SIBOGA-EXPEDITIE

Siboga-Expeditie

UITKOMSTEN

OP

ZOOLOGISCH, BOTANISCH, OCEANOGRAPHISCH EN GEOLOGISCH GEBIED

VERZAMELD IN

NEDERLANDSCH OOST-INDIË 1899—1900

AAN BOORD **H. M. SIBOGA** ONDER COMMANDO VAN

Luitenant ter zee 1e kl. G. F. TYDEMAN

UITGEGEVEN DOOR

Dr. MAX WEBER † en Prof. Dr. L. F. DE BEAUFORT

Prof. in Amsterdam, Leider der Expeditie — Oud-Directeur van het Zoölogisch Museum Amsterdam

(met medewerking van de Maatschappij ter bevordering van het Natuurkundig Onderzoek der Nederlandsche Koloniën)

LEIDEN
E. J. BRILL
1950

Siboga Expeditie
XXXIXa[9]

THE

DECAPODA OF THE SIBOGA EXPEDITION

PART X

THE PALAEMONIDAE

COLLECTED BY THE SIBOGA AND SNELLIUS EXPEDITIONS WITH REMARKS ON OTHER SPECIES I.

SUBFAMILY PALAEMONINAE

BY

DR. L. B. HOLTHUIS
(Rijksmuseum van Natuurlijke Historie, Leiden)

With 52 figs. in the text

LEIDEN
E. J. BRILL
1950

Printed in the Netherlands

THE PALAEMONIDAE COLLECTED BY THE SIBOGA AND SNELLIUS EXPEDITIONS, WITH REMARKS ON OTHER SPECIES. I.

SUBFAMILY PALAEMONINAE

BY

Dr. L. B. HOLTHUIS

(Rijksmuseum van Natuurlijke Historie, Leiden, Holland)

With 52 textfigures

INTRODUCTION

The family Palaemonidae is divided by Balss (1927a) in his general treatise on the Decapod Crustacea into 4 subfamilies: Typhlocaridinae, Desmocaridinae, Palaemoninae and Pontoniinae. In my opinion the separation of the Desmocaridinae and the Palaemoninae is not justified. On the other hand the genus *Euryrhynchus,* which up till now was placed in the subfamily Palaemoninae differs in so many respects from the other genera of that group that it cannot be maintained in the Palaemoninae; a new subfamily is erected here for it. The four subfamilies may be separated as follows:

1. The upper antennular flagellum with the two rami free throughout their length. Second pleopods of the male without an appendix masculina. Appendix interna absent from the second pleopod in the females. No pleurobranch on the base of the third maxillipede.

Euryrhynchinae nov. subfam.

— The upper antennular flagellum with the two rami fused in the basal part. Second pleopods of the male generally with an appendix masculina. Female with an appendix interna on the second pleopod. 2

2. Lateral surface of the carapace with a longitudinal suture-line over its whole length, extending posteriorly from the antennal region. No pleurobranch on the third maxillipede.

Typhlocaridinae

— Lateral surface of the carapace without such a longitudinal suture-line 3

3. Pleurobranchs absent from the third maxillipedes. Posterior margin of the telson with three pairs of spines (except in Anchistioides, where this number is smaller)

Pontoniinae

— A pleurobranch present on the base of the third maxillipede. Posterior margin of the telson with two pairs of spines and two or more setae.

Palaemoninae

The first two subfamilies are not represented in the present collections. They contain the following species:

Typhlocaridinae Annandale & Kemp, 1913

Only genus: **Typhlocaris** Calman, 1909 a

Type: *Typhlocaris galilea* Calman

galilea Calman, 1909a. Distribution: Palestine. Subterranean fresh water.
lethaea Parisi, 1920. Distribution: Cirenaica. Subterranean fresh water.
salentina Caroli, 1923. Distribution: S. E. Italy. Subterranean fresh water.

Euryrhynchinae nov. subfam.

Only genus: **Euryrhynchus** Miers, 1877

Type: *Euryrhynchus wrzesniowskii* Miers

burchelli Calman, 1907. Distribution: Pará, Brazil. In well.
wrzesniowskii Miers, 1877. Distribution: British, Dutch and French Guiana. Fresh water.

The Palaemoninae are dealt with in the present paper, while the Pontoniinae will be treated separately. The literature cited in these two papers will be given at the end of the one dealing with the Pontoniinae. The two papers not only deal with the Palaemonidae collected by the Siboga (1899-1900) and the Snellius (1929-1930) Expeditions in the eastern part of the Malay Archipelago, but also include all the indo-westpacific material of this group present in the collections of the Rijksmuseum van Natuurlijke Historie at Leiden and of the Zoological Museum at Amsterdam. I am much indebted to Prof. Dr. L. F. de Beaufort, who placed the Siboga collection and the material of the Museum at Amsterdam at my disposal and to Prof. Dr. H. Boschma, who entrusted me with the study of the collection of the Snellius Expedition and that of the Leiden Museum. The species, which have been reported from Indonesia, but which are not represented in the collections at hand, also are briefly dealt with here. In the orthography of the geographic names within Indonesia the official spelling recommended in the "Lijst van de voornaamste aardrijkskundige Namen in den Nederlandsch Indischen Archipel, 1923" is followed. As, however, the official spelling of these names has been changed in 1949 in so far that the Dutch orthography "oe" for the "oo" sound (like in "proof") has been replaced by the more international "u", this change has been adopted here too.

For a large part of the drawings I am indebted to Mr. P. van 't Zelfde.

Subfamily Palaemoninae

In an important study Kemp (1925) gave a review of the present subfamily, with a key to the genera, and more extensively dealt with the genera *Leander* and *Palaemonetes*.

As a result of the study of the material at hand, my conception of the size of the subfamily and that of its genera differs in some points strongly from that of Kemp. The main differences are: 1. The genus *Desmocaris* Sollaud has to be included in the subfamily Palaemoninae. This genus is placed by Borradaile (1915, 1917) in a separate subfamily Desmocaridinae, in which respect

Kemp (1925) apparently follows Borradaile. The characters which Borradaile uses to separate the Desmocaridinae from the Palaemoninae are:
a. The total absence of spines on the dorsal surface of the telson.
b. The closely ridged molar process of the mandible.
The first character is not even of generic importance as within the genus *Palaemon* species are found in which these spines are absent, while in most other species these spines are present. It is not justified in my opinion to base a subfamily only on the character of the structure of the mandible, the more so as the structure of that organ within the other subfamilies is rather little known. I consider therefore that character only to be of generic value. The other characteristics of the Desmocaridinae mentioned by Borradaile all may be found within the other subfamilies. Such characters are: the presence of a supraorbital spine, the shape of the first and second maxillipedes and that of the second pereiopod.

2. The genus *Leander* as concepted by Kemp, in my opinion must be divided into three separate genera. *Leander tenuicornis* and the related species *L. urocaridella* and *L. kempi* namely differ from the other species placed by Kemp in *Leander,* in such important characters, that they must be inserted in a separate genus. *L. fluminicola* and *L. potamiscus* too must be separated from the other species. For these two species a new genus *Leptocarpus* is erected here. Of the genus *Leander* the type is *L. tenuicornis,* so that the generic name *Leander* only may be used for *L. tenuicornis, L. kempi* and *L. urocaridella.* The rest of the species included by Kemp in *Leander* are for the larger part placed here in the genus *Palaemon.*

3. Kemp gives the name *Palaemon* to the group of which *Palaemon carcinus* (L.) is the type, which is done also by many other carcinologists (Stimpson, Ortmann, De Man). This is quite incorrect as Latreille (1810) already designated *Palaemon squilla* (L.) as the type of the genus *Palaemon,* while Stimpson (1860) is the first to make *Palaemon carcinus* the type of that genus [1]). Opinion 11 of the International Commission on Zoological Nomenclature (1910) states that Latreille's type designations are valid. Moreover, if the designations of Latreille should be disregarded than still *P. carcinus* may not be considered the type of *Palaemon,* since E. Desmarest (1858) indicated *Palaemon serratus* (Pennant) as the type species of *Palaemon,* this designation antedating that of Stimpson by two years. The opinion that *Palaemon squilla* is the type of the genus *Palaemon* is held by Rathbun, Schmitt and other American carcinologists. As in all respects this opinion is correct, the name *Palaemon* must be given to the group of which *Palaemon squilla* is the type; for the group with the type *P. carcinus* the generic name *Macrobrachium* Bate must be used. If Kemp's opinion is followed and *Palaemon* is considered a synonym of *Macrobrachium,* then a new name should be needed for the group of *P. squilla,* this, however, would cause unnecessary confusion.

4. Kemp's genus *Palaemon* in my opinion must be divided into two genera: *Macrobrachium* and *Cryphiops* (= *Bithynis*). Kemp's reason for uniting the two genera is that the hepatic spine, which presence in *Macrobrachium* and which absence in *Cryphiops* is the main character for separating the two genera, occasionally is missing in *Macrobrachium hildebrandti* (Richters). In my opinion the absence of the hepatic spine in some specimens of *Macrobrachium hildebrandti* must be considered an abnormality only, as the character of the presence or absence of that spine

1) According to Stebbing (1893, p. 246).

is entirely constant in all other species of the group. If, however, this character is not considered to be of generic value, then the genera *Palaemon, Leptocarpus, Cryphiops* and *Macrobrachium* must be merged into one large genus, which already from a practical point of view, is undesirable.

5. The genus *Cryphiops* Dana (1852) is synonymized here with *Bithynis* Philippi (1860), because the type and only species of Dana's genus, *Cryphiops spinulosomanus,* proves to be only an abnormal specimen of *Bithynis caementarius.* As the name *Cryphiops* is published before that of *Bithynis,* it must be used instead of Philippi's name.

6. The species described by De Man (1881) as *Leander celebensis,* which is identical with *Palaemonetes hornelli* Kemp (1925), differs from the other species of *Palaemonetes* in almost the same characters as *Leander* differs from *Palaemon,* it is therefore made here the type of a new genus *Leandrites.*

7. When studying American Palaemonid material in the U.S. National Museum at Washington, D.C., I was able to examine specimens of *Euryrhynchus wrzesniowskii* Miers, and I came to the conclusion that the genus *Euryrhynchus* cannot be maintained in the subfamily Palaemoninae, but has to be placed in a new subfamily Euryrhynchinae nov.

8. A further result of the examination of the American material is that part of the species placed up till now in the genus *Palaemonetes,* namely the cave forms from Cuba, have to be placed in a new genus, while also a new genus has to be erected for *Palaemon morleyi* Creaser. *Palaemonetes antrorum* Benedict is made the type of a new subgenus of the genus *Palaemonetes.*

Key to the genera and subgenera of Palaemoninae

1. Supraorbital spine present . . . . . *Desmocaris*
— Supraorbital spine absent 2
2. Branchiostegal spine present 3
— Branchiostegal spine absent 7
3. Mandible without palp. 4
— Mandible with palp 5
4. First pleopod of the male with a well developed appendix interna on the endopod. Branchiostegal groove absent. Propodus of fifth pereiopod without transverse rows of setae in the distal part of the posterior margin. Lower margin of the rostrum with a double row of setae, which are placed some distance above the bases of the lower teeth . . . . . *Leandrites*
— First pleopod of the male without an appendix interna on the endopod. Branchiostegal groove visible as a sharp line. Propodus of the fifth pereiopod with transverse rows of setae in the distal part of the posterior margin. Lower margin of the rostrum generally with a single row of setae, if with a double fringe then these hairs are placed close near the lower margin . . . . . *Palaemonetes*
a. Eyes with pigment. Second legs much stronger than first. Outer margin of uropodal exopod ending in a tooth and a movable spine . . . subgen. *Palaemonetes*
— Eyes without pigment. Second legs about as strong as the first. Outer margin of uropodal exopod ending in a tooth, no movable spine present . subgen. *Alaocaris*
5. Eyes without pigment, cornea reduced. Anterior margin of basal segment of

antennular peduncle concave, gradually merging into a strong anterolateral spine. No branchiostegal groove on the carapace. Propodus of fifth pereiopod with transverse rows of hairs in the distal part of the posterior margin. Mandibular palp two-jointed . . . . . *Creaseria*

— Eyes distinctly pigmented, cornea well developed. Anterior margin of the basal segment of the antennular peduncle rounded, anterolateral spine small. . . 6

6. First pleopod of the male with a well developed appendix interna on the endopod. Branchiostegal groove absent. Propodus of fifth pereiopod without transverse rows of setae in the distal part of the posterior margin. Lower margin of the rostrum with a double row of setae, which are placed some distance above the bases of the lower teeth. The two median setae of the posterior margin of the telson very strong. Mandibular palp two-jointed. . . *Leander*

— First pleopod of the male without or with a rudimental appendix interna on the endopod. Branchiostegal groove generally present, visible as a sharp line. Propodus of the fifth pereiopod with transverse rows of setae in the distal part of the posterior margin. Lower margin of rostrum generally with a single row of setae; in those cases where a double fringe is present, these setae are placed close near the lower margin of the rostrum. The two median spines of the posterior margin of the telson are slender . . . . . *Palaemon*

a. Rostrum with an elevated basal crest of teeth. Pleurae of fifth abdominal segment with the apex broadly rounded. Mandibular palp three-jointed. b

— Rostrum without an elevated basal crest. Pleurae of fifth abdominal segment generally ending in a small sharp point. Branchiostegal groove present. . c

b. Dactyli of last three legs enormously lengthened, longer than carpus and propodus together. No branchiostegal groove on the carapace. Stylocerite with a large tooth on the upper surface. . . . . subgenus *Nematopalaemon*

— Dactyli of last three legs always shorter than the propodus, never excessively long. Branchiostegal groove present on the carapace. Stylocerite without a large dorsal tooth. . . . . subgenus *Exopalaemon*

c. Mandibular palp two-jointed . . . . . subgenus *Palaeander*

— Mandibular palp three-jointed . . . . . subgenus *Palaemon*

7. Hepatic spine absent. 8

— Hepatic spine present [1]) 10

8. Mandible without palp. Eyes without pigment . . . . . *Troglocubanus*

— Mandible with a three-jointed palp. Eyes distinctly pigmented 9

9. Second legs slender, smooth; carpus 1.5 times or more as long as the chela. Rostrum elongate, reaching beyond the scaphocerite . . . . . *Leptocarpus*

— Second legs robust, spinulate; carpus less than half as long as the chela. Rostrum very short and high, not reaching the end of the scaphocerite . . . *Cryphiops*

1) In *Macrobrachium hildebrandti* sometimes the hepatic spine is absent; this species may be distinguished, however, from *Cryphiops* by the smooth second pereiopods, from *Leptocarpus* by the shorter carpus of the second pereiopods, which is about as long as the palm, and from *Troglocubanus* by the presence of a three-jointed mandibular palp, and well pigmented eyes.

10. Mandibular palp absent. Dactylus of last three legs simple . . . . . *Pseudopalaemon*
— Mandibular palp present 11
11. Dactylus of last three legs simple . . . . . *Macrobrachium*
— Dactylus of last three legs biunguiculate . . . . . *Brachycarpus*

List of all known species of Palaemoninae [1])

Desmocaris Sollaud, 1911a (Vid. p. 2)

Type: *Palaemonetes trispinosus* Aurivillius

trispinosa (Aurivillius, 1898). Synonym: *Palaemonetes trispinosus* Aurivillius, 1898. Distribution: West Africa from Gold Coast to Belgian Congo. Fresh water.

Creaseria nov. gen.

Type: *Palaemon morleyi* Creaser

morleyi (Creaser, 1936). Synonym: *Palaemon morleyi* Creaser, 1936. Distribution: Yucatan, Mexico. In caves. Fresh water.

Leander E. Desmarest, 1849

Synonym: *Urocaridella* Borradaile, 1915.

Type: *Leander erraticus* E. Desmarest

kempi nov. spec. Distribution: Celebes, Talaud Islands (Malay Archipelago). Litoral from. Vid. p. 31.

tenuicornis (Say, 1818). Synonyms: *Astacus Locusta* Fabricius, 1781 (non Pennant, 1777); *Palaemon Locusta* Fabricius, 1798; ? *Peneus punctatissimus* Bosc, 1801; *Palaemon tenuicornis* Say, 1818; ?*Penaeus adspersus* Tilesius, 1818; *Palemon natator* H. Milne Edwards, 1837; *Palemon tenuirostre* H. Milne Edwards, 1837; *Palaemon latirostris* De Haan, 1841; *Leander erraticus* E. Desmarest, 1849; *Leander natator* Stimpson, 1860; *Palaemon torensis* Paulson, 1875; *Palaemon* (*Leander*) *erraticus* Thallwitz, 1892; *Palaemon* (*Leander*) *latirostris* Thallwitz, 1892; *Palaemon* (*Leander*) *tenuirostris* Thallwitz, 1892; *Leander paulensis* Ortmann, 1897; *Palaemon paulensis* Luederwaldt, 1919. Distribution: Circumtropic (though not yet reported from the East Pacific region), among floating weeds and near the shores. Vid. p. 26.

urocaridella nom. nov. Synonym: *Urocaridella gracilis* Borradaile, 1915 (non *Leander gracilis* Smith, 1869). Distribution: Indo-westpacific region from India to the Malay Archipelago. Litoral form. Vid. p. 28.

Leandrites nov. gen.

Type: *Leander celebensis* De Man

celebensis (De Man, 1881). Synonyms: *Leander celebensis* De Man, 1881; *Palaemon* (*Leander*) *celebensis* Thallwitz, 1892; *Palaemonetes hornelli* Kemp, 1925; *Leander wieneckei* De Man MSS. Distribution: S. India, Java, Celebes. Litoral form. Vid. p. 36.

indicus nov. spec. Distribution: Celebes. Litoral form. Vid. p. 37.

stenopus nov. spec. Distribution: Java. Litoral form. Vid. p. 40.

1) See also the addendum at the end of this paper.

Palaemon Fabricius, 1798

Subgenus **Palaemon** Fabricius, 1798

Type: *Cancer Squilla* Linnaeus

affinis H. Milne Edwards, 1837. Synonyms: *Palaemon Quoianus* H. Milne Edwards, 1837; *Leander serenus* Heller, 1862a; *Leander affinis* Miers, 1876; *Leander Quoyanus* Filhol, 1886. Distribution: Falkland Islands?, New South Wales, Tasmania, New Zealand, Campbell and Chatham Islands. Litoral form. Vid. p. 76.

belindae (Kemp, 1925). Synonym: *Leander belindae* Kemp, 1925. Distribution: S. India, Gulf of Manaar. Litoral form.

capensis (De Man, 1897). Synonym: *Leander capensis* De Man, 1897. Distribution: S. Africa. Fresh water. Vid. p.74.

concinnus Dana, 1852. Synonyms: *Palaemon exilimanus* Dana, 1852; *Leander longicarpus* Stimpson, 1860; *Palaemon longicarpus* Hilgendorf, 1869; *Leander concinnus* De Man, 1892; *Palaemon* (*Leander*) *exilimanus* Thallwitz, 1892; *Palaemon lagdaoensis* Blanco, 1939. Distribution: Indo-westpacific region from the Red Sea and E. Africa to Hongkong, the Malay Archipelago and Oceania. Litoral form, also in brackish and even fresh waters. Vid. p. 61.

debilis Dana, 1852. Synonyms: *Palaemon debilis attenuatus* Dana, 1852; *Leander debilis* Stimpson, 1860; *Leander gardineri* Borradaile, 1901; *Leander attenuatus* Lenz, 1901; *Leander beauforti* J. Roux, 1923; *Palaemonetes pacificus* Gurney, 1939. Distribution: Indo-westpacific region from the Red Sea and the Western Indian Ocean to the Riukiu Archipelago and the Hawaiian and Tuamotu Islands. Litoral form, also in brackish and fresh waters. Vid. p. 66.

gladiator Holthuis, 1950. Distribution: Clipperton Island, Galápagos Islands. Litoral form.

gracilis (Smith, 1871). Synonym: *Leander gracilis* Smith, 1871. Distribution: W. America from Nicaragua to S. Panama. Fresh water.

gravieri (Yu, 1930a). Synonym: *Leander Gravieri* Yu, 1930a. Distribution: N. China (Tientsin and Tangkoo), Korea. Vid. p. 82.

hancocki Holthuis, 1950. Distribution: Colombia and Ecuador. Fresh water.

longirostris H. Milne Edwards, 1837. Synonyms: *Palaemon Edwardsii* Heller, 1863; *Leander Edwardsii* (with the vars. *brevidigitata, prototypa* and *Helleri* and the forms *typica, similis, brevirostris, simplicior* and *intermedia*) Czerniavsky, 1884; *Leander longirostris* De Man, 1915a; *Leander longirostris* var. *robusta* De Man, 1924. Distribution: From England and N.W. Germany southwards into the Mediterranean and the Black Sea. Brackish, sometimes even fresh water; in estuaries of large rivers. Vid. p. 86.

macrodactylus Rathbun, 1902b. Synonym: *Leander macrodactylus* Parisi, 1919. Distribution: Japan and China.

miyadii (Kubo, 1938). Synonym: *Leander miyadii* Kubo, 1938. Distribution: Manchuria.

ortmanni Rathbun, 1902b. Synonym: *Leander longipes* Ortmann, 1890; *Palaemon* (*Leander*) *longipes* Thallwitz, 1892. Distribution: Japan and China. Litoral form. Vid. p. 80.

pacificus (Stimpson, 1860). Synonym: *Leander pacificus* Stimpson, 1860; *Leander peringueyi* Stebbing, 1915; *Leander gilchristi* Stebbing, 1915. Distribution: Indo-westpacific region from Red Sea and Cape of Good Hope to Japan and the Hawaiian Islands. Litoral form. Vid. p. 87.

pandaliformis (Stimpson, 1871). Synonyms: *Leander pandaliformis* Stimpson, 1871; *Leander Poti-*

tinga Müller, 1892; *Palaemon* (*Leander*) *potitinga* Thallwitz, 1892; *Palaemonetes cubensis* Hay, 1903; *Leander cubensis* Kemp, 1925; *Palaemon cubensis* Schmitt, 1935. Distribution: Eastcoast of America from Guatemala to S. E. Brazil, West Indies. Fresh and brackish water.

paucidens De Haan, 1841. Synonym: *Leander paucidens* Stimpson, 1860. Distribution: S. Siberia, China, Japan. Fresh, brackish and salt water. Vid. p. 70.

peruanus Holthuis, 1950. Distribution: N. Peru. In salt creeks.

ritteri Holmes, 1895. Synonym: *Leander ritteri* Nobili, 1901. Distribution: From California to Peru, Cocos Island and Galápagos Islands. Litoral form.

serratus (Pennant, 1777). Synonyms: *Astacus serratus* Pennant, 1777; *Melicerta Triliana* Risso, 1816; *Palaemon Trilianus* Risso, 1826; *Palaemon Treillianus* H. Milne Edwards, 1837; *Leander Latreillianus* (with vars. *intermedia* and *aberrans* and the forms *gigantea, typica* and *transitans,* and the monstrosity *sculpta*) Czerniavsky, 1884; *Leander serratus* Sharp, 1893; *Leander treillianus* Adensamer, 1898; *Leander serratus* var. *treillianus* De Man, 1915a; *Palaemon rostratus* Gimenez, 1922. Distribution: British Isles, Denmark, from Holland southwards to West Africa (Cap Blanc), Mediterranean, Black Sea. Litoral form. Vid. p. 90.

serrifer (Stimpson, 1860). Synonyms: *Leander serrifer* Stimpson, 1860; *Leander Fagei* Yu, 1930a; *Leander serrifer* var. *longidactylus* Yu, 1930a. Distribution: ? South Africa, Burma, Mergui Archipelago, Java, S. Siberia, China, Japan. Litoral form. Vid. p. 83.

sewelli (Kemp, 1925). Synonym: *Leander sewelli* Kemp, 1925. Distribution: Portuguese India, Bengal, Burma. Litoral form, generally in water of low salinity.

squilla (Linnaeus, 1758). Synonyms: *Cancer Squilla* Linnaeus, 1758; *Palaemon adspersus* Rathke, 1837; *Palaemon Fabricii* Rathke, 1843; *Palaemon rectirostris* Zaddach, 1844; *Palaemon Leachii* Bell, 1851; ? *Palaemon imbellis* Fischer, 1872; *Palaemon rectirostris* var. *octodentata* Neumann, 1878; *Leander rectirostris* (with var. *transitans* and forma *typica*) Czerniavsky, 1884; ? *Leander Brandti* Czerniavsky, 1884; *Leander adspersus* Ortmann, 1890; ? *Palaemon* (*Leander*) *Brandti* Thallwitz, 1892; *Leander adspersus* var. *fabricii* De Man, 1915a; *Leander rectirostris* var. *octodentatus* Bolivar, 1916; ?*Leander imbellis* Kemp, 1925. Distribution: British Isles, Baltic Sea, from westcoast of Norway to Mediterranean and Black Sea. Litoral form. Vid. p. 87.

xiphias Risso, 1826. Synonym: *Leander xiphias* Ortmann, 1890. Distribution: Mediterranean. Litoral form.

Subgenus **Palaeander** nov.

Type: *Palaemon elegans* Rathke

elegans Rathke, 1837. Synonyms: *Palaemon minans* Norman, 1861; *Palaemonella gracilis* Paulson, 1875; *Leander squilla* (with var. *prototypa* and *brevidigitata,* and forma *typica*) Czerniavsky, 1884 (non *Cancer Squilla* Linnaeus, 1758); *Palaemon* (*Leander?*) *minans* Thallwitz, 1892; *Leander squilla elegans* De Man, 1915a; *Leander squilla intermedia* De Man, 1915a; *Leander squilla typica* Höglund, 1943. Distribution: British Isles, from W. Norway and Denmark southwards to S. W. Africa, the Mediterranean and Black Sea, ?Red Sea. Litoral form. Vid. p. 55.

floridanus Chace, 1942. Distribution: Westcoast of Florida. Litoral form.

maculatus (Thallwitz, 1892). Synonym: *Leander maculatus* Thallwitz, 1892. Distribution: West Africa from Liberia to N. Angola. In sea and brackish water.

northropi (Rankin, 1898). Synonyms: *Leander northropi* Rankin, 1898; *Palaemon brachylabis* Rathbun, 1900. Distribution: E. American coast from Florida to Uruguay, Bermudas, West Indies.

semmelinkii (De Man, 1881). Synonym: *Leander semmelinkii* De Man, 1881. Distribution: West- and eastcoast of India, Burma, Malay Archipelago. Litoral form. Vid. p. 57.

Subgenus **Nematopalaemon** nov.

Type: *Leander tenuipes* Henderson

hastatus Aurivilius, 1898. Synonym: *Leander hastatus* Balss, 1916. Distribution: West Africa from French Guinea to Angola. Litoral form.

schmitti Holthuis, 1950. Distribution: Dutch Guiana. Brackish water.

tenuipes (Henderson, 1893). Synonyms: *Leander tenuipes* Henderson, 1893; *Palaemon luzonensis* Blanco, 1939. Distribution: Somaliland?, India, Burma, Luzon, New Zealand. Litoral form, brackish and salt water. Vid. p. 44.

Subgenus **Exopalaemon** nov.

Type: *Palaemon styliferus* H. Milne Edwards

annandalei (Kemp, 1917). Synonyms: *Leander annandalei* Kemp, 1917; *Leander annandalei stylirostris* Yu, 1930; *Leander stylirostris* Kubo, 1942. Distribution: China, Korea. Fresh water. Vid. p. 46.

carinicauda nom. nov. Synonyms: *Leander longirostris* var. *carinatus* Ortmann, 1890; *Leander carinatus* Doflein, 1902; *Palaemon* (*Leander*) *carinatus* Gee, 1925 (non *Palaemon carinatus* Olivier, 1811). Distribution: China, Korea, Singapore. Vid. p. 48.

macrogenitus (Yu, 1930a). Synonym: *Leander macrogenitus* Yu, 1930a. Distribution: Hangchow. Vid. p. 50.

mani (Sollaud, 1914). Synonym: *Leander Mani* Sollaud, 1914. Distribution: Tonkin.

modestus (Heller, 1862a). Synonyms: *Leander modestus* Heller, 1862a; *Leander czerniavskyi* Brashnikov, 1907; *Leander modestus sibirica* (Czerniavsky MSS) Brashnikov, 1907; *Leander czerniavskyi lacustris* Buldovsky, 1933. Distribution: E. Siberia, China, Formosa. Fresh water. Vid. p. 51.

orientis nom. nov. Synonyms: *Leander longirostris japonicus* Ortmann, 1890; *Palaemon japonicus* Rathbun, 1902b (non De Haan, 1849); *Leander japonicus* Balss, 1914. Distribution: Japan, China, Formosa. Vid. p. 49.

styliferus H. Milne Edwards, 1840. Synonym: *Palaemon longirostris* H. Milne Edwards, 1837, p. 394 (non H. Milne Edwards, 1837, p. 392); *Leander styliferus* Kemp, 1915. Distribution: From westcoast of India to Siam, Borneo and Java. Litoral form also in brackish and fresh waters. Vid. p. 46.

Palaemonetes Heller, 1869

Subgenus **Palaemonetes** Heller, 1869

Synonyms: *Palaemonopsis* Stimpson, 1871; *Allocaris* Sollaud, 1911; *Coutierella* Sollaud, 1914.
Type: *Palaemon varians* Leach

africanus Balss, 1916. Distribution: Westcoast of Africa (Nigeria).

antennarius (H. Milne Edwards, 1837). Synonyms: *Palaemon antennarius* H. Milne Edwards, 1837; *Palaemon lacustris* Von Martens, 1857; *Pelias migratorius* Heller, 1862; *Anchistia migratoria* Heller, 1863; *Palaemon palustris* Tamarelli, 1864 (err. pro *lacustris*); *Palaemon fluviatilis* Heer, 1865 (err. pro *lacustris*); *Anchistia lacustris* Heller, 1866; *Palaemon varians termajophilus* Garbini, 1881;? *Leander antennarius* Czerniavsky, 1884; *Palaemonetes varians macrogenitor* Boas, 1889; *Palaemon* (*Palaemonetes*) *lacustris* Thallwitz, 1892; *Palaemon* (*Palaemonetes*) *palustris* Thallwitz, 1892; *Periclimenes migratorius* Pesta, 1912; *Palaemonetes varians thermaiophilus* Seurat, 1922; *Palaemonetes varians lacustris* Sollaud, 1923. Distribution: Italy, the Balkans and Syria. Fresh water.

argentinus Nobili, 1901d. Synonyms: *Leander brasiliensis* Ortmann, 1890; *Palaemon* (*Leander*) *brasiliensis* Thallwitz, 1892 (non Heller, 1862). Distribution: Eastern South America from S. Brazil to N. Argentina. In fresh water.

australis Dakin, 1915. Distribution: West Australia. Fresh water.

carteri Gordon, 1935. Distribution: Venezuela and British, Dutch and French Guiana. Fresh water.

hiltoni Schmitt, 1921. Distribution: S. California, N.W. Mexico.

intermedius Holthuis, 1949. Distribution: Atlantic coast of North America from Massachusetts to Texas. Brackish water.

ivonicus Holthuis, 1950. Distribution: N. Bolivia (Amazon basin). Fresh water.

kadiakensis Rathbun, 1902a. Distribution: Central North America, between the Great Lakes and the Gulf of Mexico, west of the Alleghenies and east of the continental divide; ? Alaska. Fresh water.

mesogenitor Sollaud, 1912. Synonyms: *Palaemonetes varians mesogenitor* Sollaud, 1912; *Palaemonetes punicus* Sollaud, 1924. Distribution: Tunisia and Algeria. Fresh water.

mesopotamicus Pesta, 1913. Synonym: *Palaemonetes varians mesopotamicus* Pesta, 1913. Distribution: Mesopotamia. Fresh water.

paludosus (Gibbes, 1850). Synonyms: *Hippolyte caroliniana* Gibbes, 1848 (nom. nud.); *Hippolyte paludosa* Gibbes, 1850; *Palaemonetes exilipes* Stimpson, 1871; *Palaemonopsis exilipes* Stimpson, 1871; *Hippolysmata paludosa* Howard, 1883; *Palaemon* (*Palaemonetes*) *exilipes* Thallwitz, 1892; *Palaemon* (*Palaemonetes*) *paludosus* Thallwitz, 1892. Distribution: U.S.A., east of the Alleghenies, from New Jersey to Florida. Fresh water.

pugio Holthuis, 1949. Distribution: Atlantic coast of N. America from Massachusetts to Texas. Brackish to almost fresh water.

schmitti Holthuis, 1950. Distribution: W. Panama and Canal Zone. Marine.

sinensis (Sollaud, 1911). Synonyms: *Allocaris sinensis* Sollaud, 1911: *Palaemonetes chankensis* Buldovsky, 1933; *Palaemonetes venephicus* Birstein & Vinogradov, 1934. Distribution: S.E. Siberia, China. Fresh water. Vid. p. 91.

tonkinensis (Sollaud, 1914). Synonym: *Coutierella tonkinensis* Sollaud, 1914. Distribution: Tonkin. Fresh water.

varians (Leach, 1814). Synonyms: ? *Astacus albescens* Pennant, 1812; *Palaemon varians* Leach, 1814; *Palaemon variabilis* Bouchard-Chantereaux, 1829; ? *Leander varians* Czerniavsky, 1884; *Palaemonetes varians microgenitor* Boas, 1889; *Palaemonetes varians occidentalis* Sollaud, 1923. Distribution: W. Baltic and North Sea southwards to the westcoast of Morocco, northcoast of N.W. Africa to Tunisia. Brackish waters.

vulgaris (Say, 1818). Synonyms: *Palaemon vulgaris* Say, 1818; *Palaemonopsis vulgaris* Stimpson, 1871; *Palaemonetes carolinus* Stimpson, 1871; *Palaemonopsis carolinus* Stimpson, 1871; ? *Palaemon* (*Leander*) *vulgaris* Von Martens, 1872; *Palaemon* (*Palaemonetes*) *carolinus* Thallwitz, 1892. Distribution: Atlantic coast of North America from Massachusetts to Texas (records from New Brunswick and Nova Scotia need confirmation). Brackish water.

zariquieyi Sollaud, 1939. Distribution: Gulf of Valencia, Spain. Slightly brackish water.

Subgenus **Alaocaris** Holthuis, 1949

Type: *Palaemonetes antrorum* Benedict

antrorum Benedict, 1896. Distribution: Texas. Fresh subterranean water.

Troglocubanus Holthuis, 1949

Type: *Palaemonetes eigenmanni* Hay

calcis (Rathbun, 1912). Synonym: *Palaemonetes calcis* Rathbun, 1912. Distribution: Havana Province, Cuba. Fresh water in cave.

eigenmanni (Hay, 1903). Synonym: *Palaemonetes eigenmanni* Hay, 1903. Distribution: Havana and Pinar del Rio Provinces, Cuba. Fresh water in caves.

gibarensis (Chace, 1943). Synonym: *Palaemonetes gibarensis* Chace, 1943. Distribution: Oriente Province, Cuba. Fresh water in cave.

inermis (Chace, 1943). Synonym: *Palaemonetes inermis* Chace, 1943. Distribution: Havana Province, Cuba. Fresh water in cave.

Leptocarpus nov. gen.

Type: *Leander fluminicola* Kemp

fluminicola (Kemp, 1917). Synonym: *Leander fluminicola* Kemp, 1917. Distribution: India, Burma. Fresh and slightly brackish water. Vid. p. 96.

potamiscus (Kemp, 1917). Synonyms: *Leander potamiscus* Kemp, 1917; *Palaemon potamiscus* Suvatti, 1937. Distribution: India, Andamans, Malay Peninsula, Siam, Malay Archipelago. Fresh, brackish and (?) salt water. Vid. p. 97.

Cryphiops Dana, 1852

Synonym: *Bithynis* Philippi, 1860

Type: *Cryphiops spinuloso-manus* Dana

caementarius (Molina, 1782). Synonyms: *Cancer caementarius* Molina, 1782; *Palaemon caementarius* Poeppig, 1836; *Palaemon Gaudichaudii* H. Milne Edwards, 1837; *Cryphiops spinuloso-manus* Dana, 1852; *Bithynis longimana* Philippi, 1860; *Macrobrachium africanum* Bate, 1868a; *Palaemon africanus* Thallwitz, 1892. Distribution: Peru and Chile. Fresh water. Vid. p. 98.

Pseudopalaemon Sollaud, 1911 b

Type: *Pseudopalaemon bouvieri* Sollaud

bouvieri Sollaud, 1911b. Synonym: *Pseudopalaemon iheringi* Sollaud, 1911c. Distribution: Brazil?, Uruguay. Fresh water.

Brachycarpus Bate, 1888

Synonym: *Calmania* Nobili, 1907a

Type: *Brachycarpus savignyi* Bate

biunguiculatus (Lucas, 1849). Synonyms: *Palaemon biunguiculatus* Lucas, 1849; *Brachycarpus savignyi* Bate, 1888; *Brachycarpus neapolitanus* Cano, 1890; *Palaemon savignyi* Ortmann, 1891; *Bithynis savignyi* Rathbun, 1902; *Brachycarpus advena* Nobili, 1905b; *Calmania biunguiculata* Nobili, 1907a; *Palaemonella rathbunensis* Borradaile, 1917; *Macrobrachium savignyi* Rathbun, 1919. Distribution: Western Mediterranean, Liberia, Atlantic coast of America from N. Carolina to Venezuela, Bermudas, Bahamas, West Indies, westcoast of America from Mexico to Colombia, Clipperton Island, Cocos Island and Galápagos Islands, ? Red Sea, Ceylon, Hawaiian Islands. Marine.

Macrobrachium Bate, 1868

Synonyms: *Eupalaemon* Ortmann, 1891; *Parapalaemon* Ortmann, 1891; *Macroterocheir* Stebbing, 1908.

Type: *Macrobrachium americanum* Bate

acanthurus (Wiegmann, 1836). Synonyms: *Palaemon acanthurus* Wiegmann, 1836; *Palemon forceps* H. Milne Edwards, 1837; *Palaemon Swainsonii* (Leach MSS) White, 1847; *Palaemon mexicanus* De Saussure, 1857; *Macrobrachium longidigitum* Bate, 1868a; *Palaemon dasydactylus* Streets, 1871; *Palaemon sexdentatus* Streets, 1871; *Palaemon longidigitum* Ortmann, 1891; *Palaemon Potieté* Müller, 1892; *Bithynis acanthurus* Rathbun, 1900; *Bithynis forceps* Young, 1900; *Palaemon (Eupalaemon) acanthurus* Nobili, 1901. Distribution: East American coast from Georgia to S. Brazil, West Indies. Fresh and brackish water.

aemulum (Nobili, 1906a). Synonyms: *Palaemon (Parapalaemon) aemulus* Nobili, 1906a; *Palaemon nobilii* Henderson & Matthai, 1910. Distribution: S. India, New Caledonia, Tuamotu Islands. Fresh water. Vid. p. 135.

altifrons (Henderson, 1893). Synonym: *Palaemon altifrons* Henderson, 1893. Distribution: North India. Fresh water. Vid. p. 196.

amazonicum (Heller, 1862). Synonyms: *Palaemon amazonicus* Heller, 1862; *Palaemon ensiculus* Smith, 1869; *Palaemon Dieperinkii* (De Haan MSS) De Man, 1879; *Bithynis lamarrei* Young, 1900; *Bithynis ensiculus* Young, 1900; *Bithynis amazonicus* Moreira, 1912. Distribution: Eastern part of S. America, from Venezuela to N. Paraguay. In rivers emptying in the Atlantic Ocean. Fresh water.

americanum Bate, 1868a. Synonym: *Palaemon americanus* Thallwitz, 1892; *Palaemon (Brachycarpus) jamaicensis* Nobili, 1901b (non *Cancer (Astacus) jamaicensis* Herbst, 1792). Distribution: Western America from Lower California to N. Peru, Cocos Island, Galápagos Islands. Fresh water.

asperulum (Von Martens, 1868). Synonyms: *Palaemon asperulus* Von Martens, 1868; *Palaemon (Parapalaemon) asperulus* De Man, 1904; *Palaemon asperulus brevirostris* Yu, 1931. Distribution: S.E. Siberia to S. China and Formosa. Fresh water. Vid. p. 193.

australe (Guérin Méneville, 1838). Synonyms: *Palaemon australis* Guérin Méneville, 1838; *Palaemon sundaicus* Heller, 1862; *Palaemon Danae* Heller, 1865; *Palaemon dispar* Von Martens, 1868; *Palaemon alphonsianus* Hoffmann,1874; *Palaemon parvus* Hoffmann, 1874; *Palaemon Mal-*

liardi Richters, 1880; *Palaemon* (*Eupalaemon*) *dispar* De Man, 1893; *Palaemon* (*Eupalaemon*) *ustulatus* Nobili, 1899; *Leander lepidus* De Man, 1915. Distribution: Indo-westpacific region from the Seychelles and Madagascar to the Malay Archipelago and Oceania. Fresh water. (Very young stages in brackish and salt water). Vid. p. 124.

australiense nom. nov. Synonyms: *Palaemon australis* Ortmann, 1891 (non Guérin Méneville, 1838); *Palaemon* (*Parapalaemon*) *australis* McNeill, 1929. Distribution: Australia (Northern Territory, Queensland, New S. Wales, S. Australia). Fresh water. Vid. p. 174.

bariense (De Man 1892). Synonym: *Palaemon* (*Macrobrachium*) *bariensis* De Man, 1892. Distribution: Eastern part of the Malay Archipelago: Celebes, Moluccas, Lesser Sunda Islands. Fresh water. Vid. p. 236.

borellii (Nobili, 1896). Synonym: *Palaemon Borellii* Nobili, 1896. Distribution: Uruguay, Argentina. Fresh water.

brasiliense (Heller, 1862). Synonyms: *Palaemon brasiliensis* Heller, 1862; *Palaemon appuni aequatorialis* Ortmann, 1891; *Palaemon* (*Eupalaemon*) *Nattereri* Nobili, 1901b (non *Palaemon Nattereri* Heller, 1862). Distribution: Amazon basin in E. Colombia, E. Ecuador, N.E. Peru and W. Brazil, British and Dutch Guiana. Fresh water.

caledonicum (J. Roux, 1926). Synonym: *Palaemon* (*Macrobrachium*) *caledonicus* J. Roux, 1926. Distribution: New Caledonia. Fresh water. Vid. p. 123.

callirhoë (De Man, 1898a). Synonym: *Palaemon* (*Macrobrachium*) *callirhoë* De Man, 1898a. Distribution: Kapuas Basin, Central Borneo. Fresh water. Vid. p. 197.

carcinus (Linnaeus, 1758). Synonyms: *Cancer Carcinus* Linnaeus, 1758; *Astacus carcinus* Fabricius, 1775; *Cancer* (*Astacus*) *Jamaïcensis* Herbst, 1792; *Palaemon jamaicensis* Olivier, 1811; *Palaemon carcinus* Leach, 1815 (non Fabricius, 1798); *Palaemon brachydactylus* Wiegmann, 1836; *Palemon punctatus* Randall, 1839; *Palemon brevicarpus* De Haan, 1849; *Palaemon aztecus* De Saussure, 1857;? *Palaemon Montezumae* De Saussure, 1857; *Palaemon laminatus* (Gollmer MSS.)Von Martens, 1869; *Palaemon* (*Macrobrachion*) *Jamaicensis* Von Martens, 1872; *Bithynis jamaicensis* Pocock, 1889; *Bithynis aztecus* Young, 1900; ? *Bithynis montezumae* Young, 1900; *Palaemon ornatus* (Forns MSS.) Torralbas, 1917 (non Olivier, 1811); *Palaemon* (*Macroterocheir*) *jamaicensis* De Man, 1925; *Periclimenes portoricensis* Schmitt, 1933. Distribution: E. America from Florida to S. Brazil, West Indies. Fresh and brackish waters.

cavernicola (Kemp, 1924). Synonym: *Palaemon cavernicola* Kemp, 1924. Distribution: Assam. Fresh water, in cave. Vid. p. 205.

chevalieri (J. Roux, 1935a). Synonym: *Palaemon* (*Macrobrachium*) *chevalieri* J. Roux, 1935a. Distribution: Cape Verde Islands and Angola. Fresh water.

clymene (De Man, 1902). Synonym: *Palaemon* (*Macrobrachium*) *clymene* De Man, 1902. Distribution: Baram River, Sarawak. Fresh water. Vid. p. 210.

cowlesi nov. spec. Distribution: Luzon, Philippines. Fresh water. Vid. p. 257.

crenulatum Holthuis, 1950. Distribution: E. Panama, Venezuela, West Indies. Fresh water.

dayanum (Henderson, 1893). Synonym: *Palaemon Dayanus* Henderson, 1893. Distribution: North and Central India. Fresh water. Vid. p. 197.

digueti (Bouvier, 1895). Synonym: *Palemon Digueti* Bouvier, 1895. Distribution: Westcoast of America from Lower California to Ecuador. Fresh water.

dux (Lenz, 1910a). Synonyms: *Palaemon* (*Eupalaemon*) *dux* Lenz, 1910a; *Palaemon* (*Eupalaemon*)

Lenzii De Man, 1911; *Palaemon* (*Eupalaemon*) *dux congoensis* De Man, 1912; *Palaemon* (*Eupalaemon*) *dux tenuicarpus* De Man, 1925. Distribution: West Africa from Spanish Guinea to Belgian Congo. Fresh water.

equidens (Dana, 1852). Synonyms: *Palaemon equidens* Dana, 1852; *Palaemon* (*Eupalaemon*) *sundaicus* De Man, 1892 (non Heller, 1862); *Palaemon sundaicus bataviana* De Man, 1897; *Palaemon* (*Eupalaemon*) *sundaicus brachydactyla* Nobili, 1899; *Palaemon sundaicus De Mani* Nobili, 1899; *Palaemon* (*Eupalaemon*) *acanthosoma* Nobili, 1899; *Palaemon* (*Eupalaemon*) *sundaicus baramensis* De Man, 1902; *Palaemon* (*Eupalaemon*) *nasutus* Nobili, 1903a; *Palaemon sulcatus* Henderson & Matthai, 1910 (non Olivier 1811); *Bithynis* (*Eupalaemon*) *sundaicus* Rathbun, 1910; *Palaemon delagoae* Stebbing, 1915; *Urocaridella borradailei* Stebbing, 1923. Distribution: Indo-westpacific region from E. and S. Africa to S. China, the Riukiu Islands and the Malay Archipelago. Brackish waters. Vid. p. 162.

esculentum (Thallwitz, 1891). Synonyms: *Palaemon esculentus* Thallwitz, 1891; *Palaemon dulcis* Thallwitz, 1891. Distribution: N. Celebes. Vid. p. 257.

faustinum (De Saussure, 1857). Synonyms: *Palaemon Faustinus* De Saussure, 1857; *Palaemon* (*Macrobrachion*) *Faustinus* Von Martens, 1872; *Bithynis spinimanus* Pocock, 1889 (non *Palemon spinimanus* H. Milne Edwards, 1837); *Palaemon cubanus* (Guérin MSS) Sharp, 1893; *Bithynis faustinus* Rathbun, 1897. Distribution: West Indies. Fresh water.

felicinum Holthuis, in press. Distribution: W. Africa from the Gold Coast to Angola. Fresh water.

