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## ON SOME INDO-WESTPACIFIC PALAEMONINAE (CRUSTACEA DECAPODA CARIDEA)

by

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Since the publication of my paper on the prawns of the subfamily Palaemoninae collected by the Siboga and Snellius Expeditions (Holthuis, 1950, Siboga Exped., mon. 39a9), I had the opportunity to examine more material of this group, which enabled me to make additions and corrections to the above paper. These additions and corrections are the subject of the present paper.

During a visit to the Istituto e Museo di Zoologia della Università at Turin, Italy, I examined the type material of *Leander deschampsii* Nobili, a species which in 1950 was placed by me among the species incertae. The examination of these types made it possible for me to fix the status of Nobili's species. The collection of the Turin Museum furthermore contained material of *Macrobrachium hirtimanus* (Olivier) from Réunion, which showed me that I was wrong in identifying *Macrobrachium lepidactyloides* (De Man) as Olivier's species. I wish to express here my sincere gratitude to Mrs. Teresita Paulucci Maccagno and to Professor Alceste Arcangeli for their help and kindness shown during my visit to their institute and for the loan of some material.

I am also most grateful to Mr. Herbert M. Hale of the South Australian Museum, Adelaide, and to Mr. Frank A. McNeill of the Australian Museum, Sydney, who were kind enough to provide me with material of three Australian Palaemonids, two of which (*Leander intermedius* Stimpson and *Leander litoreus* McCulloch) in my 1950 paper were ranged under the species incertae. The position of these two species could now be determined. The

third species, *Leander serenus* Heller, proved to have been incorrectly identified by me as *Palaemon affinis* H. Milne Edwards.

**Leandrites deschampsi** (Nobili) (Fig. 1)

*Leander Deschampsii* Nobili, 1903, Boll. Mus. Zool. Anat. comp. Torino, vol. 18 n. 455, p. 8.

*Leander deschampsi* Kemp, 1925, Rec. Indian Mus., vol. 27, p. 291; Holthuis, 1950, Siboga Exped., mon. 3929, p. 20.

Singapore; 1901; leg. E. Deschamps; types of *Leander Deschampsii* Nobili, in Turin Museum. — 3 specimens (1 ovigerous female) 22-26 mm.

Description. The rostrum (fig. 1a) is slender and curved upwards, it reaches somewhat beyond the scaphocerite. Nine or ten teeth are regularly

