

A NEW GENUS AND SPECIES OF GONEPLACID CRAB (DECAPODA, BRACHYURA, GONEPLACIDAE) FROM THE WESTERN PACIFIC

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ABSTRACT

A new genus and species of goneplacid crab are described from the Loyalty Islands and Fiji in the western Pacific. The new genus can be distinguished from the other 17 genera of the Goneplacidae sensu stricto by a carapace that lacks anterolateral teeth together with moderately long orbits and eye peduncles.

RÉSUMÉ

Un nouveau genre et une nouvelle espèce de crabe Goneplacidae sont décrits des îles Loyauté et de Fiji dans le Pacifique ouest. Le nouveau genre est distingué des autres 17 genres de Goneplacidae sensu stricto par l'absence des dents antero-laterales de la carapace et par des orbites et pedoncles oculaires de tailles réduites.

INTRODUCTION

Two unidentified specimens of goneplacid crabs collected by French expeditions in the Loyalty Islands and Fiji in the western Pacific are here referred to as a new genus and species, *Guinoplax aphaeles*. The new genus differs markedly from the 17 known genera of the Goneplacidae sensu stricto

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(see Castro, 2007) with regard to the form of the carapace, chelae, and male pleopods.

The ambulatory legs are referred to by the abbreviations P2 to P5; the first and second pairs of male pleopods by G1 and G2, respectively. Paired appendages, including the G1 and G2, are referred to in the singular for simplicity. Carapace length (CL) was measured in millimetres along the median portion of the carapace from the middle of the front to the middle of the posterior border of the carapace; carapace width (CW) across the widest breadth of the carapace; width of the front between the outer edges of the frontal margins; length of the orbit dorsally from the inner extremity of the orbit to the tip of the outer orbital angle; length of the eye peduncle dorsally from the proximal edge of the peduncle to the margin of the cornea immediately posterior to the thin extension of the peduncle; width of the cornea dorsally from its proximal edge posterior to the thin extension of the peduncle to its distal margin.

The material examined is deposited in the Muséum national d'Histoire naturelle, Paris (MNHN).

TAXONOMY

Family GONEPLACIDAE MacLeay, 1838

Guinoplax new genus

Type species. — *Guinoplax aphaeles*, new species, by monotypy. Gender feminine.

Etymology. — The new genus is an arbitrary combination of the name of Danièle Guinot, our teacher, collaborator, and loyal friend for many years, and *plax*, Greek for “plate” or “tablet”, a common suffix also used for many related goneplacid genera.

Diagnosis. — Carapace with convex anterolateral borders lacking teeth, front slightly bilobed. Orbits long (slightly longer than front), wide; outer orbital angle sharp, triangular, directed anteriorly. Eye peduncles moderately long (0.6 times frontal width), cornea slightly elongated. Chelipeds relatively short, tips of fingers light in colour; right chela with enlarged “cutting” tooth at base of dactylus. Sternal sutures 4/5, 5/6, 7/8 interrupted medially, 6/7 complete; sternites 7, 8 with median line. Male abdomen wide; somite 2 slightly narrower than somite 1, somite 3 covers space between P5 coxae, such that thoracic sternite 8 is covered by somites 2, 3 of closed abdomen. Penis

opens anterior to coxo-sternal condyle of P5 coxa, moderate size; protected by expanded episternite 7. G1 proportionally long, distally slender, slightly bent, numerous spinules distally, acuminate apex; G2 slender, almost as long as G1, flagellum distinct from basal part, as long as basal part, arched, slightly expanded tip with 2 lateral spinules. Female not known.

Remarks. — *Guinoplax* new genus, clearly belongs to the Goneplacidae sensu stricto on account of a suite of characters that distinguishes it from the remaining 10 families of the Goneplacoidea (see Castro, 2007; Ng & Manuel-Santos, 2007; Ng et al., 2008; Castro et al., 2010). Such characters include: (i) a G2 that is approximately as long as the G1 (with the exception of two genera, *Microgoneplax* Castro, 2007, and *Paragoneplax* Castro, 2007, which have a relatively short G2), and has a long flagellum that is distinct from, and as long as, the basal part; (ii) a coxal penis that is protected by an expanded episternite 7 and by wide abdominal somites 2 and 3 of the closed abdomen (somite 3 being wider or slightly wider than somites 1 and 2), and not lying in a concave or hollow posterior portion of thoracic sternites 7 and/or 8; (iii) a male sterno-abdominal cavity that is moderately shallow and reaches the median portion of thoracic sternite 4; (iv) the tubercle of the press button of the male abdominal-locking mechanism is positioned near thoracic sternal suture 4/5; (v) a complete thoracic suture 6/7 (although incomplete in four goneplacid genera); (vi) sternites 7 and 8 with a median line; and (vii) the general shape of the carapace, being transversely rectangular with a straight, moderately long front, and moderately elongated eye peduncles.

