

The Freshwater Crab Fauna (Crustacea, Brachyura) of the Philippines. I. The Family Potamidae ORTMANN, 1896

By

Peter K. L. NG

Department of Zoology, National University of Singapore,
Kent Ridge, Singapore 0511, Republic of Singapore

and

Masatsune TAKEDA

Department of Zoology, National Science Museum,
Shinjuku, Tokyo 169, Japan

Abstract Freshwater crabs of the family Potamidae (*sensu* NG, 1988) from the Philippines are studied on the basis of collections in the National Science Museum, Tokyo, and the National Museum of the Philippines. Three new genera, *Ovitamon*, *Insulamom* and *Mindoron*, are established, and five new species (*O. arcanum*, *O. tomaculum*, *Insulamom unicorn*, *Mindoron pala*, *Isolapotamon spatha*) are described. A key to the Philippine potamid genera is given.

The freshwater crab fauna of the Philippines is poorly known. Although the archipelago has more than 7,000 islands, only 20 wholly freshwater species in three families, Potamidae ORTMANN, 1896, Parathelphusidae ALCOCK, 1910 (both *sensu* NG, 1988), and Grapsidae MCLEAY, 1838 (*partim*) have been described. Most are from the largest island, Luzon.

In 1985, the second author made extensive collections of freshwater crabs in the Philippines under the financial support of the Monbusho International Scientific Research Program of the Japanese Government. The freshwater crabs were collected from many parts of Luzon, Mindoro, Cebu, Panay, Mindanao and Palawan during a period of two months.

In the serial reports of the present study, the specimens at hand will be recorded together with the additional specimens received from Drs. S. UÉNO and H. MORIOKA of the National Science Museum, Tokyo, and Prof. Y. NISHIKAWA of Otomon University, and those borrowed from the National Museum of the Philippines.

The present paper dealing with the Potamidae is intended as the first of several which will seek to eventually revise the entire freshwater crab fauna of the Philippines. The family system here follows that used by NG (1988), in which the families Sino-potamidae BOTT, 1970, and Isolapotamidae BOTT, 1970, are regarded as junior synonyms of the Potamidae ORTMANN, 1896 (*fide* BOTT, 1970a, b). Accordingly, the

known Philippine Potamidae is represented by the following four species: *Tiwaripotamon artifrons* (BÜRGER, 1894) (Luzon), *Isolapotamon sinuatifrons* (H. MILNE EDWARDS, 1853) (Mindanao), *I. mindanaoense* (RATHBUN, 1904) (Mindanao), and *Nanhaipotamon balssi* BOTT, 1970 (Mindoro) (*vide* BOTT, 1970b). In the present paper, three new genera (*Ovitamon*, *Mindoron*, *Insulamom*) and five new species (*Ovitamon arcanum*, *O. tomaculum*, *Mindoron pala*, *Insulamom unicorn*, *Isolapotamon spatha*) are described. Our studies showed that the freshwater crab fauna of the Philippine Archipelago is, as expected, much higher than known thus far. Nevertheless, the present study of the Philippine potamid crab fauna must be regarded as still in the "survey" stage, and many more species undoubtedly still await discovery.

The abbreviations G1 and G2 are used for the male first and second pleopods respectively. All measurements, in millimetres, are of the carapace width and length respectively. The terminology used here essentially follows that by NG (1988). Specimens are deposited in the National Science Museum, Tokyo (NSMT); Zoological Reference Collection, Department of Zoology, National University of Singapore (ZRC); and the National Museum of the Philippines (NMCR).

Family Potamidae ORTMANN, 1896

Key to the Philippine potamid genera

1. Carapace ovoid, dorsal surface distinctly convex, smooth; anterolateral regions without striae or granules. G1 terminal segment cylinder-shaped, upcurved *Ovitamon*
- Carapace transverse, dorsal surface flat or gently convex, gently rugose to smooth; anterolateral regions with well developed striae and/or granules. G1 terminal segment not cylinder-shaped, curving outwards or straight 2
2. Mesogastric cristae absent. Exopod of third maxilliped very stout, especially on proximal part, outer margin distinctly convex. G1 very long, slender, straight, terminal segment as long as or longer than subterminal segment; distal part dilated *Isolapotamon*
- Mesogastric cristae present, either very faint or distinct. Exopod of third maxilliped slender, outer part straight, concave or only slightly convex. G1 stout, curved outwards, terminal segment shorter than subterminal segment 3
3. Mesogastric cristae well developed, distinctly rugose. Basal part of G1 terminal segment distinctly dilated, appears swollen, distal part very slender, elongated, turned to one side at base *Insulamom*
- Mesogastric cristae faint, weak. G1 terminal segment rectangular to square-shaped, laterally flattened *Mindoron*

Genus *Ovitamon* gen. nov.Type species — *Ovitamon arcanum* sp. nov.

Diagnosis. Carapace transverse, ovoid, dorsal surface very smooth, branchial regions swollen, carapace appearing inflated laterally and longitudinally; cervical grooves narrow, shallow. Frontal margin sinuous; anterolateral margins strongly convex, not cristate in adults; epibranchial tooth small, blunt, but distinctly separated from external orbital angle; external orbital angle triangular to acutely triangular. Epigastric cristae distinct, rugose, not sharp, separated from postorbital cristae by broad notch; postorbital cristae sharp but low, smoothly confluent with epibranchial teeth; frontal marginal region narrow. Third maxilliped exopod with well developed flagellum as long as width of merus; ischium squarish, with shallow, indistinct median sulcus. Outer surfaces of chelipeds smooth; carpus with well developed inner distal spine and sharp basal granule on its proximal part; fingers slightly longer than palm. Ambulatory legs not elongated; surfaces smooth, without subdistal spines on dorsal margins. Male abdomen reaching to imaginary line joining anterior edges of bases of chelipeds. G1 slender, subterminal segment gradually tapering from relatively broad base, terminal segment upcurved, subcylindrical in shape, tip rounded, less than half length of subterminal segment. G2 with well developed distal segment, longer than half length of basal segment.

Remarks. The genus *Tiwaripotamon* BOTT, 1970, is heterogeneous, and some of the species classified in it clearly do not belong there. TÜRKAY & NAIYANETR (1987) recently transferred one of BOTT's original *Tiwaripotamon* species, *T. beusekoma* BOTT, 1970, to *Larnaudia* BOTT, 1966. NG (1992) reviewed the problems associated with *Tiwaripotamon* and suggested that *T. artifrons* (BÜRGER, 1894) should be removed, perhaps to a new genus.