fluviale (Streets, 1871). Synonyms: *Palaemon fluviale* Streets, 1871; *Palaemon fluviatilis* Sharp, 1893. Distribution: Coatzacoalcos River, E. Mexico. Fresh water.

foai (Coutière, 1902). Synonym: *Palaemon* (*Eupalaemon*) *Foai* Coutière, 1902. Distribution: Congo. Fresh water.

formosense Bate, 1868a. Synonyms: *Palemon longipes* De Haan, 1849 (non Olivier, 1811); *Palaemon formosensis* Ortmann, 1891; *Palaemon* (*Eupalaemon*) *longipes* De Man, 1897; *Bithynis longipes* Rathbun, 1902b; *Macrobrachium longipes* Maki & Tsuchiya, 1923. Distribution: Japan, Riukiu Islands, Bonin Islands, Formosa, ? Seychelles. Fresh water. Vid. p. 156.

geron nov. spec. Distribution: Banka, Malay Archipelago. Vid. p. 258.

grandimanus (Randall, 1839). Synonyms: *Palemon grandimanus* Randall, 1839; *Palemon gracilimanus* Randall, 1839; *Palaemon acutirostris* Dana, 1852; *Bithynis grandimanus* Bate, 1888. Distribution: Hawaiian Islands. Fresh water. Vid. p. 230.

hainanense (Parisi, 1919). Synonyms: *Palaemon* (*Parapalaemon*) *hainanense* Parisi, 1919; *Palaemon similis* Yu, 1931. Distribution: S. China, Java. Fresh water. Vid. p. 158.

hancocki Holthuis, 1950. Distribution: W. America from Costa Rica to Colombia, Cocos Island, Galápagos Archipelago. Fresh water.

hendersoni (De Man, 1906). Synonyms: *Palaemon* (*Parapalaemon*) *Hendersoni* De Man, 1906; *Bithynis* (*Parapalaemon*) *hendersoni* Rathbun, 1910; *Palaemon yunnanensis* Yu, 1936. Distribution: N. India, Yunnan, Burma. Fresh water. Vid. p. 209.

heterochirus (Wiegmann, 1836). Synonyms: *Palaemon heterochirus* Wiegmann, 1836; *Palaemon Appuni* Von Martens, 1869; *Bithynis appuni* Pocock, 1889. Distribution: Eastern Central and South America from Mexico to S. Brazil, West Indies. Fresh water.

hildebrandti (Hilgendorf, 1893). Synonyms: *Bithynis ? hildebrandti* Hilgendorf, 1893; *Palaemon hildebrandti* Calman, 1913. Distribution: Madagascar. Fresh water. Vid. p. 176.

hirtimanus (Olivier, 1811). Synonyms: *Palaemon hirtimanus* Olivier, 1811; *Palaemon* (*Macrobrachium*) *tepidactyloides* De Man, 1892. Distribution: Réunion, Mauritius, Malay Archipelago, Fiji. Fresh water. Vid. p. 245.

horstii (De Man, 1892). Synonym: *Palaemon* (*Parapalaemon*) *Horstii* De Man, 1892; *Palaemon* (*Parapalaemon*) *horsti brevidigitus* J. Roux, 1930. Distribution: Celebes, Lesser Sunda Islands. Fresh water. Vid. p. 203.

idae (Heller, 1862). Synonyms: *Palaemon Idae* Heller, 1862; *Palaemon* (*Eupalaemon*) *idae* De Man, 1897; *Palaemon* (*Eupalaemon*) *ritsemae* De Man, 1897; *Palaemon* (*Eupalaemon*) *Idae subinermis* Nobili, 1899; *Palaemon* (*Eupalaemon*) *Mariae* Coutière, 1900; *Palaemon Idae inermis* Coutière, 1901 (lapsus for *Palaemon Idae subinermis*); *Palaemon* (*Eupalaemon*) *robustus* De Man, 1902. Distribution: Indo-westpacific region from the Seychelles and Madagascar to the Malay Archipelago and the Admiralty Islands. Fresh water. Vid. p. 142.

idella (Hilgendorf, 1898). Synonyms: *Palaemon* (*Eupalaemon*) *idae* var. *idella* Hilgendorf, 1898; *Palaemon* (*Eupalaemon*) *multidens* Coutière, 1900. Distribution: E. Africa, Madagascar, India. Fresh water. Vid. p. 146.

iheringi (Ortmann, 1897). Synonym: *Palaemon iheringi* Ortmann, 1897. Distribution: Rio de Janeiro and São Paulo States, Brazil. Fresh water.

inca Holthuis, 1950. Distribution: Ecuador and N. Peru. Fresh water.

insulare (Parisi, 1919). Synonym: *Palaemon* (*Parapalaemon*) *insularis* Parisi, 1919. Distribution: Formosa. Fresh water. Vid. p. 176.

jacobsoni nov. spec. Distribution: Simalur Island, off W. Sumatra. Fresh water. Vid. p. 227.

japonicum (De Haan, 1849). Synonyms: *Palaemon japonicus* De Haan, 1849; *Palaemon boninensis* Stimpson, 1860; *Palaemon* (*Parapalaemon*) *japonicus* De Man, 1892. Distribution: Japan, Formosa, Bonin Islands, Riukiu Islands. Fresh water. Vid. p. 200.

jaroense (Cowles, 1914). Synonym: *Palaemon jaroensis* Cowles, 1914. Distribution: Leyte, Philippines. Fresh water. Vid. p. 205.

javanicum (Heller, 1862). Synonym: *Palaemon javanicus* Heller, 1862; *Palaemon* (*Parapalaemon*) *javanicus* De Man, 1892; *Palaemon* (*Eupalaemon*) *neglectus* De Man, 1905; *Macrobrachium neglectus* Suvatti, 1937. Distribution: Siam, Malay Peninsula, Mergui Archipelago, Sumatra, Java, ? Borneo, Celebes. Fresh water. Vid. p. 190.

jelskii (Miers, 1877). Synonyms: *Palaemon jelskii* Miers, 1877; *Bithynis jelskii* Young, 1900. Distribution: Trinidad, Venezuela, Dutch and French Guiana. Fresh water.

joppae nov. spec. Distribution: Nias, off W. Sumatra. Vid. p. 233.

kiukianense (Yu, 1931). Synonym: *Palaemon kiukianensis* Yu, 1931. Distribution: Central China. Fresh water. Vid. p. 196.

lamarrei (H. Milne Edwards, 1837). Synonyms: *Palemon Lamarrei* H. Milne Edwards, 1837; *Palaemonetes lamarrei* Arndt, 1933. Distribution: India, Ganges delta to Chilka lake. Fresh and brackish waters. Vid. p. 119.

lanceifrons (Dana, 1852). Synonym: *Palaemon lanceifrons* Dana, 1852. Distribution: Luzon, Philippines. Fresh water. Vid. p. 154.

lanceifrons ssp. *montalbanense* (Cowles, 1914). Synonym: *Palaemon lanceifrons montalbanensis* Cowles, 1914. Distribution: Luzon, Philippines. Fresh water. Vid. p. 154.

lanchesteri (De Man, 1911). Synonyms: *Palaemon paucidens* Lanchester, 1901 (non De Haan, 1841);

Palaemon (*Eupalaemon*) *Lanchesteri* (De Man, 1911). Distribution: Siam, Malay Peninsula. Fresh water. Vid. p. 139.

lar (Fabricius, 1798). Synonyms: *Palaemon Lar* Fabricius, 1798; ? *Palaemon longimanus* Fabricius, 1798; *Palaemon ornatus* Olivier, 1811; *Palaemon tridens* (Leach MSS) White, 1847; *Palaemon vagus* Heller, 1862; *Palaemon spectabilis* Heller, 1862a; *Palaemon ruber* Hess, 1865; *Palaemon mayottensis* Hoffmann, 1874; *Palaemon reunionnensis* Hoffmann, 1874; *Palaemon longimanus* Hoffmann, 1874; *Palaemon madagascariensis* Hoffman, 1874; *Bithynis lar* Bate, 1888; *Palaemon ornatus vagus* De Man, 1888; *Palaemon* (*Eupalaemon*) *lar* De Man, 1892; *Palaemon* (*Eupalaemon*) *vagus* Nobili, 1899; *Palaemon* (*Eupalaemon*) *reunionnensis* De Man, 1905; *Leander dionyx* Nobili, 1905. Distribution: Indo-westpacific region from E. Africa to the Riukiu Islands and the Marquesas. Fresh water. (Very young specimens in brackish and salt water). Vid. p. 176.

latidactylus (Thallwitz, 1891). Synonyms: *Palaemon latidactylus* Thallwitz, 1891; *Palaemon* (*Eupalaemon*) *endehensis* De Man, 1892; *Palaemon* (*Macrobrachium*) *lampropus* De Man, 1892. Distribution: Malay Peninsula, Malay Archipelago. Fresh water. Vid. p. 239.

latimanus (Von Martens, 1868). Synonyms: *Palaemon latimanus* Von Martens, 1868; *Palaemon eurythynchus* Ortmann, 1891; *Palaemon* (*Macrobrachium*) *singalangensis* Nobili, 1900. Distribution: Riukiu Islands, Malay Archipelago to the Marquesas. Fresh water. Vid. p. 205.

lepidactylus (Hilgendorf, 1879). Synonyms: *Palaemon lepidactylus* Hilgendorf, 1879; *Palaemon* (*Macrobrachium*) *Hilgendorfi* Coutière, 1899; *Macroterocheir lepidactylus* Stebbing, 1908. Distribution: E. and S.E. Africa and Madagascar. Fresh water. Vid. p. 244.

lorentzi (J. Roux, 1921). Synonym: *Palaemon* (*Parapalaemon*) *lorentzi* J. Roux, 1921. Distribution: S.W. New Guinea. Fresh water. Vid. p. 213.

lujae (De Man, 1912). Synonym: *Palaemon* (*Parapalaemon*) *Lujae* De Man, 1912. Distribution: Belgian Congo. Fresh water.

macrobrachion (Herklots, 1851). Synonyms: *Palaemon macrobrachion* Herklots, 1851; *Palaemon africanus* Kingsley, 1882; *Palaemon* (*Eupalaemon*) *macrobrachion* De Man, 1904. Distribution: West Africa from French Guinea to Angola. Fresh and brackish waters.

malcolmsonii (H. Milne Edwards, 1844). Synonyms: *Palemon Malcolmsonii* H. Milne Edwards, 1844; *Palaemon spinipes Birmanicus* Schenkel, 1902. Distribution: India, Burma. Fresh and salt waters. Vid. p. 121.

mammillodactylus (Thallwitz, 1892). Synonyms: *Palaemon idae mammillodactylus* Thallwitz, 1892; *Palaemon* (*Eupalaemon*) *Wolterstorffi* Nobili, 1900; *Palaemon philippinensis* Cowles, 1914; *Palaemon* (*Eupalaemon*) *philippinensis* J. Roux, 1921; ? *Palaemon talaverae* Blanco, 1939. Distribution: Riukiu Islands, Philippines, N. Celebes, Talaud Islands, Waigeo, New Guinea, ? Java. Fresh water. Vid. p. 148.

minutum (J. Roux, 1917). Synonym: *Palaemon minutus* J. Roux, 1917. Distribution: Sentani Lake, N. New Guinea. Fresh water. Vid. p. 140.

mirabile (Kemp, 1917). Synonym: *Palaemon mirabilis* Kemp, 1917. Distribution: Gangetic delta, Burma, Siam, Borneo. Brackish water. Vid. p. 174.

moorei (Calman, 1899). Synonym: *Palaemon moorei* Calman, 1899. Distribution: Tanganyika Lake. Fresh water. Vid. p. 197.

naso (Kemp, 1918). Synonym: *Palæmon naso* Kemp, 1918. Distribution: Inlé Lake, Central Burma. Fresh water. Vid. p. 136.

nattereri (Heller, 1862). Synonyms: *Palaemon Nattereri* Heller, 1862; *Bithynis brasiliensis* Young, 1900 (non *Palaemon brasiliensis* Heller, 1862); *Bithynis nattereri* Young, 1900. Distribution: French Guiana, Amazon basin in N. Brazil. Fresh water.

niloticum (P. Roux, 1833). Synonyms: *Palaemon Niloticus* P. Roux, 1833; *Palaemon niloticus* Klunzinger, 1866; *Palaemon* (*Eupalaemon*) *niloticus* J. Roux, 1928. Distribution: Nile River, Lake Rudolf, Lake Chad. Fresh water. Vid. p. 197.

nipponense (De Haan, 1849). Synonyms: *Palemon nipponensis* De Haan, 1849; *Palaemon asper* Stimpson, 1860 (non Latreille, 1818); *Palaemon sinensis* Heller, 1862a; *Bithynis nipponensis* Rathbun, 1902b; *Palaemon* (*Eupalaemon*) *nipponensis* Parisi, 1919. Distribution: China, Japan, Formosa. Fresh water. Vid. p. 172.

novae-hollandiae (De Man, 1908). Synonym: *Palaemon* (*Eupalaemon*) *novae-hollandiae* De Man, 1908. Distribution: Queensland, New South Wales, ? New Caledonia. Fresh water. Vid. p. 155.

occidentale Holthuis, 1950. Distribution: W. America from Guatemala to S. Panama. Fresh water.

oenone (De Man, 1902). Synonyms: *Palaemon* (*Macrobrachium*) *oenone* De Man, 1902; *Palaemon* (*Macrobrachium*) *oenone papuana* J. Roux, 1927. Distribution: Halmahera, New Guinea. Fresh water. Vid. p. 256.

ohione (Smith, 1874). Synonyms: *Palaemon Ohionis* Smith, 1874; *Palaemon ohioensis* Sharp, 1893; *Bithynis ohionis* Cary & Spaulding, 1909. Distribution: United States of America (N. Carolina, S. Carolina, Georgia, Mississippi, Arkansas, Louisiana, Illinois, Missouri, Indiana, Oklahoma, Texas). Fresh water.

olfersii (Wiegmann, 1836). Synonyms: *Astacus Serratus* Meuschen, 1781 (non Pennant, 1777); *Palaemon Olfersii* Wiegmann, 1836; *Palemon spinimanus* H. Milne Edwards, 1837 (non Latreille, 1818); *Palaemon consobrinus* De Saussure, 1857; *Palaemon Desausuri* Heller, 1862; *Palaemon potiporanga* Müller, 1892; *Bithynis olfersii* Rathbun, 1902. Distribution: Eastcoast of America from S. Mexico to S. Brazil, Florida. Fresh water.

palaemonoides nov. spec. Distribution: Simalur, off W. Sumatra. Fresh water. Vid. p. 136.

panamense Rathbun, 1912a. Synonym: *Macrobrachium acanthurus panamense* Rathbun, 1912a. Distribution: W. America from Honduras to Ecuador. Fresh water.

patsa (Coutière, 1900). Synonym: *Palaemon* (*Parapalaemon*) *Patsa* Coutière, 1900. Distribution: E. Africa, Madagascar. Fresh water. Vid. p. 210.

petersii (Hilgendorf, 1879). Synonyms: *Palaemon Petersii* Hilgendorf, 1879; *Palaemon* (*Parapalaemon*) *petersii* Weber, 1897. Distribution: S. E. Africa (Mozambique, Natal). Fresh water. Vid. p. 222.

petiti (J. Roux, 1934). Synonym: *Palaemon* (*Macrobrachium*) *petiti* J. Roux, 1934. Distribution: Madagascar. Fresh water. Vid. p. 198.

pilimanus (De Man, 1879). Synonyms: *Palaemon pilimanus* De Man, 1879; *Palaemon* (*Macrobrachium*) *pilimanus leptodactylus* De Man, 1892; *Palaemon* (*Macrobrachium*) *pygmaeus* J. Roux, 1928a; *Palaemon* (*Macrobrachium*) *pilimanus malayanus* J. Roux, 1935. Distribution: Malay Peninsula, Sumatra, Java, Borneo. Fresh water. Vid. p. 214.

placidulum (De Man, 1892). Synonyms: ? *Palaemon spinimanus* Latreille, 1818; *Palaemon* (*Macrobrachium*) *placidulus* De Man, 1892. Distribution: ? Nias, Lesser Sunda Islands, Celebes, Moluccas, New Guinea, New Hannover. Fresh water. Vid. p. 253.

placidum (De Man, 1892). Synonym: *Palaemon* (*Macrobrachium*) *placidus* De Man, 1892. Distribution: W. Sumatra, ? Java. Fresh water. Vid. p. 251.

potiuna (Müller, 1880). Synonym: *Palaemon Potiuna* Müller, 1880. Distribution: S.E. Brazil. Fresh water.

praecox (J. Roux, 1928). Synonym: *Palaemon* (*Eupalaemon*) *praecox* J. Roux, 1928. Distribution: Colombia, Venezuela. Fresh water.

quelchi (De Man, 1902b). Synonym: *Palaemon* (*Macrobrachium*) *quelchi* De Man, 1902b. Distribution: British Guiana. Fresh water.

raridens (Hilgendorf, 1893a). Synonyms: *Palaemon* (*Eupalaemon?*) *paucidens* Hilgendorf, 1893a, p. 155 (non De Haan, 1841); *Palaemon* (*Macrobrachium*) *raridens* Hilgendorf, 1893a, p. 181; *Bithynis paucidens* Rathbun, 1900a. Distribution: West Africa from French Guinea to Nigeria. Fresh water.

rathbunae Holthuis, 1950. Distribution: W. America from Panama to Ecuador. Fresh water.

rosenbergii (De Man, 1879). Synonyms: *Cancer* (*Astacus*) *Carcinus* Herbst, 1792 (non Linnaeus, 1758); *Palaemon Carcinus* Fabricius, 1798; *Palaemon Rosenbergii* De Man, 1879; *Palaemon carcinus rosenbergii* Ortmann, 1891; *Palaemon whitei* (Guérin MSS) Sharp, 1893; *Palaemon* (*Eupalaemon*) *Rosenbergi* Nobili, 1899; *Palaemon spinipes* Schenkel, 1902 (non Desmarest, 1817); *Palaemon d'Acqueti* Sunier, 1925. Distribution: India to S. China, the Malay Archipelago and N. Australia. Fresh, brackish and salt water. Vid. p. 111.

rude (Heller, 1862a). Synonyms: *Palaemon rudis* Heller, 1862a; *Palaemon Mossambicus* Hilgendorf, 1879; *Palaemon* (*Eupalaemon*) *rudis* Coutière, 1900; *Palaemon* (*Eupalaemon*) *Alcocki* Nobili, 1903. Distribution: E. Africa, Madagascar, India. Fresh water. Vid. p. 150.

scabriculum (Heller, 1862a). Synonyms: *Palaemon scabriculus* Heller, 1862a; *Palaemon dolichodactylus* Hilgendorf, 1879; *Palaemon* (*Parapalaemon*) *scabriculus* De Man, 1897; *Palaemon* (*Parapalaemon*) *dolichodactylus* Hilgendorf, 1898; *Palaemon dubius* Henderson & Matthai, 1910. Distribution: E. Africa, Madagascar, India, N. and W. Sumatra. Fresh water. Vid. p. 224.

sintangense (De Man, 1898a). Synonyms: *Palaemon* (*Eupalaemon*) *elegans* De Man, 1892 (non Rathke, 1837); *Palaemon* (*Eupalaemon*) *sintangensis* De Man, 1898a. Distribution: Malay Peninsula, Sumatra, Java, Borneo. Fresh water. Vid. p. 151.

sollaudii (De Man, 1912). Synonym: *Palaemon* (*Eupalaemon*) *Sollaudii* De Man, 1912. Distribution: West Africa from Cameroon to Belgian Congo. Fresh water.

sophronicum nom. nov. Synonyms: ? *Palaemon gracilirostris* Miers, 1875; *Palaemon* (*Parapalaemon*) *modestus* De Man, 1892 (non Heller, 1862); *Palaemon* (*Parapalaemon*) *modestus brevimanus* J. Roux, 1934a. Distribution: Riukiu Islands, Lesser Sunda Islands, Moluccas, New Ireland, ? Samoa. Fresh water. Vid. p. 198.

sulcicarpale nov. spec. Distribution: Salajar Islands near Celebes. Fresh water. Vid. p. 220.

superbum (Heller, 1862a). Synonym: *Palaemon superbus* Heller, 1862a. Distribution: China. Fresh water. Vid. p. 139.

surinamicum Holthuis, 1948. Distribution: Colombia (Atlantic drainage), British and Dutch Guiana. Fresh water.

tenellum (Smith, 1871). Synonyms: *Palaemon tenellus* Smith, 1871; *Palaemon longipes* Lockington, 1878 (non Olivier, 1811). Distribution: W. America from Lower California to N. Peru. Fresh water.

transandicum Holthuis, 1950. Distribution: W. Colombia. Fresh water.

trompii (De Man, 1898a). Synonyms: *Palaemon* (*Parapalaemon*) *Trompii* De Man, 1898a; *Palaemon*

(*Parapalaemon*) *thienemanni* J. Roux, 1932; *Palaemon* (*Parapalaemon*) *trompi armatus* J. Roux, 1936. Distribution: Malay Peninsula, Sumatra, Borneo. Fresh water. Vid. p. 211.

venustum (Parisi, 1919). Synonym: *Palaemon* (*Eupalaemon*) *venustus* Parisi, 1919. Distribution: S. China. Vid. p. 156.

vollenhovenii (Herklots, 1857). Synonyms: *Palaemon Vollenhovenii* Herklots, 1857; *Palaemon* (*Macrobrachium*) *vollenhoveni* Hilgendorf, 1893; *Palaemon jamaicensis africanus* Bouvier, 1895; *Palaemon jamaicensis Vollenhoveni* Aurivillius, 1898; *Bithynis jamaicensis vollenhovenii* Rathbun, 1900a; *Palaemon* (*Macrobrachium*) *jamaicensis angolensis* De Man, 1904; *Palaemon* (*Parapalaemon*) *Vollenhovenii* De Man, 1912; *Palaemon* (*Macroterocheir*) *jamaicensis Herklotsii* De Man, 1925. Distribution: Cape Verde Islands, West Africa from Senegal to Angola. Fresh water.

weberi (De Man, 1892). Synonym: *Palaemon* (*Eupalaemon*) *Weberi* De Man, 1892. Distribution: Celebes, New Guinea, New Britain. Fresh water. Vid. p. 122.

yui nom. nov. Synonym: *Palaemon brevicarpus heterochirus* Yu, 1936. Distribution: Yunnan. Fresh water. Vid. p. 211.

zariquieyi Holthuis, in press. Distribution: The islands Fernando Poo and São Thomé in the Gulf of Guinea, W. Africa.

Fossil Palaemonidae [1])

Homelys Von Meyer, 1862

Type: *Homelys minor* Von Meyer

minor Von Meyer, 1862. Synonym: *Homelys major* Heer, 1865; ? *Palaemon anophthalmus* Salter & Woodward, 1865 (non Kollar, 1848). Distribution: Switzerland, ? Czechoslovakia. Upper Miocene.

Micropsalis Von Meyer, 1859

Type: *Micropsalis papyracea* Von Meyer

?*bolcensis* Schauroth, 1865. Distribution: Italy. Lutetian.

papyracea Von Meyer, 1859. Synonym: *Palaemon bonnensis* Salter & Woodward, 1865. Distribution: W. Germany, Czechoslovakia. Oligocene.

Palaemon Fabricius, 1798

Type: *Cancer Squilla* Linnaeus

exul Frič, 1872. Distribution: Czechoslovakia. Upper Oligocene.

fabricii Michelotti, 1861 (non Rathke, 1843). Distribution: Italy. Lower Oligocene. The position of this species is rather doubtful.

mortuus Smirnov, 1929. Distribution: North Caucasus. Oligocene.

roemeri Von der Marck, 1858. Distribution: Westphalia. Senonian.

---

1) The data concerning the fossil Palaemonidae for the larger part are derived from: GLAESSNER, M. F., 1929. Crustacea decapoda. In: Pompeckj, J. F., Fossilium Catalogus. I: Animalia, vol. 41, pp. 1-464.

Propalaemon Woodward, 1903

Type: *Propalaemon osborniensis* Woodward

minor Woodward, 1903. Distribution: Isle of Wight, England. Lower Oligocene.

osborniensis Woodward, 1903. Distribution: Isle of Wight, England. Lower Oligocene.

Species incertae:

Cancer (*Gammarellus*) *armiger* Herbst, 1793. Synonym: *Palaemon armiger* Olivier, 1811. According to the description and figure of Herbst this species is closely related to or identical with *Palaemon serratus* (Penn.), but no certainty can be obtained in this respect; moreover the locality from which the specimen originates is not known.

Hippolyte gracilipes Randall, 1839. Distribution: Hawaiian Islands. Randall's description is not sufficient to ascertain the identity of his material. According to Gibbes (1850) the specimen belongs to *Palaemon.*

Leander deschampsi Nobili, 1903a. Distribution: Singapore [1]).

Leander distans Heller, 1862a. Synonym: *Palaemon* (*Leander*) *distans* Thallwitz, 1892. Distribution: Nicobar Islands [1]).

Leander hammondi Kingsley, 1882. Synonym: *Palaemon* (*Leander*) *hammondi* Thallwitz, 1892. Distribution: Baker's Island, northern Pacific Ocean [1]).

Leander indicus Heller, 1862. Synonym: *Palaemon* (*Leander*) *indicus* Thallwitz, 1892. Distribution: Java. The description is insufficient to make certain in which genus the species has to be placed.

Leander intermedius Stimpson, 1860. Synonym: *Palaemon* (*Leander*) *intermedius* Miers, 1884. Distribution: S. Australia, Tasmania [1]).

Leander litoreus McCulloch, 1909. Distribution: Australia [1]).

Palaemon adriaticus Costa, 1832-1839. Distribution: Adriatic Sea. The description is insufficient. Possibly the species is identical with *Palaemon serratus* (Penn.).

Palaemon audouini Heller, 1861. Distribution: Red Sea. The identity of this species cannot be made out from the original description.

Palaemon brevimanus Fabricius, 1798. Distribution: East India. Fabricius's description is insufficient for the recognition of the species. The typespecimens of his *Palaemon* species are no longer extant, as the late Dr. K. Stephensen of the Copenhagen Museum kindly informed me.

Palaemon brevirostris Andrzeiowski, 1839. Synonym: *Leander brevirostris* Kemp, 1925. Distribution: Black Sea. The species is insufficiently described.

Palaemon (*Eupalaemon*) *cognatus* J. Roux, 1927. Distribution: Mamberamo River, North New Guinea. The species is based on a young specimen of a species of *Macrobrachium,* which probably belongs to the *idae* group. The specimen is too young, however, to give a correct idea of the status of the species to which it belongs. The specimens named by Roux (1934a) *Palaemon cognatus,* however, are *Macrobrachium idae.*

Palemon Cognetii Risso, 1816. Synonym: *Alpheus Cougneti* Risso, 1826. Distribution: Nice, France.

---

1) Of these species the structure of the oral parts is not known, so that it is impossible to refer them with certainty to any of the Palaemonid genera. These species all are included in Kemp's (1925) key to the species of the genus "Leander" s.l.

The description is insufficient to recognize the species. It in all probability is no Palaemonid, but a Hippolytid prawn.

Palaemon coromandelianus Fabricius, 1798. Distribution: East India. The description is insufficient and the typespecimens are no longer extant.

Palemon crenulatus Risso, 1826. Distribution: Nice, France. The description is insufficient and mainly based on the colour. According to H. Milne Edwards (1837) this species is identical with *Palaemon xiphias* Risso.

Palaemon (*Macrobrachium*) *handschini* J. Roux, 1933a. Distribution: N. Australia. The description is not sufficient to make the systematic status of this species fully certain.

Palemon Margaritaceus Risso, 1816. Synonym: *Alpheus margaritaceus* Risso, 1826. Distribution: Nice, France. The description of the present species is not sufficient for recognition. It may be a species of Hippolytidae.

Palaemon parvulus Costa, 1832-1839. Distribution: Gulf of Napels. The description is insufficient; possibly the species is identical with *Palaemon serratus* (Penn.).

Palaemon parvus Olivier, 1811. Distribution: Mediterranean. The description is not sufficient for the recognition of the species.

Palaemon riukiuensis Kubo, 1940b. Distribution: Riukiu Islands. The specimens on which the description of this species is based, probably are not fullgrown, so that their identity with or distinctness from other species cannot be made certain.

Palaemon serratus (Fabricius, 1793) Fabricius, 1798. Synonym: *Astacus serratus Fabricius,* 1793 (non Pennant, 1777). Distribution: Norway. The description is too short to make it possible to recognize the species.

Palaemon (*Parapalaemon*) *stresemanni* J. Roux, 1918. Distribution: Bali, Malay Archipelago. The material on which this new species is based contains only 1 male specimen, this specimen is young and moreover lacks the second legs. Therefore too few characteristics are known of this species to make it possible to determine its place in the genus *Macrobrachium.*

Palaemon tranquebaricus Fabricius, 1798. Distribution: East India. The description is not sufficient to recognize the species. The typematerial is no longer extant.

Palaemon Trisetaceus Risso, 1816. Distribution: Nice, France. The description is insufficient.

†*Palaemon walchii* Holl, 1829. The description of this species is not at my disposal.

Nomina nuda:

Brachycarpus dentatus Nobili, 1907a. Cf. Kemp, 1925, p. 312, footnote.

Macrobrachium gangeticum Bate, 1868a. Distribution: Patna, near Calcutta.

Palaemon Abbotii (Leach MSS) White, 1847. Distribution: Georgia.

Palaemon aciculatus White, 1847. Distribution: unknown.

Palaemon Affinis (Costa MSS) Hope, 1851. Distribution: Napels, Italy.

Palemon amboinensis Bleeker, 1856. Distribution: Amboina, Malay Archipelago.

Palaemon Bipunctatus (Risso MSS) Hope, 1851. Distribution: Nice, France.

Palaemon Brasiliensis (Leach MSS) White, 1847. Distribution: Brazil.

Palemon Brongniartii Bleeker, 1856 (p. 64; as *Palaemon Br.* on p. 182). Distribution: Amboina and Saparua, Malay Archipelago.

Palaemon Colombicus White, 1847. Distribution: Colombia.

Palaemon Creusa White, 1847. Distribution: West Indies.
Palaemon Cydippe White, 1847. Distribution: Brazil.
Palaemon Delaserii (Geny MSS) Hope, 1851. Distribution: Nice, France.
Palemon Dumerilii Bleeker, 1856. Distribution: Amboina, Malay Archipelago.
Palemon Edwardsii Bleeker, 1856. Distribution: Amboina, Malay Archipelago.
Palaemon Electra White, 1847. Distribution: Brazil.
Palaemon fluvialis Bate, 1876. Distribution: Port Louis, Mauritius.
Palaemon gangeticum (Bate) Thallwitz, 1892 vid. *Macrobrachium gangeticum* Bate.
Palaemon Glauce White, 1847. Distribution: Philippine Islands.
Palaemon Hypsa White, 1847. Distribution: Brazil.
Palemon Inermis Roux, 1831. Distribution: ? Mediterranean.
Palaemon Latreillei (Leach MSS) White, 1847. Distribution: Brazil.
Palaemon macrorhynchos Bleeker, 1856. Distribution: Saparua, Malay Archipelago.
Palaemon Nicippe White, 1847. Distribution: West Africa.
Palemon Oratelli (Risso MSS) Monod, 1931. Distribution: Nice, France.
Palaemon Procles White, 1847. Distribution: Jamaica.
Palemon pusillum Rafinesque-Schmaltz, 1814. Distribution: Sicily.
Palaemon recticornis Sherborn, 1933. Probably an error for *P. rectirostris*.
Palaemon Siamensis Von Martens, 1868. Distribution: Siam.
Palemon Sogiontii (Risso MSS) Monod, 1931. Distribution: Nice, France.
Palaemon splendens Costa, 1840. Distribution: Mediterranean.
Palemon Vedianti (Risso MSS) Monod, 1931. Distribution: Nice, France.

Species incorrectly assigned to the Palaemoninae:

Brachycarpus audouini Bate, 1888 = *Periclimenes batei* nom. nov. Pontoniinae
Leander fluviatilis Thomson, 1879 = *Paratya curvirostris* (Heller, 1862) Atyidae
Leander pandaloides (Rathbun) Kemp, 1925 vid. *Palaemon pandaloides* Rathbun
Palaemon anophthalmus Kollar, 1848 = *Troglocaris anophthalmus* (Kollar) Atyidae
Palaemon asper Latreille, 1818 = *Stenopus hispidus* (Olivier, 1811) Stenopodidae
Palaemon audouini (Bate, 1888) Ortmann, 1891 (non Heller, 1861) = *Periclimenes batei* nom nov. Pontoniinae
Palaemon beaupresii Audouin, 1826 = *Harpiliopsis beaupresii* (Aud.) Pontoniinae
Palaemon bidens Olivier, 1811 = *Alpheus bidens* (Olivier) Alpheidae
Palaemon brevirostris Olivier, 1811 = *Alpheus brevirostris* (Olivier) Alpheidae
Palaemon canaliculatus Olivier, 1811 = *Penaeus canaliculatus* (Olivier) Penaeidae
Palaemon carinatus Olivier, 1811 = species of Penaeidae
Palaemon chlorotocus (A. Milne Edw. MSS) Filhol, 1885 = ? *Chlorotocus crassicornis* (Costa, 1871) Pandalidae
Palaemon custos (Forsskål, 1775) Latreille, 1802 = *Anchistus custos* (Forsskål) Pontoniinae
Palaemon dentatus De Haan, 1841 = *Lysmata dentata* (De Haan) Hippolytidae
† *Palaemon dentatus* Roemer, 1841 = *Hoploparia dentata* (Roemer) Nephropsidae
Palaemon diversimanus Olivier, 1811 = a species of Alpheidae

Palemon Ensiferus Risso, 1816 = *Ligur ensiferus* (Risso) Hippolytidae
Palaemon flavescens Olivier, 1811 = species incerta, but no Palaemonid (cf. H. Milne Edwards, 1837, p. 401)
Palaemon (*Leander*) *fluviatilis* (Thomson) Thallwitz, 1892 vid. *Leander fluviatilis* Thomson
Palaemon fucorum Fabricius, 1798 = *Latreutes fucorum* (Fabricius) Hippolytidae
Palaemon hispidus Olivier, 1811 = *Stenopus hispidus* (Olivier) Stenopodidae
Palaemon (*Brachycarpus*) *laccadivensis* (Alcock & Anderson, 1894) Alcock, 1901 = *Periclimenes laccadivensis* (Alc. & And.) Pontoniinae
Palemon Laevirhincus Risso, 1816 = *Athanas laevirhincus* (Risso) Alpheidae
Palaemon lancifer Olivier, 1811 = *Sicyonia lancifer* (Olivier) Penaeidae
Palaemon longicornis Olivier, 1811 = species of Penaeidae.
† *Palaemon longimanatus* (Schlotheim, 1820) Krueger, 1825 = *Mecochirus longimanatus* (Schlotheim) Glypheidae
Palaemon longipes Olivier, 1811 = *Stenopus hispidus* (Olivier) Stenopodidae
Palaemon marmoratus Olivier, 1811 = *Saron marmoratus* (Olivier) Hippolytidae
Palemon Microramphos Risso, 1816 = ? *Thoralus cranchii* (Leach, 1817) Hippolytidae
Palaemon Narval (Fabricius, 1787) Bosc, 1801 = *Parapandalus narval* (Fabricius) Pandalidae
Palaemon nitescens Leach, 1814 = *Athanas nitescens* (Leach) Alpheidae
Palaemon noctilucus Tilesius, 1818 = Decapod Larva ?
Palemon Olivieri Risso, 1816 = *Hippolyte inermis* Leach, 1814 Hippolytidae
Palaemon (*Palaemonella*) *orientalis* (Dana, 1852) Thallwitz, 1892 = *Palaemonella orientalis* Dana Pontoniinae
Palaemon pandaloides Rathbun, 1906 = *Bathypalaemonella pandaloides* (Rathbun) Campylonotidae
Palaemon pelasgicus Bosc, 1801 = *Hippolyte coerulescens* (Fabricius, 1781) Hippolytidae
Palaemon petitthouarsii Audouin, 1826 = *Periclimenes petitthouarsii* (Audouin) Pontoniinae
Palaemon pinnophylax Otto, 1821 = *Pontonia pinnophylax* (Otto) Pontoniinae
Palemon Pristis Risso, 1816 = *Parapandalus narval* (Fabricius, 1787) Pandalidae
Palaemon setiferus (Linnaeus, 1758) Olivier, 1811 = *Penaeus setiferus* (Linnaeus) Penaeidae
† *Palaemon spinipes* Desmarest, 1817 = *Aeger tipularius* (Schlotheim, 1822) Penaeidae
Palaemon spinosus Brullé, 1840 = *Oplophorus spinosus* (Brullé) Oplophoridae
Palaemon sulcatus Olivier, 1811 = *Penaeus kerathurus* (Forsskål, 1775) Penaeidae
Palaemon Tarentinum Costa, 1844 = *Parapandalus narval* (Fabricius, 1787) Pandalidae
† *Palaemon tenuicauda* Von der Marck, 1858 = *Pseudocrangon tenuicauda* (Von der Marck) Penaeidae
Palaemon (*Palaemonella*) *tenuipes* (Dana, 1852) Thallwitz, 1892 = *Palaemonella tenuipes* Dana Pontoniinae
Palaemon villosus Olivier, 1811 = *Alpheus villosus* (Olivier) Alpheidae

REPORT ON THE MATERIAL EXAMINED

Leander E. Desmarest, 1849

Definition: The body is slender and compressed. The rostrum is compressed, well developed and provided with teeth at both margins; the upper margin bears a single row of hairs, which are placed between the upper teeth of the rostrum, the lower portion of the rostrum bears two rows of

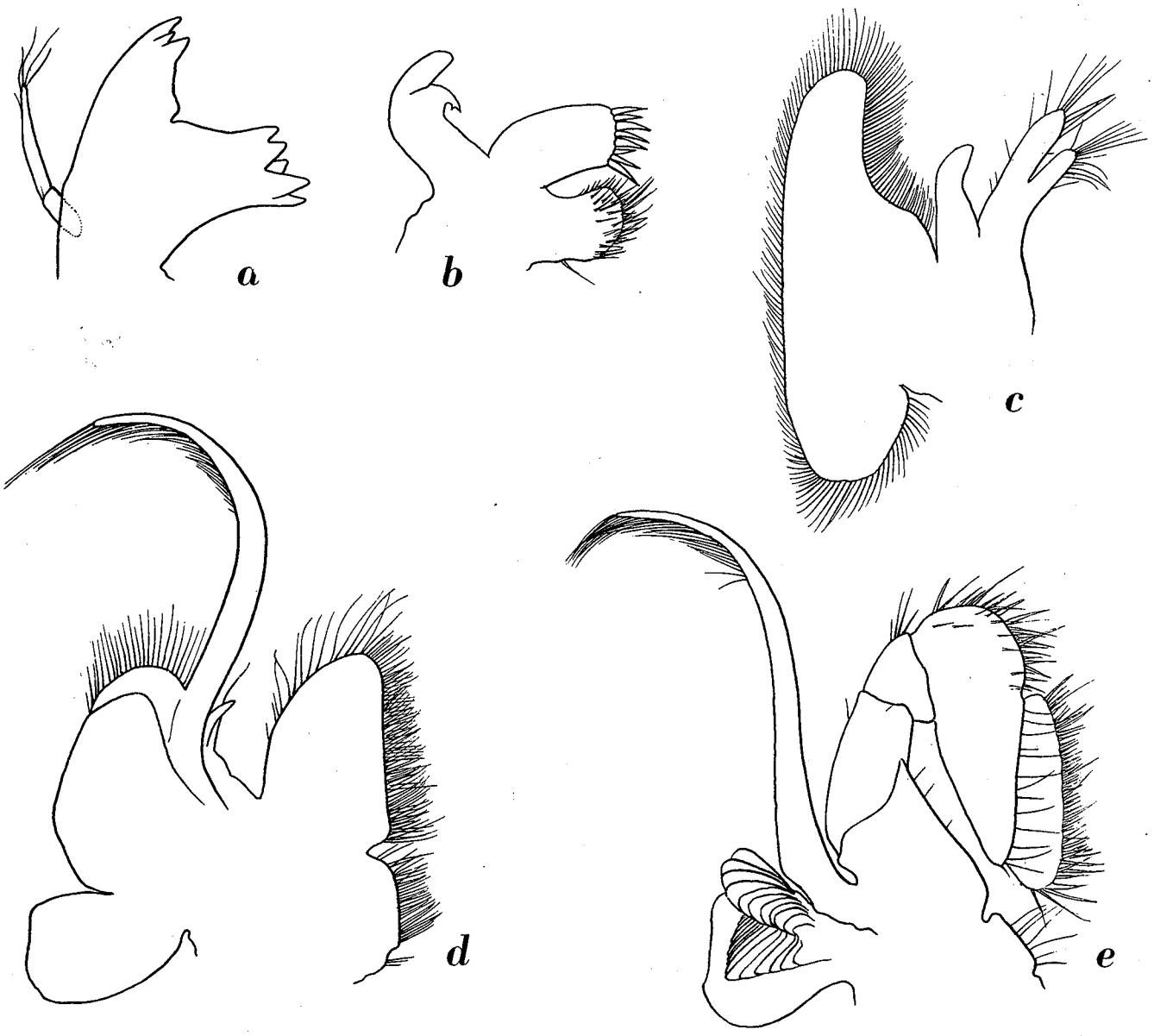

Fig. 1. *Leander tenuicornis* (Say). a, mandible; b, maxillula; c, maxilla; d, first maxillipede; e, second maxillipede. a-e, × 28.

hairs, which are directed ventrally and are inserted at each side of the rostrum above the bases of the ventral teeth: these hairs thereby cover the ventral teeth entirely. The carapace is smooth, it is provided with distinct antennal and branchiostegal spines. The branchiostegal spine is distinctly remote from the anterior margin of the carapace, the antennal spine is situated some distance below the rounded lower angle of the orbit and is placed on the anterior margin of the carapace. No

branchiostegal groove is present, though sometimes an indistinct shallow depression is visible on the carapace in the region where in the species of the genus *Palaemon* the branchiostegal groove is situated.

The abdomen is smooth. The pleurae of the first three segments are broadly rounded, those of the fourth and fifth segments are bluntly pointed, sometimes ending in a minute sharp tooth. The sixth segment is about one and a half time as long as the fifth. The pleurae of the sixth abdominal segment are very short and end in a sharp tooth, just like the posterolateral angles. The telson is elongate and slender, its dorsal surface is provided with two pairs of spines, while its posterior margin too bears two pairs of spines, between which two strong feathered setae are present; these setae sometimes are so strong, that they can better be described as setose spines.

The eyes are well developed, the cornea is hemisphaerical, it is broader and shorter than the stalk and is provided with a distinct ocellus.

The basal segment of the antennular peduncle is broad and is provided with a slender stylocerite, the anterolateral angle of the segment ends in a conspicuous spine. The second and third segments are slender. The upper flagellum is cleft and has the free part of the shorter ramus longer than the fused portion.

The scaphocerite is well developed, it ends in a distinct final tooth. The basal portion of the antennal peduncle bears a distinct external spine. The end of the antennal peduncle fails to reach the middle of the scaphocerite.

The mandible (fig. 1a) bears a two-jointed palp. The molar and incisor processes are well developed; the incisor process ends in three teeth, the molar process is provided in the distal part with blunt knobs and ridges, there are no spinules on the molar process. The maxillula (fig. 1b) has the inner lacinia slender, the upper lacinia bears some strong spines, the palp is distinctly cleft. The maxilla (fig. 1c) has the scaphognathite well developed, but not very broad, the palp is well developed, the inner lacinia is distinctly cleft. All maxillipedes are provided with distinct exopods. The epipod of the first maxillipede (fig. 1d) is bilobed, the caridean lobe of the exopod is well developed, the palp is distinct, the basis and coxa are separated by a distinct notch. The second maxillipede (fig. 1e) is normal in shape, the last joint is fused with the penultimate joint for its entire length, a podobranch is present, the epipod is well developed. The third maxillipede is elongate, and slender, the epipod is distinct, an arthrobranch as well as a pleurobranch are present.

The first pereiopods are slender and equal. The second pereiopods are slender though more heavilly build than the first pair; the fingers are elongate, the various joints unarmed. The last three pereiopods are equal in shape, they are slender and the dactylus is simple. The propodus of all three legs bears spines along the posterior margin, the propodus of the fifth pair lacks the transverse rows of hair, which are present in the species of *Palaemon.*

The first pleopod of the male has the endopod provided with an appendix interna, which is lacking in the female. The other pleopods are typical in shape. The uropods are elongate, they are longer than the telson, the outer margin of the exopod is straight and ends in two spines, the inner of which is movable; along the lower part of the outer margin of the exopod a longitudinal row of hairs is implanted.

Type species: *Leander erraticus* E. Desmarest

The genus consists of three species, which may be separated as follows:

1. Rostrum at most reaching slightly beyond the scaphocerite, generally not reaching the tip of that scale. Upper margin of the rostrum evenly toothed up to the apex. Rostrum straight 2
— Rostrum reaching far beyond the end of the scaphocerite; distal part of the upper margin of the rostrum entire, with the exception of two or three subapical teeth. Distal part of the rostrum strongly curved upwards . . . . . *urocaridella*

2. Pleurae of the fourth and fifth abdominal segments ending in a small but distinct tooth. Stylocerite large, reaching beyond the middle of the basal segment of the antennular peduncle . . . . . *tenuicornis*
— Pleurae of the fourth and fifth abdominal segments rounded at the apex. Stylocerite small, not reaching beyond the middle of the basal segment of the antennular peduncle . . . . . *kempi*

Leander tenuicornis (Say) (figs. 1, 2)

Siboga Expedition

Station 47, Bay of Bima, Sumbawa; reef; depth 55 m; bottom mud with patches of fine coral sand; April 8-12, 1899. — 3 specimens 21-29 mm.

Near Station 76, Makassar Strait, 4° 22′.1 S, 118° 16′.9 E; in Sargassum; June 9, 1899. — 1 specimen 25 mm.

Stations 204-208, Butung Strait, S. E. Celebes; among floating weeds; September 20-22, 1899. — 2 specimens 22 and 29 mm.

Station 230, Banda Sea, 3° 58′ S, 128° 30′ E; in Sargassum; November 14, 1899. — 1 specimen 24 mm.

Snellius Expedition

Makassar Strait, 4° 24′.5 S, 118° 47′.5 E; handnet; surface, between floating algae; August 2, 1929. — 3 specimens 10-23 mm.

Station 64, Sulu Sea, 7° 41′.0 N, 121° 01′.5 E; handnet; surface; September 6, 1929. — 4 specimens (including ovigerous females) 21-30 mm.

Sipankot near Sibutu, Sulu Islands; near the shore, between seagrass; September 11, 1929. — 1 specimen 20 mm.

Kera near Timor; depth 0-1 m; November 11-13, 1929. — 5 specimens 13-18 mm.

Station 330, Ceram Sea, 2° 22′.5 S, 128° 00′.5 E; September 8, 1930. — 13 specimens 8-11 mm.

