smaller (about half-size) uppermost row of body scales along the dorsal-fin base as comprising full-size scales. Tiny and irregularly spaced scales present at bases of spines are omitted from the count. The formula for configuration of the supraneural bones, neural spines and dorsal pterygiophores follow Ahlstrom *et al.* (1976). Osteological characters were examined from radiographs of all specimens involved in this study. Comparisons with related species are largely based on literature accounts. Standard length is abbreviated as SL. Institutional codes follow Fricke and Eschmeyer (2019). DOF and WCS stand for Department of Fisheries, Myanmar and Wildlife Conservation Society, respectively. The type specimens of the two newly described *Chelidoperca* species are deposited in the South African Institute for Aquatic Biodiversity, Makhanda (SAIAB); Museum Support Center, Smithsonian Institution National Museum of Natural History, Suitland (USNM); The Kagoshima University Museum, Kagoshima (KAUM).

### *Chelidoperca myathantuni* sp. nov.

(New English name: Mya Than Tun's perchlet)

Figures 1–3, 5–8, Table 1

*Chelidoperca* sp. A: Psomadakis *et al.* 2019: 385, Pl. XXVI, fig. 199 (Myanmar coast).

**Holotype.** SAIAB 203716, 114.2 mm SL (Fig. 1A), off Tanintharyi Coast, Myanmar, Andaman Sea, Indian Ocean, 13°3.21'N; 96°41.62'E, R/V *Dr. Fridtjof Nansen*, station 123, bottom trawl, 121–129 m depth, P.N. Psomadakis, 21 May 2015.

**Paratypes.** 14 specimens, 74.3–129.5 mm SL, all collected with bottom trawl in the Andaman Sea, off Myanmar's Tanintharyi Coast by the R/V *Dr. Fridtjof Nansen*: SAIAB 203721, 2: 84.3–91.8 mm SL, same collection data as holotype. SAIAB 203723, 110.9 mm SL (Fig. 1B), same collection data as holotype. SAIAB 209600, 4: 91.6–129.5 mm SL, 10°2.70'N, 97°22.75'E, 125 m, station 154, 184 m depth, P.N. Psomadakis, 27 September 2018. SAIAB 209599, 5: 74.3–115.1 mm SL, 10°21.44'N; 97°25.10'E, station 149, 181–183 m depth, P.N. Psomadakis, 26 September 2018. USNM 451517, 99.5 mm SL and KAUM-I. 149193, 88.5 mm SL, both collected with SAIAB 209599.

**Diagnosis.** A species of *Chelidoperca* distinguished from congeners by the following combination of characters: scale rows between lateral line and middle of spinous dorsal-fin base 3 (2 full-sized plus 1 half-sized); pored lateral-line scales 42–44 (modally 44); pectoral-fin rays 16; predorsal scales 7–8 (modally 7); scale rows absent from ventral side of dentary; scale rows on interorbital area extending to mid-orbit level; maxilla expanded posteriorly, covered ventrally by high skin fold; outermost row teeth of upper jaw distinctly enlarged; side of body with longitudinal dashed black stripe; 8–9 short white sub-triangular bars ventrally; dorsal-fin pale yellow with reddish pigment mostly restricted at base of spines and rays.

**Description.** Proportional measurements are given in Table 1. Data for the holotype presented first, followed by paratype data in parentheses, if different. Dorsal-fin rays X, 10; anal-fin rays III, 6; pectoral-fin rays 16; pelvic-fin rays I, 5. Pored lateral-line scales 43 (42–44); cheek scale rows 6 (5–6), scale rows above lateral line 3 (2 full-sized

plus 1 half-sized) (Fig. 5A); scale rows below lateral line 11 (10–11); predorsal scale rows 7 (7–8), circumpeduncular scales 20 (16–20). Gill rakers on upper limb 7 (5–7), gill rakers on lower limb 13 (12–14); developed gill rakers on upper limb 2 (2–3), developed gill rakers on lower limb 9 (9–10); total gill rakers 20 (17–20).



**FIGURE 1.** Fresh specimens of *Chelidoperca myathantuni* collected off Tanintharyi Coast, Myanmar: **A.** SAIAB 203716, holotype, 114.2 mm SL (photo by P.N. Psomadakis); **B.** SAIAB 203723, paratype, 110.9 mm SL (photo by O. Alvheim).

Body fusiform, slightly elongated, its depth less than head length, contained 4.1 (4.0–4.9) in SL; head length 2.5 (2.4–2.7) in SL; snout rounded, its length 10.6 (10.0–12.5) in SL; dorsal profile of snout forming an angle of ca. 30° with horizontal axis of head and body. Orbit large, its diameter 9.8 (8.6–10.1); interorbital width 31.7 (30.8–42.6) in SL. Mouth large, angled diagonally upwards; posterior margin of maxilla extending beyond vertical through mid-orbit, but not reaching vertical through posterior margin of orbit; upper jaw length 5.7 (5.3–5.8) in SL; lower jaw protruding well beyond upper jaw when mouth closed, its length 4.2 (4.1–4.5) in SL; maxilla expanded posteriorly and covered ventrally by high skin fold (Fig. 6A).

Upper jaw with a multi-serial band of mostly small, conical teeth, slightly tapering posteriorly; teeth of innermost rows near symphysis become gradually enlarged posteriorly; teeth of outermost row distinctly enlarged, those near symphysis largest, antrorse, caniniform, and gradually decreasing in size posteriorly. Lower jaw with narrower band of similar teeth, tapering posteriorly; outermost teeth enlarged on anterior part of jaw whereas innermost ones enlarged on posterior part of jaw. Vomer with V-shaped band of 3–5 rows of small conical teeth, with several enlarged and directed posteriorly on posterior portion. Palatine with 3–4 rows of small, conical teeth. Anterior nostril with raised rim anteriorly expanding to become fairly large skin flap posteriorly; posterior nostril oval.

Posterior margins of preopercle, interopercle and subopercle serrated, serrae on preopercle 35 (36 on right side) (17–36), interopercle 10 (8 on right side) (3–17) and subopercle 7 (8 on right side) (3–15). Opercle with 2 flat, prominent spines, upper spine longer than lower. Posttemporal with 2 (4 on right side) (1–4) serrae.

First supraorbital sensory canal pore at anterior edge of snout about the size of front row tooth of upper jaw; remaining pores tiny, in a series up to posterior nostril where they form two rows continuing into interorbital space. First infraorbital pore below posterior nostril, more or less at level of lower edge of pupil and similar in size to first supraorbital pore; at least 5 ventrally directed, similar size pores along ventral edge of lachrymal; remaining pores tiny, along edge of orbit. First mandibular-preopercular canal pore on chin anteriorly directed and followed by 4 round to slightly oval ventral pores, the posterior 3 usually accompanied by a smaller pore nearby. First (anterior) preopercular pore similar in size to ventral lachrymal pores, followed by many pairs of tiny pores dorsally.

Body and head covered with ctenoid scales, but snout and maxilla naked; lateral line slightly curved, terminating at caudal-fin base. Caudal-fin base covered by about 5 rows of smaller ctenoid scales; proximal part of upper- and lowermost caudal-fin rays with small weakly ctenoid scales, grading to cycloid scales distally. Pectoral-fin base with ctenoid scales anteriorly, changing to cycloid ones closer to rays. No basal scaly sheath along dorsal- and anal-fin bases. Small cycloid scales present proximally on membrane between last spine and first 1 or 2 rays of dorsal and anal fins. Scales between pelvic-fin bases cycloid; pelvic rays with small cycloid scales proximally. Scales on ventral surface of lower jaw restricted to angular, not extending onto dentary (Fig. 7A). Interorbital scales mostly cycloid, extending at most to vertical at middle of orbit (Fig. 8C). Uppermost row of body scales along dorsal-fin base always about half size of adjacent lower body scales; tiny and irregularly spaced scales sometimes present at bases of spines.

