

A revision of *Carcinoplax abyssicola* (Miers, 1885)
and seven related species of *Carcinoplax*
H. Milne Edwards, 1852, with the description
of two new species and an updated key to the genus
(Crustacea, Decapoda, Brachyura, Goneplacidae)

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ABSTRACT

The identities of the deep-water brachyuran crabs *Carcinoplax abyssicola* (Miers, 1885), *C. longipes* (Wood-Mason, 1891), and *C. specularis* Rathbun, 1914 (family Goneplacidae MacLeay, 1838) are clarified on the basis of the examination of types and of an extensive series of specimens from the Indo-West Pacific region, including colour photographs of fresh specimens. Two species described from the Philippines, *C. verdensis* Rathbun, 1914 and *C. polita* Guinot, 1989, and previously synonymised under *C. specularis*, are shown to be distinct species. Two new species, *C. adelphia* n. sp. and *C. jugum* n. sp., are described from Vanuatu and the Philippines, respectively. *Carcinoplax adelphia* n. sp. differs from the closely allied *C. specularis* by having a male first gonopod (G1) that is relatively more elongated, particularly the distinctly more slender distal half, than the G1 of *C. specularis*. *Carcinoplax jugum* n. sp. is characterized by a suite of characters that includes an epistome with strongly concave lateral margins, a carapace having distinctly swollen gastric and cardiac regions, and a G1 with a subconical distal part. The taxonomies of these seven species, as well as that of the allied *C. fasciata* Ng & Kumar, 2016 from southwestern India, are revised. A revised, updated key to the 25 known species of *Carcinoplax* H. Milne Edwards, 1852 is also provided.

KEY WORDS
Goneplacoidea,
deep-sea fauna,
Indo-West Pacific region,
new species.

RÉSUMÉ

Révision de Carcinoplax abyssicola (Miers, 1885) et de sept espèces apparentées du genre Carcinoplax H. Milne Edwards, 1852, avec la description de deux nouvelles espèces et une clé mise à jour des espèces du genre (Crustacea, Decapoda, Brachyura, Goneplacidae).

L'identité des crabes brachyours des eaux profondes *Carcinoplax abyssicola* (Miers, 1885), *C. longipes* (Wood-Mason, 1891), et *C. specularis* Rathbun, 1914 (Goneplacidae MacLeay, 1838) sont clarifiées sur la base de l'examen des types et d'une vaste collection de spécimens provenant de la région indo-pacifique occidentale, ainsi que de photographies de spécimens frais. Deux espèces décrites des Philippines, *C. verdensis* Rathbun, 1914 et *C. polita* Guinot, 1989, antérieurement mises en synonymie avec *C. specularis*, sont des espèces distinctes. Deux nouvelles espèces, *C. adelphia* n. sp. et *C. jugum* n. sp., sont décrites respectivement du Vanuatu et des Philippines. *Carcinoplax adelphia* n. sp. diffère d'une espèce très proche, *C. specularis*, par son premier pléopode mâle (G1) relativement plus allongé, en particulier la moitié distale nettement plus mince, que le G1 de *C. specularis*. *Carcinoplax jugum* n. sp. est caractérisé par un ensemble de caractères qui comprend un épisode avec des marges latérales fortement concaves, une carapace dotée de régions gastriques et cardiaques nettement gonflées, et un G1 avec une partie distale subconique. La taxonomie de ces sept espèces et d'une espèce apparentée, *C. fasciata* Ng & Kumar, 2016 du sud-ouest de l'Inde, est revue. Une clé d'indentification révisée et mise à jour des 25 espèces connues du genre *Carcinoplax* H. Milne Edwards, 1852 est également proposée.

MOTS CLÉS
Goneplacoidea,
faune des grands fonds,
région pacifique indo-
occidentale,
espèces nouvelles.

INTRODUCTION

The goneplacid genus *Carcinoplax* H. Milne Edwards, 1852 is well represented across the Indo-West Pacific region, with 25 species so far known (Castro 2007, 2009; Ng *et al.* 2008; Ng & Kumar 2016; Ng & Mitra 2019). First studied at length by Guinot (1989), based mainly on the Philippine material from the MUSORSTOM expeditions, the genus underwent a major taxonomic revision by Castro (2007), who redefined *Carcinoplax* s. str. and established four new genera.

The species of *Carcinoplax* are characterized by several characters (see Castro 2007): having a transversely rectangular carapace; a lamellar front, straight, rarely marked by a slight median notch or projection; narrow orbits; rounded suborbital borders, each with a blunt inner tooth not visible dorsally; convex anterolateral borders; a tooth typically on outer orbital angle plus two anterolateral teeth on each side of the carapace; short eye peduncles; medially interrupted sutures 4/5, 5/6, 6/7, 7/8; moderately slender cheliped fingers; dorsal margins of P2-P5 unarmed; dactyli slender, smooth. Male pleon with six freely-movable somites plus telson, narrowly or broadly triangular, somites 4-6 gradually decreasing in width from somite 3 (widest somite); telson about as long as wide; somite 3 covering space between P5 coxae, somite 2 slightly narrower than or as narrow as somite 3 so that somites 1, 2 leave small, often triangular portion of thoracic sternite 8 visible or somite 2 much narrower than somite 3 leaving a larger portion of thoracic sternite 8 visible; G1 long, slender, only slightly broadened proximally with truncated or pointed, thin tip; G2 slender, slightly longer than or as long as G1, flagellum shorter than proximal part (peduncle), slightly-expanded tip with one or two (rarely three) spinules; penis arising from P5 coxa, with broad, soft proximal expansion. Female pleon with 6 freely-movable, wide somites; telson wider than long, somite 3 covering space between P5 coxae, somite 2 narrower

than somite 3 so that somites 1, 2 leave small, often triangular portion of thoracic sternite 8 visible, or somite 2 as wide as somite 3 so that thoracic sternite 8 is not visible; and vulva of mature females greatly expanded, extending from suture 5/6 to suture 6/7, covered by a soft membrane, never by a sternal vulvar cover.

Over the last five years, the authors began to realise that the taxonomy of several species of *Carcinoplax* needed to be reappraised. One species, *C. specularis* Rathbun, 1914, was reported by Castro (2007) as having a wide distribution in the Indo-West Pacific. He noted that the characters previously used to separate *C. specularis* from congeners were unclear or proved too variable to be reliable and consequently synonymised two species, *C. verdensis* Rathbun, 1914 and *C. polita* Guinot, 1989, with it. He also suggested that the poorly known *C. abyssicola* (Miers, 1885) was closely related or even synonymous. More collections in the western Pacific and Indian oceans, however, showed that there appeared to be size, morphological, and colour differences between some populations of *C. specularis* s. str. More recently, Ng & Kumar (2016), when comparing their new species, *C. fasciata* from India with *C. specularis* s. str., suggested that the western Indian Ocean population belonged to their *C. fasciata* instead and that *C. specularis* was a species complex. The taxonomies of *C. abyssicola* and *C. longipes* (Wood-Mason, 1891) are also not well known. *Carcinoplax abyssicola* is known only from the small holotype male from Fiji and has not been reported since, while *C. longipes* was described from India but has also been reported from Philippines (see Guinot 1989; Castro 2007). In comparing *C. fasciata* with *C. longipes*, Ng & Kumar (2016: 199) commented that the "*C. longipes* as figured in Alcock & Anderson (1895: pl. 14, fig. 7) in the *Investigator* plates from the Andamans differs from that shown in Serène & Lohavanijaya (1973: 65 [part], pl. 14D), Guinot (1989: 303, pl. 10A-C) and Castro (2007: 636) from the Andamans and Philippines

in having more triangular anterolateral teeth and distinctly shorter ambulatory legs (see Castro 2007: 637). It is possible that the type material is mixed and contains two species.”

Part of the confusion in the taxonomy of these species is that *C. polita*, *C. verdensis*, and *C. specularis*, as well as *C. jugum* n. sp., all occur in the Philippines, with some stations containing specimens of two or even three species. The large series of recently collected specimens from the Philippines has allowed us to have a better understanding of the species concerned and the degree of variation of the various characters used. New characters (e.g. the structure of the posterior margin of the epistome, shape of the male pleon and colour) have also helped. The structure of the male first gonopod, while not always useful in the taxonomy of the species of *Carcinoplax*, has also proved helpful in separating the taxa as some of the features have proved to be constant when a good series of specimens are examined. Reappraisals of a good series of specimens from the western Pacific, particularly Indonesia, Fiji, and Tonga now also allowed us to clarify the precise identities of *C. abyssicola* and *C. longipes*.

Most of the species treated herein key out to epithet 13 of the key to the species of *Carcinoplax* by Castro (2007: 626) and epithet 19 of the updated key (see below). These species typically do not exceed 30 mm in carapace length, have a low outer orbital tooth, two distinct and sharp anterolateral teeth, none of which are ever distinctly curved anteriorly. Only one new species treated can reach carapace lengths of almost 35 mm, *C. jugum* n. sp., which has been confused with *C. specularis* s.l. or *C. polita* (cf. Guinot 1989; Castro 2007). Castro's (2007) epithet 13 also includes *C. inaequalis* (Yokoya, 1933) and *C. cracens* Castro, 2007, two morphologically very close Indo-West Pacific species. These two taxa, however, can be separated from most of the species we treat herein in having the dorsal surface of the carapace transversed by low ridges and grooves and the outer margin of the carpus of the cheliped with a distinct spine. Only two species treated herein have a similar carapace structure, *C. polita* and *C. jugum* n. sp., and only the former has a spine on the outer margin of the carpus of the cheliped (outer surface of carpus unarmed in *C. jugum* n. sp.). Compared to *C. inaequalis* and *C. cracens*, however, *C. polita* has a granular margin between the anterolateral teeth (Figs 16B; 17A, E) (margin smooth in *C. inaequalis* and *C. cracens*; Castro 2007: fig. 3); only about a third of the finger of the cheliped darkly pigmented (Figs 16A, H; 17D, I) (more than half of finger pigmented in the two species; Castro 2007: fig. 3), and the legs are proportionately shorter (Figs 16A; 17D) (more prominently elongated in the two species; Castro 2007: fig. 3). A southwestern Pacific (Solomon Islands and New Caledonia) species that superficially resembles some members in epithet 13 in Castro's key (2007) was subsequently described, *C. uncinata* Castro, 2009. This species is excluded from the group of species covered herein by its diagnostic hook-like first anterolateral tooth and by a narrow, J-shaped gap between a prominent outer orbital tooth and the first anterolateral tooth (Castro 2009: fig. 1A). Practically all specimens of *C. uncinata* are also distinguished by a patch of plumose setae on the inner margin of the cheliped

propodus. In order to resolve the taxonomy of these species, we consolidated the large collections of specimens that have been identified with *C. specularis* s.l., *C. abyssicola* and/or *C. longipes*, from the Muséum national d'Histoire naturelle in Paris, and the Lee Kong Chian Natural History Museum at the National University of Singapore.

MATERIAL AND METHODS

ABBREVIATIONS

Institutions

DABFUK	Department of Aquatic Biology & Fisheries, University of Kerala, Thiruvananthapuram;
MNHN	Muséum national d'Histoire naturelle, Paris;
MZB	Muzium Zoologicum Bogoriense, Bogor;
NSMT	National Museum of Science & Technology, Tokyo;
NHM	The Natural History Museum, London;
USNM	United States National Museum of Natural History, Smithsonian Institution, Washington D.C.;
ZMA	Zoologisch Museum, Universiteit van Amsterdam, Amsterdam (at present part of The Naturalis Biodiversity Museum, Leiden);
ZRC	Zoological Reference Collection, Lee Kong Chian Natural History Museum, National University of Singapore.

Measurements

Measurements (in millimetres) are of the maximum carapace length (cl) and width (including teeth) (cw), respectively. The original type material examined was re-measured using the same method used in the rest of the more recent material. The terminology used follows Davie *et al.* (2015).

cl	carapace length;
cw	carapace width (including teeth);
G1	male first gonopod;
G2	male second gonopod;
P1	pereiopod 1 (cheliped);
P2-P5	pereiopods 2-5 (ambulatory legs 1-4).

Nomenclature

The nomenclature used here for Miers' taxa follows Froglija & Clark (2011), who argue that some of the taxa supposedly published by Miers (1886) were actually made available a year earlier. The authorships and year of publication of the *Investigator* taxa similarly follow Huys *et al.* (2014).

CHARACTERS USED

We have used several new characters as well as re-interpreted some earlier ones. In describing *C. specularis* s. str., Rathbun (1914: 144) observed that “On the upper surface of the manus there is an elongate-oval area which is nearly smooth and shining; viewed with a lens, it shows scattered granules, but presents an altogether different appearance from the rest of the manus, which is covered with crowded granules.” This was probably the basis for her name for this species, “*specularis*” Latin for “transparent surface”. Guinot (1989: 296) described this feature as “une plage oblongue, plus lisse, bien délimitée, très caractéristique et présente sur les deux chélicèdes.” This feature is here referred to as a “window”, which appears to be an area of the cuticle which is weakly chitinised and/or calcified, although the surface feels as hard and firm as the rest

of the chela (Fig. 10F). It has been observed only in males. “Windows” can also be observed on another species, *C. adelphia* n. sp. (e.g. Fig. 19F) and is sometimes present on the median part of the chela in *C. abyssicola* (e.g. Figs 2H; 3I). It is quite obvious in adults of *C. specularis* and *C. adelphia* n. sp. but not in smaller specimens. The situation for *C. abyssicola* is of interest because the “window” is less distinct than the other two species and is sometimes not obvious even in larger male specimens. In fact, the “window” appears to be more visible with increased periods of preservation in *C. abyssicola*. Material of *C. abyssicola* collected in Java in March–April 2018 did not show any hints of the “window” when first collected and photographed when fresh. A trace of the “windows” was actually observed, although with some difficulty when the preserved specimens were first studied in June 2019 (e.g. Fig. 3I). The “window” is paradoxically more visible when photographed than when observed under a binocular. The purpose and significance of the “window” is not known. Such a feature has also been reported for other deep-water crabs, notably on the lower part of the chela of adult males of the portunoid *Benthochascon hemingi* Alcock & Anderson, 1899 (Geryonidae Colosi, 1923, Benthochasconinae Spiridonov, Neretina & Schepetov, 2014), with Ng (2000: 310) calling it a tympanum-like structure.

One reliable character used is the form of the dorsal surface of the carapace. Most species of *Carcinoplax* have a carapace with a dorsal surface that is more or less evenly convex, with the median gastroducardiac regions gently depressed (e.g. Fig. 14B). In a few species, however, the epibranchial and mesogastric regions are swollen, forming a low but distinct broad transverse ridge on the carapace surface. Posterior to this epibranchial-mesogastric ridge, the metagastric and urogastric regions are prominently depressed, which is followed by another broad transverse ridge formed by the swollen mesobranchial and cardiac regions. This gives the dorsal carapace surface a distinctly corrugated appearance (e.g. Figs 16B; 17A, E; 21B; 22B, E), a feature first noted by Guinot (1989: 298) when she described *C. polita*. This character is most easily seen when the carapace surface is dried and the light is directed obliquely at it, and is obvious even in subadults and females. The two species discussed in the present study that possess this character are *C. polita* and *C. jugum* n. sp. Two other species, *C. inaequalis* (Yokoya, 1933) and *C. cracens* Castro, 2007, also show this character.

The posterior margin of the epistome is a very useful character that has not been used previously but is effective in separating various groups of species. The most distinct form is the one in *C. fasciata* and *C. jugum* n. sp., in which the median part is projected ventrally as a prominent triangular structure with the lateral margins prominently concave (e.g. Figs 18D; 21D; 22D). In species like *C. abyssicola*, *C. longipes*, and *C. verdensis*, the median part is low, truncated and not projected ventrally, and is separated from the gently sinuous to almost straight lateral margins by a distinct notch (e.g. Figs 3D; 4D; 7D; 13D; 14D). Species like *C. specularis* have a more intermediate condition, with the median part gently protruding, subtruncated to subtriangular in shape, but still

separated from the almost straight or slightly sinuous lateral margins by a notch (e.g. Figs 10D; 11D).

The form of the chela is not a reliable species character. Guinot (1989: 307) used it when she commented that “*La différence la plus notable concerne les pinces, courtes et globuleuses chez C. verdensis, ce qui n'est pas le cas chez C. abyssicola.*” The large series of specimens of these two species we examined show that this character is too variable to be useful. The chelae of *C. verdensis* in particular, vary from relatively slender and appearing more elongated to being stouter, which appears to be the normal male condition (e.g. Figs 3I; 14H). The pigmentation on the cheliped fingers is always present and varies in colour from pale brown to almost black. It has proved to be very useful to separate some of the groups (see discussion for *C. abyssicola*, *C. longipes*, and *C. verdensis*). The pigmentation is only along the distal third or at most half of the finger in *C. polita* and *C. jugum* n. sp., although it may extend a bit further back along the cutting edges (e.g. Figs 16H; 17I; 21I; 22I). In older and longer-preserved specimens (e.g. in the holotype of *C. specularis*, Fig. 10A, H; specimens of *C. longipes* from Travancore, India; Figs 6G; 7I), the pigmentation becomes faint and not easily seen but can still be discerned when dried and viewed under the right lighting conditions.

It is noteworthy that all the species treated here are heterochelous, with adults having one larger chela, even for females. On the major chela, there is always a well-developed tooth at the base of the dactylar finger, which is slightly elongated and gently curved posteriorly (e.g. Figs 4H; 5H). Ng & Tan (1984, 1985) called this the “cutting tooth” and suggested it is used to break gastropod shells open. The minor chela tends to be more slender, with more elongated fingers. For this tooth to be most effective, Ng & Tan (1985) suggested that it should be on the right chela as most marine gastropods are dextrally coiled. The major chela is the right one in most of the adult specimens of the species studied here. There are, however, several specimens where the major chela is on the left side, suggesting that this adaptation may not be so developed in the genus. In some species, notably *C. polita* and *C. jugum* n. sp., the basal tooth is relatively short and more molariform in form (e.g. Figs 16H; 17I; 21I; 22I), suggesting it may be used instead to simply crush gastropod or bivalve shells.

The structure of the cheliped carpus has proved to be useful to separate species into groups. Guinot (1989: 298) distinguished *C. polita* from congeners on the presence of a tooth (often acute) on the outer proximal margin of the carpus, but Castro (2007) disagreed because he did not recognize this species as distinct from *C. specularis* s.l. The large series of specimens at hand now show the validity of this character. Only one species, *C. polita*, always possesses a tooth on the outer margin of the carpus, even as juveniles (e.g. Figs 16E, F; 17D; 27H). Even in cases when the tooth is not obvious, a careful examination will always show that it had broken off. The tooth on the inner distal margin of the carpus is also a useful, albeit not always a reliable character, notably for *C. verdensis*. It can be distinguished from the closely related *C. abyssicola* and *C. longipes* in that the spine is often elongated and the

distal half sharply tapers to an acute spine in both sexes and even juveniles (e.g. Fig. 14F).

The use of the proportion of the legs (P2-P5) has proven useful to separate some taxa. When specimens of similar size and of the same sex of *C. abyssicola* are compared with those of *C. longipes* (and *C. verdensis*), the relatively shorter legs (notably the meri) are apparent (e.g. Fig. 4A vs Fig. 8A). There is of course some degree of variation in the legs (see discussion for *C. verdensis*) but the large series of specimens of the species examined show that this is a reliable character.

The transverse proportions of the male pleon can be used to separate groups; for example, the pleon of *C. abyssicola* and *C. verdensis* are always proportionately wider (Figs 3H; 14G) than that of *C. specularis* (Fig. 10G), notably in the widths of somites 5 and 6. Again, there is variation in the proportions of the various somites among the species of *Carcinoplax*, often associated with size (see discussion in Ng & Mitra 2019). As such, it is not always a reliable character.

The structure of the G1 has proved to be more useful than previously believed and has been used here to differentiate several species effectively. The G1 was used more recently by Ng & Kumar (2016) and Ng & Mitra (2019) to separate some morphologically very similar species of *Carcinoplax*. Even when the structures are very similar (e.g. between *C. abyssicola* and *C. longipes*, and *C. specularis* and *C. adelphia* n. sp.), there are sufficient differences in the proximal and distal structures to separate them (Fig. 23A-C, I, E-G, J, K; 25A-D, F-H). This confidence is mainly because there is a good series of specimens at hand, allowing us to better define variations as well as changes associated with size and growth.

SYSTEMATICS

Family GONEPLACIDAE MacLeay, 1838

Genus *Carcinoplax* H. Milne Edwards, 1852

Carcinoplax abyssicola (Miers, 1885)

(Figs 1A-D; 2A-H; 3A-I; 4A-H; 5A-H;
23A-D, E-H; 26A-F)

Pseudorhombila (*Pilumnoplax*) *abyssicola* Miers, 1885: 588 [Fiji].

Pilumnoplax abyssicola Miers, 1886: xxiv, xl, xlviii, 226, 227 [in list], 228, pl. 19, figs 2, 2a, 2b [Fiji]. — Tesch 1918: 155 [in list], 156 [in key], 156 [Indonesia]. — Serène 1968: 90 [in list]. — Guinot 1969: 526; 1971: 1081 [in list]. — Serène & Lohavanijaya 1973: 62 [in list], 65 [in key].

Not *Pilumnoplax abyssicola* – Whitelegge 1900: 158 (= *Pycnoplax meridionalis* (Rathbun, 1923)).

Neopilumnoplax abyssicola – Serène 1968: 90 [in list].

Carcinoplax abyssicola – Guinot 1969: 526; 1989: 305, fig. 38; pl. 9, figs A-C [holotype] [Fiji]. — Castro 2007: 623 [in list], 627 [in key], 628 [holotype] [Fiji]. — Ng *et al.* 2008: 80 [in list].

Carcinoplax specularis [part] – Castro 2007: 640 [Indonesia, New Guinea, Solomon Islands, Vanuatu, New Caledonia, Fiji, Tonga].

TYPE MATERIAL. — **Holotype**. Fiji. ♂, 8.2 × 10.0 mm (Castro 2007), *Challenger*; stn 173; NHM 84.31.

TYPE LOCALITY. — Fiji, *Challenger*; stn 173; 576 m depth.

MATERIAL EXAMINED. — **Indonesia** • 1 ♀, 11.2 × 15.2 mm; Kai Is.; KARUBAR; stn CP59; 08°20'S, 132°11'E; 399–405 m depth; 31.X.1991; MNHN-IU-2016-100 (= MNHN-B29387) • 1 ♀, 19.3 × 24.5 mm; KARUBAR; stn CP63; 08°00'S, 132°58'E; 214–215 m depth; 1.XI.1991; MNHN-IU-2016-99 (= MNHN-B29380) • 1 ♀, 12.4 × 17.6 mm; Java; E. Sunda Strait; SJADES; stn CP7; 05°44.678'S, 104°51.151'E; 379–409 m depth; 25.III.2018; ZRC 2018.1414 • 4 ♀, 1 ovigerous ♀, 1 ♂; same data as ZRC 2019.0568 • 1 ♀, 13.9 × 19.9 mm, 1 ♀, 14.8 × 20.0 mm, 1 ♂, 12.8 × 19.1 mm, 1 ♂, 13.6 × 18.4 mm; Java; E. Sunda Strait; SJADES; stn CP8; 05°45.126'S, 104°51.080'E; 425–442 m depth; 25.III.2018; ZRC 2018.1415 • 5 ♀, 7.6 × 10.1 mm to 14.5 × 21.2 mm; same data as ZRC 2019.0569 • 5 ♀; same data as ZRC 2019.0569 • 1 ♂, 13.0 × 19.4 mm; SJADES; stn CP10; Java; E. Sunda Strait; 05°45.399'S, 104°56.098'E; 429–446 m depth; 25.III.2018; ZRC 2018.1416 • 1 ♂, 2 ♀, 10.0 × 13.8 mm, 11.9 × 16.1 mm, 1 ♂, 13.9 × 20.3 mm; SJADES; stn CP39; E. Indian Ocean; 08°15.885'S, 109°10.163'E; 528–637 m depth; 30.III.2018; ZRC 2018.1418.

Papua New Guinea • 1 ♂, 14.3 × 19.1 mm; BIOPAPUA; stn CP3570; 1.X.2010; 497–500 m depth; ZRC 2019.1029; ex MNHN-IU-2011-1469 • 1 ♂, 11.8 × 16.5 mm; BIOPAPUA; stn CP3740; 556–645 m depth; 10.X.2010; MNHN-IU-2011-2471 • 1 ♂, 13.2 × 16.4 mm; BIOPAPUA; stn CP3742; 448–470 m depth; 10.X.2010; ZRC 2019.1028; ex MNHN-IU-2011-2001 • 1 ♀, 13.9 × 11.0 mm; PAPUA NIUGNI; stn CP3970; 04°39'S, 145°52'E; 573 m depth; 4.12.2012; MNHN-IU-2013-9399 • 1 ♀, 11.0 × 11.7 mm; PAPUA NIUGNI; stn CP4033; 04°52'S, 145°53'E; 780 m depth; 16.12.2012; MNHN-IU-2013-9402 • 1 ♀, 11.8 × 16.7 mm; PAPUA NIUGNI; stn CP4042; 03°53'S, 144°40'E; 495–693 m depth; 18.XII.2012; MNHN-IU-2013-9391 • 1 ♂, 8.7 × 11.0 mm; PAPUA NIUGNI; stn CP4048; 03°20'S, 143°28'E; 325–345 m depth; 19.XII.2012; MNHN-IU-2013-9405 • 1 ♂, 6.0 × 7.4 mm; same data as MNHN-IU-2013-9405; MNHN-IU-2013-15592 • 1 ♂, 8.1 × 9.9 mm; same data as MNHN-IU-2013-9405; MNHN-IU-2013-9393.

Solomon Islands • 1 ♀, 11.7 × 15.9 mm; SALOMON 1; stn CP1747; 09°21.8'S, 159°58.7'E; 364–402 m depth; 25.IX.2001; MNHN-IU-2016-129 (= MNHN-B29394) • 1 ♀, 11.1 × 16.1 mm; SALOMON 1; stn CP1748; 09°20.4'S, 159°58.2'E; 509–522 m depth; 25.IX.2001; MNHN-IU-2016-128 (= MNHN-B29395) • 1 ♂, 5.8 × 7.5 mm; SALOMON 1; stn DW1768; 08°21.4'S, 160°41.8'E; 194–286 m depth; 28.IX.2001; MNHN-IU-2016-127 (= MNHN-B29393) • 2 ♀, 6.2 × 7.6 mm; 12.9 × 16.5 mm; SALOMON 1; stn DW1808; 09°45.5'S, 160°52.5'E; 611–636 m depth; 2.X.2001; MNHN-IU-2016-130 (= MNHN-B29396) • 1 ♀, 12.3 × 18.8 mm; SALOMON 1; stn DW1851; 10°27.6'S, 162°00'E; 297–350 m depth; 6.X.2001; MNHN-IU-2016-131 (= MNHN-B29397) • 1 ♀, 10.5 × 13.7 mm; SALOMON 1; stn CP2288; 08°36.3'S, 157°26.5'E; 509–520 m depth; 7.XI.2004; MNHN-IU-2016-133 (= MNHN-B30095) • 2 ♀, 10.9 × 14.0 mm; 13.8 × 19.2 mm; SALOMON 2; stn CP2195; 08°25.5'S, 159°26.4'E; 543–593 m depth; 24.X.2004; MNHN-IU-2016-136 (= MNHN-B30111) • 1 ovigerous ♀, 13.5 × 18.8 mm; SALOMON 2; stn 2212; 07°37.8'S, 157°41.7'E; 400–475 m depth; 26.X.2004; MNHN-IU-2016-134 (= MNHN-B30114) • 1 ♂; SALOMON 2; stn CP2213; 07°38.7'S, 157°42.9'E; 495–650 m depth; 26.X.2004; MNHN-IU-2016-138 (= MNHN-B30097) • 1 ♀, 2 ♂; SALOMON 2; stn CP2246; 07°42.6'S, 156°24.6'E; 664–682 m depth; 1.X.2004; MNHN-IU-2016-132 (= MNHN-B30109) • 1 ♂, 10.8 × 14.9 mm; SALOMON 2; stn CP2262; 07°56.4'S, 156°51.2'E; 460–487 m depth; 3.X.2004; MNHN-IU-2016-137 (= MNHN-B30112) • 1 juvenile, 6.7 × 8.3 mm; SALOMON 2; stn CP2287; 08°40.8'S, 157°24.6'E; 253–255 m depth; 6.XI.2004; MNHN-IU-2016-135 (= MNHN-B30089) • 1 ♀, cl 13.4 mm; carapace damaged; Malaita; SALOMON

BOA 3; stn CP2787; 08°31'S, 160°39'E; NW 570-885 m depth; 14.IX.2007; MNHN-IU-2010-5567 • 1 ♂, 8.3 × 9.9 mm; same data as MNHN-IU-2010-5567; MNHN-IU-2010-5568.

