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OBSERVATIONS ON THE MALE PLEOPOD OF THE SPECIES OF *ILYOPLAX* STIMPSON WITH A KEY TO THE IDENTIFICATION OF THE SPECIES

by

R. Serene and S. Lundoer

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OBSERVATIONS ON THE MALE PLEOPOD OF THE SPECIES OF *ILYOPLAX* STIMPSON WITH A KEY TO THE IDENTIFICATION OF THE SPECIES

By R. SERENE[1] and S. LUNDOER[2]
Phuket Marine Biological Center

ABSTRACT

An account is given on the use of the male pleopod for specific identification and grouping of the known species of *Ilyoplax*. A Key is given to the 24 known species of the genus with additional illustrations of the male pleopods of nine of these species.

Ilyoplax Stimpson (1858) was established for *I. tenellus* Stimpson 1858, a species from Hong Kong which has not been recorded again since Stimpson (1858); the type specimen is probably lost. The gender of *Ilyoplax* is masculine. *Tymnanomerus* Rathbun 1897 with *Cleistostoma pusilla* de Haan as type species is only a new name for *Dioxippe* de Man 1888 (nom. preocc.). Kemp (1919) suggested the synonymy of *Tympanomerus* with *Ilyoplax* and this was confirmed by Tweedie (1935). Kemp (1919) gave a key for 11 species and Tweedie (1937) for 19 species and one subspecies.

Six species of *Ilyoplax* were collected by the junior author during his ecological survey of the mangroves of Phuket island in Thailand. In order to establish the value of the ecological observations at the specific level, the senior author initiated the use of the characters provided by the male pleopod. These characters apart from being a means for specific identification, also provide new information about the grouping of the species. To the illustrations of the male pleopod already published for six species, we add those of nine more species. The male pleopod is still unknown for the remaining nine species of the 24 included in the genus.

Our drawings of the male pleopod, made from specimens cleared with glycerine, give the main outlines but these may slightly change with the position of the pleopods in the preparation. Generally the magnification of our drawings is × 80 or × 120. A larger magnification provides more accurate information on the apical structures. A magnification × 500 was used for *I. longicarpus* (fig. 3), and a magnification × 250 for *I. integer* (fig. 11).

The text of our illustrations gives the information on our material: Briefly, five species are from Phuket and are deposited at the Phuket Marine Biological Centre (PMBC), one is from Muar (Malaysia), one from Nhatrang (Vietnam) and the other from Korea. All our measurements are in millimetres; the first number represents the length of the carapace and the second number represents its breadth.

Our key, amended from that of Tweedie (1937), gives the reference to the illustrations of the male abdomen and pleopod. An asterisk (*) indicates that no material on the species has been available to us. In those cases, the characters in the key refer only to information obtained from the literature, principally from Tweedie (1937).

As some species were described during the last century and are insufficiently described and illustrated, and some characters of the carapace or cheliped might have been established from immature specimens, the male pleopod will make possible the checking of the validity of closely related established species without reference to comparative material. For example, *I. tansuiensis*

1 Presently of 46 Boulevard Pasteur, 75015, Paris, France.
2 Presently of Kildebakkegårds Alle 159A, 2860 Söborg, Denmark.

could be a synonym of *I. orientalis* and *I. formosensis* a synonym of *I. tenellus*.

The comparison between the already known male pleopod of 15 species confirms the heterogeneity of the genus mentioned by Kemp (1919). He noticed particularly that the species with long ambulatory legs, generally equipped with brushes of long setae on the carpi and propodes, inhabit soft mud. Those with short ambulatory legs inhabit hard mud. The grouping of the species resulting from their position in the key can be seen, with few exceptions, to be concordant with the grouping of species having the same type of male pleopod. This could lead to separating the homogeneous group of species as subgenera, or even as genera, when more information becomes available.

The following remarks on the grouping of the species are only indicative. The species could be separated into at least three groups in the order given in our key.