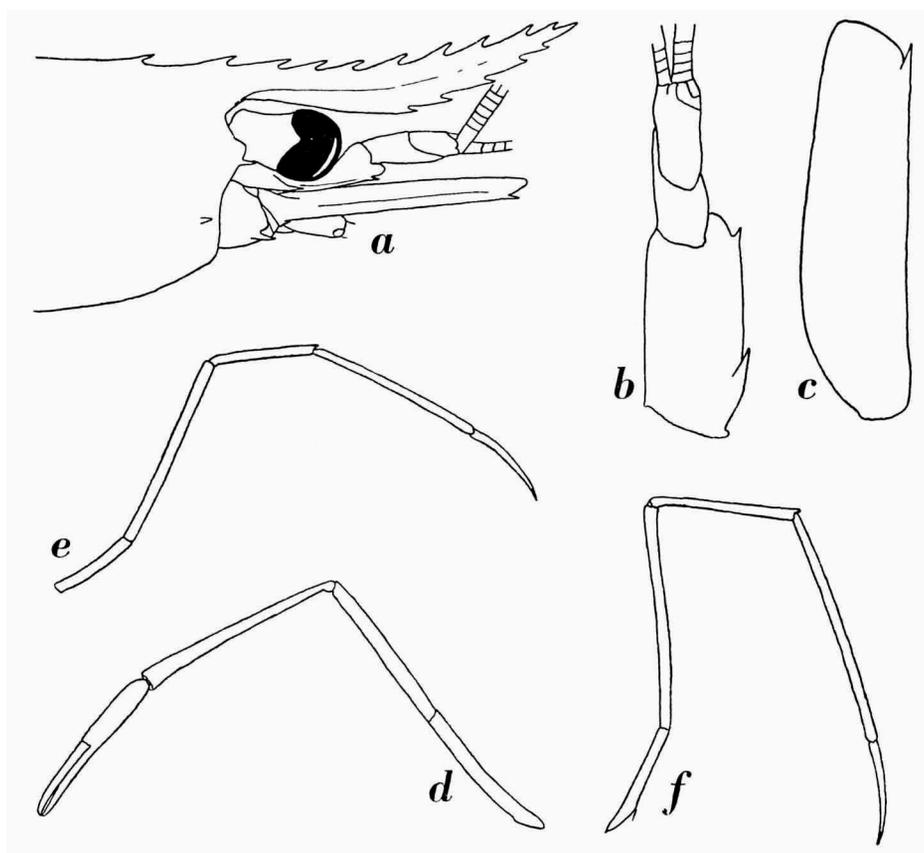


Fig. 1. *Leandrites deschampsi* (Nobili), syntype. a, anterior part of body in lateral view; b, antennular peduncle; c, scaphocerite; d, second pereiopod; e, third pereiopod; f, fifth pereiopod. a, d-f,  $\times 8.5$ ; b, c,  $\times 12$ .

divided over the upper margin of the rostrum. One or two of these are placed on the carapace behind the orbit. The lower margin of the rostrum bears four or five teeth. The shape of the carapace and the abdomen is like in *Leandrites celebensis* (De Man).

The eyes are normal.

The antennulae (Fig. 1b) have the anterior margin of the basal segment far more anteriorly produced than in *L. celebensis*, while the scaphocerite (Fig. 1c) also is more slender. In these two characters the present species shows a strong resemblance to *Leandrites indicus* Holthuis.

The mandible lacks a palp and thus clearly shows that the present species does not belong in the genus *Leander* Desm.

The first legs reach with part of the chela beyond the scaphocerite, they do not differ from those of *L. indicus*. The second legs (Fig. 1d) reach with part of the carpus beyond the scaphocerite. The fingers are as long as, or a trifle shorter than the palm. The dactylus bears two, the fixed finger bears one extremely small tooth in the extreme proximal part of the cutting edge. The palm is but little swollen. The carpus is very long, being fully 1.2 times as long as the chela. The merus is slightly shorter than the chela and somewhat longer than the ischium. The last three legs are distinctly less slender than in *L. indicus*. They reach with a small part of the propodus beyond the scaphocerite. The fifth leg reaches slightly farther than the third. The third leg (Fig. 1e) has the propodus twice as long as the dactylus. The carpus is distinctly longer than half the propodus, while the merus is somewhat longer than the entire propodus. The fifth leg (Fig. 1f) has the dactylus slightly less than half as long as the propodus. The carpus measures  $\frac{3}{5}$  of the length of the propodus. The merus, finally, is somewhat shorter than the propodus.

The pleopods are as in *Leandrites indicus*. In the first pleopod of the male the endopod is provided with an appendix interna. The eggs in this material are not in a very good condition. They are numerous and small.

*Leandrites deschampsi* is closely related to *L. celebensis* and to *L. indicus*. From *L. celebensis* it differs in the shape of the slender upwards curved rostrum, in the shape of the antennular peduncle and of the scaphocerite. Also the second legs are more slender than those in De Man's species and have the carpus distinctly longer instead of shorter than the chela. From *Leandrites indicus*, Nobili's species at once may be distinguished by the rostral formula. In *L. deschampsi* this formula is  $\frac{1-2) \ 9-10}{4-5}$ , while the formula of *L. indicus* is  $\frac{2) \ 11-14}{8-9}$ . Furthermore in *L. deschampsi* the carpus of the second legs is longer, while the last three pairs of legs are stouter. It is

possible, of course, that in future *L. indicus* and *L. deschampsi* will prove to be only two extreme forms of one variable species, but the data now available do not point in that direction.

Distribution. *Leandrites deschampsi* is only known from the three type specimens from Singapore.