Station 331, between Buru and S. Celebes, 3° 34′.0 S, 124° 20′.5 E; September 19, 1930. — 3 specimens 14-23 mm.

Station 363, W. of the Kai Islands, 6° 02′.0 S, 131° 52′.0 E; October 22, 1930. — 6 specimens 9-27 mm.

Museum Leiden

Japan (cotypes of *Palaemon latirostris* De Haan). — 5 specimens (including ovigerous females) 29-31 mm.

Muara Antjol, coast near Batavia; March 2, 1908; leg. E. Jacobson. — 1 specimen 32 mm.

Waigeo, off N. W. New Guinea; 1864; leg. H. A. Bernstein. — 1 specimen 31 mm.
Pacific Ocean; 1887; coll. Museum Godeffroy. — 3 specimens 22-31 mm.
Sargassum Sea, 29° N, 38° W; leg. Behrens. — 6 specimens 23-31 mm.
Northern Atlantic Ocean, 27° N, 42° 10′ W; in Sargassum; 1880; leg. L. R. Lusink. — 1 specimen 24 mm.
Sargassum Sea, 23° N, 35° W; 1879; leg. J. Kruisinga. — 1 specimen 38 mm.
Sargassum Sea; leg. Otke. — 1 ovigerous female 40 mm.
Sargassum Sea; 1879. — 9 specimens (including ovigerous female) 25-40 mm.
Curaçao, Rifwater; shallow water with algae; beam trawl; May 26, 1905; leg. J. Boeke. — 1 ovigerous female 36 mm.
Curaçao, Rifwater; shallow water; beam trawl; September 28, 1905; leg. J. Boeke. — 1 specimen 17 mm.
? Amsterdam. — 4 specimens (including ovigerous females) 30-37 mm.
Locality unknown. — 5 specimens (including ovigerous females) 34-37 mm.

Museum Amsterdam

Noordwachter Island, Java Sea; leg. J. Brock. — 1 ovigerous female 28 mm.
Banda; leg. E. van der Velde. — 1 ovigerous female 33 mm.
Atlantic Ocean, 30° N, 70° W; in Sargassum; April 14-16, 1896; coll. Yacht „Chazalie". — 70 specimens (including ovigerous females) 21-42 mm.
Atlantic Ocean, 26° 32′ N, 73° W; April 10, 1896; coll. Yacht "Chazalie". — 172 specimens (including ovigerous females) 9-36 mm.
Sargassum Sea; April 4, 1879; leg. J. Kruisinga. — 15 specimens 25-33 mm.
Gairaca, Santa Marta, Colombia; dredge; depth 0-15 m; February 29, 1896; coll. Yacht "Chazalie". — 1 specimen 19 mm.
Curaçao, Spaansche haven; April 10, 1920; leg. C. J. van der Horst. — 1 specimen 26 mm.
Curaçao, Spaansche water; May 25, 1920; leg. C. J. van der Horst. — 1 specimen 37 mm.
Locality unknown. — 23 specimens (9 ovigerous females) 27-40 mm.

A complete synonymy and a description of this species will be given in my revision of the American Palaemonidae in the Reports of the Allan Hancock Expeditions (Holthuis, in press).

The cotypes of *Palaemon latirostris* De Haan, present in the collection of the Rijksmuseum van Natuurlijke Historie at Leiden, show no differences with the specimens of *Leander tenuicornis,* so that the species must be considered identical, as is already pointed out by De Man (1881). The specimens from Curaçao, preserved in the collection of the Leiden Museum have already been mentioned by Rathbun (1919), the specimens in the same collection from Japan, Waigeo and some from the Sargassum Sea were reported upon by De Man (1881), that from Noordwachter Island in the collection of the Amsterdam Museum by De Man (1888) and finally those from Curaçao, also in the Amsterdam Museum, by Schmitt (1924). The specimen with the label "Amsterdam" probably does not originate from that locality, though it might be introduced by ships.

According to a note accompanying the specimen from Muara Antjol near Batavia, the species is named there by the natives "udang ronggeng", which means "dancing girl prawn".

A specimen from Station 64 of the Snellius Expedition bears a Bopyrid parasite under the abdomen.

Distribution: The species is a common inhabitant of the floating Sargassum weed on high sea, but it also occurs in shallow water near the shore between seaweeds. It is circumtropic and occurs

in the indo-westpacific region from the Red Sea and Réunion to Japan, New Guinea, Australia and New Zealand; in the Atlantic it is known from New Foundland Banks and Bermuda to S. Brazil and the Falkland Islands, from the Sargassum Sea, and the Eastern Atlantic from the Mediterranean to south of the Azores.

Leander urocaridella nom. nov.

Urocaridella gracilis Borradaile, 1915, Ann. Mag. nat. Hist., ser. 8 vol. 15, p. 210.
Urocaridella gracilis Borradaile, 1917a, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 17, p. 352, pl. 53 fig. 2.
Urocaridella gracilis Kemp, 1922, Rec. Indian Mus., vol. 24, p. 122.

Siboga Expedition

Station 7, near reef of Badjulmati, E. Java, 7° 55'.5 S, 114° 26' E; dredge and shore exploration; depth 15 m and more; bottom coral and stones; March 11, 1899. — 1 specimen 31 mm.
Station 47, Bay of Bima; trawl, dredge and shore exploration; depth up to 55 m; bottom mud with patches of fine coral sand; April 8-12, 1899. — 1 specimen 19 mm.
Station 71, Makassar; dredge, townet and shore exploration; depth up to 32 m; bottom mud, sand with mud and coral; May 10 till June 7, 1899. — 1 ovigerous female 33 mm.

Museum Leiden

Java Sea. — 1 specimen 25 mm.

Description: The rostrum is very long and slender, it is about twice as long as the carapace and is strongly curved upwards, it reaches far beyond the scaphocerite. The upper margin of the rostrum bears 8 teeth; the first tooth is placed over the posterior margin of the orbit, the second is situated close near the first, the distance between the third and the second tooth is much larger than that between the first and the second, the third tooth is very small and placed over the anterior part of the basal segment of the antennular peduncle. The fourth and fifth teeth are somewhat larger than the third and are placed close together, near the third tooth; distally of the fifth tooth the upper margin of the rostrum is entire for a long distance; close to the apex three teeth are present, which are placed close together and diminish in size gradually. On the middle of the median dorsal line of the carapace a strong tooth is present; like the first two teeth of the rostrum, this tooth has the tip curved anteriorly, the lower margin of the tip of each of these strong teeth is finely serrate, resembling in this respect the Pontoniid prawn *Periclimenes psamathe* De Man. The lower margin of the rostrum is provided with nine to eleven teeth, the proximals of which are placed close together, the distals are separated by larger intervals. Like in the previous species a row of hairs is present in the lower part of each of the lateral surfaces of the rostrum some distance above the bases of the ventral teeth; these hairs are directed ventrally and cover the lower teeth of the rostrum. The antennal spine of the carapace is strong and placed below the lower orbital angle, which is produced forwards as a large rounded lobe. The branchiostegal spine is about as strong as the antennal and is placed some distance behind the anterior margin of the carapace, but reaches with its tip slightly beyond that margin.

The abdomen is smooth. The pleurae of the first four segments are broadly rounded, that of the fifth is narrower and ends in a small, but distinct, sharp point. The fifth abdominal segment is slightly more than half as long as the sixth.

The telson is about as long as the sixth abdominal segment. The anterior pair of dorsal spines of the telson is situated in the middle of the telson, the other pair is placed about halfway between the

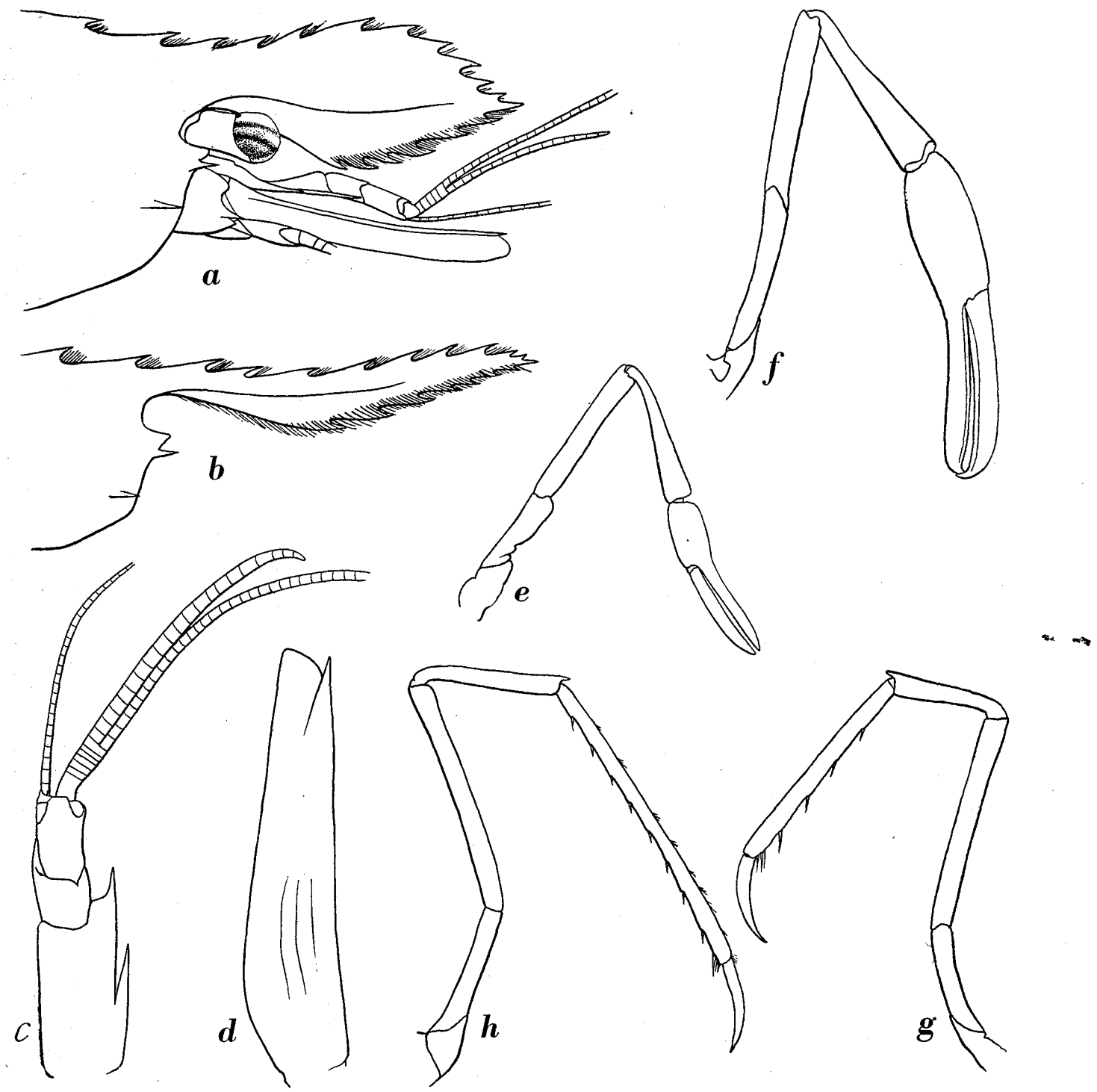

Fig. 2. *Leander tenuicornis* (Say). a, rostrum of a female; b, rostrum of a male; c, antennula; d, scaphocerite; e, first pereiopod; f, second pereiopod; g, third pereiopod; h, fifth pereiopod. a, b, × 8.5; c-h, × 12.

anterior pair and the posterior margin of the telson. The posterior margin ends in a distinct point, which is flanked at each side by two spines and a strong feathered seta. This feathered seta is so strong, that one might call it a setose spine.

The eyes are elongate and reach about ¾ of the length of the basal segment of the antennular peduncle. The eyestalk is much longer, but distinctly narrower than the cornea.

The first segment of the antennular peduncle is broad and reaches somewhat beyond the middle of the scaphocerite. The stylocerite is well developed and ends in a sharp point, it fails to reach the middle of the basal segment. The anterolateral spine of this basal segment is distinct, but does not reach the middle of the second segment of the peduncle; the anterior margin of the basal segment is convex and fails to reach the end of the anterolateral spine. The second segment is distinctly shorter and slightly broader than the third. Together the second and third segments measure ¾ of the length of the first segment. The two rami of the upper flagellum are fused for about five segments, the free portion of the shorter ramus consists of about 9 segments, it is somewhat more than twice as long as the fused part.

The scaphocerite is well developed. The outer margin is almost straight and ends in a strong final tooth, which fails to reach the end of the lamella. The inner anterior angle of the lamella is almost rectangular. The last segment of the antennal peduncle fails to reach the middle of the scaphocerite.

The oral parts do not differ essentially from those of the previous species. The third maxillipede reaches about to the end of the basal segment of the antennular peduncle. The last segment is somewhat shorter than the penultimate, while the antepenultimate segment is about twice as long as the ultimate. The exopod is well developed. The base of the third maxillipede bears a rather large arthrobranch and a smaller pleurobranch, which is partly concealed by the arthrobranch.

The first pereiopod reaches almost the end of the scaphocerite. The fingers are long and slender, they are somewhat longer than the palm. The carpus is about as long as the palm and narrows posteriorly. The merus is as long as the palm and the carpus together. The ischium is half as long as the merus and is somewhat broadened. The second pereiopods are equal in shape, they reach with the entire chela beyond the scaphocerite. The fingers are very slender, they measure almost 1.5 times the length of the palm, they bear no teeth. The carpus is much shorter than the palm and the merus is about twice as long as the carpus. The ischium is more than half as long as the merus. None of the segments bears any spine. The last three pereiopods are of equal shape, all three reach beyond the scaphocerite. The dactylus is very slender and simple. The propodus of the third leg is thrice, those of the fourth and fifth legs are about four times as long as the dactylus. The posterior margin of the propodus bears some scattered spinules, the ultimate of which is by far the strongest. The carpus is about half as long as the propodus and the ischium is about as long as the carpus.

The first pleopod of the male has the endopod provided with an appendix interna. The other pleopods are normal in shape.

The uropods are quite typical.

Figures of this species are given by Borradaile (1917a).

Borradaile (1915, 1917a) described the present species under the name *Urocaridella gracilis,* making it the type of a new genus of Pontoniinae. In reality, however, the species belongs to the Palaemoninae as is shown by the presence of a pleurobranch at the base of the third maxillipede. The species shows all characters of the genus *Leander,* so that it has to be incorporated in that genus. The name of the species therefore should have to become *Leander gracilis* (Borradaile, 1915), this name, however, is preoccupied by *Leander gracilis* Smith (1871). A new name thus is needed for the

present form, for which I propose *Leander urocaridella* nom. nov. Borradaile indicates the branchiostegal spine under the name hepatic spine; comparison with the branchiostegal spine of *Leander tenuicornis* shows that the spine of *L. urocaridella* indeed is the branchiostegal too.

Distribution: This litoral form has been reported in literature from: the Suvadiva, Kolumadulu and Haddumati Atolls in the Maldive Archipelago (Borradaile, 1915, 1917a), off Chilka Lake, Orissa Coast (Kemp, 1922), Port Blair, Andaman Islands (Kemp, 1922), Mergui Archipelago: 12° 40′ N, 98° 26′.5 E and 11° 17′.3 N, 98° 29′.6 E (Kemp, 1922).

Leander kempi nov. spec. (fig. 3)

Siboga Expedition

Station 121, Menado anchorage; shore exploration; depth 55 m; July 14-16, 1899. — 2 specimens (one of which an ovigerous female) 31 and 48 mm.

Snellius Expedition

Beo, Talaud Islands; June 14-21, 1930. — 1 ovigerous female 37 mm.

Description: The rostrum (figs. 3a, b) is rather high, straight, and slightly directed upwards, it reaches a little beyond the end of the scaphocerite. The upper margin of the rostrum bears 12 to 14 teeth, which are regularly divided over the entire length of the margin. The two posterior teeth are placed behind the posterior orbital margin, the first is distinctly more remote from the second than the third is. The two anterior teeth are smaller than the rest and are placed rather close near the apex. Between these teeth a single row of hairs is present. The lower margin of the rostrum bears 5 to 7 teeth, which are placed on the anterior $^2/_3$ of the margin; anteriorly the teeth become smaller. A row of long setae is present on each side of the rostrum slightly above the bases of the ventral teeth; these setae are directed downwards and entirely cover the ventral teeth. The carapace is smooth, though short and rather stiff hairs often are scattered over its surface. The antennal spine is placed some distance below the rounded lower orbital margin; the branchiostegal spine is somewhat stronger than the antennal, it is distinctly remote from the anterior margin of the carapace, the tip of this spine just reaches or fails to reach the anterior margin. The branchiostegal groove is absent.

The abdomen is smooth, similar hairs as on the carapace are present here, they even are more numerous especially on the posterior segments. The pleurae of the first three segments are broadly rounded. Those of the fourth and fifth segment are narrower, they do not end in an apical tooth. The sixth segment is rather short and high, it is less than 1.5 times as long as the fifth.

The telson is elongate, it is much shorter than the uropods. The anterior of the two dorsal pairs of spines is placed immediately behind the middle of the telson, the posterior pair is situated about midway between the anterior pair and the posterior margin of the telson. This posterior margin ends in a sharp point, which is flanked at each side by the usual two spines; the inner spines are very long and slender with curved tips. Two strong feathered setae are present between the inner spines. The dorsal surface of the telson is densely pubescent.

The eyes are well developed, they are not as elongate as in *L. urocaridella.* The cornea is broader and shorter than the stalk. The black pigment is not divided regularly over the cornea, but

shows two concentric bands in which the pigment is much less distinct than in the rest of the cornea. A distinct ocellus is present.

The basal segment of the antennular peduncle is broad. The stylocerite is short, rather slender

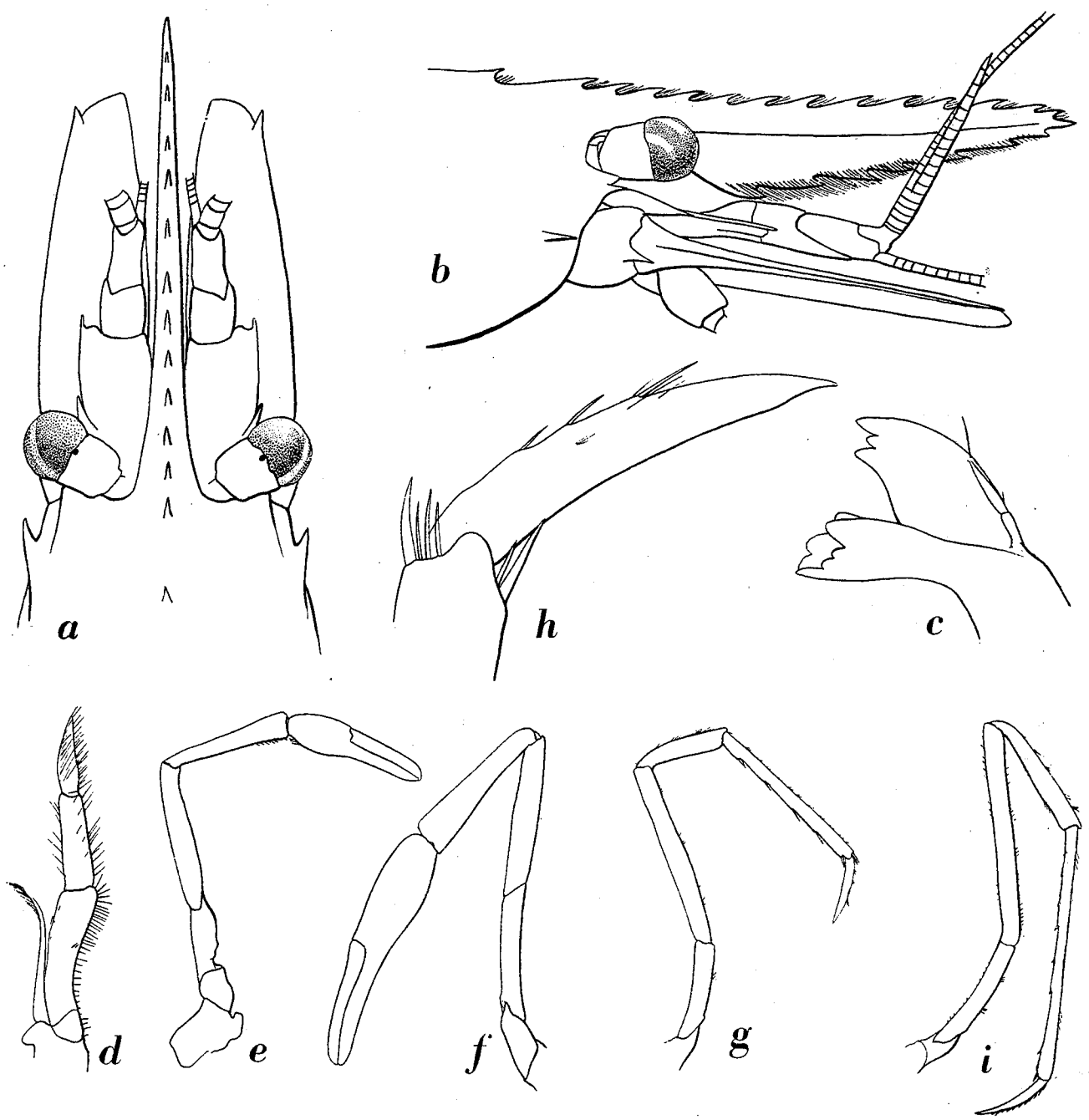

Fig. 3. *Leander kempi* nov. spec. a, anterior part of body in dorsal view; b, anterior part of body in lateral view; c, mandible; d, third maxillipede; e, first pereiopod; f, second pereiopod; g, third pereiopod; h, dactylus of third pereiopod; i, fifth pereiopod. a, b, d-g, i, × 10; c, × 33; h, × 50.

and sharp, it fails to reach the middle of the basal segment. The outer margin of the basal segment is about straight and ends in a distinct tooth which reaches about to the middle of the second segment of the peduncle and overreaches the convex anterior margin of the basal segment. The second segment is slightly shorter than the third, together they are about as long as the first segment. The upper antennular flagellum has the two rami fused for about seven joints, the free part of the shorter ramus

consists of 12 to 15 joints and is slightly more than twice as long as the fused portion.

The scaphocerite just fails to reach the end of the rostrum, it reaches with about 1/3 of its length beyond the antennular peduncle. The outer margin is straight and ends in a strong final tooth, which is distinctly overreached by the lamella. The scaphocerite is slightly more than thrice as long as broad, its greatest breadth lies close near the base; the anterolateral angle of the lamella is rather acute. The antennal peduncle almost reaches 1/3 of the length of the scaphocerite.

The oral parts (figs. 3c, d) are quite typical. The third maxillipede reaches slightly beyond the end of the antennal peduncle. The penultimate segment is distinctly longer than the ultimate. The antepenultimate segment is almost 1.5 times as long as the penultimate. The exopod reaches beyond the antepenultimate segment.

The first pereiopod (fig. 3e) reaches slightly beyond the end of the antennular peduncle, but largely fails to reach the end of the scaphocerite. The fingers measure 4/3 of the length of the palm and are unarmed. The palm is somewhat swollen. The carpus is about as long as or slightly shorter than the chela, and broadens anteriorly. The merus is somewhat longer than the carpus. The ischium is about half as long as the merus. The second pereiopod (fig. 3f) is stronger than the first, it reaches with half the length of the fingers beyond the scaphocerite. The fingers are about as long as the palm, they are slender and bear no teeth. The palm is swollen. The carpus measures about 3/5 of the length of the entire chela, it is broadest distally and narrows proximally. The merus and ischium are subequal in length, they are each about as long as the carpus, the merus being generally slightly longer than both carpus and ischium. The last three pereiopods are slender. The third (fig. 3g) reaches about to the end of the antennular peduncle. The simple dactylus (fig. 3h) bears some hairs on the anterior margin. The propodus is about 2.5 times as long as the dactylus and has the posterior margin provided with some five spinules. The carpus is half as long as the propodus; the merus is slightly longer than the propodus, while the ischium is somewhat more than half as long as the merus. The fifth pereiopod (fig. 3i) is much more slender than the third, it reaches somewhat beyond the tip of the scaphocerite. The dactylus strongly resembles that of the third leg. The propodus is thrice as long as the dactylus and like in the third leg bears scattered spinules along its posterior margin. The carpus is half as long as the propodus. The merus is distinctly shorter than the propodus, while the ischium is somewhat more than half as long as the merus. The fourth pereiopod is intermediate in shape between the third and the fifth. All joints of these pereiopods bear many short setae. In the young specimen of the Siboga Expedition the legs are generally somewhat shorter.

The pleopods of my female specimens are normal in shape. Among the material at hand no males are present.

The uropods are elongate and much longer than the telson (the final spines excluded). The endopod is slightly shorter than the exopod. The shape of the uropods is quite typical.

The present species is closely related to *Leander tenuicornis,* but differs from that species in the following features:

1. The pubescence of the body of *L. kempi,* especially of the abdomen, is not observed in *L. tenuicornis.*

2. The basal segment of the antennular peduncle in *L. tenuicornis* has the stylocerite much longer, reaching beyond the middle of the segment and the anterior margin of that segment is not so strongly convex as in *L. kempi.*

3. The fingers of the second pereiopod of *L. kempi* are as long as the palm, in *L. tenuicornis* they generally are longer. Furthermore the second pereiopods in *L. kempi* do not reach as far forwards as they do in *L. tenuicornis.*

4. The fourth and fifth abdominal segments in *L. kempi* have their tips rounded, while they end in a distinct tooth in *L. tenuicornis.*

The second and fourth points are the most important in my opinion.

Leandrites nov. gen.

Definition: The body is slender, compressed. The rostrum is compressed, well developed and provided with teeth on the upper and lower margins. The upper margin bears a single row of setae, which is placed between the teeth, while a row of setae is placed in the lower portion of each of the lateral surfaces, somewhat above the bases of the ventral teeth of the rostrum, these hairs are directed ventrally and cover the lower rostral teeth. The carapace is smooth, it is provided with well developed antennal and branchiostegal spines. The branchiostegal spine is distinctly remote from the anterior margin of the carapace. No branchiostegal groove is present. The anterolateral angle of the carapace is rounded.

The abdomen is smooth. The pleurae of the first three segments are broadly rounded, that of the fourth and fifth segments are narrower. The pleura of the sixth segment is very short and ends just like the posterolateral angle in a sharp tooth. The sixth segment is about 1.5 times as long as the fifth.

The telson is elongate and slender, its dorsal surface is provided with two pairs of spines, the posterior margin too bears two pairs of spines, between which two very heavy, feathered setae are present. Of the two pairs of spines the outer is very short, the inner long and slender. The setae often are so heavy that they perhaps better can be described as setose spines.

The eyes are well developed, the cornea is hemisphaerical.

The basal segment of the antennular peduncle is very broad, it bears a slender stylocerite and has the anterolateral angle ending in a spine. The second and third segments are shorter and narrower. The upper flagellum consists of two rami, which are fused for a short distance.

The scaphocerite is well developed and ends in a distinct final tooth. A distinct exterior tooth is present at the basal part of the antennal peduncle. The end of the antennal peduncle fails to reach to the middle of the scaphocerite.

The mandible (fig. 4a) bears no palp, the molar and incisor processes are well developed. The maxillula (fig. 4b) has the inner lacinia slender, the upper lacinia bears strong distal spines, the palp is well developed and is distinctly cleft. The maxilla (fig. 4c) has the endite deeply cleft, the palp is distinct, the scaphognathite is large but not very broad. All maxillipedes are provided with well developed exopods. The first maxillipede (fig. 4d) has the basis and coxa separated by a distinct notch, the palp and the caridean lobe of the exopod are well developed, the epipod is bilobed. The second maxillipede (fig. 4c) shows the same shape as that of *Leander,* here too the last and the penultimate segments are fused over their entire length and a podobranch is present. The third maxillipede (fig. 4f) is slender, it is provided with an arthrobranch as well as with a pleurobranch.

The first pereiopods are slender and equal in shape. The second legs too are slender and equal, the fingers are very long and slender; none of the joints of the second leg bears spines or teeth.

The last three pereiopods are of equal shape and are very slender. The dactylus is simple, the propodus of the third leg only bears some posterior spinules, in both other legs it is entirely smooth, bearing only some scattered hairs on the posterior margin.

The endopod of the first pleopod of the male is provided with an appendix interna. The other pleopods are like in *Leander*. The uropods are elongate, longer than the telson. The outer margin of the exopod is straight and ends in a distinct tooth, which at its inner side bears a small movable spine.

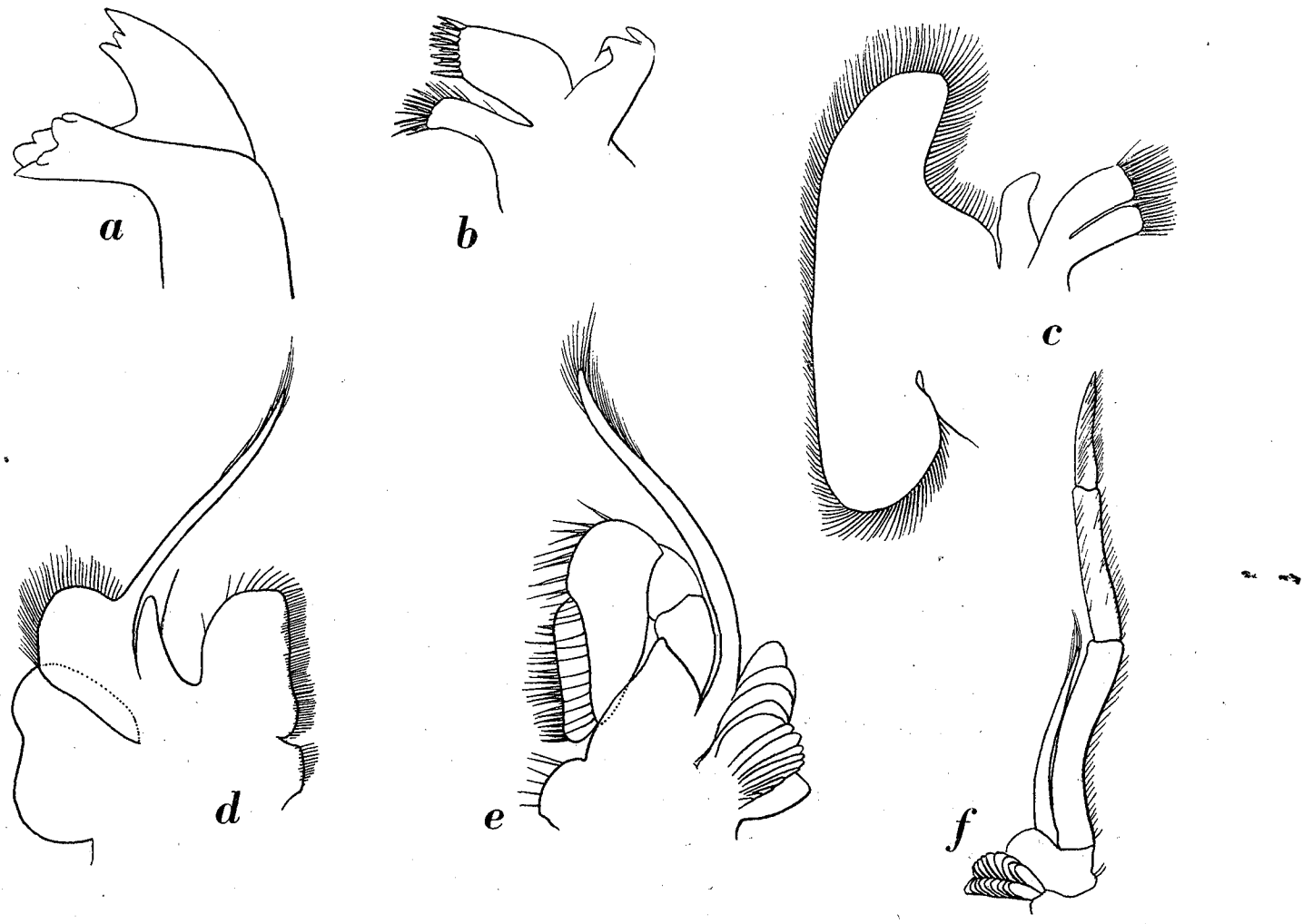

Fig. 4. *Leandrites celebensis* (De Man). a, mandible; b, maxillula; c, maxilla; d, first maxillipede; e, second maxillipede; f, third maxillipede. a-c, × 33; d, e, × 27; f, × 14.

Type species: *Leander celebensis* De Man, 1881.

The present genus very closely resembles the genus *Leander*; in fact the only important difference between these two genera is the absence of a mandibular palp in *Leandrites,* while such a palp is present in *Leander.* The relation between *Leander* and *Leandrites* therefore is the same as that between *Palaemon* and *Palaemonetes.*

At present three species of the genus *Leandrites* are known. These species may be separated as follows:

1. Second legs reaching with part of the carpus beyond the scaphocerite. Lower margin

of the rostrum with 3-9 teeth, which are divided regularly over the distal half of the rostrum 2

— Second legs reaching with almost entire merus beyond the scaphocerite. Lower margin of the rostrum entire for the larger part, only about 3 inconspicuous teeth are placed close near the apex. . . . . *stenopus*

2. Rostrum very slender, curved slightly upwards at the tip, reaching much beyond the end of the scaphocerite. Lower margin of rostrum provided with 8 or 9 teeth . . *indicus*

— Rostrum rather high, directed forwards, reaching to or slightly beyond the scaphocerite. Lower margin of rostrum provided with 3 to 5 (seldom 7) teeth . . . . *celebensis*

Leandrites celebensis (De Man) (fig 4)

Leander celebensis De Man, 1881, Notes Leyden Mus., vol. 3, p. 141.
Palaemonetes hornelli Kemp, 1925, Rec. Indian Mus., vol. 27, p. 318, figs. 14, 15.
Palaemonetes hornelli Nataraj, 1942, Current Sci., vol. 11, p. 468.
Leander wieneckii De Man MSS. in Museum Leiden.

Museum Leiden

Makassar, S. W. Celebes; January, 1880; leg. J. Semmelink (cotypes). — 20 specimens (included ovigerous females) 19-26 mm.

Antjol near Batavia; mangrove swamp; July 15, 1938; leg. F. P. Koumans. — 6 specimens (two of which are ovigerous females) 15-25 mm.

Pond near the Laboratorium voor Onderzoek der Zee (Laboratory for Marine Investigations), Batavia; July 18, 1938; leg. F. P. Koumans. — 1 specimen 22 mm.

Locality unknown. — 1 specimen 27 mm.

The specimens studied agree good with Kemp's (1925) excellent description and figures of *Palaemonetes hornelli*; the limbs of the second pereiopods of the females, however, generally are broader in my material, the relations between the lengths of the various parts of the limbs agree perfectly with those reported by Kemp. The oral parts of the present species are figured here, they show a large resemblance to those of *Leander,* only the mandibular palp is absent. The epipod of the first maxillipede is large and indistinctly bilobed.

The specimens from Makassar are the types of *Leander celebensis* De Man; these specimens were inserted in the collection of the Rijksmuseum van Natuurlijke Historie at Leiden under the name: "*Leander wieneckii* De Man type"; *Leander wieneckii* has never been described by De Man and examination of the specimens showed that they are in reality the types of *Leander celebensis* De Man. In his description De Man did not mention the shape of the oral parts, therefore the fact that the mandibular palp is absent escaped his notice, and the species was wrongly placed by him in the genus *Leander.* Kemp (1925) redescribed the species as *Palaemonetes hornelli,* overlooking De Man's description of *Leander celebensis,* which also is not inserted in Kemp's list of species of the genus *Leander.* The characters shown by the present species and the two following make it necessary in my opinion to place them in a separate genus, for which I indicate *Leandrites celebensis* as the type, being the best known of the three species.

Vertical distribution: The species is found in rather shallow, often brackish water near the shore.

Horizontal distribution: The species is recorded in literature from Travancore, S. India (N a t a r a j, 1942), Silavathurai Lagoon, Tuticorin and from Cochin backwater near Ernakulam, both localities in S. India (K e m p, 1925) and from off Makaṣsar, S.W. Celebes (D e M a n, 1881).

Leandrites indicus nov. spec. (fig. 5)

Leander indicus? De Man, 1881, Notes Leyden Mus., vol. 3, p. 139. (non *L. indicus* Heller, 1865).

Museum Leiden

Off Makassar; January, 1880; leg. J. Semmelink. — 2 specimens 24 and 25 mm.

Description: The rostrum (figs. 5a-c) is long and slender, it reaches with $^1/_3$ to $^1/_4$ of its length beyond the scaphocerite, the tip is somewhat curved upwards. The dorsal margin bears 11-14 teeth; the first tooth is distinctly more remote from the second tooth than the second is from the third. The first and second teeth are placed on the carapace behind the orbital margin, the other teeth are regularly divided over the rest of the length of the rostrum, only the two or three distal teeth are placed close together near the apex of the rostrum; in one of the specimens the upper margin is entire for a short distance behind the penultimate tooth; before each tooth a short single row of setae is present. The lower border bears eight or nine teeth, which are regularly divided over the distal $^2/_3$ of that margin. A double fringe of ventrally directed setae is present near the lower margin of the rostrum slightly above the bases of the ventral teeth, which are thereby entirely covered by these hairs. The carapace is smooth. The antennal spine is strong and is placed some distance below the rounded lower orbital angle. The branchiostegal spine is almost as strong as the antennal spine and is placed some distance behind the anterior margin of the carapace.

The abdomen is smooth. The pleurae of the first three segments are broadly rounded, those of the fourth and fifth are narrower, but have the tips rounded too. The sixth abdominal segment is about 1.5 times as long as the fifth, and is somewhat shorter than the telson.

The telson is of the usual elongate shape. The dorsal surface bears two pairs of spinules, the first of which is situated in the middle of the telson, the second pair is placed midway between the anterior pair and the posterior margin of the telson. The posterior margin ends in a sharp median point and bears three pairs of spinules: the outer pair is very short, the intermediate pair very long, reaching with much more than half its length beyond the tip of the telson, the inner pair is setose and perhaps also might be regarded as being very strong feathered setae.

The eyes reach almost the end of the basal segment of the antennular peduncle. A distinct ocellus is visible. The cornea is broader and slightly shorter than the stalk.

The stylocerite of the basal segment of the antennular peduncle ends in an acute point, it just fails to reach the middle of the basal segment. The outer margin of the segment is about straight and ends in a strong, slightly outwards directed anterolateral spine, which is overreached by the strongly convex anterior margin of the segment. The second segment of the antennular peduncle, when measured in dorsal line, is distinctly shorter than the third; together these two segments measure about $^3/_4$ of the length of the basal segment. The upper antennular flagellum has the two rami fused for 6 or 7 joints, the free part of the shorter ramus is considerably longer than the fused part (in

both specimens at my disposal the shorter rami are broken, but in one 15 joints are still visible, this remaining free part of the shorter ramus being about thrice as long as the fused part).

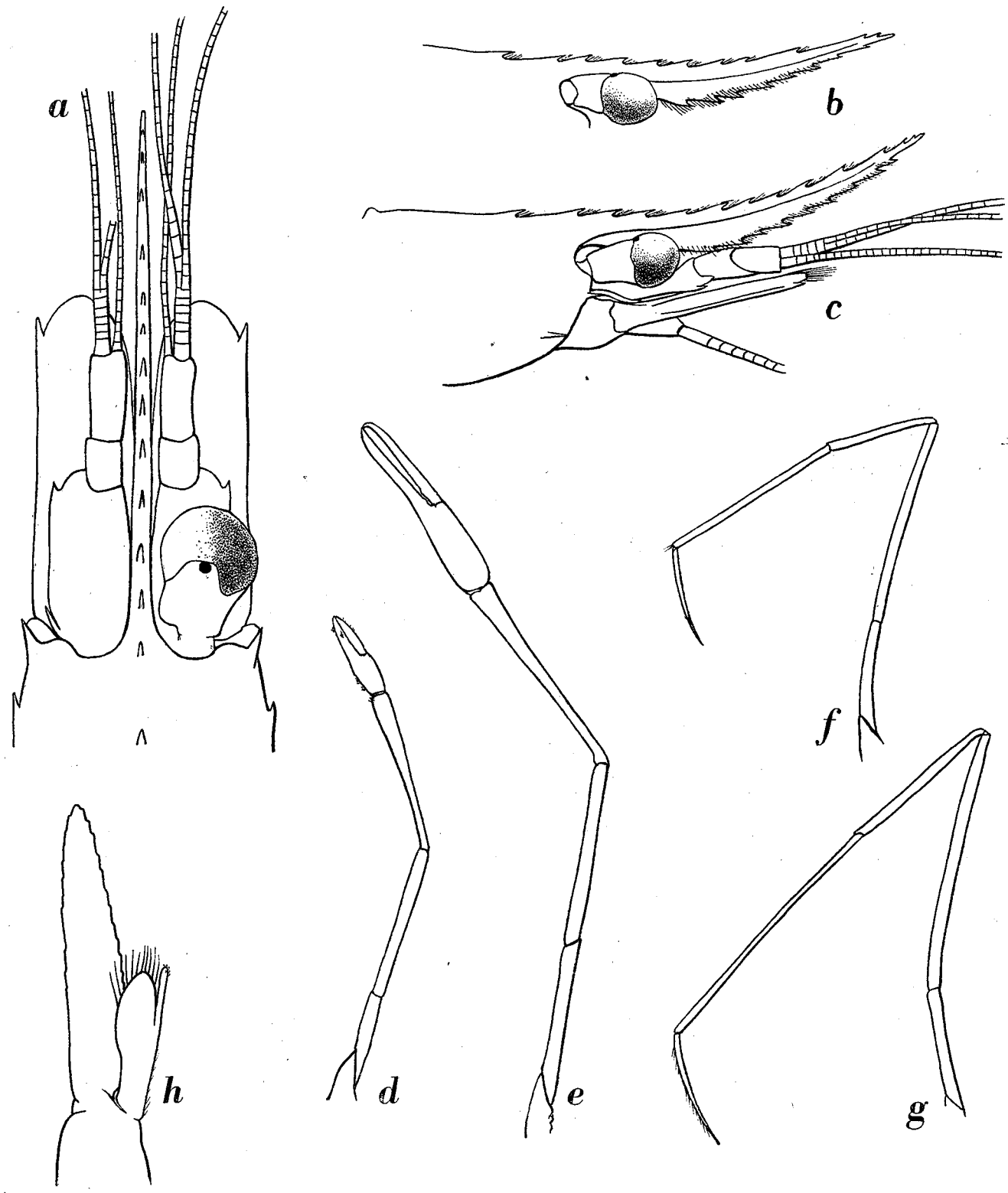

Fig. 5. *Leandrites indicus* nov. spec. a, anterior part of body in dorsal view; b, rostrum in lateral view; c, anterior part of body in lateral view; d, first pereiopod; e, second pereiopod; f, third pereiopod; g, fifth pereiopod; h, first pleopod of male. a-g, × 14; h, × 33.

The scaphocerite reaches with about 1/5 of its length beyond the antennular peduncle, it is

about thrice as long as wide. The outer margin of the scaphocerite is almost straight and ends in a strong final tooth, which is outreached by the lamella.

The oral parts are quite typical, they do not differ essentially from those of the preceding species. The third maxillipede is slender, it reaches almost to the end of the basal segment of the antennular peduncle. The last segment of the maxillipede measures about $^2/_3$ of the length of the penultimate, while the antepenultimate segment is about twice as long as the ultimate; this antepenultimate segment is curved and is about four times as lang as broad.

The first pereiopods (fig. 5d) are slender and reach to or slightly beyond the scaphocerite. The fingers are slender and a trifle longer than the palm. The carpus is almost twice as long as the chela, it is broadened distally. The merus is distinctly shorter than the carpus, and the ischium is somewhat more than half as long as the merus. The second legs (fig. 5e) are long, they reach with part of the carpus beyond the scaphocerite, they are slender, but distinctly stouter than the first legs. The fingers are elongate, they are somewhat longer than the palm and have the tips curved inwards; in the proximal part of the cutting edge both fingers are provided with a minute tooth. The palm is a little swollen. The carpus is somewhat longer than the chela, it widens distally. The merus is subequal in length to the chela. The ischium is slightly shorter than the merus. The last three legs are very slender, the third (fig. 5f) reaches with the dactylus, the fifth even with part of the propodus beyond the scaphocerite. The third pereiopod has the dactylus very slender, it is a little longer than half the length of the propodus. The posterior margin of the propodus is naked. The carpus is about as long as the dactylus. The merus is a little longer and broader than the propodus. The ischium is of about the same length as the carpus. The fifth pereiopod (fig. 5g) has the dactylus very slender, it is half as long as the propodus. The carpus is distinctly longer than the dactylus. The merus is broader than, but of the same length as the propodus. The ischium is shorter than the carpus. The posterior margin of the propodus bears no spinules or transverse rows of setae. The fourth pereiopod is about intermediate in shape between the third and the fifth.

The endopod of the first pleopod of the male (fig. 5h) is provided with an appendix interna, which is well developed and reaches beyond the tip of the endopod. The appendix masculina of the second pleopod of the male is broad and reaches almost to the end of the appendix interna. The other pleopods are of the usual shape.

The uropods are elongate in shape. The endopod reaches beyond the telson, but fails to reach the end of the posterior spines of the telson. The shape of the uropods does not differ from that of the previous species.

Both specimens examined are males.

The present specimens were brought by De Man (1881) with some doubt to *Leander indicus* Heller. In my opinion, however, the differences between De Man's specimens and Heller's (1865) description, which for the larger part are also enumerated by De Man, are ot specific importance. These differences are:

1. Heller's specimen is much larger (45 mm). De Man thought the present specimens to be juvenile, but this is contradicted, I think, by the well developed state of the appendix masculina of the second pleopods and of the appendix interna of the first pleopod.

2. The rostrum in Heller's specimen has the distal part of the upper margin entire for a long distance, in one of the present specimens no such entire portion may be observed, while in the other it is extremely short.

3. The relation between the lengths of the various joints of the second leg is entirely different in the two forms. In Heller's specimen the palm is longer than the fingers and the carpus is twice as long as the chela, in my specimens the fingers are longer than the palm and the carpus is scarcely longer than the chela.

4. In Heller's figure the dactylus of the third leg is much shorter than it is in my specimens.

Examination of Heller's specimen is badly needed, as his description and figure give too few data about his material, so for instance nothing is known about the oral parts, so that the generic position of the species even is not certain.

The present species shows close affinity to *Leandrites celebensis,* from which species it at once may be distinguished by the shape of the rostrum.

Leandrites stenopus nov. spec. (fig. 6)

Siboga Expedition

Station 2, Madoera Strait, 7° 25′ S, 113° 16′ E; trawl; depth 56 m; bottom grey mud with some radiolariae; March 8, 1899. — 1 specimen 22 mm.