No female specimens of the new species are known, so information on the morphology of the vulva, a character used by Castro (2007) and Castro et al. (2010) as part of their diagnoses of the goneplacid genera and families, respectively, is unfortunately lacking.

Guinoplax differs from all the 17 other genera of Goneplacidae by having a carapace that lacks anterolateral teeth, as well as moderately long orbits and eye peduncles (fig. 1). It also appears to be the only genus in which the right chela possesses an enlarged “cutting” tooth at the base of the dactylus of one claw (fig. 2A, B). This specialized tooth is likely to be used for feeding on gastropod snails (see Ng & Tan, 1984, 1985). Anterolateral teeth are absent in all species of *Microgoneplax* and *Singhaplax* Serène & Soh, 1976, but their orbits and eye peduncles are much longer than those in *Guinoplax* and their outer orbital teeth are also conspicuously long and directed outwards (see Castro, 2007, figs. 35A, 37, 38A, 39A, 41A, 42, 43A, 44A, 45A, 46) (relatively short and directed anteriorly in *Guinoplax*;

fig. 1A, B). Furthermore, the G2 of *Microgoneplax* is proportionally much shorter than that of *Guinoplax* (see Castro, 2007, figs. 41D, 43C, 44C, 45C). In *Paragoneplax*, the anterolateral teeth are absent, with the orbits and eye peduncles similar to those of *Guinoplax*, but the G1 of *Paragoneplax* is very different, being distally bent (Zarenkov, 1972, fig. 7-2, as *Geneplax* [sic] *serenei*) (almost straight in *Guinoplax*; fig. 3A, B); the G2 is short (Chen, 1998, fig. 12-8, as *Goneplax serenei*) (long in *Guinoplax*; fig. 3C); and the cornea is distinctively rheniform (spherical and not anterolaterally flattened in *Guinoplax*; fig. 2A-C). The apex of the G2 has two spinules in *Guinoplax* (fig. 3C, D) as in most species of *Carcinoplax* (see Guinot, 1989; Castro, 2007) but the carapace of *Carcinoplax* is quadrate, with two anterolateral teeth on each side of the carapace [only one in *Carcinoplax ischurodous* (Stebbing, 1923)], and the eye peduncles are relatively short. *Guinoplax* also superficially resembles *Psopheticoides* Sakai, 1965, a genus which, until recently, was classified in the Goneplacidae. *Psopheticoides* has, however, been referred to the Euryplacidae, a goneplacoid family (see Castro, 2007; Ng et al., 2008; and Castro & Ng, 2010).

Guinoplax apheles new species (figs. 1-3)

Material examined. — Holotype: male (CL 5.5 mm, CW 8.0 mm), MNHN-B30842, Fiji, BORDAU 1, station DW 1479, off Tuvana-i-Colo I., 20°58.05'S 178°44.94'W, R/V "Alis", 450-460 m, 9.iii.1999. Paratype: 1 male (CL 4.2 mm, CW 4.7 mm), MNHN-B30843, Loyalty Is., MUSORSTOM 6, station CP 464, 21°02.30'S 167°31.60'E, R/V "Alis", 430 m, 21.ii.1989.

Etymology. — The new species is named *apheles*, Greek for "even", "smooth", and "simple", in reference to the smooth appearance of its carapace, which results from the absence of anterolateral teeth and comparatively inconspicuous outer orbital angles.