### ***Palaemon serenus* (Heller)**

*Leander serenus* Heller, 1862, Verh. zool.-bot. Ges. Wien, vol. 12, p. 527; Heller, 1865, Reise Novara, Zool., vol. 2 pt. 3, p. 110, pl. 10 fig. 5; Hess, 1865, Arch. Naturgesch., vol. 31 pt. 1, p. 167; Haswell, 1882, Catal. Aust. Crust., p. 195; Whitelegge, 1890, Journ. Roy. Soc. New S. Wales, vol. 23, p. 224; McCulloch, 1909, Rec. Aust. Mus., vol. 7, p. 306, pl. 89 figs. 9-12; Hale, 1924, Trans. Proc. Roy. Soc. S. Aust., vol. 48, p. 68; Kemp, 1925, Rec. Indian Mus., vol. 27, p. 292; Hale, 1927, Crust. S. Aust., vol. 1, p. 59, fig. 54; Hale, 1927a, Trans. Proc. Roy. Soc. S. Aust., vol. 51, p. 309; Tubb, 1937, Proc. Roy. Soc. Victoria, vol. 49, p. 408; Anderson, 1938, Proc. Roy. Soc. Victoria, vol. 50, p. 351.

*Palaemon affinis* Bate, 1888, Rep. Voy. Challenger, Zool., vol. 24, p. 728, pl. 128 fig. 5; Whitelegge, 1890, Journ. Roy. Soc. New S. Wales, vol. 23, p. 224.

*Palaemon (Palaemon) affinis* p.p. Holthuis, 1950, Siboga Exped., mon. 39a9, pp. 7,76.

Coast near Maroubra, Sydney, New S. Wales; rockpool; leg. F. A. McNeill, don. Australian Museum; Aust. Mus. no. P. 4658, Leiden Mus. no. 7756. — 3 specimens (2 ovigerous females, 41 and 46 mm) 40-46 mm.

Port Jackson, New S. Wales; leg. F. A. McNeill, don. Australian Museum; Aust. Mus. no. P. 4777, Leiden Mus. no. 7757. — 1 ovigerous female, 51 mm.

Kingscote, Kangaroo Island, S. Australia; leg. F. A. McNeill, don. Australian Museum; Aust. Mus. no. P. 4840, Leiden Mus. no. 7758. — 1 specimen, 46 mm.

Muston, Kangaroo Island, S. Australia; April, 1950; leg. H. M. Cooper, don. South Australian Museum; Leiden Mus. no. 7260. — 22 specimens, 25-50 mm.

Port Willunga, S. Australia; reef; September, 1949; leg. H. M. Hale, don. South Australian Museum; Leiden Mus. no. 7261. — 2 specimens (1 ovigerous female, 52 mm), 39 and 52 mm.

Marino near Adelaide, S. Australia; leg. H. M. Hale, don. South Australian Museum; Leiden Mus. no. 7262. — 1 specimen 36 mm.

In my Siboga paper I identified *Leander serenus* Heller as *Palaemon affinis* H. Milne Edwards, but examination of actual specimens of Heller's species shows that the two forms are distinct.

*Palaemon serenus* indeed is closely related to *Palaemon affinis* but may be distinguished by that, in contradiction to what is said in Kemp's (1925) key, the upper antennular flagellum in the former species has the fused part of the two rami shorter than half the free portion of the shorter ramus. In *Palaemon affinis* this fused part is longer than half the free portion of the shorter ramus. Furthermore in my material of *Palaemon affinis* the second legs reach at most with the chela beyond the scaphocerite, while in the material of *Palaemon serenus* seen by me the second leg is more slender and reaches always with part of the carpus beyond the scaphocerite. In

practically all other respects there is a very close resemblance between the two species. The differences, however, seem to be sufficiently constant to justify the recognition of *Palaemon serenus* as a good species.

Mr. Frank A. McNeill kindly permitted me to publish the following colour description, which he made after living specimens of this species: "*Palaemon serenus* has distinct reddish stripes running longitudinally on the cephalothorax and flecks of the same colour occur longitudinally on the abdomen. The palm has a broad band of dark red, while the rest of the upper part of the cheliped limb bears tiny red spots. Fingers are white."