Description: The rostrum (fig. 6a) is slender, it reaches beyond the end of the antennular peduncle and almost reaches the end of the scaphocerite; it is about straight. The upper margin is provided with 11 teeth, the first tooth is somewhat smaller than the second and is placed a larger distance from the second than the third is. The second tooth is placed closely behind the posterior limit of the orbit, the other teeth are regularly divided over the upper margin of the rostrum; in the distal part of that margin the teeth become gradually smaller. A single row of hairs is placed on the upper margin of the rostrum between the teeth. The lower margin is almost straight, it is entire for the larger part of its length, only three small teeth are present in the extreme distal part of the margin, the first of these teeth is placed on a level between the seventh and eighth dorsal tooth, the second ventral tooth is placed below the ninth dorsal and the third ventral below the tenth dorsal tooth. The lower part of the rostrum bears at each side a longitudinal row of ventrally directed setae, which cover the lower rostral margin. The carapace has the antennal spine strong and placed below the lower orbital angle, which is produced forwards to a broadly rounded lobe. The branchiostegal spine is about as strong as the antennal and is placed some distance behind the anterior margin of the carapace, reaching slightly beyond this margin with its tip. No branchiostegal groove is present.

The abdomen is smooth. The pleurae of the first five abdominal segments are rounded, those of the first four segments are broader than that of the fifth. The sixth segment is about 1.5 times as long as the fifth.

The telson is elongate, but falls short of the tip of the uropods. The dorsal spines are small, the anterior pair is situated about in the middle of the telson, while the posterior pair is placed closer to the posterior margin of the telson than to the anterior pair. The posterior margin ends in a sharp median point, at each side of which two spines and one seta are present: the outer spine is very short, the inner spine is long with the tip curved slightly inwards, the seta is situated closest near the median point of the posterior margin of the telson, it is very strong and resembles a spine, it bears fine hairs.

The eyes are rather large, the cornea is as long as and distinctly broader than the stalk.

The basal segment of the antennular peduncle has the stylocerite slender, pointed and very short, it distinctly fails to reach the middle of the basal segment. The anterolateral spine of the basal segment is distinct, but fails to reach the middle of the second segment of the peduncle; the anterior margin of the basal segment is strongly curved and produced forwards, reaching distinctly beyond the anterolateral spine. The second and third segments are much narrower than the basal segment, together they are shorter than the first segment. The third segment is distinctly longer than the second. The upper antennular flagellum has the two rami fused for about three joints; of both upper flagella

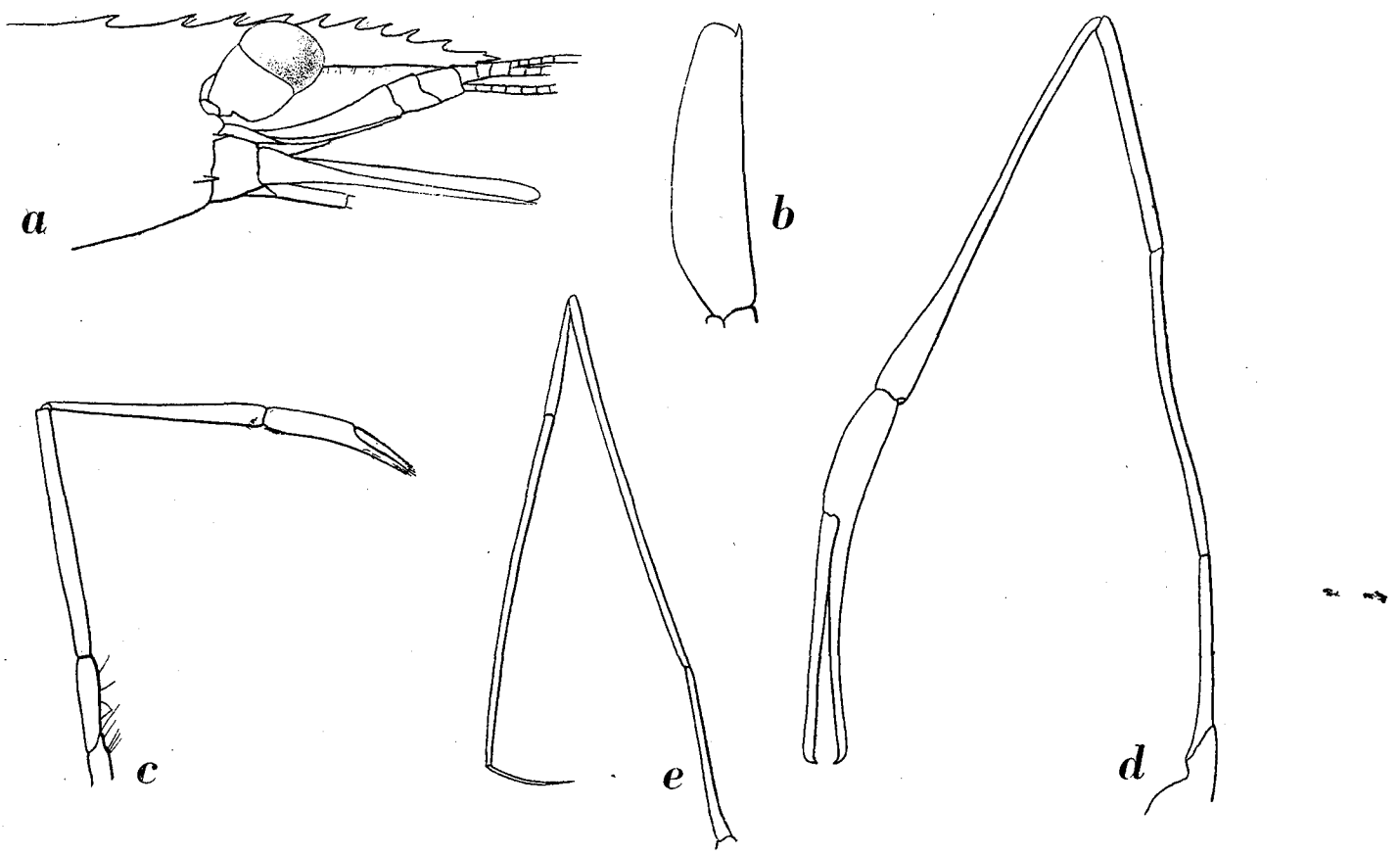

Fig. 6. *Leandrites stenopus* nov. spec. a, anterior part of body in lateral view; b, scaphocerite; c, first pereiopod; d, second pereiopod; e, third pereiopod. a-e, × 14.

in my specimen the shorter ramus is broken.

The scaphocerite (fig. 6b) reaches somewhat beyond the tip of the rostrum. The outer margin is slightly concave and ends in a final tooth, which reaches slightly beyond the lamella. The lamella is of about the same breadth over its entire length.

The oral parts closely resemble those of *L. celebensis*; the first maxillipede, however, has the epipod deeply bilobed. The third maxillipede is long and slender, it almost reaches the end of the scaphocerite. The last segment is about half as long as the preceding, the antepenultimate segment is longer than the penultimate, but shorter than the last two segments combined.

The first pereiopod (fig. 6c) is slender, it reaches with about half the carpus beyond the end of the scaphocerite. The fingers are elongate and provided with numerous setae, they are shorter

than the elongate palm. The carpus is slender, it is about 1.5 times as long as the chela, it is broadest distally and narrows proximally. The merus is distinctly longer than the carpus. The ischium is about half as long as the merus. The second pereiopod (fig. 6d) (in my specimen only the left pereiopod of the second pair is present) is extremely slender, it reaches with almost the entire merus beyond the scaphocerite. The fingers are very long and slender, they are about twice as long as the palm and of the same width throughout their length, the cutting edge is entire and the tips of the fingers are rather strongly curved inwards. The carpus is somewhat longer than the chela, it is unarmed, the distal portion is broadest, the chela gradually narrows proximally. The merus is about half as long as the carpus. The ischium is distinctly longer than the merus and the basis is somewhat shorter than the merus. The last three pereiopods are of about equal structure. The third (fig. 6e) reaches with half the carpus beyond the scaphocerite. The dactylus is simple, it is very long, slender and curved, it measures about $^1/_3$ of the length of the propodus. The propodus too is long and slender, it is about 2.5 times as long as the carpus. The merus is about as long as the propodus and the ischium is of about the same length as the carpus. All joints are filiform.

The shape of the first two pleopods of the male are unknown, the only specimen at my disposal being a female.

The uropods show no important differences from those of the two previous species.

The species may at once be recognized by the shape of the rostrum and the extremely long legs. The very long second pereiopods show a curious resemblance to those of the Pontoniid prawn *Periclimenes longipes* (Stimpson), but may at once be distinguished from that species by the long fingers of that leg.

Palaemon Fabricius, 1798

Description: Body slender or more robust, compressed. The rostrum is well developed, it is compressed and provided with teeth at both sides. The upper margin of the rostrum bears a single row of hairs, which is placed between the dorsal teeth. The lower margin is provided either with a single row like that of the dorsal margin or with a double row, in the latter case the hairs are placed so close near the lower margin that they do not entirely cover the ventral teeth of the rostrum. The carapace is smooth and provided with antennal and branchiostegal spines. The antennal spine generally is strong and situated on the anterior margin of the carapace some distance below the rounded lower orbital angle. The branchiostegal spine is placed either on the anterior margin of the carapace or slightly remote from it. A distinct sharp branchiostegal groove generally is present, it reaches the anterior margin of the carapace just above the branchiostegal spine; anteriorly the groove runs horizontally, in the posterior part it curves downwards. The anterolateral angle of the carapace is rounded.

The abdomen is smooth. The pleurae of the first three segments are broadly rounded, those of the fourth and fifth segments are narrower, the apex of the fifth segment sometimes ends in a minute sharp tooth. The sixth abdominal segment has the pleurae very short, they end in a posteriorly directed spine; the posterolateral angle of that segment too ends in a sharp point. The sixth segment is distinctly longer than the fifth.

The telson is elongate triangular and generally bears two pairs of spines on the dorsal surface, sometimes one or even both pairs are absent. The posterior margin of the telson ends in an acute point,

and generally bears 4 spines, the outer of which are very short, the inner pair is much longer. Between the two inner spines two long feathered setae are present. In some species there are only two posterior spines, in others both pairs are wanting.

The eyes are well developed. The cornea is hemisphaerical. An ocellus is present.

The basal segment of the antennular peduncle is very broad, it is provided with a distinct slender and sharp stylocerite. The anterolateral angle of that segment is produced to a sharp spine, the anterior margin of the segment is convex. The second and third segments of the antennular peduncle are much shorter and narrower than the basal segment. The antennula bears two flagella, the lower is simple, the upper consists of two rami, which have the basal joints fused.

The scaphocerite is large and reaches beyond the end of the antennular peduncle. The outer margin of it ends in a strong tooth, which is overreached by the broad lamella; the greatest breadth of the lamella lies slightly above the base of that scale, which narrows slightly towards the apex. A distinct exterior spine is present in the basal part of the antennal peduncle; this peduncle fails to reach the middle of the scaphocerite.

The mandible is provided with a two- or threejointed palp; the incisor process ends in three distinct teeth, the molar process bears in its distal part blunt knobs and ridges and sometimes is provided with a row of spinules. The maxillula has the inner lacinia rather slender, the upper lacinia is provided with a row of strong teeth at its distal margin, the palp is well developed and distinctly bilobed. The maxilla has the endite deeply cleft, the palp is well developed, the scaphognathite is large, but not very broad. All maxillipedes are provided with well developed exopods. The first maxillipede has the basis and coxa separated by a distinct notch, the palp is well developed, the exopod bears in the basal part a rather broad caridean lobe, and the epipod is large and distinctly bilobed. The second maxillipede is pediform, it has the last joint fused with the penultimate for its entire length. The exopod reaches distinctly beyond the endopod. A large epipod and a well developed podobranch are present at the base of the second maxillipede. The third maxillipede is slender, it is provided with an arthrobranch and a pleurobranch.

The first pereiopods are slender. The fingers are unarmed and provided with tufts of setae. The propodus bears in the proximal part of its lower margin some stiff posteriorly directed setae, which, together with some longer anteriorly directed setae of the anteroventral part of the carpus form an organ for cleaning purposes. The carpus is slender, it is longer than the chela. The second pereiopods are slender too, but they are more heavily built than the first pair. No teeth are present on the merus or carpus. The last three pairs of pereiopods are of similar construction mutually. The third pair is shortest, the fourth and fifth are longer and more slender. The dactylus is falcate and simple. The fifth pereiopod has the posterior margin provided in the distal part with some transverse rows of setae, while spinules generally are present on the posterior margin of the third, fourth and fifth pereiopods.

The pleopods are leaf-shaped. The endopod of the first pair is smaller than the exopod, in the male this endopod is ovate in shape and never bears a well developed appendix interna, in most species this appendix is entirely absent, only in *P. concinnus* a rudiment of it is visible. The second pleopods of the male are provided with an appendix interna as well as with an appendix masculina, all following pleopods only bear an appendix interna.

The uropods are elongate, they reach beyond the tip of the telson. The endopod is ovate in

shape. The exopod is broader, the outer margin of it is straight or slightly convex and ends in a distinct tooth, which at its inner side is provided with a slender movable spine. A row of setae is present along the lower side of the lateral margin of the exopod.

The genus *Palaemon* may be subdivided into four subgenera, which may be distinguished by the characters given in the key (p. 5).

Subgenus **Nematopalaemon** nov.

This new subgenus is very close to the subgenus *Exopalaemon* nov. It resembles that subgenus in the shape of the rostrum, which is very elongate and slender and bears an elevated basal crest of teeth on the upper margin. The differences between the two groups are very important and in my opinion justify their separation as distinct subgenera. In *Nematopalaemon* the branchiostegal groove is absent, the dactyli of the last three legs are unusually long and the stylocerite bears a dorsal tooth. In *Exopalaemon* the branchiostegal groove is present and visible as a distinct sharp line, the dactyli are normal in shape (only in *Palaemon* (*Exopalaemon*) *annandalei* the dactylus is almost as long as the propodus, but still is much shorter than in the species of *Nematopalaemon*), and the stylocerite has no dorsal tooth.

The name *Nematopalaemon* is given because of the threadlike last legs, which give the animals a superficial resemblance to the species of the genus *Nematocarcinus*.

Type of this subgenus is *Leander tenuipes* Henderson.

The subgenus consists of three species, one of which, *P. tenuipes,* occurs in the indo-west-pacific region, one, *P. hastatus,* is Westafrican and one, *P. schmitti,* is known from the northcoast of South America.

In the present collection only one species is represented:

Palaemon (*Nematopalaemon*) *tenuipes* (Henderson) (fig. 7)

Leander tenuipes Henderson, 1893, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 5, p. 440, pl. 40 figs. 14, 15.
Leander tenuipes Nobili, 1903, Boll. Mus. Zool. Anat. comp. Torino, vol. 18 n. 452, p. 7.
Leander tenuipes Kemp, 1917, Rec. Indian Mus., vol. 13, p. 206, pl. 8 fig. 1.
Leander tenuipes Kemp, 1917a, Rec. Indian Mus., vol. 13, p. 234, fig. a.
Leander tenuipes Kemp, 1925, Rec. Indian Mus., vol. 27, p. 289.
Palaemon luzonensis Blanco, 1939a, Philipp. Journ. Sci., vol. 67, p. 201, pl. 1.
Leander tenuipes Chopra, 1943, Indian Sci. Congr., vol. 30 pt. 2 sect. 6, p. 5.
? *Leander* aff. *tenuipes* Vatova, 1943, Thalassia, vol. 6 pt 2, p. 11, pl. 1 fig. 2.

Museum Amsterdam

Matlah River, Gangetic Delta; December, 1916; coll. J. G. de Man. — 3 specimens (2 of which ovigerous females) 64-68 mm.

The above specimens formed part of the material described by Kemp (1917) and were presented by the Indian Museum to the Dutch carcinologist Dr. J. G. de Man, after whose death the material was incorporated in the collection of the Zoological Museum at Amsterdam.

Kemp (1917) gives an excellent description and figures of the present form. The oral

parts of the species are figured here (fig. 7). In the specimens seen by me two pairs of spines are present on the dorsal surface of the telson and two pairs on the posterior margin. The anterior dorsal pair and the outer posterior pair, however, are extremely small, and therefore probably overlooked by K e m p, who only mentions one pair of dorsal and one of posterior spines.

The specimens described by B l a n c o (1939a) as a new species under the name *Palaemon luzonensis* undoubtedly belong to the present species, as is clearly shown by B l a n c o ' s description and good figures.

Vertical distribution: The species occurs in superficial coastal waters up to a depth of about 17 m; it lives in salt as well as in brackish waters. *Palaemon tenuipes* is of economic importance in the Gangetic delta (vid. K e m p, 1917, p. 203; Chopra, 1943, p. 5) as well as in Northern Luzon (vid. B l a n c o, 1939a, p. 201); vast numbers of specimens are caught and sold immediately or are dried and salted.

Fig. 7. *Palaemon* (*Nematopalaemon*) *tenuipes* (Henderson). a, mandible; b, maxillula; c, maxilla; d, first maxillipede; e, second maxillipede. a-e, × 14.

Horizontal distribution: The species is recorded in literature from: Juba, Italian Somaliland? (V a t o v a, 1943), Bombay (H e n d e r s o n, 1893; N o b i l i, 1903), Madras (H e n d e r s o n, 1893; K e m p, 1917), Tanda and near Vizagapatam, Madras Presidency (K e m p, 1917), Puri, Orissa Coast (K e m p, 1917), many localities in the Gangetic Delta (K e m p, 1917), Gulf of Martaban (H e n d e r s o n, 1893), mouths of Rangoon River, Moulmein River and Bassein River, Burma (K e m p, 1917), Green Island, Tennasserim (K e m p, 1917), mouth of Cagayan River, Northern Luzon (B l a n c o, 1939a), ? Lyttelton Harbour, New Zealand (K e m p, 1917).

Subgenus **Exopalaemon** nov.

As already pointed out under *Nematopalaemon,* the present subgenus is very closely related to the latter. The differences between the two groups have already been given (pp. 5, 44). K e m p

(1917) united these two subgenera and the genus *Leptocarpus* as "*Leander styliferus* and related species". *Leptocarpus* is excluded from the genus *Palaemon* in the present paper, while also the two other groups differ so much, that in my opinion they are distinct subgenera. *Palaemon annandalei* is more or less intermediate between *Nematopalaemon* and *Exopalaemon,* but distinctly shows more affinity to the latter subgenus.

The type of the present subgenus is *Palaemon styliferus* H. Milne Edwards.

At present 7 species of *Exopalaemon* are known, all seven ocurring in the indo-westpacific region. A key to the species of *Exopalaemon, Nematopalaemon* and *Leptocarpus* is given by Kemp (1917). This key also is included in Kemp's (1925) key to the species of the genus "*Leander*".

Palaemon (*Exopalaemon*) *annandalei* (Kemp)

Leander annandalei Kemp, 1917, Rec. Indian Mus., vol. 13, p. 211, figs. 1-4.
Leander annandalei Kemp, 1918a, Mem. Asiat. Soc. Bengal, vol. 6, p. 268.
Palaemon (Leander) annandalei Gee, 1925, Lingnaam agric. Rev., vol. 3, p. 158.
Leander annandalei Kemp, 1925, Rec. Indian Mus., vol. 27, p. 289.
Leander annandalei stylirostris Yu, 1930, Bull. Soc. zool. France, vol. 55, p. 460, figs. C, P.
Leander annandalei Yu, 1930, Bull. Soc. zool. France, vol. 55, p. 460, figs. CC, PP.
Leander Annandalei Yu, 1930a, Bull. Soc. zool. France, vol. 55, p. 554.
Leander Annandalei stylirostris Yu, 1930a, Bull. Soc. zool. France, vol. 55, pp. 554, 557.
Leander stylirostris Kubo, 1942, Journ. Imp. Fish. Inst. Tokyo, vol. 35, p. 66, figs. 19H, S, 20H, 21H, 22H, 23N, S, 27K, 28J, 29I, 31.

This species of which no material is at my disposal, is extensively described and figured by Kemp (1917). Yu (1930) described a new variety of this species as *Leander annandalei* var. *stylirostris,* which differs from the main form by that the rostrum is longer, and that the carpus of the first pereiopod is longer in relation to the chela. These differences, however, in all probability are due only to age. Of the 5 specimens mentioned by Yu, in which the rostrum is entire, two are 63 mm in length, one is 62 mm, one 59 and one 48 mm. Kemp's specimen measured about 33 mm. The relation between the length of the rostrum and carapace of the specimens from 59-63 mm in length ranges between 2 and 2.3, that of the specimen of 48 mm is 1.6 and that of Kemp's specimen is 1.2. In the four large specimens the relation between the length of the carpus and the chela of the first pereiopod ranges between 2.7 and 2.9, in the specimen of 48 mm it is 2.3, in Kemp's specimen of 33 mm it is 2.3 too. Yu's specimens therefore must be considered only to be older specimens of *Palaemon annandalei* and are not varietally distinct from it.

Vertical distribution: Kemp's specimen was collected in fresh water at a depth of 5.5 to 7.5 m.

Horizontal distribution: The species is recorded from: Guzan, Korea (Kubo, 1942), Tangkoo near Tientsin (Yu, 1930), Wangpoo River between Shanghai and Woosung (Kemp, 1917, 1918a).

Palaemon (*Exopalaemon*) *styliferus* H. Milne Edwards (fig. 8)

Palemon longirostris H. Milne Edwards, 1837, Hist. nat. Crust., vol. 2, p. 394 (non H. Milne Edwards, 1837, Hist. nat. Crust., vol. 2, p. 392).
Palemon styliferus H. Milne Edwards, 1840, Hist. nat. Crust., vol. 3, p. 638.
Leander longirostris Henderson, 1893, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 5, p. 439.

Leander longirostris Nobili, 1901c, Boll. Mus. Zool. Anat. comp. Torino, vol. 16 n. 397, p. 3.
Palaemon styliferus Rathbun, 1902b, Proc. U. S. Nat. Mus., vol. 26, p. 51.
Leander longirostris Nobili, 1903, Boll. Mus. Zool. Anat. comp. Torino, vol. 18 n. 452, p. 7.

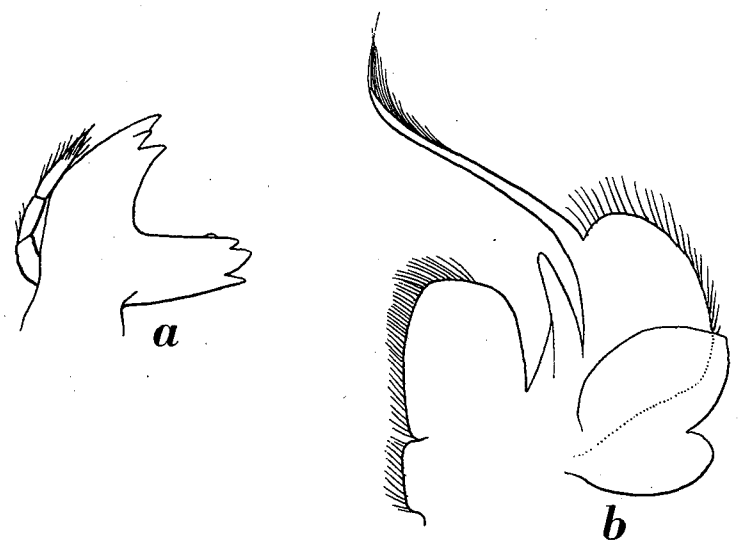

Fig. 8. *Palaemon* (*Exopalaemon*) *styliferus* H. Milne Edw. a, mandible; b, first maxillipede. a, b, × 14.

Leander sp. De Man, 1908, Rec. Indian Mus., vol. 2, p. 220, pl. 18 fig. 3.
Leander styliferus Kemp, 1915, Mem. Indian Mus., vol. 5, p. 273.
Leander styliferus Kemp, 1917, Rec. Indian Mus., vol. 13, p. 124, textfigs. 5, 6a, b, pl. 8 fig. 2.
Leander styliferus Kemp, 1917a, Rec. Indian Mus., vol. 13, p. 234.
Leander styliferus Kemp, 1925, Rec. Indian Mus., vol. 27, p. 289.
Leander styliferus Balss, 1930, Ergebn. Biol., vol. 6, p. 316.
Leander styliferus Rai, 1933, Journ. Bombay nat. Hist. Soc., vol. 36, p. 886.
Leander styliferus Panikkar, 1937, Journ. Bombay nat. Hist. Soc., vol. 39, p. 345.
Palaemon styliferus Suvatti, 1937, Check List aq. Fauna Siam, p. 50.
Leander styliferus Chopra, 1939, Journ. Bombay nat. Hist. Soc., vol. 41, p. 223, pl. 2 fig. 1.
Leander styliferus Chopra, 1943, Indian Sci. Congr., vol. 30 pt. 2 sect. 6, p. 5.

Museum Leiden

Batavia; 1896; leg. A. Vorderman. — 3 ovigerous females 78-92 mm.
Bay of Batavia; March, 1925; leg. P. Buitendijk. — 4 specimens 40-52 mm.
Off Semarang, northcoast of Central Java; April, 1911; leg. P. Buitendijk. — 1 specimen 40 mm.

Museum Amsterdam

Dhappa near Calcutta; slightly brackish water; coll. J. G. de Man. — 6 juvenile specimens 14-16 mm.

The oral parts of *Palaemon styliferus* show no important differences from those of *Palaemon tenuipes*. The mandible (fig. 8a) is somewhat stouter in shape. The palps of the maxillula, maxilla and first maxillipede show no hairs, but these may be worn off. Furthermore the upper lobe of the epipod of the first maxillipede (fig. 8b) is more rounded.

The specimens from the Leiden Museum, which were inserted in the collection under the

name "*Leander longirostris,* Say" agree in all respects with Kemp's (1917) description and figures.

The specimens from the Amsterdam Museum belong to those described by De Man (1908) as *Leander* sp.

Vertical distribution: The species lives in shallow coastal waters, salt as well as brackish; Kemp (1917) records it also from fresh water.

Horizontal distribution: Karachi (Henderson, 1893; Rathbun, 1902b), Keti, near Karachi (Kemp, 1917), Bombay (Nobili, 1903; Kemp, 1917; Rai, 1933), Malabar Coast (Panikkar, 1937), Chilka Lake, Orissa Coast (Kemp, 1915, 1917), Gangetic Delta (H. Milne Edwards, 1837; Kemp, 1917), Sunderbunds, Gangetic Delta (Henderson, 1893), Dhappa near Calcutta (De Man, 1908), Chittagong (Kemp, 1917), Gulf of Martaban (Henderson, 1893), mouths of Yé River and Rangoon River, Burma (Kemp, 1917), Rangoon (Kemp, 1917), Haingyi Island and Green Island, Tennasserim (Kemp, 1917), Mergui Archipelago (Henderson, 1893; Kemp, 1917), near Paknam, Siam (Suvatti, 1937), Bang-pa-Kong River and Bang-pla-soi, Siam (Suvatti, 1937), Singgora, Siamese Malay States (Suvatti, 1937), Pulu Burong, Sarawak (Nobili, 1901c). The species is now recorded for the second time from the Malay Archipelago.

Palaemon (*Exopalaemon*) *carinicauda* nom. nov. (fig. 9)

Leander longirostris carinatus Ortmann, 1890, Zool. Jb. Syst., vol. 5, p. 521.
Leander carinatus Doflein, 1902, Abh. Bayer. Akad. Wiss., vol. 21, p. 639, pl. 3 fig. 8.
Leander styliferus carinatus Balss, 1914, Abh. Bayer. Akad. Wiss., suppl. vol. 2 pt. 10, p. 57.
Leander carinatus Kemp, 1917, Rec. Indian Mus., vol. 13, p. 219, figs. 6c, d.
Leander carinatus Parisi, 1919, Atti Soc. Ital. Sci. nat., vol. 58, p. 77, pl. 4 fig. 3, pl. 6 figs. 8, 9.
Palaemon (*Leander*) *carinatus* Gee, 1925, Lingnaam agric. Rev., vol. 3, p. 158.
Leander carinatus Kemp, 1925, Rec. Indian Mus., vol. 27, p. 289.
Palaemon carinatus Sowerby, 1925, Nat. Note-Book in China, p. 133.
Leander carinatus Urita, 1926, Dobuts. Zasshi, vol. 38, p. 428.
Leander carinatus Yu, 1930a, Bull. Soc. zool. France, vol. 55, p. 556.
Leander carinatus Yoshida, 1941, Bull. Fish. Exper. Sta. Tyôsen, n. 7, p. 28, pl. 7 fig. 2.
Leander carinatus Kubo, 1942, Journ. Imp. Fish. Inst. Tokyo, vol. 35, p. 62, figs. 14C, 16B, 17, 18, 19K, V, 20M, 21K, 22L, 23Q, V, 24K, V, 25M, M', 26 M, W, 27I, T, 28I, R, 29K, 33.

Museum Leiden

Hongkong; June 5, 1917; leg. P. Buitendijk. — 1 specimen 71 mm.

The specimen agrees in all respects with Kemp's (1917) description. The rostrum in my specimen is undamaged, it bears one subapical dorsal tooth. The palm shows a distinct groove on the dorsal surface, as is already described by Parisi (1919); this groove, however, only is visible when the chela is taken out of the spirit and is superficially dried. The mandible has the palp three-jointed as in the other species of the present subgenus, but the division between the first and second joint is not very distinct. The maxillula possesses a spine near the tip of the lower lobe of the palp. The maxilla does not differ in shape from that of *P. tenuipes.* Also the first maxillipede (fig. 9a) resembles that of *P. tenuipes,* only the upper lobe of the epipod is more rounded. The second maxillipede is typical in shape. The first pleopod of the male is figured here (fig. 9b).

The present form first was described as new under the name *Leander longirostris carinatus* Ortmann (1890). Afterwards it is generally considered to be a distinct species. Its name at present should have to be *Palaemon carinatus* (Ortmann, 1890), this name, however, is preoccupied by the

name *Palaemon carinatus* Olivier (1811). A new name therefore is needed, for which I propose *Palaemon* (*Exopalaemon*) *carinicauda* nom. nov.

Vertical distribution: *Palaemon carinicauda* is a form of superficial, probably brackish, waters.

Horizontal distribution: The species is recorded in literature from: Korea (Yoshida, 1941; Kubo, 1942), China (Ortmann, 1890), N. China (Sowerby, 1925), Chingwangtao (Yu, 1930a), Peitaiho (Yu, 1930a), Tientsin (Yu, 1930a), Tsingtao (Doflein, 1902; Balss, 1914; Urita, 1926; Yu, 1930a), Pai-chii (Yu, 1930a), Chung-ming (Yu, 1930a), Shanghai (Parisi,

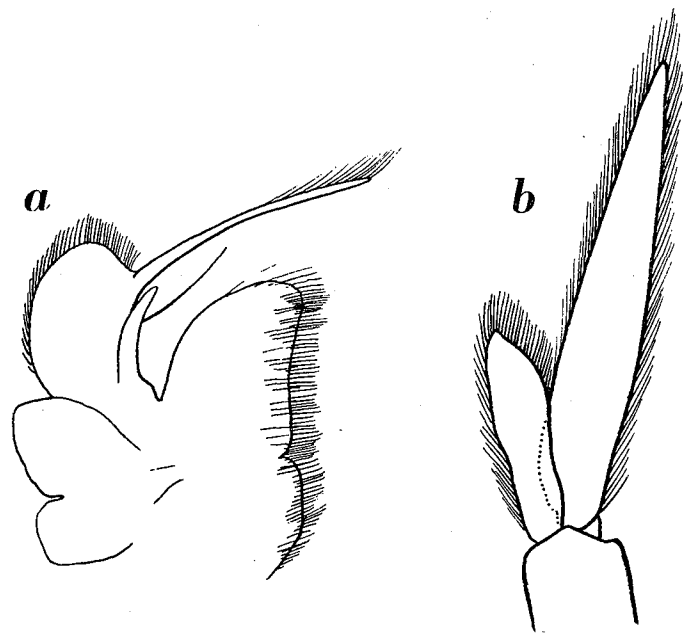

Fig. 9. *Palaemon* (*Exopalaemon*) *carinicauda* nom. nov. a, first maxillipede; b, first pleopod of male. a, b, × 14.

1919; Yu, 1930a), Ningpo (Kemp, 1917), Southern China (Parisi, 1919), Singapore (Balss, 1914). Hongkong, from which locality the specimen of the Leiden Museum originates, is the southernmost locality from which the species is known, since according to Kemp (1917), Balss's record from Singapore is doubtful.

Palaemon (*Exopalaemon*) *orientis* nom. nov.

Leander longirostris japonicus Ortmann, 1890, Zool. Jb. Syst., vol. 5, p. 519, pl. 37 fig. 14.
Leander longirostris japonicus Doflein, 1902, Abh. Bayer. Akad. Wiss., vol. 21, p. 639.
Palaemon japonicus Rathbun, 1902b, Proc. U. S. Nat. Mus., vol. 26, p. 50 (non De Haan, 1841).
Leander japonicus Balss, 1914, Abh. Bayer. Akad. Wiss., suppl. vol. 2 pt. 10, p. 58.
Leander japonicus Kemp, 1917, Rec. Indian Mus., vol. 13, p. 205, 221 (footnote).
Leander japonicus Parisi, 1919, Atti Soc. Ital. Sci. nat., vol. 58, p. 77, pl. 6 fig. 10.
Palaemon japonicus Urita, 1921, Dobuts. Zasshi, vol. 33, pp. 214-220.
Palaemon japonicus Maki & Tsuchiya, 1923, Rep. Dept. Agric. Formosa, vol. 3, p. 53, pl. 2 fig. 4.
Palaemon (*Leander*) *japonicus* Gee, 1925, Lingnaam agric. Rev., vol. 3, p. 158.
Leander japonicus Kemp, 1925, Rec. Indian Mus., vol. 27, p. 289.
Palaemon japonicus Sowerby, 1925, Nat. Note-Book China, p. 133.
Palaemon (*Leander*) *japonicus* Kellogg, 1929, Lingnan Journ. Sci., vol. 5, p. 352.
Leander japonicus Yu, 1930a, Bull. Soc. zool. France, vol. 55, p. 553.
Leander japonicus Kubo, 1937, Bull. Japan. Soc. sci. Fish, vol. 5, p. 346, figs. 2 K, 2 L, 3 R, 3 S.

Leander japonicus Yoshida, 1941, Bull. Fish. Exper. Sta. Tyôsen, n. 7, p. 28, pl. 7 fig. 1.
Leander japonicus Kubo, 1942, Journ. Imp. Fish. Inst. Tokyo, vol. 35, p. 57, figs. 14A, B, 15, 16C, 17, 19J, U, 20L, 21L, 22K, 23P, U, 24J, U, 25L, L', 26L, V, 27J, U, 28H, S, 29J, 33.

As already shown by Rathbun (1902b) the present species belongs in the genus *Palaemon* Fabr., therefore its name accordingly should become *Palaemon japonicus*; this name, which is used by Rathbun and some other authors, is, however, preoccupied by the much older name *Palaemon japonicus* De Haan (1849) for the species known at present as *Macrobrachium japonicum* (De Haan). As thus the name *japonicus* may not be used for the present species and no other specific name is available, a new name is needed, for which I propose the name *Palaemon orientis* nom. nov.

The present species is very insufficiently known, the original description is very short and illustrated by a rather poor figure. Rathbun (1902b) gives some additional details, one of which, however, is in contradiction with Ortmann's description. Rathbun (p. 51) namely states: "*P. japonicus* has no dorsal spines on the rostrum except at the base, while *P. styliferus* has 2 or 3 on the terminal half". Ortmann's description of the rostrum runs as follows: "Der aufwärts gebogene Theil oben ganz zahnlos, nur dicht vor der Spitze findet sich oft ein winziger Zahn", in the accompanying figure this subapical tooth is distinctly visible. Either Rathbun's specimens do not belong to the species of Ortmann, or the character of the presence or absence of the subapical tooth is variable in the present species. Of the later authors only Parisi (1919) gives a good figure of the second pereiopod, which differs rather much from Ortmann's figure. A good description of the species thus is badly needed, and examination of the material examined by the various authors perhaps will prove that the specimens, brought by them to the present species, belong to different forms.

Horizontal distribution: The species is recorded in literature from Japan, China and Formosa. These records are: Japan: ? Hakodate, Hokkaido (Doflein, 1902), Matsushima near Sendai, Hondo (Rathbun, 1902b), Tokyo Bay (Ortmann, 1890; Balss, 1914), Fukugawa, Tokyo (Kubo, 1942), Enoshima, Sagami Bay (Rathbun, 1902b), Lake Hamana and Yosida (Kubo, 1942), Tsu (Balss, 1914), Fukuyama, Hondo (Kubo, 1942), Kawatana and Nagasaki, Kyushyu (Rathbun, 1902b). Korea (Yoshida, 1941; Kubo, 1942). China: Tsingtao (Urita, 1921), Hankow (Balss, 1914; Kellogg, 1929), Foochow (Gee, 1925; Kellogg, 1929), Fukien (Gee, 1925). Formosa: Formosa (Maki & Tsuchiya, 1923), Tamsui (Parisi, 1919), Takao (Balss, 1914).

Palaemon (Exopalaemon) macrogenitus (Yu)

Leander macrogenitus Yu, 1930a, Bull. Soc. zool. France, vol. 55, p. 559, fig. 1.

Yu (1930) gave the following differences between this and the next species:

1. The fingers of the second leg in *P. macrogenitus* are as long as the palm, while in *P. modestus* they are longer than the palm.

2. In *P. macrogenitus* the first two teeth of the upper margin of the rostrum are placed behind the posterior limit of the orbit, in *P. modestus* there should be only one tooth behind the orbital margin.

3. The ovae of *P. macrogenitus* are larger than those of *P. modestus.*

The first of the above differences between the two species is very small, so that it hardly can be considered to be of specific value, the relation between the length of the fingers and that of the palm in *P. macrogenitus* according to Yu is 1, while that relation in *P. modestus,* according to

Kemp (1917) varies between 1.1 and 1.2. The second character too is of no importance since Kemp (1917) remarks that in *P. modestus* of the teeth of the upper margin of the rostrum "one or two are situated on the carapace behind the orbit". As Yu gives measurements of the ovae of neither *P. macrogenitus* nor of those of *P. modestus,* one can form no opinion about the importance of this character. I think it very probable, that if no other differences are found, the species have to be fused, the more as *Palaemon macrogenitus* is known only from one specimen, which is collected at Hangchow, a locality from where *P. modestus* is recorded too and which is situated in the centre of the range of distribution of that species. Kubo (1942) synonymizes the two forms.

Palaemon (*Exopalaemon*) *modestus* (Heller) (fig. 10)

Leander modestus Heller, 1862a, Verh. zool.-bot. Ges. Wien, vol. 12, p. 527.
Leander modestus Heller, 1865, Reise Novara, vol. 2 pt. 3, p. 111, pl. 10 fig. 6.
Leander spec. Czerniavsky, 1878, Trav. Soc. Nat. Petersb., 1878, p. 23.
non *Leander modestus* Henderson, 1893, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 5, p. 441.
Leander czerniavskyi Brashnikov, 1907, Mem. Acad. Sci. Petersb., ser. 8 vol. 20 pt. 6, p. 176.
Leander modestus var. *sibirica* (Czerniavsky MSS) Brashnikov, 1907, Mem. Acad. Sci. Petersb., ser. 8 vol. 20 pt. 6, p. 176.
Leander modestus Kemp, 1917, Rec. Indian Mus., vol. 13, p. 221, pl. 9 fig. 1.
Leander modestus Kemp, 1918a, Mem. Asiat. Soc. Bengal, vol. 6, p. 268.
Palaemon (*Leander*) *modestus* Gee, 1925, Lingnaam agric. Rev., vol. 3, p. 158.
Leander modestus Kemp, 1925, Rec. Indian Mus., vol. 27, p. 289.
Palaemon modestus Sowerby, 1925, Nat. Note-Book in China, p. 133.
Leander czerniavskyi Derjavin, 1930, Hydrobiol. Zeitschr. biol. Wolga Sta., vol. 9, p. 2.
Leander modestus Yu, 1930a, Bull. Soc. zool. France, vol. 55, p. 558.
Leander modestus Ping, 1932, Peking nat. Hist. Bull., vol. 7, p. 169.
Leander czerniavskyi Buldovsky, 1933, Bull. Far East. Br. Acad. Sci. U.S.S.R., 1933, p. 47, pl. 2 figs., 18, 19, 22.
Leander czerniavskyi lacustris Buldovsky, 1933, Bull. Far East. Br. Acad. Sci. U.S.S.R., 1933, p. 47, pl. 2 figs. 21, 23.
Leander czerniavskyi Birstein & Vinogradov, 1934, Zool. Journ. Moscow, vol. 13, p. 44, figs. 2 A, B.
Leander modestus Birstein & Vinogradov, 1934, Zool. Journ. Moscow, vol. 13, p. 44, figs. 2 C, D.
Leander modestus Uéno, 1935, Trans. nat. Hist. Soc. Formosa, vol. 25, p. 274, figs. 3, 4.
Leander modestus Birstein, 1939, Zool. Journ. Moscow, vol. 18, p. 61.
Leander modestus Kubo, 1940d, Kantôsyu oyobi Mansyûkoku Rikusui, p. 271, figs. 1, 2.
Leander modestus Birstein, 1941, Life Freshw. U.S.S.R., vol. 1, p. 424, pl. 222 fig. 10.
Leander modestus Kubo, 1942, Journ. Imp. Fish. Inst. Tokyo, vol. 35, p. 55, figs. 16A, 19I, T, 20K, 21M, 22M, 23O, T, 24I, T, 25H, H', 26K, U, 27H, S, 28G, Q, 29H, 32.

Museum Leiden

Ahan, South Formosa; December 1-10, 1907; leg. H. Sauter (n. 16953). — 1 juvenile specimen 25 mm.

Museum Amsterdam

Tai Hu, Kiangsu Province, China; December, 1915; leg. N. Annandale; coll. J. G. de Man. — 3 specimens 45-56 mm.
Marsh near Tientsin, China; May, 1909; leg. A. Hüllmann. — 1 specimen 58 mm.

As the present species has to be placed in the genus *Palaemon* its name becomes *Palaemon modestus* (Heller). De Man (1892) described a species of *Macrobrachium* under the name

Palaemon modestus. As the name *modestus* of Heller (1862a) is older than that of De Man, the latter has to be changed. It is named here (vid. p. 198) *Macrobrachium sophronicum* nom. nov.

Leander czerniavskyi Brashnikov (1907) is identical with the present species. I give here a translation of Brashnikov's Russian description of *Leander czerniavskyi*. For this translation I am much indebted to Mr. A. Kroonenberg.

"The carapace has the dorsal keel starting about at the middle of its length, in the beginning this keel is hardly noticeably curved at all, but almost immediately behind the orbit the keel is elevated to a rather high crest, which continues into the lamella of the rostrum. The midrib of the rostrum is strong and straight (in larger specimens it sometimes it slightly curved upwards) and reaches in situ to the end of the scaphocerite, sometimes, however, it reaches beyond the scaphocerite. The anterior third (sometimes less) of the midrib of the rostrum is deprived of the upper and lower lamellae as well as of teeth. The rostral formula runs as follows:

$$1+\frac{6-10}{1-5}+1$$

The peduncles of the antennulae reach almost the tip of the final tooth of the scaphocerite, their two flagella, which have the 6 lower joints fused, are unequal in length; the external flagellum is almost twice as long as the internal, the latter being hardly longer than the rostrum, the former being about as long as the thick flagellum (= antennal flagellum); the free part of the shorter, slender, flagellum consists of 13 to 15 joints. The apex of the antennal peduncle reaches about to the middle of the outer margin of the scaphocerite. The tip of the third maxillipede reaches about to the end of the antennal peduncle. The first pereiopods in situ are longer than the third maxillipedes and reach the end of the antennulae. The second pereiopods are more robust and longer, they reach beyond the final tooth of the scaphocerite (with less than the length of their fingers); the hand is somewhat thickened when compared with the carpus, and is distinctly longer than the latter (with about $^1/_3$ of its length). The length of the fingers is somewhat more than half the full length of the chela. The third to fifth pereiopods are slender and almost naked; the fifth pereiopods in situ reach almost to the tip of the final tooth of the scaphocerite. The telson is distinctly shorter than the uropods; two to three pairs of spines are present on the lateral margins."

Brashnikov himself already pointed to the close relationship between the two forms and justified the erection of a new species for his specimens mainly on the fact that they were collected in localities geographically far distant and climatologically strongly different from that of Heller's specimen. According to Brashnikov the description of Heller is too short to bring final certainty in the matter of the identity or distinctness of the two forms. Kemp (1917) gives a detailed description and a good figure of *"Leander" modestus* from Shanghai (the typelocality of the species), while Birstein & Vinogradov (1934) give figures of Brashnikov's type-specimens. Comparison of Kemp's description and figure with the description and figures of Brashnikov's specimens distinctly shows that the two forms are identical. Apart from the specimens identified as *Leander czerniavskyi*, Birstein & Vinogradov (1934) also mentioned specimens under the name *Leander modestus*. These specimens differ from the *L. modestus* of Kemp by having the rostrum shorter and the telson more blunt. According to Kemp the character of the length of the rostrum is variable with age, the young specimens possess "a shorter rostrum, often not

reaching beyond the end of the antennular peduncle." In his 1939 paper Birstein also comes to the conclusion that *L. czerniavskyi* and *L. modestus* are identical. The difference in the shape of the rostrum and the telson of the *L. modestus* and *L. czerniavskyi* specimens of Birstein and Vinogradov (1934), according to Birstein (1939) are due to ecological factors only: "This species shows a large variability, due to ecological factors, which is especially distinctly shown in the shape and armament of the rostrum and the shape of the apex of the telson: the typical form, with the short straight rostrum and the blunt telson, lives in calmly flowing water, in stagnant water lives the form with the elongate upwards curved rostrum, acute telson and longer antennae and pereiopods. It is this latter form, which is described and figured by Kemp from near Shanghai as the typical *L. modestus,* while he ascribes the characters of the first form to juvenile specimens (15-25 mm)" [1]). Further Birstein (1939) points out that Buldovsky's *Leander czerniavskyi* ssp. *lacustris* is identical with the form from stagnant water.

In his paper on freshwater Decapoda from Formosa Uéno (1927) gave the following account of *Leander modestus* [2]):

"I found four specimens at Uzanto, and one specimen at Zitugetutan. The material is insufficient for dealing with the mutual variations; we may note, however, some differences with the typical *Leander modestus.* As first difference must be mentioned the fact that the apex of the rostrum is extremely short (fig. 3A), as is clearly shown by comparison with the rostrum of *L. modestus* from the Tai Lake in China (fig. 4). Kemp (1917, p. 223) states that the rostra of young specimens are short, but one of the specimens from Uzanto certainly is no juvenile specimen, as it, though being very small (24 mm), is provided with ova. The number of teeth on the dorsal margin of the rostrum is 5 to 8 (in one specimen 10), 2 to 3 of which are placed behind the anterior margin of the carapace. The number of teeth on the lower margin of the rostrum is 3 (Kemp states 2-4), the specimen from Zitugetutan, however, differs from the rest in having only one ventral tooth. The tip of the rostrum is very acute and never possesses, as may be observed in *C.* [*aridina*] *nilotica,* small subapical teeth. The carpus of the first leg is somewhat longer than the merus and slightly shorter than twice the length of the propodus (fig. 3B). According to Kemp's description the carpus is somewhat longer than twice the length of the propodus. The propodus of the second leg is about as long as the carpus (fig. 3C). The third to fifth pereiopods are very long and narrow, the third leg being shortest. The propodus of the third leg is about 1.5 times as long as the carpus and slightly shorter than in Kemp's specimen, the dactylus is as long as the carpus. The dactylus of the fifth pereiopod is about as long as or slightly shorter than the carpus, the latter being slightly longer than half the propodus. This relation between the lengths of the various joints differs from those of Kemp's specimen, especially the short propodus is noteworthy.