Description. — Carapace (fig. 1A) transversely rectangular, moderately wider than long (CW 1.4 CL in holotype, 1.1 in paratype); widest at junction of anterolateral, posterolateral borders in holotype (at outer orbital angles in smaller paratype); dorsal surface smooth, moderately convex, without indication of regions. Front (fig. 1B) strongly deflexed ventrally, slightly bilobed, medially marked by short, straight gap, without notch or projection. Hardly noticeable notch between front, inner edge of supraorbital border; orbits (fig. 1B) long (slightly longer than front), wide, further expanded before outer orbital angle; supraorbital borders long, thinly cristate, undular, each with wide, short median convexity; suborbital borders (fig. 1B, C) long, thinly cristate, rounded,

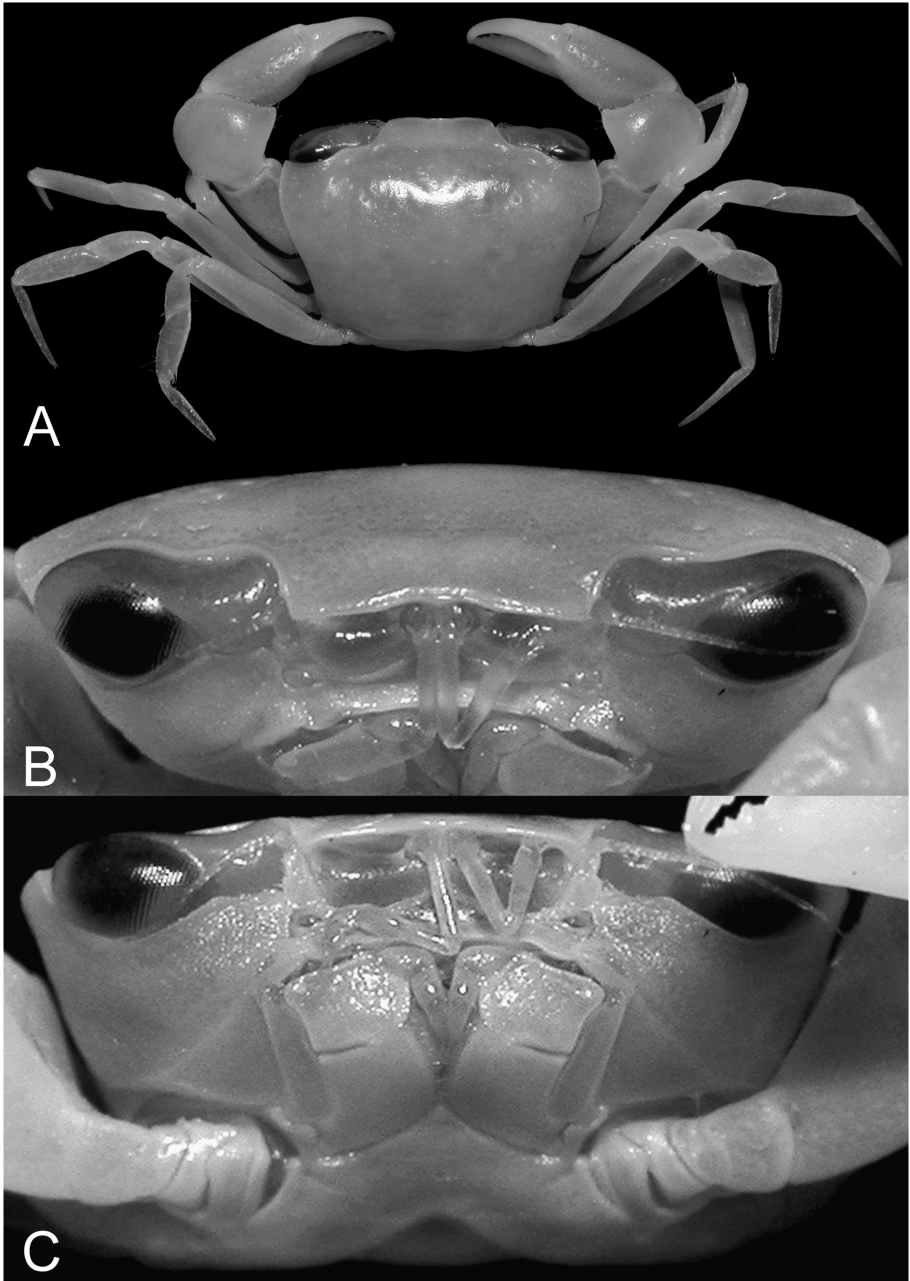


Fig. 1. *Guinoplax apheles* new genus, new species. A-C, holotype, male (CL 5.5 mm, CW 8.0 mm) (MNHN-B 30842). A, dorsal view; B, frontal view of carapace; C, ventral view of anterior portion of carapace.

each with wide, short median convexity, inner tooth absent. Outer orbital angle sharp, triangular, directed anteriorly. Anterolateral borders slightly convex in holotype (straight in paratype), anterolateral teeth absent, boundary between anterolateral, posterolateral borders not pronounced. Posterolateral borders proportionally long, slightly concave.