Distribution. *Palaemon serenus* is a litoral form, which generally inhabits rock-pools. It is known from the coast of E. and S. Australia. The records in literature are: Rat Island, Port Curtis, S. Queensland (McCulloch, 1909), Sydney, New S. Wales (Heller, 1862; 1865; Hess, 1865; Haswell, 1882; Whitelegge, 1890; McCulloch, 1909), Port Jackson, New S. Wales (Bate, 1888; Whitelegge, 1890), Port Phillip, Victoria (McCulloch, 1909), Lady Julia Percy Island, Victoria (Tubb, 1937), Bay of Shoals and Vivonne Bay, Kangaroo Island, S. Australia (Hale, 1927a), Port Willunga (Hale, 1927), Reevesby Island, Sir Joseph Banks Group (Anderson, 1938), Flinders and Pearson Islands, South Australia (Hale, 1924). Thomson (1903, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 8, p. 450) reports *Palaemon affinis* from Tasmania, it is possible that this record is based on specimens of the present species.

#### ***Palaemon litoreus* (McCulloch)**

*Leander litoreus* McCulloch, 1909, Rec. Aust. Mus., vol. 7, p. 308, fig. 16; Hale, 1924, Trans. Proc. Roy. Soc. S. Aust., vol. 48; p. 68; Kemp, 1925, Rec. Indian Mus., vol. 27, p. 293; Hale, 1927, Crust. S. Aust., vol. 1, p. 59, fig. 55; Holthuis, 1950, Siboga Exped., mon. 39a9, p. 20.

Coast near Maroubra, Sydney, New South Wales; rockpool; leg. F. A. McNeill, don. Australian Museum; Aust. Mus. no. P. 4659, Leiden Mus. no. 7755. — 3 specimens, 35-45 mm.

The rostrum is straight and reaches slightly beyond the end of the scaphocerite. The upper margin bears 8 teeth which are regularly divided over the rostrum, 2 or 3 of these teeth are placed behind the posterior limit of the orbit. The lower margin bears three or four teeth. The branchiostegal spine stands on the anterior margin of the carapace just below the branchiostegal groove.

The pleurae of the fifth abdominal segment are pointed. The fifth segment is distinctly shorter than the sixth. The telson has the two dorsal pairs of spines placed in its middle and at  $\frac{3}{4}$  of its length. The posterior margin bears a distinct median point and is provided with the usual two pairs of spines and two setae.

The eyes are provided with an ocellus. The cornea of my preserved material still shows two bands of dark pigment.

The stylocerite of the basal segment of the antennular peduncle is very slender and reaches beyond the middle of the segment. The anterolateral spine of this segment is strong and reaches beyond the middle of the second segment.

The scaphocerite is about three times as long as broad. The outer margin is slightly concave and ends in a strong final tooth, which, however, falls short of the end of the lamella.

The mouth parts are typical. The mandible bears a distinctly three-jointed palp.

The first pereiopods reach slightly beyond the scaphocerite. The fingers are slightly longer than the palm. The carpus is about 1.5 times as long as the chela and as long as the merus. The carpus of the second leg is practically as long as the palm. The dactylus of the second leg is provided with one or two small teeth in the proximal part of the cutting edge. Sometimes a small tooth is visible in the proximal part of the cutting edge of the fixed finger. The third leg reaches to the end of the scaphocerite. The dactylus is rather short, it measures  $\frac{1}{3}$  of the length of the propodus. The carpus is about half as long as the propodus, the merus is longer than the latter joint. The posterior margin of the propodus is provided with about 5 scattered spinules. The fifth leg strongly resembles the third, it is only somewhat more slender and has the merus about as long as the propodus. The posterior margin of the propodus, apart from the scattered spinules, bears in its distal part several transverse rows of short setae.

The pleopods and uropods are normal in shape. The movable spine at the inner side of the final tooth of the external margin of the uropodal exopod is strong and reaches as far as or somewhat beyond the final tooth.