Tiwaripotamon annamense (BALSS, 1914), the type species of *Tiwaripotamon* s. str., differs from *T. artifrons* in several significant aspects, viz., the G1 terminal segment of *T. annamense* is evenly cone-shaped, sharply tapered, the subterminal segment being sinuous (vs. recurved upwards, sausage-shaped, the tip is blunted; the subterminal segment straighter in *T. artifrons*); the third maxilliped exopod has only a short flagellum which does not extend beyond the width of the merus (vs. long in *T. artifrons*); the ambulatory legs are much longer; the tip of the male abdomen extends only the posterior edge of the bases of the chelipeds (vs. reaching the anterior edges of the chelipeds in *T. artifrons*). The distribution of *T. artifrons* is also very disjunct from that of *Tiwaripotamon* s. str. (Indo-China). With the study of fresh specimens of *T. artifrons*, as well as specimens of two allied new species described below, the establishment of a new genus for these species, here named *Ovitamon*, was shown to be warranted.

Three species are recognised as belonging to the new genus, *O. arcanum* sp. nov. (type species by present designation), *O. artifrons* (BÜRGER, 1894), and *O. tomaculum* sp. nov.

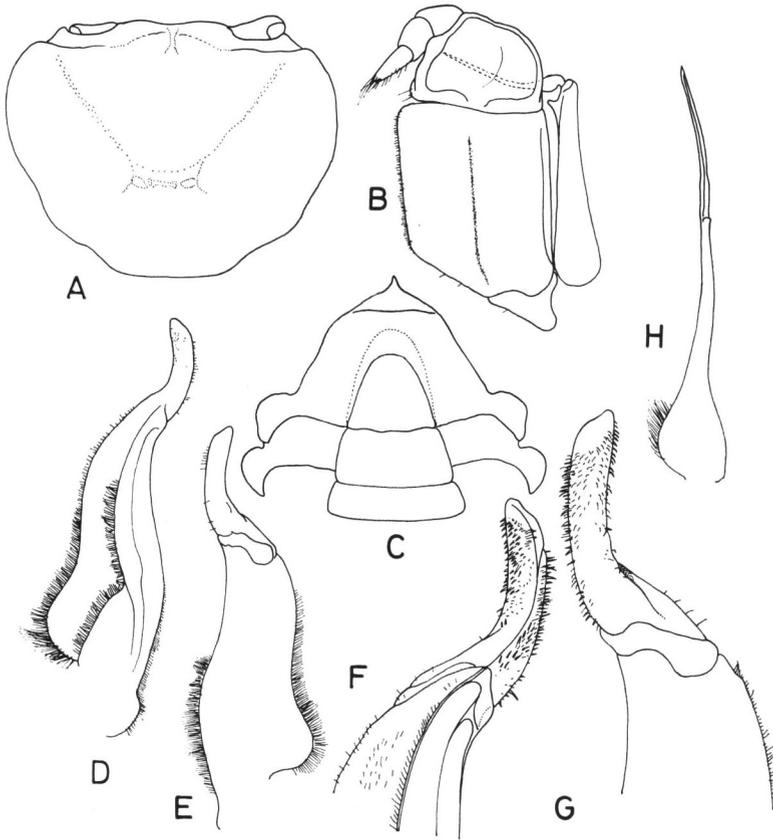


Fig. 1. *Ovitamon arcanum* sp. nov. Holotype male, 21.5 by 16.7 mm (NMCR 4901a), Marinduque. A, dorsal view of carapace; B, left third maxilliped; C, sternum and last three abdominal segments; D–G, left G1; H, left G2. D, F, ventral view; E, G, dorsal view; F, G, G1 terminal segment.

The genus name “*Ovitamon*” is derived from the Latin for egg, alluding to the smooth and oval carapace shape of members of the genus, with the latter part of the name “*Potamon*”. The gender of the genus is neuter.

***Ovitamon arcanum* sp. nov.**

(Fig. 1)

Material. Holotype: Male (21.5 by 16.7 mm) (NMCR 4901 a), Tawang Tambangan, Sta. Cruz, Marinduque, leg. Ramos SISON, v. 1976. Paratypes: One male (21.6 by 16.7 mm), 1 female (25.9 by 19.4 mm) (NMCR 4901 b), same data as holotype.

Diagnosis. Carapace very shallow, broad; posterolateral regions appears almost smooth; suborbital, sub-branchial and pterygostomial regions smooth. Supraorbital

margin entire; external orbital angle broadly triangular, outer margin beaded to almost entire, 2–3 times length of inner margin; epibranchial tooth low, blunt, indistinct, but clearly separated from external orbital angle; anterolateral margin convex, granulated; posterolateral margin distinctly converging. Epigastric cristae low, rugose, vaguely confluent with low but sharp postorbital cristae. Suture separating male sternal segments 2 and 3 sinuous. Male abdominal segment 7 longer than segment 6; lateral margins of segment 7 almost straight; lateral margins of segment 6 slightly convex. G1 terminal segment cylinder-shaped, strongly upcurved, 0.38 times length of subterminal segment, surfaces densely covered with stiff hairs and spinules, collar separating terminal and subterminal segments slightly swollen, distinct. G2 distal segment long, 0.59 times length of basal segment.

Remarks. Following BOTT'S (1970b) definition of *O. artifrons* (BÜRGER, 1894), the present species differs most clearly in the form of the G1. In *O. artifrons*, the terminal segment is more sharply bent outwards, tapering gradually to a rounded tip. In *O. arcanum*, the terminal segment curves gently outwards, and the distal and proximal diameters are approximately equal, the segment appearing more distinctly cylinder-shaped. These differences are also true for the recent specimens identified to *O. artifrons* (see next species). *Ovitamon arcanum* differs from *O. tomaculum* in having a longer and more upcurved terminal segment and smoother carapace and margins.

The species name "arcanum" is from the Latin for being able to keep a secret, alluding to the species having eluded discovery for so long.

Ovitamon artifrons (BÜRGER, 1894)

(Fig. 2)

Thelphusa artifrons BÜRGER, 1894: 3, pl. 1 fig. 2. — ORTMANN, 1897: 312.

Potamon (Potamon) artifrons — RATHBUN, 1904: 308.

Potamon artifrons — DE MAN, 1898: 435. — BALSS, 1937: 168, figs. 33, 34.

Isolapotamon artifrons — BOTT, 1968: 124, fig. 8.

Tiwaripotamon artifrons — BOTT, 1970: 152, pl. 41 fig. 75, pl. 55 fig. 76.