Dorsal-fin origin above pectoral-fin base, 4<sup>th</sup> spine (rarely 5<sup>th</sup>) longest, 1<sup>st</sup> spine shortest, all soft rays branched, 8<sup>th</sup> or 9<sup>th</sup> longest. Anal-fin origin below base of 1<sup>st</sup> dorsal-fin soft ray, 3<sup>rd</sup> spine longest; all soft rays branched, 5<sup>th</sup> longest. Pectoral fin with uppermost 2 rays and lowermost ray unbranched, remaining rays branched, its posterior tip not extending beyond anal-fin origin. Pelvic-fin origin below opercular spines; all soft rays branched, 2<sup>nd</sup> longest, its tip usually not reaching to anus. Caudal fin truncate, its upper lobe pointed and slightly longer than lower lobe; principal caudal-fin rays 9+8, upper- and lowermost rays unbranched; 1–2 segmented and at least 5 unsegmented procurrent caudal-fin rays dorsally and ventrally.

Formula for configuration of supraneural bones, neural spines and dorsal pterygiophores 0/0/0+1/2/1/1/1/1/1/1/1/2/1/1/1–2/1–2/1/; vertebrae 10+14.

*Fresh coloration.* Based on colour photographs of fresh holotype, one paratype (Fig. 1) and photographic records of three (including one juvenile) not retained specimens (Fig. 2). Head and body red, the scales dorsally (excluding those of lateral line) intensely edged with black. Eight or nine short white sub-triangular bars arising from ventral profile and not extending beyond level of upper pectoral-fin base. Lower part of opercle, subopercle and branchiostegal rays with a yellow tinge. Blackish dashed stripe along midbody from upper corner of opercle to mid-caudal-fin base in juveniles (from behind upper corner of opercle to mid-caudal peduncle in adults) composed of a series of five or six elongate dark blotches. Dorsal fin pale yellow with reddish pigment at base of spines and rays. Anal fin light red with submarginal yellow band, distal margin whitish; last rays of anal fin sometimes with alternating yellow and grey short bands. Pectoral fins with reddish base, the remainder of fin hyaline with yellowish tinge. Membrane of pelvic fins yellow with pale red spines and rays; caudal fin red basally and extending along upper and lower edges, midposterior portion of fin with several irregular rows of yellow spots on a pale grey background.

*Preserved coloration.* Based on all examined specimens (Fig. 3A). Body pale brown, head somewhat darker, mostly on upper half, including tip of upper jaw. Five or six dark dashes, each 3–5 scales long and 1–2 scales deep, in straight line from corner of opercle and below lateral line, crossing lateral line below middle of soft portion of dorsal fin and ending above lateral line at caudal-fin base; area between dark dashes dusky. Scales above dashes and on predorsal area dark-edged. Dark brown dots present proximally between 4<sup>th</sup> and 6<sup>th</sup> dorsal-fin spines; dorsal-fin soft rays with dark brown dots along most of their length. Anal fin usually pale. Pectoral-fin base with melanophores, usually in stellate form, that together may look like a faint brown spot on the fin's base, and variable amount of microscopic blackish dots proximally on pectoral-fin rays. Pelvic fins pale. Caudal fin with four or five irregular, narrow bars dark brown on central rays, becoming increasingly faint toward the dorsal and ventral margins. Microscopic blackish dots present on upper jaw, mostly on premaxilla and sometimes in two or three clusters; similar dots sometimes present on maxillary flange. Lower jaw mostly pale, but scattered microscopic blackish dots and/or one cluster of such dots, usually anteriorly, sometimes present. Peritoneum, stomach and intestine pale.



**FIGURE 2.** Images of fresh and subsequently discarded specimens of *Chelidoperca myathantuni* collected off Tanintharyi Coast, Myanmar (photos by O. Alvheim): **A.** 150 mm TL; **B.** 145 mm TL; **C.** 62 mm TL.



**FIGURE 3.** Preserved holotypes: **A.** *Chelidoperca myathantuni*, SAIAB 203716, 114.2 mm SL; and **B.** *Chelidoperca flavimacula*, SAIAB 209601, 69.5 mm SL, both collected off Tanintharyi Coast, Myanmar (photos by N. Mazungula).

**Distribution.** *Chelidoperca myathantuni* is currently known only from the Andaman Sea, off the south-eastern coast of Myanmar at depths of 101–185 m.

**Etymology.** The species is named in honor of Mya Than Tun, former Director, Research and Development Division, DOF, Myanmar and WCS national coordinator (now retired), in recognition of his remarkable contribution to improving knowledge on the fisheries resources in Myanmar, and untiring dedication to the advancement of ichthyology in his country.

**Comparisons.** *Chelidoperca myathantuni* can be distinguished from *C. africana*, *C. cerasina*, *C. flavolineata*, *C. hirundinacea*, *C. lecromi*, *C. maculicauda* and *C. pleurospilus* by having 3 (2 full-sized plus 1 half-sized) vs. 4 (3 full-sized plus 1 half-sized) scale rows between the lateral line and the middle of the spinous dorsal-fin base. Among the species having 3 scale rows in that region, *C. myathantuni* is most similar to *C. occipitalis* in general morphology and coloration (i.e., presence of a longitudinal dashed stripe composed of five or six blackish blotches along the side of the body) but it can be readily distinguished from the latter in lacking the short, dark bands on the upper caudal-fin ray and the small dark red spots anteriorly on the soft-rayed portion of dorsal fin (both retained as dark markings in preserved specimens). It is also distinguishable from *C. occipitalis* in having relatively more pectoral-fin rays [16 vs. 14–16 (modally 15)]; a longer jaw [22.2–24.1 (mean 23.2) vs. 18.4–20.3 (mean 19.4) % SL]; a shorter caudal-fin length [22.7–25.7 (mean 24.4) vs. 26.9–28.1 (mean 27.5) % SL]; a slightly smaller head length

[36.6–41.8 (mean 39.7) vs. 41.3–43.2 (mean 42.2) % SL], orbit diameter [9.9–11.6 (mean 10.5) vs. 11.5–12.6 (mean 11.8) % SL] and pectoral-fin length 22.2–26.0 (mean 24.4) [vs. 26.1–26.9 (mean 26.5) % SL].

*Chelidoperca myathantuni* can be easily distinguished from other congeners (except *C. investigatoris*) having 3 (2 full-size plus 1 half-sized) scale rows between the lateral line and spinous dorsal-fin base by the presence of a distinct blackish dashed stripe along mid-body (retained in preserved specimens). It differs from *C. investigatoris* in having 16 (vs. 14–15) pectoral-fin rays; 7–8 (vs. 10) predorsal scales; a smaller head, 36.6–41.8 % (vs. 45.0–46.5 %) of SL, postorbital length, 20.2–22.7 % (vs. 26.2–27.0 %) of SL and upper jaw, 17.1–18.7 % (vs. 20.1–20.2 %) of SL; enlarged caniniform teeth in the upper jaw (vs. no distinct caniniform teeth in the upper jaw); caudal fin truncate, with the upper lobe slightly elongate and pointed and the lower lobe truncate (vs. caudal fin emarginate, with both lobes slightly elongate and pointed); pectoral fin short, nearly extending to the anus (vs. pectoral fin long, extending to the anal-fin origin; upper lip fold high (vs. upper lip fold low); interorbital scales reaching to mid-orbit (vs. extending to level of posterior nostril); scales on the lower jaw ventral surface restricted to the angular (vs. extending onto the posterior portion of the dentary). Although *C. investigatoris* may occasionally present a darkish dashed stripe along midbody (see Fig. 2 in Bineesh *et al.* 2014), it usually has a longitudinal uninterrupted yellow stripe on midbody from snout tip to caudal-fin base in fresh condition which readily distinguishes it from *C. myathantuni*. The latter also has several irregular rows of yellow spots on the mid-posterior portion of the caudal fin (vs. caudal fin uniformly yellowish to reddish) and a reddish anal fin with yellow submarginal band (vs. anal fin transparent with narrow yellowish to reddish edge).