No males have been examined.

The above mentioned features distinctly show that the present species has to be placed in the genus *Palaemon*.

The following colour notes have been made by Mr. Frank A. McNeill after living specimens of this species, whom I wish to thank for his kindness to permit me to publish them. "*Palaemon litoreus* is readily distinguished in colour from *P. serenus* by possessing saddle stripes of red, which extend across the back and sides of the whole body. The stripes on the cephalothorax are not so distinct as elsewhere on the body, and the distinct dark red band around the palm of the hand is much narrower than in *P. serenus*. Each of the fingers has a band of the same colour placed at about midway along their length. The rest of the cheliped limb is spotted above as in *P. serenus*."

Distribution. The species is known from E. and S. Australia, where it lives in the litoral region. According to Mr. McNeill it is invariably found together with *Palaemon serenus* in rock-pools. The records in literature are: Near Sydney, New S. Wales (McCulloch, 1909), Glenelg, S. Australia (Hale, 1924), Flinders Island, Investigator Group, S. Australia (Hale, 1924).

### **Macrobrachium intermedium** (Stimpson)

*Leander intermedius* Stimpson, 1860, Proc. Acad. nat. Sci. Philad., 1860, p. 41; Haswell, 1882, Catal. Aust. Crust., p. 195; Whitelegge, 1890, Journ. Roy. Soc. New S. Wales, vol. 23, p. 224; G. M. Thomson, 1893, Pap. Proc. Roy. Soc. Tasmania, 1892, p. 51; Stead, 1898, Zoologist, ser. 4 vol. 2, p. 210; Grant, 1902, Victoria Nat., vol. 18, p. 155; McCulloch, 1909, Rec. Aust. Mus., vol. 7, p. 309, pl. 89 figs. 13, 14; Hale, 1924, Trans. Proc. Roy. Soc. S. Aust., vol. 48, p. 68; Kemp, 1925, Rec. Indian Mus., vol. 27, p. 291; Hale, 1927, Crust. S. Aust., vol. 1, p. 58, fig. 53; Hale, 1927a, Trans. Roy. Soc. S. Aust., vol. 51, p. 309; Anderson, 1938, Proc. Roy. Soc. Victoria, vol. 50, p. 351; Mack, 1941, Mem. Nat. Mus. Melbourne, vol. 12, p. 108; J. M. Thomson, 1946, Journ. Roy. Soc. W. Aust., vol. 30, pp. 59, 67; Holthuis, 1950, Siboga Exped., mon. 39a9, p. 20.

*Palaemon (Leander) intermedius* Miers, 1884, Rep. Zool. Coll. Voy. "Alert", p. 295.

non *Leander* (?) *intermedius* Ortmann, 1890, Zool. Jb. Syst., vol. 5, p. 523.

Botany Bay, new South Wales; about 6 fathoms deep, among weeds; don. Australian Museum; Aust. Mus. no. P. 11461, Leiden Mus. no. 7754. — 2 ovigerous females, 40 and 43 mm, 1 male, 32 mm.

Muston, Kangaroo Island, South Australia; April, 1950; leg. H. M. Cooper, don. South Australian Museum; Leiden Mus. no. 7264. — 46 specimens, 17-43 mm.

Bay of Shoals, Kangaroo Island, South Australia; April, 1950; leg. H. M. Cooper, don. South Australian Museum; Leiden Mus. no. 7265. — 1 specimen, 21 mm.

Shoalwater Point, Spencer Gulf, South Australia; coarse tonet behind dinghy, 15 m depth; February 28, 1938; leg. F. Moorhouse, don. South Australian Museum; Leiden Mus. no. 7266. — 3 specimens, 26-42 mm.