Vanuatu • 1 ♀, 11.9 × 16.2 mm, 2 ♂, 9.9 × 14.1 mm, 14.5 × 19.8 mm; BOA0; stn CP2304; 16°35'S, 167°59'E, 564-582 m depth; 14.XI.2004; MNHN-IU-2016-118 • 1 ovigerous ♀, 12.8 × 17.5 mm; BOA0; stn CP2313; 15°04'S, 166°55'E; 421-482 m depth; 16.XI.2004; MNHN-IU-2016-116) • 1 ♂, 10.7 × 14.0 mm; BOA0; stn CP2330; 295-890 m depth; 18.II.2004; MNHN-IU-2016-117) • 1 ♀, 11.9 × 14.8 mm; BOA1; stn CP2457, 16°16'S, 167°19'E; 630-690 m depth; 6.XII.2005; MNHN-IU-2016-115 • 2 ♀, 9.7 × 12.9 mm, 10.4 × 14.6 mm; SANTO 2006; stn AT9; W. Malo I.; 15°41.5'S, 167°01.3'E, 481 m depth; 17.IX.2006; ZRC 2008.0970 • 1 ♂, 8.0 × 10.6 mm; SANTO 2006; stn AT19; W. Malo I.; 15°41'S, 167°01'E; 503-600 m depth; 21.IX.2006; ZRC 2018.1419 • 1 juvenile female; no data; ZRC 2009.0994.

New Caledonia. 3 ♂; SMIB 6; stn DW212; 19°05.6'S, 163°30.2'E; 220-225 m depth; 2.III.1990; MNHN-IU-2016-120 (= MNHN-B29818) • 1 ♂, 13.0 × 17.6 mm; BATHUS 4; stn CP910; 18°59.32'S, 163°08.47'E; 560-608 m depth; 5.VIII.1994; MNHN-IU-2016-111 (= MNHN-B29417) • 2 ♂; BATHUS 4; stn CP911; 18°57.80'S, 163°08.47'E; 566-558 m depth; 5.VIII.1994; MNHN-IU-2016-112 (= MNHN-B29420) • 1 ♂, 6.0 × 7.3 mm; EXBODI; stn CP3788; 22°13'S, 167°07'E; 264-273 m depth; 3.IX.2011; MNHN-IU-2011-8816.

Fiji • 3 ♀, largest 11.2 × 15.6 mm; MUSORSTOM 10; stn DW1330; 17°09.5'S, 177°56.3'E; 567-699 m depth; 8.VIII.1998; MNHN-IU-2014-11513 (= MNHN-B29504) • 3 ♀, 1 ♂, 10.5 × 15.3 mm; BORDAU 1; stn DW1393; 16°45'S, 179°59'E; 426-487 m depth; 23.II.1999; MNHN-IU-2014-11531 (= MNHN-B29505) • 1 juvenile ♀, 7 ♀, largest 11.7 × 16.0 mm, 2 ♂, larger one 11.0 × 15.5 mm; BORDAU 1; stn DW1395; 16°45'S, 179°59'E; 423-500 m depth; 23.II.1999; MNHN-IU-2014-11529 (= MNHN-B29505) • 1 ♀, 2 ♂; ZRC 2019.1030; same data as MNHN-IU-2014-11529 • 1 ♂, cl 13.4 mm, carapace damaged; BORDAU 1; stn CP1401; 16°35'S, 179°41'E; 600-648 m depth; 25.II.1999; MNHN-IU-2014-11532 (= MNHN-B29506) • 1 ♂, 13.3 × 17.8 mm; BORDAU 1; stn CP1407; 16°40'S, 179°39'E, 499-527 m depth; 25.II.1999; MNHN-IU-2014-11533 (= MNHN-B29507) • 9 ♀, largest 11.1 × 15.0 mm, 4 ♂, largest 12.4 × 17.6 mm; BORDAU 1; stn DW1447; 16°45'S, 179°59'E; 420-513 m depth; 4.III.1999; MNHN-IU-2014-11530 (= MNHN-B29503) • 2 ♀, 2 ♂; ZRC 2019.1027; same data as MNHN-IU-2014-11530 • 1 ♀; BORDAU 1; stn CP1448; 16°45'S, 179°59'E; 410-500 m depth; 4.III.1999; MNHN-IU-2014-11534 (= MNHN-B29508) • 2 ♀, 1 ♂; BORDAU 1; stn DW1451; 16°45'S, 179°59'E; 400-460 m depth; 4.III.1999; MNHN-IU-2014-11535 (= MNHN-B29509) • 1 juvenile ♀, 1 ♀, cl 9.4 mm, carapace damaged; BORDAU 1; stn DW1453; 16°45'S, 179°59'E; 414-510 m depth; 4.III.1999; MNHN-IU-2014-11536 (= MNHN-B29510) • 1 ♀, 7.2 × 9.9 mm; BORDAU 1; stn DW1463; 18°10'S, 178°44'W; 300-400 m depth; 6.III.1999; MNHN-IU-2014-7671 (= MNHN-B29511) • 1 ♂; BORDAU 1; stn DW1491; 18°50'S, 178°52'W; 777-787 m depth; 11.III.1999; MNHN-IU-2014-7697 (= MNHN-B29511).

Tonga • 1 juvenile ♀; BORDAU 2; stn CP1530; 21°12'S, 174°58'W; 802-803 m depth; 3.VI.2000; MNHN-IU-2014-11538 (= MNHN-B29555) • 3 ♀; BORDAU 2; stn CP1539; 21°37'S, 175°19'W; 558-586 m depth; 4.VI.2000; MNHN-IU-2014-11539 (= MNHN-B29558) • 1 ♀, 1 ♂; BORDAU 2; stn DW1553; 20°42'S, 174°54'W; 650-676 m depth; 6.VI.2000; MNHN-IU-2014-11544 (= MNHN-B29566) • 1 ♀; BORDAU 2; stn CP1556; 20°11'S, 174°45'W; 589-591 m depth; 7.VI.2000; MNHN-IU-2014-11541 (= MNHN-B29560) • 1 juvenile ♀; BORDAU 2; stn CP1557; 20°10'S, 174°42'W; 578 m depth; 7.VI.2000; MNHN-IU-2014-11543 (= MNHN-B29563) • 8 ovigerous ♀, 4 ♀, 1 ♂; BORDAU 2; stn CP1568; 21°02'S, 175°19'W; 431 m depth; 10.VI.2000; MNHN-2014-11537 (= MNHN-B29309) • 1 ♀, 1 ♂; ZRC 2019.1031; same data as MNHN-2014-11537; 2 ovigerous ♀, largest 13.3 ×

18.0 mm, 8 ovigerous ♀, 5 ♀, 2 ♂; same data as MNHN-2014-11537; MNHN-2014-11537 (= MNHN-B29309) • 2 ovigerous ♀; BORDAU 2; stn CP1620; 24°18'S, 176°20'W; 572 m depth; 18.VI.2000; MNHN-IU-2014-11540 (= MNHN-B29559) • 1 juvenile ♀; BORDAU 2; stn CP1641; 21°09'S, 175°22'W; 395 m depth; 21.VI.2000; MNHN-IU-2014-11542 (= MNHN-B29561).

RE-DESCRIPTION

Carapace (Figs 1A, D; 2A, B, I; 3A, B; 4A, B; 5A, B; 26A-F) Quadrate, slightly wider than long (1.2 × as wide as long in holotype; Castro 2007), anterolateral borders arched; slightly convex, mostly smooth, rarely granular in large specimens, marked by slight transverse elevations in branchial regions. Front (Figs 3C, D; 4C, D; 5C) lamellar, straight, margin not marked by median notch; notch between front, inner edge of supraorbital border. Supraorbital borders sinuous, margins smooth; suborbital borders with short, rounded inner tooth, reduced in some specimens. Outer orbital angles truncated when seen dorsally; first anterolateral teeth rounded but sometimes acute, second curved, acute-tipped. Posterolateral borders arched. Subhepatic, pterygostomial regions, pterygostomial crest, pterygostomial lobe, merus, ischium of third maxilliped endopod with short, small granules. Posterior margin of epistome (Figs 2C; 3C, D; 4C, D; 5C) straight, slight median projection in some specimens; u- or v-shaped notch on each lateral margin.

Chelipeds (Figs 1A, C; 2A, F, H; 3A, F, I; 4A, F, H; 5A, H; 26A-F) and *ambulatory legs* (Figs 1A, D; 2A; 3A; 4A; 5A; 26A-F)

Chelipeds (P1) nearly equal in females and males; fingers slender, about as long or slightly shorter as propodus, with cutting edges, broadly blunt teeth; nearly all distal portion of fingers dark brown in males, half to ¾ in females (Figs 1A, C; 2A, F, H; 3A, F, I; 4A, H; 5A, H; 26A-F). “Window” (see discussion of *C. specularis* below) observed on outer surface of cheliped propodi in several males (e.g. MNHN-IU-2014-11529, 11.0 × 15.5 mm [Fig. 3I] and MNHN-IU-2016-127, 5.8 × 7.5 mm). Inner, outer (dorsal), distal margin of cheliped carpus with short, triangular to acute tooth (Figs 1A, C; 2F; 3F; 4F; 5E). P2-P5 (Figs 1A, D; 2A; 3A; 4A; 5A; 26A-F) slender, proportionally long, smooth; many short, simple setae along inner, outer margins of P5 propodus, dactylus, outer margin of P5 carpus; P5 dactylus long, slender, smooth.

Sternum, male pleon (Figs 2D; 3H; 4G), and *male gonopods* (Fig. 23A-C, E-G)

Tomentum on sternum and pleon of large individuals of both sexes. Male pleon (Figs 2D; 3H; 4G) proportionally wide, with 6 freely-movable somites plus telson; telson slightly wider than long, somite 3 covering space between P5 coxae. Somites 1, 2 slightly narrower than somite 3, thoracic sternite 8 not visible. G1 (Fig. 23A-C, E-G) straight, short, obtuse to slightly laterally pointed tip; dorsal surface with numerous minute spinules that nearly reach tip. G2 (Fig. 23D, H) slender, slightly longer than G1, slightly curved flagellum, tip with spinule at each side.

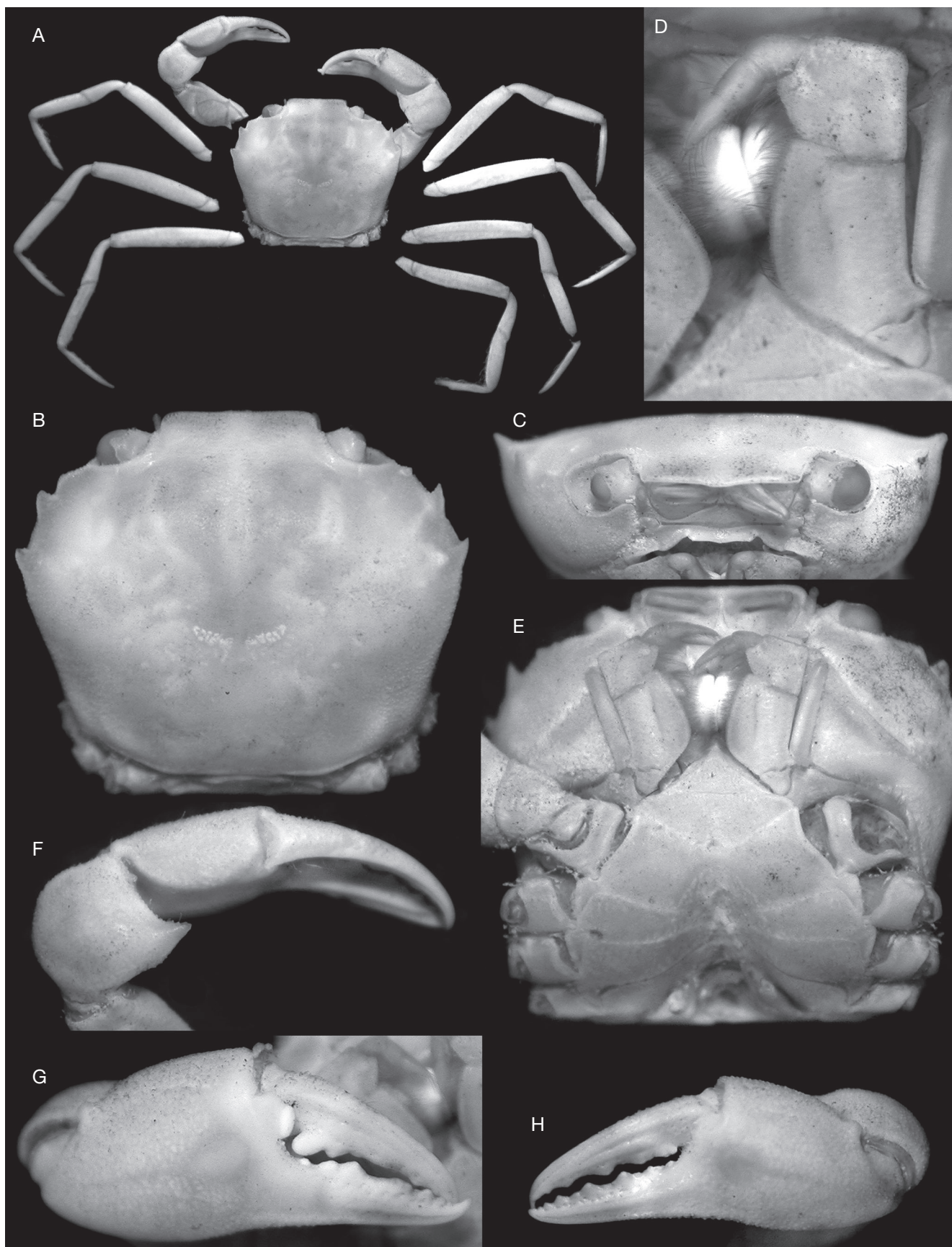


FIG. 1. — *Carcinoplax abyssicola* (Miers, 1885), holotype ♂ (8.2 × 10.0 mm) (NHM 84.31), Fiji: **A**, overall habitus; **B**, dorsal view of carapace; **C**, frontal view of cephalothorax; **D**, left third maxilliped; **E**, thoracic sternum and third maxillipeds; **F**, dorsal view of left cheliped; **G**, outer view of right chela; **H**, outer view of left chela.

Female pleon (Fig. 5F) and vulva (Fig. 5G)

Female pleon (Fig. 5F) wide; telson slightly wider than long. Somites 1, 2 covering space between P5 coxae, thoracic sternite 8 not visible. Vulva of mature females (Fig. 5G) extending from edge of suture 5/6 to suture 6/7; membrane covering aperture leaving space open along pointed anterior margin.

COLOUR IN LIFE. — Carapace and chelipeds light to bright orange; legs white with broad orange band across middle (Fig. 26A-F).

GEOGRAPHICAL DISTRIBUTION. — Indonesia (Kai Is and southern Java), Papua New Guinea, Solomon Islands, Vanuatu, New Caledonia, Fiji, and Tonga.

DEPTH. — Present in samples collected at depths of 194–890 m.

REMARKS

The taxonomy of *C. abyssicola*, *C. longipes*, and *C. verdensis* has been confused mainly because of a shortage of specimens, as well as having type specimens that are small or females. It has been made more difficult because these species sometimes overlap in distribution, with *C. abyssicola* and *C. longipes* now known to co-occur in southern Java.

Carcinoplax abyssicola has been a problematic species because it was described from only one small male (8.2 × 10.0 mm, NHM 84.31), and its affinities with allied taxa have been far from clear. Guinot (1989) and Castro (2007) examined the holotype male and the present study confirms the specimens from Fiji, Papua New Guinea, Solomon Islands, Vanuatu, New Caledonia, Tonga and Indonesia (Kai Is and southern Java) are conspecific with the type. The anterolateral armature varies to some degree; the holotype has a small first tooth on the right side while that on the left side is missing (Fig. 1B). A male (10.5 × 15.3 mm, MNHN-IU-2014-11531) also has an acute right tooth but an obtuse left tooth (Fig. 2I). The holotype specimen no longer has the male pleon and the gonopods are not in the bottle. The G1 and G2 of the holotype, however, were sketched by the second author in 2004. Their morphology agrees with the gonopods drawn here (Fig. 23A–C, E–G), except that the tip of the G1 appears slightly longer. It, however, falls within the variation observed in the species.

The description by Miers (1886: 228) agrees with the material at hand but the diagnostic details in the description are scant. We are therefore re-describing the species in order to include a good number of diagnostic characters not included in the original description. No mention was made of the notch at the lateral borders of the front as well as details on the morphology of the epistome and the gonopods. Miers' figures clearly show the small granules along the anterior portion of the ventral surface of the carapace, which are diagnostic for the species (Miers 1886: pl. 19, fig. 2a; Fig. 1B, C), and the fingers of the male holotype were black along their distal two-thirds (Miers 1886: pl. 19, fig. 2b; Fig. 1A, C) (now faded in the type specimen; Fig. 1G, H).

With only one specimen at that time, Guinot (1989) accepted the validity of *C. abyssicola* and indicated that it was close to *C. longipes*. Castro (2007) commented on the similarities between the holotype of *C. abyssicola* and specimens

of *C. specularis* s.l., a species in which he included two species now being resurrected. He found that the main difference between the two species was the truncated and posteriorly inclined outer orbital angles of the holotype of *C. abyssicola*, a condition that is visible in the illustrations of the holotype by Guinot (1989: fig. 38; pl. 9, figs A, B).

Although we are now able to separate *C. specularis* s. str. (and the allied *C. adelphia* n. sp.) from the other species previously included under it (see Remarks for this species), the taxonomic history of *C. abyssicola*, *C. longipes*, and *C. verdensis* is confusing and is best discussed together here.

The presence of a good series of fresh specimens of *C. abyssicola* and *C. longipes* in the deep waters of southern Java is significant as it allows us to compare them directly. They are most easily distinguished by the proportions of their legs, which in *C. longipes* are distinctly longer (Figs 6A; 7A; 8A; 9A; 27A–C), especially the meri. The ambulatory meri of *C. abyssicola* are relatively shorter and stouter (Figs 1A, E; 2A; 3A; 4A; 5A; 26A–F). Another obvious difference, which can vary occasionally, is the armature of the anterolateral margin (not including the external orbital tooth). The anterolateral teeth of *C. abyssicola*, especially the first one, are more obtusely triangular in adults (Figs 1E; 2B, I; 3B; 4B; 5B). In *C. longipes*, the teeth are acutely triangular, appearing almost spiniform, and are spaced further apart as a result (Figs 6B; 7B; 8B; 9B). The structure of the posterior margin of the epistome is also useful to separate the two species in most cases; in *C. abyssicola*, the median truncated lobe is separated from the lateral margins by a relatively shallower and narrower cleft (Figs 2C; 3D; 4F; 5C) but this cleft is deeper and wider in *C. longipes* (Figs 5C; 6C; 7D; 8D). The structures of their G1 are superficially similar but the general structure is proportionately shorter and more slender, especially on the basal part (Fig. 23A, E) in *C. abyssicola*, whereas the G1 is more elongated and the basal part is relatively broader and more truncated in *C. longipes* (Fig. 23I).

The two species differ in their colour in life. *Carcinoplax abyssicola* is a distinct orange (Fig. 26A–F), with larger specimens dull or dark orange. The legs are white with a broad orange band across middle portions. In contrast, the overall colour in *C. longipes* is a faded yellowish-orange with the legs more uniformly coloured (Fig. 27A–C).

Carcinoplax abyssicola and *C. longipes* are both superficially similar to *C. verdensis* in the shape of their carapaces and the relatively more elongated legs, but *C. verdensis* can usually be distinguished by several clear features. The inner distal tooth of the carpus of the cheliped in *C. verdensis* is usually elongated, with the distal half sharply tapering to an acute spine in both sexes and usually even in subadults (Figs 14F; 15E). The inner distal tooth of the carpal spine is always more obtuse and the distal part is never spiniform in *C. abyssicola* (Figs 2E; 3G; 4F, 5E) and *C. longipes* (Figs 6E; 7F; 8F; 9E). The carpal spine of Miers' drawing of the holotype of *C. abyssicola* is nevertheless spiniform (Fig. 1C), but obtuse in Guinot's photograph of the holotype (Fig. 1E). Some specimens of *C. verdensis* from the Philippine and South China seas, however, have relatively

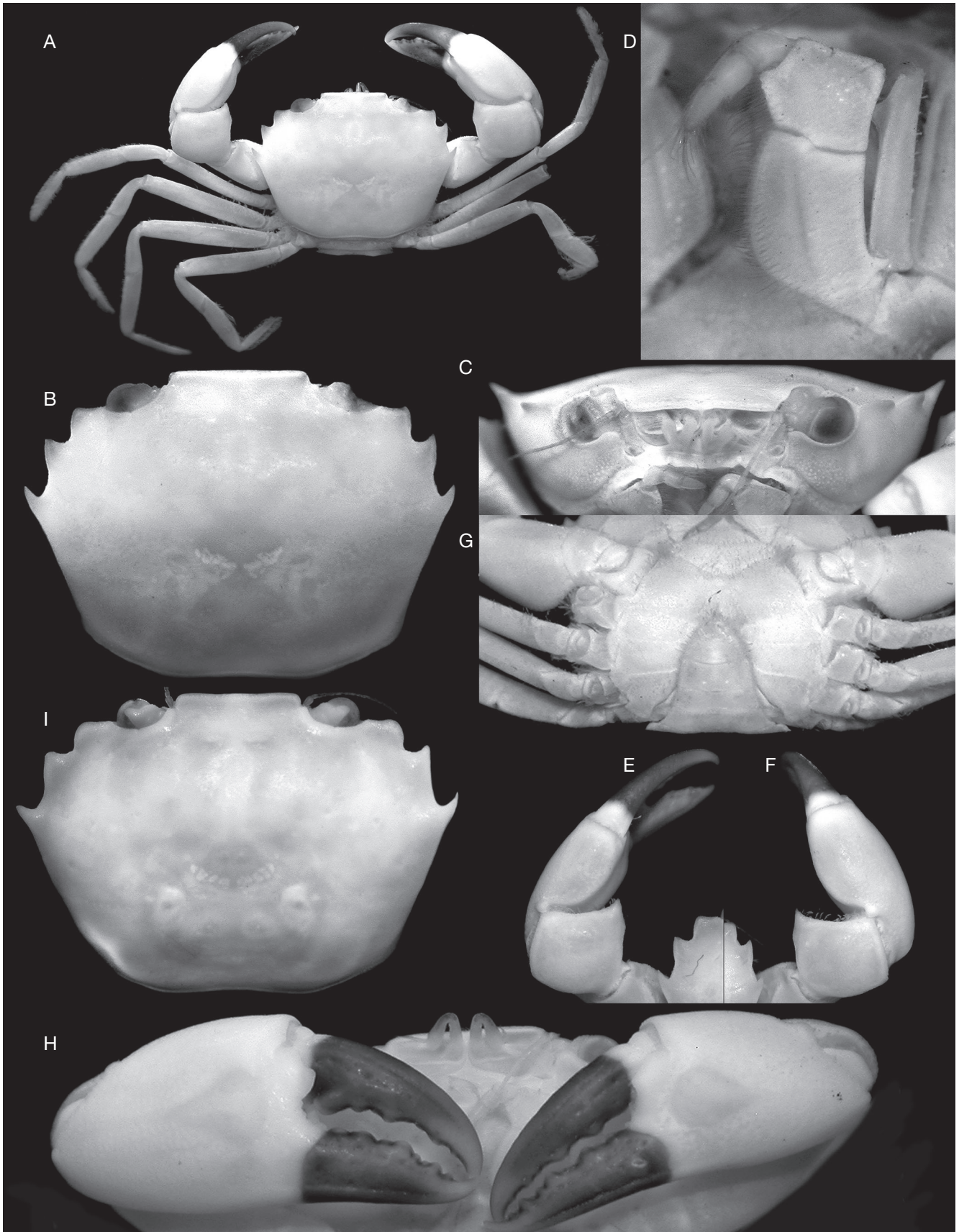


FIG. 2. — *Carcinoplax abyssicola* (Miers, 1885): **A–H**, ♂ (8.0 × 10.4 mm) (MNHN-IU-2014-11535), Fiji; **I**, ♂ (10.5 × 15.3 mm) (MNHN-IU-2014-11531), Fiji; **A**, overall habitus; **B**, **I**, dorsal view of carapace; **C**, frontal view of cephalothorax; **D**, left third maxilliped; **E**, dorsal view of left cheliped; **F**, dorsal view of right cheliped; **G**, thoracic sternum and pleon; **H**, outer view of chelae.