Eye peduncles (fig. 1B, C) moderately long (0.6 times front width); cornea proportionally large, slightly elongated (0.5 times front width, almost as long as peduncle), expanded distally, rounded outer margin; conspicuous, thin extension of peduncle across dorsal surface.

Basal antennal article short, subquadrate, distalmost (third) article reaches front. Anterior border of endostome well demarcated from buccal cavern, ridges clearly defined. No obvious stridulating mechanism other than possible rubbing of proximal portion of cheliped (P1) merus against pterygostomial ridge.

Third maxillipeds (fig. 1C) rectangular, leaving gap when closed; ischium nearly square, inner margin dentate, lined with setae, mid-length slightly less than 2 times mid-length of merus; merus with distal inner angle excavated, anteroexternal margin angular; exopod wide, distal end reaching beyond external outer angle of merus, flagellum long.

Chelipeds relatively short (figs. 1A, 2A, B). Chelae (fig. 2A, B) markedly heterochealous, surfaces microscopically granular; right one larger, relatively swollen, subequal, microscopically granular; fingers relatively slender, not compressed, shorter than palm, tips light in colour; cutting margins of fingers with moderately large, triangular, rounded teeth, base of dactylus with prominent large “cutting” tooth; smaller chela similar in form to larger chela but palm relatively more slender, cutting margins of fingers without specialized tooth. Carpus with obtuse tooth on inner margin; anterior margin of merus granular, with short, rounded, granular crest distally. Meri, carpi of ambulatory legs (P2-P5) subcylindrical in cross section; propodi, dactyli dorsoventrally flattened. Anterior, posterior margins of P2-P5 articles unarmed, covered with scattered, simple setae; P2-P4 propodi, dactyli slender, dactyli with slight longitudinal ridge along each side. P5 propodus proportionally wide, short; dactylus slender, smooth, fringed with short, simple setae.

Thoracic sternum (fig. 2B) wide. Thoracic suture 2/3 complete, straight; suture 3/4 visible laterally; sterno-abdominal cavity moderately shallow, with anterior end wide, rounded, reaching median portion of thoracic sternite 4. Sutures 4/5, 5/6, 7/8 interrupted medially, 6/7 complete; sternites 7, 8 with median line.