A good description and figure of this species has been given by McCulloch, 1909. I should like to add the following remarks: The branchiostegal spine which McCulloch describes as being somewhat removed from the anterior margin of the carapace, on close examination proves to be a hepatic spine. The branchiostegal groove, namely, does not pass above this spine, as it should do if the latter actually was a branchiostegal spine, but it runs straight towards the spine and stops there. The same situation is found in species of the genus *Macrobrachium*. The fact that the species does not possess a branchiostegal but a hepatic spine, makes it necessary to remove it from *Leander* and to place it in the genus *Macrobrachium* Bate. The species shows all the characteristics of the latter genus, except for its slender shape and its habitat. Most species of *Macrobrachium*, namely, are much more robust in shape, while the adult males have the second pereopods generally

very large and often provided with spines; there are several species of *Macrobrachium*, however, that, like *M. intermedium*, have both the adult males and females slender, with slender and smooth chelipeds. *M. intermedium* is the only known species of the genus that spends its entire life in the sea. All other species of *Macrobrachium* live in fresh or brackish water, some having been occasionally reported from the sea.

The pleurae of the fifth abdominal segment of *Macrobrachium intermedium* end in a sharp point. The sixth segment is somewhat less than twice as long as the fifth. The telson has the dorsal spinules placed in the middle and at  $\frac{3}{4}$  of its length. The posterior margin of the telson bears a sharp median point and the usual two pairs of spines. The inner spines are very slender; two setae are placed between them.

The eyes possess a distinct ocellus.

The stylocerite is very slender and reaches slightly beyond the middle of the basal segment of the antennular peduncle. The anterolateral spine of this segment is strong, reaches about as far as the anteriorly produced anterior margin of the basal segment and almost attains the middle of the second segment.

The scaphocerite is more than three times as long as broad. The outer margin is straight and ends in a strong final tooth, which is overreached by the lamella.

The oral parts are normal. The mandible bears a three-jointed palp, the middle joint of which is very short.

The first legs have the fingers slightly longer than the palm. The carpus is almost twice as long as the chela and distinctly longer than the merus. The dactylus of the second legs possesses two teeth in the proximal part of the cutting edge, the distal tooth being most distinct. The cutting edge of the fixed finger bears one tooth, which is placed between the two teeth of the dactylus. The carpus is slightly longer than the merus. The third leg distinctly fails to reach the end of the scaphocerite. The dactylus is slender. The propodus is about 2.5 times as long as the dactylus, less than twice as long as the carpus and slightly shorter than the merus. Its posterior margin bears about 7 spines. The fifth leg is more slender than the third. The propodus is more than 2.5 times as long as the dactylus, about twice as long as the carpus and as long as the merus. The posterior margin of the propodus bears some scattered spinules, while it furthermore possesses numerous transverse rows of short hairs, which are placed in its distal part.

The pleopods and uropods are normal in shape. The first pleopod of the male has the endopod elongate with the inner margin concave. No appendix is present here. The second pleopod of the male has the appendix

masculina distinctly longer than the appendix interna. The exopod of the uropod has the outer margin ending in a tooth at the inner side of which a movable spinule is present.

Colour. Mr. Frank McNeill informs me that the "colour of *M. intermedium* is negligible. There is only a series of hair-line, dullish purple stripes along the cephalothorax and lines and flecks on the abdomen. The lines are longer and more conspicuous on the cephalothorax. The rest of the body is semitransparent as in *P. serenus* and *P. litoreus*".