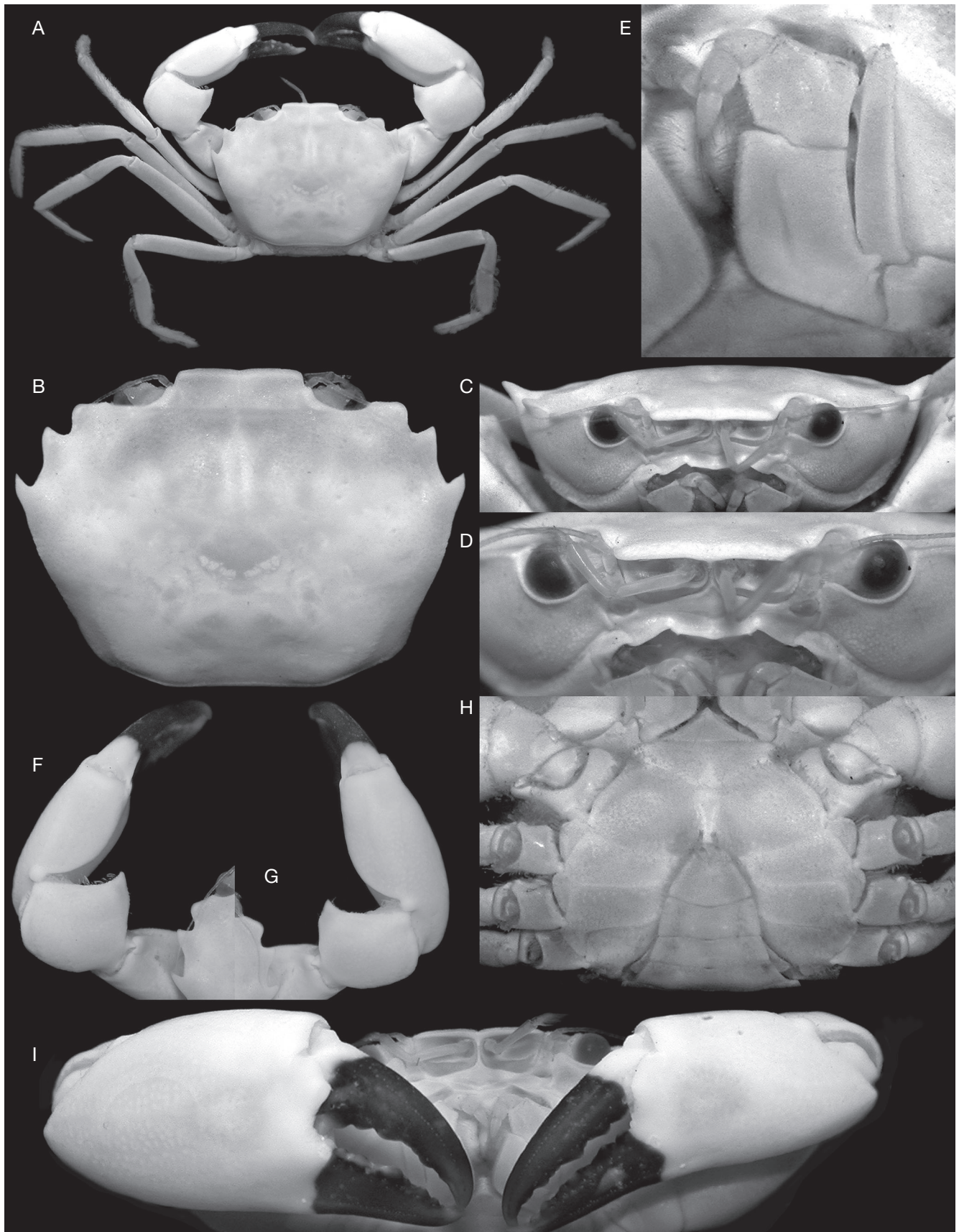


FIG. 3. — *Carcinoplax abyssicola* (Miers, 1885), ♂ (11.0 × 15.5 mm) (MNHN-IU-2014-11529), Fiji: **A**, overall habitus; **B**, dorsal view of carapace; **C**, frontal view of cephalothorax; **D**, posterior margin of epistome; **E**, left third maxilliped; **F**, dorsal view of left cheliped; **G**, dorsal view of right cheliped; **H**, thoracic sternum and pleon; **I**, outer view of chelae.

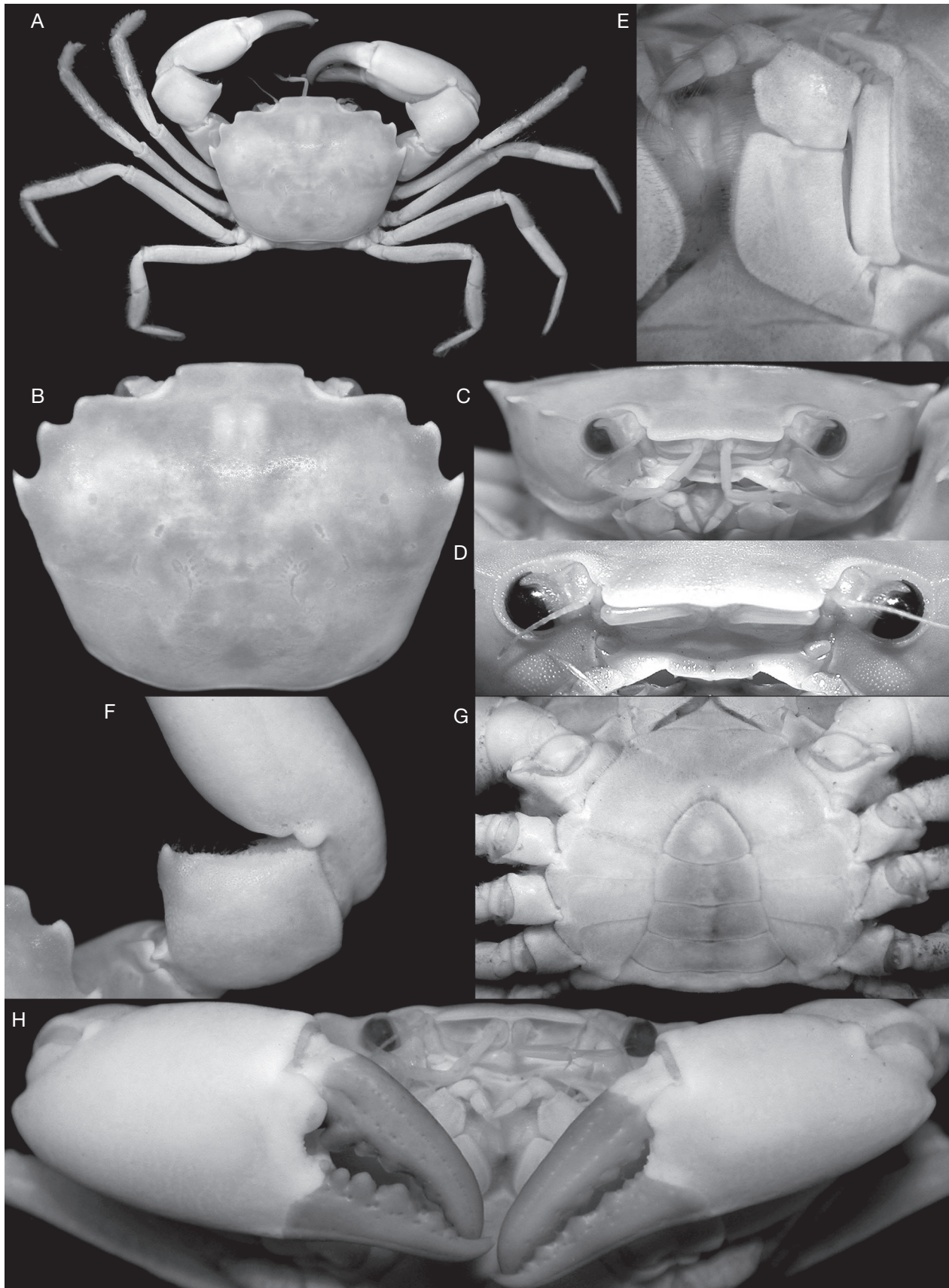


FIG. 4. — *Carcinoplax abyssicola* (Miers, 1885), ♂ (13.6 × 18.4 mm) (ZRC 2018.1415), Indonesia: **A**, overall habitus; **B**, dorsal view of carapace; **C**, frontal view of cephalothorax; **D**, posterior margin of epistome; **E**, left third maxilliped; **F**, dorsal view of carpus of right cheliped; **G**, thoracic sternum and pleon; **H**, outer view of chelae.

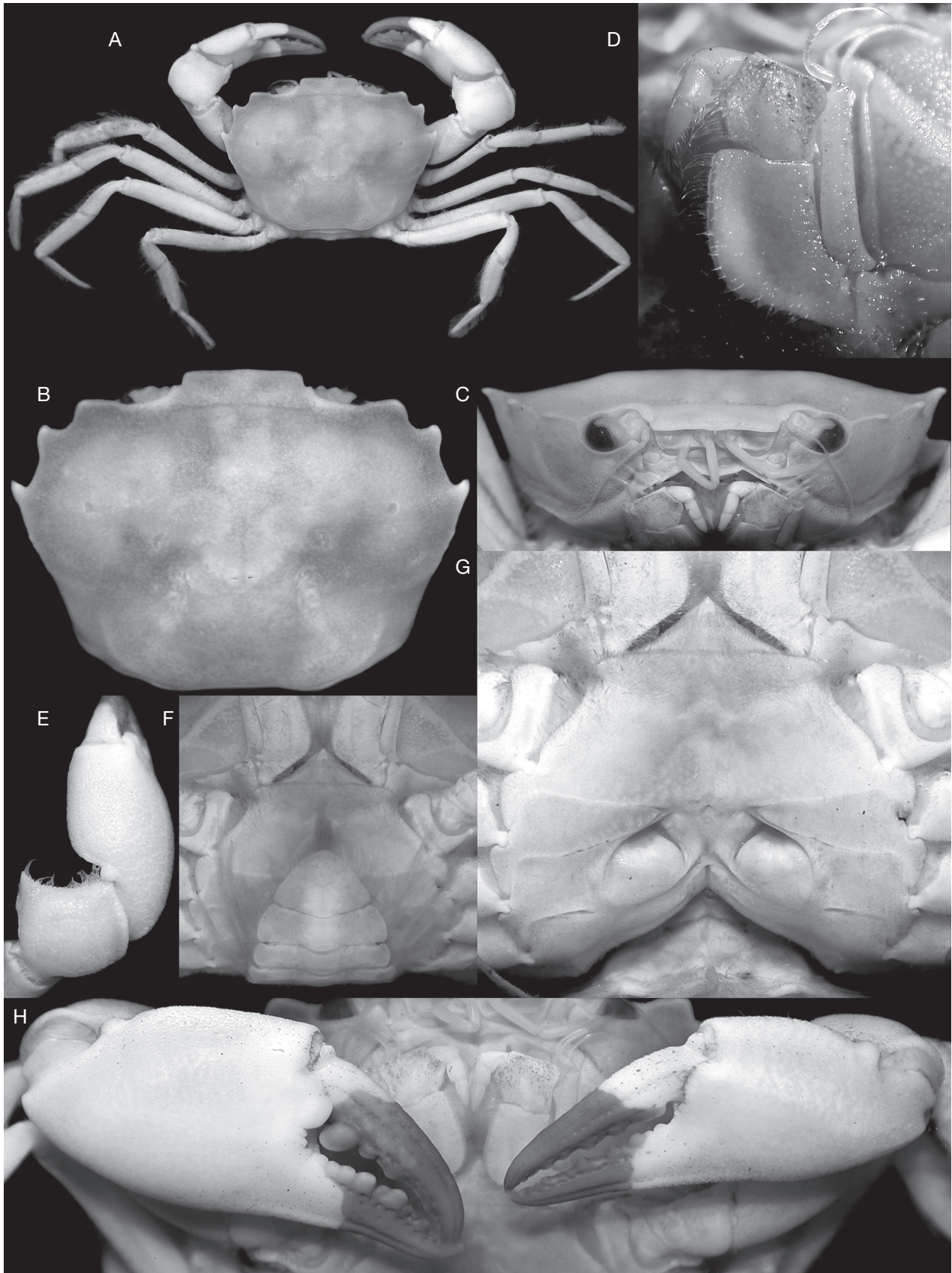


FIG. 5. — *Carcinoplax abyssicola* (Miers, 1885), ♀ (14.8 × 20.0 mm) (ZRC 2018.1415), Indonesia: **A**, overall habitus; **B**, dorsal view of carapace; **C**, frontal view of cephalothorax; **D**, left third maxilliped; **E**, dorsal view of carpus of right cheliped; **F**, thoracic sternum and pleon; **G**, sternopleonal cavity and vulvae; **H**, outer view of chelae.

less elongated carpal spines (Fig. 13F); so this character is not always reliable. The ambulatory meri of *C. verdensis* is usually elongated and slender (Figs 13A; 14A; 15A) like in *C. longipes* (Figs 6A; 7A; 8A), but the ambulatory merus appears relatively shorter in a few specimens (Fig. 9A), although it is still longer than those of adult *C. abyssicola* (Figs 1A, E; 2A; 3A; 4A; 5A). The structure of the posterior margin of the epistome of *C. verdensis* resembles that of *C. abyssicola*, with the truncated median lobe separated from the lateral margins by a relatively deep cleft (Figs 2C, D; 4D; 5C for *C. abyssicola*; Figs 6C; 7D; 8D; 9C for *C. longipes*). *Carcinoplax verdensis* more closely resembles *C. longipes* in the shape of their anterolateral teeth, with the spines typically more acute and spiniform (Figs 6B; 7B; 8B; 9B for *C. longipes*; Figs 13B; 14B; 15B for *C. verdensis*). There are, however, several specimens that have more obtuse teeth (Fig. 13B), demonstrating that the shape of anterolateral teeth is not always a reliable character among these and other species of *Carcinoplax*.

Two characters, however, seem constant for *C. verdensis* and support our view that this is a distinct species. The fingers of the chelipeds in adult *C. verdensis* of both sexes are dark brown or almost black only along the distal two-thirds to half of the fingers (Figs 13I, J; 14H; 15A); whereas in *C. abyssicola* and *C. longipes*, almost the entire length of the fingers in adults is pigmented (Figs 1C; 2F, H; 3F, I; 4H; 5H for *C. abyssicola*; Figs 6A; 7A; 8H; 9H for *C. longipes*). While the G1 of *C. verdensis* is similar to that of *C. abyssicola*, being relatively shorter and less broad basally, the distal part in *C. verdensis* is always directed obliquely outwards (Fig. 24A-C), whereas the distal part is more truncated and the tip is directed laterally in *C. abyssicola* (Fig. 23A-C, E-G).

Additional support on the distinct nature of *C. abyssicola* has been provided by preliminary data based on the barcode region of the cytochrome oxidase I (COI) gene (L. Corbari, unpublished data) as well as *C. abyssicola* and the remaining species treated here (L. M. Tsang, unpublished data).

On the basis of the figures of the specimens, and in particular the structures of the G1, it is clear that the material referred to as '*Carcinoplax* aff. *longipes*' by Guinot (1989) (Fig. 24E, G) belongs to *C. verdensis* as presently defined.

The known geographical distributions of the four species being discussed are relatively distinct. *Carcinoplax abyssicola* so far is known from the western Pacific, from southeastern Moluccas and southern Java in Indonesia to Tonga (see above) as well as in the easternmost part of the Indian Ocean. *Carcinoplax longipes* is known only from the Indian Ocean, although it occurs in the same area as *C. abyssicola* in southern Java. The two species, however, seem to have different habitats and were only collected together from one station (out of 10 stations) in Java. *Carcinoplax verdensis* is known for certain only from Japan, Taiwan, Philippines, and South China Sea (see below). *Carcinoplax fasciata* is so far known from the Arabian Sea off the coast of Kerala, India. *Carcinoplax abyssicola* and the species treated here so far extend east as far as Tonga. The only species of *Carcinoplax* east of Tonga are two small-size species, *C. velutina* Castro, 2007 and *C. uncinata* Castro, 2009 both known from French Polynesia. *Carcinoplax velutina* is also

found in Vanuatu, New Caledonia, and Fiji (Castro 2007); *C. uncinata* in New Caledonia and Solomon Islands (Castro 2009). *Carcinoplax uncinata* is herein recorded from French Polynesia for the first time (male 8.8 × 11.4 mm, TARASOC; stn CP3376, Tuamotu Archipelago, 15°41'S, 146°54'W, 646–737 m depth; 10.V.2009, MNHN-IU-2011-5233).

The depth distribution is similar in all three species. Specimens of *C. abyssicola* and *C. longipes* were taken at maximum depths of 890 m and 870 m, respectively, but one specimen of *C. verdensis* was recorded at 2149 m, which is likely to be in error.

Individuals of *C. abyssicola* and *C. verdensis* appear to be larger in size (largest specimens measured reaching 19.3 mm CL and 19.2 mm CL, respectively) than those of *C. longipes* (largest specimen measured 10.8 mm CL). Of the six species being treated here, *C. polita* is characterised by having the largest measured individuals, with one specimen 25.9 mm CL.

Specimens collected by the Siboga Expedition from Indonesia and identified as *C. abyssicola* by Tesch (1918) could not be found in the ZMA, where all other Siboga gonoplacids were originally deposited. This record is provisionally recognised as correct as the species is known from that area.

Guinot (1989: 307) commented that in the form of the carapace and anterolateral teeth, *C. abyssicola* was closest to *C. verdensis*, but differed in having the teeth more spiniform and the chelae being short and globose. While this difference is usually valid for the structure of the anterolateral teeth, the form of the chela varies with size and sex and it is not a reliable character. As discussed earlier, the two species, however, differ in other characters.

Carcinoplax longipes

(Wood-Mason in Wood-Mason & Alcock, 1891)
(Figs 6A-G; 7A-I; 8A-H; 9A-H; 23I-L; 27A-C)

Nectopanope longipes Wood-Mason in Wood-Mason & Alcock, 1891: 262 [type locality: Andaman Sea].

Nectopanope longipes – Alcock & Anderson 1895: pl. 14, fig. 7 [Andaman Sea].

Carcinoplax longipes – Alcock 1899: 71; 1900: 302 [in key], 303 [southern India, Andaman Sea]. — Alcock & Anderson 1899: 5 [in list]. — Doflein 1904: 117, 306 [Andaman Sea]. — Tesch 1918: 154 [in list]. — Serène 1968: 90 [in list]. — Sakai 1969: 270 [in list]. — Serène & Lohavanijaya 1973: 63, 765, 68, pl. 14, fig. D [Indian material]. — Guinot 1989: 303 [India], fig. 26, pl. 10, figs A-C [Andaman Sea]. — Chen 1998: 266 [in key]. — Ng *et al.* 2008: 80 [in list]

Carcinoplax longipes [part] – Castro 2007: 636 [Laccadive Sea].

Pilumnoplax longipes – Miers 1886: 226 [in list].

Not *Carcinoplax longipes* – Sakai 1976: 524 [in key], 527, fig. 281 [Japan] (= *C. specularis* Rathbun, 1914).

Not *Carcinoplax longipes* – Miyake 1991: 220 [in list] [Japan]. — Takeda *et al.* 2006: 204 [in list] [Japan]. — Takeda & Yaganisawa 1985: 61 [in list] [Japan] (?*C. specularis* Rathbun, 1914 or *C. verdensis* Rathbun, 1914).

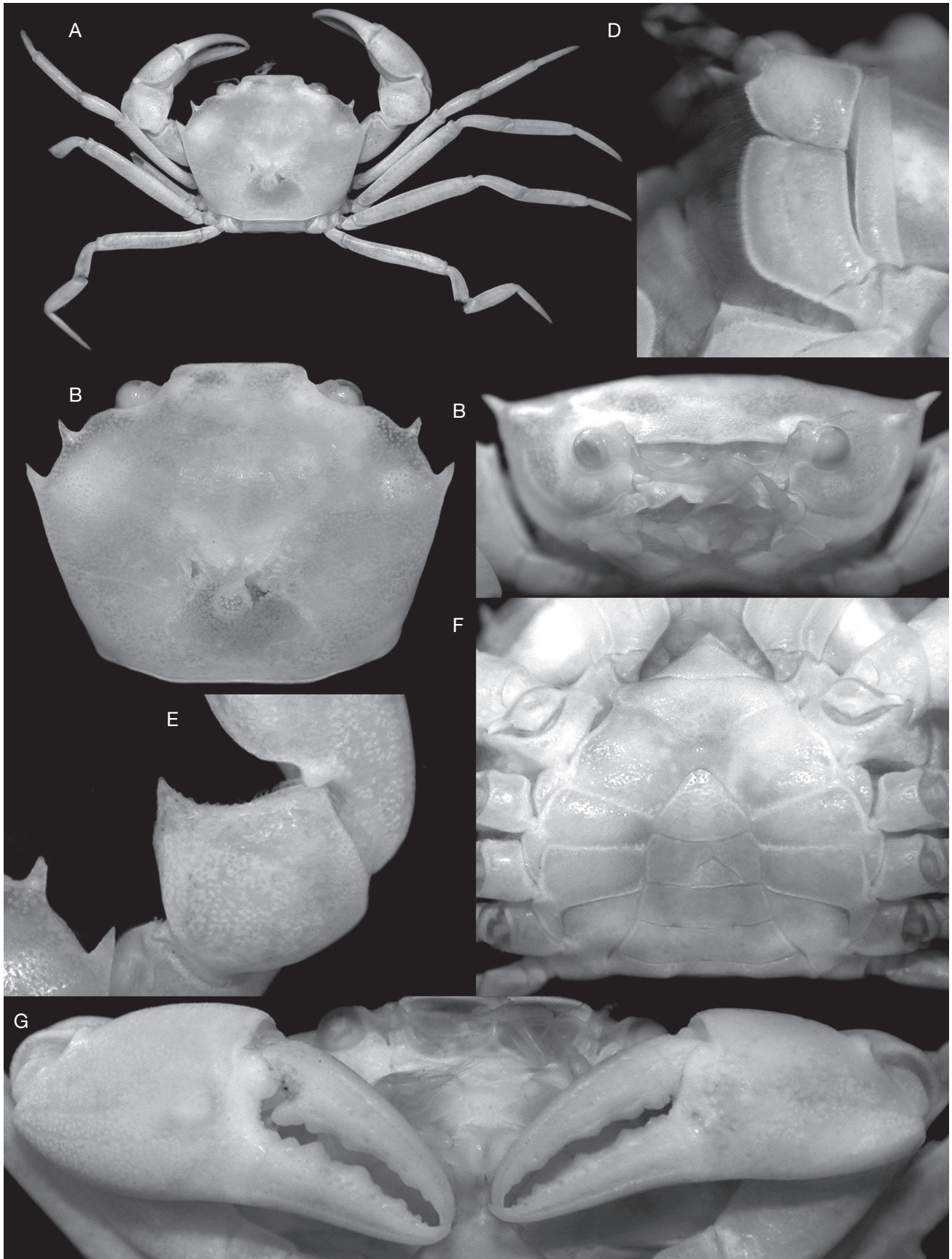


FIG. 6. — *Carcinoplax longipes* (Wood-Mason, 1891), ♂ (8.5 × 11.4 mm) (USNM 46291), India: **A**, overall habitus; **B**, dorsal view of carapace; **C**, frontal view of cephalothorax; **D**, left third maxilliped; **E**, dorsal view of carpus of right cheliped; **F**, thoracic sternum and pleon; **G**, outer view of chelae.

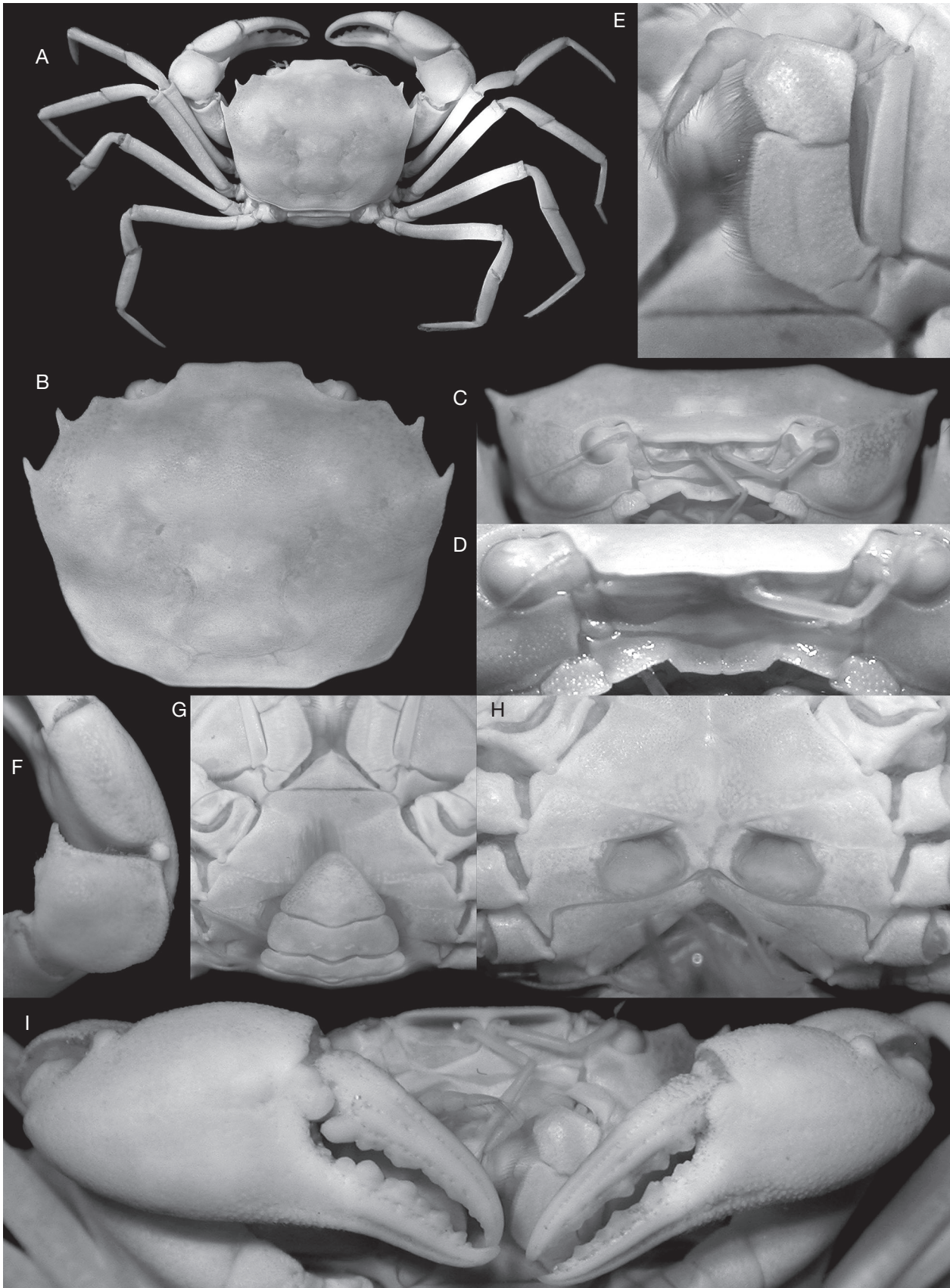


FIG. 7. — *Carcinoplax longipes* (Wood-Mason, 1891), ♀ (11.9 × 15.1 mm) (USNM 46291), India: **A**, overall habitus; **B**, dorsal view of carapace; **C**, frontal view of cephalothorax; **D**, posterior margin of epistome; **E**, left third maxilliped; **F**, dorsal view of carpus of right cheliped; **G**, thoracic sternum and pleon; **H**, sternopleonal cavity and vulvae; **I**, outer view of chelae.