Material. Two males (larger 13.9 by 10.4 mm), 5 females (largest 13.3 by 10.2 mm) (NSMT-Cr 11218), small valley north of Taal Lake, near Tagaytay, southern Luzon, leg. M. TAKEDA & S. SHOKITA, 20. vii. 1985.

Diagnosis. Carapace cervical grooves very shallow; posterolateral regions lined with low to almost undiscernible oblique striae; suborbital regions slightly rugose to smooth; sub-branchial and pterygostomial regions smooth. Frontal margin gently sinuous; supraorbital margin entire; external orbital angle triangular, outer margin entire, 2 times length of inner margin; epibranchial tooth very low, blunt. Epigastric cristae low, faintly rugose; postorbital cristae very low. Suture separating male sternal segments 2 and 3 convex towards buccal cavity. Male abdominal segment 7 longer than segment 6; lateral margins of segment 7 straight; lateral margins of segment

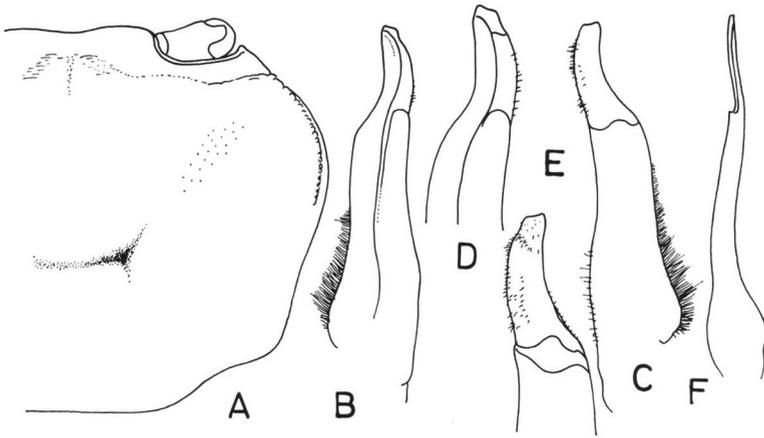


Fig. 2. *Ovitamon artifrons* (BÜRGER, 1894). Male, 13.9 by 10.4 mm (NSMT-Cr 11218), southern Luzon. A, dorsal view of carapace; B-E, left G1; F, left G2. B, D, ventral view; C, E, dorsal view; D, E, G1 terminal segment.

6 slightly convex. G1 terminal segment stout, distinctly cylinder-shaped, distinctly upcurved, 0.31 times length of subterminal segment, surfaces covered with scattered stiff hairs and spinules, collar separating terminal and subterminal segments not distinct. G2 distal segment long, 0.37 times length of basal segment.

Remarks. The present specimens from north of Tagaytay are tentatively identified with *O. artifrons*, although there are some differences in their carapace features and G1 (cf. BÜRGER, 1894; BOTT, 1968; 1970b). Most of the specimens are however, rather small compared with the types of BÜRGER's (1894) species, although the female is already mature. The carapaces of the present specimens appear to be less broad, and the external orbital angle of the present specimens are less acutely triangular. This however, may be a consequence of age (see next species). The difference in proportions and shape of the G1 terminal segment (shorter and less upcurved) in the present specimens may also be explained thus.

The type locality of *O. artifrons*, Cavite, is in southwestern Luzon, and relatively near the present locality in Tagaytay. When larger males from Tagaytay become available, it should then be possible to be certain if the Cavite and Tagaytay specimens are indeed conspecific.

BOTT (1968) classified this species in the genus *Isolapotamon* BOTT, 1968, although the species did not fit his generic definition, especially with regards to the form of the G1. He later (1970b) transferred it to his new genus *Tiwaripotamon* BOTT, 1970, probably because of the shape of its G1 terminal segment.

Ovitamon tomaculum sp. nov.

(Fig. 3)

Material. Holotype: Male (13.5 by 10.4 mm) (NSMT-Cr 11219), Pitogo River,

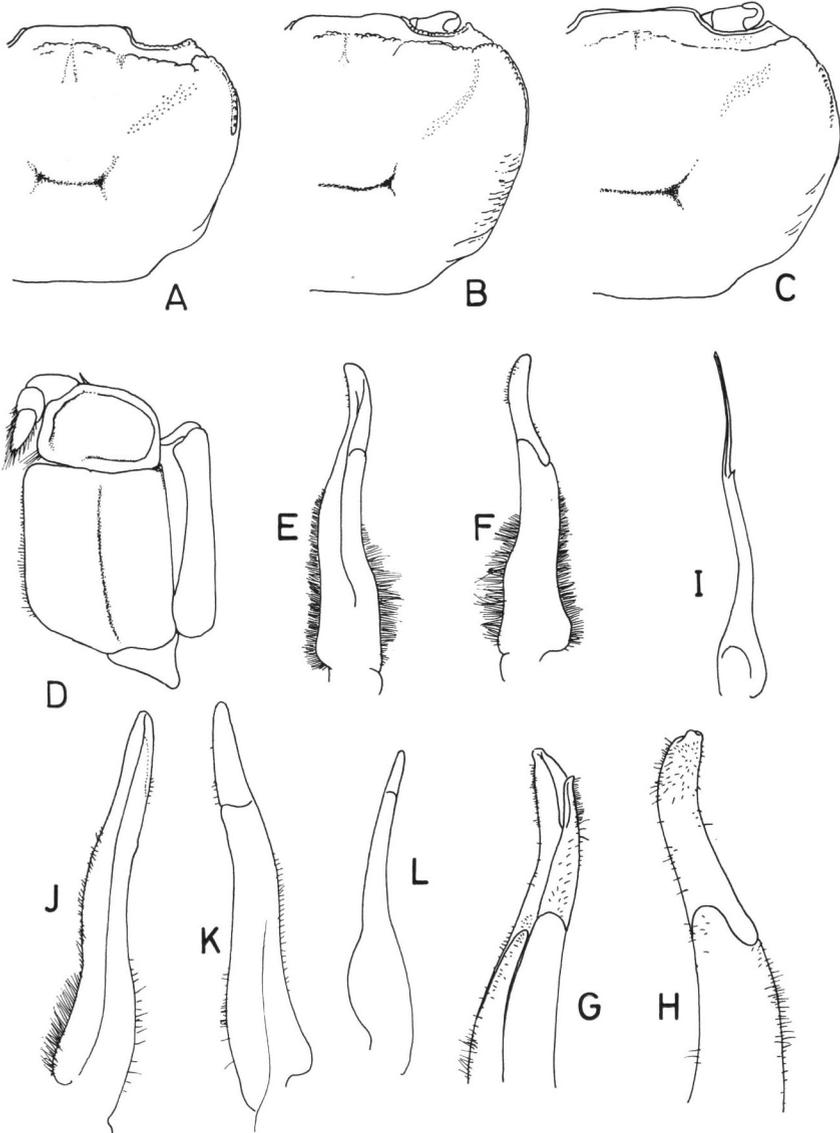


Fig. 3. *Ovitamon tomaculum* sp. nov. (NSMT-Cr 11219; 11220), Panay. A, D-I, holotype male, 13.5 by 10.4 mm; B, J-L, paratype male, 20.2 by 15.7 mm; C, paratype female, 21.6 by 17.1 mm. A-C, dorsal view of carapace; D, left third maxilliped; E-H, J, K, left G1s; I, L, left G2s. E, G, J, ventral view; F, H, K, dorsal view; G, H, G1 terminal segment.