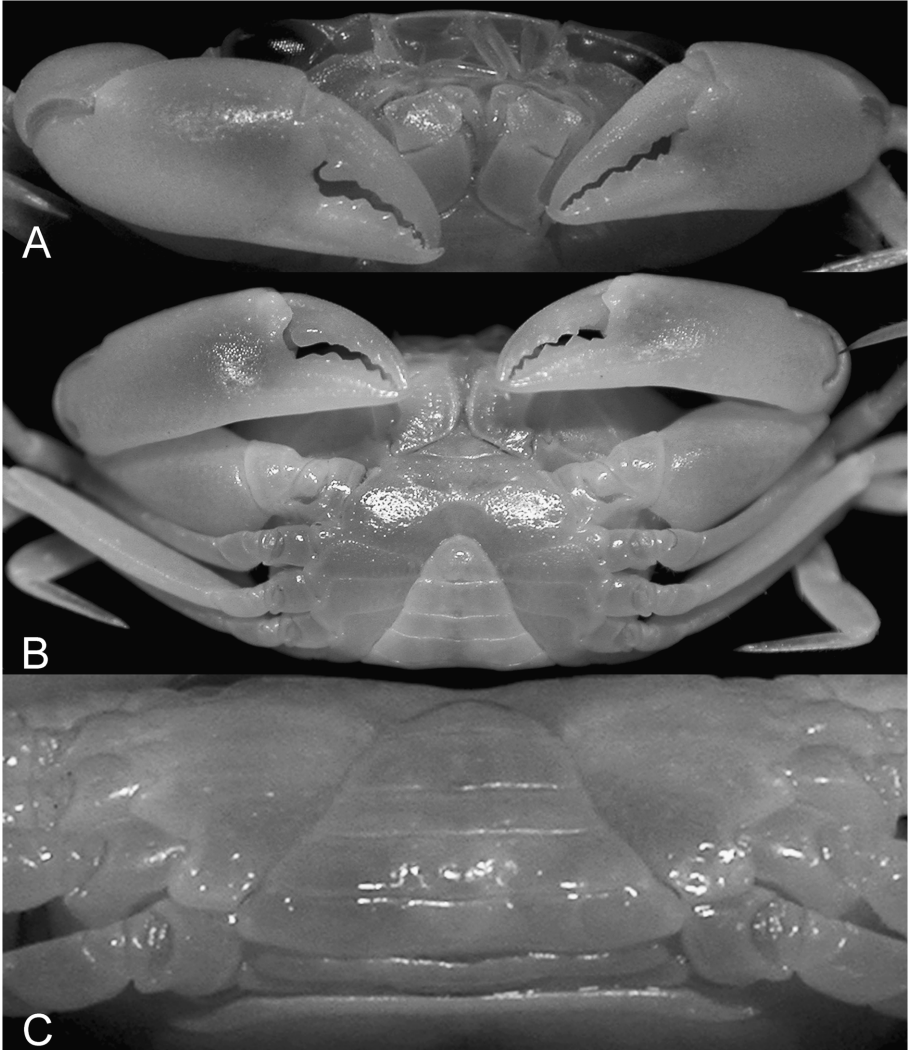


Fig. 2. *Guinoplax apheles* new genus, new species. A-C, holotype, male (CL 5.5 mm, CW 8.0 mm) (MNHN-B 30842). A, chelae; B, ventral view of carapace; C, abdomen.

Male abdomen (fig. 2B, C) wide, with six freely-movable somites plus telson; somite 1 wide, short, partially covered by posterior margin of carapace; somite 2 only slightly narrower than somite 1, short; somites 3-6 longer than 1, 2, somites 4-6 gradually decreasing in width from somite 3 (widest somite). Somite 3 covers space between P5 coxae, so that thoracic sternite 8 is covered by somites 2, 3 of closed abdomen. Telson wider than long, unarmed. Press button of male abdominal-locking mechanism consisting of

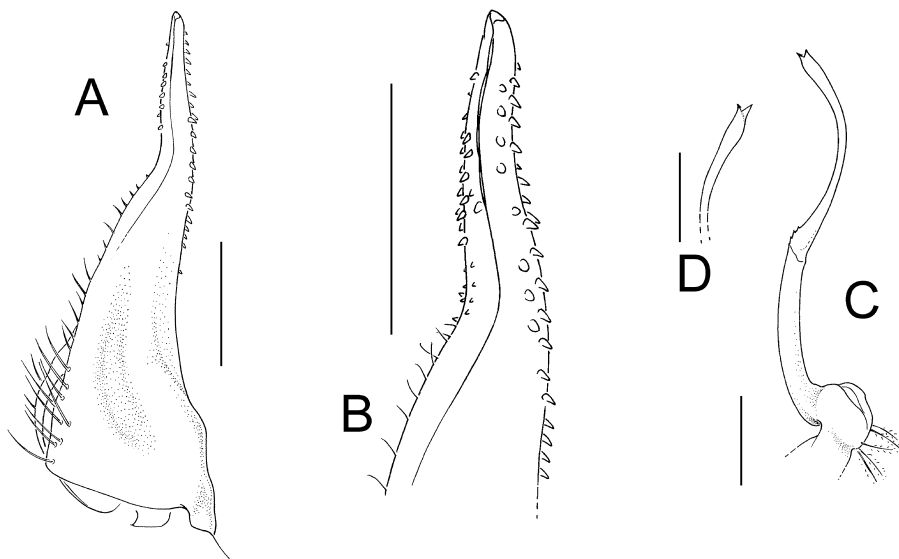


Fig. 3. *Guinoplax apheles* new genus, new species. A-C, holotype, male (CL 5.5 mm, CW 8.0 mm) (MNHN-B 30842). A, B, right G1, dorsal view; C, right G2, dorsal view. Scales: A, C = 1.0 mm; B = 0.5 mm.

tubercle positioned near thoracic sternal suture 4/5. Penis arising from large gonopore that opens just anterior to coxo-sternal condyle of P5 coxa, moderate size; protected by expanded episternite 7.

G1 (fig. 3A, B) proportionally long, distally slender, slightly bent, broadened proximally; numerous spinules distally, on most distal portion of proximal part; acuminate apex. G2 (fig. 3C, D) slender, almost as long as G1; flagellum distinct from basal part (peduncle), as long as basal part, arched, slightly expanded tip with two lateral spinules.