Group I includes *I. orientalis*, *I. tansuiensis*, *I. gangeticus* and *I. longicarpus*. All of these species have long ambulatory legs without visible tympana. The type of male pleopod of *I. orientalis* and *I. longicarpus* is the same and is characterized by an apex distally divided into several short lobes. A large population of *I. orientalis* is common on the soft mud of the oceanic margin of the mangroves of Southeast Asia. In the field, these crabs wave their chelipeds similar to the *Uca* spp.

Group II includes *I. obliquus*, *I. lingulatus* and *I. punctatus*. These species have short, thick ambulatory legs without tympana. The type of male pleopod, which is nearly the same as that of the three species, is characterized by a preapical oblique row of thick spines; the pleopod of *I. lingulatus* differs only slightly. *I. dentatus* probably belongs to the same group. *I. delsmani* and *I. serrata* belong to a group distinct from, but closer to, group II than to any other. The male pleopod without the preapical oblique row of thick spines is of a different type.

Tweedie (1935) suggests the identity of *I. delsmani* and that *I. yuana* is synonymous to *serrata*. If such an identity is demonstrated, the name given by Rathbun should have priority. The material of *I. delsmani* from Phuket has a male pleopod identical with specimens from Djakarta Bay (Type locality). According to the drawing of Shen, that of *I. serrata* is slightly different.

Group III includes *I. pusillus*, *I. dentimerosus*, *I. formosensis* and *I. pingi*, which have the same type of male pleopod characterized by a narrow tonguelike apex and a stem with a longitudinal row of setae on one side, and a subdistal lobe with long setae on the other side. All the species except *I. pingi* have tympana on their ambulatory legs.

I. philippinensis, *I. spinimerus*, *I. deschampsi*, *I. stevensi*, *I. frater*, *I. stapletoni* and *I. ningpoensis* all, except *I. stapletoni*, with tympana on the ambulatory legs probably belong to Group III. At least *I. deschampsi* has a type of male pleopod similar to that of *I. pusillus*. The difference in shape of the male abdomen seems to have little value other than specific as, for example, among the species of *Scopimera*. Similarly *I. dentimerosus*, *I. pingi*, *I. deschampsi* and other species with orbit transverse and short eye stalks belong to the same group as *I. pusillus* (and *I. philippinensis*) with the orbit oblique and eye stalks rather long.

However *I. integer*, in spite of its oblique orbit and long eye stalks belongs to a different group. By its male abdomen with segments 4 and 5 fused into one piece and the type of its male pleopod, *I. integer* is aberrant from any group. It is noticeable that this species inhabits neither the soft nor the hard mud of the mangrove, but the sand muddy shores nearby. The species was collected at Phuket as well as at Nhatrang. As we have suggested, then, further observations could lead to the use of *Ilyoplax* Stimpson (1858) s. *strictus* only for Group III with *I. pusillus* (de Haan, 1835) as type species; subgenera or even genera could be established for Group I with *I. orientalis* (de Man, 1888) as type species and for Group II with *I. obliquus* Tweedie 1935 as type species.

Key to the species of *Ilyoplax*[1] (amended from Tweedie, 1937)

1 A tooth on the inner surface of the carpus of the male cheliped ..... 2.
— Carpus of male cheliped unarmed ..... 11.

2(1) Upper surface of carpus of male cheliped elongate, at least twice as long as broad. Pereiopods 2-4 elongate and slim with brushes of long setae on carpi and propodes. Dactylus of cheliped with elongate proximal serrate tooth on cutting edge (weak in *orientalis*) ... 3.
— Upper surface of carpus rounded or rhomboidal, never twice as long as broad. Pereiopods 2-4 short and stout except on *delsmani* and *serratus* ..... 6.

3(2) Lower orbital margin with a large projecting lobe near its outer end; lateral margin of carapace sinuous ..... 4.
— Lower orbital margin without a projecting lobe; lateral margin of carapace regularly convex ..... 5.

4(3) Dorsal surface of carapace nearly smooth. Tooth of inner angle of carpus not remarkably acute. The elongate proximal tooth on cutting edge of dactylus very weak. Male abdomen in Tweedie (1935, pl. 3, fig. e); male pleopod in present paper (fig. 1). Size: 4.8×6.3. West coast of Malay Peninsula, South China Sea ..... *orientalis* (de Man).
— Dorsal surface of carapace uneven and granulated. Outer suborbital lobe more sharp. Tooth of inner angle of carpus slender and accuminate. Male abdomen in Sakai (1939, fig. 110d); male pleopod unknown. Size: 5×7.8. Taiwan ..... **tansuiensis* (Sakai).