Panay, leg. M. TAKEDA & S. SHOKITA, 19. viii. 1985. Paratypes: Two males, 5 females (largest 21.6 by 17.1 mm), 2 juveniles (NSMT-Cr 11220), same data as holotype.

Diagnosis. Carapace cervical grooves very shallow; posterolateral regions lined with low to almost undiscernible oblique striae; suborbital regions slightly rugose; sub-branchial and pterygostomial regions smooth. Supraorbital margin gently beaded; external orbital angle broadly triangular, outer margin beaded to almost entire, 2–3 times length of inner margin; epibranchial tooth low, blunt. Suture separating male sternal segments 2 and 3 convex towards buccal cavity. Male abdominal segment 7 longer than segment 6; lateral margins of segment 7 straight; lateral margins of segment 6 slightly convex. G1 terminal segment cylinder-shaped, gently upcurved, 0.39 times length of subterminal segment, distal surfaces covered with stiff hairs and spinules, less so on proximal parts, collar separating terminal and sub-terminal segments not distinct. G2 distal segment long, 0.60 times length of basal segment.

Remarks. There are some variations in the form and sculpturing of the carapace. In most of the smaller specimens (except the holotype male), the carapace appears more squarish, more rugose, with the striae on the posterolateral margins stronger; the margins of the supraorbital and external orbital angles are distinctly beaded, and the epigastric and postorbital cristae are more rugose and appear stronger. The largest female however, has the typical characteristics of the genus.

The species differs from *O. artifrons* in having a straighter G1, and a more slender, shorter and less upcurved terminal segment. The cristae and margins of *O. tomaculum* also tend to be more rugose and pronounced. It differs from *O. arcanum* mainly in having a shorter and less upcurved G1 terminal segment.

The species name is from the Latin name for a kind of sausage, alluding to the sausage-shaped G1 terminal segment. The name is used as a noun in apposition.

Ovitamon sp.

Material. One female (25.4 by 20.1 mm) (NSMT-Cr 11227), Borabod Stream, Buhi, Camarines Sur, Luzon, leg. Noe GAPAS, 19. viii. 1985.

Remarks. Although the specimen on hand is large and mature, it has no clear features which distinguish it from other species in the genus. A male specimen will probably be needed to help resolve its identity. The only other known species on southern Luzon is *O. artifrons*, and it is possibly that.

Genus *Insulamon* gen. nov.

Type species — *Insulamon unicorn* sp. nov.

Diagnosis. Carapace ovoid, broader than long; dorsal surface rugose, regions well demarcated; cervical grooves narrow but distinct; external orbital angle broadly triangular, epibranchial tooth low, blunt; posterolateral margin converging. Epi-

gastric cristae very distinct, rugose, postorbital cristae strong, rugose, joining epibranchial tooth smoothly and gradually; mesogastric cristae present, rugose, low, parallel to epigastric cristae. Third maxilliped exopod with well developed flagellum reaching beyond width of merus. Outer surfaces of chelipeds very rugose; merus with two rows of granules on inner margins, outer margin serrated with blunt knob-like subdistal structure; carpus with one strong inner distal spine and one sharp basal granule on its proximal part; fingers longer than palm. Second ambulatory leg longest; outer surfaces of all legs slightly rugose; dorsal margin of merus without subdistal spines. Male abdomen reaching imaginary line connecting anterior edges of bases of chelipeds. G1 stout, terminal segment with distal part very narrow, elongate, turned upwards, proximal part dilated, appears swollen, with well developed collar separating terminal and subterminal segments; groove for G2 on the median ventral surface of both terminal and subterminal segments. G2 with long distal segment longer than half length of basal segment.

Remarks. The present new genus seems to be most allied to *Mindoron* gen. nov. externally, but differs remarkably in the forms of their G1s. Also diagnostic is the presence of a pair of mesogastric cristae on the carapace, barely discernible to absent on *Mindoron*. Some species of *Isolapotamon* have the grooves separating the epigastric and postorbital cristae extend some distance posteriorly, curving behind the epigastric cristae, giving the appearance of mesogastric cristae being present. These are however grooves, not cristae. In *Mindoron*, the faint ridges mark the presence of mesogastric cristae. The distal part of the G1 terminal segment of *Insulamon* is characteristically elongate, narrow and turned upwards, the proximal part being dilated and appearing swollen. These features suggest a separate genus should be established for the Palawan species.

The genus *Insulamon* contains only one species, *I. unicorn* sp. nov.

The genus name "Insulamon" is derived from the Latin for island, alluding to the island of Palawan where the genus appears to be endemic, in combination with the latter part of the name "Potamon". The gender of the genus is neuter.

***Insulamon unicorn* sp. nov.**

(Figs. 4, 5)

Material. Holotype: Male (34.7 by 26.8 mm) (NMCR), Salvacion, Busuanga, Palawan, leg. GONZALES *et al.*, iii. 1976. Paratypes: Two males (24.8 by 18.3 mm, 24.2 by 17.7 mm) (NSMT-Cr 11222), vicinity of Puerto Princesa, Palawan, leg. Y. KURATA. — Two males (larger 19.9 by 14.8 mm), 1 female (26.0 by 19.1 mm) (NSMT-Cr 11223), Tagbariri River, Palawan, leg. M. TAKEDA & S. SHOKITA, 9. viii. 1985.