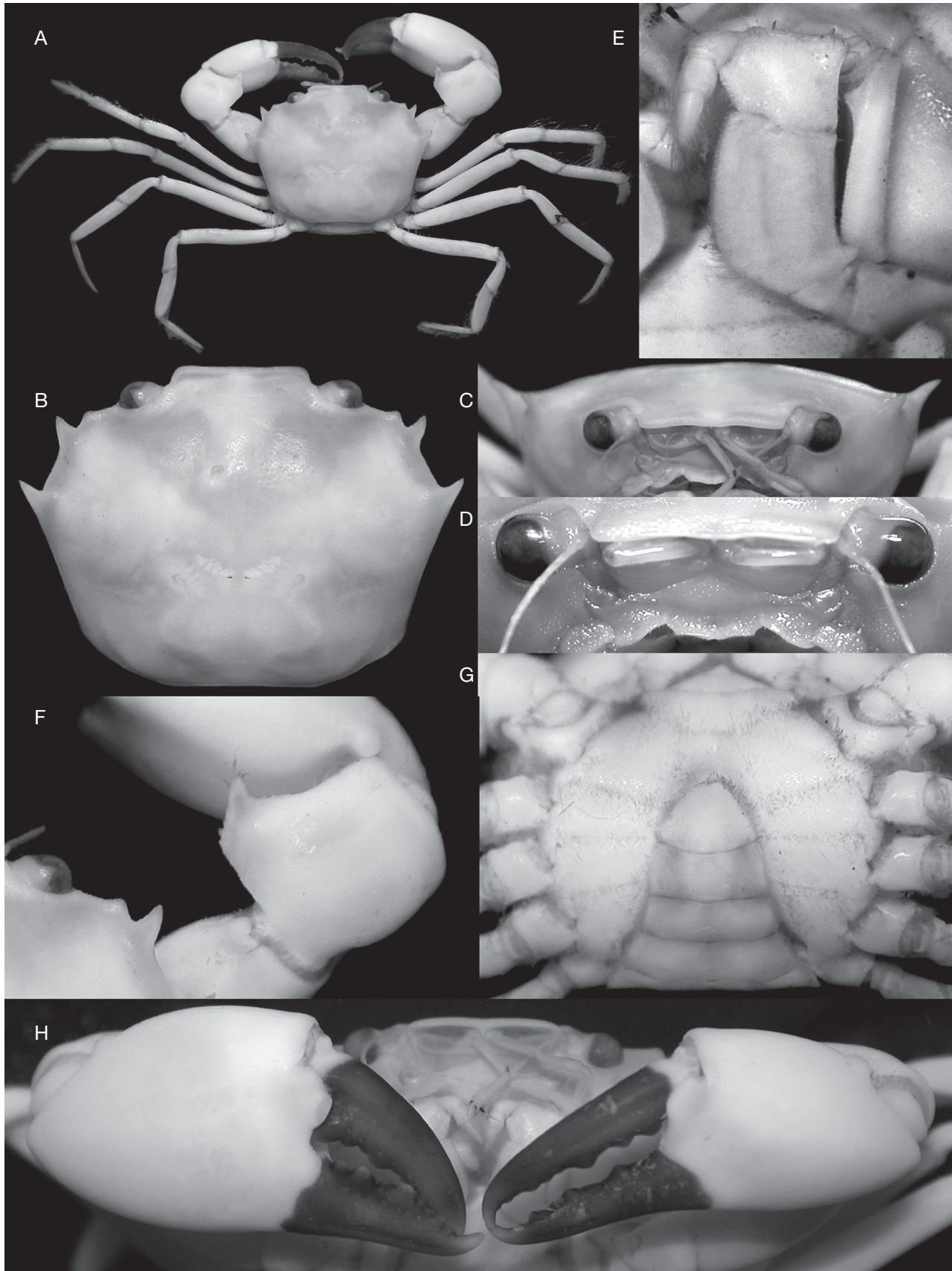


FIG. 8. — *Carcinoplax longipes* (Wood-Mason, 1891) ♂ (9.9 × 13.9 mm) (ZRC 2018.1424), Indonesia: **A**, overall habitus; **B**, dorsal view of carapace; **C**, frontal view of cephalothorax; **D**, posterior margin of epistome; **E**, left third maxilliped; **F**, dorsal view of carpus of right cheliped; **G**, thoracic sternum and pleon; **H**, outer view of chelae.

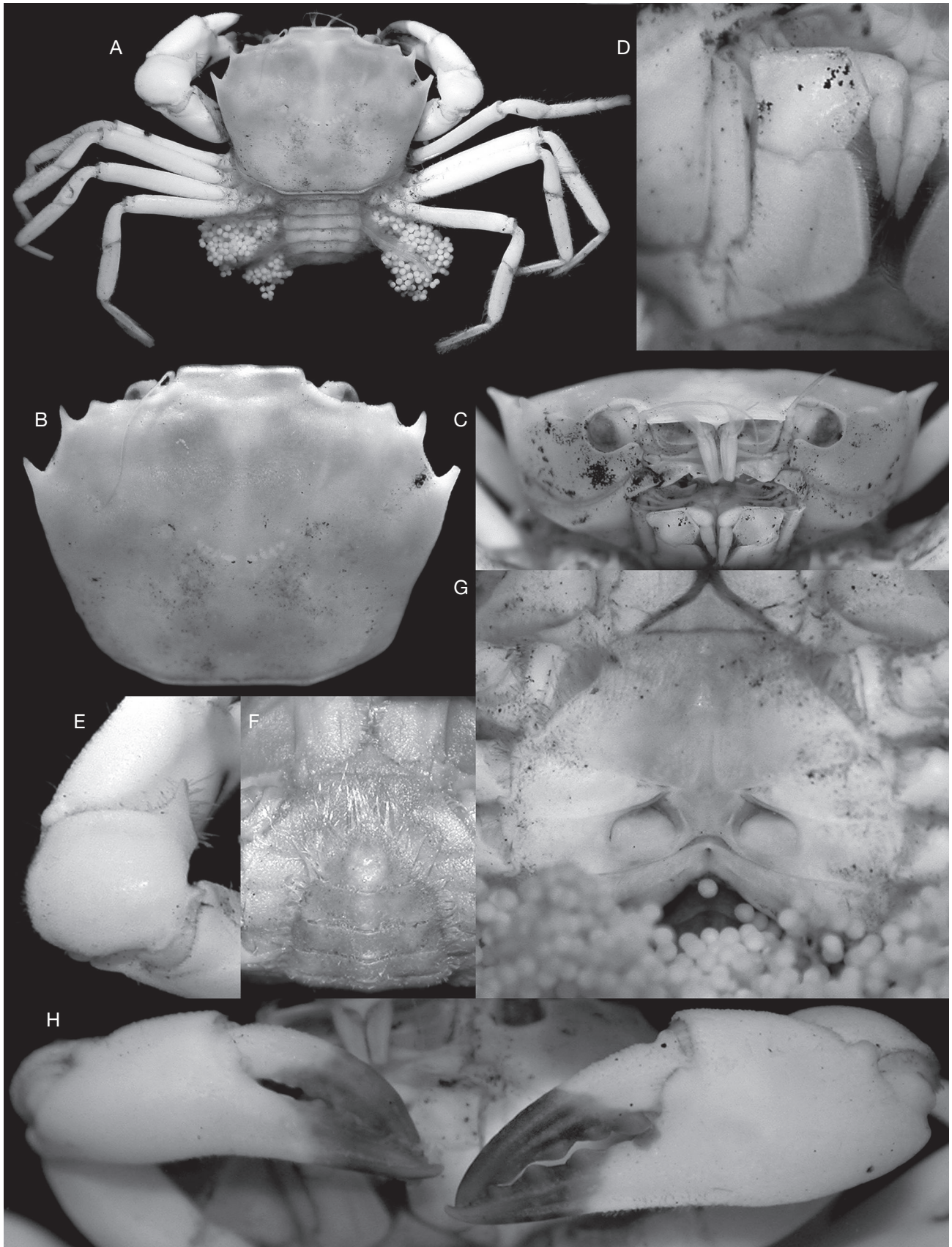


FIG. 9. — *Carcinoplax longipes* (Wood-Mason, 1891): **A–E, G, H**, ovigerous ♀ (10.8 × 14.3 mm) (ZRC 2018.1424), Indonesia; **F**, ♀ (9.9 × 12.9 mm) (ZRC 2018.1424), Indonesia. **A**, overall habitus; **B**, dorsal view of carapace; **C**, frontal view of cephalothorax; **D**, right third maxilliped; **E**, dorsal view of carpus of right cheliped; **F**, thoracic sternum and pleon; **G**, sternopleonal cavity and vulvae; **H**, outer view of chelae.

Not *Carcinoplax longipes* – Chen 1984: 189 [in key], 195, 197, fig. 6 [East China Sea]. — Ikeda 1998: 15, 42, 135, pl. 55 [Japan] (= *C. verdensis* Rathbun, 1914).

TYPE MATERIAL. — **Syntypes**. Andaman Sea. ♂ (8.5 × 11.7 mm), juvenile female from *Investigator*, stn 56, deposited at Zoological Survey of India, Kolkata.

TYPE LOCALITY. — Andaman Sea, 403–439 m.

DIAGNOSIS. — Carapace (Figs 6A, B; 7A, B; 8A, B; 9A, B) quadrate, slightly wider than long (1.3 × wider than long in two topotypes); slightly convex, smooth. Front (Figs 6C; 7C, D; 8C, D; 9C) slightly sinuous, notch between front, inner edge of supraorbital border absent. Truncated or short triangular tooth on outer orbital angle; two slender, acute-tipped, curved anterolateral teeth on each side of carapace. Short granules on subhepatic, pterygostomial regions (Fig. 7C, D), becoming more pronounced in pterygostomial crest, ridge. Posterior margin of epistome (Figs 6C; 7C, D; 8C, D; 9C) short, straight, deep u- or v-shaped notch on each lateral margin. Nearly all distal portion of fingers dark brown in males, about half in females (Figs 8H; 9H; 27A–C). “Window” not observed on outer surface of cheliped propodus. Inner (ventral), distal margin of cheliped carpus (Figs 5E; 6E; 7F; 8F; 9E) with triangular, acute tipped tooth. P2–P5 (Figs 6A; 7A; 8A; 9A; 26A–C) long, slender. Male pleon (Figs 6F; 8G) proportionally wide. G1 (Fig. 23I, J, K) slender; pointed tip with scattered spinules; G2 (Fig. 23L) slender, slightly longer than G1, slightly curved flagellum, tip with two lateral spinules.

MATERIAL EXAMINED. — **India** • 1 ♀, 10.8 × 14.9 mm, 1 ♂, 8.6 × 11.0 mm; off Travancore coast; *Investigator*; USNM 4691.

Indonesia • 1 ovigerous ♀, 10.8 × 14.3 mm; SJADES; stn CP22, E. Sunda Strait, Java, 06°46.458'S, 105°07.068'E; 864–870 m depth; 27.III.2018; ZRC 2018.1420 • 1 ♂, 8.3 × 9.9 mm; SJADES; stn CP23; E. Sunda Strait, Java, 06°46.739'S, 105°09.239'E; 559–571 m depth; 27.III.2018; ZRC 2018.1421 • 1 ♂, 9.0 × 12.4 mm; SJADES; stn CP33, E. Indian Ocean south of Java; 07°42.912'S, 107°36.559'E; 312–525 m depth; 29.III.2018; ZRC 2018.1422 • 1 ovigerous ♀, cl 8.5 mm, carapace damaged, 1 ♂, 7.9 × 10.5 mm; SJADES; stn CP35, E. Indian Ocean; 07°47.677'S, 107°41.904'E; 603–686 m depth; 29.III.2018; ZRC 2018.1423 • 4 ovigerous ♀, 6.2 × 8.0 mm to 7.7 × 9.5 mm, 12 ♂, 7.3 × 9.4 mm to 9.9 × 13.9 mm; SJADES; stn CP39, E. Indian Ocean; 08°15.885'S, 109°10.163'E; 528–637 m depth; 31.III.2018; ZRC 2018.1424 • 1 juvenile ♀, 6.0 × 7.8 mm; SJADES; stn DW46, E. Indian Ocean; 07°47.716'S, 107°44.896'E; 540–654 m depth; 1.IV.2018 • 2 ovigerous ♀, 7.6 × 9.6 mm, 6.7 × 8.1 mm; SJADES; stn CP47, E. Indian Ocean; 07°47.972'S, 107°45.298'E; 476–530 m depth; 1.IV.2018; MZB • 1 ♂, 7.9 × 9.9 mm; SJADES; stn CP48, E. Indian Ocean; 07°51.120'S, 107°46.245'E; 637–689 m depth; 1.IV.2018; MZB • 2 ♀, 2 ovigerous ♀, 2 ♂, larger one 9.5 × 12.9 mm; stn CP51, E. Indian Ocean; 07°04.874'S, 106°25.396'E; 569–657 m depth; 2.IV.2018; ZRC 2018.1427 • 1 ♀, 1 ovigerous ♀, 1 ♂, 10.8 × 14.4 mm; same data as ZRC 2018.1427; MZB.

COLOUR IN LIFE. — Faded yellowish orange to orange brown (Fig. 27A–C).

GEOGRAPHICAL DISTRIBUTION. — Andaman Sea and Indian Ocean south of Java.

DEPTH. — Present in samples collected at depths of 312–870 m.

REMARKS

See Remarks for *C. abyssicola*.

Wood-Mason (*in* Wood-Mason & Alcock 1891) described *Nectopanope longipes* on the basis of a male and a juvenile female from station 56 from a depth of 220–240 fathoms

(= 402–439 m). He provided measurements for one specimen (8.5 × 11.7 mm) but did not indicate which one it was, although it is probably the male as this is the adult size for this species. He did not indicate where the site was but the data in Anonymous (1914) indicate that station 56 was between North and South Sentinel I. in the Andamans and was collected between 24 and 25 April 1889. Both specimens are therefore syntypes. Alcock (1900) listed 20 specimens from Andamans and off Travancore.

Serène & Lohavanijaya (1973: pl. 14, fig. D) figured a male “cotype” measuring 10.0 × 12.0 mm deposited at the Zoological Survey of India, Kolkata, but they did not indicate where or from which station it was from. It is not possible to be sure if it is part of the syntype series and/or if the different measurements (original size was given as 8.5 × 11.7 mm) are due merely to them being differently measured. The *Investigator* specimens we examined (USNM 4691) and those reported by Castro (2007) are all from Travancore and as such, cannot be part of the type series.

Ikeda (1998: 135) recorded a male (16.0 × 22.0 mm) and a female (17.7 × 25.0 mm) “*Carcinoplax longipes*” from 250–300 m depth in Sagami Bay, Japan. Both specimens agree well with what is here identified as *C. verdensis* s. str. The figure of a fresh specimen (Ikeda 1998: pl. 55, fig. 1) also agrees well with the fresh colours of *C. verdensis* we have observed in specimens from the Philippines (Fig. 28A–F). On the basis of this, as well as on biogeography, it is also likely that the material listed as “*C. longipes*” from Japan by Miyake (1991: 220), Takeda *et al.* (2006: 204) and Takeda & Yaganisawa (1985: 61) also belong to *C. verdensis* as presently defined. Both these species have proportionately longer ambulatory legs than *C. abyssicola*.

The name *Nectopanope longipes* was actually first used in Anonymous (1891: 56) but both these taxa are *nomina nuda*. Wood-Mason (*in* Wood-Mason & Alcock 1891) validated the names and included *N. rhodobaphes* as a second new species. Huys *et al.* (2014) clarified the nomenclature of these species, and argued that *Nectopanope rhodobaphes* is the type species of *Nectopanope* Wood-Mason *in* Wood-Mason & Alcock, 1891. Alcock (1898, 1899) later treated *N. longipes* as a species of *Carcinoplax*. *Nectopanope* is now regarded as a member of the Euryplacidae Stimpson, 1871 *sensu* Castro & Ng (2010) (see Ng *et al.* 2019).

Carcinoplax specularis Rathbun, 1914 (Figs 10A–H; 11A–I; 12A–I; 25A–E; 27D)

Carcinoplax specularis Rathbun, 1914: 143 [Philippines].

Carcinoplax specularis – Serène 1968: 90 [in list]. — Sakai 1969: 270, fig. 15c [holotype]. — Takeda & Yaganisawa 1985: 61 [in list] [Japan]. — Guinot 1989: 296, figs 25, 34; pl. 8, figs A–D [holotype] [Philippines]. — Ho *et al.* 2004: 659, fig. 6F (colour) [Taiwan]. — Ng *et al.* 2008: 80 [in list].

?*Carcinoplax specularis* – Serène & Vadon 1981: 119, 120, 123, 126 [Philippines].

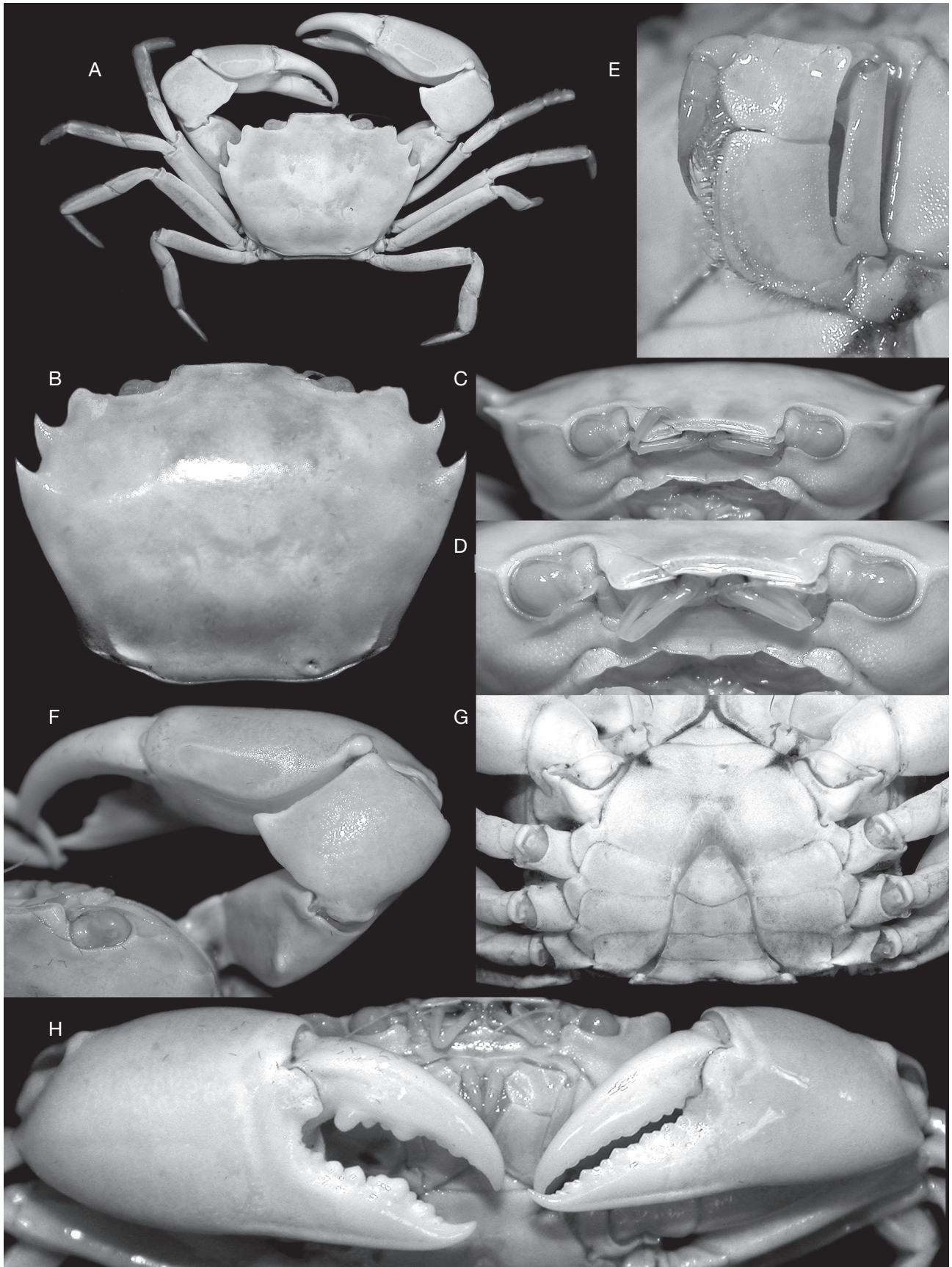


FIG. 10. — *Carcinoplax specularis* Rathbun, 1914, holotype ♂ (16.7 × 23.0 mm) (USNM 46164), Philippines: **A**, overall habitus; **B**, dorsal view of carapace; **C**, frontal view of cephalothorax; **D**, posterior margin of epistome; **E**, left third maxilliped; **F**, right cheliped; **G**, thoracic sternum and pleon; **H**, outer view of chelae.

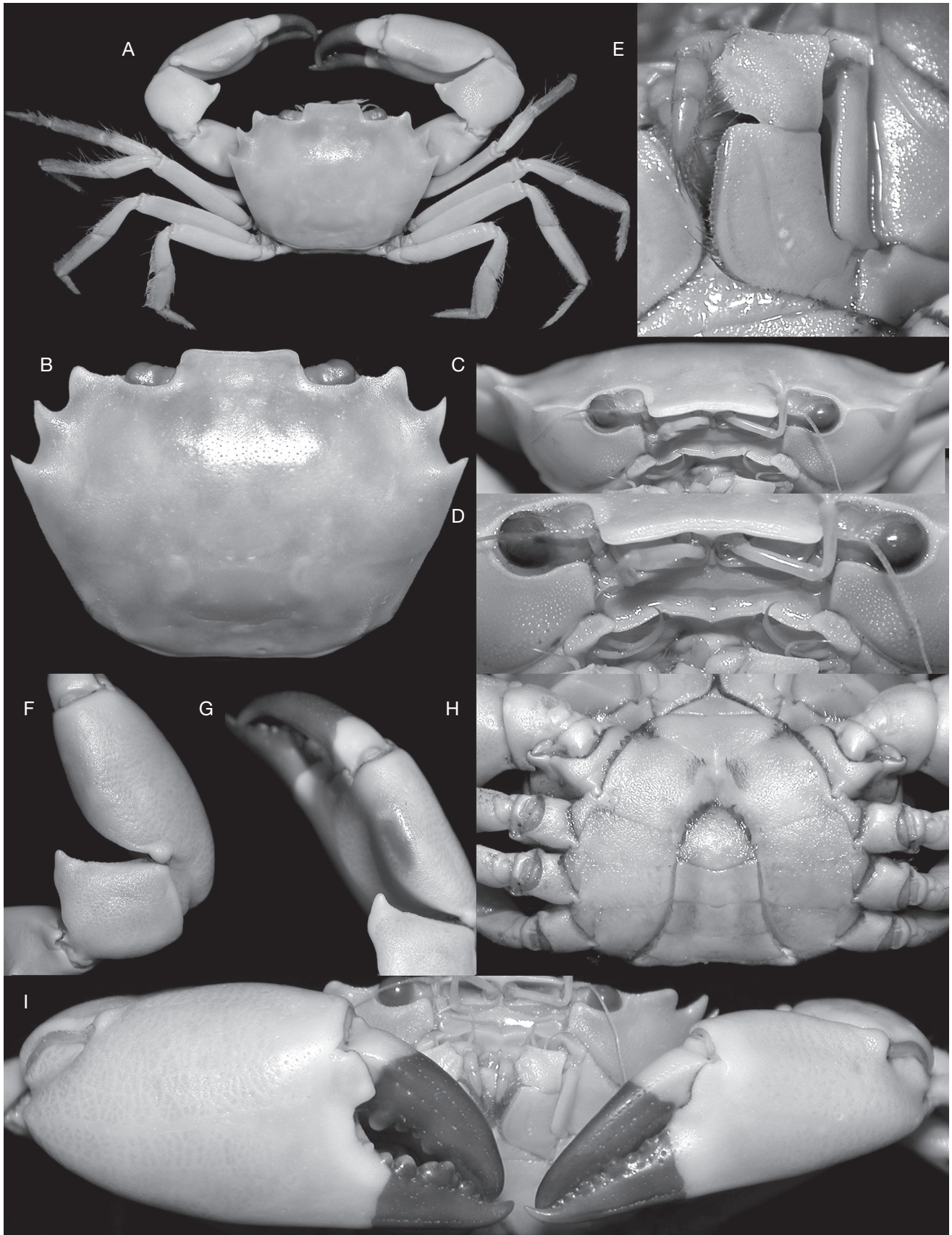


FIG. 11. — *Carcinoplax specularis* Rathbun, 1914, ♂ (18.4 × 25.8 mm) (ZRC 2001.0134), Taiwan: **A**, overall habitus; **B**, dorsal view of carapace; **C**, frontal view of cephalothorax; **D**, posterior margin of epistome; **E**, left third maxilliped; **F**, dorsal view of carpus of right cheliped; **G**, dorsal view of right chela; **H**, thoracic sternum and pleon; **I**, outer view of chelae.

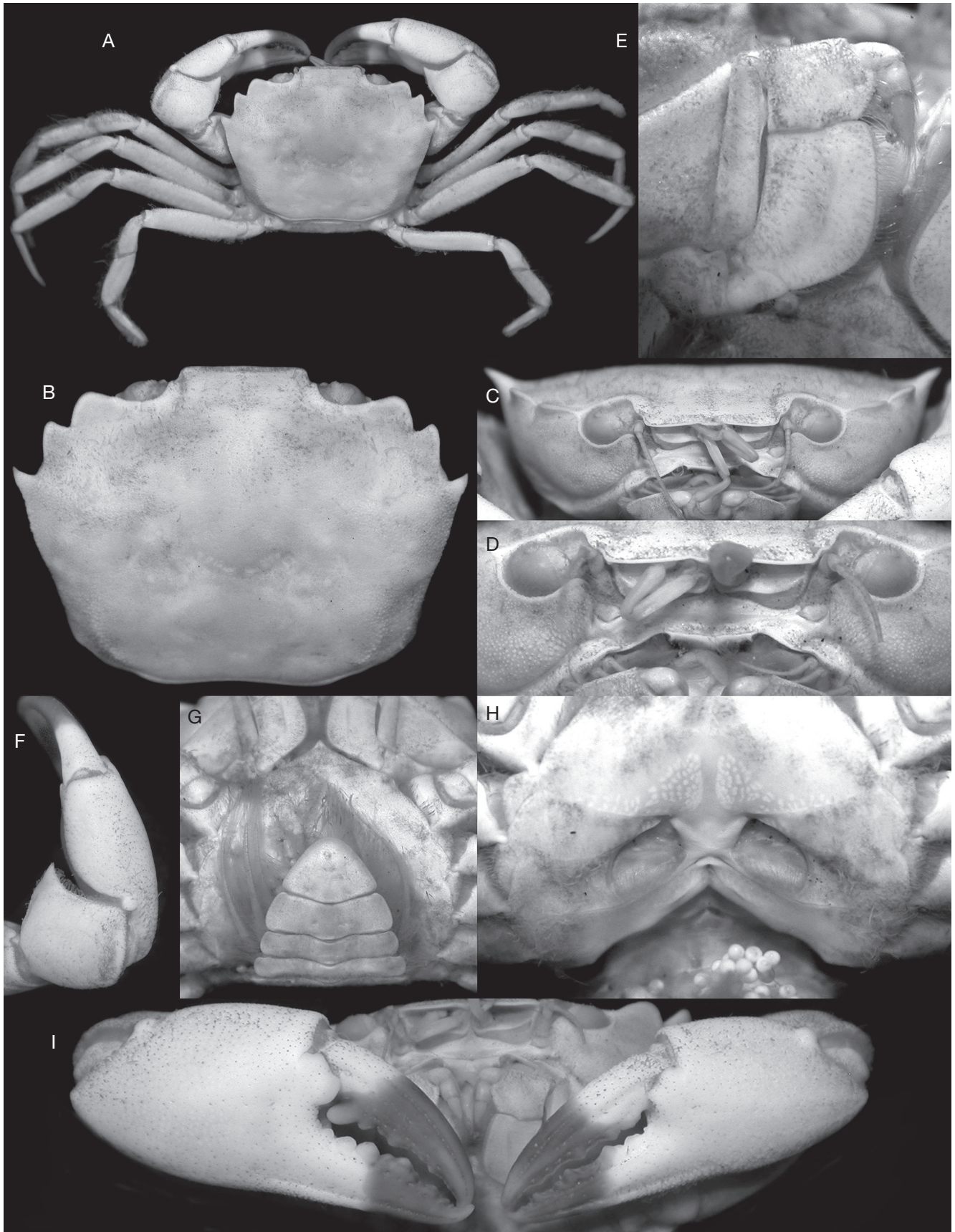


FIG. 12. — *Carcinoplax specularis* Rathbun, 1914, ♀ (12.4 × 16.7 mm) (MNHN-IU-2016-125), Taiwan: **A**, overall habitus; **B**, dorsal view of carapace; **C**, frontal view of cephalothorax; **D**, posterior margin of epistome; **E**, right third maxilliped; **F**, dorsal view of carpus of right cheliped; **G**, thoracic sternum and pleon; **H**, sterno-pleonal cavity and vulvae; **I**, outer view of chelae.