5(3) Ratio of length to anterior breadth of carapace 0.75:1; chelipeds of male moderately elongate. Male abdomen in Kemp (1919, fig. 21); male pleopod unknown. Size: 4 × 5.3. Ganges River Delta ..... **gangeticus* (Kemp).
— Ratio of length of anterior breadth of carapace 0.8:1; chelipeds of male greatly elongated. Male abdomen in Tweedie (1935, pl. 3, figs. f, g, as *gangetica*). Male pleopod in present paper (fig. 2, 3). Size: 4.75 × 6.3. West coast of Malay Peninsula ... *longicarpus* (Tweedie).

6(2) Orbits very oblique, eyes rather long ..... 7.
— Orbits nearly transverse, eyes short and thick ..... 8.

7(6) Surface of carapace smooth and not areolated, ornamented on branchial regions with series of fine, oblique, beaded lines. Dactyl of male cheliped with high narrow subproximal tooth and a small subdistal. Meri of pereiopods 2-5 stout with carpi, propodi and distal part of meri tomentose. Male abdomen (not illustrated) with broad segment 6 and segment 5 strongly constricted. Male pleopod in present paper (fig. 4). Size: 3.7 × 5. Singapore and west coast of Malay Peninsula ..... *obliquus* (Tweedie).
— Surface of carapace smooth and conspicuously areolated. Male abdomen without marked broadening of segment 6 nor constriction of segment 5. Male pleopod unknown. Size: 6. Queensland, Australia ..... **dentatus* (Ward).

8(6) No antero-lateral tooth distinctly separated from external orbital angle by a deep concavity. Epibranchial angle salient; meri of pereiopods 2-5 stout and short ..... 9.
— An antero-lateral tooth distinctly separated from external angle by a deep concavity. Lateral border of carapace without or with feebly marked epibranchial angle; meri of pereiopods 2-5 not remarkably stout and short ..... 10.

[1] An asterisk (*) indicates species with no material available; characters in the Key are obtained from references.

PLATE I

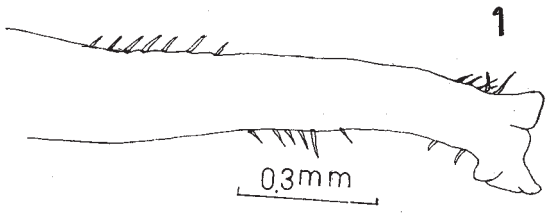
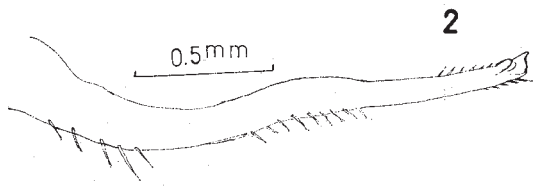
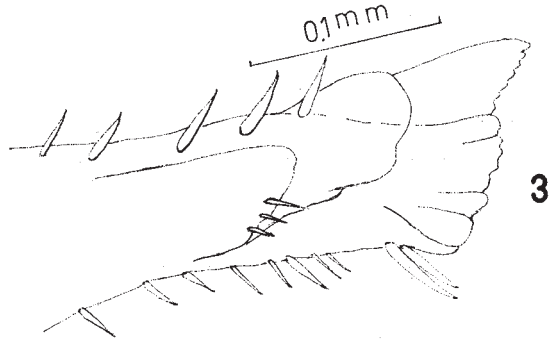


Fig. 1—Male pleopod of *Ilyoplax orientalis*, PMBC, Phuket (Thailand), male of cl: 3.8, cb: 5.8; Lundoer coll. 1972.





Figs. 2-3—(2) Male pleopod of *Ilyoplax longicarpus*, NMS. 1965.7.19.112, Paratype, Muar, Malaysia, male of cl: 4.75 × 6.5; Tweedie coll. and det. 1937. (3) Same, magnified tip.