The only other congener sharing with *C. myathantuni* a longitudinal blackish dashed stripe along the side of the body in fresh condition is *C. pleurospilus* (Ogino *et al.* 2019; Matsunuma *et al.* 2020; this study). However, *C. myathantuni* can be distinguished from the latter species in having 3 (2 full-size plus 1 half-sized) vs. 4 (3 full-sized plus 1 half-sized) scale rows between the lateral line and middle of the spinous dorsal-fin base. Furthermore, *C. myathantuni* has relatively more pectoral-fin rays [16 vs. 15–16 (modally 15)]. In pigmentation, *C. myathantuni* differs from *C. pleurospilus* in having the soft portion of the dorsal fin with reddish spots mostly restricted to the base of rays (vs. two or three rows of distinct dark red elongate spots on rays) and the scales on dorsum intensely black-edged (vs. only lightly black-edged).

**Remarks.** Most specimens have lost many of their scales, more often those on the lower part of the body, the predorsal area, the cheek and on the fins. The cheek scale count is of the large scales between the preopercular ridge and the eye, but there are 1–3 small scales between the edge and ridge covering the preopercular sensory canal. In most specimens the small scales on the dorsal- and anal-fin rays are limited to the area between the last spine and first soft ray, but in some of the largest specimens scales are also present between the first two soft rays of these fins. Also, in most specimens there are no scales along the uppermost caudal-fin rays other those of the transverse series that covers the fin's base. The majority of the specimens have 18–20 circumpeduncular scales, and one has 16 scales. Because the skin of the predorsal and temporal areas and the cheek was mostly damaged it was impossible to describe details of the preopercular, temporal and supratemporal sensory canals. However, in some specimens we were able to observe some tiny pores, single or paired, the latter two canals.

In preservative, colour variation in the pectoral fin includes differences between the two fins of the same fish. In the larger specimen small clusters of dark brown dots are present basally on the anal fin membrane, and also along part of the posterior rays. The dark areas of the middle caudal-fin rays look like an extension of the lateral body stripe, but there is usually a clear, unpigmented space between the last dark dash of the body stripe and the first dark bar of the caudal fin.

### ***Chelidoperca flavimacula* sp. nov.**

(New English name: Yellow-spotted perchlet)

Figures 4, 5, 6–8, Table 1

*Chelidoperca* sp. B: Psomadakis *et al.* 2019: 386, Pl. XXVI, fig. 200 (Myanmar coast).

**Holotype.** SAIAB 209601, 69.5 mm SL (Fig. 4A), off Ayeyarwady coast, Myanmar, Andaman Sea, Indian Ocean, 14°30.76'N ; 95°47.22'E, R/V *Dr. Fridtjof Nansen*, station 73, bottom trawl, 126–131 m depth, P.N. Psomadakis, 6 September 2018.

**Paratypes.** (7 specimens). SAIAB 208475, 3: 49.8–59.4 mm SL, off Ayeyarwady coast, Myanmar, Andaman Sea, Indian Ocean, 15°20.29'N; 94°5.82'E, R/V *Dr. Fridtjof Nansen*, station 47, bottom trawl, 84 m depth, 2 September 2018. USNM 451518, 52.5 mm SL and KAUM-I. 149194, 57.4 mm SL, both collected with SAIAB 208475. SAIAB 209602, 3: 49.8–70.8 mm SL, collected with holotype.

**Diagnosis.** A species of *Chelidoperca* distinguished from congeners by the following combination of characters: scale rows between lateral line and middle of first dorsal-fin base 3 (2 full-sized plus 1 half-sized); pored lateral-line scales 42–45 (modally 42); pectoral-fin rays 15–16 (modally 15); predorsal scale rows 6; scale rows below lateral line 9–10; circumpeduncular scales 16–17; scale rows absent from ventral side of dentary; scale rows on interorbital area extending to mid-orbit level; maxilla expanded posteriorly, covered ventrally by low skin fold; outermost row teeth of upper jaw distinctly enlarged; gill rakers 6–7 + 10–12; developed gill rakers 1–2 + 6–8; serrations on preopercle 31–45; serrations on posttemporal 2–5; body depth 4.1–4.3 in SL; head length 2.6–2.7 in SL; three, poorly-defined longitudinal rows of small whitish spots on body; dorsal fin transparent with about four longitudinal rows of bright yellow spots mostly covering soft portion of fin; anal fin transparent white with yellow or reddish distal margin and three or four rows of bright yellow spots over its proximal half; posteriormost dorsal and anal-fin rays with short alternating yellow and dark grey bands.

**Description.** Proportional measurements are given in Table 2. Data for the holotype presented first, followed by paratype data in parentheses if different. Dorsal-fin rays X, 10; anal-fin rays III, 6; pectoral-fin rays 15 (15–16); pelvic-fin rays I, 5. Pored lateral-line scales 42 (42–45); cheek scale rows 5; scale rows above lateral line 3 (2 full-sized plus 1 half-sized) (Fig. 5B); scale rows below lateral line 10 (9–10); predorsal scale rows 6; circumpeduncular scales 16 (16–17). Gill rakers on upper limb 6 (6–7), gill rakers on lower limb 11 (10–12), developed gill rakers on upper limb 1 (1–2), developed gill rakers on lower limb 7 (6–8), total gill rakers 17 (16–19).

Body fusiform, slightly elongated, its depth less than head length, contained 4.2 (4.1–4.3) in SL; head length 2.6 (2.6–2.7) in SL; snout rounded, its length 15.4 (12.6–15.6) in SL; dorsal profile of snout forming an angle of ca. 30° with horizontal axis of head and body. Orbit large, its diameter 8.9 (8.1–9.2) and interorbital width 27.8 (22.7–28.6), both in SL. Mouth large, angled diagonally upwards; posterior margin of maxilla extending to vertical through posterior edge of orbit; upper jaw length 5.7 (5.6–5.8) in SL; lower jaw protruding in front of upper jaw when mouth closed, exposing symphyseal teeth, its length 4.7 (4.5–4.8) in SL; maxilla expanded posteriorly, partially covered ventrally by low skin fold (Fig. 6B).

Upper jaw with a multi-serial band of mostly small, conical teeth, slightly tapering posteriorly; teeth of innermost rows near symphysis become gradually enlarged posteriorly; teeth of outermost row distinctly enlarged, those near symphysis largest, antrorse, caniniform, gradually decreasing in size posteriorly. Lower jaw with narrower band of similar teeth, tapering posteriorly; outermost teeth enlarged on anterior part of jaw whereas innermost ones enlarged on posterior part of jaw. Vomer with V-shaped band of 4 rows of small conical teeth, with several enlarged and directed posteriorly, on posterior portion. Palatine with 4 rows of small, conical teeth. Anterior nostril with raised rim anteriorly expanding to become fairly large skin flap posteriorly; posterior nostril oval.

Posterior margins of preopercle, interopercle and subopercle serrated, serrae on left side of preopercle 45 (32–43), interopercle 12 (20–33) and subopercle 9 (7–15). Opercle with 2 flat, prominent spines, upper spine longer than lower. Posttemporal with 3 (2–5) serrae.