Female not known.

Remarks. — Only two male specimens are known, both of small size. Their male abdomens, however, are fully formed, and the G1 and G2 structures are fully calcified so both specimens are almost certainly mature. The abdomen of the small, paratype specimen is identical to that of the larger holotype. The anterolateral borders are slightly convex in the larger specimen but straight in the small specimen, thus indicating that allometric change occurs correlated with increasing size.

Distribution. — The species is so far known only from two localities in the western Pacific Ocean, the Loyalty Islands and Fiji. The two specimens were collected from depths of 430 to 460 m.

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REFERENCES

- CASTRO, P., 2007. A reappraisal of the family Goneplacidae MacLeay, 1838 (Crustacea, Decapoda, Brachyura) and revision of the subfamily Goneplacinae, with the description of 10 new genera and 18 new species. *Zoosystema*, **29** (4): 609-774.
- CASTRO, P., D. GUINOT & P. K. L. NG, 2010. A new family for *Sotoplax robertsi* Guinot, 1984, with a diagnosis and key to the Goneplacoidea MacLeay, 1838 (Crustacea: Decapoda: Brachyura). *Zootaxa*, **2356**: 36-56.
- CASTRO, P. & P. K. L. NG, 2010. Revision of the family Euryplacidae Stimpson, 1871 (Crustacea: Decapoda: Brachyura: Goneplacoidea). *Zootaxa*, **2375**: 1-130.
- CHEN, H., 1998. The Goneplacidae (Crustacea: Brachyura) from Nansha Islands and adjacent waters. In: *Studies on Marine Fauna and Flora and Biogeography of the Nansha Islands and Neighbouring Waters*, **3**: 265-316. (Academia Sinica, Beijing). [In Chinese with English abstract.]
- GUINOT, D., 1989. Le genre *Carcinoplax* H. Milne Edwards, 1852 (Crustacea, Brachyura: Goneplacidae). In: J. FOREST (ed.), *Résultats des Campagnes MUSORSTOM*, **5**. Mémoires du Muséum national d'Histoire naturelle, Paris, (A) **144**: 265-345.
- MACLEAY, W. S., 1838. On the brachyurous decapod Crustacea brought from the Cape by Dr. Smith. In: A. SMITH (ed.), *Illustrations of the zoology of South Africa; consisting chiefly of figures and descriptions of the objects of natural history collected during an expedition into the interior of South Africa, in the years 1834, 1835, and 1836; fitted out by "The Cape of Good Hope Association for Exploring Central Africa": together with a summary of African Zoology, and an inquiry into the geographical ranges of species in that quarter of the globe*. Invertebratae: 53-71, pls. 2, 3. (Smith, Elder & Co., London).
- NG, P. K. L., D. GUINOT & P. J. F. DAVIE, 2008. Systema Brachyurorum, Part I. An annotated checklist of extant brachyuran crabs of the world. *Raffles Bulletin of Zoology*, (Supplement) **17**: 1-286.
- NG, P. K. L. & M. R. MANUEL-SANTOS, 2007. Establishment of the Vultocinidae, a new family for an unusual new genus and new species of Indo-West Pacific crab (Crustacea: Decapoda: Brachyura: Goneplacoidea), with comments on the taxonomy of the Goneplacidae. *Zootaxa*, **1558**: 39-68.
- NG, P. K. L. & L. W. H. TAN, 1984. The 'shell peeling' structure of the box crab *Calappa philargius* (L.) and other crabs in relation to mollusc shell architecture. *Journal of the Singapore National Academy of Science*, **13**: 195-199.

- — & — —, 1985. 'Right handedness' in heterochelous calappoid and xanthoid crabs — suggestion for a functional advantage. *Crustaceana*, **49**: 98-100.
- SAKAI, T., 1969. Two new genera and twenty-two new species of crabs from Japan. *Proceedings of the Biological Society of Washington*, **82**: 243-280.
- STEBBING, T. R. R., 1923. Crustacea of Natal. *Fisheries and Marine Biological Survey*, **3** [1922]: 1-16.
- ZARENKOV, N. A., 1972. [New data on Indo-Pacific crabs (fam. Goneplacidae, Pinnotheridae, Parthenopidae, Dorippidae) and the problem of seasonal reproduction of decapod animals in the Bay of Tonkin]. In: [The complex investigations of ocean nature], **3**: 229-253. (Moscow State University, Moscow). [In Russian.]