The various differences mentioned, especially the shape of the rostrum, the relation between the lengths of the joints of the legs etc. give the impression that it should be justified to separate the specimens from Formosa and to place them in a new species. The decision over this question, however, better may be postponed till a large number of specimens can be examined.

The specimens of *L. modestus* from the Tai Lake, China, which are used for comparison, have been collected by the teacher Kawamurada Saneji in December, 1917 and are preserved

---

1) The translation of this part of Birstein's article (1939, p. 61) I owe to Mr. A. Kroonenberg.
2) I am much indebted to Miss M. Snellen for the translation of this Japanese text.

at the Limnological laboratory at Otsu. The length of the specimens is 30-47 mm, generally 38-42 mm, thus being much larger than those from Formosa. The number of teeth on the rostrum is about as follows:

Table 3. *Leander modestus* (from the Tai Lake, China): the number of teeth on the rostrum

Number of dorsal teeth	number of specimens	number of ventral teeth	number of specimens
11	3	4	10
10	10	3	12
9	10	2	5
	5		

Commonly the teeth on the ventral margin are placed somewhat before the extreme tooth of the dorsal margin (fig. 4A) and Kemp's (1917, pl. 9 fig. 1) figure is in agreement herewith. Some, however, as is shown in figure 4 B, are placed far posteriorly."

My specimen from Formosa, a non-ovigerous female, agrees good with the characters mentioned by Uéno. The differences in the relation between the lengths of the joints of the pereiopods of this specimen and of the typical *P. modestus* are, however, extremely small. Here in all probability the differences also may be due to ecological factors (and perhaps to difference in age).

The Chinese specimens at my disposal entirely agree with Kemp's description. The specimens from Shanghai even formed part of the material on which Kemp based his description.

The oral parts of the present species closely resemble those of *P. tenuipes*. The first maxillipede

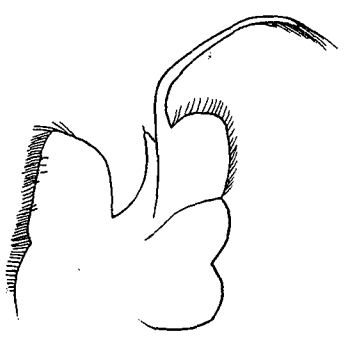

Fig. 10. *Palaemon* (*Exopalaemon*) *modestus* (Heller). First maxillipede. × 14.

(fig. 10) is figured here for comparison with Sollaud's (1914) figure of that appendage of *Palaemon mani* and with that of Yu (1930) of *Palaemon macrogenitus*. In my opinion one may not attach too much value to the shape of the epipod of the first maxillipedes, as it is membranaceous and therefore easily deformable.

As already remarked by Kemp (1918a) the specimens brought by Henderson (1893) to the present species in reality belong to *Palaemon semmelinkii* (De Man).

Vertical distribution: The species lives in shallow (5.5-7.5 m) fresh water.

Horizontal distribution: The species is recorded in literature from the following localities: Upper Tungush River, Amur basin (Czerniavsky, 1878; Brashnikov, 1907), mouth of the Amur River (Brashnikov, 1907; Birstein & Vinogradov, 1934), Tyr on the Amur River (Brashnikov, 1907), Khanka Lake, Ussur Province (Derjavin, 1930; Buldovsky, 1933; Birstein & Vinogradov, 1934; Kubo, 1940d), Daubicha, Ussur basin (Birstein &

Vinogradov, 1934), Suifun basin near Vladivostoc (Derjavin, 1930; Birstein, 1939), Daila Nor, Manchuria (Kubo, 1940d), Harbin, Manchuria and Rakutôkô River, Korea (Kubo, 1942), Pai-chii, China [1]) (Yu, 1930a), Shanghai, Kiangsu province (Heller, 1862a, 1865), Whangpoo River near Shanghai, Kiangsu province (Kemp, 1917, 1918a), Taihu Lake, Kiangsu province (Kemp, 1917, 1918a; Uéno, 1935), Soochow, Kiangsu province (Yu, 1930a), Hangchow, Chekiang province (Yu, 1930a), Yochow, Hunan province (Ping, 1932; Kubo, 1942), Fukien province (Sowerby, 1925), Ihing [1]) and Kinkiang [1]) (Yu, 1930a), Formosa (Uéno, 1935). Both Czerniavsky and Brashnikov thought the type specimens of *Leander czerniavskyi* to orginate from the Upper Tungush river in Central Siberia, but as Birstein (1939) pointed out, they certainly come from the Tungush river in eastern Siberia, which is a tributary of the Amur river.

Subgenus **Palaeander** nov.

The present new subgenus closely resembles *Palaemon* s.s., but differs from it by having the mandibular palp two-jointed instead of three-jointed, a character which shows to be very constant and in other groups often is of generic value. In the present case the difference only may be considered to be of subgeneric value as it is not accompanied by other differences. Five species at present are known to belong to the present subgenus, these species are: *Palaemon elegans* Rathke (the type of the subgenus), *Palaemon semmelinkii* (De Man), *Palaemon floridanus* Chace, *Palaemon maculatus* (Thallw.) and *Palaemon northropi* (Rankin).

Only *Palaemon semmelinkii* is represented in the collection at hand, but *P. elegans,* though being a European species, is dealt with here too.

Palaemon (*Palaeander*) *elegans* Rathke, 1837

No references are given here, as a complete synonymy of the present species would fall out of the scope of the present paper.

Palaemon elegans Rathke in modern carcinological literature is better known under the name *Palaemon* (or *Leander*) *squilla.* The species described by Linnaeus (1758) as *Cancer Squilla,* however, is not identical with the present form but with the species best known as *Palaemon* (or *Leander*) *adspersus* Rathke. Linnaeus namely gives the following description of his *Cancer Squilla*:

"C.[ancer] macrourus, thorace lævi, rostro supra serrato subtus tridentato, manuum digitis aequalibus. *Fn. svec.* 1252.

Matth. diosc. 229. *Rond. pisc.* 549.

Klein. dub. 35. *f. A.*

Habitat in M. Balthico, *Oceano* Europæo."

Linnaeus's definition fits for *Leander squilla* auctt. as well as for *Leander adspersus,* but the references to literature and the distribution show the real identity of Linnaeus's species. In Fauna Suecica (Linnaeus, 1746) the description though somewhat more extensive than in Systema Naturae, gives no further decisive characters: "Rostrum lanceolatum, perpendiculare, acutum, supra octo crenis, infra tribus serratum; manus, quae tertio pedum pari insident, digitis sunt aequalibus."

1) The exact situation of this locality is unknown to me.

But the indication "Habitat in mari *Balthico*" excludes the possibility that this form is identical with *Leander squilla* auctt., as the latter does not occur in the Baltic Sea. Matthioli (1565) gives three good figures of his "Squilla", which, by the fact that only the first tooth of the rostrum is situated on the carapace behind the orbit and by having long and slender fingers at the chela of the second legs, distinctly must belong to *Leander adspersus* and not to *Leander squilla* auctt., as the latter has the first three teeth of the rostrum placed behind he orbit and has the fingers of the chela of the second legs very short. Klein's (1754) *Squilla fusca,* which was collected at Danzig, only can be *Leander adspersus,* as *Leander squilla* auctt. does not occur there. Klein's figure of *Squilla fusca* is very poor. Rondelet's (1554) *Squilla gibba* is a species incerta, the description as well as the figure are insufficient to make the identity of the species certain; it might be *Palaemon serratus.* Because the species recognizable from the references all are *Leander adspersus* and as Linnaeus mentions in his description for *Cancer Squilla* "*Habitat in M.* Balthico" and as *Leander squilla* auctt. does not occur in the Baltic, we only can come to the conclusion that *Cancer Squilla* is identical with *Leander adspersus.*

According to Balss (1926) and Schellenberg (1928) *Leander squilla* auctt. has been found in the western Baltic Sea as far as Rügen and the Danzig Bight. These statements, however, are incorrect. They are based on the records of Möbius and Seligo, who both do not separate *Leander squilla* auctt. and *Leander adspersus.* Zaddach (1844) described the only species of *Palaemon* occurring at Danzig as *Palaemon rectirostris,* which later is recognized to be identical with *Leander adspersus.* Important also is a footnote in the paper of Ehrenbaum (1898, p. 107), in which he reviews Mortensen's paper on the larval development of *Palaemon Fabricii* (= *Leander adspersus*): "Auf meine Bitte theilt mir Herr Prof. Brandt-Kiel, freundlichst mit, dass bezüglich der Benennung der Palaemoniden der westlichen Ostsee offenbare Verwirrung herrscht. Was die dänischen Forscher Meinert und Mortensen *Palaemon Fabricii Rathke* nennen, ist früher von Moebius — vermuthlich irrthümlich — als *Palaemon squilla L.* gedeutet worden, müsste aber unter Berücksichtigung der Priorität, wie Ortmann feststellt (Spengels zoolog. Jahrb. Abth. f. Systematik V. 1891 S. 512 und 524), wahrscheinlich richtiger bezeichnet werden als *Leander adspersus Rathke.* Garneelen von Kiel und Kappel, die in neuerer Zeit von Brandt, Dahl, Vanhöffen und auch von Ortmann untersucht wurden, sind sicher keine *squilla*, sondern entsprechen vollkommen der Diagnose von Ortmann für *Leander adspersus.* Professor Brandt bezweifelt, das *Palaemon squilla L.* überhaupt südlich von den Belten vorkomt; im Kattegat ist dieselbe jedoch nach Meinerts Angabe vorhanden. Demnach wird die Garneele der westlichen Ostsee und auch der dänischen Gewässer am richtigsten mit dem wissenschaftlichen Namen *Leander adspersus Rathke* bezeichnet." Entirely agreeing with this statement is the record of Lagerberg (1908) that *Leander squilla* auctt. occurs along the Swedish coast from Bohuslån to Skåne, thus only at the westcoast, while *Leander adspersus* is found as well on the westcoast as on the eastcoast; on the eastcoast it is found as far northward as Stockholm.

As *Cancer Squilla* L. is identical with *Palaemon adspersus* Rathke, that species has to bear the name *Palaemon squilla* (L.), while the species known best as *Leander squilla* must be named *Palaemon elegans* Rathke.

The fact that the specific name *squilla* generally is given to the wrong species probably is due to the fact that Leach in his Podophthalmia Britannica gave a very good figure of *P. elegans,* which he named *P. squilla.* As Leach's work at that time was a standardwork, he is followed in this error

by numerous other authors, among which Bell (1844-1853) in his highly important work on the British stalk-eyed Crustacea and De Man (1915a) in his revision of the European species of the genus *Leander*.

In 1875 Paulson described a new species of *Palaemonella, P. gracilis,* from the Red Sea. His species, however, does not belong to the Pontoniinae but to the Palaemoninae as is shown by the presence of two pairs of spines and one pair of feathered setae at the posterior margin of the telson and by the presence of a branchiostegal and the absence of a hepatic spine. Paulson's species in all respects agrees with *Palaemon elegans* Rathke, it possesses a two-jointed mandibular palp, there are three teeth of the upper margin of the rostrum situated behind the orbit, the shape of the rostrum also closely resembles that of Rathke's species, furthermore the position of the branchiostegal spine, the fact that the shorter ramus of the upper antennular flagellum is fused with the longer ramus for the larger part of its length, and the short fingers of the second legs all are exactly as in *Palaemon elegans*. *Palaemonella gracilis* therefore must be considered a synonym of that species. As *Palaemon elegans* is not known from the indo-westpacific region, it is possible that Paulson's specimen was incorrectly labelled.

De Man (1915a) divided the present species into three forms, namely the typical form and the varieties *intermedia* De Man and *elegans* Rathke. The differences between these forms are so insignificant and the characters upon which the differences are based vary so much in my material, that I can not attach to them any value for separating even varieties.

Palaemon (Palaeander) semmelinkii (De Man) (fig. 11)

Leander semmelinkii De Man, 1881, Notes Leyden Mus., vol. 3, p. 137.
Leander semmelinkii Ortmann, 1890, Zool. Jb. Syst., vol. 5, p. 517.
Leander modestus Henderson, 1893, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 5, p. 441 (non Heller, 1862).
Leander Semmelinkii Nobili, 1903a, Boll. Mus. Zool. Anat. comp. Torino, vol. 18 n. 455, p. 8.
non ? *Leander Semmelinkii* Nobili, 1905a, Ann. Mus. nat. Hung., vol. 3, p. 482.
Leander semmelinki Kemp, 1918a, Mem. Asiat. Soc. Bengal, vol. 6, p. 268.
Leander semmelinki Kemp, 1925, Rec. Indian Mus., vol. 27, p. 304.

Snellius Expedition

Kambang; shore and reef; November 26-28, 1929. — 2 specimens (1 ovigerous female) 37 & 41 mm.

Museum Leiden

Off Makassar; 1881; leg. J. Semmelink (cotypes). — 48 specimens (included ovigerous females) 23-38 mm.
Makassar; January, 1880; leg. J. Semmelink. — 3 specimens 31-32 mm.
Belawan Deli, eastcoast of Sumatra; November 1926; leg. P. Buitendijk. — 15 specimens (included 2 ovigerous females) 24-35 mm.
Northcoast of Java near Tandjong Priok; 1906; leg. P. Buitendijk. — 1 specimen 29 mm.
Tandjong Priok, near Batavia; May, 1924; leg. P. Buitendijk. — 9 specimens (included ovigerous females) 22-33 mm.
Mangroves near Antjol, coast near Batavia; July 15, 1938; leg. F. P. Koumans. — 1 specimen 27 mm.
Fishpond near the Laboratorium voor Onderzoek der Zee (Laboratory for Marine Investigations), Batavia; July 18, 1938; leg. F. P. Koumans. — 1 specimen 41 mm.

Museum Amsterdam

Off Makassar; 1881; leg. J. Semmelink (cotypes). — 2 specimens (1 ovigerous female) 25 & 36 mm.

Description: The rostrum (figs. 11a, b) is straight, with the tip curved upwards, it reaches with 1/5 to 1/3 of its length (1/3 to almost 1/2 in the males) beyond the scaphocerite. The upper margin is provided with 7 to 11 (mostly 8 or 9) teeth; the first of these teeth is placed on the carapace behind the orbit, it is more remote from the second tooth than the third is, the second tooth is situated slightly behind or just over the posterior margin of the orbit. The first teeth are more or less distinctly movable, the ultimate 2 or 3 teeth are immovable (in the specimen with 11 dorsal teeth there are three more teeth immovable). The teeth are placed in the proximal part of the rostrum only: slightly more than the distal third to slightly less than the distal half of the rostrum is entire; there is no subapical tooth near the apex of the rostrum. The lower margin of the rostrum bears 2 to 5 (almost always 3) teeth, here too the distal part is entire. The setae of the upper as well as of the lower margin of the rostrum are arranged in a single row. In the males the rostrum is more slender than in the females, the teeth, especially the distals, are longer and more pressed against the rostrum proper. The carapace has the branchiostegal spine slightly smaller than the antennal; it is placed on the anterior margin of the carapace.

The abdominal pleurae are normal in shape. The sixth segment is about 1.5 times as long as the fifth.

The telson is distinctly longer than the sixth abdominal segment. Of the two dorsal pairs of spines the anterior is situated in the middle of the telson, the place of the posterior pair is rather variable, mostly it is situated midway between the anterior pair and the posterior margin of the telson, sometimes, however, it is placed closer to the anterior spines, sometimes closer to the posterior margin. The posterior margin ends in a sharp median point, and is provided with two pairs of spines, the outer of which is about four times as short as the inner; a pair of feathered setae is present between the two inner spines.

The eyes have the cornea distinctly shorter and broader than the eye-stalk. An ocellus is present.

The stylocerite of the basal segment of the antennular peduncle (fig. 11c) is sharp and slender, but just fails to reach the middle of the segment, no dorsal carina is visible on the stylocerite. The outer margin of the basal segment is more or less straight and ends in a strong anterolateral spine, which reaches beyond the middle of the second segment of the antennular peduncle and distinctly overreaches the convex anterior margin of the basal segment. The second segment of the peduncle is distinctly shorter than the third, when measured in dorsal line; together these two segments are slightly shorter than the first. The upper antennular flagellum has the two rami fused for about 7 to 12 joints, the free part of the shorter ramus consists of 11 to 17 joints and is about 1.5 times to twice as long as the fused portion.

The scaphocerite (fig. 11d) is rather broad, it is about thrice as long as broad and reaches with 1/3 of its length beyond the antennular peduncle. The outer margin is straight or slightly convex and ends in a strong final tooth, which is distinctly overreached by the lamella. Some distance above the base the lamella is broadest, it slightly narrows towards the apex.

The oral parts are quite typical for the present genus. The mandibular palp (fig. 11e), however, is two-jointed, for which reason the species is placed in the subgenus *Palaeander*. The epipod

of the first maxillipede is divided into two rounded lobes. The third maxillipede reaches beyond the antennal peduncle. The ultimate segment is somewhat shorter than the penultimate. The antepenulti-

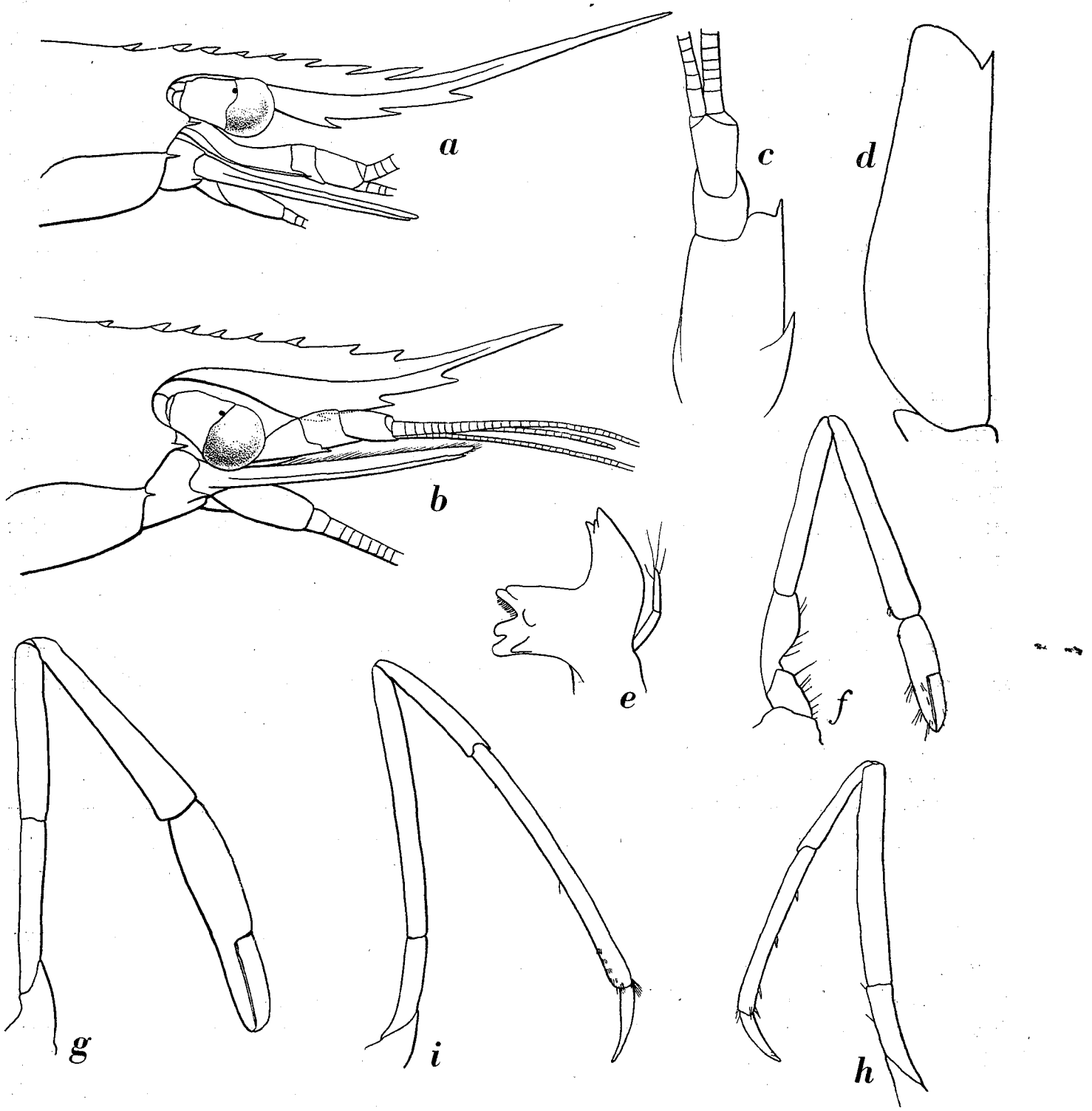

Fig. 11. *Palaemon* (*Palaeander*) *semmelinkii* (De Man). a, anterior part of body of male; b, anterior part of body of female; c, antennular peduncle; d, scaphocerite; e, mandible; f, first pereiopod; g, second pereiopod; h, third pereiopod; i, fifth pereiopod. a, b, × 10; c, d, f-i, × 14;e, × 33.

mate segment is slightly less than twice as long as the ultimate.

The first pereiopod (fig. 11f) reaches somewhat beyond the end of the antennular peduncle,

but fails to reach the end of the scaphocerite. The fingers are as long as the palm, they bear some tufts of setae and have blunt tips. The carpus is somewhat less than twice as long as the chela, it broadens distally. The merus is distinctly shorter than the carpus. The ischium is about half as long as the carpus. The second pereiopods (fig. 11g) are distinctly stronger than the first, they reach with the fingers, sometimes even with half the palm, beyond the scaphocerite. The fingers are slender, they measure about $^2/_3$ of the length of the palm. The cutting edge of the dactylus is provided in its proximal part with a small inconspicuous tooth, the rest of the cutting edge of the dactylus as well as that of the fixed finger is entire. The palm is cylindrical and slightly swollen. The carpus is as long as the chela, sometimes slightly shorter or somewhat longer (Nobili's (1903) statement that the carpus is subequal to the palm probably is an error), it broadens distally. The merus measures about $^4/_5$ of the length of the carpus. The ischium is as long as the merus. All segments of the second leg are unarmed. The third periopod (fig. 11h) reaches about to the end of the antennular peduncle. The propodus measures somewhat less than thrice the length of the dactylus; the posterior margin of the propodus is provided with scattered spinules. The carpus is somewhat more than half as long as the propodus. The merus is much stronger than the propodus and is about as long as the propodus and half the carpus combined. The ischium is half as long as the merus. The fifth pereiopod (fig. 11i) is slender, it reaches almost to the end of the scaphocerite. The propodus is more than thrice as long as the dactylus. The carpus is half as long as the propodus. The merus is about as long as the propodus. The ischium is less than half as long as the merus. The fifth pereiopod resembles the fourth in most respects, it is slightly more slender and reaches farther forwards than the fourth leg. Like in all other species of the genus the fifth leg has transverse rows of setae in the distal part of the posterior margin, these setae are closely packed together, the rest of the posterior margin of the propodus, except for one or two single setae, is naked.

The pleopods are normal in shape. The endopod of the first pleopod of the male is ovate and bears no appendix interna, its inner margin is concave. The appendix masculina of the second pleopod of the male is strong and reaches distinctly beyond the appendix interna.

The uropods are elongate, they are of the normal shape.

The eggs are numerous and small.

The specimens from Berlinhafen, Papua, identified by Nobili (1905a) with some doubt with the present species, certainly do not belong here, as the specimens all have the upper margin of the rostrum provided with a subapical tooth; perhaps the specimens will prove to belong to *Palaemon concinnus* or *P. debilis*.

Distribution: The present species, which inhabits shallow coastal, sometimes brackish, water, is recorded in literature from: Bombay (Kemp, 1925), Bandra near Bombay (Kemp, 1918a), E. of Cacara Pt., Mormugao Bay, Portuguese India (Kemp, 1925), Madras (Henderson, 1893), Ennur backwater near Madras (Kemp, 1918a), Fisher Bay, Port Owen, Tavoy Island, Burma (Kemp, 1918a), Jack and Una Island, Mergui Archipelago (Kemp, 1925), Nancowry Island, Nicobar Archipelago (Kemp, 1925), mouth of Prai River, opposite Penang, Malay Peninsula (Kemp, 1918a), Singapore (Nobili, 1903a), Luzon (Ortmann, 1890), Makassar, Celebes (De Man, 1881).

Subgenus **Palaemon** Fabricius s.s.

This is the largest of the four subgenera of the genus *Palaemon*. The type species is *Palaemon squilla* (L.), which as already pointed out above, is identical with the species best known as *Leander*

adspersus and is different from *Leander squilla* of most authors. Eight species of this subgenus are present in the material examined by me, while moreover some other species of this group are dealt with here too.

Palaemon (*Palaemon*) *concinnus* Dana (fig. 12)

Palaemon concinnus Dana, 1852, Proc. Acad. nat. Sci. Philad., vol. 6, p. 26.
Palaemon exilimanus Dana, 1852, Proc. Acad. nat. Sci. Philad., vol. 6, p. 26.
Palaemon concinnus Dana, 1852a, U. S. Explor. Exped., vol. 13, p. 587.
Palaemon exilimanus Dana, 1852a, U. S. Explor. Exped., vol. 13, p. 586.
Palaemon concinnus Weitenweber, 1854, Lotos Praha, vol. 4, p. 61.
Palaemon exilimanus Weitenweber, 1854, Lotos Praha, vol. 4, p. 61.
Palaemon concinnus Dana, 1855, U. S. Explor. Exped., vol. 13, atlas, p. 12, pl. 38 fig. 10.
Palaemon exilimanus Dana, 1855, U. S. Explor. Exped., vol. 13, atlas, p. 12, pl. 38 fig. 8.
Leander longicarpus Stimpson, 1860, Proc. Acad. nat. Sci. Philad., 1860, p. 40.
Palaemon longicarpis Hilgendorf, 1869, v. d. Decken's Reisen O. Afr., vol. 3 pt. 1, p. 102.
Palaemon (*Leander*) *concinnus* Hilgendorf, 1879, Mber. Akad. Wiss. Berlin, 1878, p. 842.
Leander longicarpus De Man, 1888, Arch. Naturgesch., vol. 53 pt. 1, p. 560.
Leander longicarpus Ortmann, 1890, Zool. Jb. Syst., vol. 5, p. 516.
Leander concinnus De Man, 1892, Weber's Zool. Ergebn., vol. 2, p. 506.
Leander longicarpus Ortmann, 1894, Denkschr. med.-naturw. Ges. Jena, vol. 8, p. 17.
Leander concinnus De Man, 1897, Zool. Jb. Syst., vol. 9, p. 765.
Leander concinnus Coutière, 1900, C. R. Acad. Sci. Paris, vol. 130, p. 1267.
Leander concinnus Coutière, 1901, Ann. Sci. nat. Zool., ser. 8 vol. 12, p. 337, pl. 14 fig. 47.
Leander concinnus De Man, 1902, Abh. Senckenb. naturf. Ges., vol. 25, p. 807.
Leander concinnus Voeltzkow, 1902, Abh. Senckenb. naturf. Ges., vol. 26, p. 564.
Leander concinnus Lenz, 1905, Abh. Senckenb. naturf. Ges., vol. 27, p. 380.
Palaemon concinnus Rathbun, 1910, Bull. Mus. comp. Zoöl. Harv., vol. 52, p. 316.
Leander concinnus J. Roux, 1919, Abh. Senckenb. naturf. Ges., vol. 35, p. 341.
Leander concinnus Tattersall, 1921, Journ. Linn. Soc. Lond. Zool., vol. 34, p. 393.
Leander concinnus Sendler, 1923, Abh. Senckenb. naturf. Ges., vol. 38, p. 46.
Palaemon (*Leander*) *longicarpus* Gee, 1925, Lingnaam agric. Rev., vol. 3, p. 158.
Leander concinnus Kemp, 1925, Rec. Indian Mus., vol. 27, pp. 290, 296.
Leander exilimanus Kemp, 1925, Rec. Indian Mus., vol. 27; p. 291.
Leander concinnus Balss, 1927, Trans. zool. Soc. Lond., vol. 22, p. 223.
Leander concinnus Gurney, 1927, Trans. zool. Soc. Lond., vol. 22, p. 229.
Leander concinnus Yu, 1930a, Bull. Soc. zool. France, vol. 55, p. 555.
Leander concinnus J. Roux, 1934, Faune Colon. Franç., vol. 5, p. 545.
Leander concinnus J. Roux, 1934a, Rev. Suisse Zool., vol. 41, p. 218.
Palaemon lagdaoensis Blanco, 1939, Philipp. Journ. Sci., vol. 69, p. 167, pl. 1.

Siboga Expedition

River near Station 33, Pidjot, Lombok; March 25, 1899. — 4 specimens 18-50 mm.
Station 58, anchorage off Seba, Sawu Island; dredge and shore exploration; depth up to 27 m; bottom sand; April 25, 1899. — 1 specimen 28 mm.
Station 142, Obimajor, Moluccas; in river; August 5-7, 1899. — 16 specimens 25-32 mm.

Snellius Expedition

Rivulet near Menado, N. Celebes; depth 0-1 m; August 28, 1929. — 14 specimens 12-48 mm.

Museum Leiden

Pulu We, Northpoint of Sumatra; May, 1922, February, 1927 and July, 1930; leg. P. Buitendijk. — 21 specimens (included ovigerous females) 36-56 mm.

Atjeh (Atchin); leg. capt. Storm; ex. coll. Mus. Lübeck. — 4 specimens 27-42 mm.
Bay of Batavia, W. Java; January, 1908; leg. P. Buitendijk. — 1 ovigerous female 45 mm.
Tjipaserangan river near desa (= native village) Tjikelet, S. W. Java; June 13 and 14, 1939; leg. C. P. J. de Haas. — 2 specimens 31 and 38 mm.
Tjisanggiri river near desa Kalong, S. W. Java; June 15 and 16, 1939; leg. C. P. J. de Haas. — 10 juvenile specimens 11-14 mm.
Tjilatjap, southcoast of Java; August, 1905; leg. P. Buitendijk. — 1 specimen 25 mm.
Raka-mbaha (= Mbawa), Flores; close to the sea; 1888-1889; leg. M. Weber. — 6 specimens 37-44 mm.
Rivulet near Balangnipa, Celebes; 1888-1889; leg. M. Weber. — 2 specimens 32 and 43 mm.
Sula Sanana, Moluccas; 1877; leg. J. E. Teysmann. — 1 specimen 45 mm.
East Indian Archipelago. — 2 specimens 34 and 45 mm.
Tahiti; ex. coll. Mus. Godeffroy. — 1 specimen 50 mm.

Museum Amsterdam

Sinabang, Simalur, off W. Sumatra; January, 1913; leg. E. Jacobson. — 1 specimen 66 mm.
Gunung Sitoli, Nias; leg. J. P. Kleiweg de Zwaan. — 34 specimens (included ovigerous females) 23-50 mm.
Western Nias; leg. J. P. Kleiweg de Zwaan. — 4 specimens (1 ovigerous female) 32-57 mm.
Nias; 1910; leg. J. P. Kleiweg de Zwaan. — 10 specimens (included ovigerous females) 32-50 mm.
Raka-mbaha (= Mbawa), southcoast of Flores; close to the sea; 1888-1889; leg. M. Weber. — 22 specimens (included ovigerous females) 22-56 mm.
Konga, Larantuka Strait, E. Flores; in river; December 9, 1908 and October 30, 1909; leg. G. A. J. van der Sande. — 8 specimens 40-56 mm.
Palima, S. W. Celebes; estuary of the Tjenrana river; brackish water; 1888-1889; leg. M. Weber. — 71 specimens 11-18 mm.
Balangnipa, S. W. Celebes; in large river, which is subject to the influence of the tides, being fresh at low tide; 1888-1889; leg. M. Weber. — 2 specimens 28 and 39 mm.
Balangnipa, S. W. Celebes; in small rivulet, which has no connection with the sea; 1888-1889; leg. M. Weber. — 15 specimens 26-52 mm.
Bonea river, Salajar Island; 1888-1889; leg. M. Weber. — 3 specimens (1 ovigerous female) 49-55 mm.
Ternate; pool in the dry bed of a small river; February 1, 1903; leg. L. F. de Beaufort. — 7 specimens 41-54 mm.

Description: The rostrum (fig. 12a) is well developed, it is slender and slightly curved upwards at the tip, it reaches generally somewhat beyond the end of the scaphocerite, sometimes, however, it fails to reach the end of that scale. The upper margin is provided with 5 to 8, seldom 3 and mostly 6 teeth, which are placed in the proximal half of the upper margin, its distal half is entire except for a small subapical tooth. Only the first dorsal tooth is placed behind the posterior limit of the orbit. The first and second teeth articulate with the rostrum proper. The lower margin of the rostrum bears 3 to 7 (mostly 4 or 5) teeth, which are placed in the distal $^2/_3$ of that margin. The proximal teeth are placed more closely together than the distals. O r t m a n n mentions a specimen which had the lower margin devoid of teeth, this specimen undoubtedly is abnormal. Both upper and lower margin of the rostrum are provided with a single row of hairs. The carapace has the branchiostegal spine about as strong as the antennal. It is placed on the anterior margin of the carapace some distance below the branchiostegal groove.

The abdomen is normal in shape, the sixth segment is twice or almost twice as long as the fifth.

The telson is slightly less than 1.5 times as long as the sixth abdominal segment. The anterior pair of dorsal spines is situated in the middle of the length of the telson, the posterior pair is placed

more closely to the anterior pair than to the posterior margin of the telson. The posterior margin of the telson is provided with the usual two pairs of spines and two feathered setae, the inner pair of spines reaches with about half its length beyond the median tooth of the posterior margin.

The cornea of the eyes is about as long as the stalk, but is distinctly broader. A distinct ocellus is present.

The antennular peduncle (fig. 12b) fails to reach the end of the scaphocerite. The stylocerite is well developed and sharply pointed, it fails to reach the middle of the basal segment, its dorsal surface is provided with a distinct longitudinal carina. The anterolateral angle of the basal segment is provided with a strong spine, which reaches far beyond the middle of the second segment of the peduncle, and also overreaches the convex anterior margin of the basal segment. The second segment, when measured in dorsal line, is distinctly shorter than the third segment. Together the second and third segments are about as long as the basal segment. The upper antennular flagellum has the two rami fused for 6 to 10 joints, the free part of the shorter ramus consists of 21 to 30 joints, it is considerably (3.5 to 6 times) longer than the fused portion.

The scaphocerite (fig. 12c) is about 2.5 times as long as broad. The outer margin is slightly convex and ends in a distinct final tooth, which is overreached by the broad anterior margin of the lamella.

The oral parts are quite typical in shape. The third maxillipede reaches as far forwards as the end of the basal segment of the antennular peduncle. The last segment is about $^2/_3$ as long as the penultimate. The antepenultimate segment is somewhat shorter than the two last segments combined. The exopod reaches slightly beyond the end of the antepenultimate segment.

The first pereiopod (fig. 12d) reaches about to the end of the scaphocerite. The fingers are blunt and as long as or distinctly longer than the palm. The carpus is elongate, almost 2.5 to 3 times as long as the chela (C o u t i è r e, 1901, reports a specimen in which the carpus is 4 times as long as the chela). The merus measures about $^3/_4$ of the length of the carpus. The ischium is about half as long as the merus. The second pereiopod (fig. 12e) is slender, it reaches with half the carpus or less beyond the scaphocerite. The fingers are $^2/_3$ as long as the palm; the fixed finger bears in the proximal third a small but distinct tooth, the dactylus also bears a small tooth on the cutting edge slightly anterior of the tooth of the fixed finger, moreover two smaller teeth are placed proximally of this tooth. The palm is cylindrical and not swollen. The carpus measures about 1.5 times to twice the length of the chela, it is slightly broadened anteriorly. The merus and ischium are subequal in length, both are about as long as the chela. All the segments of the second leg are not provided with spines or tubercles. The third pereiopod (fig. 12f) reaches beyond the end of the antennular peduncle, but fails to reach the end of the scaphocerite, the fifth reaches with somewhat more than the dactylus beyond the scaphocerite. The dactylus bears some tufts of setae at the anterior margin. The propodus is almost thrice as long as the dactylus, the posterior margin bears some 5 to 6 equidistant spinules. The carpus is half as long as the propodus. The merus is about as long as, but distinctly broader than the propodus. The ischium is as long as the carpus. The fifth pereiopod (fig. 12g) is much more slender than the third. The propodus is about 4 to 5 times as long as the dactylus. The carpus is about half as long as the propodus. The merus is distinctly shorter than the propodus. The ischium is shorter than the carpus. The fourth pereiopod is about intermediate in shape between the third and fifth legs.

The endopod of the first pleopod (fig. 12h) in the male is provided at its inner margin with a

small, but distinct rudiment of an appendix interna, which lacks in the female. The first pleopod is about half as long as the carapace. The presence of the rudimental appendix interna at the first

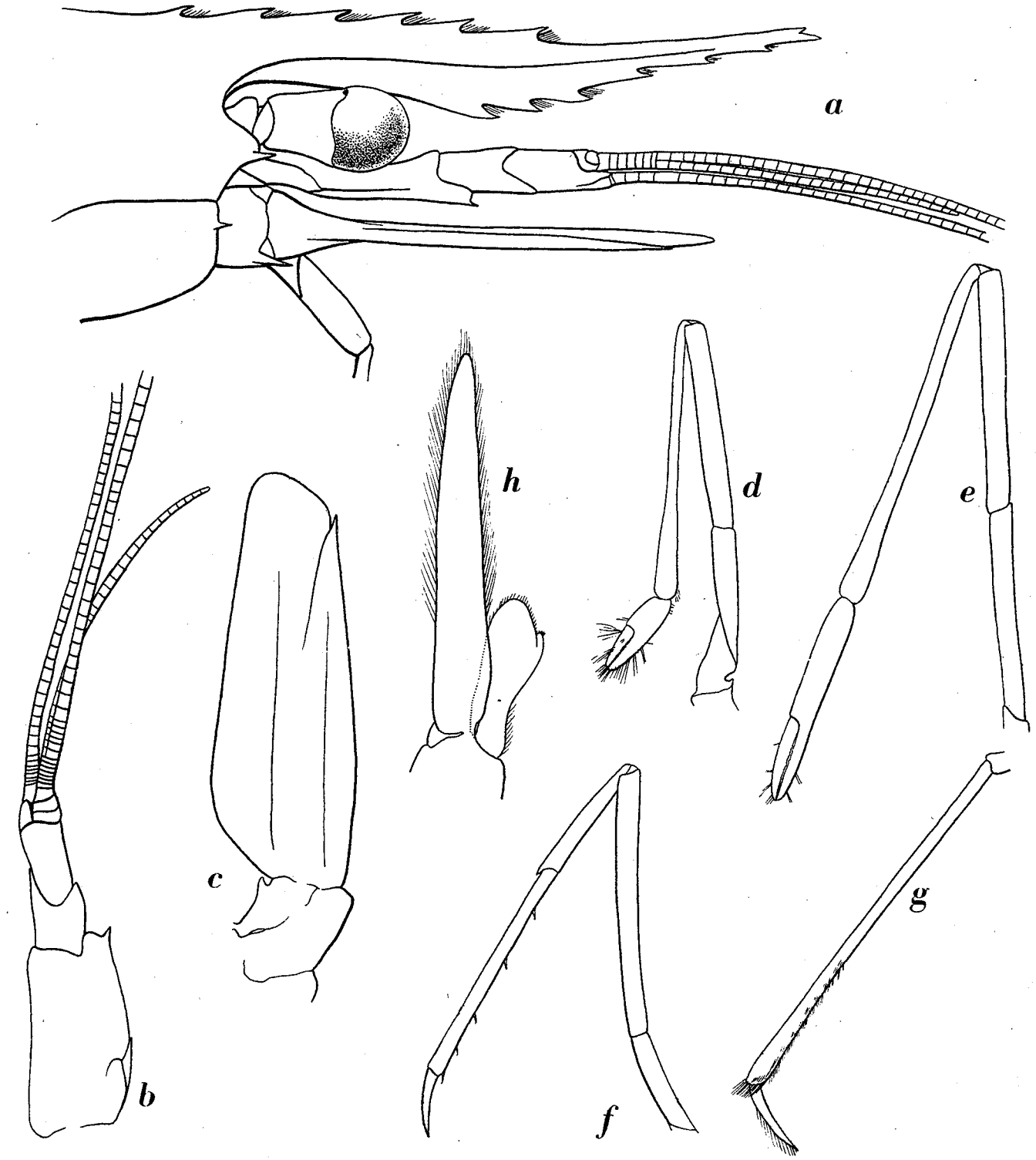

Fig. 12. *Palaemon* (*Palaemon*) *concinnus*, Dana. a, anterior part of body in lateral view; b, antennula; c, scaphocerite; d, first pereiopod; e, second pereiopod; f, third pereiopod; g, dactylus and propodus of fifth pereiopod; h, first pleopod of male. a-g, × 8; h, × 15.

pleopod of the male distinguishes this species from all other members of the genus. The other pleopods are normal in shape. The appendix masculina of the second pleopod in the male is much longer and broader than the appendix interna.

The uropods are quite normal in shape.

The eggs of the ovigerous female are numerous and small, the diameter varying between 0.5 and 0.7 mm. The young specimens differ from the older by having the rostrum shorter, they mostly do not reach the tip of the scaphocerite, furthermore the unarmed portion of the rostrum is relatively shorter; the sixth abdominal segment is longer and the carpus of the first pereiopod is about twice as long as the chela.

The specimen described by Dana (1852) as *Palaemon exilimanus* in all respects resembles *Palaemon concinnus* from the same author, but for the shape of the rostrum, which in *P. exilimanus* is shorter than in *P. concinnus* and which has the distal portion not devoid of teeth. I think it very probable that the distal part of the rostrum in the type specimen of *P. exilimanus* has been broken. The fact that in *P. exilimanus* the extreme tip of the rostrum is curved strongly downwards also is an indication that the rostrum is abnormal in shape. Furthermore the only specimen of *P. exilimanus* known, was collected by the U.S. Exploring Expedition in the same locality from where it obtained the specimens of *P. concinnus,* viz. the Fiji Islands; also the fact that after Dana's description of the single specimen of *P. exilimanus* that species never has been reported again, supports the supposition of the identity of *P. concinnus* and *P. exilimanus.* The name *P. exilimanus* has page priority over *P. concinnus,* but I think it best to adopt the latter name for the present species as that name was used for the undamaged specimens and moreover is very commonly met with in literature.

Tattersall's (1921) statement, that the mandibular palp is two-jointed obviously is an error, since it is three-jointed in all my material.

Palaemon lagdaoensis described by Blanco (1939) is identical with the present species, as is shown by the description and figures given by Blanco. Blanco's statement that the second legs reach with the tip of the merus and the chela beyond the scaphocerite, is incorrect, as is shown by the figure; here not the merus but the carpus is meant.

The specimen from Atjeh (Museum Leiden) has already been recorded by De Man (1897), those of Flores, Salajar and Celebes, collected by Professor M. Weber, have been dealt with by De Man (1892).

Distribution: The species inhabits shallow waters; it lives as well in fresh, salt as in brackish waters. In literature it is recorded from: Suez (Tattersall, 1921), Port Taufiq, near Suez (Balss, 1927), Ain Musa, Gulf of Suez (Balss, 1927; Gurney, 1927), Zanzibar (Hilgendorf, 1869), Dar-es-Salaam (Ortmann, 1894), Mozambique (Hilgendorf, 1879), Aldabra (Voeltzkow, 1902; Lenz, 1905), Bemazaka, Ambongo, W. Madagascar (J. Roux, 1934), Tulear, S. W. Madagascar (J. Roux, 1934), Arm of Onilahy River, S. W. Madagascar (Coutière, 1900, 1901), Ivoloina near Tamatave and Iranjy River, Canal des Pangalanes, Tamatave province, E. Madagascar (J. Roux, 1934), Hongkong (Stimpson, 1860), Cagayan River, N. Luzon, Philippines (Blanco, 1939), Atjeh, Sumatra (De Man, 1897), near Deli, Sumatra (De Man, 1892), Buleleng, Bali (Rathbun, 1910), Ampenan, Lombok (Rathbun, 1910), Raka-mbaha, Flores (De Man, 1892), Balangnipa and Palima, S. Celebes (De Man, 1892), Salajar (De Man, 1892), Ternate, Moluccas (De Man, 1902), Amboina, Moluccas (De Man, 1888), Elat, Groot Kai, Kai Islands (J. Roux, 1919), Aru Islands (Kemp, 1925), Udjir, Aru Islands (J. Roux, 1919), Woskai River near Sungai Manumbai, Wokam, Aru Islands (J. Roux, 1919), Negerilama near Ngaiguli, Trangan, Aru Islands (J. Roux, 1919), Omboi Islands, New Britain (J. Roux, 1934a), Beilifu, Komatahu, New Ireland

(J. R o u x, 1934a), Marshall Islands (O r t m a n n, 1890), Fiji Islands (D a n a, 1852; Weitenweber, 1854), Makatea (S e n d l e r, 1923).