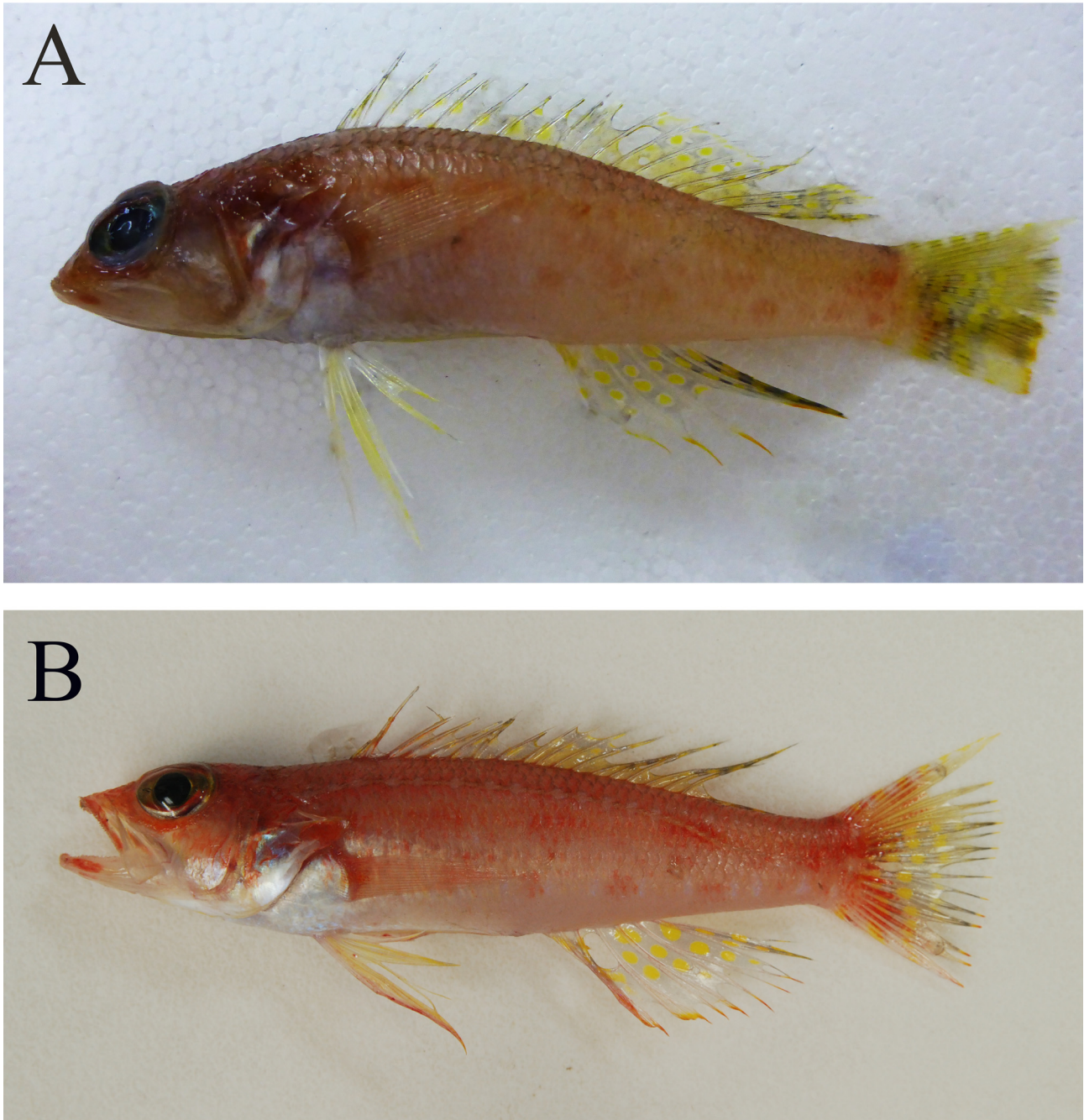
First supraorbital sensory canal pore at anterior edge of snout, about the size of front row tooth of upper jaw; remaining pores tiny, in double series up to posterior nostril and interorbital space. First infraorbital pore below posterior nostril, more or less at level of lower edge of pupil and somewhat smaller than first supraorbital pore; second infraorbital pore (first on lachrymal) of similar size and directed ventrally; remaining pores tiny, running posterodorsally along edge of orbit. First mandibular-preopercular canal pore on chin, anteriorly directed, and followed by four round to slightly oval ventral pores, the posterior three usually accompanied by a smaller pore nearby. First (anterior) preopercular pore similar in size to ventral lachrymal pores, followed by many single or paired tiny pores dorsally.

Body and head covered with ctenoid scales, but snout and maxilla naked. Lateral line curved between head and middle of caudal peduncle, continuing in straight line to middle caudal-fin base. Caudal-fin base with several rows of smaller weakly ctenoid scales grading to cycloid scales distally; scales on lowermost caudal-fin rays reach farther distally than those on uppermost rays. Pectoral-fin base with cycloid scales and pectoral-fin rays with several rows of smaller scales proximally. Scales between pelvic-fin bases cycloid. No basal scaly sheath along dorsal- and anal-fin bases. No scales present on fin rays of dorsal, anal and pelvic fins. Scales on ventral surface of lower jaw



restricted to angular, not extending onto dentary (Fig. 7B). Interorbital scales cycloid, extending to about vertical at middle of orbit (Fig. 8B). Uppermost row of body scales along dorsal-fin base always about half size of adjacent lower body scales; tiny and irregularly spaced scales sometimes present at bases of spines.

Dorsal-fin origin above pectoral-fin base, 5<sup>th</sup> spine longest, 1<sup>st</sup> spine shortest, all soft rays branched, 8<sup>th</sup> or 9<sup>th</sup> longest. Anal-fin origin below base of 1<sup>st</sup> dorsal-fin soft ray, 3<sup>rd</sup> spine longest, all soft rays branched, 5<sup>th</sup> longest. Pectoral fin with uppermost 2 rays and lowermost ray unbranched, remaining rays branched, its posterior tip extending to or slightly beyond anal-fin origin. Pelvic-fin origin below opercular spines; all soft rays branched, 2<sup>nd</sup> longest, its tip reaching beyond anal-fin origin. Caudal fin truncate, its upper lobe pointed and slightly longer than lower lobe; principal caudal-fin rays 9+8, upper- and lowermost ray unbranched; 1–2 segmented and at least 5 unsegmented procurrent caudal rays dorsally and ventrally.



**FIGURE 4.** Fresh specimens of *Chelidoperca flavimacula* collected off Tanintharyi Coast, Myanmar: **A.** SAIAB 209601, holotype, 69.5 mm SL, defrosted (photo by P.N. Psomadakis); **B.** Specimen of 82 mm TL, immediately after collection, discarded (photo by O. Alvheim).

**TABLE 1.** Morphometrics (expressed as percentages of SL) of type specimens of two new *Chelidoperca* species.

	<i>C. myathantuni</i>			<i>C. flavimacula</i>		
	Holotype SAIAB 203716	Paratypes <i>n</i> = 14	Means	Holotype SAIAB 209601	Paratypes <i>n</i> = 7	Means
SL (mm)	114.2	74.3–129.5		69.5	49.8–70.8	
Body depth at pelvic-fin origin	24.1	20.6–25.1	22.2	24.0	23.1–24.5	24.1
Body width	19.3	17.3–20.1	18.8	18.6	17.2–18.6	18.2
Head length	40.6	36.6–41.8	39.7	37.9	36.5–38.4	37.6
Snout length	9.5	8.0–10.0	9.1	6.5	6.4–7.9	7.1
Orbit diameter	10.2	9.9–11.6	10.5	11.2	10.9–12.3	11.3
Interorbital width	3.2	2.3–3.2	2.8	3.6	3.5–4.4	3.8
Upper-jaw length	17.7	17.1–18.7	18.0	17.6	17.2–17.8	17.5
Lower-jaw length	23.7	22.2–24.1	23.2	21.4	20.7–22.0	21.4
Maxillary depth	4.4	4.3–4.9	4.6	4.8	4.8–5.2	5.0
Postorbital length	21.9	20.2–22.7	21.8	20.1	19.5–21.9	20.4
Predorsal-fin length	38.9	35.8–39.3	37.9	35.4	32.5–35.4	34.3
Preanal-fin length	64.9	56.0–66.4	63.0	57.6	57.6–61.2	59.1
Prepelvic-fin length	35.0	30.7–36.1	33.5	31.1	30.6–33.4	31.7
1 <sup>st</sup> dorsal-fin spine length	5.2	4.5–5.9	5.2	4.5	4.5–6.5	5.5
2 <sup>nd</sup> dorsal-fin spine length	8.9	7.4–9.6	8.6	12.2	9.5–12.2	10.7
3 <sup>rd</sup> dorsal-fin spine length	13.6	12.4–15.3	13.5	-	13.2–15.7	14.5
10 <sup>th</sup> dorsal-fin spine length	9.6	8.3–10.6	9.7	10.6	9.9–12.2	11.0
Longest dorsal-fin soft ray length	17.4	16.4–19.2	18.0	22.3	20.1–22.5	21.6
1 <sup>st</sup> anal-fin spine length	5.1	3.6–5.6	4.8	4.5	4.0–4.9	4.3
2 <sup>nd</sup> anal-fin spine length	7.7	5.9–8.3	7.3	6.3	6.3–8.7	7.3
3 <sup>rd</sup> anal-fin spine length	8.6	8.0–10.4	9.0	11.3	10.3–11.3	10.8
Longest anal-fin soft ray length	16.3	15.4–18.2	17.0	27.0	22.6–27.1	25.6
Pectoral-fin length	22.3	22.2–26.0	24.4	24.9	23.7–25.7	24.7
Pelvic-fin spine length	12.0	11.4–14.1	12.5	14.0	13.3–15.9	14.6
Caudal-fin length	23.7	22.7–25.7	24.3	22.4	22.4–26.0	24.9
Caudal-peduncle depth	11.6	10.2–11.8	11.3	12.2	12.0–12.4	12.2
Caudal-peduncle length	20.5	16.3–21.3	20.0	25.0	21.0–25.7	23.3

Formula for configuration of supraneural bones, neural spines and dorsal pterygophores 0/0/0+1/2/1/1/1/1/1/1/1/2/1/1/2/1/1/; vertebrae 10+14.