Carcinoplax specularis [part] – Castro 2007: 640 [Taiwan, Philippines].

Carcinoplax longipes – Sakai 1976: 524 [in key], 527, fig. 281 [Japan] (not *C. longipes* (Wood-Mason, 1891)).

?*Carcinoplax longipes* – Miyake 1991: 220 [in list] [Japan]. — Takeda *et al.* 2006: 204 [in list] [Japan]. — Takeda & Yaganisawa 1985: 61 [in list] [Japan] (not *C. longipes* (Wood-Mason, 1891), either *C. specularis* s. str. or *C. verdensis* Rathbun, 1914).

Not *Carcinoplax specularis* [part] – Castro 2007: 640 (= *C. polita* Guinot, 1989).

Not *Carcinoplax specularis* [part] – Castro 2007: 640. (= *C. tuberosa* Castro, 2007).

Not *Carcinoplax specularis* [part] – Castro 2007: 640 (= *C. verdensis* Rathbun, 1914).

Not *Carcinoplax specularis* [part] – Castro 2007: 641 (? = *C. fasciata* Ng & Kumar, 2016)

TYPE MATERIAL. — **Holotype. Philippines.** ♂, 16.7 × 23.0 mm, *Albatross*; stn 5113; 17.I.1908; USNM 46164.

TYPE LOCALITY. — Philippines, off southern Luzon, Sombrero I., S. 7°W., 9.5 miles, 13°51'30"N, 120°50'30"E, 159 fathoms (= 291 m).

MATERIAL EXAMINED. — **Taiwan** • 1 ♂, 14.2 × 19.9 mm; TAIWAN 2001; stn CP77, 24°54.2'N, 122°02.5'E; 220–360 m depth; 7.V.2001; MNHN-IU-2016-122 (= MNHN-B29821) • 1 ♂, 16.5 × 22.5 mm; same data as MNHN-IU-2016-122; MNHN-IU-2016-123 (= MNHN-B29822); • 1 ♂, 18.4 × 25.8 mm, 1 ♀, 13.2 × 17.8 mm; TAIWAN 2001; stn CP85; 24°0.65'N, 122°0.64'E; 255–390 m depth; 9.V.2001; ZRC 2001.0134 • 1 ♀, ovigerous 1 ♂; TAIWAN 2001; stn CP96; 24°04.2'N, 122°04.2'E; 472–586 m depth; 18.V.2001; MNHN-IU-2016-124 (= MNHN-B29823) • 1 ♀, 12.4 × 16.7 mm; TAIWAN 2001; stn CP104; 24°48.9'N, 122°05.3'E; 365–447 m depth; 10.V.2001; MNHN-IU-2016-125 (= MNHN-B29824). **Philippines** • 1 ♂, 12.5 × 17.9 mm; PANGLAO 2005; stn CP2359, Bohol Sea; 08°49.9'N, 123°34.9'E; 437–476 m depth; 26.V.2005; ZRC 2018.1435 • 2 ♀; PANGLAO 2005; stn CP2372, Dipolog Bay, Bohol Sea; 8°38.7'N, 123°16.0'E; 27.V.2005; ZRC 2018.1436 • 1 ♀, 13.9 × 18.0 mm; PANGLAO 2005; stn CP2407, Maribohoc Bay; 09°41.3'N, 123°48.5'E, 256–268 m depth; ZRC 2006.0207 • 2 ♂; AURORA; stn CP2731, Luzon Sea; 15°22.44'N, 121°33.58'E - 15°24.48'N, 121°33.51'E; 376–391m; 31.V.2007; ZRC 2018.1437 • 4 ♀, largest 10.5 × 15.7 mm, 2 ♂, larger one 1.0 × 15.0 mm; AURORA; stn CP2734, Luzon Sea; 15°56.41'N, 121°48.71'E - 15°56.98'N, 121°49.21'E; 453–460 m depth; 1.VI.2007; ZRC 2018.1438.

DIAGNOSIS. — Carapace (Figs 10A, B; 11A, B; 12A, B) quadrate, slightly wider than long (1.4 × wider than long in holotype); slightly convex, marked by slight transverse elevations. Front (Figs 10C, D; 11C, D; 12C, D) straight, notch between front, inner edge of supraorbital border absent. Triangular or rounded tooth on outer orbital angle; two slender, acute or obtuse anterolateral teeth on each side of carapace. Small, short granules on subhepatic, pterygostomial regions (Figs 10D; 11D; 12D), becoming slightly more pronounced in pterygostomial crest, ridge. Posterior margin of epistome (Figs 10D; 11D; 12D) straight, slightly pointed medially, slight gap or notch on each lateral margin. Distal half of fingers dark brown in females (Fig. 12A, F, I), two-thirds in males (Fig. 11A, I). Smooth, oblong “window” on inner, dorsal surface of cheliped propodi of some males, including holotype (Figs 10F; 11G). Inner (ventral), distal margin of cheliped carpus (Figs 10F; 11F, G; 12F) with short, blunt or acute-tipped tooth. P2–P5 (Figs 10A; 11A; 12A; 27D) moderately stout

in appearance. Male pleon (Figs 10G; 11F) proportionally narrow. G1 (Fig. 25A–D; Guinot 1989: fig. 34A) slender; truncated tip with scattered spinules that do not reach distal margin; G2 (Fig. 25E; Guinot 1989: fig. 34B) slender, nearly equal or slightly longer than G1, slightly curved flagellum, tip with two lateral spinules.

COLOUR IN LIFE. — Light orange with a semi-circular row of small white spots on each side of the carapace (Fig. 27D; Ho *et al.* 2004: fig. 6F).

GEOGRAPHICAL DISTRIBUTION. — Japan, Taiwan, and Philippines.

DEPTH. — Present in samples collected at depths of 220–586 m.

REMARKS

Larger males show a “window”, an oblong, slightly darker spot on the inner, dorsal surface of the cheliped propodi (Figs 10F; 11G), that was previously noted in the holotype by Rathbun (1914) and Guinot (1989). It has not been observed in females. Such a “window” was also observed by us in *C. abyssicola* and *C. adelphia* n. sp. For differences with *C. adelphia* n. sp., see the remarks for the latter species.

Carcinoplax specularis was found together with *C. verdensis* and *C. jugum* n. sp. from one station in the Philippines (CP2359).

Three specimens of *C. tuberosa* Castro, 2007 from Kai Is, Indonesia (MNHN-IU-2016-98 (= MNHN-B29385), MNHN-IU-2016-101 (= MNHN-B29390), and MNHN-IU-2016-102 (= MNHN-B29392)) were erroneously identified as *C. specularis* by Castro (2007).

Two ovigerous females from the Maldives (John Murray Expedition, stn 143, 05°15.8'N, 73°22.8'E - 05°13.7'N, 73°23.6'E, 797 m depth; 30.III.1934, MNH 2007.64–65) identified as *C. specularis* by Castro (2007: 641) most probably belong to a different species of *Carcinoplax*, with Ng & Kumar (2016) suggesting it was likely to be *C. fasciata* Ng & Kumar, 2016 instead. The specimens in the NHM could not be located for re-examination (see Ng & Kumar 2016: 199).

Carcinoplax verdensis Rathbun, 1914 (Figs 13A–J; 14A–H; 15A–G; 24A–H; 28A–F)

Carcinoplax verdensis Rathbun, 1914: 143 [type locality: southern Luzon, Philippines]. — Tesch 1918: 154 [in list]. — Éstampador 1937: 533 [in list]; 1959: 89 [in list] [Philippines]. — Serène 1968: 90 [in list]. — Sakai 1969: 269 [in list], fig. 15d [holotype]. — Serène & Lohavanijaya 1973: 62 [in list], 65 [in key]. — Serène & Vadon 1981: 119, 123, 126 [Philippines]. — Guinot 1989: 300, fig. 22; pl. 9, figs D–F [holotype] [Philippines]. — Ng *et al.* 2008: 80 [in list].

Carcinoplax longipes – Chen 1984: 189 [in key], 195, 197, fig. 6 [East China Sea]. — Ikeda 1998: 15, 42, 135, pl. 55 [Japan] (not *C. longipes* (Wood-Mason, 1891)).

Carcinoplax aff. *longipes* – Guinot 1989: 305, figs 27, 35, 36; pl. 10, figs D–G [Philippines].

Carcinoplax specularis [part] – Castro 2007: 640 [Philippines].

Not *Carcinoplax verdensis* – Selvaraj & Kathirvel 1980: 159, figs 1, 2 [India] (*C. indica* Doflein, 1904).

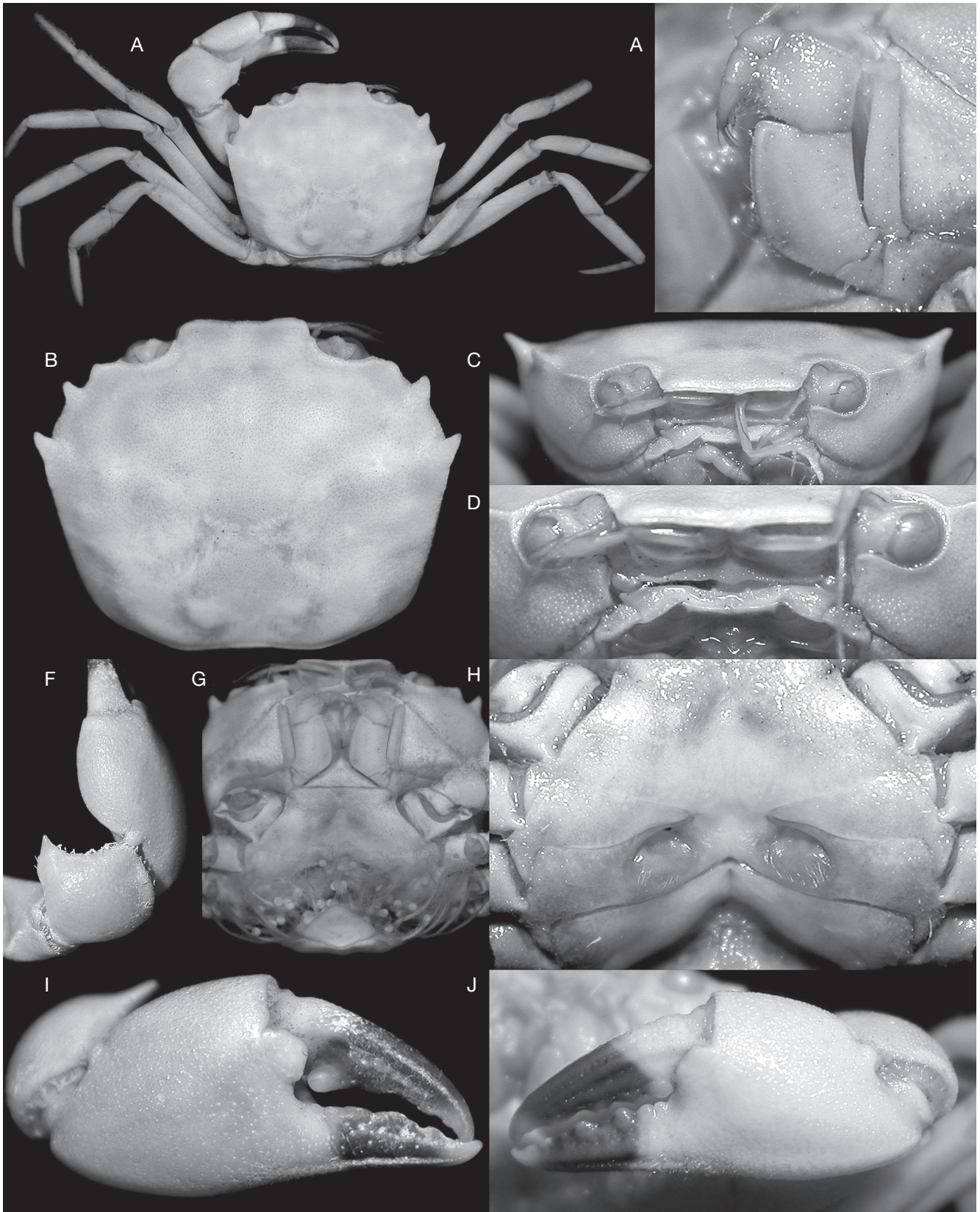


FIG. 13. — *Carcinoplax verdensis* Rathbun, 1914, holotype ovigerous ♀ (10.5 × 13.0 mm) (USNM 46167), Philippines: **A**, overall habitus; **B**, dorsal view of carapace; **C**, frontal view of cephalothorax; **D**, posterior margin of epistome; **E**, left third maxilliped; **F**, dorsal view of carpus of right cheliped; **G**, thoracic sternum and pleon; **H**, sternopleonal cavity and vulvae; **I**, outer view of right chela; **J**, outer view of left chela.

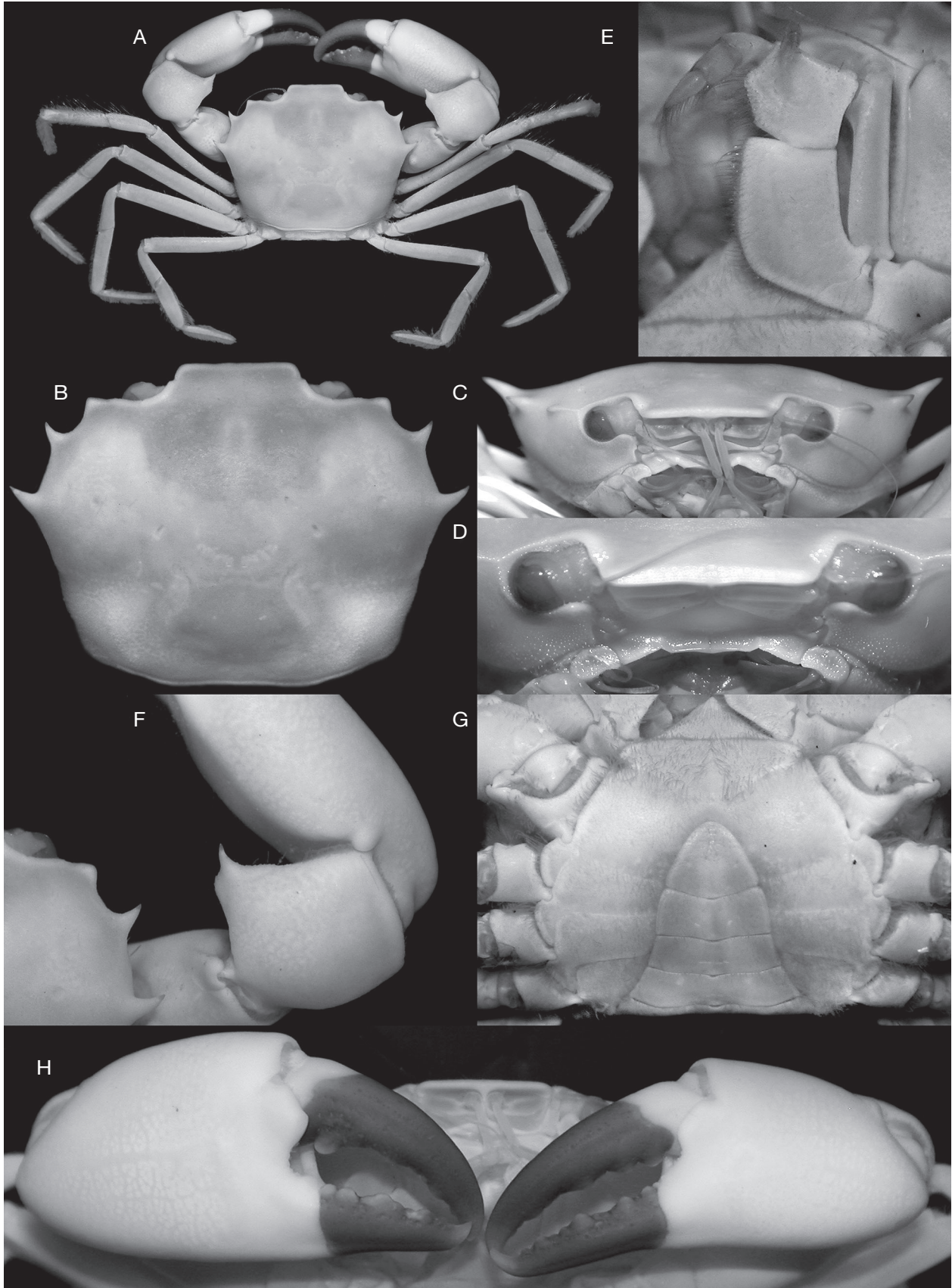


FIG. 14. — *Carcinoplax verdensis* Rathbun, 1914, ♂ (15.7 × 21.4 mm) (ZRC 2019.0549), Philippines: **A**, overall habitus; **B**, dorsal view of carapace; **C**, frontal view of cephalothorax; **D**, posterior margin of epistome; **E**, left third maxilliped; **F**, dorsal view of carpus of right cheliped; **G**, thoracic sternum and pleon; **H**, outer view of chelae.

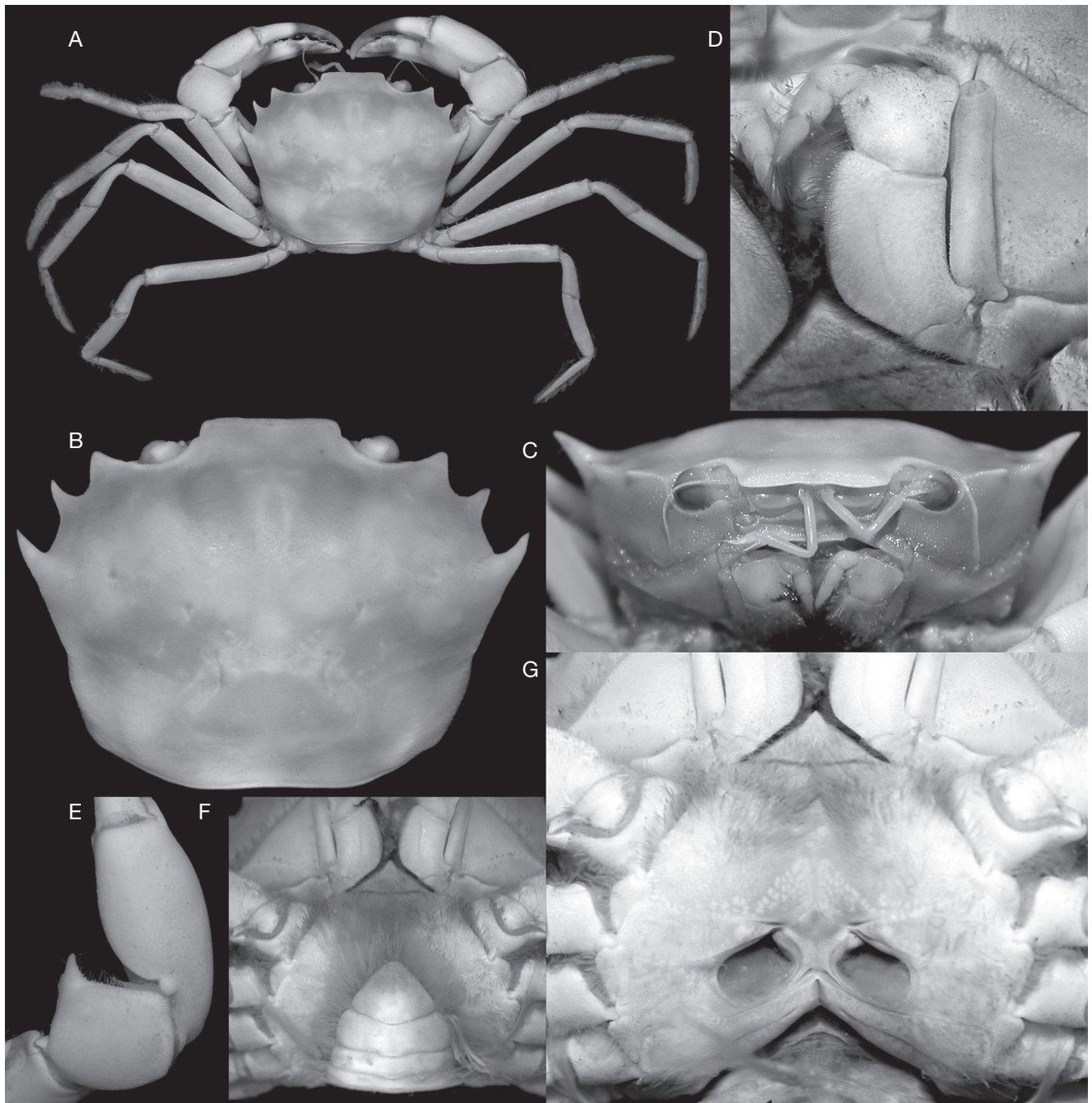


FIG. 15. — *Carcinoplax verdensis* Rathbun, 1914, ♀ (16.3 × 21.9 mm) (ZRC 2019.0546), Philippines: **A**, overall habitus; **B**, dorsal view of carapace; **C**, frontal view of cephalothorax; **D**, left third maxilliped; **E**, dorsal view of carpus of right cheliped; **F**, thoracic sternum and pleon; **G**, sternopleonal cavity and vulvae.

TYPE MATERIAL. — **Holotype**. Philippines • Ovigerous ♀, 10.5 × 13.0 mm; *Albatross*; stn 5119; USNM 46167.

TYPE LOCALITY. — Philippines, off Sombrero I., Verde I. Passage, 159-394 fathoms (= 291-721 m),

MATERIAL EXAMINED. — **Taiwan** • 1 ♂ (badly damaged); stn CP19, southwestern Taiwan; 22°24.2'N 120°10.2'E - 22°23.8'N 120°09'E; 467-634 m depth; coll. T.-Y. Chan; 29.VII.2000; ZRC 2001.2216. Philippines. 1 ovigerous ♀, holotype 10.5 × 13.0 mm; *Albatross*, stn

5119, off Sombrero I., Verde I. Passage; 291-721 m depth; 21.I.1908; USNM 46167 • 1 ♀; MUSORSTOM 3, stn CP116; 12°32'N, 120°47'E; 804-812 m depth; 3.VI.1985; MNHN-IU-2016-8001 • 2 ♀, 9.2 × 12.1 mm, 12.0 × 16.7 mm, 8 ♂ (2 with bopyrids); MUSORSTOM 3, Bohol, Balicasag I., off Panglao I., tangle nets of local fishermen; 09°31'00.2"N, 123°40'50.5"E; 200-300 m depth; XII.2000; ZRC 2001.0395 • 1 ♀; MUSORSTOM 3, tangle nets of local fishermen; 09°31'00.2"N, 123°40'50.5"E; 200-300 m depth; XII.2000; ZRC 2019.0544 • 1 ♂, 14.9 × 20.2 mm; PANGLAO 2005, stn CP2332, Maribohoc Bay; 09°38.8'N, 123°45.9'E; 396-418 m depth; 22.V.2005, ZRC 2019.0547,

ex ZRC 2006.0214 (part) • 1 ♀, 5.8 × 8.1 mm; PANGLAO 2005, stn DW2338, off Balicasag Island; 09°30.7'N, 123°42.4'E; 347–349 m depth; 23.V.2005; ZRC 2019.0548 • 1 ♂, 19.0 × 27.7 mm; PANGLAO 2005, stn CP2339, off Balicasag Island; 09°31.9'N, 123°43.7'E, 164–176 m depth; 23.V.2005; ZRC 2019.0550 • 1 ♀, 10.9 × 14.4 mm; same data as ZRC 2019.0550; ZRC 2019.0573 • 1 ♂, 3.8 × 4.8 mm; PANGLAO 2005, stn CP2359, Bohol Sea; 08°49.9'N, 123°34.9'E; 437–476 m depth; 26.V.2005; ZRC 2019.0553 • 1 ♂, 15.7 × 21.4 mm, ZRC 2019.0549 • 1 juvenile ♂; same data as ZRC 2019.0549; ZRC 2009.0990 • 2 ♀, 12.4 × 17.1 mm, 13.0 × 18.3 mm; PANGLAO 2005, stn CP2361, Bohol Sea; 08°53.1'N, 123°33.5'E; 516–543 m depth; 26.V.2005; ZRC 2019.0554 • 11 ♀ (1 with rhizocephalan), 4 ♂, 1 juvenile; PANGLAO 2005, stn CP2384, off Aligbay Island; 08°46.2'N, 123°16.1'E; 624–647 m depth; 29.V.2005; ZRC 2019.0546 • 1 ♂, 16.9 × 23.0 mm; PANGLAO 2005, stn CP2385; 08°51.0'N, 123°10.0'E, 982–989 m depth; 29.V.2005; ZRC 2009.1003 • 1 ♂, with sacculinid; PANGLAO 2005, stn CP2386; 08°49.3'N, 123°01.9'E, 2120–2149 m depth (?); 29.V.2005; ZRC 2019.0556 • 1 ♀, 10.9 × 14.6 mm; PANGLAO 2005, stn CP2388, Maribohoc Bay; 09°26.9'N, 123°34.5'E; 762–786 m depth; 30.V.2005; ZRC 2019.0551 • 2 ♂, 11.6 × 15.4 mm, 11.0 × 14.6 mm; same data as ZRC 2019.0551; ZRC 2019.0571 • 2 ♂, larger one 19.2 × 27.7 mm, 2 ♀; PANGLAO 2005, stn CP2389, Bohol Sea; 09°27.9'N, 123°38.4'E; 784–786 m depth; 30.V.2005; ZRC 2019.0555 • 2 ♂, 9.6 × 12.0, 12.8 × 17.1 mm; PANGLAO 2005, stn CP2394, off Balicasag Island; 09°28.6'N, 123°40.0'E; 470–566 m depth; 30.V.2005; ZRC 2019.0557 • 1 ♂, 10.0 × 13.4 mm; same data as ZRC 2019.0557; ZRC 2019.0574 • 3 ♂, 8.7 × 10.1 mm, 9.8 × 11.8 mm, 17.6 × 13.7 mm; PANGLAO 2005, stn CP2396, west Panglao, on sandy bottom; 09°36.3'N 123°42.0'E; 673–715 m depth; 31.V.2005; ZRC 2016.0446 • 2 ♂, 1 ♂, 13.2 × 16.1 mm with sacculinid; PANGLAO 2005, stn CP2405, on sandy-muddy bottom; 09°39.0'N 123°46.1'E, 1.VI.2005; ZRC 2006.0199 • 1 ♂, 1 ♀, (both with bopyrids); PANGLAO 2005, stn CP2358, Bohol Sea; 08°52.1'N, 123°37.1'E; 569–583 m depth; 26.V.2005; ZRC 2016.0439 • 1 ♂ (with bopyrid); PANGLAO 2005, stn CP2396, Maribojoc Bay, 09°36.3'N, 123°42.0'E; 609–673 m depth; 31.V.2005; ZRC 2016.0447 • 1 ♂, (with bopyrid); PANGLAO 2005, stn CP2405, Maribojoc Bay; 09°39.0'N, 123°46.1'E; 387–453 m depth; 1.VI.2005; ZRC 2016.0436 • 1 ♀ (with bopyrid), station unknown; Bohol Sea; V–VI 2005; ZRC 2016.0441 • 1 ♀, 12.8 × 17.9 mm; AURORA 2007, stn CP2673, Luzon Sea; 14°59.83'N, 121°43.90'E - 15°01.44'N, 121°44.75'E; 431–493m; 22.V.2007; ZRC 2019.0559 • 1 ♀, 7.9 × 10.9 mm; AURORA 2007, stn DW2692, Luzon Sea; 14°40.15'N, 123°40.06'E - 14°40.45'N, 123°40.59'E; 261–272 m depth; 26.V.2007; ZRC 2019.0560.