Palaemon (*Palaemon*) *debilis* Dana (fig. 13)

Palaemon debilis Dana, 1852, Proc. Acad. nat. Sci. Philad., vol. 6, p. 26.
Palaemon debilis attenuatus Dana, 1852, Proc. Acad. nat. Sci. Philad., vol. 6, p. 26.
Palaemon debilis Dana, 1852a, U. S. Explor. Exped., vol. 13, p. 585.
Palaemon debilis attenuatus Dana, 1852a, U. S. Explor. Exped., vol. 13, p. 585.
Palaemon debilis Weitenweber, 1854, Lotos Praha, vol. 4, p. 61.
Palaemon debilis Dana, 1855, U. S. Explor. Exped., vol. 13, atlas, p. 12, pl. 38 fig. 6.
Palaemon debilis attenuatus Dana, 1855, U. S. Explor. Exped., vol. 13, atlas, p. 12, pl. 38 fig. 7.
Leander debilis Stimpson, 1860, Proc. Acad. nat. Sci. Philad., 1860, p. 40.
Palaemon (*Leander*) *debilis* Miers, 1879, Philos. Trans. Roy. Soc. Lond., vol. 168, p. 494.
Leander debilis p.p. Ortmann, 1890, Zool. Jb. Syst., vol. 5, p. 515.
Leander debilis Sharp, 1893, Proc. Acad. nat. Sci. Philad., 1893, p. 120.
Leander debilis Borradaile, 1901, Fauna Geogr. Mald. Laccad., vol. 1, p. 98.
Leander gardineri Borradaile, 1901, Fauna Geogr. Mald. Laccad., vol. 1, p. 98.
Leander debilis Lenz, 1901, Zool. Jb. Syst., vol. 14, p. 435.
Leander attenuatus Lenz, 1901, Zool. Jb. Syst., vol. 14, p. 435.
Leander debilis De Man, 1902, Abh. Senckenb. naturf. Ges., vol. 25, p. 808.
Palaemon debilis Rathbun, 1906, Bull. U. S. Fish Comm., vol. 23, p. 924, pl. 22 fig. 1.
Leander debilis Nobili, 1907, Mem. Accad. Sci. Torino, ser. 2 vol. 57, p. 363.
Leander debilis Borradaile, 1917, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 17, p. 404.
Palaemon debilis Maki & Tsuchiya, 1923, Rep. Dept. Agric. Formosa, vol. 3, p. 54, pl. 3 fig. 5.
Leander beauforti J. Roux, 1923, Capita Zool., vol. 2 pt. 2, p. 18, figs. 1, 2.
Leander beauforti Kemp, 1925, Rec. Indian Mus., vol. 27, p. 295.
Leander prox. *debilis* Kemp, 1925, Rec. Indian Mus., vol. 27, p. 297.
Leander gardineri Kemp, 1925, Rec. Indian Mus., vol. 27, p. 298.
Leander beauforti J. Roux, 1928a, Treubia, vol. 10, p. 215.
Palaemonetes pacificus Gurney, 1939a, Annot. Zool. Japon., vol. 18, p. 145, pls. 5, 6.
Leander gardineri Gurney, 1940, Annot. Zool. Japon., vol. 19, p. 80.
Leander longicarpus Kubo, 1941, Trans. biogeogr. Soc. Japan, vol. 3, p. 308, textfig. 3, pl. 20 fig. 1.
Leander longicarpus Kubo, 1942, Journ. Imp. Fish. Inst. Tokyo, vol. 35, p. 51, figs. 13, 19F, Q, 20F, 21F, 22F, 23F, M, 24F, Q, 25F, F', 26F, S, 27F, P, 28E, N, 29F.
Leander debilis Edmondson, 1946, Spec. Publ. Bishop Mus. Honolulu, vol. 22, p. 251, fig. 152b.

Siboga Expedition

Station 4, Anchorage off Djangkar, E. Java, 7° 42′ S, 114° 12′.6 E; shore exploration; depth 9 m; March 9, 1899. — 1 specimen 34 mm.

River near Station 19, Bay of Labuhan Tereng, westcoast of Lombok, 8° 44′.5 S, 116° 2′.5 E; March 19-21, 1899. — 2 specimens 30 & 31 mm.

Station 181 or 231; Amboina anchorage; reef exploration; September 5-11 or November 14-18, 1899. — 1 ovigerous female 44 mm.

Snellius Expedition

Beo, Talaud Islands; fresh water; June 14-21, 1930. — 6 specimens 26-36 mm.

Museum Leiden

Pulu We, off N. Sumatra; fresh water; 1906; leg. P. Buitendijk. — 3 ovigerous females 39-41 mm.

Museum Amsterdam

Durban, S. Africa; mangrove swamp; leg. M. Weber. — 1 specimen 39 mm.
Merdika river, Amboina; December 6, 1909; leg. L. F. de Beaufort. — 2 specimens 30 & 35 mm.

Description: The rostrum (figs. 13a-b) is very long and slender, strongly curved upwards in the distal part; it may reach with about half its length beyond the scaphocerite, but sometimes it even fails to reach the end of that scale. The dorsal margin of the rostrum bears in the proximal half 2 to 8, generally 5, teeth, the first of which is placed behind the orbital margin, the second slightly before the posterior limit of the orbit. The teeth are separated by large interspaces, the second and third teeth generally are placed closest together. The first three teeth are movable. The distal part of the upper margin is entire, safe for a distinct subapical tooth. The lower margin bears 3 to 10 (mostly 6) teeth, which are regularly divided over the distal 3/4 of the lower margin, the proximals of these teeth are placed closer together than the distals. The upper margin of the rostrum is provided with a single row of setae, while a double row is present at the lower margin. The carapace has the branchiostegal spine smaller than the antennal and placed on the anterior margin of the carapace just below the branchiostegal groove.

The abdomen is normal in shape. The sixth segment is 1.5 times to slightly more than twice as long as the fifth. The telson is about as long as the sixth abdominal segment. It is elongate in shape and is provided with the usual two pairs of dorsal spinules, which are placed in the middle and at 3/4 of the length of the telson. The posterior margin of the telson bears the usual two pairs of spines and the two feathered setae. The inner spines reach with more than half their length beyond the tip of the telson.

The eyes just fail to reach to the end of the basal segment of the antennular peduncle. The cornea is about as long as, but distinctly broader than the stalk.

The stylocerite (fig. 13c) is small and pointed, it fails to reach the middle of the basal segment of the antennular peduncle; a faint carina is present on the dorsal surface of the stylocerite. The outer margin of the basal segment is slightly convex and ends in a distinct anterolateral tooth, which reaches about to the middle of the second peduncular segment, but is distinctly overreached by the strongly convex anterior margin of the basal segment. The second segment of the peduncle is shorter than the third, together these joints measure about 2/3 of the length of the basal segment. The upper antennular flagellum has the two rami fused for 7 to 14 joints, the free part of the shorter ramus consists of 7 to 17 joints, it is about as long as or slightly longer (sometimes much shorter, vid. Kemp, 1925) than the fused part.

The scaphocerite (fig. 13d) is somewhat more than thrice as long as broad, it reaches with about 1/3 of its length beyond the antennular stalk. The outer margin is almost straight and ends in a strong final tooth, which is distinctly overreached by the lamella. The lamella has the inner antero-lateral angle more or less acute.

The oral parts are quite typical in shape. The epipod of the first maxillipede is divided into rounded lobes. The third maxillipede is slender, it reaches distinctly beyond the distal margin of the basal segment of the antennular peduncle. The last segment measures 2/3 of the length of the penultimate segment. The antepenultimate segment is about twice as long as the ultimate.

The first pereiopods (fig. 13e) reach to, or just fail to reach to the end of the scaphocerite. The

fingers are about as long as or slightly longer than the palm. The carpus is slender, it is somewhat more than twice as long as the chela (in young specimens somewhat shorter) and is slightly broadened anteriorly. The merus is distinctly shorter than the carpus. The ischium is about half as long as the

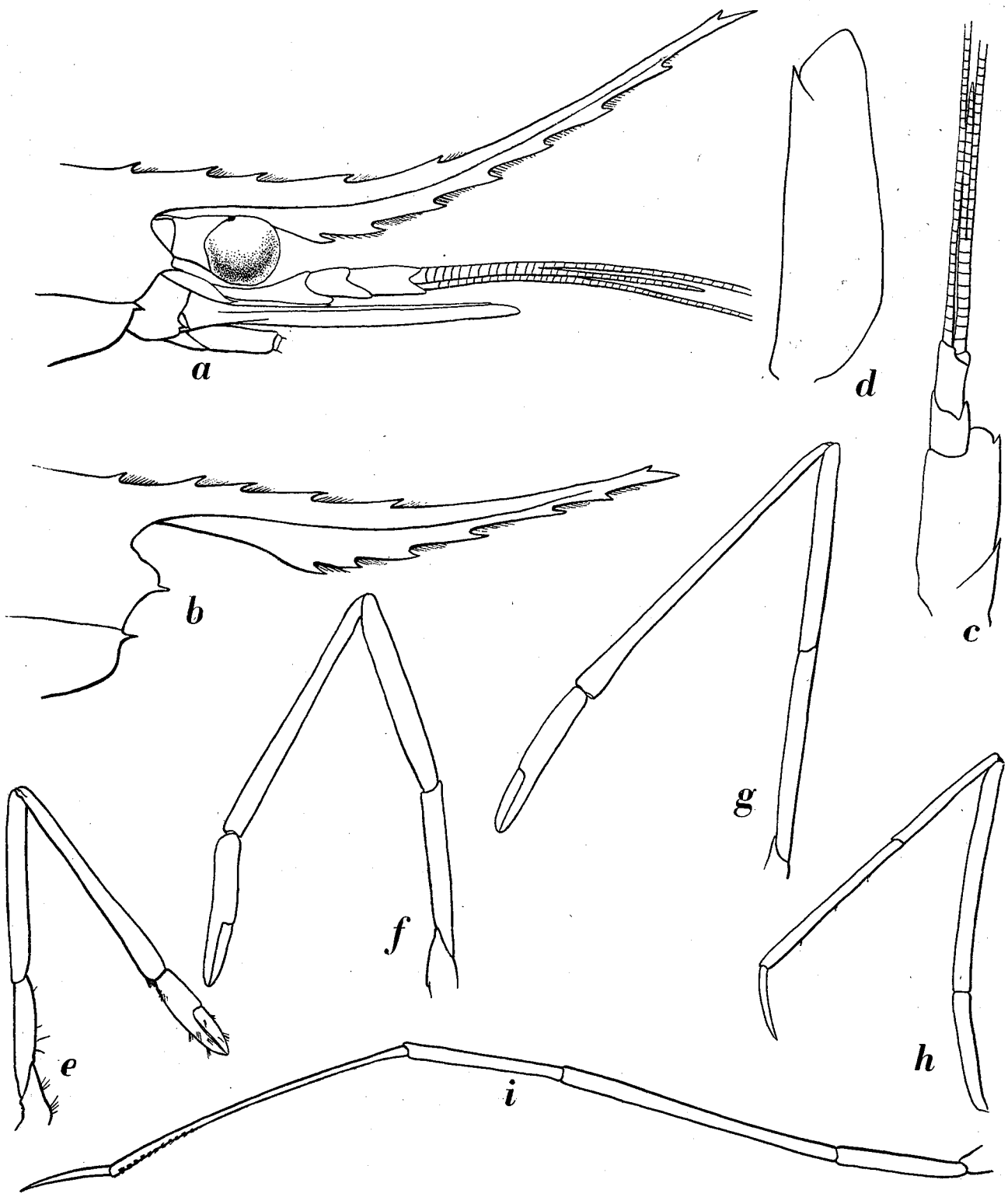

Fig. 13. *Palaemon* (*Palaemon*) *debilis* Dana. a, anterior part of body in lateral view; b, rostrum in lateral view; c, antennula; d, scaphocerite; e, first pereiopod; f, g, second pereiopods; h, third pereiopod; i, fifth perciopod. a, b, × 10; c-i, × 14.

carpus. The second pair of pereiopods (figs. 13f, g) is extremely slender, the legs are equal. They reach with the entire chela, and sometimes also with a part of the carpus, beyond the scaphocerite. The chela is slender, the fingers are unarmed and close for their entire length, they measure about $^2/_3$ of the length of the palm. The carpus is more or slightly less than twice as long as the chela. The merus measures about $^2/_3$ of the length of the carpus. The ischium is about as long as the merus. All joints are unarmed. The last three pereiopods are slender, the third (fig. 13h) fails or almost fails to reach the end of the scaphocerite. The dactylus is about $^2/_5$ as long as the propodus. The propodus is provided at its posterior margin with some very small spinules. The carpus measures $^2/_3$ of the length of the propodus and almost half the length of the merus. The ischium is somewhat shorter than the carpus. The fifth pereiopod (fig. 13i) reaches with the dactylus or slightly more beyond the scaphocerite. The dactylus measures somewhat more than $^1/_4$ of the length of the propodus. The posterior margin of the propodus bears in the proximal part some very small scattered spinules, while in the distal part the usual transverse rows of hairs are present. The carpus is about half as long as the propodus, the merus is about as long as the propodus, while the ischium is about as long as the carpus. The relation between the length of the joints of the fourth pereiopod is intermediate between that of the third and fifth legs.

The endopod of the first pleopod of the male is ovate in shape, with the inner margin distinctly concave, no trace of an appendix interna is visible. The first pleopod is about half as long as the carapace. The appendix masculina of the second pleopod is much longer and stronger than the appendix interna.

The uropods are normal in shape.

The eggs are numerous and small, their diameter varies between 0.5 and 0.9 mm.

After examination of my material and of the literature concerning the present species, I have come to the conclusion that it it impossible to keep the forms described as *Leander beauforti, Palaemon* (or *Leander*) *debilis* and *Leander gardineri* separated. *Leander beauforti* is distinguished by Kemp (1925) on account of having the carpus of the second leg twice or slightly less than twice as long as the chela, while in *L. debilis* the carpus should be distinctly less than twice as long as the chela. In my material, even from one locality (e.g. from the Talaud Islands), the carpus of the second leg varies between 1.5 times and slightly more than twice the length of the chela, showing all transitions between these two extremes. Also the characters mentioned by Kemp (1925, p. 298) for distinguishing *L. debilis* and *L. gardineri* are too variable in my material to be of specific value. The carapace of the specimens at my disposal varies between being slightly longer than the sixth abdominal segment and being about as long as the fifth and sixth segments together. The second tooth of the rostrum sometimes is placed over the posterior margin of the orbit, but mostly is situated more or less in advance of that margin. The anterior margin of the carapace always is more or less concave. The antennal scale may be shorter, as long as, or longer than the carapace. And the second legs sometimes reach to the end of the scaphocerite, but also may reach beyond that scale with the entire chela and part of the carpus, while all transitions between these extremes occur. The variability of the relation between the length of the carpus and the chela has already been pointed out above. As all these characters are variable and seem in no way linked with one another in my material, as the differences are so small and unimportant and as I can find no other differences, the three forms in my opinion can not be kept separate. They therefore are united here to one species, which has to bear the name *Palaemon debilis* Dana.

Kubo's (1941, 1942) account of *Leander longicarpus* shows his material to be *P. debilis.*

Distribution: The species inhabits shallow coastal waters and also is found in brackish or even fresh waters. It is recorded in literature from: Ain Musa, Gulf of Suez (Kemp, 1925), Rodriguez (Miers, 1879; Kemp, 1925), Aldabra (Borradaile, 1917), Diego Garcia, Chagos Archipelago (Borradaile, 1917), Landu and Ekasdu, Miladumadulu Atoll, Maldive Archipelago (Borradaile, 1901), Manradu, Miladumadulu Atoll, Maldive Archipelago (Kemp, 1925), Dunk Island, Maldive Archipelago (Kemp, 1925), Addu Atoll, Maldive Archipelago (Kemp, 1925), Nancowry Island, Nicobar Group (Kemp, 1925), Riukiu Islands (Stimpson, 1860; Kubo, 1941, 1942), Formosa (Maki & Tsuchiya, 1923), Ternate, Moluccas (De Man, 1902), Kairatu, Ceram, Moluccas (J. Roux, 1923), Merdika River, Amboina, Moluccas (J. Roux, 1928a), Saipan, Marianne Islands (Gurney, 1939a), Hao and Rikitea, Tuamotu Islands (Nobili, 1907), Hawaiian Archipelago (Dana, 1852; Weitenweber, 1854; Stimpson, 1860; Edmondson, 1946), Oahu (Sharp, 1893; Lenz, 1901), Kaliki, Oahu (Lenz, 1901), Pearl Harbor and Honolulu Reef, Oahu (Rathbun, 1906), Southcoast of Molokai (Rathbun, 1906), Lahaina, Maui (Lenz, 1901), Mauna Loa, Kealakekua Bay and Puako Bay, Hawaii (Rathbun, 1906), Hilo, Hawaii (Dana, 1852; Rathbun, 1906), Opae, Oehau, Hawaiian Islands (Rathbun, 1906).

Palaemon (*Palaemon*) *paucidens* De Haan (fig. 14)

Palaemon paucidens De Haan, 1841, Fauna Japonica, Crust., atlas, pl. 45 fig. 11.
Palemon paucidens De Haan, 1849, Fauna Japonica, Crust., p. 170.
Leander paucidens Stimpson, 1860, Proc. Acad. nat. Sci. Philad., 1860, p. 40.
Palemon Paucidens Herklots, 1861, Tijdschr. Ent., vol. 4, p. 145.
Palemon paucidens Bouvier, 1901, Bull. Mus. Hist. nat. Paris, vol. 7, p. 332.
Leander paucidens Doflein, 1902, Abh. Bayer. Akad. Wiss., vol. 21, p. 640.
Palaemon paucidens Rathbun, 1902b, Proc. U. S. Nat. Mus., vol. 26, p. 51.
Leander paucidens Brashnikov, 1907, Mém. Acad. Sci. Petersb., ser. 8 vol. 20 pt. 6, p. 175.
Leander paucidens De Man, 1907, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 9, p. 409.
Leander paucidens Balss, 1914, Abh. Bayer. Akad. Wiss., supp!. vol. 2 pt. 10, p. 58.
Leander paucidens Kemp, 1918a, Mem. Asiat. Soc. Bengal, vol. 6, p. 270.
Leander paucidens Parisi, 1919, Atti Soc. Ital. Sci. nat., vol. 58, p. 76.
Palaemon paucidens Urita, 1921, Dobuts. Zasshi, vol. 33, p. 214-220.
Leander paucidens Annandale, 1922, Annot. Zool. Japon., vol. 10, p. 137.
Palaemon (*Leander*) *paucidens* Gee, 1925, Lingnaam agric. Rev., vol. 3, p. 158.
Leander paucidens Kemp, 1925, Rec. Indian Mus., vol. 27, p. 291.
Palaemon paucidens Sowerby, 1925, Nat. Note-Book in China, p. 133.
Palaemon (*Leander*) *paucidens* Kellogg, 1928, Lingnan Sci. Journ., vol. 5, p. 352.
Leander paucidens Derjavin, 1930, Hydrobiol. Zeitschr. biol. Wolga Sta., vol. 9, p. 2.
Leander Paucidens Yokoya, 1931, Journ. Coll. Agric. Tokyo, vol. 11, p. 106, textfigs. 10-19, pl. 10 figs. 98-107, pls. 11-15.
Leander paucidens Miyadi, 1933, Japan. Journ. Zool., vol. 5, p. 184.
Leander pausidens Uéno, 1933, Annot, Zool. Japon., vol. 14, p. 113.
Leander paucidens Birstein & Vinogradov, 1934, Zool. Journ. Moscow, vol. 13, p. 44.
Leander paucidens Derjugin & Kobjakova, 1935, Zool. Anz., vol. 112, p. 142.
Leander paucidens Kubo, 1937, Bull. Japan. Soc. sci. Fish, vol. 5, p. 346, fig. 1B.
Leander paucidens Matsui & Wainai, 1937, Japan. Journ. Limnol., vol. 7, p. 31.
Leander paucidens Miyadi, 1937, Soyokubutu oyobi Dôbutu, vol. 5, p. ....
Leander paucidens Miyadi, 1938, Int. Rev. Hydrobiol. Hydrogr., vol. 37, p. 133.
Leander paucidens Miyadi, 1938a, Japan. Journ. Limnol., vol. 8, p. ...

Leander paucidens Birstein, 1939, Zool. Journ. Moscow, vol. 18, p. 55.
Leander paucidens Mori, 1939, Annot. Zool. Japon., vol. 18, p. 75.
Leander paucidens Birstein, 1941, Life Freshw. U.S.S.R., vol. 1, p. 424.
Leander paucidens Kubo, 1942, Journ. Imp. Fish. Inst. Tokyo, vol. 35, p. 25, figs. 1, 3-6, 19A, L, 20A, 21A, 22A, 23A, H, 24A, L, 25A, A', 26A, N, 27A, R, 28A, P, 29A, L.

Museum Leiden

Japan; cotypes. — 3 specimens (2 ovigerous females) 55-60 mm.

Museum Amsterdam

Hakone Lake, Japan; 2400 feet above sealevel; July, 1896. — 1 specimen 48 mm.
Locality unknown. — 1 specimen 54 mm.

Description. The rostrum (fig. 14a) is rather high and almost straight, it reaches to or slightly (at most with $^1/_5$ of its length) beyond the end of the scaphocerite. The apex of the rostrum is curved upwards. The upper margin bears four to six teeth, the first of which is placed on the carapace behind the posterior limit of the orbit. The other teeth are regularly divided over the proximal $^2/_3$ of the upper margin of the rostrum, the distal third of that margin is entire, with the exception of a small subapical tooth, which is placed close near the apex. The lower margin of the rostrum bears 1 to 4, generally 2 or 3, teeth in the distal part, the last tooth is more remote from the apex of the rostrum than from the penultimate ventral tooth. A double row of short setae is placed along the lower margin of the rostrum, while the upper margin is provided with a single row. The carapace has the branchiostegal spine about as strong as the antennal, it is situated on the anterior margin of the carapace.

The abdomen is normal in shape The sixth segment is 1.5 times as long as the fifth. The telson measures $^5/_4$ of the length of the sixth abdominal segment. It is elongate and is provided with the usual two pairs of spines, the anterior of which is situated in the middle of the telson, the posterior pair midway between the anterior pair and the posterior margin of the telson. The final margin of the telson ends in a median sharp point, which is flanked by the usual two pairs of spines and the two plumose setae.

The eyes are normal in shape, they distinctly fail to reach the end of the basal segment of the antennular peduncle. The cornea is shorter and broader than the stalk. An ocellus is present.

The stylocerite (fig. 14b) is slender and pointed, it almost reaches the middle of the basal segment. The outer margin of the basal segment of the antennular peduncle is straight and ends in a strong anteroventral tooth, which reaches beyond the middle of the second segment. The anterior margin of the basal segment is convex, but is distinctly overreached by the anterolateral spine. The second and third segments of the peduncle, when measured in dorsal line are of the same length, together they are somewhat shorter than the basal segment. The upper antennular flagellum has the two rami fused for 8 or 9 joints; the free portion of the shorter ramus consists of 20 to 28 joints, being thereby 2.5 to 3.5 times as long as the fused portion.

The scaphocerite (fig. 14c) reaches with about $^1/_5$ of its length beyond the antennular peduncle. It is of about the same breadth over its entire length. The outer margin is slightly convex and ends in a strong final tooth, which is distinctly overreached by the convex anterior margin of the lamella.

The oral parts are typical in shape. The third maxillipede is slender, it reaches to or a trifle

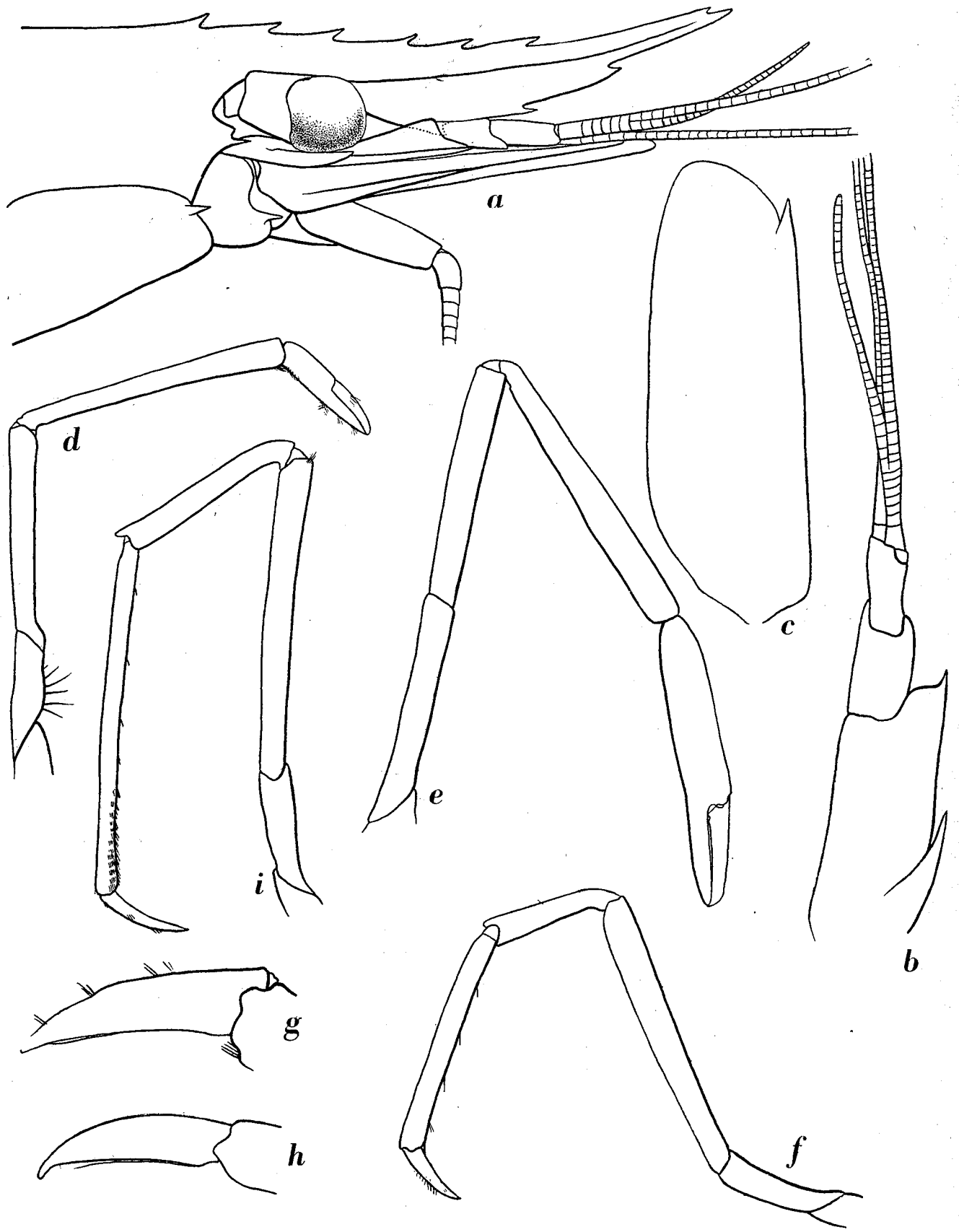

Fig. 14. *Palaemon* (*Palaemon*) *paucidens* De Haan. a, anterior part of body in lateral view; b, antennula; c, scaphocerite; d, first leg; e, second leg; f, third leg; g, dactylus of third leg (type); h, dactylus of third leg (specimen from Hakone Lake); i, fifth leg. a-f, i, × 8; g, h, × 30.

beyond the end of the antennal stalk. The last segment is slightly longer than 2/3 of the length of the penultimate segment. The antepenultimate joint is slightly less than 1.5 times as long as the penultimate.

The first pereiopod (fig. 14d) reaches with its tip about to the end of the scaphocerite. The fingers are slender and are as long as the palm. The carpus is about twice as long as the chela, it broadens slightly anteriorly. The merus is about 3/4 as long as the carpus. The ischium is short, being about half as long as the merus. The second pereiopods (fig. 14e) are stronger than the first, they reach with the entire chela beyond the scaphocerite. The fingers are slender, they measure 1/2 to 2/3 of the length of the palm. The cutting edge of the dactylus bears in its proximal part a small tooth, no teeth are observed on the rest of the cutting edge and also none are present on the cutting edge of the fixed finger. The palm is elongate and cylindrical. The carpus is as long as or slightly longer than the chela, it slightly broadens anteriorly. The merus is about 4/5 as long as the carpus. The ischium is somewhat shorter than the merus. The last three pereiopods are rather slender. The third (fig. 14f) just fails to reach to the end of the scaphocerite. The dactylus is falciform and simple; in my male specimen from Hakone Lake (Museum Amsterdam), however, the posterior margin of the dactylus ends in an extremely thin transparent lamella, and shows a distinct accessory tooth behind the apex (fig. 14h), in the specimens from the Leiden Museum this toothlike process of the lamella is very inconspicuous or absent (fig. 14g). The propodus is slightly more than 2.5 times as long as the dactylus, its posterior margin is provided with some spines. The carpus measures about 2/3 of the length of the propodus. The merus is somewhat longer and stronger than the propodus. The ischium is about half as long as the propodus. The fifth pereiopod (fig. 14i) is much more slender, it reaches with the dactylus and a part of the propodus beyond the scaphocerite. The dactylus is slender. The propodus is about 3.5 times as long as the dactylus, its posterior margin bears, except the scattered spinules, the usual transverse rows of setae in the distal part. The carpus is half as long as the propodus. The merus is slightly shorter than the propodus. The ischium is about half as long as the propodus. The fourth leg is intermediate in shape between the third and the fifth legs.

The endopod of the first pleopod in the male is ovate in shape, the inner margin is concave, there is no trace of an appendix interna. In the second pleopod of the male the appendix masculina is much longer and stronger than the appendix interna. The other pleopods are normal in shape.

The uropods are typical in shape.

Doflein (1902) remarks that the branchiostegal spine is removed from the anterior margin in the present species; this, however, is not correct, as this spine, though it is placed distinctly behind the antennal spine, stands on the anterior margin of the carapace, which curves strongly backwards there.

The specimen from Hakone Lake formed part of De Man's (1907) material.

Distribution: The species is known from fresh, brackish and salt water, it is found in freshwater lakes up to an altitude of almost 4400 feet. It lives on the bottom and is known from depths up to 170 m. *Palaemon paucidens* is recorded in literature from: Mouth of the Suifun River near Vladivostoc (Birstein & Vinogradov, 1934), Gensan and Fusan, Korea (Rathbun, 1902b), Suigen, Urutin and Kôshyû, Korea (Kubo, 1942), Shanghai (Gee, 1925; Sowerby, 1925; Kellogg, 1928), Foochow (Balss, 1914; Kellog, 1928), Japanese Sea (Derjugin & Kobjakova, 1934), between Yesso and the Asiatic mainland, 43° 5′ N, 139° 24′ E (Balss, 1914), Tym

River, Sakhalin (Derjavin, 1930), Tukaichi Lake, S. Sakhalin (Brashnikov, 1907), Tibesan Lake, S. Sakhalin (Kubo, 1942), Yeturup, Kuriles (Doflein, 1902; Balss, 1914; Miyadi, 1933, 1938; Uéno, 1933), Kunasiri, Kuriles (Miyadi, 1938), Japan (De Haan, 1841, 1849; Herklots, 1861; Bouvier, 1901; Parisi, 1919), Abasiri and Mokoto Lakes, Yesso (Kubo, 1942), Nemuro (Doflein, 1902), Sapporo (Kemp, 1918a; Kubo, 1942), Titose and Hakodate, Yesso (Kubo, 1942), Aomori, Hondo (Rathbun, 1902b), Ôhata, Nobedi and Aisaka (Kubo, 1942), Lake Towada (Matsui & Wainai, 1937; Kubo, 1942), Mogami River, Yamagata and Murakami (Kubo, 1942), Washinokami, Onagawa Bay near Sendai (Balss, 1914), Matsushima near Sendai (Rathbun, 1902b), Lake Chuzenzi near Nikko (Balss, 1914), Kasumiga-ura (Kemp, 1918a; Kubo, 1942), Kizaki, Suwa and Yamanaka Lakes, Satte, Teganuma, Yamaguti and Komaba (Kubo, 1942), Tokyo (Yokoya, 1931), Misaki (Rathbun, 1902b), Hakone Lake (De Man, 1907; Balss, 1914; Kubo, 1942), Shimoda (Stimpson, 1860), Yosida, Gihu, Kawagoye, and Lake Hamana (Kubo, 1942), Lake Biwa (Rathbun, 1902b; Kemp, 1918a; Annandale, 1922; Mori, 1939; Kubo, 1942), Ogura Pond near Kyoto, and Yodo River near Osaka (Kemp, 1918a), Fukuyama, Hondo (Kubo, 1942), Oki Islands (Kubo, 1942), Tokusima, Shikoku (Kubo, 1942), Nagasaki, Kyushyu (Rathbun, 1902b; Kubo, 1942), Fukuoka, Kumamoto and Itiki (Kubo, 1942), Kawatana and Kurume (Rathbun, 1902b), Bay of Kagoshima, Kyushyu (Urita, 1921), Okinawa, Riukiu Islands (Miyadi, 1937).

Palaemon (*Palaemon*) *capensis* (De Man) (fig. 15)

Leander capensis De Man, 1897, in Weber, Zool. Jb. Syst., vol. 10, p. 174, pl. 15 fig. 3.
Leander capensis Stebbing, 1910, Ann. S. Afr. Mus., vol. 6, p. 386.
Leander serrifer Stebbing, 1914, Ann. S. Afr. Mus., vol. 15, p. 31.
Leander capensis Kemp, 1925, Rec. Indian Mus., vol. 27, p. 291.
Leander capensis Barnard, 1947, Ann. Mag. nat. Hist., ser. 11 vol. 13, p. 391.

Museum Amsterdam

Knysna river, Westfort, S. Africa; fresh water; 1894; leg. M. Weber; cotypes. — 5 specimens 39-52 mm.

The present specimens have been extensively described by De Man. The following additions may be added to this description:

Like in all other species of *Palaemon,* here too the branchiostegal groove is distinct and sharp, it reaches the anterior margin of the carapace just above the branchiostegal spine, which is placed some distance behind that margin.

The pleurae of the fourth and fifth abdominal segments have the tips rounded, there is no trace of the final tooth, which may be found in almost any other species of the present subgenus.

The antennula (fig. 15a) has the stylocerite slender, it reaches about to the middle of the basal segment of the antennular peduncle. The anterolateral spine of the basal segment reaches somewhat beyond the middle of the second segment. The anterior margin of the basal segment is rounded, but fails to overreach the anterolateral spine. The upper antennular flagellum has the two rami fused for 6 joints, the first of which is rather large, the following very short, the fifth and sixth are fused

in the outer half. The free part of the shorter ramus consists of 23 to 31 joints, it is six times as long as the fused portion. The scaphocerite is of the normal shape.

The oral parts are quite normal in shape (fig. 15b, c).

The first pleopod of the male has the endopod ovate with the inner margin concave; no appendix interna is present. The appendix masculina of the second pleopod of the male is much longer and more robust than the appendix interna.

According to Barnard (1947) the specimen recorded by Stebbing (1914) under the name *Leander serrifer* is nothing but a *Palaemon capensis*.

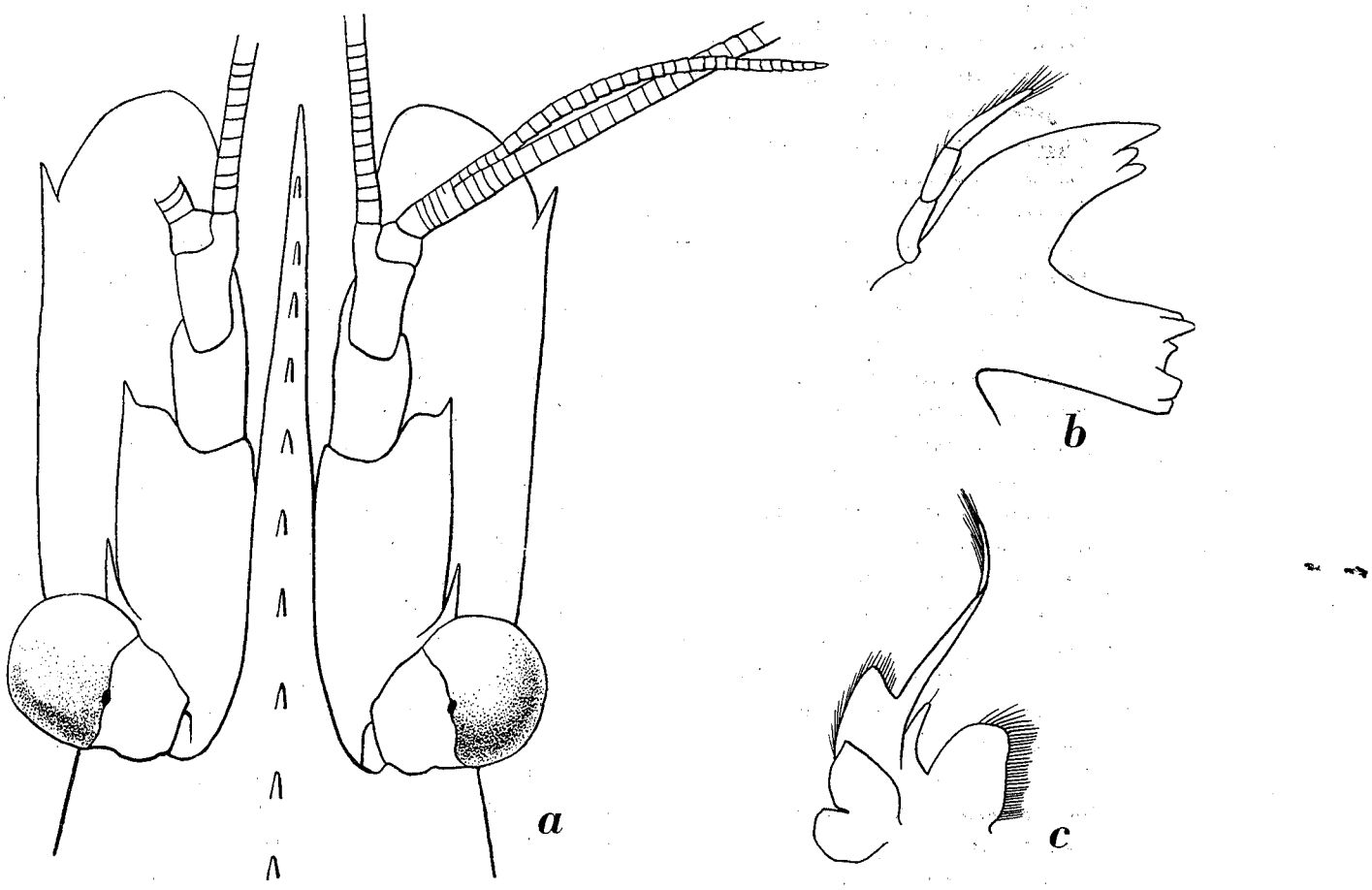

Fig. 15. *Palaemon* (*Palaemon*) *capensis* (De Man). a, anterior part of body in dorsal view; b, mandible; c, first maxillipede. a, × 10; b, × 33; c, × 14.

The species is rather aberrant by having the apex of the pleurae of the last two abdominal segments rounded, also the upper flagellum of the antennula has the fused part of a somewhat other shape than the rest of the species of the present genus.

Distribution: The species is known from several rivers in Cape Province, South Africa: Palmiet River near Kleinmond, River Zonder End and Buffeljacht River (the latter two are tributaries of Breede River), and Duivenhoks River at Heidelberg (Barnard, 1947), Knysna River (De Man, 1897; Barnard, 1947), Gamtoos River (Barnard, 1947), Baakens River near Port Elizabeth (Stebbing, 1914; Barnard, 1947).

Palaemon (*Palaemon*) *affinis* H. Milne Edwards (fig. 16)

Palemon affinis H. Milne Edwards, 1837, Hist. nat. Crust., vol. 2, p. 391.
Palemon Quoianus H. Milne Edwards, 1837, Hist. nat. Crust., vol. 2, p. 393.
non *Palaemon Quoianus* Krauss, 1843, Südafr. Crust., p. 55.
Palaemon Quoianus White & Doubleday, 1843, Dieffenbach's Voy. New Zealand, vol. 2, p. 268.
Palaemon Quoianus White, 1847, List Crust. Brit. Mus., p. 78.
Palaemon affinis White, 1847, List Crust. Brit. Mus., p. 78.
Palaemon affinis Dana, 1852a, U. S. Explor. Exped., vol. 13, p. 584.
Palaemon affinis Dana, 1855, U. S. Explor. Exped., vol. 13 atlas, p. 12, pl. 38 fig. 5.
Leander serenus Heller, 1862a, Verh. zool.-bot. Ges. Wien, vol. 12, p. 527.
Leander serenus Heller, 1865, Reise Novara, Zool., vol. 2 pt. 3, p. 110, pl. 10 fig. 5.
Leander serenus Hess, 1865, Arch. Naturgesch., vol. 31 pt 1, p. 167.
Leander affinis p.p. Miers, 1876, Catal. Crust. New Zeal., p. 85.
Leander serenus Haswell, 1882, Catal. Aust. Crust., p. 195.
Leander affinis Filhol, 1885, Bibl. Éc. haute Étud., vol. 30 pt. 2, p. 52.
Leander Quoyanus Filhol, 1885, Bibl. Éc. haute Étud., vol. 30 pt. 2, p. 52.
Leander affinis Filhol, 1886, Miss. Ile Campbell, Zool., vol. 3 pt. 2, p. 433.
Leander Quoyanus Filhol, 1886, Miss. Ile Campbell, Zool., vol. 3 pt. 2, p. 434.
Palaemon affinis Bate, 1888, Rep. Voy. Challenger, Zool., vol. 24, p. 782, pl. 128 fig. 5.
non *Palaemon affinis* Heilprin, 1888, Proc. Acad. nat. Sci. Philad., 1888, p. 322.
non *Palaemon affinis* Heilprin, 1889, Bermuda Isl., p. 151.
Leander serenus Whitelegge, 1890, Journ. Roy. Soc. New S. Wales, vol. 23, p. 224.
Palaemon affinis Whitelegge, 1890, Journ. Roy. Soc. New S. Wales, vol. 23, p. 224.
Leander affinis Pfeffer, 1892, Neumayer's Deutsch. Exped. Ergebn., vol. 2, p. 547.
non *Leander affinis* Ortmann, 1893, Ergebn. Plankton Exped., vol. 2Gb, p. 47.
? *Palaemon affinis* Whitelegge, 1898, Proc. Linn. Soc. New S. Wales, vol. 23, p. 368.
non *Leander affinis* Rankin, 1900, Ann. New York Acad. Sci., vol. 12, p. 539.
Leander affinis Lenz, 1901, Zool. Jb. Syst., vol. 14, p. 435.
Leander affinis Thompson, 1901, Catal. Crust. Mus. Dundee, p. 19.
non *Palaemon affinis* Rathbun, 1902, Bull. U. S. Fish Comm., vol. 20 pt. 2, p. 125.
Palaemon affinis Thomson, 1903, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 8, p. 450.
Palaemon affinis Chilton, 1906, Trans. Proc. New Zeal. Inst., vol. 38, p. 270.
Palaemon affinis Chilton, 1909, Subantarct. Isl. New Zeal., p. 614.
Leander serenus McCulloch, 1909, Rec. Aust. Mus., vol. 7, p. 306, pl. 89 figs. 9-12.
non *Palaemon quoianus* Stebbing, 1910, Ann. S. Afr. Mus., vol. 6, p. 384.
Leander affinis Chilton, 1911, Rec. Canterbury Mus., vol. 1 pt. 3, p. 305.
Palaemon affinis Thomson, 1913, Trans. Proc. New Zeal. Inst., vol. 45, p. 240.
Leander affinis p.p. Lenz & Strunck, 1914, Deutsche Südpolar Exped., vol. 15, p. 322.
non *Leander affinis* Stebbing, 1914a, Trans. Roy. Soc. Edinb., vol. 50 pt. 2, p. 287.
non *Leander affinis* Verrill, 1922, Trans. Connect. Acad. Arts Sci., vol. 26, p. 142, pl. 48 fig. 4.
Leander affinis Verrill, 1922, Trans. Connect. Acad. Arts Sci., vol. 26, pl. 43 fig. 3, pl. 47 fig. 7.
Leander serenus Hale, 1924, Trans. Proc. Roy. Soc. S. Aust., vol. 48, p. 68.
non *Palaemon affinis* Schmitt, 1924a, Bijdr. Dierk., vol. 23, p. 72.
Leander affinis Kemp, 1925, Rec. Indian Mus., vol. 27, p. 292.
Leander serenus Kemp, 1925, Rec. Indian Mus., vol. 27, p. 292.
Leander serenus McNeill, 1926a, Aust. Encycl., vol. 2, p. 325.
non *Leander affinis* Boone, 1927, Bull. Bingham oceanogr. Coll., vol. 1 pt. 2, p. 113.
Leander serenus Hale, 1927, Crust. S. Aust., vol. 1, p. 59, fig. 54.
Leander serenus Hale, 1927a, Trans. Proc. Roy. Soc. S. Aust., vol. 51, p. 309.
Palaemon affinis Young, 1929, Trans. Proc. New Zeal. Inst., vol. 60, pp. 154, 166 (on p. 166 as *Leander affinis*).

non *Palaemon affinis* Schmitt, 1935, Sci. Surv. Porto Rico Virgin Isl., vol. 15, p. 160.
non *Leander affinis* Gurney, 1936, Proc. zool. Soc. Lond., 1936, p. 619.
Leander serenus Tubb, 1937, Proc. Roy. Soc. Victoria, vol. 49, p. 408.
Leander serenus Anderson, 1938, Proc. Roy. Soc. Victoria, vol. 50, p. 351.
Leander affinis Powell, 1947, Native Anim. New Zeal., p. 35, fig. 172.

Museum Leiden

Summer, South Island, New Zealand; 1894; leg. H. Suter. — 2 specimens 48 and 54 mm.

Description: The rostrum (fig. 16a) is robust, straight, it reaches to the end of the scaphocerite. The upper margin possesses 8 to 10 teeth, the first two or three are placed on the carapace behind the posterior limit of the orbit. The first five teeth are more or less movable. The teeth are placed regularly over the upper margin, though the distance between the last and the penultimate tooth is distinctly larger than that between the penultimate and the antepenultimate. The last tooth (sometimes the two last teeth) is placed close to the tip, giving it thereby a bifid appearance. The lower margin possesses four equally spaced teeth. Both upper and lower margin are provided with a single row of setae. The lateral carina of the rostrum continues in the posterior orbital margin. The branchiostegal spine of the carapace is almost as strong as the antennal spine, it is placed on the anterior margin of the carapace.

The abdomen is normal in shape. The pleurae of the first four segments have the tips rounded, while in the fifth it ends in a distinct small tooth. The sixth segment is about 1.5 times as long as fifth. The telson is somewhat longer than the sixth abdominal segment and is provided dorsally with the usual two pairs of spines, which are placed respectively in the middle and at three quarters of the length of the telson. The posterior margin of the telson ends in a sharp median tooth, which is flanked at each side with two spines and a feathered seta; the inner spines are longest, they are about four times as long as the outer.

The eyes are normal in shape. The cornea is shorter and broader than the stalk. An ocellus is present.

The stylocerite (fig. 16b) is long and slender, it fully reaches the middle of the basal segment of the antennular peduncle. The outer margin of the basal segment is about straight and ends in a strong anterolateral tooth, which reaches beyond the middle of the second segment. The anterior margin of the basal segment is convex and is produced forwards, it fails, however, to reach the tip of the anterolateral tooth. The second segment of the peduncle is about as long as, but distinctly broader than the third segment; together these two segments are almost as long as the basal segment. The upper antennular flagellum has the two rami fused for about 12 joints, the free part of the shorter ramus consists of about 17 joints, the free part being less than twice as long as the fused.

The scaphocerite (fig. 16c) reaches with $^1/_4$ of its length beyond the antennular peduncle and is about as long as the rostrum. The outer margin is straight and ends in a forwards directed final tooth, which falls short of the end of the lamella. The scaphocerite is about thrice as long as broad. The inner anterior angle of the lamella is rather sharp.

The oral parts are quite typical. The third maxillipede reaches to the end of the second segment of the antennular peduncle. The last joint of this maxillipede is $^2/_3$ as long as the penultimate, while the antepenultimate is about 1.5 times as long as the penultimate.