*Fresh coloration.* Based on colour photographs of defrosted holotype, one fresh paratype (not publishable due to low quality) and photographic record (immediately after collection) of one unretained specimen (see Fig. 4). Head and body pinkish to reddish, becoming paler ventrally. Lower part of preopercle, opercle, interopercle, subopercle, branchiostegal rays and breast, including part extending on sides to pectoral-fin base, silvery white. Three poorly defined longitudinal rows of small whitish spots on flanks, one running along curved part of lateral line, one along midbody and one along ventral half of body. About four irregular reddish blotches running along ventral portion of body at level of ventralmost row of whitish spots. Upper and lower lips partially or completely pigmented in orange-red. Iris of eye yellow centrally and dirty red dorsally and ventrally. Dorsal fin transparent with two to four longitudinal rows of bright yellow spots, the number of rows incrementing on soft portion of fin. Anal fin transparent white, with yellow to reddish distal margin and three or four rows of bright yellow spots over its proximal half (number of rows incrementing posteriorly); posteriormost dorsal- and anal-fin rays with short alternating yellow and dark grey bands. Pectoral fin translucent or with pale reddish tinge, the axil more intensely pigmented. Pelvic fins transparent with yellowish tinge. Outermost rays of anal and pelvic fins sometimes reddish. Caudal fin reddish

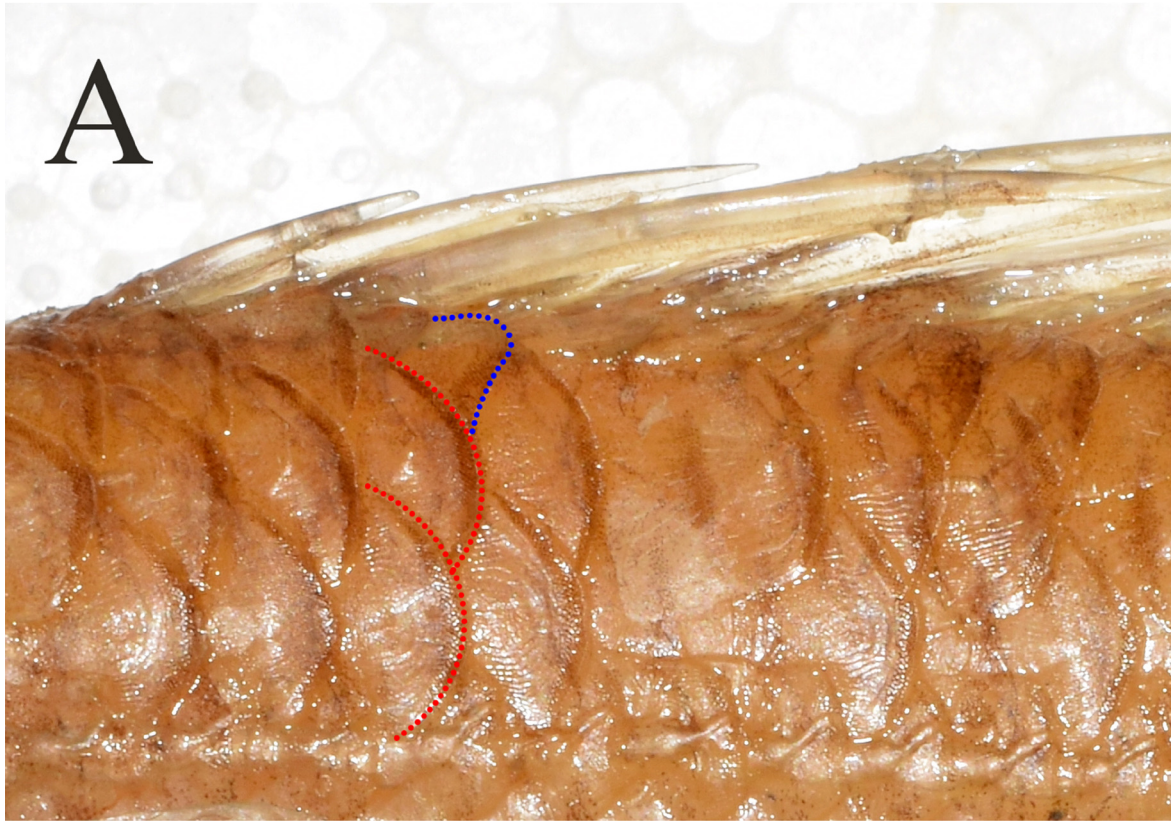
basally, mid-posterior portion of fin greyish with several irregular diagonal rows of yellow spots and yellow to reddish distal margin (scattered pinpoint white dots sometimes also present medially); upper and lowermost caudal-fin rays with four or five and two or three short whitish bands, respectively.

**Preserved coloration.** Based on all examined specimens (Fig. 3B). Body pale brown, top of head darker. Lateral line with single series of dusky spots, about one spot per scale, from corner of opercle to below middle of soft dorsal fin; lateral-line scales, those above them and scales on predorsal area with dusky edge. Clusters of microscopic dark brown dots on interorbital space and anteriorly on snout; semicircular cluster of similar dots in front of eye, its posterior arm reaching down between nostrils to ventral edge of lachrymal near 2<sup>nd</sup> infraorbital pore, and its anterior arm reaching across supraorbital sensory canal down to tip of snout; both ends of this arch frequently extend to upper jaw. Variable amount of microscopic brown dots on opercle, mostly above its largest (middle) spine; a small cluster of similar dots under and/or behind lowest opercular spine. Dorsal and anal fins pale, except last few soft rays that have four or five dark bars separated by pale spaces. Pectoral-fin base pale or with few scattered microscopic blackish dots; pectoral-fin rays pale, the middle rays sometimes with microscopic dark dots near base. Pelvic fins pale. Caudal fin with four or five irregular, narrow dusky bars usually most evident on central rays, becoming increasingly faint toward the dorsal and ventral margins. Peritoneum, stomach and intestine pale.