Distribution. The species is a marine litoral form. It lives in shallow water amongst weeds and has been reported from depths between 2 and 9 fathoms; it seems to be absent from rock-pools. Mr. McNeill kindly provided me with the following interesting data about the habitat of this species: "*M. intermedium* is always taken amongst weed such as *Posidonia*, which occurs in large patches in shallow estuarine waters and is commonly called "strap weed". I know of only one case where the species was collected on the open coast. This was in a pool at Long Reef, a big expanse of rock platform just north of Port Jackson, N.S.W. The conditions (weed presence etc.) here simulated those to be found in an estuarine habitat. Obviously, an estuarine habitat is the normal one for the species". *Macrobrachium intermedium* is known with certainty from E. and S. Australia. The records in literature are: Australia (Stead, 1898), Port Molle, Queensland (Miers, 1884), Port Jackson, New S. Wales (Stimpson, 1860; Haswell, 1882; Miers, 1884; Whitelegge, 1890; McCulloch, 1909), near Gippsland Lakes, Victoria (Mack, 1941), Port Phillip, Victoria (Grant, 1902), Bay of Shoals and Beare's Point, Kangaroo Island, S. Australia (Hale, 1927a), St. Vincent Gulf (Hale, 1927), between Reevesby and Lusby Islands, and off Spilsby Island, Sir Joseph Banks Group (Anderson, 1938), Nuyts Archipelago, S. Australia (Hale, 1924), King George's Sound, W. Australia (Miers, 1884), Swan River Estuary, W. Australia (J. M. Thomson, 1946), Tasmania (Miers, 1884; G. M. Thomson, 1893), Ovalau, Fiji Islands (Miers, 1884). Miers's (1884) records are doubtful, since this author does not distinguish between *Palaemon serenus* and *M. intermedium*, while furthermore it seems highly improbable that either of these two species occurs in Fiji. Stead mentions his material from rock-pools, it seems possible therefore that what he named *Leander intermedius* actually is *Palaemon serenus*.

### **Macrobrachium hirtimanus** (Olivier) (Pl. XV fig. 1)

*Palaemon hirtimanus* Olivier, 1811, Enc. méth. Hist. nat., vol. 8, p. 663; Lamarck, 1818, Hist. nat. Anim. s. Vert., ed. 1 vol. 5, p. 207; Latreille, 1818, Tabl. enc. méth., vol. 24, p. 5, pl. 318 fig. 2; H. Milne Edwards, 1838, Lamarck's Hist. nat. Anim. s.

Vert., ed. 2 vol. 5, p. 367; White, 1847, List Crust. Brit.Mus., p. 79; A. Milne Edwards, 1862, Maillard's Notes Ile Réunion, Ann. F, p.16; Miers, 1879, Philos. Trans. Roy. Soc. Lond., vol. 168, p. 493; De Man, 1892, Weber's Zool. Ergebn., vol. 2, p. 486; Sharp, 1893, Proc. Acad. nat. Sci. Philad., 1893, p.122; Ward, 1942, Mauritius Inst. Bull., vol. 2, p. 57.

*Palaemon hirtimanus* H. Milne Edwards, 1837, Hist. nat. Crust., vol. 2, p. 400.

*Palaemon (Macrobrachium) hirtimanus* J. Roux, 1934, Faune Colon. Franç., vol. 5, p. 543.

*Macrobrachium hirtimanus* p.p. Holthuis, 1950, Siboga Exped., mon. 39a9, pp. 245.

### **Macrobrachium lepidactyloides** (De Man) (Pl. XV fig. 2)

*Palaemon hirtimanus* De Haan, 1849, Fauna Japonica Crust., pl. P.

*Palaemon hirtimanus* Von Martens, 1876, Preuss. Exped. Ost-Asien, Zool., vol. 1, p. 315; Ortmann, 1891, Zool. Jb. Syst., vol. 5, p. 737, pl. 47 fig. 10.

*Palaemon lepidactylus* Miers, 1880, Ann. Mag. nat. Hist., ser. 5 vol. 5, p. 384; Cowles, 1915, Philipp. Journ. Sci., vol. 9 sect. D, p. 389, pl. 3 fig. 9; Estampador, 1937, Philipp. Journ. Sci., vol. 62, p. 488.

*Palaemon (Macrobrachium?)* sp. De Man, 1892, Weber's Zool. Ergebn., vol. 2, p. 488, pl. 28 fig. 47.

*Palaemon (Macrobrachium) placidulus* p.p. De Man, 1892, Weber's Zool. Ergebn., vol. 2, p. 489; De Man, 1893, Notes Leyden Mus., vol. 15, p. 305.

*Palaemon (Macrobrachium) lepidactyloides* De Man, 1892, Weber's Zool. Ergebn., vol. 2, p. 497, pl. 29 fig. 51; De Man, 1893, Notes Leyden Mus., vol. 15, p. 308, pl. 7 fig. 8.