The first pereiopods (fig. 16d) reach as far forwards as, or slightly overreach the scaphocerite. The fingers are slender, they are about as long as the palm. The carpus is elongate, it is twice as long as

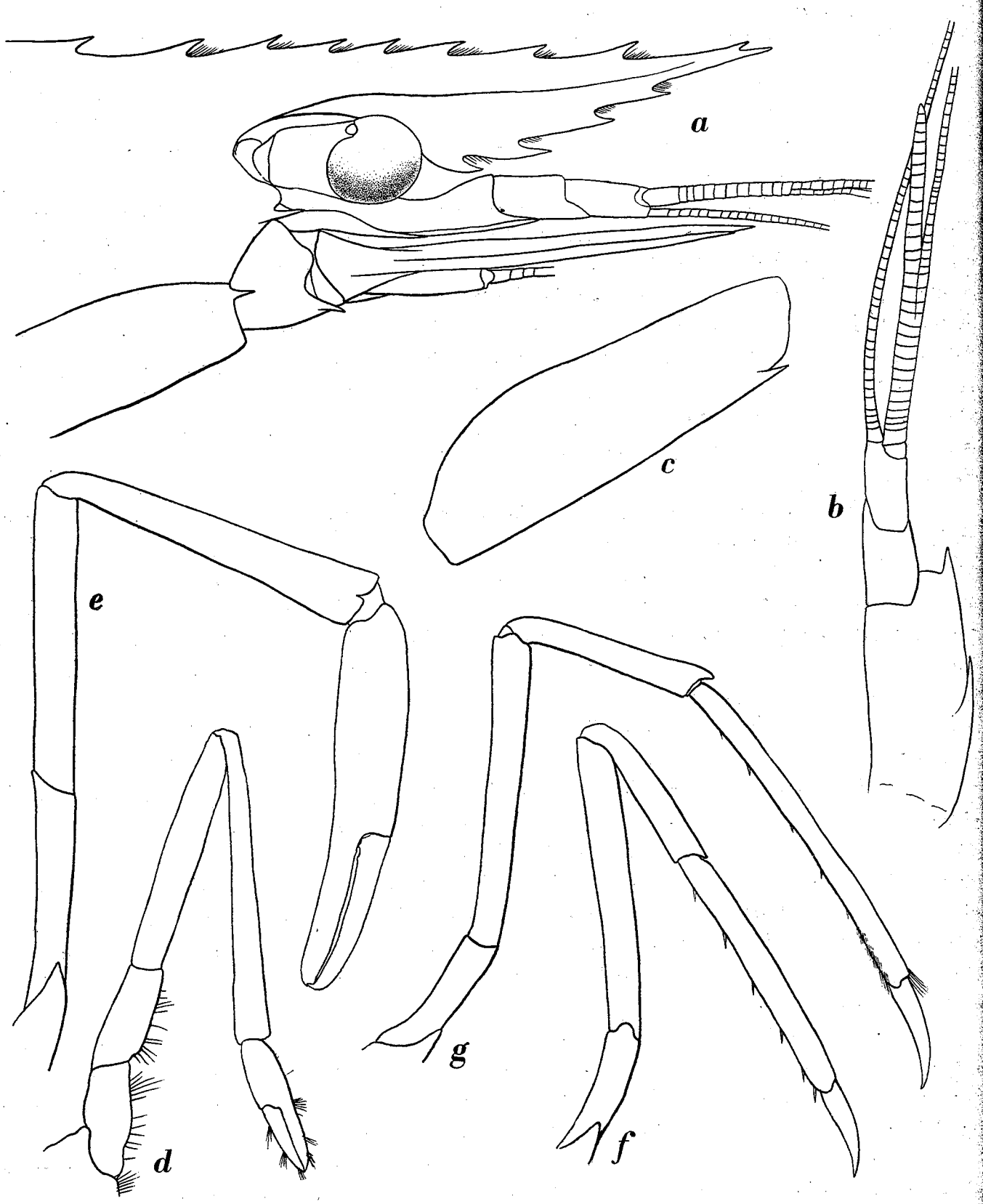

Fig. 16. *Palaemon* (*Palaemon*) *affinis* H. Milne Edw. a, anterior part of body in lateral view; b, antennula; c, scaphocerite; d, first pereiopod; e, second pereiopod; f, third pereiopod; g, fifth pereiopod. a-g, × 8.

the chela and narrows posteriorly. The merus is distinctly shorter than the carpus. The ischium is somewhat less than half as long as the merus. The second pereiopods (fig. 16e) reach with the chela beyond the scaphocerite. The fingers are slender, they measure $^2/_3$ of the length of the palm. The dactylus bears two small teeth in the proximal part of the cutting edge, the fixed finger bears one tooth there. The palm is cylindrical. The length of the carpus is about $^4/_5$ of that of the chela, it narrows posteriorly. The merus is slightly shorter than the carpus. The ischium measures about $^2/_3$ of the length of the merus. The last three pereiopods are almost similarly built. The third leg (fig. 16f) reaches about to the end of the final tooth of the scaphocerite. The dactylus is rather strong. The propodus is 2.5 times as long as the dactylus and has the posterior margin provided with some five movable spines. The carpus is somewhat more than half as long as the propodus. The merus is slightly longer and broader than the propodus. The fifth pereiopod (fig. 16g) reaches to or somewhat beyond the end of the final tooth of the scaphocerite. The propodus is thrice as long as the dactylus, its posterior margin bears some scattered small spinules, while in the distal part of that margin the usual transverse rows of closely packed setae are present. The carpus is half as long as, and the merus is as long as the propodus. The fourth pereiopod is intermediate in shape between the third and the fifth.

The pleopods are normal in shape. The endopod of the first pleopod of the male is oval in shape, the inner margin is concave; no appendix interna is present. The appendix masculina of the second pleopod of the male is slightly longer and broader than the appendix interna.

The uropods are rather broad, they are normal in shape.

Palaemon quoyanus agrees in all respects with *Palaemon affinis* but for the fact that the tip of the rostrum is simple, and that there are only six dorsal teeth on the rostrum. This, however, may be an abnormality, as is already supposed by other authors. No other species of *Palaemon* is known from New Zealand, while *P. affinis* is very common there.

The specimens recorded in literature as *Palaemon* (or *Leander*) *affinis* from Bermuda and the West Indies do not belong here, but are specimens of *Palaemon* (*Palaeander*) *northropi* (Rankin).

Palaemon affinis often has been reported from Cape of Good Hope, but, as Barnard (1947) pointed out, these specimens belong to *Palaemon pacificus.*

No constant differences seem to exist between the specimens of *Palaemon affinis* from New Zealand and *P. serenus* from Australia. Therefore these two species are synonymized here.

Distribution: *Palaemon affinis* is a litoral form. It is recorded in literature from: Falkland Islands (Miers, 1876), Rat Island, Port Curtiss, S. Queensland (McCulloch, 1909), Sydney, New S. Wales (Heller, 1862a, 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, S. Australia (Hale, 1927b), Reevesby Island, Sir Joseph Banks Group, S. Australia (Anderson, 1938), Flinders and Pearson Islands, South Australia (Hale, 1924), Tasmania (Thomson, 1903), New Zealand (H. Milne Edwards, 1837; White, 1843, 1847; Dana, 1852; Miers, 1876; Filhol, 1885, 1886; Pfeffer, 1892; Lenz & Strunck, 1914), Bay of Islands, North Island, New Zealand (White, 1847; Thomson, 1903), Wellington, North Island (Thomson, 1903), d'Urville Island, New Zealand (Lenz, 1901), French Pass, South Island (Lenz, 1901), Christ-

church, South Island (Thomson, 1903), Lyttelton (Thompson, 1901; Thomson, 1903), Akaroa (Thomson, 1903), Otago (Thomson, 1903, 1913), Dunedin, South Island, New Zealand (Thomson, 1903), Stewart Island, New Zealand (Filhol, 1886; Thomson, 1903), Chatham Islands (Lenz, 1901; Thomson, 1903; Chilton, 1906, 1911; Young, 1929), Campbell Island (Filhol, 1886; Pfeffer, 1892). Whitelegge's (1898) record of this species from Fife Bay, S. E. Papua probably is incorrect, as the locality falls far out of the range of distribution of the species; Whitelegge's statement that one of his specimens has the lower margin of the rostrum provided with seven ventral teeth supports the above supposition; Whitelegge's specimens perhaps belong to *Palaemon concinnus* or *debilis*.

Palaemon (*Palaemon*) *ortmanni* Rathbun (fig. 17)

Leander longirostris De Man, 1881, Notes Leyden Mus., vol. 3, p. 141. (non H. Milne Edwards, 1837).
Leander longipes Ortmann, 1890, Zool. Jb. Syst., vol. 5, p. 519, pl. 37 fig. 13. (non *Palaemon longipes* Olivier, 1811).
Palaemon ortmanni Rathbun, 1902b, Proc. U. S. Nat. Mus., vol. 26, p. 53 footnote.
Leander longipes De Man, 1907, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 9, p. 409, pl. 32 figs. 26-30.
Leander longipes Kemp, 1925, Rec. Indian Mus., vol. 27, pp. 291, 293.
Leander longipes Kubo, 1937, Bull. Japan. Soc. sci. Fish., vol. 5, p. 346, figs. 2M, 2N, 3T, 3U.
Leander longipes Kubo, 1942, Journ. Imp. Fish. Inst. Tokyo, vol. 35, p. 52, figs. 13, 19G, R, 20G, 21G, 22G, 23G, R, 24G, R, 25G, G', 26G, T, 27G, Q, 28F, O, 29G, 32.

Museum Leiden

Amoy; leg. G. Schlegel. — 2 specimens 70 and 72 mm.

De Man (1907) has given an extensive description of the present species, to which I only will add the following remarks. In both specimens at my disposal, which have already been treated by De Man (1881), the first two teeth of the upper margin of the rostrum are situated on the carapace behind the orbit (fig. 17a); the first of these teeth generally is more distant from the second than the second is from the third, the following six teeth are equally spaced, while in the specimen with 8 basal and two apical teeth the eighth tooth is somewhat more remote from the seventh than the sixth is. In the specimen with three apical teeth the first of these is placed farther from the second than the third is, in both specimens the last two apical teeth and the apex of the rostrum are separated by equal interspaces. The branchiostegal spine is placed on the anterior margin of the carapace; De Man's remark, that it is slightly remote from that margin, probably is due to the fact that the anterior margin is curved backwards at the level of the branchiostegal spine.

The pleurae of the first four abdominal segments are rounded, that of the fifth ends in a minute sharp point. The sixth segment is 1.5 times as long as the fifth. The shape of the telson does not differ essentially from that of the previous species.

The antennular peduncle (fig. 17b) has the stylocerite short and slender, it fails to reach the middle of the basal segment of the peduncle. The anterolateral tooth of the basal segment is strong, but fails to reach the middle of the second segment. The anterior margin of the basal segment is strongly convex and slightly overreaches the anterolateral tooth. The third segment is distinctly longer than the

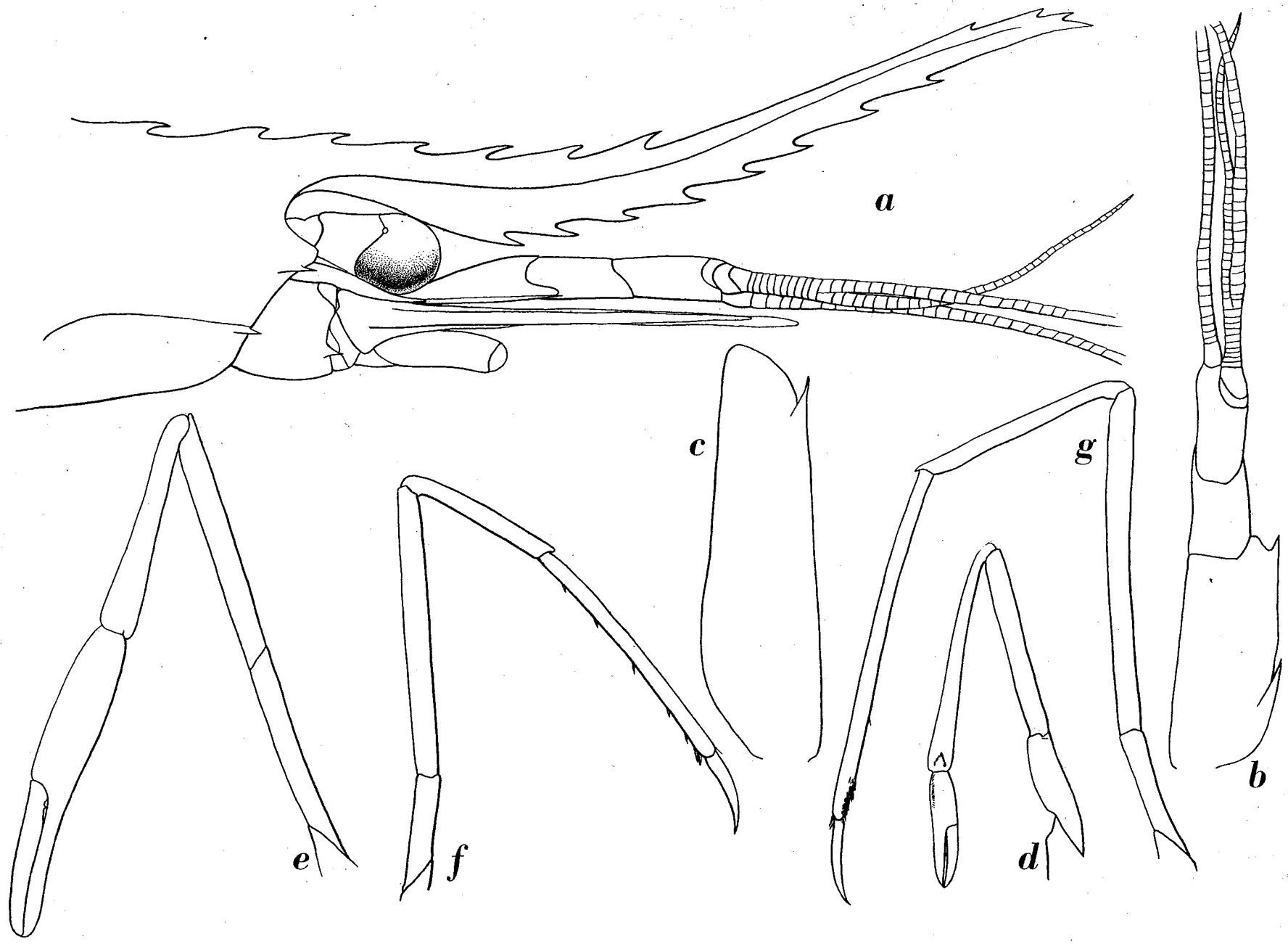

Fig. 17. *Palaemon* (*Palaemon*) *ortmanni* Rathbun. a, anterior part of body in lateral view; b, antennula; c, scaphocerite; d, first pereiopod; e, second pereiopod; f, third pereiopod; g, fifth pereiopod. a-g, ×7.

second, together these two segments are about as long as the first segment. Of the upper antennular flagellum the two rami are fused for 10 or 11 joints, while 36 or 37 joints of the shorter ramus are free, the free part being slightly more than thrice as long as the fused part.

The scaphocerite (fig. 17c) reaches slightly (with about only $^1/_7$ of its length) beyond the antennular peduncle. It is somewhat more than thrice as long as broad. The outer margin is straight, the lamella distinctly overreaches the final tooth.

The oral parts are typically built. Of the third maxillipede the last joint measures $^2/_3$ of the length of the penultimate joint, while the antepenultimate joint is about twice as long as the ultimate.

The merus of the first pereiopod (fig. 17d) is somewhat shorter than the carpus. In one of my specimens the second pereiopods (fig. 17e) are equally built, in the other the left leg is missing; in both specimens the second legs reach to the end of the rostrum. The palm of the second leg is about as long as or slightly longer than the fingers, as is also figured by De Man (1907), who in his description, however, states the fingers to be longer.

The endopod of the first pleopod of the male is ovate in shape, with the inner margin concave, no appendix interna is present. The second pleopod of the male has the appendix masculina longer and broader than the appendix interna, also the other pleopods are normal in shape.

The uropods are of the normal shape, they are rather broad and are longer than the telson. The outer margin of the exopod is slightly convex and ends in a tooth, which at its inner side is provided with a movable spine.

Distribution: This rather rare species is recorded in literature from: Kominato, Hondo, Japan (Kubo, 1942), Sagami Bay, Japan (Ortmann, 1890), Inland Sea of Japan (De Man, 1907), Tsushima Island, Japan (Rathbun, 1902b), Amoy, China (De Man, 1881).

Palaemon (Palaemon) gravieri (Yu)

Leander Gravieri Yu, 1930a, Bull. Soc. zool. France, vol. 55, p. 561, fig. 3.
Leander macrodactylus Yoshida, 1941, Bull. Fish. Exper. Sta. Tyôsen, n. 7, p. 26, pl. 6 fig. 4 (non *Palaemon macrodactylus* Rathbun).
Leander gravieri Kubo, 1942, Journ. Imp. Fish. Inst. Tokyo, vol. 35, p. 48, figs. 19E, P, 20E, 21E, 22E, 23E, L, 24E, P, 25E, E′, 26E, R, 27E, O, 28D, M, 29E, 30.

The species in all respects shows the closest resemblance to *Palaemon ortmanni,* but for the dentition of the rostrum. The rostral formula of *P. ortmanni* runs as follows:

$$\frac{2\text{–}3)\ 7\text{–}9 + 2\text{–}3}{7\text{–}9}$$

in *Palaemon gravieri* it is:

$$\frac{2\text{–}3)\ 12\text{–}17 + 4}{5\text{–}6}$$

The rostrum in *P. gravieri* shows the same slender shape as in *P. ortmanni* (in Ortmann's, 1890, figure the rostrum is drawn too slender). It is possible that *P. ortmanni* and *P. gravieri* only form two extremes of a variable species; this, however, only can be proved by more material.

Distribution: The species is known from: Korea (Yoshida, 1941; Kubo, 1942), Tientsin and Tangkoo, China (Yu, 1930a).

Palaemon (*Palaemon*) *serrifer* (Stimpson) (fig. 18)

Leander serrifer Stimpson, 1860, Proc. Acad. nat. Sci. Philad., 1860, p. 41.
Leander serrifer De Man, 1881, Notes Leyden Mus., vol. 3, p. 139.
Leander serrifer Ortmann, 1890, Zool. Jb. Syst., vol. 5, p. 525, pl. 37 fig. 17.
Leander serrifer Doflein, 1902, Abh. Bayer. Akad. Wiss., vol. 21, p. 640.
Palaemon serrifer Rathbun, 1902b, Proc. U. S. Nat. Mus., vol. 26, p. 52.
Leander serrifer Balss, 1914, Abh. Bayer. Akad. Wiss., suppl. vol. 2 pt. 10, p. 57.
non *Leander serrifer* Stebbing, 1914, Ann. S. Afr. Mus., vol. 15, p. 31.
Palaemon (*Leander*) *serrifer* Gee, 1925, Lingnaam agric. Rev., vol. 3, p. 158.
Leander serrifer Kemp, 1925, Rec. Indian Mus., vol. 27, p. 305.
Leander serrifer Urita, 1926, Dobuts Zasshi, vol. 38, p. 428.
Palaemon (*Leander*) *serrifer* Kellogg, 1928, Lingnan Sci. Journ., vol. 5, p. 352.
Leander serrifer Yokoya, 1930, Sci. Rep. Tohôku Imp. Univ., ser. 4 vol. 5, p. 543.
Leander Fagei Yu, 1930a, Bull. Soc. zool. France, vol. 55, p. 561, fig. 2.
Leander serrifer Yu, 1930a, Bull. Soc. zool. France, vol. 55, p. 567, figs. 4A-C.
Leander serrifer longidactylus Yu, 1930a, Bull. Soc. zool. France, vol. 55, p. 570, figs. 4 B′, C′.
Leander serrifer Kubo, 1937, Bull. Japan. Soc. sci. Fish., vol. 5, p. 346, figs. 1D, 2G, 2H, 3N, 3O, 3P, 3Q.
Leander serrifer Kubo, 1942, Journ. Imp. Fish. Inst. Tokyo, vol. 35, p. 33, figs. 8, 9, 19C, N, 20C, 21C, 22C, 23C, J, 24C, N, 25C, C′, 26C, P, 27C, M, 28B, K, 29C, 30.

Museum Leiden

Amoy, China; leg. G. Schlegel. — 167 specimens (included ovigerous females) 34-48 mm.
Northcoast of Java; 1906; leg. P. Buitendijk. — 1 ovigerous female 34 mm.
Northcoast of Java near Tandjong Priok; 1906; leg. P. Buitendijk. — 1 specimen 29 mm.
Southcoast of Madura; 1914; leg. P. Buitendijk. — 7 specimens (included ovigerous females) 32-38 mm.

Description: The rostrum (fig. 18a) is straight with the distal part often slightly curved upwards, it reaches to or slightly (with 1/5 of its length) beyond the apex of the scaphocerite. The upper margin is provided with 9 to 16 small teeth, the first two or three of which are placed on the carapace behind the orbit. The distance between the first and the second tooth is larger than that between the second and the third. The intervals beween the teeth become larger distally, the last and the penultimate tooth often are separated by a large interspace. There are one or two subapical teeth on the rostrum, which in some specimens are removed rather far from the apex. The lower margin of the rostrum bears 3 to 5 (generally 4) strong teeth. On both upper and lower margin there is a single row of setae.

The antennal and branchiostegal spines are of about the same strength. The branchiostegal spine is placed on the anterior margin of the carapace. The anterolateral angle of the carapace is about rectangular with a rounded apex.

The sixth abdominal segment is 1.5 times as long as the fifth.

The telson is somewhat longer than the sixth abdominal segment. The anterior pair of spines

is situated in or slightly beyond the middle of the telson, the posterior pair is placed about midway between the anterior pair and the posterior margin of the telson.

The eyes are normal in shape. A distinct ocellus is present.

The stylocerite (fig. 18b) is long and slender, it reaches about to the middle of the basal segment of the antennular peduncle. The anterolateral spine of the basal segment reaches as far forwards as the middle of the second segment. The anterior margin of the basal segment is convex but does not overreach the anterolateral spine. The third segment of the peduncle is about 1.5 times

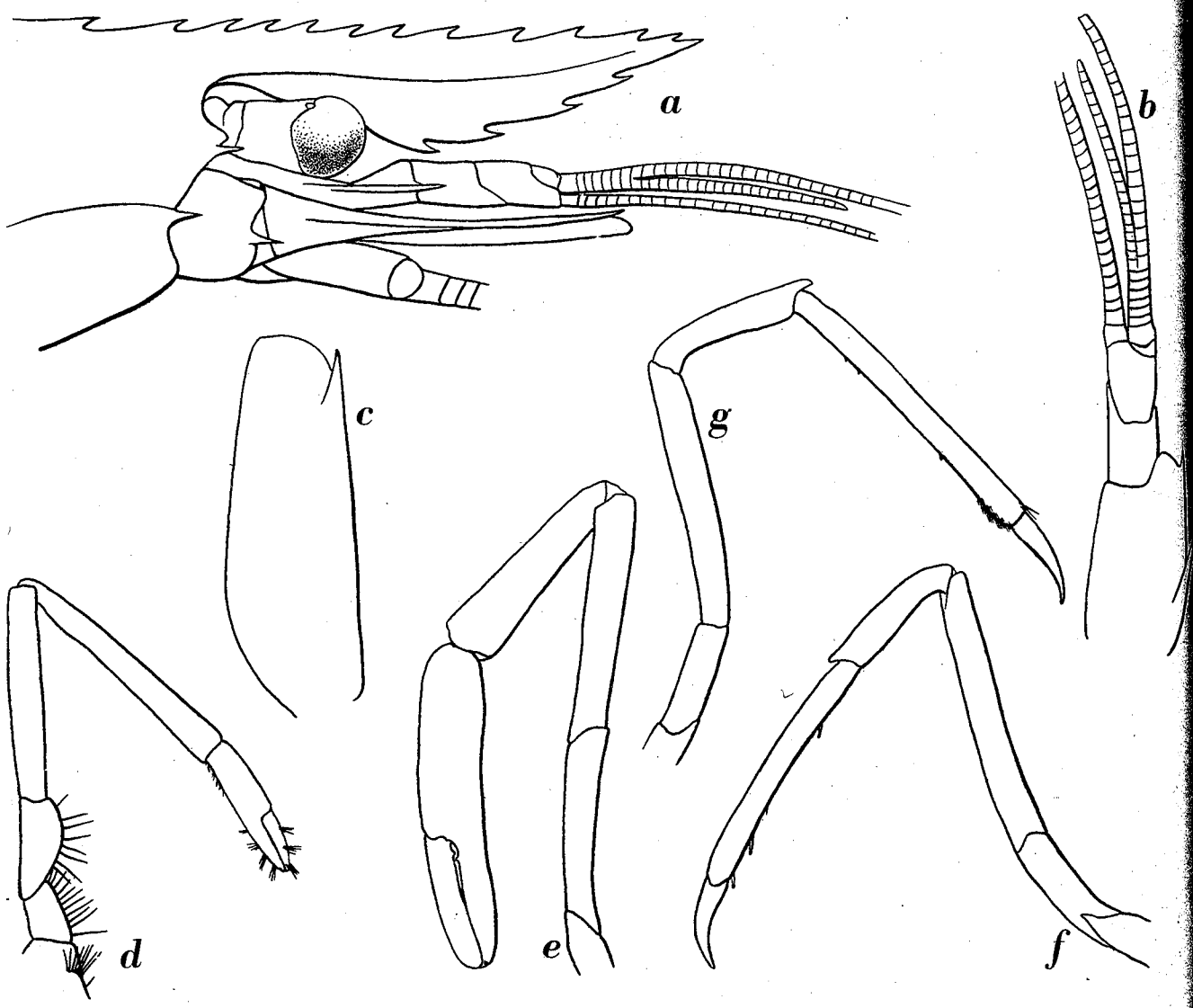

Fig. 18. *Palaemon* (*Palaemon*) *serrifer* (Stimpson). a, anterior part of body in lateral view; b, antennula; c, scaphocerite; d, first pereiopod; e, second pereiopod; f, third pereiopod; g, fifth pereiopod. a-g, × 8.

as long as the second; together the second and third segments are somewhat shorter than the basal segment. The upper antennular flagellum has the two rami fused for 5 to 8 joints, the free part of the shorter ramus consists of 18 to 26 joints, being thereby thrice as long as the fused portion. The inner margin of the shorter ramus is not so distinctly serrate as in *Palaemon pacificus*.

The scaphocerite (fig. 18c) reaches with $^1/_5$ to $^1/_6$ of its length beyond the antennular peduncle

It is somewhat less than or quite thrice as long as broad. The lamella slightly overreaches the final tooth.

The oral parts are quite typical and do not show any remarkable feature. The third maxillipede reaches to or somewhat beyond the end of the antennal peduncle. The last joint is about $^3/_4$ of the length of the penultimate joint and about half as long as the antepenultimate.

The first pereiopod (fig. 18d) is slender, it reaches to or with the fingers beyond the end of the scaphocerite. The fingers are slender and somewhat shorter than the palm. The carpus is about 1.5 times as long as the chela. The merus is somewhat shorter than the carpus. The ischium is half as long as the merus. The second pereiopod (fig. 18e) is strong, it is very variable in length, in some specimens it reaches with the chela, in others with the chela and a part of or even with the entire carpus beyond the scaphocerite. The fingers are slender; the palm is 1.4 to 1.8 times as long as the fingers. The dactylus bears two, the fixed finger one tooth in the proximal part of the cutting edge, these teeth sometimes are very inconspicuous. The palm is cylindrical. The carpus is as long as or somewhat longer than the palm, it varies from $^2/_3$ to $^3/_5$ of the length of the entire chela. The merus is about as long as the carpus. The ischium has about $^2/_3$ of the length of the merus. The last three pereiopods are rather slender. The third pereiopod (fig. 18f) reaches with a part of or with the entire dactylus beyond the scaphocerite. The propodus is 2.6 to 3 times as long as the dactylus. The posterior margin of the propodus bears some 4 to 6 scattered spinules. The carpus is half as long as the propodus. The merus is as long as the propodus. The ischium is half as long as the merus. The fourth pereiopod is similarly built as the third, it only is slightly more slender and reaches a little farther forwards. The fifth pereiopod (fig. 18g) reaches as far forwards as the third. The propodus is 3 to 4 times as long as the dactylus, it is similarly built as the third, only the posterior margin of the propodus bears, apart from the scattered spinules, the usual transverse rows of setae.

The endopod of the first pleopod of the male is ovate, there is no trace of an appendix interna. The other pleopods are quite normal in shape.

The specimens from Amoy have already been recorded by De Man (1881).

Leander Fagei of Yu (1930a) entirely agrees with the present species. According to Yu himself (p. 555) the difference between the two species is that in *Leander Fagei* the rostrum has a larger part curved upwards than in *P. serrifer.* This character, however, in my opinion is too vague and too variable to be used for specific distinction; in my rather large material from Amoy for instance all transitions between Yu's two species occur, so that of many of the specimens it is impossible to say to which of the two forms it belongs. Yu, moreover, figures the second chela of his *Leander Fagei* somewhat more robust than that of his *Leander serrifer,* but this character too is variable. As in all other characters there is the closest resemblance between the two forms, I can not keep them separate. In the same paper Yu distinguishes some specimens of *Palaemon serrifer* as a distinct variety *longidactylus.* This variety is said to differ from the main form in three points:

1. In the typical form the first two teeth of the rostrum are situated behind the posterior orbital margin, in the var. *longidactylus* three teeth.

2. The fused portion of the two rami of the upper antennular flagellum in var. *longidactylus* consists of 5 or 6, the free portion of 23 to 26 joints, in the typical form these numbers are respectively 5 to 7 and 19 to 23.

3. In var. *longidactylus* the relation between the length of the carpus and the chela of the

second leg varies between 0.69 and 0.98, and the relation between the length of the palm and the fingers of that leg varies between 1.14 and 1.30. These relations in the typical form are respectively 0.70 to 0.85 and 1.43 to 1.60.

The first character is very variable, sometimes the third tooth of the upper margin of the rostrum is placed behind, sometimes above and sometimes before the posterior limit of the orbit and it is in no way connected with the number of free joints of the shorter ramus of the upper flagellum, which in my material varies freely between 18 and 26. The relation between the lengths of the carpus and chela of the second leg is of no value at all, as that of the typical form falls entirely within the range of that of the variety. The relation between the length of the fingers and that of the palm of the second leg too is variable: in Kemp's material it varied between 1.4 and 1.7, in my material between 1.35 and 1.8. In Yu's material of the variety *longidactylus* the fingers of the second leg indeed are longer than in the typical material, but this difference is very small. If the variety *longidactylus* must be considered as a separate form, then its only difference with the typical form lies in the relatively longer fingers of the second legs.

The specimen recorded by Stebbing (1914) from Port Elizabeth belongs to *P. capensis* as is pointed out by Barnard (1947).

Distribution: The species is a marine litoral form. It is reported in literature from: Bandra near Bombay (Kemp, 1925), Byick Hwaaw Bay and Daimond Island off Cape Negrais, Burma (Kemp, 1925), Jack and Una Island and Paway Island, Mergui Archipelago (Kemp, 1925), ? Hakodate, Yesso, Japan (Doflein, 1902), Fukikoshi and Sai Bay, Mutsu Bay (Yokoya, 1930), Kominato (Balss, 1914; Kubo, 1942), Tokio Bay (Ortmann, 1890), Tokio (Balss, 1914), Tanagawa (Ortmann, 1890), Yokohama (Doflein, 1902), Sagami Bay (Balss, 1914), Misaki (Rathbun, 1902b; Balss, 1914), Aburatsubo (Balss, 1914), Atami (Rathbun, 1902b), Oshima (Stimpson, 1860), Nagasaki (Balss, 1914), Vladivostoc (Balss, 1914), Peitaiho (Yu, 1930a), Tangkoo Yu, 1930a), Shantung peninsula (Yu, 1930a), Chefoo (Yu, 1930a), Tsingtao (Doflein, 1902; Urita, 1926), Hangchow (Balss, 1914), Wenchow (Gee, 1925; Kellogg, 1928), Foochow (Kellogg 1928), Amoy (De Man, 1881; Gee, 1925; Kellogg, 1928), Hongkong (Stimpson, 1860; Kellogg, 1928), Making, Pescadores Islands (Balss, 1914), Yangmatao (Yu, 1930a) (the exact position of the last locality is unknown to me). The present specimens from Java largely extend our knowledge of the range of distribution of this species.

Palaemon (*Palaemon*) *longirostris* H. Milne Edwards

De Man (1924) erected a new variety of this species for the specimens of the Dutch estuaries; this variety also was found in the S.W. of France (Biarritz and the mouths of the rivers Adour and Nivelle). This form was named by the Dutch carcinologist *Leander longirostris* var. *robusta*. The only typical specimens of the species examined by De Man originated from the Guadalquivir near Sevilla. The specimens on which H. Milne Edwards's original description is based came from the Garonne. These specimens may be expected to belong to the same form as those from the other rivers of S. W. France; De Man, however, considered Milne Edwards's specimens to belong to the same form as the specimens from the Guadalquivir, because in the latter the rostrum is longer than in the specimens from the Atlantic coasts. Milne Edwards in his

description, however does not give characters which make it certain that his specimens belong to one of the two forms; as from the southwest coast of France after thorough investigations only the form *"robusta"* is found, we may safely consider it certain that Milne Edwards's specimens belong to that form. Thus the specimens from the estuaries of England, Germany, Holland, Belgium and W. France are the typical *Palaemon longirostris,* while the specimens from the Guadalquivir may belong to a separate variety. As the entire collection of *Palaemon* species of Dr. J. G. de Man at present is preserved in the Zoological Museum at Amsterdam, I had the opportunity to examine all specimens mentioned in De Man's papers. The specimens from Sevilla indeed are more slender than those from the Atlantic coasts, they have the legs more slender and the rostrum longer, but I hesitate to give them a new name, as there is very little known about the shape of the specimens from other southern localities and the variability of the length of the rostrum and the legs in those specimens.

Palaemon (*Palaemon*) *squilla* (Linnaeus)

As already pointed out on p. 55 the species named here *Palaemon squilla* is not the form indicated by most authors under the name *Leander* or *Palaemon squilla,* but is identical with their *Leander* (or *Palaemon*) *adspersus. Leander Brandti* Czerniavsky, according to the description, differs from the present species by having the merus as long as the carpus and the palm (not the chela as Kemp, 1925, p. 294 states) together. It is possible, however, that Czerniavsky overlooked the articulation between the ischium and the merus and considered them to be one segment, namely his "brachium"; in that case the brachium indeed is as long as the carpus and the palm together. Only examination of Czerniavsky's type specimen, however, can give final certainty in this matter.

De Man (1915a) divided the present species into two forms, the typical form from the Black Sea and the var. *Fabricii* from the Baltic Sea, the westcoast of Europe and the Mediterranean. The differences are based on the dentition of the rostrum (the formula in the typical form being generally $\frac{5}{4}$ and in the variety $\frac{6}{3}$) and by the fact that in the typical form the rostrum reaches "especially in young and middle-sized specimens, sometimes also in adult individuals" more or less far beyond the end of the shorter ramus of the antennular peduncle, while in the var. *Fabricii* the shorter ramus reaches beyond the rostrum. In my opinion these two forms can not be kept separate. In the material at my disposal, which includes all material examined by De Man, the rostral formula of specimens from the Black Sea, as well as those from the other regions, is variable and both may bear 5 or 6 upper and 3 or 4 lower teeth. The second character too can not be used to separate two varieties, as in the young specimens from the Black Sea as well as those from Finland, which are at my disposal, the rostrum reaches beyond the shorter ramus of the upper antennular flagellum, while in adult specimens from those two and other regions the ramus generally reaches beyond the rostrum. In my opinion therefore it is not possible to keep the two forms separate. By most authors the varietal names were given to the forms only on account of the locality from where the material originated.

Palaemon (*Palaemon*) *pacificus* (Stimpson) (fig. 19)

Palaemon Quoianus Krauss, 1843, Südafr. Crust., p. 55 (non H. Milne Edwards, 1837).
Leander pacificus Stimpson, 1860, Proc. Acad. nat. Sci. Philad., 1860, p. 40.

Leander affinis p.p. Miers, 1876, Catal. Crust. New Zeal., p. 85.
Leander pacificus De Man, 1881, Notes Leyden Mus., vol. 3, p. 137.
Leander pacificus De Man, 1888, Arch. Naturgesch., vol. 53 pt. 1, p. 559.
Leander pacificus Borradaile, 1899, Willey's Zool. Results, vol. 4, p. 410.
Leander pacificus Doflein, 1902, Abh. Bayer. Akad. Wiss., vol. 21, p. 639.
Leander pacificus De Man, 1902, Abh. Senckenb. naturf. Ges., vol. 25, p. 806.
Palaemon pacificus Rathbun, 1902b, Proc. U. S. Nat. Mus., vol. 26, p. 53.
Leander pacificus Nobili, 1906b, Ann. Sci. nat. Zool., ser. 9 vol. 4, p. 73.
Palaemon pacificus Rathbun, 1906, Bull. U. S. Fish Comm., vol. 23, p. 924, pl. 22. fig. 3.
Palaemon quoianus Stebbing, 1910, Ann. S. Afr. Mus., vol. 6, p. 384.
Leander squilla Stebbing, 1910, Ann. S. Afr. Mus., vol. 6, p. 386.
Leander pacificus Balss, 1914, Abh. Bayer. Akad. Wiss., suppl. vol. 2 pt. 10, p. 57.
Leander affinis p.p. Lenz & Strunck, 1914, Deutsche Südpolar Exped., vol. 15, p. 322.
Leander affinis Stebbing, 1914a, Trans. Roy. Soc. Edinb., vol. 50 pt. 2, p. 287.
Leander pacificus Balss, 1915, Denkschr. Akad. Wiss. Wien, vol. 91 suppl., p. 31.
Leander peringueyi Stebbing, 1915, Ann. S. Afr. Mus., vol. 15, p. 75, pl. 17.
Leander gilchristi Stebbing, 1915, Ann. S. Afr. Mus., vol. 15, p. 76, pl. 18.
Leander pacificus Stebbing, 1917, Ann. S. Afr. Mus., vol. 17, p. 34, pl. 4B.
Palaemon (Leander) pacificus Gee, 1925, Lingnaam agric. Rev., vol. 3, p. 158.
Leander pacificus Kemp, 1925, Rec. Indian Mus., vol. 27, p. 307.
Leander pacificus Balss, 1927, Trans. zool. Soc. Lond., vol. 22, p. 223.
Leander pacificus Gurney, 1927, Trans. zool. Soc. Lond., vol. 22, p. 229.
Leander pacificus Yu, 1930a, Bull. Soc. zool. France, vol. 55, p. 555.
Leander pacificus Kubo, 1937, Bull. Japan. Soc. sci. Fish., vol. 5, p. 346, figs. 1C, 2D, 2E, 2F, 3D, 3E, 3F, 3G, 3H, 3K, 3L, 3M.
Leander pacificus Gurney, 1938, Sci. Rep. Great Barrier Reef Exped., vol. 6, p. 3, figs. 1-7.
Leander pacificus Kubo, 1942, Journ. Imp. Fish. Inst. Tokyo, vol. 35, p. 42, figs. 10, 11, 12, 19B, M, 20B, 21B, 22B, 23B, I, 24B, M, 25B, B′, 26B, O, 27B, L, 29B, 31.
Leander pacificus Edmondson, 1946, Spec. Publ. Bishop Mus. Honolulu, vol. 22, p. 251, fig. 152d.
Leander pacificus Barnard, 1947, Ann. Mag. nat. Hist., ser. 11 vol. 13, p. 390.

Snellius Expedition

Kambang; shore and reef; November 26-28, 1929. — 4 specimens (included ovigerous females) 44-51 mm.

Museum Leiden

Amboina; 1879; leg. Schorel. — 4 specimens 41-45 mm.
Ternate; 1893-1894; leg. W. Kükenthal. — 2 specimens 37 and 46 mm.
Honolulu; May 12, 1917; leg. P. Buitendijk. — 1 ovigerous ♀ 43 mm.

Museum Amsterdam

Durban; October 3, 1894; leg. M. Weber. — 2 specimens 18 and 24 mm.
Durban, mangrove swamps; 1894; leg. M. Weber. — 9 specimens (included 1 ovigerous female) 17-44 mm.
Knysna, S. Africa; October, 1894; leg. M. Weber. — 14 specimens (included ovigerous females) 41-53 mm.

Amboina; leg. J. Brock; coll. J. G. de Man. — 1 specimen 44 mm.

The specimens agree with K e m p ' s (1925) description. In my specimens the stylocerite (fig. 19b) is slender, but just fails to reach the middle of the basal segment of the antennular peduncle.

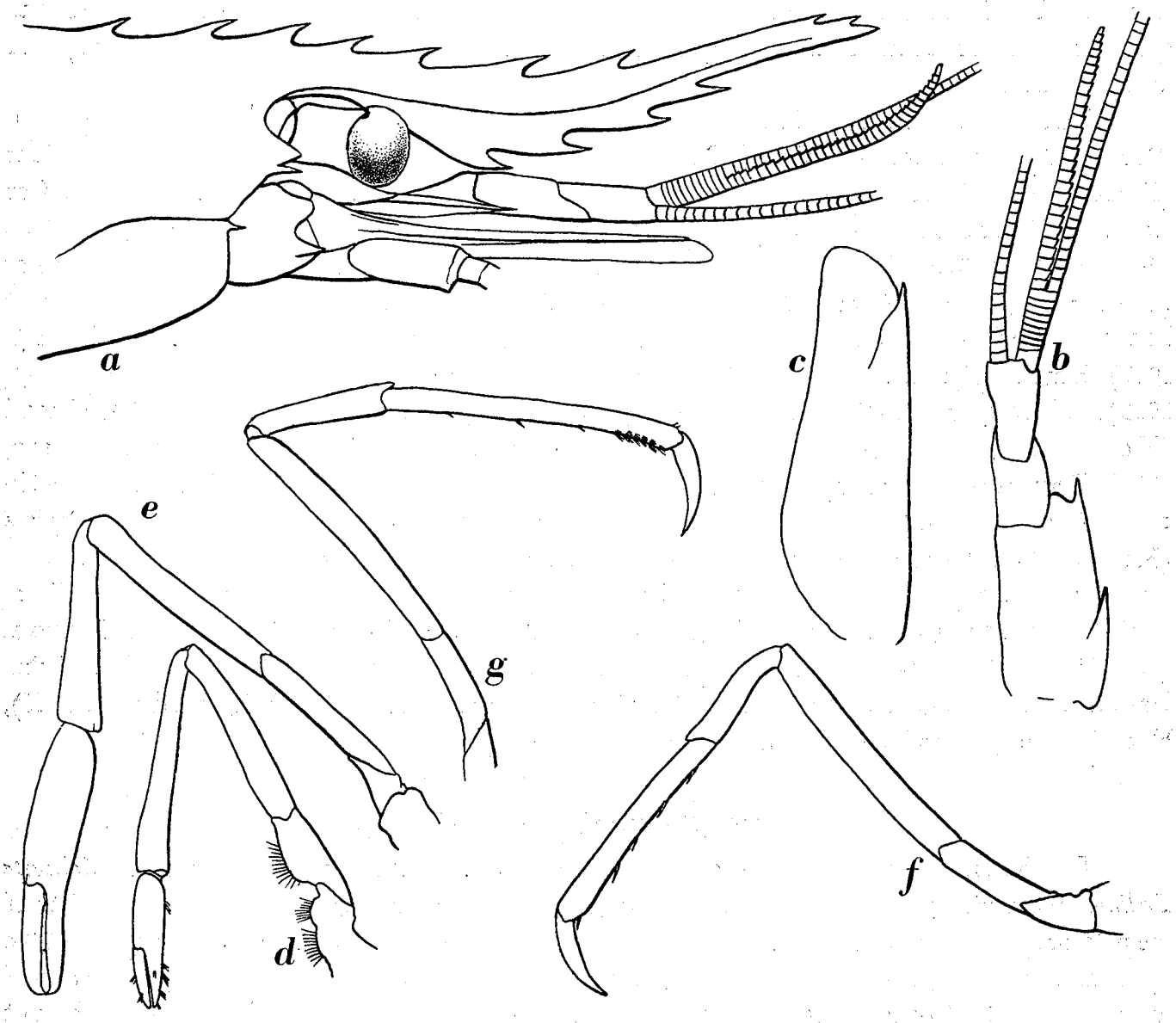

Fig. 19. *Palaemon* (*Palaemon*) *pacificus* (Stimpson). a, anterior part of body in lateral view; b, antennula; c, scaphocerite; d, first pereiopod; e, second pereiopod; f, third pereiopod; g, fifth pereiopod. a-g, × 8.

The third maxillipede reaches with half the ultimate joint beyond the antennal peduncle. The ultimate segment is about $^2/_3$ of the length of the penultimate and half the length of the antepenultimate. The first pereiopod has the carpus slightly longer than the merus and not slightly shorter as stated by K e m p. The fingers of the second pereiopod both bear one small tooth in the proximal part of the cutting edge. The oral parts are typical. The endopod of the first pleopod of the male is ovate with the inner margin concave, no trace of an appendix interna is visible there. The other pleopods are quite normal.

As already pointed out by Barnard (1947), the specimens recorded from S. Africa under the names *Palaemon quoianus, Leander affinis, Leander squilla, L. peringueyi* and *L. gilchristi,* belong to the present species. *Palaemon affinis* does not occur in S. Africa, *L. peringueyi* and *L. gilchristi* are based on specimens of *Palaemon pacificus* with a deformed rostrum.

The specimen from Amboina in the collection of the Leiden Museum has already been mentioned by De Man (1881), that from Ternate in De Man's (1902) paper, while the Amboina specimen in the collection of the Zoological Museum at Amsterdam is inserted in the 1888 paper of the same author.

Distribution: This litoral form is known from the following localities: Red Sea (Nobili, 1906), Little Bitter Lake, Suez Canal (Balss, 1927), Suez (Balss, 1927), Ain Musa, Gulf of Suez (Kemp, 1925; Balss, 1927), Tor, Gulf of Suez (Kemp, 1925), Naiwibi (= ? Nuebe, Gulf of Aquaba) (Balss, 1915), Ghardaqa, Red Sea (Gurney, 1938), Cape of Good Hope (Krauss, 1843; Miers, 1876; Nobili, 1906), Saldanha Bay, S. Africa (Stebbing, 1914a), Reitz Bay (Stebbing, 1914a), Capetown (Lenz & Strunck, 1914), Table Bay and False Bay to East London, Cape Province (Barnard, 1947), False Bay (Stebbing, 1910), Mosselbay (Stebbing, 1917), Knysna (Barnard, 1947), Port Elizabeth (Barnard, 1947), East London (Stebbing, 1915), off Delagoa Bay, Portuguese E. Africa, 33° 49′ S, 25° 56′ E (Stebbing, 1915), Karachi (Kemp, 1925), Mormugao Bay, Portuguese India (Kemp, 1925), Cape Comorin, S. India (Kemp, 1925), Kominato, Hondo, Japan (Kubo, 1942), Sagami Bay (Doflein, 1902), Misaki (Rathbun, 1902b), Dzushi, Fukuura and between Ito and Hatsushima, Sagami Bay (Balss, 1914), Oshima (Kubo, 1942), Shimoda (Stimpson, 1860; Kubo, 1942), Miya (Kubo, 1942), Wakanoura, Hondo (Rathbun, 1902b), Nobeoka and Itiki, Kyushyu (Kubo, 1942), Nagasaki (Rathbun, 1902b), Hongkong (Stimpson, 1860), Ternate, Moluccas (De Man, 1902), Amboina, Moluccas (De Man, 1881, 1888), Isle of Pines, New Caledonia (Borradaile, 1899), Honolulu, Oahu, Hawaiian Archipelago (Rathbun, 1906), Hawaii (Stimpson, 1860; Edmondson, 1946), Hilo, Hawaii (Rathbun, 1906).