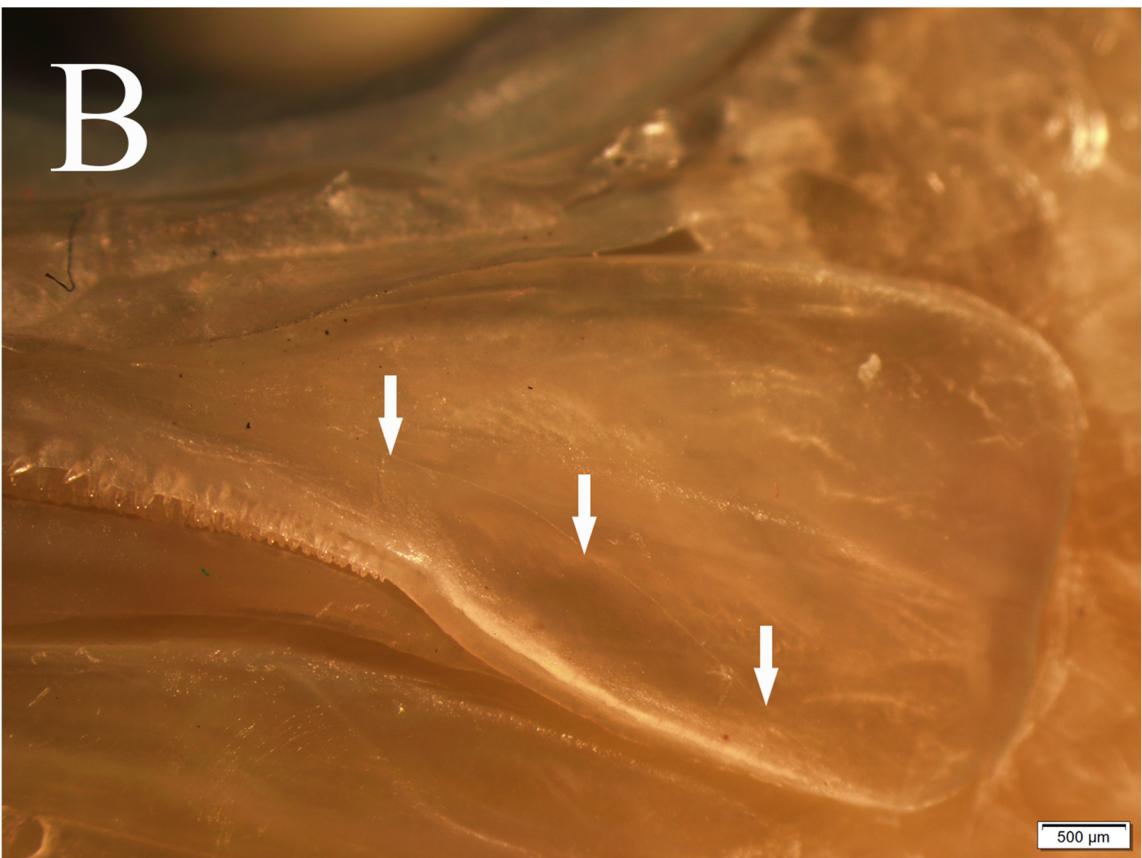
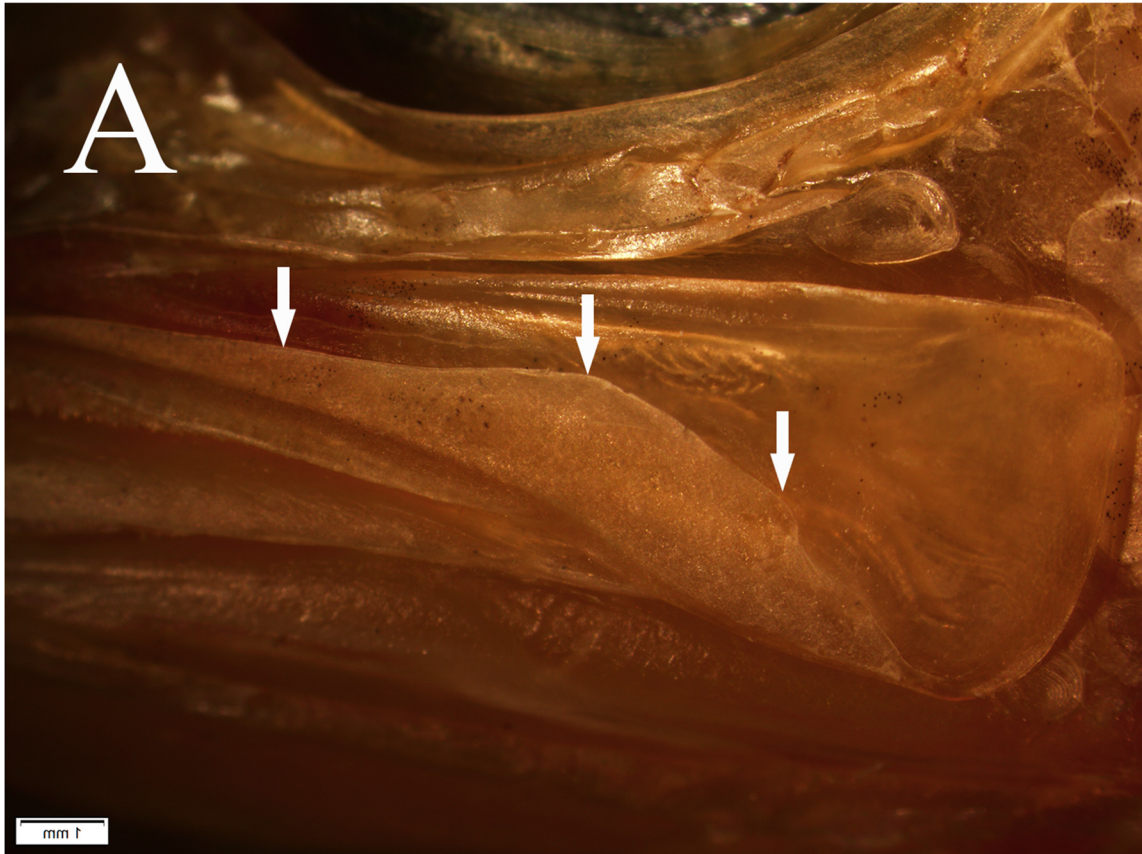
**Distribution.** *Chelidoperca flavimacula* is currently known only from the Andaman Sea, off the south-eastern coast of Myanmar at depths of 84–131 m.

**Etymology.** The species epithet *flavimacula* is a conjunction of the Latin words “*flavus*” for yellow and “*macula*” for spot in reference to the characteristic yellow spots covering the anal fin in this species.