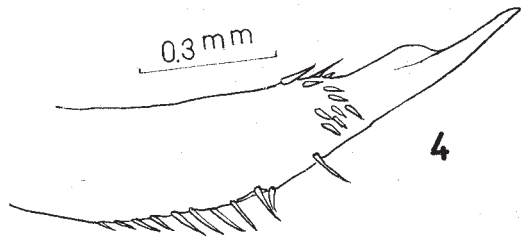


Fig. 4—Male pleopod of *Ilyoplax obliquus*, PMBC, Ko Sireh 6, Phuket (Thailand), male of cl: 3.9, cb: 5.5; Lundoer coll. 1972.

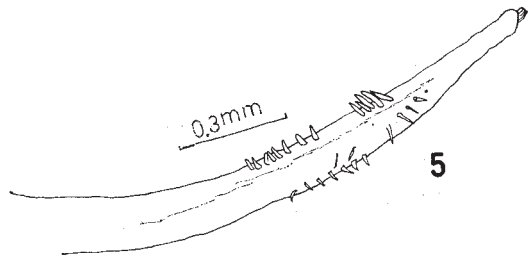


Fig. 5—Male pleopod of *Ilyoplax lingulatus*, PMBC, Phangnga 9, Phuket (Thailand), male of cl: 3.6, cb: 4.4; Lundoer coll. 1972.

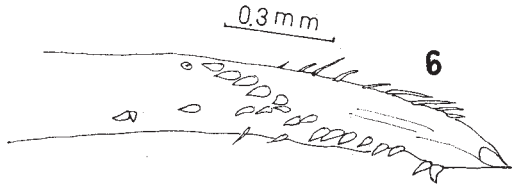


Fig. 6—Male pleopod of *Ilyoplax punctatus*, PMBC 71, Phuket (Thailand), male of cl: 3.8, cb: 5.6; Lundoer coll. 1972.

9(8) Surface of carapace with furry patches marking clusters of small granules. Male cheliped strong with large proximal tooth on fixed finger and dactyl. Male abdomen in Tweedie (1935, pl. 3, figs. h, i). Male pleopod in present paper (fig. 5). Size: 4×5.4. Gulf of Thailand. Singapore, Malayan coast, India ..... *lingulatus* (Rathbun).

— Surface of carapace without furry patches, coarsely punctate with irregular lines of granules on branchial region. Male cheliped small and weak with finger unarmed. Male abdomen in Tweedie (1935, pl. 3, fig. j, k.). Male pleopod in present paper (fig. 6). Size: 4.5 × 6.9. Singapore and Malayan coasts ..... *punctatus* (Tweedie).

10(8) Inner part of the infra-orbital ridge in the male armed with 8-9 conspicuous teeth. Male abdomen in Tweedie (1935, pl. 3, fig. c); male pleopod in present paper (fig. 7). Size: 5 × 6.6. Djakarta Bay; west coast of Malay Peninsula ..... *delsmani* (de Man).

— Inner part of the infra-orbital ridge in the male armed with 4 conspicuous teeth. (Female indistinguishable from *delsmani*). Male abdomen and pleopod in Shen (1931, figs. 4a, b). Size: 5×6.6. South China; east coast of Malay Peninsula .. *serratus* (Shen) (? = *yuana* Rathbun).

11(1) Abdomen of male not or only slightly constricted at the 5th segment ..... 12.

— Abdomen of male abruptly narrowed or constricted at the 5th segment ..... 17.

12(11) Carapace pentagonal; orbits decidedly oblique, elongate and slim. An angular notch on lateral border behind external orbital angle ..... 13.

— Carapace quadrilateral; orbits almost or quite transverse, short and thick ..... 14.

13(12) Meri of pereiopods 2-4 with large tympana on two sides. Two fingers of male cheliped without trace of differentiated tooth. A strong crenulate carina on outer side of both fingers; fixed finger horizontal in relation to palm. Male abdomen in de Haan (1835, pl. 16, fig. 1). Male pleopod in present paper (fig. 8). Size: 6.5 × 9.5. Japan, Korea ..... *pusillus* (de Haan).