Diagnosis. Carapace cervical grooves narrow, but deep enough to discern clearly; posterolateral regions lined with oblique striae; suborbital regions lightly rugose; sub-branchial regions rugose; pterygostomial regions smooth. Frontal margin rugose, almost straight; supraorbital margin entire; outer margin of external orbital angle

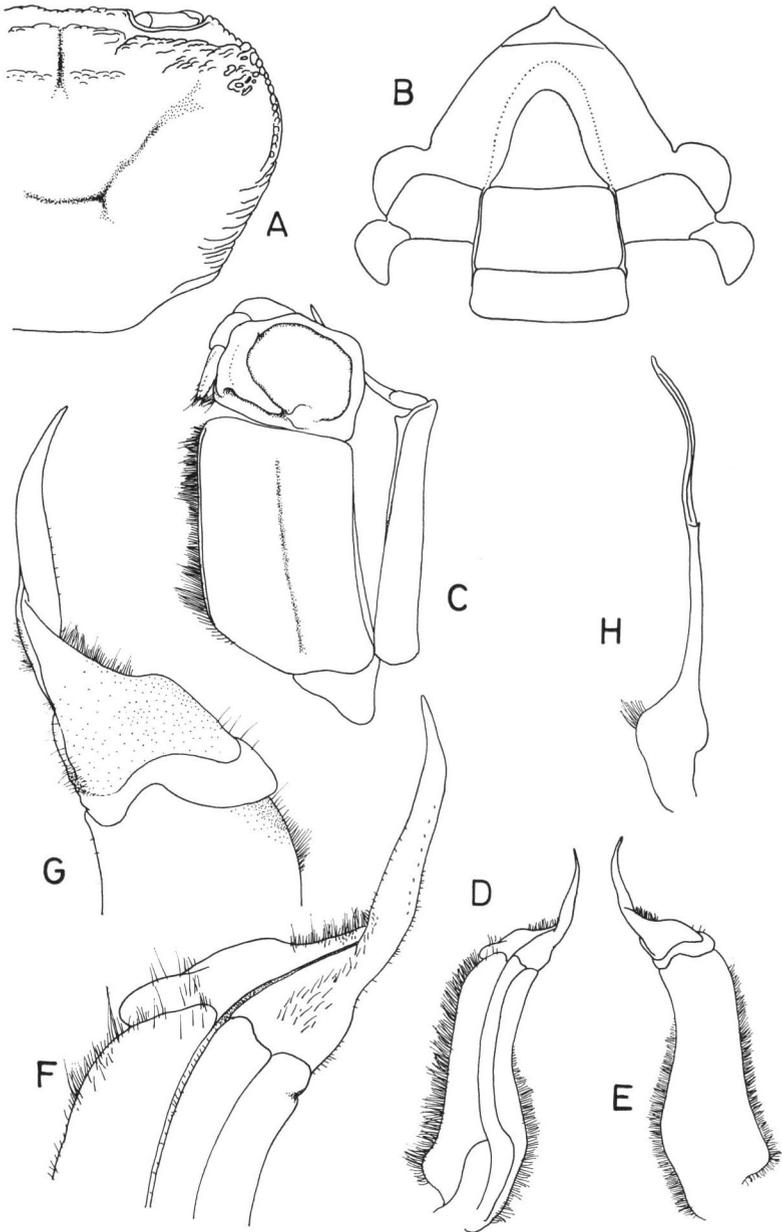


Fig. 4. *Insulamon unicorn* sp. nov. Holotype male, 34.7 by 26.8 mm (NMCR), Palawan. A, dorsal view of carapace; B, sternum and last three abdominal segments; C, left third maxilliped; D–G, left G1; H, left G2. D, F, ventral view; E, G, dorsal view; F, G, G1 terminal segment.

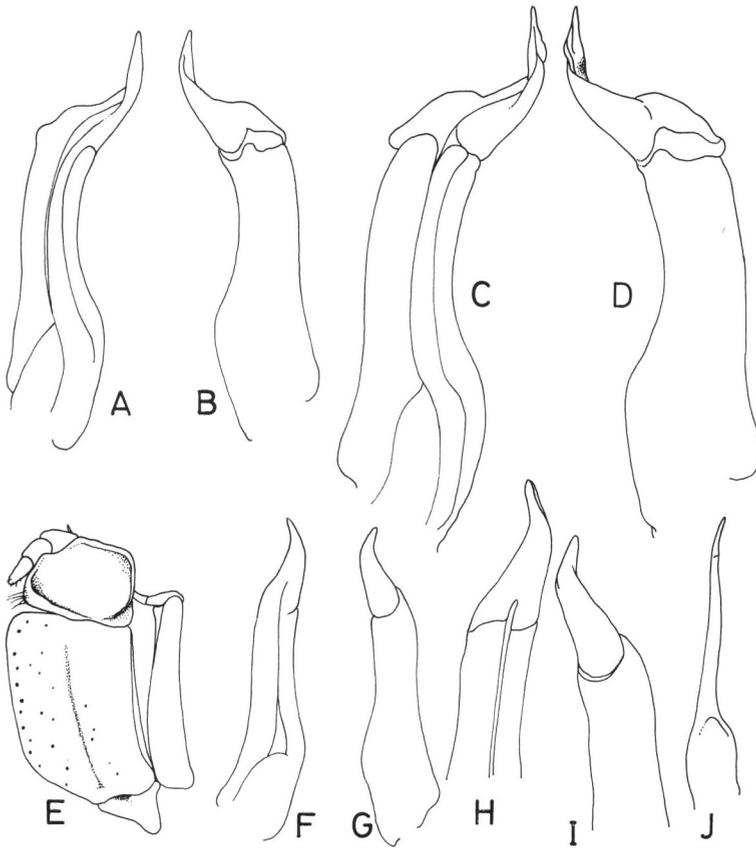


Fig. 5. *Insulamon unicorn* sp. nov. Paratype males, Palawan. A, B, 24.2 by 17.7 mm (NSMT-Cr 11222-b); C, D, 24.8 by 18.3 mm (NSMT-Cr 11222-a); E–J, 19.9 by 14.8 mm (NSMT-Cr 11223-a). A–D, F–I, left G1 (hairs not drawn); E, left third maxilliped; J, distal part of left G2. A, C, F, H, ventral view; B, D, G, I, dorsal view; H, I, G1 terminal segment.

uneven, 3 times length of inner margin; epibranchial tooth low, blunt; anterolateral margin granulated, subcristate. Epigastric cristae very distinct, rugose, not sharp, separated from postorbital cristae by distinct oblique groove; postorbital cristae strong, rugose. Carpi, propodi, dactyli of ambulatory legs with scattered short, stiff hairs. Suture separating male sternal segments 2 and 3 gently convex towards buccal cavity. Male abdominal segment 7 longer than segment 6; lateral margins of segment 7 distinctly concave; lateral margins of segment 6 almost straight. G1 terminal segment 0.48 times length of subterminal segment (in holotype male) with distal part very narrow, almost 2 times length of dilated proximal part. G2 with long distal segment 0.90 times length of basal segment.