South China Sea • 1 ♀, ovigerous 9.4 × 13.0 mm; NANHAI 2014, stn CP4117, LL4; 20°00.8788'N, 114°08.7974'E; 333–421 m depth; 11.I.2014, ZRC 2019.0561 • 1 ♀, 1 ♂; same data as stn CP4117; ZRC 2019.0210 • 1 ♀; ZHONGSHA 2015, stn CP4155, northeast of Macclesfield Bank; 16°13.60'N, 115°01.61'E; 510–526 m depth; 28.VII.2015; ZRC 2019.0562 • 1 ♂, 11.1 × 16.0 mm; ZHONGSHA 2015, stn CP4165, south of Taiwan Bank; 22°09.888'N, 118°42.023'E; 443–618 m depth; 1.VIII.2015; ZRC 2019.0563 • 1 ♀; ZHONGSHA 2015, stn CP4166, south of Taiwan Bank; 22°07.6245'N, 118°43.3003'E; 587–756 m depth; 1.VIII.2015; ZRC 2019.0564 • 1 ♀, 6.8 × 8.8 mm; ORI3 CRUISE, stn 9, Tungsha Is, 21°40.293'N 117°43.244'E - 21°38.995'N 117°41.649'E; 523–510 m depth; coll. I.-S. Chen; 9.VII.2011; ZRC 2019.0374.

DIAGNOSIS. — Carapace (Figs 13A, B; 14A, B; 15A, B) quadrate, slightly wider than long (1.4 × wider than long in holotype); slightly convex, slight transverse elevations, slight tomentum.

Front (Figs 13C, D; 14C, D; 15C) straight, notch on each lateral margin absent or slight if present. Rounded, short tooth on outer orbital angle; two slender, acute-tipped anterolateral teeth on each side of carapace. Small, short granules on subhepatic, pterygostomial regions (Figs 13D; 14D), becoming more pronounced in pterygostomial crest, ridge; short granules on anterior, dorsal surface of carapace. Posterior margin of epistome (Figs 13D; 14D) straight, slight median emargination in some specimens, shallow notch on each lateral margin. Distal half of fingers dark brown in females (Figs 13A, I, J; 15A), two third in males (Fig. 14A, H). “Window” not observed on outer surface of cheliped propodus. Inner (ventral), distal margin of cheliped carpus (Figs 13F; 14F; 15E) with acute, conspicuous tooth. P2–P5 (Figs 13A; 14A; 15A; 28A–F) slender in appearance. Male pleon proportionally wide (Fig. 14G). G1 (Fig. 24A–C, E, G) slender; pointed tip with scattered spinules, abundant, almost reaching margin of tip in some individuals; G2 (Fig. 24D, F, H) slender, nearly equal or slightly longer than G1, slightly curved flagellum, tip with two lateral spinules.

COLOUR IN LIFE. — Orange carapace that intensifies with age, at least in females (Fig. 27D–F). The legs (P2–P5) of females show thin, red bands across the middle portion. Males are orange without any banding on the legs (Fig. 27A–C).

GEOGRAPHICAL DISTRIBUTION. — Japan, East China Sea, Taiwan, Philippines, and South China Sea.

DEPTH. — Present in samples collected at depths of 164–989 m; 2120–2149 m in one station, possibly an error.

REMARKS

See Remarks for *C. abyssicola*.

The relatively long, acute, and conspicuous tooth on the inner distal angle of the cheliped carpus (Figs 13F; 14F; 15E) is a good character to distinguish *C. verdensis*, with most specimens showing this character. No other species treated here has this character. Some specimens (e.g. 1 ♀, 12.8 × 17.9 mm, ZRC 2019.0559) have lower, more obtuse cheliped carpal spines, not acute and elongated as is typical specimens.

Guinot (1989), who only observed the holotype, separated *C. verdensis* because of the absence of the “window” of *C. specularis*, the acute anterolateral teeth, and relatively more slender legs (P2–P5). The ambulatory meri of *C. verdensis* are indeed one of the longest in the group (see remarks for *C. abyssicola*), although in a few specimens, the legs are somewhat shorter (e.g. Fig. 28E, F).

A very large (54.0 × 69.0 mm) male specimen from southwestern India identified as *C. verdensis* by Selvaraj & Kathirvel (1980: 159, figs 1, 2) is clearly not this species as presently defined. *Carcinoplax verdensis* does not grow to such a large size, and the general carapace facies and G1 structure also do not match. The photograph of the overall habitus is too poor to see distinguishing characters and it probably belongs to *C. indica* Doflein, 1904 instead. This species was described from the Andamans and is known to grow to very large sizes. The size of the Indian specimen also argues against it being *C. longipes*, *C. fasciata* Ng & Kumar, 2016, or *C. mistio* Ng & Mitra, 2019.

Carcinoplax polita Guinot, 1989
(Figs 16A-H; 17A-I; 24I-O; 27G, H)

Carcinoplax polita Guinot, 1989: 298, figs 24, 37, pl. 8, figs E-H [type locality: southern Luzon, Philippines]. — Ng *et al.* 2008: 80 [in list].

Carcinoplax specularis [part] – Castro 2007: 640 [Taiwan, Philippines].

TYPE MATERIAL. — **Holotype**. South China Sea • ♂, 14.5 × 20.4 mm; MUSORSTOM 1, stn CP31; MNHN-IU-2008-10565 (= MNHN-B10140); allotype ♀, 12.5 × 16.9 mm; MNHN-IU-2008-10584 (= MNHN-B10543); paratype ♂, 9.2 × 12.2 mm; MNHN-IU-2008-10571 (= MNHN-B10268).

TYPE LOCALITY. — South China Sea, Philippines, southern Luzon, 187–195 m.

MATERIAL EXAMINED. — **South China Sea** • 1 ♀, 8.8 × 12.7 mm; NANHAI 2014, stn CP4116; 20°02.3211'N, 114°10.2157'E; 262–298 m depth; 11.I.2014; ZRC 2018.1428 • 1 ♀, 9.8 × 13.9 mm; DONGSHA 2014, stn CP4128, Dongsha Is, 20°44.857'N, 116°08.01'E; 420–444 m depth; 1.V.2014; ZRC 2018.1429.

Philippines • 1 ♀, 8.7 × 12.4 mm; Bohol, Balicasag I., off Panglao I.; tangle nets of local fishermen; 9°31'00.2"N, 123°40'50.5"E; 2–700 m depth; XII.2000; ZRC 2019.0565 • 2 ♂, 13.6 × 18.9 mm, 15.0 × 19.4 mm; same location as ZRC 2019.0565; 200–300 m depth; I.2004; ZRC 2004.0805 • 1 ♂, 25–30; same location as ZRC 2019.0565; VII.2006; ZRC 2019.0567 ex ZRC 2004.0730 (part) • 4 ♀, 11.6 × 15.6 to 16.0 × 22.4 mm, 5 ♂, 14.1 × 20.0 mm to 15.0 × 20.9 mm; same location as ZRC 2019.0565; 50–500 m depth; 2.III.2004; ZRC 2004.0727 • 1 ovigerous ♀, 15.4 × 21.4 mm, 1 ♀, 5 ♂, largest 17.8 × 24.5 mm; same location as ZRC 2019.0565; 50–500 m depth; 28.XI.2001; ZRC 2001.0540 • 1 ♀, 2 ♂; same location as ZRC 2019.0565; 50–500 m depth; 25–30 July.2006; ZRC 2019.0566, ex ZRC 2001.0845 (part) • 2 ♀, 2 ♂; same location as ZRC 2019.0565; coll. M. Takeda & H. Komatsu, II.2003; NSMT-Cr 15365 • 1 ♀, 12.8 × 17.8 mm; PANGLAO 2004, stn P1, tangle nets of local fishermen; 09°36'S, 123°45'E, 90–200 m depth; ZRC 2006.017 • 1 ♂, 14.5 × 20.0 mm; PANGLAO 2004, stn P4, 09°31'00.2"N, 123°40'50.5"E, tangle nets of local fishermen; 8.VI.2004; ZRC 2006.0173 • 1 ♂, 25.9 × 30.1 mm; AURORA 2007, stn CP2709, Luzon Sea; 15°11.07'N, 121°34.72'E–15°12.36'N, 121°34.02'E; 244–296 m depth; 28.V.2007; ZRC 2019.0545.

Indonesia. 1 ♂, 6.5 × 7.9 mm; SJADES, stn CP34, E. Indian Ocean; 07°44.464'S, 107°39.018'E; 234–243 m depth; 29.III.2018; ZRC 2018.1417.

DIAGNOSIS. — Carapace (Figs 16A, B; 17A, B, E; 27G, H) quadrate, slightly wider than long (1.4 × wider than long in holotype); slightly convex, marked by two distinct transverse elevations across cardiac, gastric regions. Front (Figs 16H; 17B, C, F) straight, no notch between front, inner edge of supraorbital border (slight notch in some specimens). Rounded, short tooth on outer orbital angle; margin between outer orbital tooth, anterolateral teeth distinctly granular; two slender, acute-tipped anterolateral teeth on each side of carapace, second tooth curved. Large, high granules on subhepatic, pterygostomial regions (Figs 16C; 17B, C, F), particularly pronounced in pterygostomial crest, ridge; short granules on anterior (sometimes throughout) dorsal surface of carapace. Posterior margin of epistome (Fig. 17B, C, F) straight, notch on each lateral margin absent or slight. Distal fourth of fingers dark brown in females (Fig. 17D, I), males (Fig. 16A, H). “Window” not observed on cheliped propodi. Inner (ventral),

distal margin of cheliped carpus (Fig. 16E, F) with acute, curved, triangular tooth typically accompanied by tooth-like tubercles along margin of carpus; outer, proximal margin with short tooth. P2–P5 (Figs 16A; 17D; 27G, H) moderately stout in appearance, P5 barely reaching tip of second anterolateral tooth. Male pleon proportionally narrow (Fig. 16G). G1 (Fig. 24I, K, L–N; Guinot 1989: fig. 37A) slender, subconical, with tapering tip, sometimes elongated; scattered spinules; G2 (Fig. 24J, O; Guinot 1989: fig. 37B) slender, nearly equal or slightly longer than G1, straight flagellum, tip with two lateral spinules.

COLOUR IN LIFE. — Colours of the two photographed individuals (Fig. 27G, H) varies from orange to bright red-orange. Legs (P2–P5) are orange to red-orange with white proximal and distal portions.

GEOGRAPHICAL DISTRIBUTION. — Taiwan, South China Sea, Philippines, and Indonesia (southern Java).

DEPTH. — Present in samples collected at depths of 200–700 m.

REMARKS

The carapaces of two species (*C. polita* and *C. jugum* n. sp.) are distinctive in that the gastric and cardiac regions are distinctively more swollen laterally, so much so that the dorsal surface appears gently corrugated, with a shallow but distinct transverse furrow between the regions (Figs 16A, B; 17A, B, E; 27G, H). This is particularly obvious when the surface is dried. While there is also a shallow groove between the gastric and cardiac regions in the other species, the conditions in *C. polita* and *C. jugum* n. sp. are unusual in that the groove is distinctly wider and more prominent. The chelipeds of these two species are also distinctive in that only the distal third or half of the fingers are pigmented, even in juveniles. *Carcinoplax polita* is a very distinctive taxon in that it is the only member of this group of species that has an additional spine on the outer surface of the carpus of the cheliped (Fig. 16E). All other species, including *C. jugum* n. sp., has a smooth and unarmed outer margin. The spine is always present, even if eroded, and occurs even in small specimens and females. In addition to the structure of the cheliped carpal spines, *C. polita* is easily separated from *C. jugum* n. sp. in that the margins between the outer orbital tooth and the anterolateral teeth are distinctly granular (Fig. 17F) (margins appear smooth in *C. jugum* n. sp.; Fig. 21C); the dorsal surface of the carapace is gently convex in frontal view (Figs 16C; 17B, F) (more prominently inflated in *C. jugum* n. sp.; Figs 21C; 22C); the posterior margin of the epistome with a prominent triangular median lobe and strongly concave lateral margins (Fig. 17B, C, F) (median lobe more obtuse, lower and the lateral margins distinctively v-shaped in *C. jugum* n. sp.; Figs 21D; 22D); possessing a proportionally wider male pleon (Fig. 16G) than in *C. jugum* n. sp. (Fig. 21H), and most significantly, the G1 has the distal part subconical in form with the tip tapering, sometimes elongated, and directed obliquely laterally (Fig. 24I, K, L–N) (the distal part is more dilated, resembling a bird's head with the tip never elongated and directed upwards in *C. jugum* n. sp.; Fig. 25Q–S).

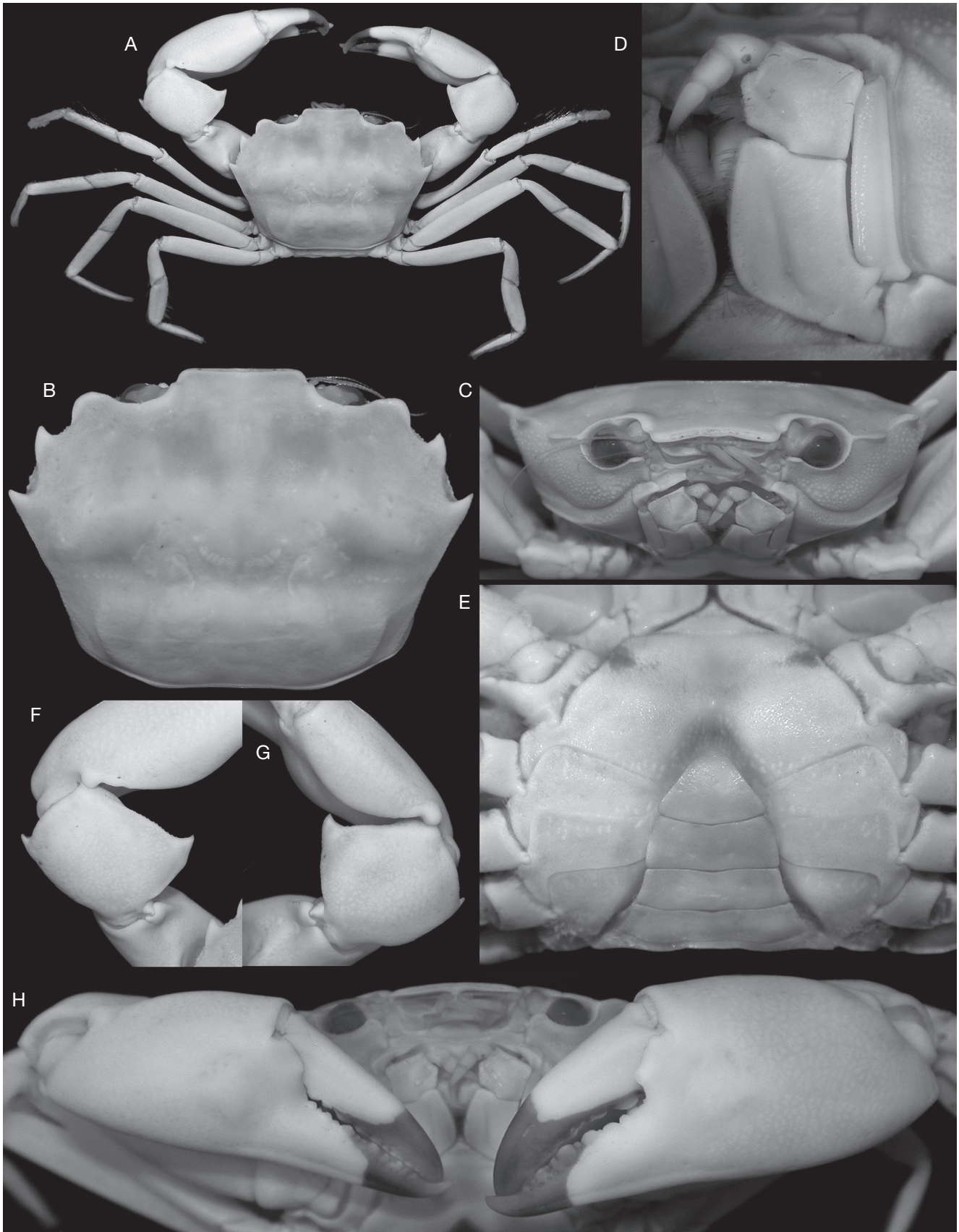


FIG. 16. — *Carcinoplax polita* Guinot, 1989, ♂ (15.7 × 22.4 mm) (ZRC 2004.0727), Philippines: **A**, overall habitus; **B**, dorsal view of carapace; **C**, frontal view of cephalothorax; **D**, left third maxilliped; **E**, thoracic sternum and pleon; **F**, dorsal view of carpus of left cheliped; **G**, dorsal view of carpus of right cheliped; **H**, outer view of chelae.

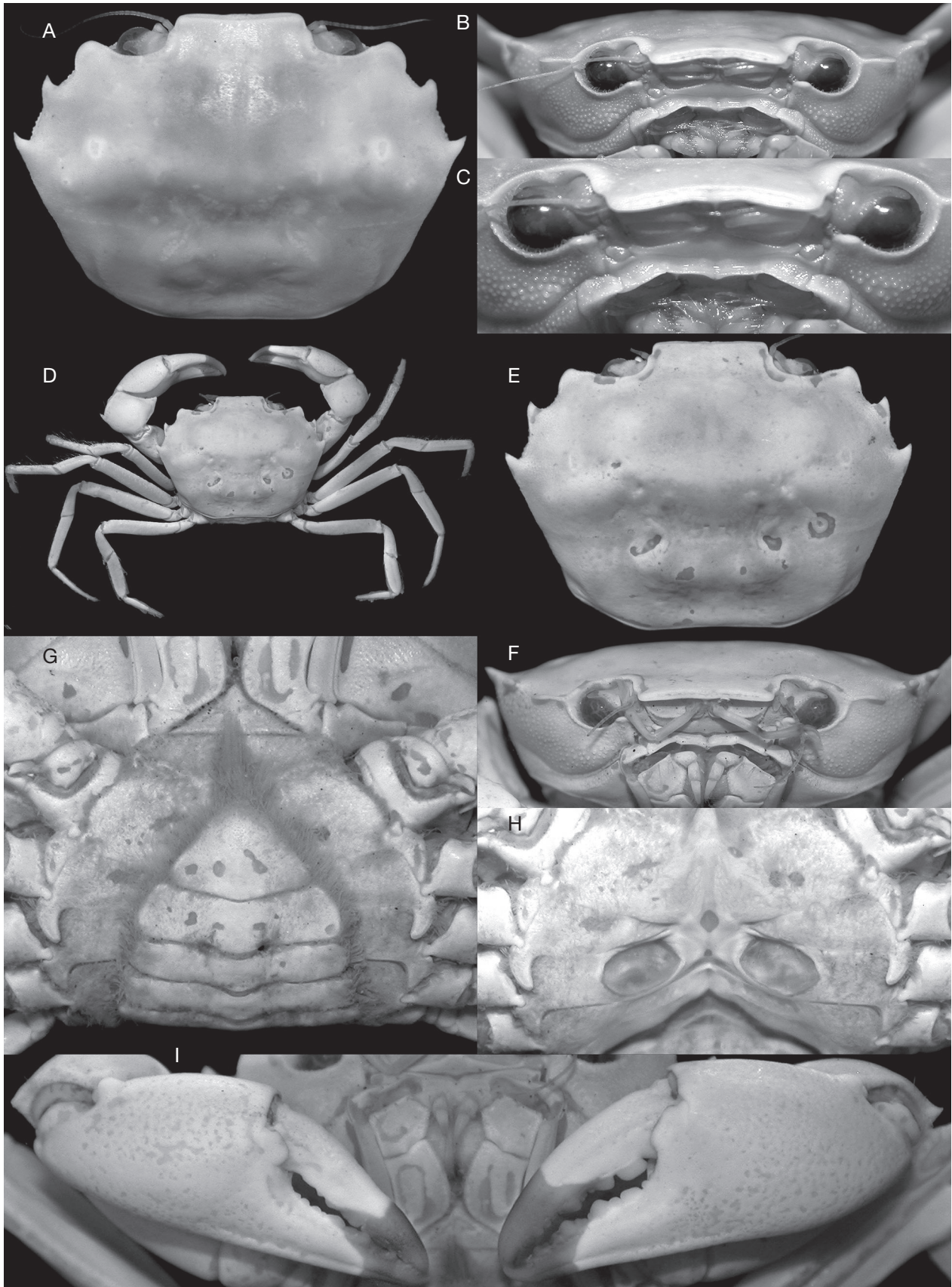


FIG. 17. — *Carcinoplax polita* Guinot, 1989: **A–C**, ♂ (15.2 × 20.5 mm) (ZRC 2004.0727), Philippines; **D–I**, ♀ (15.3 × 21.1 mm) (ZRC 2004.0727), Philippines; **A, E**, dorsal view of carapace; **B, F**, frontal view of cephalothorax; **C**, posterior margin of epistome; **D**, overall habitus; **G**, thoracic sternum and pleon; **H**, sternopleonal cavity and vulvae; **I**, outer view of chelae.

Small but adult specimens of *C. polita* (15–18 mm CL), including the holotype, have a G1 which is gently sinuous, with the distal part subconical in form and the tip tapering but short (Fig. 24I, K). In a very large specimen of *C. polita* (25.9 × 30.1 mm, ZRC 2019.0545), the overall G1 is proportionately more slender than in smaller specimens, with the tip of the distal part prominently more elongated (Fig. 24L–N). This specimen, however, agrees in all other aspects with typical *C. polita*, although that it has relatively larger granules on the carapace surface. These differences are likely to be associated with its large size.

Carcinoplax fasciata Ng & Kumar, 2016
(Figs 18; 25J–P)

?*Carcinoplax specularis* [part] – Castro 2007: 641 [Maldives].

Carcinoplax fasciata Ng & Kumar, 2016: 193, figs 1–4 [type locality: Kerala, India].

TYPE MATERIAL. — **Holotype.** Arabian Sea • ♂, 25.8 × 19.3 mm, DABFUK, India.

TYPE LOCALITY. — Arabian Sea, off Kerala, India.

MATERIAL EXAMINED. — **India.** Holotype ♂, 25.8 × 19.3 mm; Arabian Sea, Neendakara fishing port, Kerala, southwestern India; 8°38'N 76°14'E; 450–500 m depth; coll. B. Kumar, from trawler, 27.XI.2015; DABFUK.

DIAGNOSIS (HOLOTYPE MALE, FEMALES UNKNOWN). — Carapace (Fig. 18A, B) quadrate, slightly wider than long (1.3 × wider than long in holotype); slightly convex, smooth. Front (Fig. 18C, D) straight, notch between front, inner edge of supraorbital border absent. Slightly pointed, short tooth on outer orbital angle preceded by low protuberance near orbit; two slender, acute-tipped anterolateral teeth on each side of carapace, first slightly curved. Conspicuous granules on subhepatic, pterygostomial regions (Fig. 18C, D), becoming more pronounced in pterygostomial crest, ridge; short granules on anterior. Posterior margin of epistome (Fig. 18C, D) sinuous, with median salient tip, lateral margins wide, strongly concave. Distal third of fingers pale brown (Figs 21A, I, J; 28G). “Window” not observed on cheliped propodi. Inner (ventral), distal margin of cheliped carpus (Fig. 18G, H) with long, acute tooth. P2–P5 (Fig. 18A, 28G) moderately short in appearance, P5 just reaching base of second anterolateral tooth. Male pleon (Fig. 18E) proportionally narrow. G1 (Fig. 25J–L) slender, straight; slightly pointed tip with scattered spinules, distal end slightly distended; G2 (Fig. 25M–P) slender, slightly longer than G1, slightly curved flagellum, tip weakly bifurcated, sharp.

COLOUR IN LIFE. — “Dorsal surfaces of carapace and chelipeds bright orange; tips of anterolateral teeth and cheliped carpal spine white; fingers of chelipeds mostly white except for orange base, distal third light brown; ambulatory legs with dorsal surfaces mostly orange except for white patches on propodus, ventral surfaces paler; prominent red band present that stretches from ventrum of posterolateral carapace margin to below frontal margin; rest of ventral surfaces pinkish-white.” (Ng & Kumar 2016: 197) (Fig. 28G).

GEOGRAPHICAL DISTRIBUTION. — Western India.

DEPTH. — 450–500 m.

REMARKS

Carcinoplax fasciata is unusual among the species treated here in that its life coloration is distinctive. The front has a prominent red band below it and the fingers of the cheliped are not pigmented black, with only the distal part light brown (Fig. 28G). The condition of the fingers is most like *C. polita* and *C. jugum* n. sp., although in these species, the distal parts of the fingers are black or dark brown (Figs 16H; 17I; 21I, J; 22I, J), not pale brown. The life coloration of *C. jugum* n. sp., unfortunately, is not known. The posterior margin of the epistome of *C. fasciata* (Fig. 18C, D) most closely resembles that of *C. jugum* n. sp. with the median part salient and the lateral margins wide and prominently concave (Figs 21C, D). The dorsal carapace features of *C. fasciata* are, however, very different, being evenly convex (Fig. 18A, B); in *C. jugum* n. sp. (and *C. polita*) the gastric and cardiac regions are distinctively swollen laterally and the surface appears gently corrugated with a distinct transverse furrow between the regions (Figs 16A, B; 17A, B, E; 27G, H). The G1 of *C. fasciata* is distinct among the species treated here in that it is relatively straight with the structure gradually tapering from the broad base (Fig. 25J), although the distal part (Fig. 25K, L) resembles those of *C. abyssicola*, *C. longipes*, and *C. verdensis* (Fig. 23B, C, F, G, J, K; 24B, C).

Carcinoplax adelphia n. sp.
(Figs 19A–H; 20A–I; 25F–I; 27E, F)

urn:lsid:zoobank.org:act:4AA2E938-5F47-4B42-8BCC-83A2CD1D8E18

TYPE MATERIAL. — **Holotype.** Vanuatu • ♂, 19.4 × 25.4 mm; Vanuatu; MNHN-IU-2016-8002.