— Meri of pereiopods 2-4 without tympana. A low subproximal tooth on cutting edge of dactylus. No carina on outer side of fingers; fixed finger deflexed. Male abdomen and pleopod not illustrated. Size: 3.5 × 5.2. Philippine Islands ..... **philippinesis* (Rathbun).

14(12) Meri of pereiopods 2-5 naked; those of pereiopods 2-4 with anterior border finely granular and posterior border serrulate. Lateral border of carapace without notch behind external orbital angle. Male abdomen in Shen (1932, fig. 154a). Male pleopod in Shen (1932, fig. 154b). Size: 5.7 × 8.4. Shantung, China ..... *dentimerosus* (Shen).

— Meri of at least pereiopods 2-3 tomentose ..... 15.

15(14) Lateral border of carapace without notch behind external orbital angle. Cutting edge of dactylus of male cheliped with two or more denticulated prominences, the proximal one the broadest. (Pereiopods 2-4 tomentose, with indistinct tympana on the meri). Male abdomen in Shen (1932, fig. 152a). Male pleopod in Shen (1932, fig. 152b). Size: 8.4 × 13.2. North China, Korea ..... *pingi* (Shen).

— Cutting edge of dactylus of male cheliped with a single tooth. Lateral border of carapace with a notch behind external orbital angle ..... 16.

16(15) Carapace hard and well calcified. Pereiopods 2-4 tomentose with tympana occupying whole surface only on pereiopod 3. Cheliped elongate with stout subproximal tooth on cutting edge of dactylus. Male abdomen not illustrated. Male pleopod in present paper (fig. 9). Size: 5.5 × 8.1. Taiwan, Vietnam ..... *formosensis* (Rathbun).

PLATE II

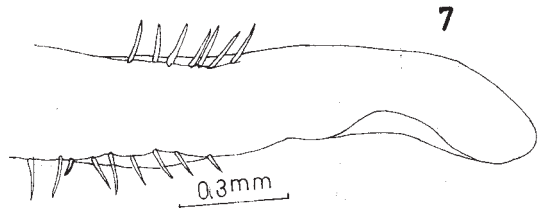


Fig. 7—Male pleopod of *Ilyoplax delsmani*, PMBC, Phangnga 8, Phuket (Thailand), male of cl: 4.0, cb: 5.6; Lundoer coll. 1972.

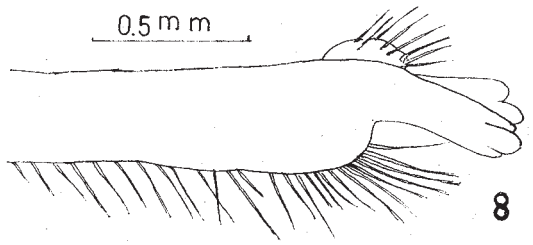


Fig. 8—Male pleopod of *Ilyoplax pusillus*, Busan, Korea, male of cl: 7.5, cb: 11; Prof. H.S. Kim coll. and det. 12/7/1969.

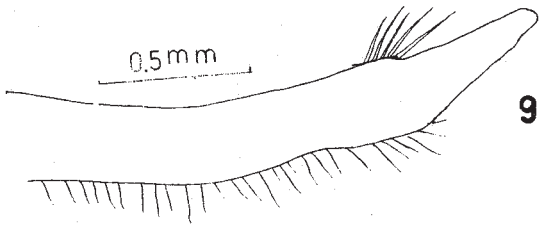
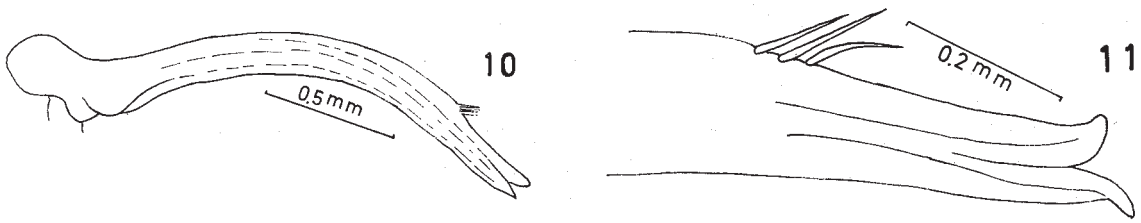


Fig. 9—Male pleopod of *Ilyoplax formosensis*, ION 48.915, Nhatrang Bay (Vietnam), male of cl: 4.5, cb: 6.5; Luom coll. and Serene det. 1972.