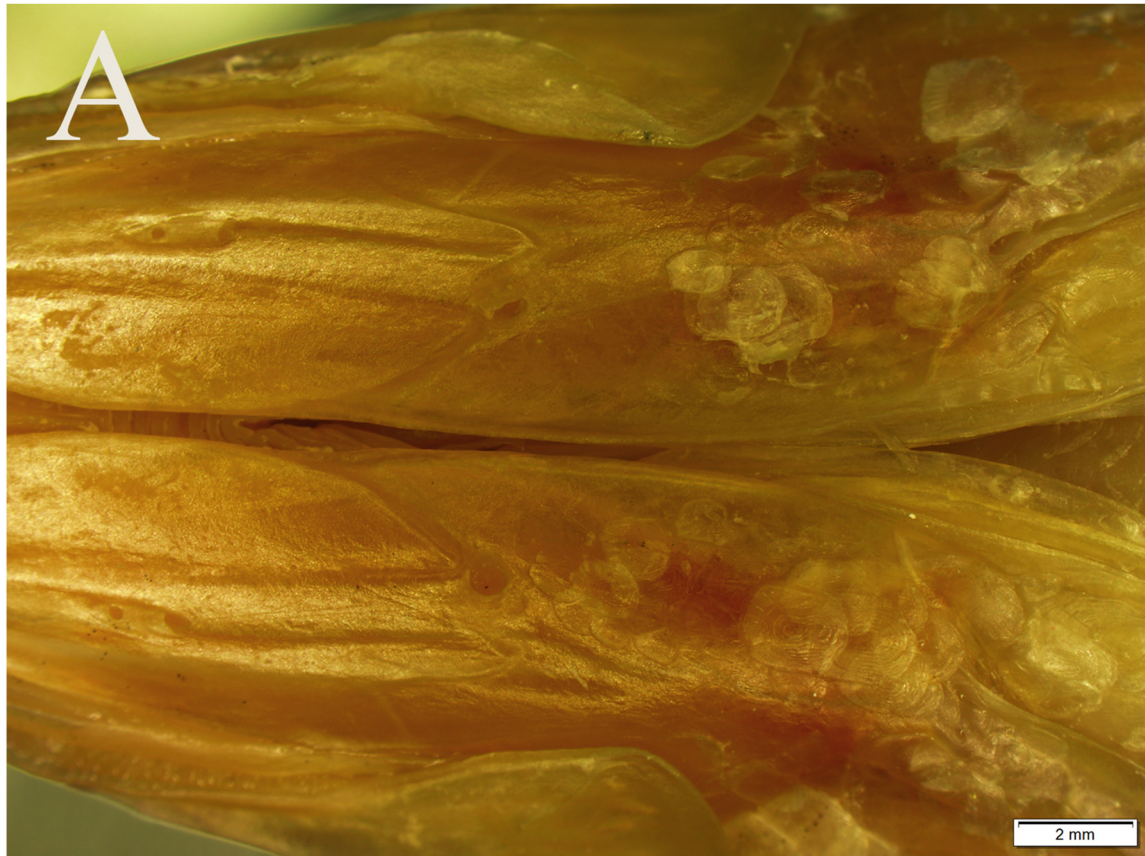
**Comparisons.** *Chelidoperca flavimacula* can be distinguished from *C. africana*, *C. cerasina*, *C. flavolineata*, *C. hirundinacea*, *C. lecromi*, *C. maculicauda* and *C. pleurospilus* by having 3 (2 full-sized plus 1 half-sized) vs. 4 (3 full-sized plus 1 half-sized) scale rows between the lateral line and the middle of the spinous dorsal-fin base. Among the species having 3 (2 full-sized plus 1 half-sized or 3 full-sized) scale rows in that region, *C. flavimacula* can be readily distinguished from remaining congeners except *C. leucostigmata*, *C. microdon*, *C. santosi*, *C. tosaensis* by the presence of yellow spots on the anal fin (not retained in preserved specimens). *C. flavimacula* is most similar to *C. santosi* in overall body appearance and coloration, but it can be readily distinguished from the latter in having the snout uniformly pigmented (vs. 2 pairs of dark spots on the snout and a pair of spots on the chin) and the presence of 3 longitudinal series of small whitish spots on the sides (vs. no white spots along the body). Also, in *C. santosi*, the rows of yellow spots on the anal fin are fewer (usually 2 vs. 3–4) and somewhat coalescing (vs. well separated). *Chelidoperca flavimacula* also differs from *C. santosi* in having fewer circumpeduncular scales (16–17 vs. 19–22) and subopercle serrae (7–15 vs. 16–21), and relatively fewer elements in the following counts: scale rows below the lateral line (9–10 vs. 10–12), predorsal scales (6 vs. 6–10). *Chelidoperca flavimacula* can be distinguished from *C. tosaensis* by the absence of an ocellated red spot on the posterodorsal corner of the opercle and red markings on the dorsal fin. It also differs from *C. tosaensis* in lacking saddle marks on the dorsum and vertically elongate white blotches along the ventral portion of the body. Also, in *C. tosaensis*, the yellow spots on the anal fin are restricted to the basal and central parts of its posterior half (vs. yellow spots covering the whole fin). In meristic characters, *Chelidoperca flavimacula* differs from *C. tosaensis* in having relatively fewer elements in the following counts: scale rows below the lateral line [9–10 (modally 10) vs. 10–12 (modally 11)]; predorsal scales [6 vs. 6–9 (modally 7)]; circumpeduncular scales [16–17 (modally 16) vs. 17–20 (modally 18)] and in having relatively more pored lateral line scales [42–45 (modally 42) vs. 37–42 (modally 39)]. *Chelidoperca flavimacula* can be distinguished from *C. leucostigmata* in having the interorbital scales extending to mid-eye (vs. extending to the margin of the anterior orbit). In meristic characters, it has fewer scale rows below the lateral line (9–10 vs. 12–13) as well as circumpeduncular scales (16–17 vs. 20–24), and relatively fewer elements in the following counts: developed gill rakers (8–10 vs. 9–11); predorsal scales (6 vs. 6–8); scale rows on cheek (5 vs. 5–6); subopercle serrae (7–15 vs. 14–25). In pigmentation, *C. flavimacula* differs from *C. leucostigmata* in lacking an elliptical light yellow blotch on the side of the body and a yellow oblique streak below the eye. Also in *C. leucostigmata*, the yellow spots on the anal fin are less conspicuous and scattered irregularly over the fin (vs. conspicuous and regularly distributed over the fin). *Chelidoperca flavimacula* can be distinguished from *C. microdon* in having 3 (2 full-sized plus 1 half-sized) vs. 3 full-sized scales between the lateral line and the middle of the spinous dorsal fin; enlarged caniniform teeth in the upper jaw (vs. no distinct caniniform teeth in the upper jaw) as well as a smaller head (36.5–38.4 vs. 38.8–43.1 % of SL) and snout length (6.4–7.9 vs. 9.1–11.0 % of SL). In meristic characters, *Chelidoperca flavimacula* differs from *C. microdon* in having fewer developed gill rakers (8–10 vs. 11); predorsal scales (6 vs. 7); circumpeduncular



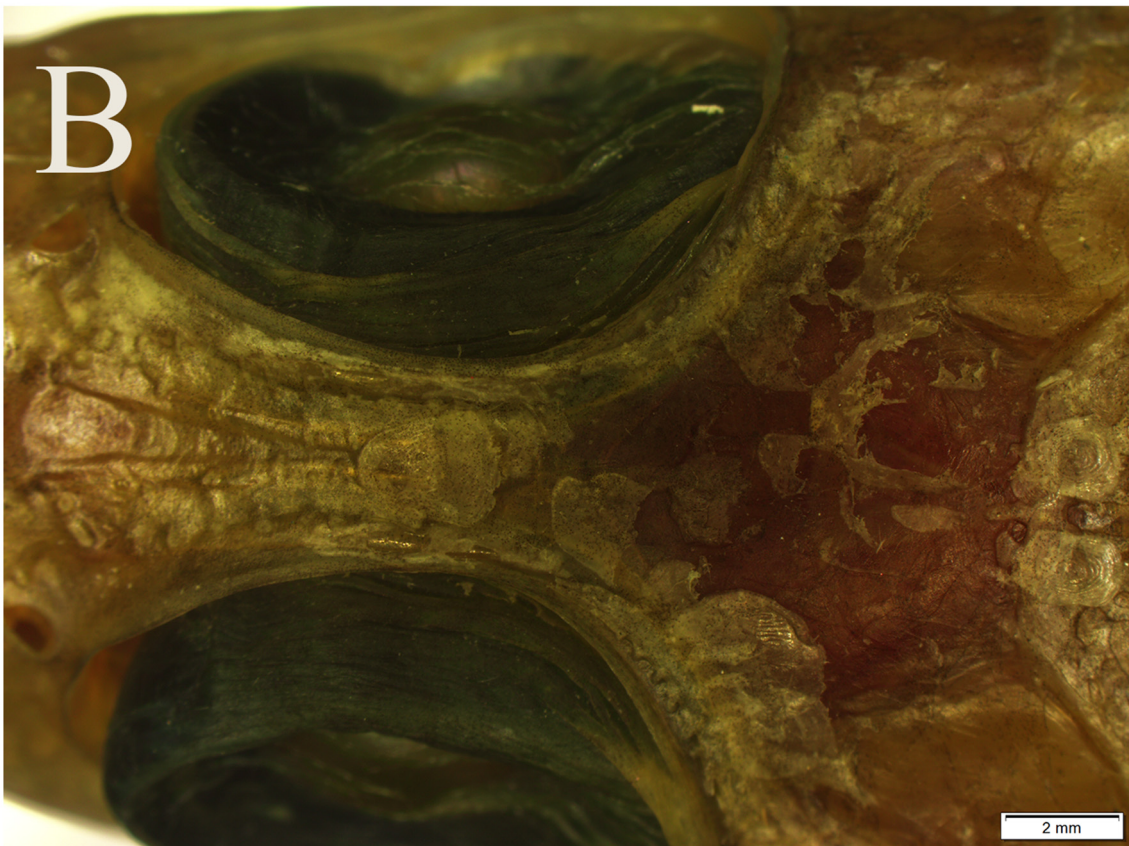
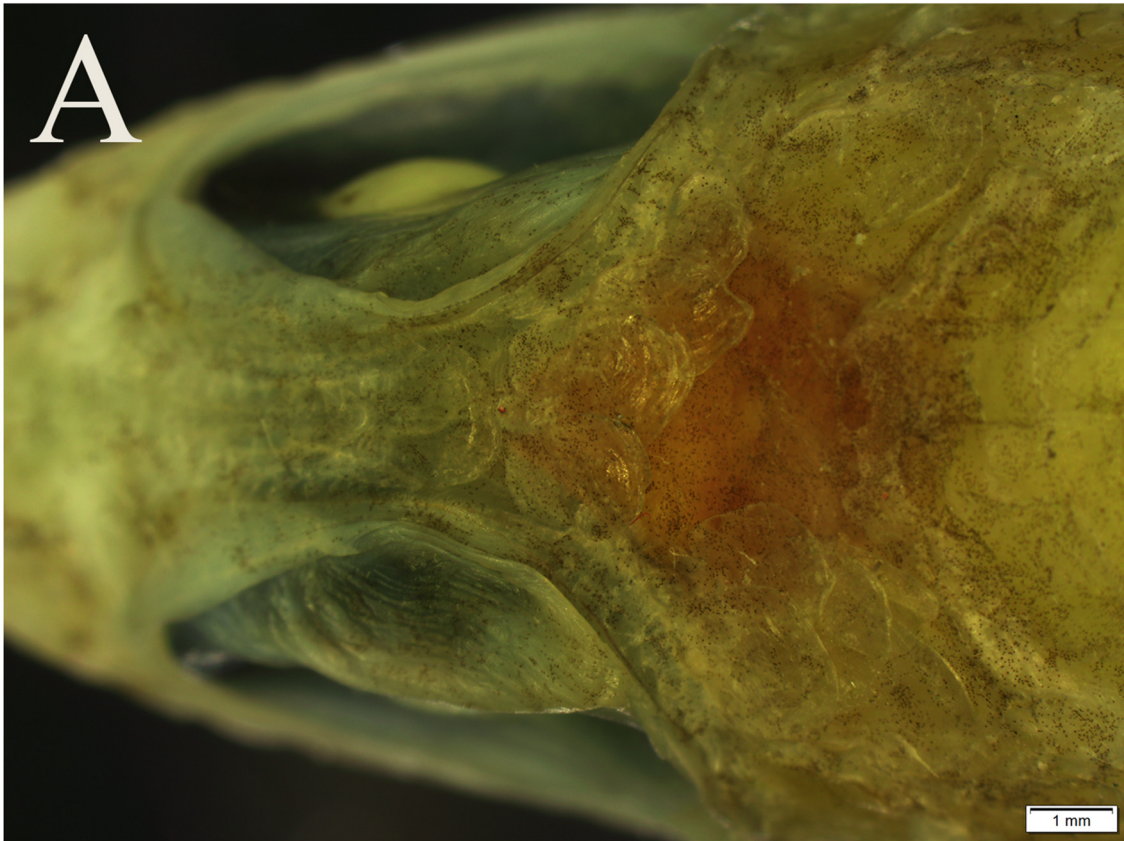
**FIGURE 5.** Dorsolateral view of dorsal portion of body showing scale rows between lateral line and base of spinous dorsal fin (photos by N. Mazungula): **A.** *Chelidoperca myathantuni*, SAIAB 203716, holotype, 114.2 mm SL, and **B.** *Chelidoperca flavimacula*, SAIAB 209601, holotype, 69.5 mm SL. Red-outlined and blue-outlined scales indicate full-sized and half-sized scales, respectively.