Paratypes. Vanuatu • 2 ♀, largest 16.9 × 22.4 mm; SANTO 2006, stn AT19, S. Urelapa I.; 15°41'S, 167°01'E; 503–600 m depth; 21.IX.2006, ZRC 2009.0997 • 1 ovigerous ♀, 14.4 × 19.0 mm; SANTO 2006, stn AT96, Big Bay, Santo; 15°06.9'S, 166°52.8'E; 328–354 m depth; 14.X.2006; ZRC 2018.1412 • 1 ♀, 16.9 × 22.4 mm, 1 ♂, 15.7 × 21.2 mm; SANTO 2006, stn AT98, Big Bay; 15°06.6'S, 166°50.6'E; 347–394 m depth; 14.X.2006; ZRC 2009.0922 • 5 ♀, 16.5 × 22.5 mm, 2 ♂, larger one cl 12.3 mm, damaged; same data as ZRC 2009.0922; ZRC 2009.0998 • 1 ♂, 18.8 × 29.9 mm; SANTO 2006, stn AT99, Big Bay; 15°05.5'S, 166°50.9'E; 351–395 m depth; 14.X.2006; ZRC 2008.0907 • 10 ♀, largest 13.6 × 18.3 mm, 15.9 × 20.8 mm, 1 ♂, 16.0 × 22.9 mm; same data as ZRC 2008.0907; ZRC 2009.0996 • 1 ovigerous ♀, 17.7 × 24.2 mm; same data as ZRC 2008.0907; ZRC 2018.1413 • 3 ♀, largest 15.1 × 19.3 mm, 14 ♂; SANTO 2006, stn AT100, Big Bay; 15°06.0'S, 166°51.4'E; 399–416 m depth; 14.X.2006; MNHN-IU-2016-8002 • 1 ovigerous ♀, 8.5 × 11.2 mm, 1 ♂, 7.6 × 11.2 mm; SANTO 2006, stn AT121, W Malo I.; 15°38.7'S, 167°01.2'E; 275–290 m depth; 19.X.2006, ZRC 2009.0989 • 1 ♂, trap 3, no other data, MNHN-IU-2010-5546.

TYPE LOCALITY. — Vanuatu, SANTO 2006; stn AT100, Big Bay; 15°06.0'S, 166°51.4'E; 399–416 m depth.

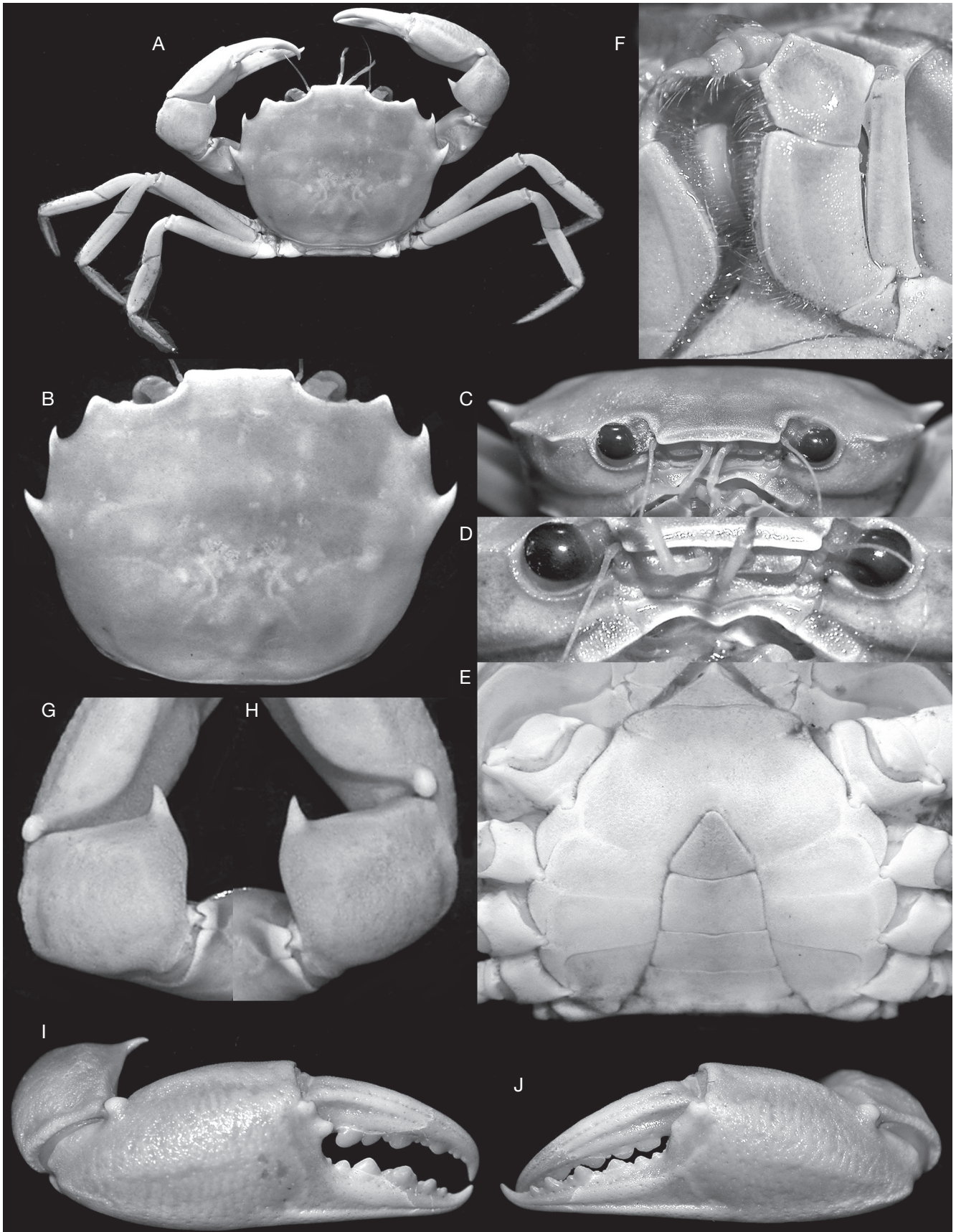


FIG. 18. — *Carcinoplax fasciata* Ng & Kumar, 2016, holotype ♂ (25.8 × 19.3 mm) (DABFUK), India: **A**, overall habitus; **B**, dorsal view of carapace; **C**, frontal view of cephalothorax; **D**, posterior margin of epistome; **E**, thoracic sternum and pleon; **F**, left third maxilliped; **G**, dorsal view of carpus of left cheliped; **H**, dorsal view of carpus of right cheliped; **I**, outer view of right chela; **J**, outer view of left chela.

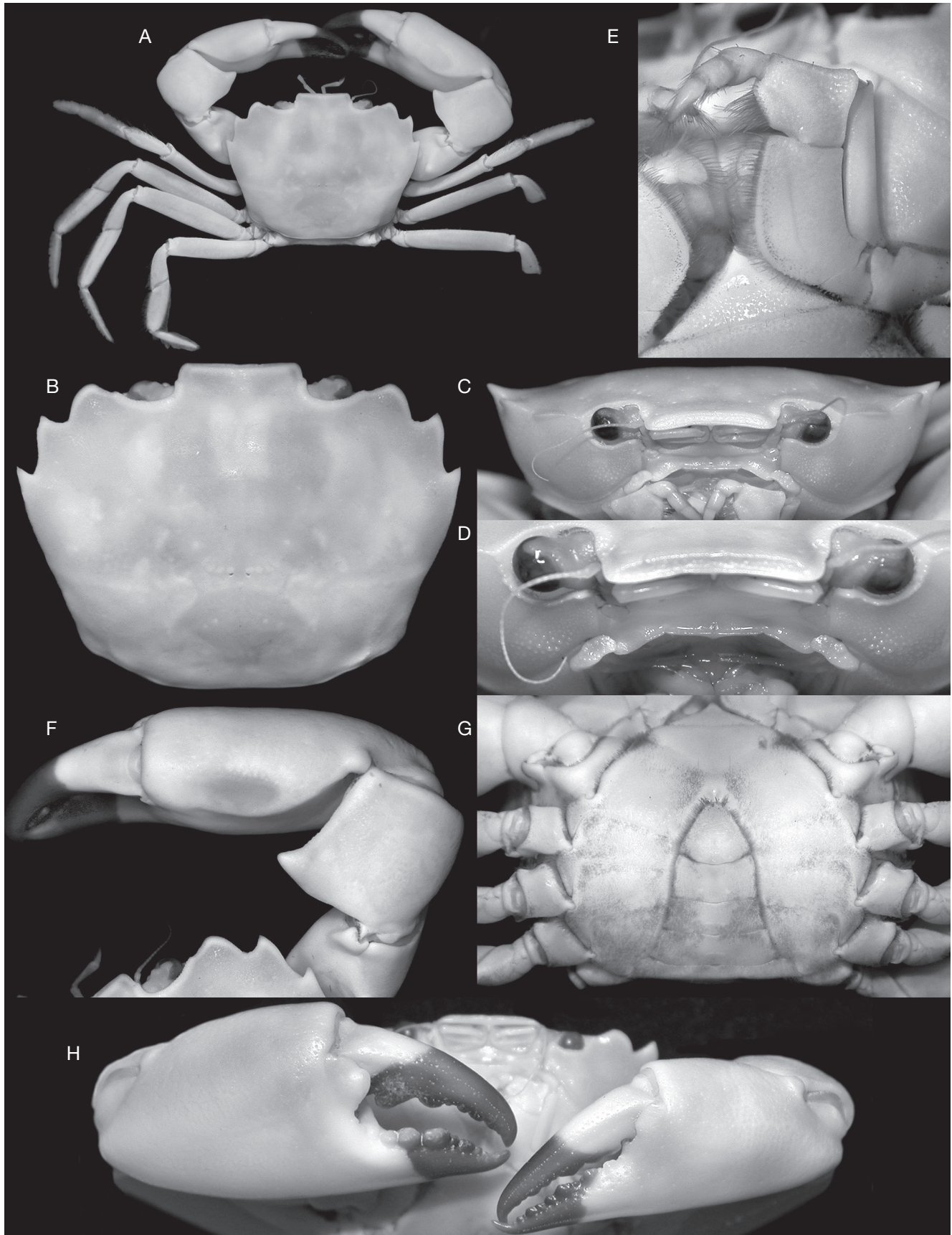


FIG. 19. — *Carcinoplax adelphia* n. sp., holotype ♂ (19.4 × 25.4 mm) (MNHN-IU-2016-8002), Vanuatu: **A**, overall habitus; **B**, dorsal view of carapace; **C**, frontal view of cephalothorax; **D**, posterior margin of epistome; **E**, left third maxilliped; **F**, dorsal view of right cheliped; **G**, thoracic sternum and pleon; **H**, outer view of chelae.

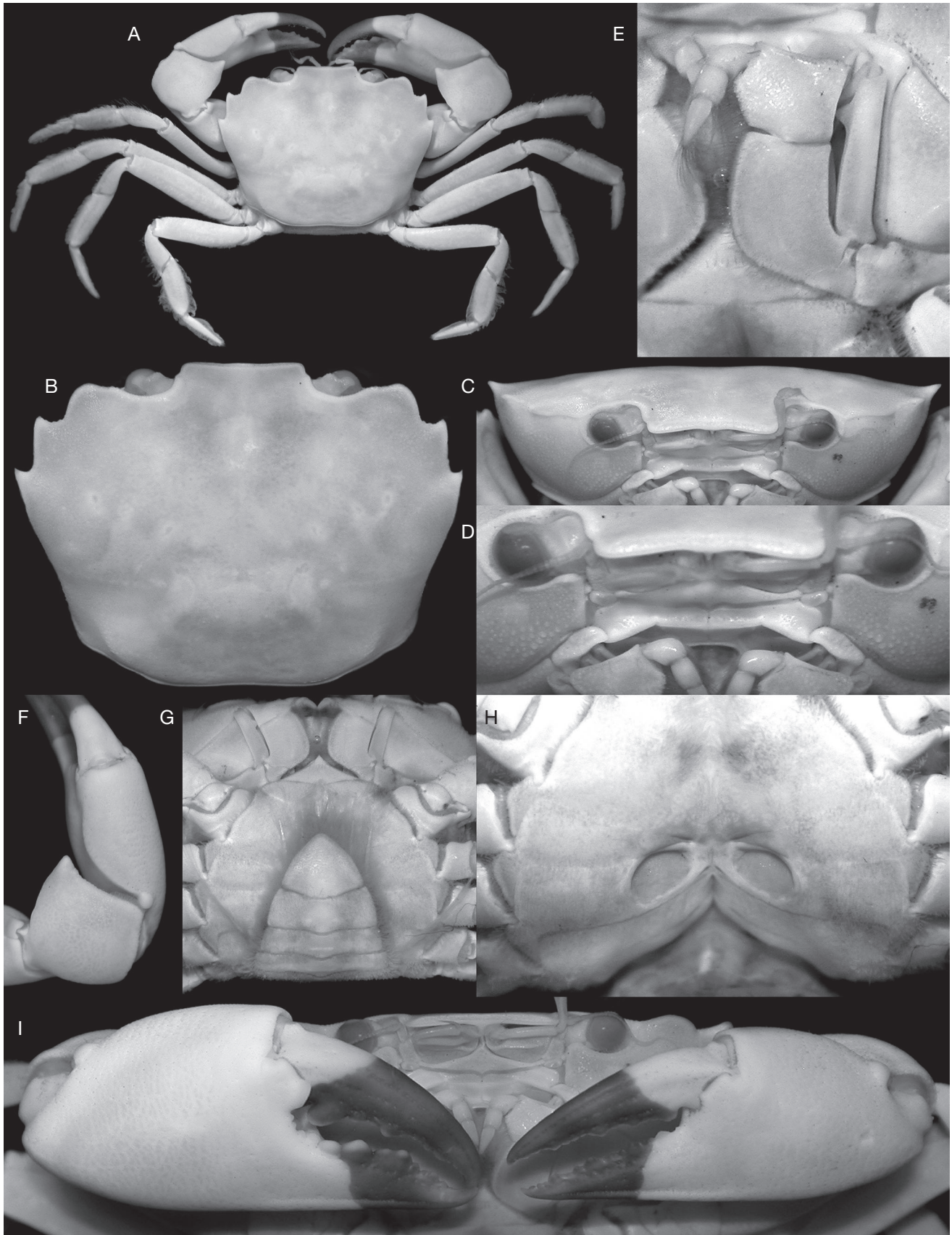


FIG. 20. — *Carcinoplax adelphia* n. sp., paratype ♀ (16.9 × 22.4 mm) (ZRC 2009.0992), Vanuatu: **A**, overall habitus; **B**, dorsal view of carapace; **C**, frontal view of cephalothorax; **D**, posterior margin of epistome; **E**, left third maxilliped; **F**, dorsal view of carpus of right cheliped; **G**, thoracic sternum and pleon; **H**, sterno-pleonal cavity and vulvae; **I**, outer view of chelae.

DIAGNOSIS. — Carapace (Figs 19A, B; 20A, B; 27E, F) quadrate, slightly wider than long (1.4 × wider than long in holotype); slightly convex, smooth. Front (Figs 19C, D; 20C, D) straight, slight notch between front, inner edge of supraorbital border. Rounded, short tooth on outer orbital angle; two slender, acute-tipped anterolateral teeth on each side of carapace. Conspicuous granules on subhepatic, pterygostomial regions (Figs 19C, D; 20C, D), becoming more pronounced in pterygostomial crest, ridge; short granules on anterior, dorsal surface of carapace. Posterior margin of epistome (Figs 19D; 20D) straight, slight notch on each lateral margin. Distal 2/3 to half of fingers dark brown in females (Fig. 20A, F, I), males (Fig. 19A, F, H). Smooth, oblong “window” on inner, dorsal surface of cheliped propodi of some males (Fig. 19F). Inner (ventral), distal margin of cheliped carpus (Figs 19F; 20F) with triangular tooth. P2-P5 (Figs 19A; 20A; 27E, F) moderately stout in appearance, P5 not reaching second anterolateral tooth. Male pleon (Fig. 19G) proportionally narrow. G1 (Fig. 25F-H) slender; pointed tip with scattered spinules; G2 (Fig. 25I) slender, nearly equal or slightly longer than G1, slightly curved flagellum, tip with two lateral spinules.

ETYMOLOGY. — The name is derived from the Greek *adelphos* for ‘brother’ or ‘sister,’ alluding to the close affinities of the new species with *C. specularis*. The name is treated as a noun.

COLOUR IN LIFE. — Orange with a semi-circular row of small white spots on each side of the carapace (Fig. 27E, F).

GEOGRAPHICAL DISTRIBUTION. — Vanuatu.

DEPTH. — Present in samples collected at depths of 275–600 m.

REMARKS

Carcinoplax adelphia n. sp. and *C. specularis* are superficially very similar, including the spots on the dorsal surface of the carapace shown in life (Fig. 27E, F for *C. adelphia* n. sp.; Fig. 27D for *C. specularis*). They are, however, easily separated by the structure of their G1s. The G1 is relatively shorter and stouter in *C. specularis* (Fig. 25A, B), than in *C. adelphia* n. sp., which is more elongated, particularly the distinctly more slender distal half (Fig. 25F).

Carcinoplax specularis can be also separated from allied species by the obtusely triangular median part of the posterior margin of its epistome, which extends beyond the lateral margins, with the lateral margins gently concave (Figs 10D; 11D; 12D) (median part very low and almost at the same level as the lateral margins, which are almost straight in *C. adelphia* n. sp.; Figs 19D; 20D). Both share a similar colour pattern, with two unique semi-circular rows of white spots on the dorsal surface of the carapace of live individuals (Fig. 27D for *C. specularis*; Fig. 27E, F for *C. adelphia* n. sp.).

Like in *C. specularis*, a “window” on the chela was found in a few large males of *C. adelphia* n. sp.: 15.7 × 21.2 mm (ZRC 2009.0922), 18.8 × 29.9 mm (ZRC 2008.0907) and the holotype 19.4 × 25.4 mm (MNHN-IU-2016-8002). These are not obvious in females or juveniles.

Carcinoplax jugum n. sp. (Figs 21A–I; 22A–J; 25Q–T)

urn:lsid:zoobank.org:act:AF26AE84-ADE8-4F9A-9A41-BA26DEAFE781

TYPE MATERIAL. — **Holotype.** Philippines • ♂, 45.5 × 33.6 mm; Philippines; ZRC 2004.0777.

Paratypes. Philippines • 1 ♀, 25.7 × 33.8 mm; Bohol, Balicasag I., off Panglao I., tangle nets of local fishermen; 09°31'00.2"N, 123°40'50.5"E; 28.XI.2001; ZRC 2001.0528 • 1 ♂, 24.2 × 32.8 mm; same location as ZRC 2002.0528; 50–500 m depth; ZRC 2001.0973 • 3 ♀, 23.3 × 31.4 mm, 24.9 × 33.4 mm, 27.0 × 35.7 mm, 3 ♂, 13.8 × 19.6 mm, 13.9 × 19.9 mm, 17.2 × 22.2 mm; same location as ZRC 2002.0528; 25–30.VII.2003; ZRC 2004.0750 • 1 ♀, 4 ♂, largest 35.9 × 48.4 mm, smallest 13.6 × 18.9 mm; same location as ZRC 2002.0528; 25–30.VII.2006; ZRC 2001.0845 • 2 ♀, 23.9 × 30.5, 26.8 × 35.3 mm; same location as ZRC 2002.0528; ZRC 2004.0730 • 6 ♀, largest 31.7 × 41.4 mm; same location as ZRC 2002.0528; 200–300 m depth; ZRC 2002.0655 • 1 ♀, 25.1 × 32.5 mm; PANGLAO 2005, stn CP2343, off Pamilican I.; 09°27.4'N, 123°49.4'E; 273–356 m depth; 23.V.2005; ZRC 2006.0217 • 2 ♂, 38.5 × 50.5, 41.4 × 63.0 mm; Maribohoc Bay; coll. J. Arbasto, VII.2004 to V.2005; ZRC 2018.1432 • 1 ♀, 26.8 × 35.2 mm, 1 juvenile ♀, 11.0 × 14.2 mm; PANGLAO 2005, stn CP2359, Bohol Sea; 08°49.9'N, 123°34.9'E; 437–476 m depth; 26.V.2005; ZRC 2018.1433 • 1 juvenile ♀, 13.8 × 18.0 mm; PANGLAO 2005: stn CP2406, Maribohoc Bay, 9°40.6'N, 123°46.8'E; 334–387 m depth; 1.VI.2005; ZRC 2018.1434 • 1 ♀, 30.0 × 40.2 mm, 1 ♂, 23.7 × 31.4 mm; PANGLAO 2005, stn PN1, tangle nets; 09°31'00.2"N, 123°40'50.5"E; 29.V.2004; ZRC 2004.0777.

TYPE LOCALITY. — Philippines, Bohol, Balicasag I., off Panglao I.; PANGLAO 2004, stn P4, tangle nets of local fishermen.

DIAGNOSIS. — Carapace (Figs 21A, B; 22A, B) quadrate, slightly wider than long (1.3 × wider than long in holotype); slightly convex, marked by two distinct transverse elevations across cardiac, gastric regions. Front (Figs 21C, D; 22C, D) slightly sinuous, slight oblique notch between front, inner edge of supraorbital border. Conspicuous, salient ocular margins, subocular tooth. Triangular, elevated tooth on outer orbital angle; two slender, acute-tipped anterolateral teeth on each side of carapace. Short granules on subhepatic, pterygostomial regions (Figs 21C, D; 22C, D), becoming more pronounced in pterygostomial crest, ridge. Posterior margin of epistome (Figs 21D; 22D) sinuous, with median salient tip, lateral margins wide, concave. Distal third to half of fingers dark brown in females (Fig. 22I, J), males (21A, I, J). Inner (ventral), distal margin of cheliped carpus (Figs 21F, D; 22F) with long, slender, acute-tipped tooth. P2–P5 long, slender in appearance. Male pleon (Fig. 21H) proportionally narrow. G1 (Fig. 25Q–S) slender; conspicuously pointed tip; G2 (Fig. 25T) slender, nearly equal or slightly longer than G1, slightly curved flagellum, tip with two lateral spinules.

ETYMOLOGY. — From the Latin *jugum* for ‘yoke’; in reference to the diagnostic yoke-like, wide, and prominently concave lateral margins of the posterior margin of the epistome. Used as a noun in apposition.

COLOUR IN LIFE. — Not known.

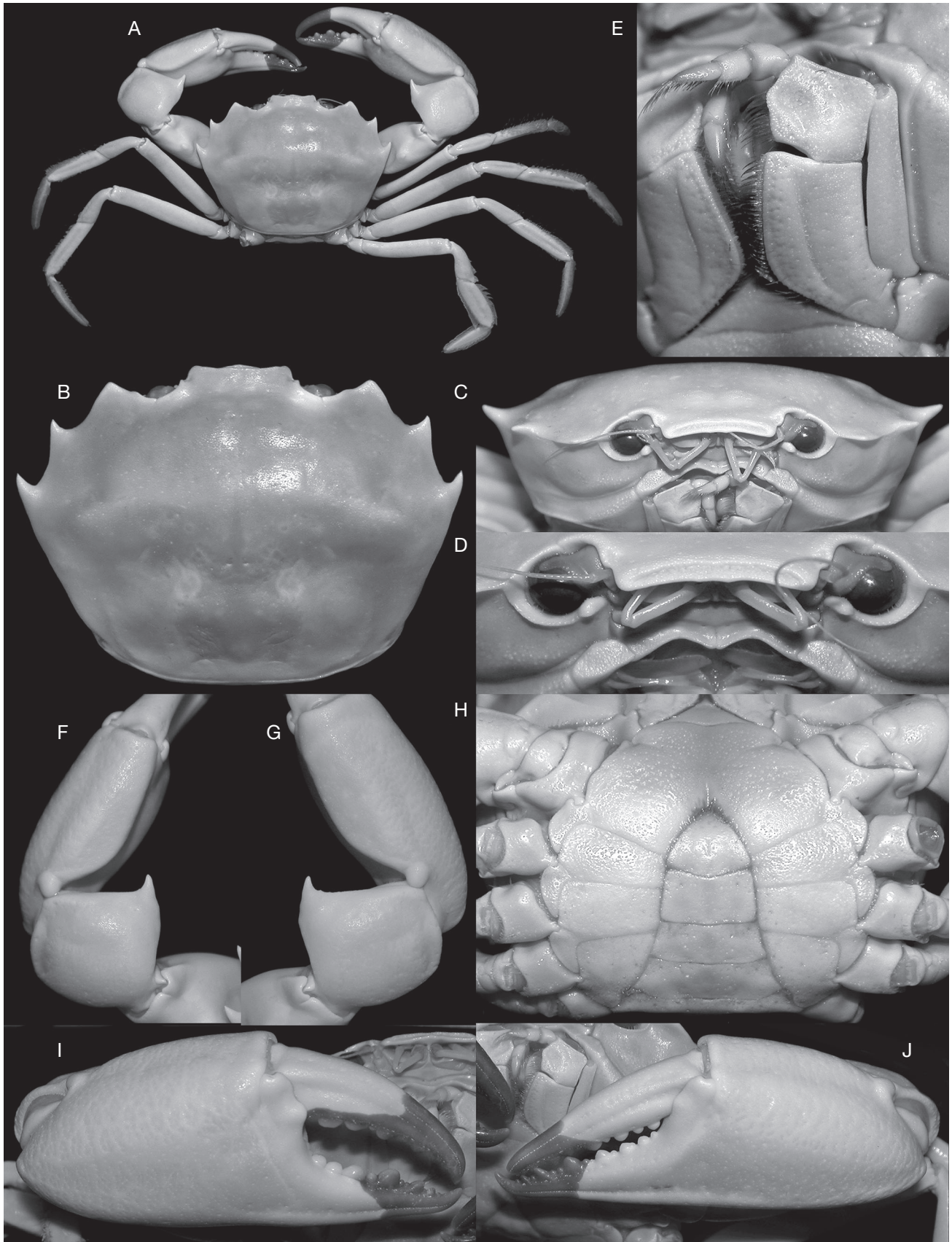


FIG. 21. — *Carcinoplax jugum* n. sp., holotype ♂ (33.6 × 45.5 mm) (ZRC 2004.0777), Philippines: **A**, overall habitus; **B**, dorsal view of carapace; **C**, frontal view of cephalothorax; **D**, posterior margin of epistome; **E**, left third maxilliped; **F**, dorsal view of carpus of left cheliped; **G**, dorsal view of carpus of right cheliped; **H**, thoracic sternum and pleon; **I**, outer view of right chela; **J**, outer view of left chela.