Figs. 10-11—(10) Male pleopod of *Ilyoplax integer*, ION 47.989, Nhatrang Bay (Vietnam), male of cl: 3.5, cb: 5; Luom coll. and Serene det. 1972. (11) Same, magnified tip.

— Carapace soft (?) and ill calcified; tympana on meri of walking legs occupying the whole of their surfaces. Cheliped elongate with median tooth on cutting edge of dactylus (no illustration). Canton River (China) ..... **tenellus* (Stimpson).

17(11) Epistomial margin without median lobes. Front remarkably narrow. Meri of pereiopods 2-5 with margin spinulous. Male abdomen in Tweedie (1950, fig. 8e). Male pleopod in Tweedie (1950, fig. 8b). Size: 6.8×9.8 Sarawak ..... *spinimerus* (Tweedie).

— Epistomial margin with median lobes. Front not remarkably narrow. Meri of pereiopods 2-5 without spinules ..... 18.

18(17) Male cheliped with 3-4 longitudinal carina on lower surface of palm and immovable finger ..... 19.

Male cheliped with lower surface of palm and immovable finger without longitudinal carinae ..... 21.

19(18) Lateral margin of carapace with a notch behind outer orbital angle. Surface of carapace beset with short, setiferous, rugose lines. A small tympanum (sometimes indistinct) on upper surface of merus of pereiopods 2-5. Male abdomen in Shen (1932, fig. 150a). Male pleopod in Shen (1932, fig. 150b). Size: 7.4×11.5. China .... **deschampsi* (Rathbun).

— Surface of carapace smooth except for some oblique rows of tubercles on branchial regions; no tympana on upper surface of merus of pereiopods 2-5 ..... 20.

20(19) Lateral margin of carapace without notch behind outer orbital angle. Front not more than 1/11 of anterior breadth of carapace; upper surface of carapace not wider at the middle than anteriorly; cheliped of adult male weak, similar to that of female; male with a patch of tomentum on carpus and propodus of pereiopod 3. Male abdomen in Kemp (1919, fig. 15). Male pleopod unknown. Size: 5.1 × 7.7. Karachi ..... **stevensi* (Kemp).

— Lateral margins of carapace with a notch behind outer orbital angle. Front not less than 1/7 of anterior breadth of carapace; upper surface of carapace wider at the middle than anteriorly; cheliped of adult male strong; male without tomentum on pereiopod 3. Male abdomen and male pleopod not illustrated. Size: 4.9 × 5.6. Karachi ..... **frater* (Kemp).

21(18) Orbits oblique; lateral margins of carapace entire (without notch behind outer orbital angle). 4th and 5th segments of male abdomen fused, distal angles of 4th segment produced and acute; meri of pereiopods 2-5 with conspicuous tympana. Male abdomen in Tesch (1918, fig. 1b). Male pleopod in present paper (fig. 10, 11). Size: 4 × 5.5. Kur Island, West of Kai Island, Vietnam, Japan, East shores of Andaman Sea ..... *integer* (Tesch).

— Orbits transverse. All male abdominal segments separate and distinct ..... 22.

22(21) Lateral margin of carapace with a notch behind outer orbital angle; meri of pereiopods 2-5 without tympana. Male abdomen in de Man (1908, fig. 1d). Male pleopod unknown. Size: 7.7 × 9. Ganges River Delta ..... **stapletoni* (de Man).

— Lateral margin of carapace entire (without notch behind outer orbital angle). Tympana on meri of pereiopods 2-4 occupying half dorsal and ventral surfaces; on pereiopod 5 dorsal tympana obliterated, ventral very big. Male abdomen in Shen (1940, fig. 7). Male pleopod in Shen (1940, fig. 9). Size: 10 × 14.5. Chekiang and Fukien (China). ..... **ningpoensis* (Shen).

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