**FIGURE 6.** Lateral view of posterior portion of maxilla showing condition of skin fold (photos by O. Gon): **A.** *Chelidoperca myathantuni*, SAIAB 203716, holotype, 114.2 mm SL, and **B.** *Chelidoperca flavimacula* SAIAB 209601, holotype, 69.5 mm SL. Arrows indicate upper edge of skin fold.



**FIGURE 7.** Ventral view of head showing scale condition (photos by O. Gon): **A.** *Chelidoperca myathantuni*, SAIAB 203716, holotype, 114.2 mm SL, and **B.** *Chelidoperca flavimacula*, SAIAB 209601, holotype, 69.5 mm SL.



**FIGURE 8.** Dorsal view of head showing scale condition (photos by O. Gon): **A.** *Chelidoperca myathantuni* SAIAB 203716, holotype, 114.2 mm SL, and **B.** *Chelidoperca flavimacula*, SAIAB 209601, holotype, 69.5 mm SL.

scales (16–17 vs. 19); scale rows on cheek (5 vs. 8); subopercle serrae (7–15 vs. 18–20) and relatively fewer scale rows below the lateral line (9–10 vs. 10–11); total gill rakers (16–19 vs. 18–20) and relatively more pored lateral line scale rows (42–45 vs. 42); interopercle serrae (12–33 vs. 9–13) and posttemporal serrae (2–5 vs. 2–3). In pigmentation, *C. flavimacula* differs from *C. microdon* in lacking saddle marks on the dorsum as well as vertically elongate white blotches along the ventral portion of the body, a dark blurry spot on the snout and an ocellated red spot on the posterodorsal corner of the opercle. Also in *C. microdon*, the yellow spots on the anal fin are variably present, less conspicuous and scattered irregularly over the fin (vs. always present, conspicuous and regularly distributed over the fin).

*Chelidoperca flavimacula* is easily distinguished from *C. myathantuni* and the remaining congeners with 3 (2 full-sized plus 1 half-sized) scale rows between the lateral line and the middle of the spinous dorsal-fin base in having three or four rows of yellow spots on the anal fin (vs. anal fin without yellow spots) in fresh condition. It also differs from *C. myathantuni* in lacking a dark dashed stripe along midbody and in having fewer developed gill rakers (7–10 vs. 11–13) and predorsal scales (6 vs. 7–8); a greater length of the longest anal (22.6–27.1 vs. 15.4–18.2 % of SL) and dorsal-fin (20.1–22.5 vs. 16.4–19.2 % of SL) soft ray; a slightly larger interorbital width (3.5–4.4 vs. 2.3–3.2 % of SL) and caudal peduncle depth (12.0–12.4 vs. 10.2–11.8 % of SL); smaller predorsal (32.5–35.4 vs. 35.8–39.3 % of SL) and postorbital (19.5–21.9 vs. 20.2–22.7 % of SL) length, as well as a low skin fold (vs. high skin fold) ventrally on maxilla.

**Remarks.** The innermost teeth at the symphysis of the upper jaw sometimes include one or two distinctly larger caniniform teeth that are almost flat against the roof of the mouth. Most specimens had 16 circumpeduncular scales, but one has 17. In most specimens the pores of the mandibular sensory canal are in a shallow depression. Preserved specimens varied in the amount of microscopic dark dots on pectoral-fin base and rays, as well as on the opercle and snout.

## Comparative material examined

*Chelidoperca investigatoris*: SAIAB 203715, 97.5 mm SL, off Rakhine coast, Myanmar, Bay of Bengal, Indian Ocean, 16°29.63'N; 94°0.32'E, R/V *Dr. Fridtjof Nansen*, station 43, bottom trawl, 121–125 m depth, P.N. Psomadakis, 6 May 2015; SAIAB 203718, 118.0 mm SL, off Rakhine coast, Myanmar, Bay of Bengal, Indian Ocean, 16°11.80'N; 93°53.63'E, R/V *Dr. Fridtjof Nansen*, station 48, bottom trawl, 136–140 m, P.N. Psomadakis, 7 May 2015; SAIAB 203719, 125.8 mm SL, off Ayeyarwady coast, Myanmar, Andaman Sea, Indian Ocean, 14°14.73'N; 95°45.47'E, R/V *Dr. Fridtjof Nansen*, station 91, bottom trawl, 149–164 m, P.N. Psomadakis, 14 May 2015. SAIAB 208886, 96.4 mm SL, off Rakhine coast, Myanmar, Bay of Bengal, Indian Ocean, 16°11.71' N, 93°53.73' E, R/V *Dr. Fridtjof Nansen*, bottom trawl, station 28, 133–144 m, P.N. Psomadakis, 30 August 2018; *Chelidoperca occipitalis*: SAIAB 189559, 3: 87.8–94.6 mm, Sud-Est Pointe Barrow, Madagascar, 25.4667° S, 44.41667° E, 10 May 2010; *Chelidoperca stella*: SAIAB 203727, 77 mm SL, off Ayeyarwady coast, Myanmar, Andaman Sea, Indian Ocean, 14°0.72'E; 96°49.40'E, R/V *Dr. Fridtjof Nansen*, bottom trawl, station 108, 90–94 m, P.N. Psomadakis, 19 May 2015.

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