Remarks. The external appearances of the specimens from different parts of Palawan are similar, although the smaller specimens from the vicinity of Puerto Princesa and Tagbariri have flatter carapaces than the holotype of *I. unicorn*. This however, is usual in young specimens of potamids, and hence not much significance is attached to this. Although the G1s of the males from the three localities appear different, we believe that the differences are due to age and size, and not specific. The smallest male from Tagbariri does not have the proximal part of the G1 terminal segment distinctly dilated, and the elongate distal part is only just forming but already curving upwards. In the two larger males from near Puerto Princesa, the distal part is shorter than that of the largest specimen from Salvacion (holotype).

The species name refers to the shape of the G1 terminal segment which seems to resemble the mythical one-horned horse. It is used as a noun in apposition.

Genus *Mindoron* gen. nov.

Type species — *Mindoron pala* sp. nov.

Diagnosis. Carapace broader than long; dorsal surface rugose, regions well demarcated; cervical grooves shallow, faint. External orbital angle triangular, epibranchial tooth low but distinct, blunt; posterolateral margin converging. Epigastric cristae low, rugose; postorbital cristae very low, rugose, indistinctly joining epibranchial tooth. Third maxilliped ischium with distinct median sulcus; merus subquadrate; exopod reaches half length of merus, with distinct flagellum which is as long as width of merus. Outer surfaces of chelipeds smooth to slightly rugose; merus with two rows of granules on inner margins, outer margin serrated with low, knob-like subdistal structure; carpus with one strong inner distal spine and one sharp basal granule on its proximal part; fingers longer than palm. Second ambulatory leg longest; outer surfaces of all legs smooth; dorsal margins of meri entire, without subdistal spines. Male abdomen reaching imaginary line connecting anterior edges of bases of chelipeds. G1 stout, terminal segment bent outwards, lamelliform, flattened laterally, shorter than half length of subterminal segment; groove for G2 on the median ventral surface of subterminal segment. G2 with well developed distal segment more than half length of basal segment.

Remarks. NG & DUDGEON (1992), in reviewing the genus *Nanhaipotamon* BOTT, 1968, commented that *Isolapotamon* (*Nanhaipotamon*) *balssi* BOTT, 1968, clearly did not belong in the genus, differing in carapace morphology and G1 structure (cf. BOTT, 1968; 1970b). Although we have not managed to reexamine BOTT's species, the collection of an allied species from Mindoro, here described as new (*Mindoron pala*), shows that a new genus is indeed necessary for the two species.

The new genus, here named *Mindoron*, differs from *Nanhaipotamon* in having a flatter, more transverse and lower carapace, more rugose carapace surface, lower and more rugose postorbital cristae (vs. sharp), granulated anterolateral margins (vs. smooth), a long third maxilliped exopod flagellum which spans the width of the merus

(vs. a flagellum which reaches only half the width), a male abdomen which reaches to the anterior edges of bases of the chelipeds (vs. reaching only the posterior edges), and the G1 terminal segment is distinctly laterally flattened, without a dorsal fold (vs. more cylindrical, with a well developed dorsal fold).

The genus, as conceived here, includes only two species, *M. pala* sp. nov. (type species by present designation) and *M. balssi* (BOTT, 1968).

***Mindoron pala* sp. nov.**

(Fig. 6)

Material. Holotype: Male (33.4 by 26.5 mm) (NSMT-Cr 11224), Tamarau Falls, northeastern Mindoro, leg. M. TAKEDA & S. SHOKITA, 15. viii. 1985.

Diagnosis. Carapace cervical grooves very shallow, faint; antero- and postero-lateral regions lined with oblique striae; suborbital and sub-branchial regions gently rugose; pterygostomial regions smooth. Frontal margin rugose, sinuous; supraorbital margin entire; infraorbital margin beaded; outer margin of external orbital angle granulose, 3 times length of inner margin; epibranchial tooth low, distinct; antero-lateral margin distinctly granulated, subcristate. Epigastric cristae low, rugose, not sharp, separated from postorbital cristae by shallow, indistinct oblique groove; post-orbital cristae very low, rugose, indistinctly joining epibranchial tooth via a series of rugae and flattened granules; mesogastric cristae very low and faint, almost undiscernible. Suture separating male sternal segments 2 and 3 almost straight. Lateral margins of entire male abdomen appears "scalloped" because of rounded edges of each segment; segment 7 longer than segment 6; lateral margins of segment 7 concave; lateral margins of segment 6 almost straight. G1 terminal segment bent obliquely outwards, lamelliform, flattened laterally, 0.41 times length of subterminal segment, tip sharp; groove for G2 on the median ventral surface of proximal part of terminal segment, sloping towards upper margin on distal part. G2 with long distal segment, 0.69 times length of basal segment.

Remarks. The present species, although it was obtained relatively near the type locality of *M. balssi*, is quite different from that species in several aspects. The lateral margins of the male abdomen of *M. pala* are distinctly "scalloped", while almost entire in *M. balssi*. Although the type males of both species are of comparable sizes, the G1 terminal segment of *M. pala* differs from that of *M. balssi* in being more strongly bent outwards and much longer (0.41 times length of subterminal segment vs. 0.26 times for *M. balssi*).

The species name is derived from the Latin "pala" for spade, alluding to the flattened blade-like G1 of the species. It is to be used as a noun in apposition.

***Mindoron balssi* (BOTT, 1968), comb. nov.**

Potamon sinuatifrons — BALSS, 1937: 163, fig. 24 (*nec* H. MILNE EDWARDS, 1853).

Isolapotamon (Nanhaipotamon) balssi BOTT, 1968: 125, figs. 11, 17.