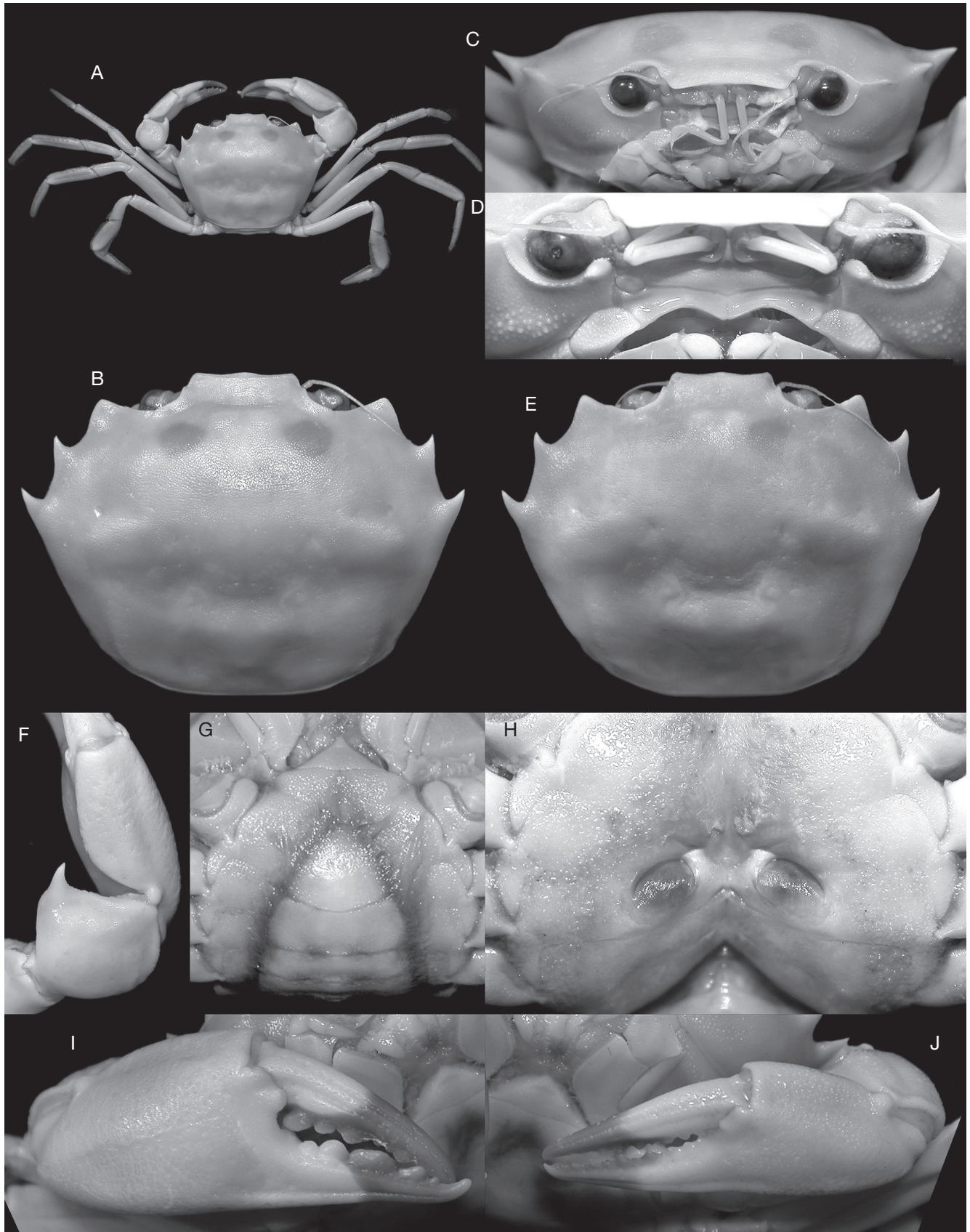


FIG. 22. — *Carcinoplax jugum* n. sp.: **A–C, F–J**, paratype ♀ (25.1 × 32.5 mm) (ZRC 2006.0217), Philippines; **D, E**, paratype ♀ (26.9 × 35.4 mm) (ZRC 2018.1431), Philippines: **A**, overall habitus; **B, E**, dorsal view of carapace; **C**, frontal view of cephalothorax; **D**, posterior margin of epistome; **F**, dorsal view of carpus of right cheliped; **G**, thoracic sternum and pleon; **H**, sternopleonal cavity and vulvae; **I**, outer view of right chela; **J**, outer view of left chela.

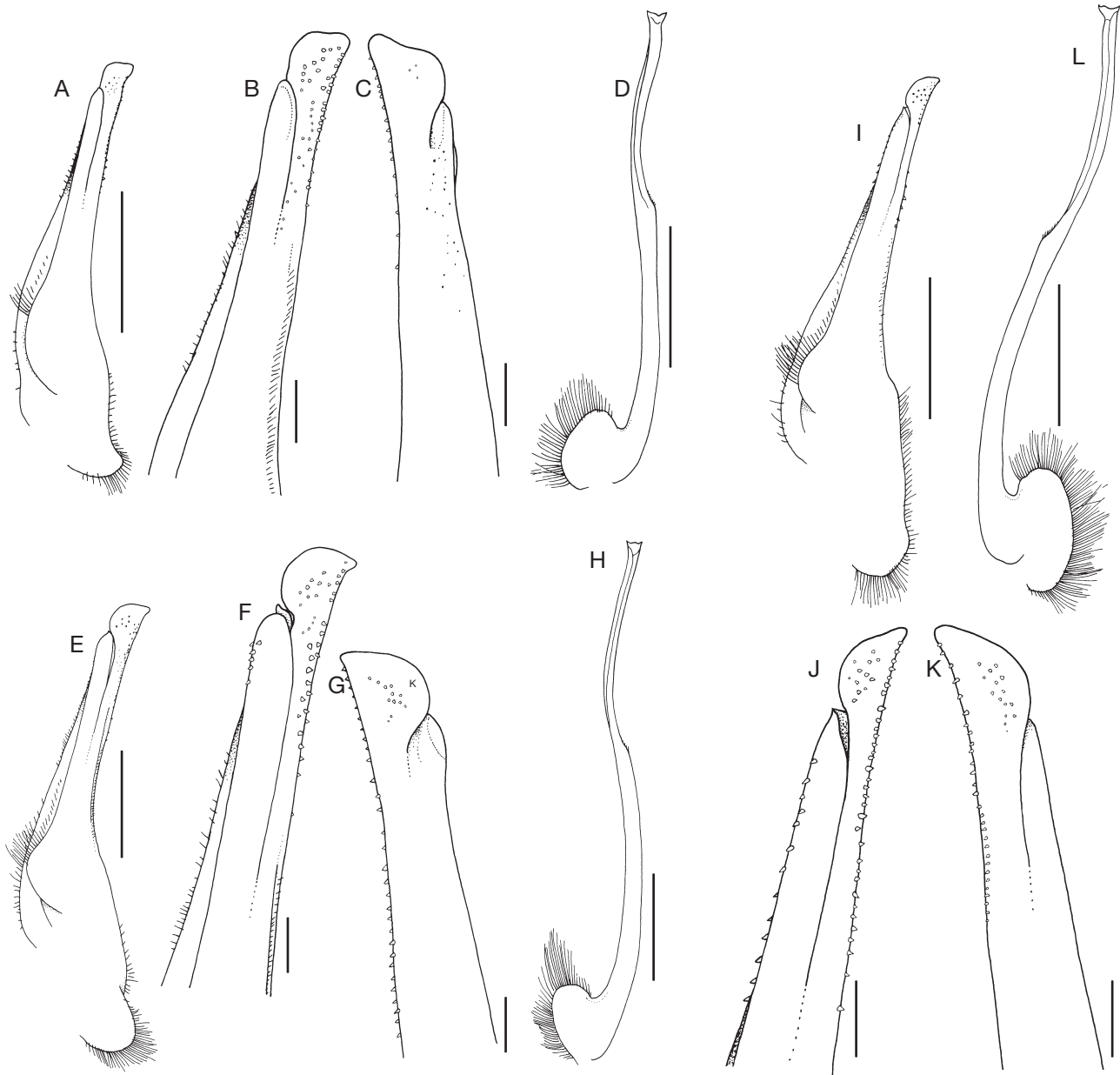


FIG. 23. — Gonopods: **A–D**, *Carcinoplax abyssicola* (Miers, 1885), ♂ (8.0 × 10.4 mm) (MNHN-IU-2014-11535), Fiji; **E–H**, *C. abyssicola*, ♂ (11.0 × 15.5 mm) (MNHN-IU-2014-11529), Fiji; **I–L**, *C. longipes* (Wood-Mason, 1891), ♂ (9.9 × 13.9 mm) (ZRC 2018.1424), Java. **A, E, I**, left G1 (ventral view); **B, F, J**, distal part of left G1 (ventral view); **C, G, K**, distal part of left G1 (dorsal view); **D, H**, right G2 (left G2 damaged); **L**, left G2. Scale bars: A, D, E, H, I, L, 1.0 mm; B, C, F, G, J, K, 0.2 mm.

GEOGRAPHICAL DISTRIBUTION. — Philippines.

DEPTH. — Present in samples collected at depths of approximately 50–500 m (273–476 m where depths were more accurately measured).

REMARKS

See Remarks for *C. polita*.

It is noteworthy that most of the specimens of *C. jugum* n. sp. collected were obtained from tangle nets set on steep deep-sea cliffs, a habitat which is hard to survey (see Ng *et al.* 2009; Mendoza *et al.* 2010). This probably explains the paucity of specimens of this species from trawled material in earlier expeditions to Philippines.

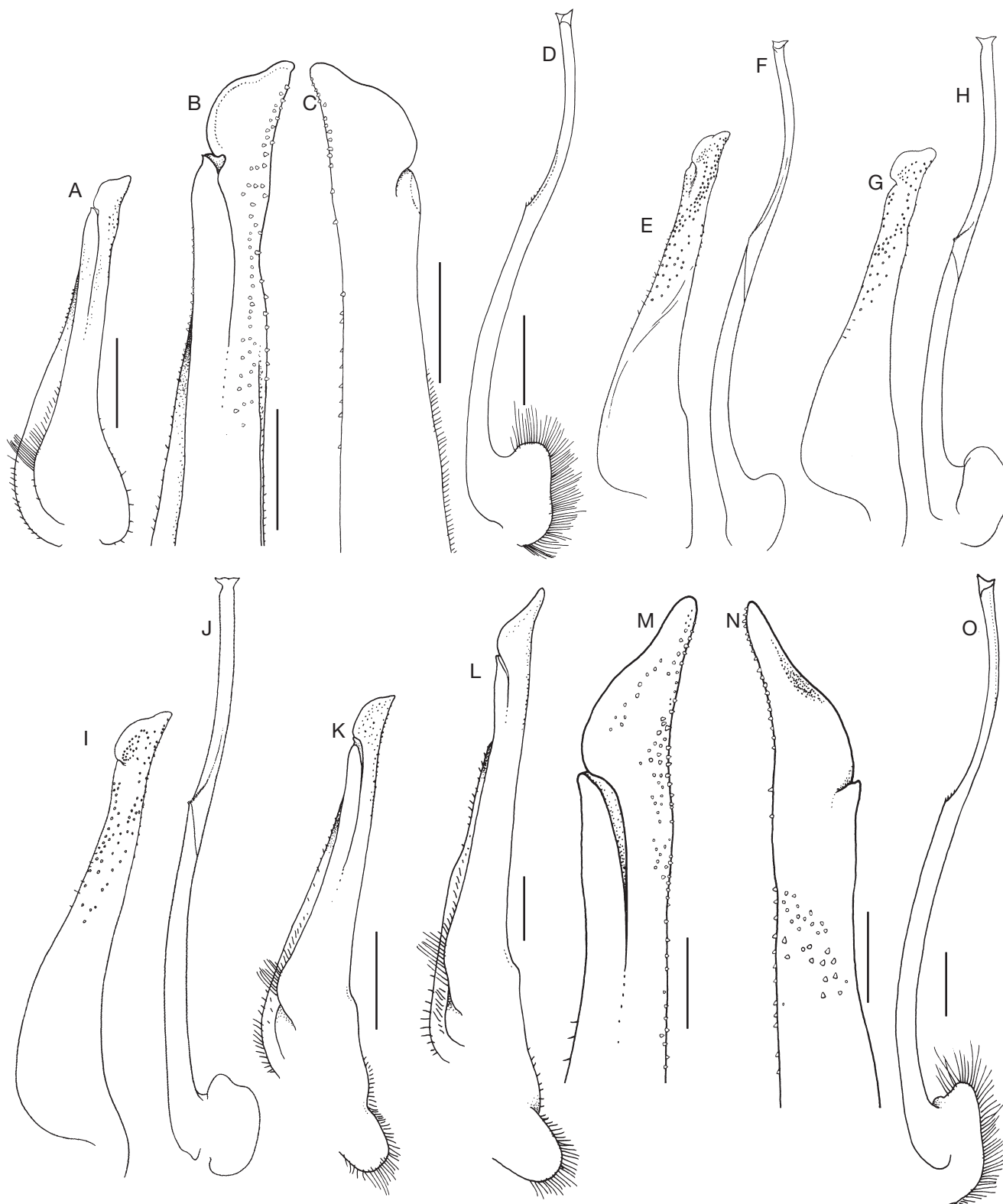


FIG. 24. — Gonopods: **A–D**, *Carcinoplax verdensis* Rathbun, 1914, ♂ (14.9 × 20.2 mm) (ZRC 2019.0547), Philippines; **E, F**, *C. verdensis*, ♂ (18.0 × 24.4 mm) (MNHN-B10377), Philippines; **G, H**, *C. verdensis*, ♂ (13.0 × 18.0 mm) (MNHN-B10264), Philippines; **I, J**, *C. polita* Guinot, 1989, holotype ♂ (15.0 × 19.0 mm) (MNHN-B10141), Philippines; **K**, *C. polita*, ♂ (14.5 × 20.0 mm) (ZRC 2000.0173), Philippines; **L–O**, *C. polita*, ♂ (25.9 × 30.1 mm) (ZRC 2019.0545), Philippines. **A, K, L**, left G1 (ventral view); **B, M**, distal part of left G1 (ventral view); **C, N**, distal part of left G1 (dorsal view); **E, G, I**, right G1 (dorsal view); **D, J, O**, **D, L, H**, left G2; **F, H, J**, right G2. **E–H**, after Guinot (1989: figs 35A, B; 36A, B) (as *C. aff. longipes*); **I, J**, after Guinot (1989: fig. 37A, B). Scale bars: A, D, K, L, O, 1.0 mm; B, C, M, N, 0.5 mm; E, F, G, H, not to scale.



FIG. 25. — Gonopods: **A-E**, *Carcinoplax specularis* Rathbun, 1914, holotype ♂ (16.7 × 23.0 mm) (USNM 46164), Philippines; **F-I**, *C. adelphia* n. sp., holotype ♂ (19.4 × 25.4 mm) (MNHN-IU-2016-8002), Vanuatu; **J-P**, *C. fasciata* Ng & Kumar, 2016, holotype ♂ (25.8 × 19.3 mm) (DABFUK), India; **Q-T**, *C. jugum* n. sp., holotype ♂ (33.6 × 45.5 mm) (ZRC 2004.0777), Philippines. **A**, right G1 (dorsal view); **B**, right g1 (ventral view); **C**, distal part of right G1 (ventral view); **D**, distal part of right G1 (dorsal view); **E**, right G2; **F**, **J**, **Q**, left G1 (ventral view); **G**, **K**, **R**, distal part of left G1 (ventral view); **H**, **L**, **S**, distal part of left G1 (dorsal view); **I**, **M**, **D**, **Q**, left G2; **N**, right G2; **O**, **P**, distal part of right G2. **A**, after Guinot (1989: fig. 34A). Scale bars: A, B, E, F, I, J, M, N, Q, T, 1.0 mm; C, D, G, H, K, L, R, S, 0.5 mm; O, P, 0.25 mm.



FIG. 26. — Colour in life, *Carcinoplax abyssicola* (Miers, 1885). **A**, ♀ (10.4 × 14.6 mm) (ZRC 2008.0970), Vanuatu; **B**, ♂ (8.0 × 10.6 mm) (ZRC 2018.1419), Vanuatu; **C**, ♀ (12.4 × 17.6 mm) (ZRC 2018.1414), Java; **D**, ♂ (13.0 × 19.4 mm) (ZRC 2018.1416), Java; **E**, ♂ (12.8 × 19.1 mm) (ZRC 2018.1415), Java; **F**, ♀ (14.8 × 20.0 mm) (ZRC 2018.1415), Java. Photographs: SJADES.

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FIG. 27. — Colour in life: **A**, *Carcinoplax longipes* (Wood-Mason, 1891), ♂ (9.0 × 12.4 mm) (ZRC 2018.1422), Java; **B**, *C. longipes*, ♂ (10.8 × 14.4 mm) (ZRC 2018.1427), Java; **C**, *C. longipes*, ovigerous ♀ (10.8 × 14.3 mm) (ZRC 2018.1420), Java; **D**, *C. specularis* Rathbun, 1914, ♂ (18.4 × 25.8 mm) (ZRC 2001.0134), Taiwan; **E**, *C. adelphia* n. sp., paratype ♂ (15.7 × 21.2 mm) (ZRC 2009.0922), Vanuatu; **F**, *C. adelphia* n. sp., paratype ♀ (16.9 × 22.4 mm) (ZRC 2009.0922), Vanuatu; **G**, *C. polita* Guinot, 1989, ♀ (12.8 × 17.8 mm) (ZRC 2006.0176), Philippines; **H**, *C. polita*, ♂ (6.5 × 7.9 mm) (ZRC 2018.1417), Java. Photographs: A-C, SJADES; D, P.-H. Ho; E-H, T.-Y. Chan.



FIG. 28. — Colour in life: **A**, *Carcinoplax verdensis* Rathbun, 1914, ♂ (16.9 × 23.0 mm) (ZRC 2009.1003), Philippines; **B**, *C. verdensis*, ♂ (15.7 × 21.4 mm) (ZRC 2019.0549), Philippines; **C**, *C. verdensis*, ♂ (19.2 × 27.7 mm) (ZRC 2019.0555), Philippines; **D**, *C. verdensis*, ♀ (5.8 × 8.1 mm) (ZRC 2019.0548), Philippines; **E**, *C. verdensis*, ♀ (12.8 × 17.9 mm) (ZRC 2019.0559), Philippines; **F**, *C. verdensis*, ♀ (7.9 × 10.9 mm) (ZRC 2019.0560), Philippines; **G**, 1 ♀ (6.8 × 8.8 mm) (ZRC 2019.0374), South China Sea; **H**, *C. fasciata* Ng & Kumar, 2016, holotype ♂ (25.8 × 19.3 mm) (DABFUK), India. Photographs: D-G, T.-Y. Chan; H, B. Kumar.

SALOMON BOA 3 (<https://doi.org/10.17600/7100070>);
BOA 0 (<https://doi.org/10.17600/4100140>); BOA 1
(<https://doi.org/10.17600/5100060>); SANTO 2006
(<https://doi.org/10.17600/6100110>); SMIB 6 (<https://doi.org/10.17600/7100070>);

doi.org/10.17600/90005911); BATHUS 4 (<https://doi.org/10.17600/94100030>); EXBODI (<https://doi.org/10.17600/11100080>); BORDAU 1 (<https://doi.org/10.17600/99100020>); BORDAU 2 (<https://doi.org/10.17600/99100020>);

KEY TO SPECIES OF *CARCINOPLAX* H. MILNE EDWARDS, 1852

1. One well-developed, anteriorly curved anterolateral tooth posterior to outer orbital tooth on each side of carapace (Guinot 1989: pl. 13, fig. F, as *C. eury sternum* Guinot & Richer de Forges, 1981) *C. ischurodous* (Stebbing, 1923).
— Two anterolateral teeth posterior to outer orbital angle (1 or 2 anterolateral teeth may be greatly reduced or even obsolete in some large individuals) 2
2. Adults attain large size (cl more than 30–40 mm), with reduced outer orbital and anterolateral teeth (obsolete in largest individuals), rounded anterolateral borders (carapace becoming almost spherical), and much enlarged chelipeds (P1) with conspicuously elongated meri, propodi 3
— Adults do not attain large size (cl less than 30–40 mm), do not show progressive reduction in outer orbital (if present) and anterolateral teeth with corresponding rounded anterolateral borders and chelipeds (P1) with conspicuously elongated meri, propodi 8
3. Low, conspicuous granules on carapace; small individuals with triangular, acute, curved, acute first and second anterolateral teeth (Guinot 1989: pl. 1, fig. D); uniformly red to dark red-brown carapace in life, bright red-brown markings on chelipeds (P1) *C. longimana* (De Haan, 1833).
— No conspicuous granules on carapace; small individuals with narrow, acute anterolateral teeth, or small, blunt first anterolateral teeth; in life, carapace not uniformly red or dark-red brown 4
4. Small- to medium-size individuals with 2 narrow, acute, spine-like anterolateral teeth below acute, conspicuous outer orbital tooth on each side of carapace (Guinot 1989: pl. 1, figs G, H; Hsueh & Huang 2002: fig. 6A); carapace nearly quadrate, with red, round spot on dorsal surface in most individuals when fresh (Hsueh & Huang 2002: fig. 8B) *C. indica* Doflein, 1904.
— Small- to medium-size individuals with blunt first anterolateral tooth, second tooth curved, acute; carapace globose; never with red spot on carapace in life 5
5. Outer orbital angle with low tooth or absent; second anterolateral tooth short, low (more conspicuous in small individuals), not hook-like 6
— Outer orbital angle with distinct tooth; second anterolateral tooth usually distinct, elongated, hook-like 7
6. P2–P5 relatively short; anterolateral teeth may be low in larger individuals but always visible (Ng & Mitra 2019: fig. 6C, D); purple-red vertical band across carapace from front to posterior border in life (Hsueh & Huang 2002: fig. 8C); western Pacific *C. purpurea* Rathbun, 1914.
— P2–P5 relatively longer; anterolateral tooth short, absent in large individuals (Guinot 1989: fig. 9A–C; pl. 3, figs A, C, E); carapace uniformly colored in life; Red Sea and Persian Gulf *C. monodi* Guinot, 1989.
7. G1 with rounded, truncated tip (Ng & Mitra 2019: fig. 8K, L, N); western Pacific *C. sinica* Chen, 1984.
— G1 with pointed tip (Ng & Mitra 2019: fig. 8E, F); Indian Ocean *C. mistio* Ng & Mitra, 2019.
8. Carapace, chelipeds (P1), and P2–P5 covered with conspicuous short setae 9
— Carapace, chelipeds (P1), and/or P2–P5 may have sparse setae, short tomentum, or mostly or completely devoid of conspicuous setae, or tomentum 10
9. Conspicuous, acute tubercles on proximal portion of P1 propodi (may be absent in large individuals) (Hsueh & Huang 2002: fig. 5E); distal quarter of fingers darkly pigmented; acute tooth on distal portion of P2–P5 meri (Chen 1998: fig. 4–2; Hsueh & Huang 2002: fig. 5C); no conspicuous color pattern in life *C. spinosissima* Rathbun, 1914.
— Conspicuous, low, blunt tubercles on proximal portion of cheliped (P1) propodi (Guinot 1989: pl. 6, fig. H); distal half of fingers darkly pigmented; distal portion of P2–P5 meri smooth; in life with orange reticulated lines on P1 and carapace (obvious when denuded) *C. nana* Guinot, 1989.
10. Carapace, chelipeds (P1), and P2–P5 covered with short tomentum (large individuals only on ambulatory legs) (Hsueh & Huang 2002: fig. 7A) *C. tomentosa* Sakai, 1969.
— Carapace, chelipeds (P1), and P2–P5 not covered with conspicuous short tomentum 11
11. Outer orbital angle without tooth or eminence; with 2 thin, spine-like anterolateral teeth (Castro 2007: figs 4A, 5) *C. tenuidentata* Castro, 2007.
— Outer orbital angle ends in lobe or tooth; anterolateral teeth not thin, spine-like 12
12. Front with slight median notch (Guinot 1989: fig. 17) *C. confragosa* Rathbun, 1914.
— Front straight, without distinct median notch. 13

13. Conspicuous, well-developed anterolateral teeth, with acute, anteriorly-oriented or hook-like tips 18
 — Relatively small, blunt, non-spinous anterolateral teeth (Castro 2007: figs 7, 10) 24
14. P2-P5 long, relatively slender, distal end of folded P5 merus extending beyond tip of second anterolateral tooth 15
 — P2-P5 short, distal end of folded P5 merus only reaching or barely reaching tip of second anterolateral tooth 16
15. Two conspicuous, wide transverse ridges on dorsal surface of carapace (Castro 2007: fig. 3); western Pacific ..
 *C. cracens* Castro, 2007.
 — Dorsal surface of carapace evenly convex, without transverse ridges; eastern Indian Ocean
 *C. longipes* (Wood-Mason, 1891).
16. Two conspicuous, wide transverse ridges on dorsal surface of carapace *C. inaequalis* (Yokoya, 1933).
 — Dorsal surface of carapace evenly convex, without conspicuous ridges. 17
17. All anterolateral teeth anteriorly curved; narrow, J-shaped gap between outer orbital tooth and first anterolateral tooth (Castro 2009: fig. 1A); southwestern and central Pacific *C. uncinata* Castro, 2009.
 — Anterolateral teeth sharp but not curved (only first one in rare cases); outer orbital angle often prominent, rounded. 18
18. Posterior margin of epistome with median part pronounced, triangular, lateral margins conspicuously concave (Fig. 21D) 19
 — Posterior margin of epistome with truncated or nearly straight median part; lateral margins nearly straight or slightly sinuous (Fig. 3D) 20
19. Two transverse elevations across cardiac, gastric regions of carapace (Figs 21C, D; 22C, D); western Pacific ...
 *C. jugum* n. sp.
 — Dorsal surface of carapace evenly smooth, without transverse elevations; western Indian Ocean
 *C. fasciata* Ng & Kumar, 2009.
20. Outer, proximal margin of cheliped carpus with sharp tooth; western Pacific and eastern Indian Ocean
 *C. polita* Guinot, 1989.
 — Outer, proximal margin of cheliped carpus smooth, without tooth 21
21. P2-P5 proportionally short, stout, with distal end of folded P5 merus not reaching tip of second anterolateral tooth (e.g. Figs 10A; 11A; 19A; 20A) 22
 — P2-P5 proportionally long, slender, with distal end of folded P5 merus reaching tip of second anterolateral tooth (e.g. Figs 2A; 3A; 13A; 14A) 23
22. Posterior margin of epistome with median part not protruding (Figs 19D; 20D); G1 elongated, distal half distinctly slender (Fig. 25F); southwestern Pacific *C. adelphia* n. sp.
 — Posterior margin of epistome with median part pronounced, protruding (Figs 10D; 11D; 12D); G1 relatively short, stout (Fig. 25A, B); northwestern Pacific *C. specularis* Rathbun, 1914.
23. Fingers dark brown or black almost along their entire lengths (Figs 2H; 3I; 4H; 5H); inner distal angle of carpus of cheliped dentiform (Figs 2E, F; 3F, 4F, 5E); Indian Ocean and southwestern Pacific
 *C. abyssicola* (Miers, 1885).
 — Fingers dark brown or black along the distal two-thirds to half portions (Figs 13I, J; 14H); inner distal angle of carpus of cheliped usually spiniform with tip narrow (Figs 13F; 14F; 15E); western Pacific
 *C. verdensis* Rathbun, 1914.
24. Outer, dorsal surface of cheliped (P1) propodi and carpi with conspicuous granular tubercles (Castro 2007: fig. 8); P2-P5 relatively short (Fig. 7), distal end of folded P5 merus only reaching tip of second anterolateral tooth; western Pacific *C. tuberosa* Castro, 2007.
 — Outer, dorsal surface of chelipeds (P1) smooth; P2-P5 proportionally long (Castro 2007: fig. 10), distal end of folded P5 merus extending beyond tip of second anterolateral tooth; central and southwestern Pacific
 *C. velutina* Castro, 2007.

org/10.17600/100060); MUSORSTOM 10 (<https://doi.org/10.17600/98100080>). The specimens from the Papua New Guinea expeditions were collected by R.V. *Alis* during the BIOPAPUA (<https://doi.org/10.17600/10100040>) and PAPUA NIUGINI (<https://doi.org/10.17600/18000841>) ex-

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