*Palaemon lepidactyloides* Schenkel, 1902, Verh. naturf. Ges. Basel, vol. 13, p. 514.

*Palaemon (Macrobrachium) lepidactylus lepidactyloides* p.p. J. Roux, 1923, Capita Zool., vol. 2, pt. 2, p. 11.

*Palaemon (Macrobrachium) lepidactylus lepidactyloides* J. Roux, 1928, Treubia, vol. 10, p. 220.

*Macrobrachium hirtimanus* p.p. Holthuis, 1950, Siboga Exped., mon. 39a9, pp. 245, fig. 51a.

In my Siboga report (Holthuis, 1950) I synonymized *Palaemon lepidactyloides* De Man with *Macrobrachium hirtimanus* (Olivier). All the material examined by me at that time was perfectly in agreement with the description and figure given of *P. lepidactyloides*. The differences which I found with the only figure published of *M. hirtimanus* (namely Latreille's 1818 figure) were thought by me to be due only to inaccuracies of this figure, since the descriptions given of *M. hirtimanus* agreed well with my material. During my visit to the Turin Museum I examined some specimens of the typical *Macrobrachium hirtimanus* (Olivier) from Réunion (1901, leg. J. Sikora) and found them to be specifically distinct from *Palaemon lepidactyloides* De Man. Two of the Réunion specimens, both adult males of 62 and 72 mm, were taken with me to Leiden for a direct comparison with the material from the Malay Archipelago.

The two species are indeed very closely related and the only distinct characters which I can find to separate them are provided by the large

chelae of the adult male. In *Macrobrachium hirtimanus* the large cheliped of the adult male is less slender than in *M. lepidactyloides*. The carpus is less than twice as long as broad, in *M. lepidactyloides* it is more than twice as long as broad. The whole of the outer surface of the carpus and the palm in *M. hirtimanus* is covered by strong erect spines, while there are squamiform tubercles on the fingers and part of the inner surface of the cheliped. In *M. lepidactyloides* the whole cheliped is covered with these squamiform tubercles, only near the lower margin of the joints they are somewhat more erect and spine-like. In *Macrobrachium hirtimanus* the fingers are convex and gape considerably. The combined height of the fingers, when these are closed, is only slightly less than the height of the palm. In *M. lepidactyloides* the fingers of the large cheliped are more or less straight, running parallel in the ultimate half; the combined height of the fingers in the closed chela is less than half the height of the palm. In *M. hirtimanus* a double row of three or four strong tubercles is visible on the cutting edge of both fingers near their apex, in *M. lepidactyloides* a row of six to eight pairs of similar tubercles is placed in the distal half of each of the cutting edges. The smaller second leg in *M. hirtimanus* too is somewhat less slender than in *M. lepidactyloides*, while the tubercles of the merus, carpus and palm are somewhat more spiniform.

Distribution. *Macrobrachium hirtimanus* seems to be restricted to Réunion (A. Milne Edwards, 1862; J. Roux, 1934), Mauritius (H. Milne Edwards, 1837; De Man, 1892; Sharp, 1893; Ward, 1942), and Rodriguez (Miers, 1879), while the old records of *Palaemon hirtimanus* from the Indian Ocean (Olivier, 1811; Lamarck, 1818; H. Milne Edwards, 1837, 1838; White, 1847) also are probably based on this species.

*Macrobrachium lepidactyloides* seems to occur only in the Malay Archipelago, while it also has been reported from Fiji (Ortmann, 1891; Holthuis, 1950). All the material reported upon by me in 1950 as *Macrobrachium hirtimanus* actually belongs in *Macrobrachium lepidactyloides*.

#### PLATE XV

Fig. 1. *Macrobrachium hirtimanus* (Olivier). Larger second pereiopod of adult male from Réunion.  $\times 2$ .

Fig. 2. *Macrobrachium lepidactyloides* (De Man). Larger second pereiopod of adult male from the Indian Archipelago.  $\times 1.5$ .