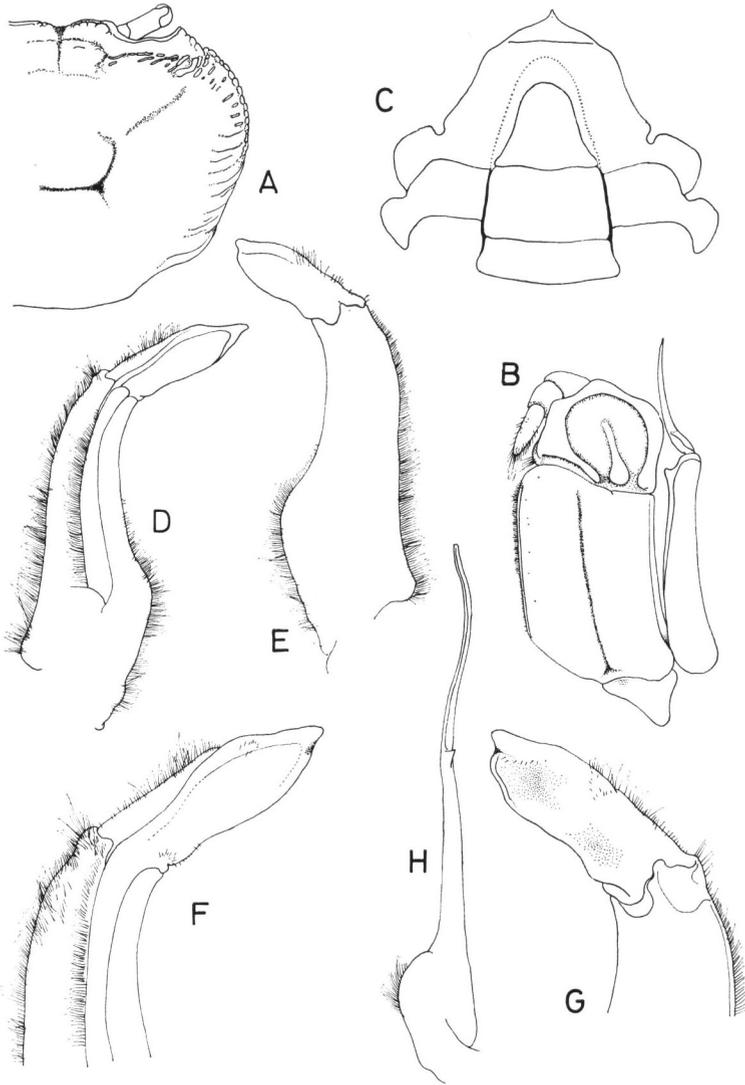


Fig. 6. *Mindoron pala* sp. nov. Holotype male, 33.4 by 26.5 mm (NSMT-Cr 11224), Mindoro. A, dorsal view of carapace; B, left third maxilliped; C, sternum and last three abdominal segments; D-G, left G1; H, left G2. D, F, ventral view; E, G, dorsal view; F, G, G1 terminal segment.

Nanhaipotamon balssi — BOTT, 1970: 196, pl. 41 fig. 85, pl. 57 fig. 85.

Material. None.

Remarks. This species is known from only one 35.0 by 27.0 mm male (holotype) and a female from Naujan Lake, Mindoro. The figures of the G1 terminal segment

figured by BALSS (1937) and BOTT (1968; 1970b) differ somewhat, with that by BOTT (1968; 1970b) appearing shorter and stumper. It is possible that the tips and distalmost margins have been slightly damaged by the time BOTT examined the specimen.

Genus *Isolapotamon* BOTT, 1968

Remarks. Only two species of this genus are known from the Philippines, *I. sinuatifrons* (H. MILNE EDWARDS, 1853), and *I. mindanaoense* (RATHBUN, 1904), both from Mindanao. A third species is described below. The genus has the highest diversity in Borneo, where some 15 species are known (NG, unpublished data).

Isolapotamon spatha sp. nov.

(Fig. 7)

Material. Holotype: Male (28.0 by 22.7 mm) (NSMT-Cr 11225), Kraan, 100 m alt., Sultan Kradarat Province, Mindanao, leg. Y. NISHIKAWA, 12. viii. 1985. Paratypes: One male (30.6 by 24.3 mm), 1 female (NSMT-Cr 11226), 1 male, 1 female (ZRC), same data as holotype.

Diagnosis. Carapace transverse, broader than long, dorsal surface flat, smooth; regions well demarcated; cervical groove very shallow; H-shaped central depression deep; posterolateral regions lined with fine oblique striae; suborbital and sub-branchial regions rugose; pterygostomial regions smooth. Frontal margin sinuous, finely beaded; supraorbital margin beaded; external orbital angle triangular, outer margin granulated, 2 times length of inner margin, clearly separated from epibranchial tooth by deep V-shaped notch; epibranchial tooth distinct, blunt; anterolateral margin distinctly cristate and granulated; posterolateral margin gently concave, converging. Epigastric crista rugose, low, separated from postorbital crista by distinct oblique groove; postorbital crista sharp, low, becoming obscure just before beginning of cervical groove. Outer surfaces of chelipeds rugose; carpus with well developed long inner distal spine and sharp basal granule on its proximal part; fingers longer than palm. Outer surfaces of ambulatory legs slightly rugose, dorsal margins slightly serrated, no subdistal spine present; propodus of last leg longer than broad, subequal in length to dactylus. Male abdomen reaching imaginary line connecting median part of bases of chelipeds; suture separating sternites 2 and 3 almost straight. Male abdominal segment 7 slightly longer than segment 6; lateral margins of segment 7 convex; lateral margins of segment 6 slightly sinuous. G1 terminal segment long, 0.85 times length of subterminal segment, gently sinuous, tip dilated, laterally flattened, outer distal part of subterminal segment with broad truncate cleft. G2 distal segment long, 0.44 times length of basal segment.

Remarks. The carapace of this species resembles that of *I. consobrinum* (DE MAN, 1899) from Borneo (*vide* NG, 1986), being flattened and the epibranchial tooth relatively distinct. The G1s of these species are however, very different, with the

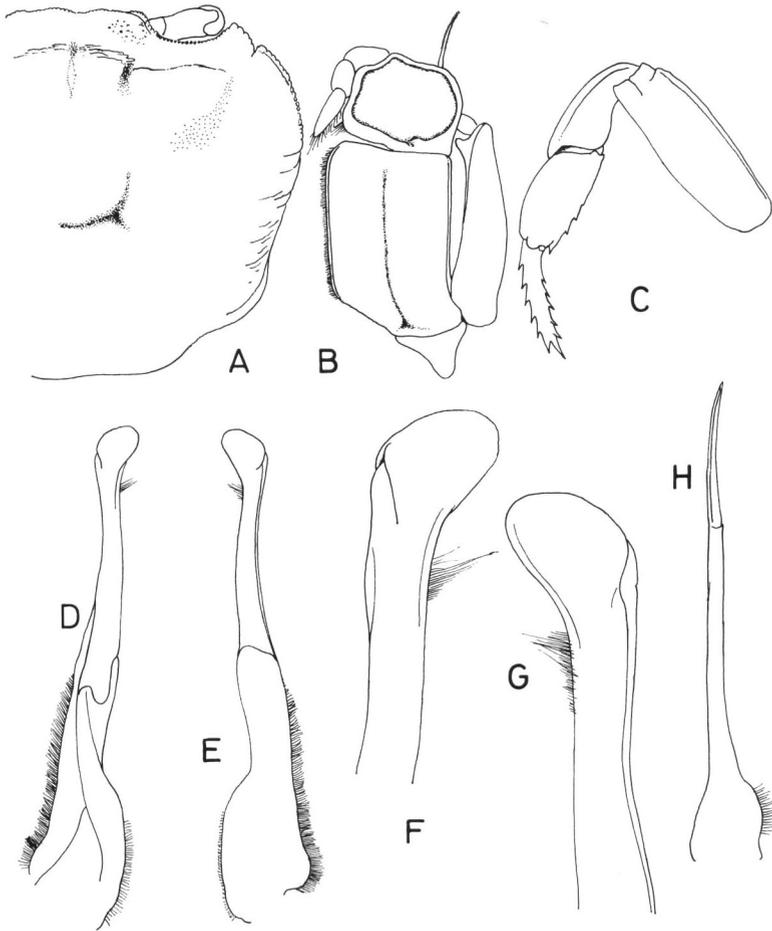


Fig. 7. *Isolapotamon spatha* sp. nov. Holotype male, 28.0 by 22.7 mm (NSMT-Cr 11225), Mindanao. A, dorsal view of carapace; B, left third maxilliped; C, left fourth ambulatory leg; D–G, left G1; H, left G2. D, F, ventral view; E, G, dorsal view; F, G, G1 terminal segment.

distal part of the terminal segment of *I. consobrinum* not as dilated as that in *I. spatha*.

The form of the G1 of *I. spatha* somewhat resembles that of *I. mindanaoense* (RATHBUN, 1904), but in *I. mindanaoense*, the dilated distal part is more pronounced and longer, although the size of the present specimens of *I. spatha* is similar to that of the only known specimen of *I. mindanaoense*. The carapaces of the two species are also different, with *I. mindanaoense* being a higher and more convex species. Following BOTT (1970b), the male abdomen of *I. mindanaoense* is also proportionately broader.

The species name refers to the spatula-shaped distal part of the G1 terminal segment. The name is used as a noun in apposition.

Isolapotamon sp.

Material. One male (19.5 by 16.0 mm), 1 female (36.0 by 28.1 mm) (NMCR 1253), Salol Creek, Bo. Palkan, Cotabato, Mindanao, leg. T. OANE, 19. xi. 1962.

Remarks. The larger female specimen is probably different from *I. spatha*, possessing a distinctly higher and more convex carapace, and the dactylus of the last ambulatory leg is also proportionately longer. The carapace form of the female and the G1 vaguely resembles those of *I. mindanaoense* (RATHBUN, 1904), but the present specimen is too juvenile to be certain if it is that species.

Acknowledgements

Thanks are due to Dr. S. SHOKITA of the University of the Ryukyus and Mr. N. GAPAS of the National Museum of the Philippines for their cooperative help during the field work, and Drs. S. UÉNO and H. MORIOKA of the National Science Museum, Tokyo, and Prof. Y. NISHIKAWA of Otemon University for collecting the freshwater crabs during their field surveys. The second author wish to express his gratitude to the authority of the National Museum of the Philippines for the research permission. The field survey and the examination of the crab collections were kindly arranged through the courtesy of Mr. J. J. CABRERA and Ms M. R. MANUEL of the National Museum of the Philippines. The first author's study in Japan was supported by the JSPS (Japanese Society for the Promotion of Science) Programme with the National University of Singapore, and partial support by a research grant, RP 900360, from the National University of Singapore is gratefully acknowledged.

References

- BALSS, H., 1937. Potamoniden (Decapoda Brachyura) der Philippinen und des Malayischen Archipels. *Intern. Rev. d. ges. Hydrobiol. u. Hydrogr.*, **34**: 143-187.
- BOTT, R., 1968. Potamiden aus Süd-Asien (Crustacea, Decapoda). *Senckenb. biol.*, **49**: 119-130, pls. 1-5.
- 1969. Flüsskrabben aus Asien und ihre Klassifikation (Crustacea, Decapoda). *Ibid.*, **50**: 359-366.
- 1970a. Betrachtungen über Entwicklungsgeschichte der Süßwasserkrabben nach der Sammlung des Naturhistorischen Museums in Genf/Schweiz. *Rev. Suisse. (Zool.)*, **77**: 327-344, pls. 1, 2, maps 1, 2.
- 1970b. Die Süßwasserkrabben von Europa, Asien, Australien und ihre Stammesgeschichte. Eine Revision der Potamoidea und Parathelphusoidea (Crustacea, Decapoda). *Abh. Senckenb. nat. Ges.*, **526**: 1-338, pls. 1-58.
- BÜRGER, O., 1894. Beiträge zur Kenntnis der Gattung *Telphusa*. *Zool. Jb., Syst.*, **8**: 1-7, pl. 1.
- MAN, J. G., DE, 1898. Viaggio di Leonardo Fea in Birmania. *Ann. Mus. Civ. Stor. nat. Genova*, (2), **19**: 284-440.
- MILNE EDWARDS, H., 1853. Memoire sur la famille des ocyropodiens. *Ann. Sci. Nat., Zool.*, (3), **20**: 163-228, pls. 6-11.
- NG, P. K. L., 1988. The Freshwater Crabs of Peninsular Malaysia and Singapore. Dept. Zool.,

- National University of Singapore, Shinglee Press, Singapore, pp. i-viii, 1-156, 4 color plates.
- NG, P. K. L., 1992. A new genus and species of cavernicolous crab (Brachyura: Potamidae) from Kanchanaburi, Thailand, with comments on the genera *Tiwaripotamon* BOTT, 1970 and *Larnaudia* BOTT, 1966. *Mém. Biospéol.*, **19**: 159-167.
- NG, P. K. L., & D. DUDGEON, 1992. The Potamidae and Parathelphusidae (Crustacea: Decapoda: Brachyura) of Hong Kong. *Invert. Tax.*, **6** (3): 1-28.
- ORTMANN, A., 1897. Carcinologische Studien. *Zool. Jb., Syst.*, **10**: 256-372, pl. 17.
- RATHBUN, M. J., 1904. Les crabes d'eau douce. *Nouv. Arch. Mus. Hist. nat., Paris*, (4), **6**: 225-312, pls. 9-18.