Palaemon (*Palaemon*) *serratus* (Pennant)

De Man (1915a) distinguished the form described by Risso under the name *Melicerta Triliana* and which by other authors was named *Palaemon* (or *Leander*) *treillianus,* as a variety of the present species. The variety is said to differ from the main form by having the shorter ramus of the upper antennular flagellum longer than in the typical form (reaching 4.5 to 4.6 mm beyond the tip of the rostrum instead of 2.5 mm) and by having the second joint of the mandibular palp somewhat broader (1.7 times as long as thick instead of 2.5 to 2.7 times). In the large material at my disposal, which includes all material examined by De Man, these two characters showed to be too variable to be of even varietal value. The variety *treillianus* therefore is suppressed here. In the collection of the Zoological Museum at Amsterdam two specimens of the present species are present, which were sent by Mr. S. F. Gimenez to Dr. J. G. de Man under the name *Palaemon rostratus* Gimenez and which were captured near St. Jean de Luz (S. W. France). These specimens were identified by Dr. de Man as *Leander serratus.* Herewith the identity of Gimenez's species, which never has been described and the name of which is published only as a nomen nudum in his (1922) article, is established.

Palaemonetes Heller, 1869

Kemp (1925) gave a revision of this genus, with a key to all species known to him at that moment. The following species have been described as new after the publication of Kemp's paper: *Palaemonetes chankensis* Buldovsky (1933), *Palaemonetes venephicus* Birstein & Vinogradov (1934), *Palaemonetes carteri* Gordon (1935), *Palaemonetes zariquieyi Sollaud* (1938), *Palaemonetes pacificus* Gurney (1939), *Palaemonetes gibarensis* Chace (1943), and *Palaemonetes inermis Chace* (1943). *P. chankensis* and *P. venephicus* both are synonymous with *P. sinensis* (Sollaud), while *Palaemonetes pacificus* is based on a specimen of *Palaemon debilis*. Both *P. gibarensis* and *P. inermis* are transferred now to the genus *Troglocubanus,* just like the species *P. calcis* and *P. eigenmanni,* which were included by Kemp in the genus *Palaemonetes.* Another species considered by Kemp (1925) to be a *Palaemonetes* is here removed from that genus; this species is *Palaemonetes hornelli* Kemp, which is now placed in the genus *Leandrites* and is identified with *Leandrites celebensis* (De Man).

Sollaud (1938) divided the European and Mesopotamian *Palaemonetes* forms into 5 species: *Palaemonetes varians,* a brackish water form ranging from the W. Baltic and the North Sea to the westcoast of Morocco and penetrating into the western Mediterranean, *Palaemonetes antennarius,* which lives in the fresh waters of Italy and the Balkans, *P. Zariquieyi* from the very slightly brackish (oligohaline) water of the Gulf of Valencia, *P. mesogenitor* from fresh water of Tunisia and Algeria and *P. mesopotamicus* from fresh water of Mesopotamia. A key is given by Sollaud to these species. I do not know if *P. antennarius, mesopotamicus* and *zariquieyi* really can be maintained as distinct species. Examination of abundant material from various localities of the Mediterranean region is much needed. So for instance in the collection of the Rijksmuseum van Natuurlijke Historie at Leiden a specimen from Barcelona is preserved, which certainly does not belong to *P. zariquieyi,* but to *P. antennarius.* In the list of the species of the present genus (p. 9-11) I have treated, provisionally at least, the forms as separate species.

One indo-westpacific species of *Palaemonetes* is at my disposal:

Palaemonetes sinensis (Sollaud) (figs. 20, 21)

Allocaris sinensis Sollaud, 1911, Bull. Mus. Hist. nat. Paris, vol. 17, p. 50, figs. 1, 2.
Palaemonetes sinensis Kemp, 1918a, Mem. Asiat. Soc. Bengal, vol. 6, p. 272.
Palaemonetes (*Allocaris*) *sinensis* Sollaud, 1923, Bull. biol. France Belg., vol. 57, p. 589.
Palaemon sinensis Gee, 1925, Lingnaam Agric. Rev., vol. 3, p. 158.
Palaemonetes sinensis Kemp, 1925, Rec. Indian Mus., vol. 27, p. 316.
Palaemonetes chankensis Buldovsky, 1933, Bull. Far East. Br. Acad. Sci. U.S.S.R., 1933, p. 43, pl. 1, pl. 2 figs. 12-16, 18, 19.
Palaemonetes venephicus Birstein & Vinogradov, 1934, Zool. Journ. Moscow, vol. 13, p. 45, fig. 3.
Palaemonetes sinensis Birstein, 1939, Zool. Journ. Moscow, vol. 18, pp. 55, 61.
Palaemonetes sinensis Birstein, 1941, Life Freshw. U.S.S.R., vol. 1, p. 424.

Museum Amsterdam:

Marsh near Tientsin, China; May, 1909; leg. Miss A. Hüllmann. — 6 specimens 22-46 mm.

The present specimens perfectly agree with Sollaud's and Kemp's descriptions. The rostrum (fig. 20a) is straight, it bears 5 or 6 upper and 1 or 2 lower teeth, the tip of the rostrum in

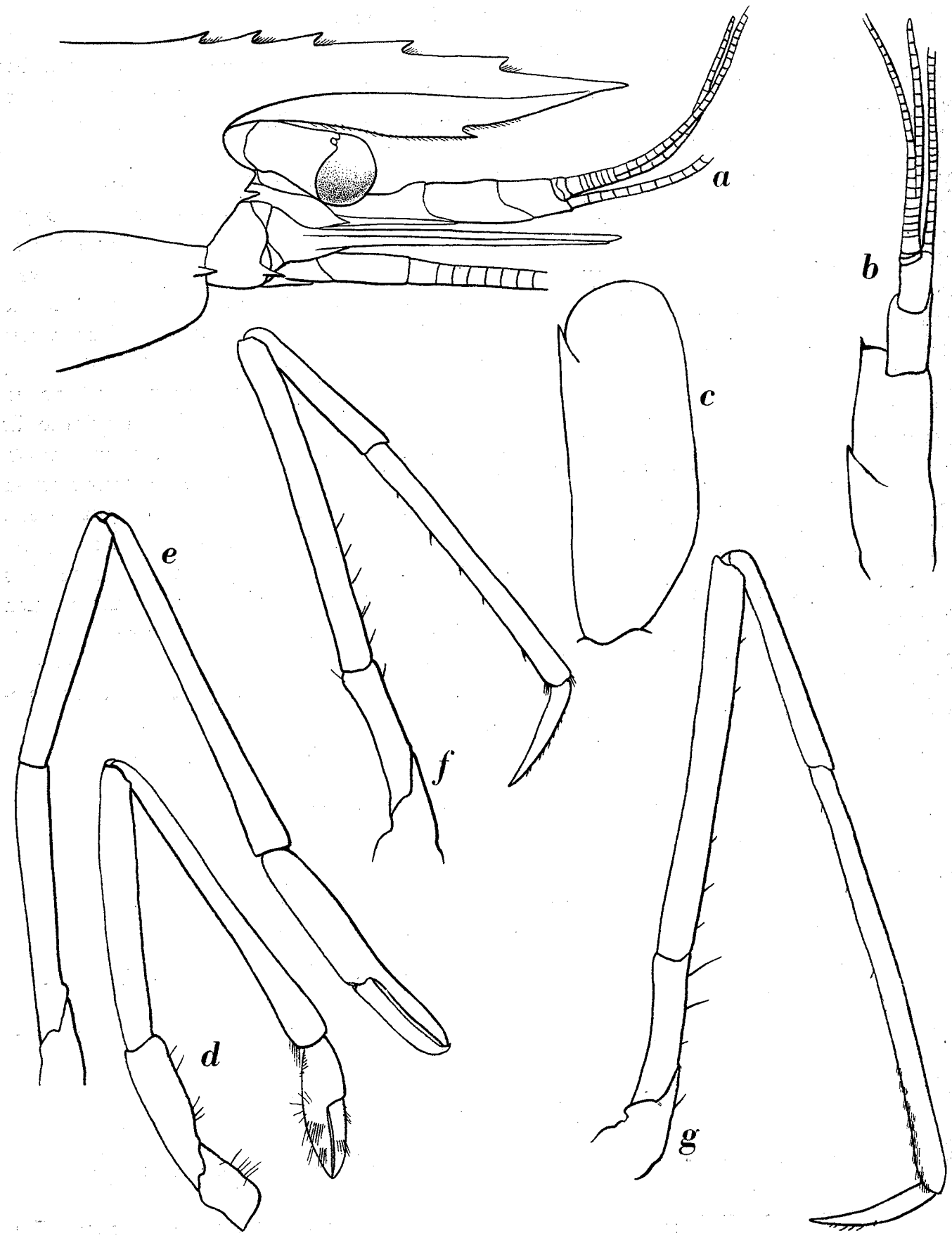

Fig. 20. *Palaemonetes sinensis* (Sollaud). a, anterior part of body in lateral view; b, antennula; c, scaphocerite; d, first pereiopod; e, second pereiopod; f, third pereiopod; g, fifth pereiopod. a-g, × 10.

all my specimens is simple and reaches about to the end of the scaphocerite. The first dorsal tooth of the rostrum generally is placed on the carapace behind the orbit; in one specimen at my disposal, however, all the dorsal teeth are situated on the rostrum proper. The carapace is smooth. The antennal spine is placed some distance below the rounded lower orbital angle. The branchiostegal spine is about as strong as the antennal, it is placed slightly behind the anterior margin of the carapace; this distance, however, is so small, that the spine reaches with the larger part of its length beyond the margin. The branchiostegal groove is distinct.

The abdomen is smooth. The first three segments have the pleurae broadly rounded, the pleurae of the fourth and fifth segment are narrower, but have the apex rounded too. The sixth segment is somewhat longer than the fifth.

The telson is slightly longer than the sixth abdominal segment. Its dorsal surface bears two pairs of spinules, the anterior of which is situated in the middle of the telson, the posterior pair halfway between the anterior pair and the posterior margin of the telson. The telson ends in a distinct sharp median point, which is flanked at each side with the two usual spines; between the two longer spines four pairs of feathered setae and one unpaired seta are present.

The eyes are well developed. The cornea is shorter and somewhat broader than the stalk, it is distinctly pigmented and is provided with an ocellus.

The basal segment of the antennular peduncle (fig. 20b) is broad, the stylocerite is slender and pointed, it does not reach the middle of the basal segment. The anterolateral angle of the basal segment ends in a distinct spine, which overreaches the convex anterior margin of the basal segment. The second segment of the peduncle is about as long as the third segment, when measured in dorsal line. The two rami of the upper antennular flagellum are fused for 6 to 8 joints, the free part of the shorter ramus consists of 15 to 18 joints and is 3 or 4 times as long as the fused part.

The scaphocerite (fig. 20c) is about $2^{3}/_{4}$ as long as broad, the outer margin is convex in the distal part; the final tooth of the outer margin fails to reach the rounded end of the lamella.

The mandible (fig. 21a) has the incisor process ending in three teeth, the molar process ends in blunt knobs, no palp is present on the mandible. The inner lacinia of the maxillula (fig. 21b) is rather broader than in other species of the genus. The maxilla (fig. 21c) is normal in shape. The first maxillipede is peculiar in shape, the coxa and basis namely are widely separated, moreover the epipod is small. The second and third maxillipede are normal in shape. The last joint of the third maxillipede measures $^{3}/_{4}$ of the length of the penultimate joint, the antepenultimate joint is about 1.5 times as long as the penultimate. The last joint of the third maxillipede reaches to the end of the basal segment of the antennular peduncle.

The first pereiopod (fig. 20d) reaches to the end of the scaphocerite. The chela is rather broad. The fingers are longer than the palm. The carpus is almost 2.5 times as long as the chela and it is $^{1}/_{5}$ longer than the merus. The second leg (fig. 20e) is slender, it reaches with almost the entire chela beyond the scaphocerite. The fingers are slender, they are little more than $^{2}/_{3}$ as long as the palm. The carpus is somewhat more than $^{4}/_{3}$ as long as the chela, while the merus is about as long as the chela. The third pereiopod (fig. 20 f) largely fails to reach the end of the scaphocerite, while the fifth pereiopod reaches to or slightly beyond the tip of that scale. The propodus of the third pereiopod is almost 2.5 times as long as the dactylus, there are some spinules present along the posterior margin. The carpus is somewhat less than $^{2}/_{3}$ as long as the propodus. The merus is

longer than the propodus. The fourth pereiopod is somewhat more slender than the third. The fifth leg (fig. 20g) is still more slender; here the propodus is about thrice as long as the dactylus; the posterior margin of the propodus bears, apart from some scattered spinules, several transverse rows of hairs, which are placed in the distal part. The carpus is almost half as long as the propodus. The merus is slightly shorter than the propodus.

The pleopods are normal in shape. The endopod of the first pleopod of the male (fig. 21d) is ovate, with the inner margin concave, there is no trace of an appendix interna. The second pleopod

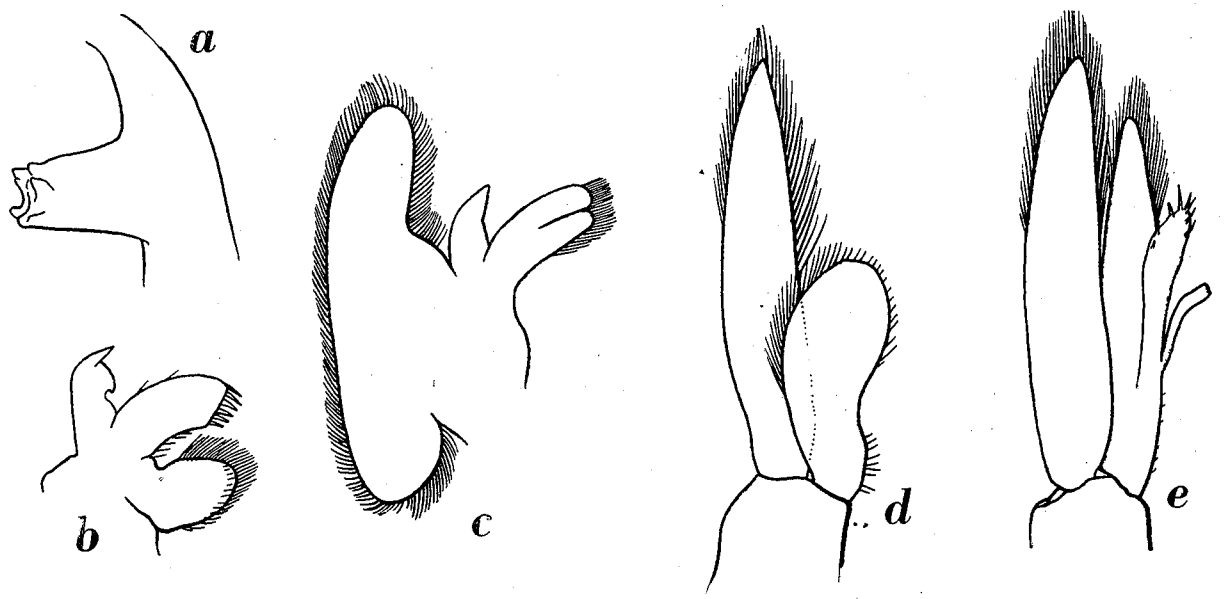

Fig. 21. *Palaemonetes sinensis* (Sollaud). a, mandible; b, maxillula; c, maxilla; d, first pleopod of male; e, second pleopod of male. a-e, × 14.

of the male (fig. 21e) has the appendix masculina broadened towards the top and provided there with some spinules, this appendix masculina is much shorter than the endopod and distinctly longer than the appendix interna.

The uropods are normal in shape, they are longer than the telson. The outer margin of the exopod is slightly convex and ends in a distinct tooth, which at its inner side is provided with a movable spinule.

My specimens were found together with *Palaemon modestus* (Heller), *Macrobrachium asperulum* (Von Martens) and *Caridina denticulata* (De Haan).

The specimens described by Birstein & Vinogradov (1934) as new under the name *Palaemonetes venephicus,* show no difference with the present species as far as can be ascertained from the description and figures of the Russian authors, so that it is considered here to be a synonym of the present species. A year before the publication of Birstein & Vinogradov's paper Buldovsky (1934) described from the same region a new species of *Palaemonetes* too; this species was named by him *P. chankensis.* Birstein (1939) pointed out that, just like *P. venephicus*, *P. chankensis* is identical with *P. sinensis.*

Distribution: The present species has been collected in fresh waters of E. Siberia and China. The records in literature are: Santacheza, Liu and Chantacheza, E. Siberia (Birstein, 1939), Lake

Pir (Buldovsky, 1933), Lake near Daubiche, S.E. Siberia (Birstein & Vinogradov, 1934), Peiping (Sollaud, 1911, 1923), Shanghai (Kemp, 1918a).

Leptocarpus nov. gen.

Definition: Rather large and slender prawns. Body slender and compressed. Rostrum well developed, long, provided with teeth on both margins. Upper margin with the basal teeth placed on an elevated crest. A single row of hairs is present on the upper margin, while the lower margin bears a double row, which are placed on the margin proper. The carapace is smooth and provided with antennal spines only. These antennal spines are placed some distance below the rounded orbital angles. A distinct and sharp branchiostegal groove is present, it is situated at the same place as that of the members of *Palaemon.* The abdomen is smooth. The pleurae of the first three segments are broadly rounded, those of the fourth and fifth segments are narrower, but both end in a rounded apex. The sixth segment has the pleurae very short and pointed, the posterolateral angle is pointed too. The sixth segment is distinctly longer than the fifth. The telson is about as long as the sixth segment, it is elongate triangular and is provided with two pairs of dorsal spines. The posterior margin of the telson ends in a sharp median point which is flanked by two pairs of spines; the outer pair of these spines is much shorter than the inner pair. Between the two longer spines a pair of feathered setae is present.

The eyes are well developed, and bear a hemisphaerical cornea, which is provided with black pigment. An ocellus is present.

The basal segment of the antennular peduncle is broad and is provided with a stylocerite, which is sharply pointed. The anterolateral spine of the basal segment is rather weak, it reaches about to the middle of the second segment. The anterior margin of the basal segment is convex, but reaches little or not at all beyond the base of the anterolateral spine. The second segment of the peduncle is much shorter than the third. The upper antennular flagellum has the shorter ramus fused for a short distance with the longer, the free part of the shorter ramus is much longer than the fused part.

The scaphocerite is well developed. The lamella distinctly overreaches the final tooth of the outer margin. The antennal peduncle fails to reach the middle of the scaphocerite. A strong external tooth is present at the base of the antennal peduncle.

The mandible (fig. 22a) bears a distinct three-jointed palp; the incisor process ends in three teeth, the molar process bears some blunt knobs and ridges in the distal part, no spines are present. The maxillula (fig. 22b) shows close resemblance to that of *Palaemon,* the inner lacinia is rather slender, the upper lacinia ends in some strong spines, the palp is distinct and bifid. The maxilla (fig. 22c) has the endite deeply cleft, the palp is distinct, the scaphognathite is large. The basis and the coxa of the first maxillipede (fig. 22d) are separated by a deep notch, the palp is well developed, the exopod is large, bearing a distinct caridean lobe at the base; the epipod is deeply bilobed, the tip of the upper lobe is somewhat produced. The second maxillipede (fig. 22e) has the same shape as in *Palaemon,* the exopod is well developed, the epipod bears a distinct podobranch. The third maxilipede is slender and provided with an exopod and an epipod, furthermore an arthrobranch and a pleurobranch are present. The first pereiopod is very slender, the fingers are unarmed and provided with tufts of setae; the carpus is elongate. The second legs are extremely slender, the carpus

here too is very long. The last three pereiopods mutually are equal in shape, the posterior legs are longer than the anteriors, all legs are very slender; the dactylus is simple.

All pleopods except those of the first pair are provided with an appendix interna at the endopod. The endopod of the second pair of the males moreover is provided with an appendix masculina. The endopod of the first pleopods of the male is elongate.

The uropods are distinctly longer than the telson. The endopod is ovate, the exopod is longer

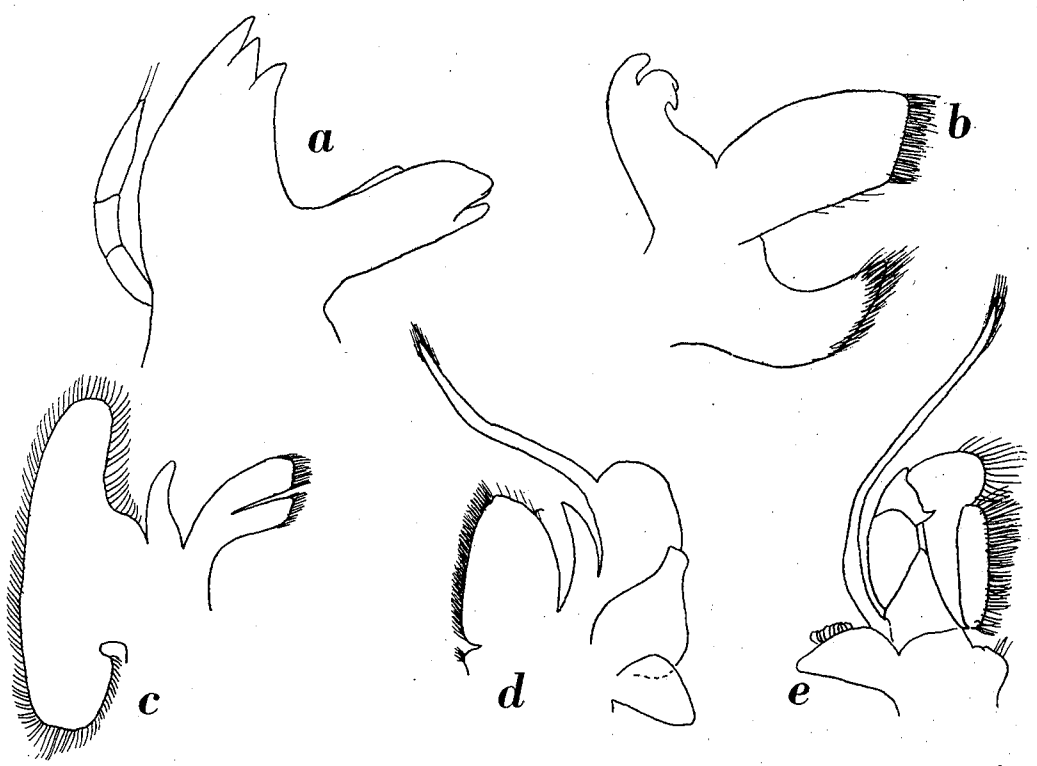

Fig. 22. *Leptocarpus fluminicola* (Kemp). a, mandible; b, maxillula; c, maxilla; d, first maxillipede; e, second maxillipede. a, b, × 27; c-e, × 13.

than the endopod, its outer margin is slightly convex and ends in a strong tooth, which at its inner side is provided with a movable spine. The posterior margin of the exopod is strongly produced posteriorly.

Type: *Leander fluminicola* Kemp, 1917.

The present genus is closely related to the subgenera *Nematopalaemon* and *Exopalaemon* of the genus *Palaemon,* it may, however, at once be recognized by the absence of the branchiostegal spine.

Both species of the present genus are represented in the collections at hand:

Leptocarpus fluminicola (Kemp) (fig. 22)

Leander fluminicola Kemp, 1917, Rec. Indian Mus., vol. 13, p. 223, pl. 9 fig. 2.
Leander fluminicola Kemp, 1925, Rec. Indian Mus., vol. 27, p. 288.

Museum Amsterdam

Pazudaung and Dala Creeks, Rangoon, Burma; August, 1915; leg. N. Annandale; paratypes. — specimens 44-47 mm.

The present specimens formed part of the material on which Kemp's original description is based. They were presented by the Indian Museum to Dr. J. G. de Man, after whose death, they were inserted in the collection of the Amsterdam Museum.

Distribution. The species is known from fresh and slightly brackish water. The only records in literature are those of Kemp from several localities in the United Provinces (India), Bengal and Burma.

Leptocarpus potamiscus (Kemp)

Leander potamiscus Kemp, 1917, Rec. Indian Mus., vol. 13, p. 225, fig. 7.
Leander potamiscus Kemp, 1918a, Mem. Asiat. Soc. Bengal, vol. 6, p. 270.
Leander potamiscus Kemp, 1925, Rec. Indian Mus., vol. 27, p. 288.
Leander potamiscus Rai, 1933, Journ. Bombay nat. Hist. Soc., vol. 36, p. 886.
Leander potamiscus Gordon, 1935a, Ann. Mag. nat. Hist., ser. 10 vol. 16, p. 629.
Palaemon potamiscus Suvatti, 1937, Check-List aquat. Fauna Siam, p. 50.

Museum Leiden

Tandjungmerawa near Medan, N. E. Sumatra; leg. B. Hagen. — 4 specimens 28-50 mm.
Harbour of Belawan Deli; brackish water; December, 1924, leg. P. Buitendijk. — 1 ovigerous female 45 mm.
Belawan Deli, E. coast of Sumatra; June, 1927 and February, 1930; leg. P. Buitendijk. — 44 specimens 34-54 mm.
Tandjong Priok near Batavia; 1907; leg. P. Buitendijk. — 3 specimens (1 ovigerous female) 34-48 mm.
Island Alkmaar, Bay of Batavia; 1906; leg. P. Buitendijk. — 1 ovigerous female 48 mm.
Indramaju, northcoast of West Java; September, 1924; leg. P. Buitendijk. — 9 specimens (included ovigerous females) 52-59 mm.
Tjilatjap, south coast of Central Java; August, 1905; leg. P. Buitendijk. — 1 specimen 42 mm.
Surabaja, E. Java; February, 1927; leg. P. Buitendijk. — 1 ovigerous female 49 mm.

The present specimens agree good with Kemp's description and figure. Most localities in which my material is collected are situated on the coast, where the water is salt or brackish, only Tandjungmerawa is situated 20 to 25 km inland.

Distribution. The species is recorded in literature from: Bombay (Rai, 1933), Sanguem River at Sanvordem and Tuari near Cortalim, Portuguese India (Kemp, 1917, 1918a), Middle Island, Andaman Archipelago (Kemp, 1917, 1918a), Telok Tikus, Penang (Kemp, 1917, 1918a), Bangkok, Siam (Suvatti, 1937), Chao Phya River at Bangsorn and Paknam, Siam (Suvatti, 1937), Bang-pa-kong River, Siam (Suvatti, 1937), Tale Sap, Singora, Siamese Malay States (Suvatti, 1937), Patani River near Patani, Siamese Malay States (Kemp, 1917, 1918a), Belawan, Sumatra (Gordon, 1935a). The present records from Java form an important enlargement of the range of distribution of the species.

Cryphiops Dana (1852)

The present genus differs from *Macrobrachium,* with which it often is united, by the absence of the hepatic spine on the carapace. In *Macrobrachium hildebrandti,* however, this spine sometimes

is absent too. On p. 3 I have already set forward my reasons for keeping *Cryphiops* and *Macrobrachium* as separate genera.

The type and only species of this genus is *Cryphiops spinuloso-manus* Dana. The species is better known under the name *Bithynis gaudichaudii* (H. Milne Edwards). Dana (1852a, b) described *Cryphiops spinuloso-manus* after a specimen in which the eyes, the antennae and antennulae were pressed under the carapace; he thought this probably articifial deformation to be a natural condition and considered the specimen to belong to a new genus and species. Dana's name *Cryphiops* is older than the name *Bithynis* Philippi (1860), and therefore has to be used.

Macrobrachium Bate, 1868

Cancer p.p. Linnaeus, 1758, Syst. Nat., ed. 10 vol. 1, p. 625.
Astacus p.p. Fabricius, 1775, Syst. Ent., p. 413.
Palaemon p.p. Fabricius, 1798, Suppl. Ent. Syst., pp. 378, 402.
Macrobrachium p.p. Bate, 1868, Proc. zool. Soc. Lond., 1868, p. 363.
Bithynis p.p. Bate, 1888, Rep. Voy. Challenger, Zool., vol. 24, p. 788.
Eupalaemon Ortmann, 1891, Zool. Jb. Syst., vol. 5, p. 696.
Brachycarpus p.p. Ortmann, 1891, Zool. Jb. Syst., vol. 5, p. 696.
Parapalaemon Ortmann, 1891, Zool. Jb. Syst., vol. 5, p. 696.
Macroterocheir Stebbing, 1908, Ann. S. Afr. Mus., vol. 6, p. 39.

Description. The body is compressed, generally it is robust, though in some species (e.g. *M. lanchesteri, M. jelskii, M. palaemonoides*) it is very slender. The rostrum is well developed, serrate and compressed; hairs are present between the teeth. The carapace in young specimens is smooth, in several species numerous small tubercles are present on the carapace of the adult specimens, being earlier visible in the males than in the females and being most distinct in the anterolateral part of the carapace. Antennal and hepatic spines are present (the occasional lacking of the hepatic spine in specimens of species belonging to the present genus must be considered an abnormality). The antennal spine is placed slightly below the rounded orbital angle, the hepatic spine is situated slightly below and behind the antennal spine, being far removed from the anterior margin of the carapace in the adults (in the very young specimens of *M. australe* and *M. lar* (cf. pp. 130, 185) the hepatic spine is placed on the anterior margin of the carapace). A branchiostegal groove is present and visible as a sharp line (in very old specimens the groove sometimes has become rather indistinct), which runs from the anterior margin of the carapace straight to the hepatic spine, where it ends. Aberrant in this respect is *M. palaemonoides,* in which species the branchiostegal groove runs closely below the hepatic spine and continues a considerable distance behind it. This branchiostegal groove must not be confounded with the longitudinal groovelike depression, which is present in most species some distance below and behind the hepatic spine, this depression namely, is not indicated by a sharp line as is the branchiostegal groove.

The abdomen generally is smooth, at least in not full grown animals. In some species (e.g. *M. idae*) numerous small tubercles, similar to those on the carapace of those species, may be seen on the pleurae of the abdominal segments. The pleurae of the first three segments are broadly rounded, those of the fourth and fifth segments are narrower and tapering towards the apex, which is directed posteriorly. The top of the fourth segment always is broadly rounded, that of the fifth

sometimes ends in a minute sharp point. The pleurae of the sixth segment are very small and triangular, they end in a sharp posteriorly directed point. The posterolateral angle of the sixth segment ends in a sharp point, which overhangs the articulation with the telson. The telson is elongate triangular, narrowing posteriorly. Its dorsal surface is smooth or covered with numerous tubercles (e.g. in adult males of some species as *M. idae*). Two pairs of spines always are present on the dorsal surface of the telson. The anterior pair of these spines is placed in the middle of the telson, the posterior pair lies just midway between the anterior pair and the posterior margin of the telson. This posterior margin always ends in a sharp median point, which, however, in adult specimens often is much worn, so that it becomes truncate. The apex is flanked by two pair of spines, the outer of which generally are much shorter than the inner. The inner spines are slender and mostly overreach the apex of the telson (only in *M. rosenbergii, M. amazonicum,* and *M. panamense* these spines fail to reach the apex of the telson). Between the two inner spines several feathered setae are present, varying in number from 2 (e.g. in *M. amazonicum, M. mirabile,* and *M. palaemonoides*) to a very large number (in most species).

The eyes generally are well developed (only in *M. cavernicola* the cornea is strongly reduced in size). The cornea is globular and generally (with the exception of *M. cavernicola*) broader than the peduncle and pigmented. An ocellus always is present.

The antennular peduncle (fig. 23a) consists of three segments, the basal of which is broadest. In the proximal part of the outer margin it bears a slender stylocerite; the anterolateral angle of the segment is provided with a strong forwards directed spine, which overreaches distinctly the convex anterior margin of the segment. The second and third segments are much shorter and narrower than the first, mutually they are of about equal length and breadth. Of the two antennular flagella the lower is simple, the upper consists of two rami, which are fused in the basal part. This fused portion of the two rami consists of various joints: the first joint is largest, then follow 2-10 smaller joints, and finally there are 2-4 joints, which are separated by distinct grooves in their internal half, but are completely fused in their external half, where no trace of the grooves is visible. The shorter ramus of the flagellum consists of numerous joints, the number of which is due to considerable variation within the species.

The antenna has the scaphocerite well developed, it is twice to thrice as long as broad. The outer margin ends in a strong final tooth. The lamella has its anterior margin rounded or produced anteriorly or anterointernally, it generally overreaches the final tooth. The antennal peduncle fails to reach the middle of the scaphocerite. An external tooth always is present at the base of the antennal peduncle.

The mandible (fig. 23b) is distinctly cleft; the incisor process ends in three large blunt teeth, the molar process is provided with blunt knobs and ridges in its distal part. A large three-jointed palp is present (only in *M. cavernicola* the palp is stated to be two-jointed; in all species examined by me the palp is three-jointed). The maxillula (fig. 23c) has the inner lacinia slender, the upper lacinia is broadened and ends in several movable spines, the palp is distinctly bilobed. The maxilla (fig. 23d) has the endite deeply cleft, the palp is simple and well developed, the scaphognathite is large and rather slender. All maxillipedes are provided with well developed exopods. The basis and coxa of the first maxillipede (fig. 23e) are separated by a distinct notch, the palp is well developed and the exopod bears a distinct but not very broad caridean lobe; the epipod is bilobed, the upper lobe ends in

a rather acute point. The second maxillipede (fig. 23f) is more pediform, the last joint is fused with the penultimate along its entire length, the exopod reaches much beyond the endopod; the epipod bears a well developed podobranch. The third maxillipede (fig. 23g) is slender, it generally reaches with about the last joint beyond the antennal peduncle. This last joint measures about $^2/_3$ of the length of the penultimate and about half the length of the antepenultimate joint. The exopod is

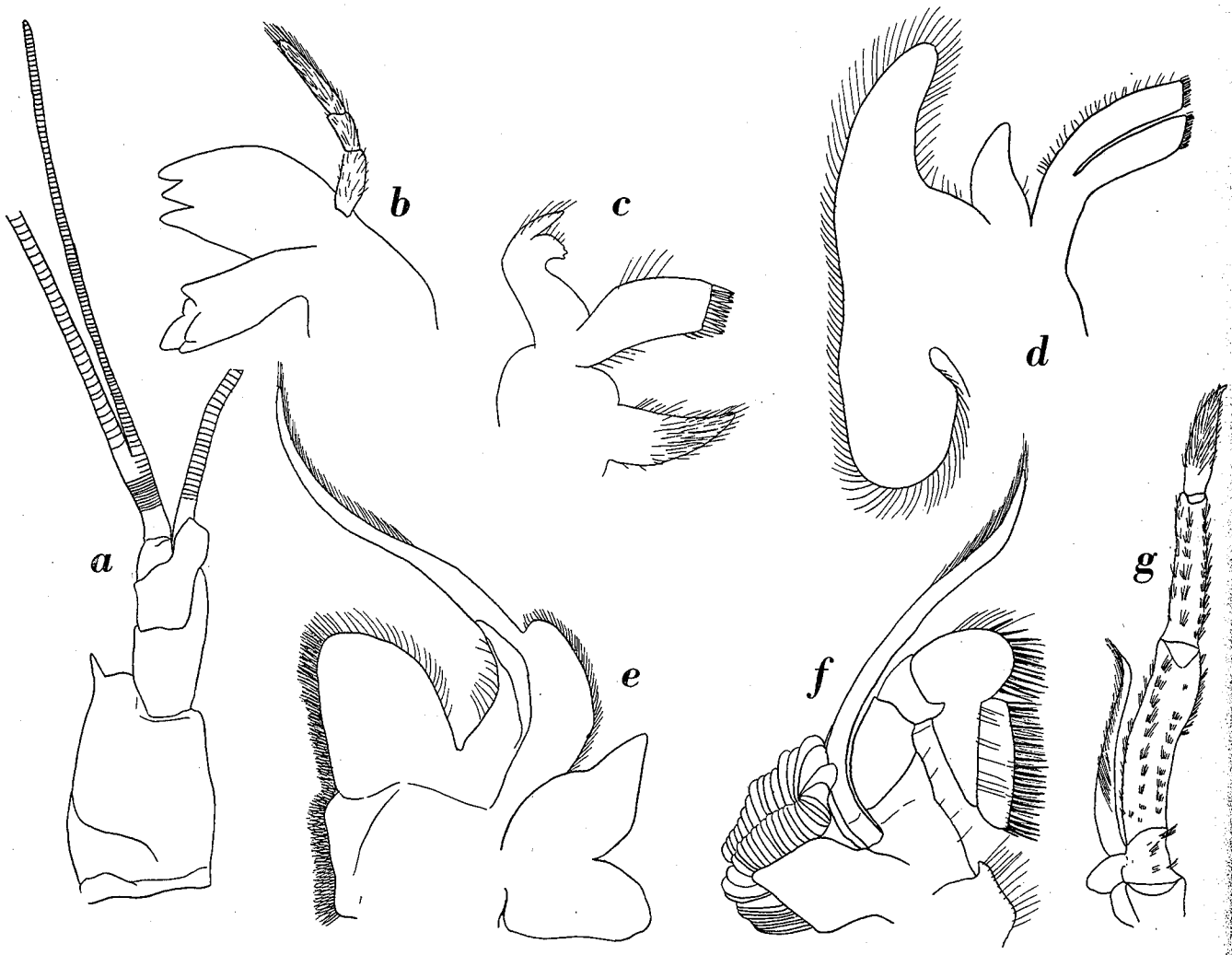

Fig. 23. *Macrobrachium carcinus* (L.). a, antennula; b, mandible; c, maxillula; d, maxilla; e, first maxillipede; f, second maxillipede; g, third maxillipede. a, g, × 2.5; b-f, × 4.

well developed, an epipod is present, while furthermore an arthrobranch as well as a pleurobranch are attached to the base of the maxillipede.

The branchial formula is identical with that of the other Palaemoninae, it runs as follows:

	maxillipedes			pereiopods				
	I	II	III	I	II	III	IV	V
pleurobranchs	—	—	+	+	+	+	+	+
arthrobranchs	—	—	+	—	—	—	—	—
podobranchs	—	+	—	—	—	—	—	—
epipods	+	+	+	—	—	—	—	—
exopods	+	+	+	—	—	—	—	—

The first pereiopods are slender, the chela has the palm about as long as the fingers. No teeth are present on the cutting edges and no tubercles or spines on the rest of the surface, which, however, bears tufts of setae. At the lower surface of the palm and on the ventral surface of the distal part of the carpus groups of stiff setae are present, which together form an organ for cleaning purposes. The carpus is elongate, varying between being 1.5 to twice as long as the chela. The merus is somewhat shorter than the carpus. The shape of the second legs differs greatly in the various species of the present genus. The shape of the second leg is more robust than that of the other legs, and in adult males it often is larger than the entire body. The relation between the joints of the second legs is very different in the various species and in the various stages of one species. The legs may be covered with tubercles and spines or be entirely smooth. Often the right and left legs are equal in shape and size, but in some species there is a marked difference in the size and (or) the shape of these legs. The last three legs are equal in structure, the anterior generally being shorter and less slender than the posteriors. The dactylus is simple and generally provided with an anterior row of hairs. The propodus carries a posterior row of spinules, while in the fifth leg, just like in *Palaemon* there are transverse rows of setae or very fine and slender spinules present in the distal part of the posterior margin of the propodus. In some species the adult males have the various joints of the last three pereiopods closely beset with numerous small spinules.

The first pleopod has the endopod much smaller than the exopod, being still smaller in the female than in the male; in the male the endopod (fig. 24a) is ovate in shape, with the inner margin concave, no trace of an appendix interna is visible. The other pleopods have the endo- and exopods of about the same size, the endopod is provided with a slender appendix interna. In the male moreover, the endopod of the second pleopod (fig. 24b) bears a strong appendix masculina, which is placed between the appendix interna and the endopod, and which is longer and stronger than the appendix interna, it is provided with several stiff setae.

The uropods are ovate, they overreach the telson. The exopod has the outer margin slightly convex and ending in a tooth, which at its inner side bears a longer movable spine (only in *M. lamarrei* I could not detect this spine). The endopod is ovate, and unarmed.

Eggs. The ova have different sizes in the various species; some of the species carrying large eggs (1.0-2.0 mm in diameter) are *M. sintangense, M. pilimanus* and *M. trompii.* In many other species the eggs have a diameter of about 0.5 mm.

Ecology. The majority of the species of the present genus inhabits fresh waters of tropical regions. Some species (e.g. *M. rosenbergii* and *M. equidens*) often are found in brackish water and even may go into the sea. Of several others the localities mentioned in literature are too vague or not trustworthy enough to make it certain that they really occur in sea. Of several species the young hatch in or near the sea, which probably will account for the fact that several of these freshwater species have such a large range of distribution.

Geographic distribution of the indo-westpacific species. A number of species of *Macrobrachium* has a large range of distribution, some for instance are known from E. Africa or India to Polynesia (*M. australe, M. aemulum* and *M. lar*), others range from E. Africa or India to the Malay Archipelago (*M. idae, M. equidens, M. mirabile, M. rosenbergii, M. hirtimanus,* and *M. scabriculum*), *M. rude* and *M. idella* occur in E. Africa and India, *M. hainanense* in China and the Malay Archipelago, while *M. latimanus* is known from W. Sumatra eastwards to the Marquesas. Most other indo-westpacific

species are confined to a smaller area. So *M. lepidactylus, M. petersii, M. patsa, M. hildebrandti, M. petiti, M. niloticum* and *M. moorei* are only known from E. Africa (including Madagascar), *M. lamarrei, M. malcolmsonii, M. naso, M. altifrons, M. cavernicola, M. hendersoni* and *M. dayanum* from India and Burma. Restricted to the Chinese area (including S. Siberia, Japan and Formosa) are 9 species: *M. superbum, M. venustum, M. formosense, M. nipponense, M. japonicum, M. insulare, M. asperulum, M. kiukianense,* and *M. yui.* The Malay Archipelago (including the Malay Peninsula, the Philippines and New Guinea) possesses the following 27 endemic species: *M. weberi, M. latidactylus, M. minutum, M. mammillodactylus, M. sintangense, M. lanceifrons, M. oenone, M. cowlesi,*

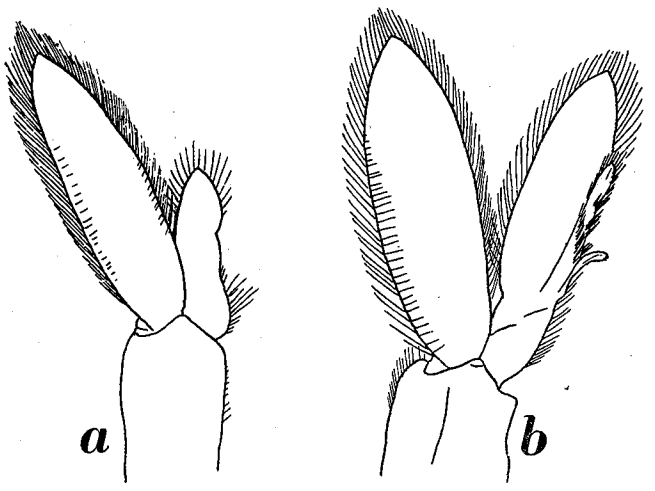

Fig. 24. *Macrobrachium carcinus* (L.). a, first pleopod of male; b, second pleopod of male. a, b, × 3.

M. esculentum, M. geron, M. joppae, M. palaemonoides, M. bariense, M. placidum, M. placidulum, M. lorentzi, M. pilimanus, M. sulcicarpale, M. jacobsoni, M. trompii, M. clymene, M. sophronicum, M. horstii, M. jaroensis, M. callirhoë, M. javanicum, and *M. lanchesteri.* From Australia two endemic species are known: *M. australiense* and *M. novae-hollandiae* (the latter, however, also has been reported from New Caledonia). From Oceania only two endemic species are known, namely *M. caledonicum* from New Caledonia and *M. grandimanus* from the Hawaiian Archipelago.

From the 67 species of *Macrobrachium* at present known with certainty from the indo-west-pacific region not less than 37 occur in the Malay Archipelago. From the region east of the Malay Archipelago only 9 species are known, from the region north of the Archipelago 11 species, and from the region west of the Archipelago 25 species. From the distribution of the species in the Malay Archipelago still too little is known to make it possible to draw zoogeographic conclusions, only the close relation between Sumatra, Borneo, Java and the Malay Peninsula is distinctly shown by the distribution of *M. sintangense, M. pilimanus, M. trompii* and *M. javanicum.*

The difficulty of the study of the genus *Macrobrachium* is largely due to two factors, these are:

1. Most species of *Macrobrachium* resemble each other in so many respects that only a very restricted number of organs are providing characters for the separation of the species (the most important of these organs are the rostrum and the second pereiopods).

2. The large variability of the various characters, which are used for the specific separation of the members of the genus. Apart from individual variability, which often is considerable, the

specimens of one and the same species often show large differences which are only due to age or sex:
A. Differences due to age.

The first differences due to age of course are shown in the embryonic and larval development. Our knowledge of these developments in the present genus is very poor. For literature on this subject I refer to Gurney (1939, pp. 78, 79). It will not be dealt with here.

The postlarval stages of three species (*M. australe, M. latimanus* and *M. lar*) are treated in the present paper (cf. respectively pp. 130, 208, and 185). They agree well with the description given by Müller (1880) [1]) of young stages of *Macrobrachium potiuna.* These postlarval specimens may be distinguished from older forms by having the carapace provided with a supraorbital tubercle at each side, this tubercle probably is the last vestige of the supraorbital spine of the larva. Further the hepatic spine is placed on the anterior margin of the carapace, in older stages this spine gradually moves backwards. The mandibular palp consists of only one bud-like joint. The last three pereiopods have the dactylus biunguiculate. Whether these features are present in all species of *Macrobrachium,* or only in the forms mentioned above, I could not make out by lack of material.

Young (not larval or postlarval) specimens of *Macrobrachium* species differ from older in the following points:

1. The size is smaller and the body is more slender.
2. The rostrum is relatively longer and more slender.
3. The carapace and the abdomen are always smooth and shining.
4. The sixth abdominal segment is much more elongate.
5. The tip of the telson always ends in a sharp median point.
6. The second pereiopods are equal, smooth, slender, and distinctly shorter than the body. The toothing of the cutting edges of the fingers is not or only indistinctly visible. Also the relation between the various joints of the second leg in the young specimens is different from that in the adults, as the various joints do not grow with the same rapidity. Henderson & Matthai (1910, p. 278) gave the following rules for the relation between the rapidity of the growth of the joints of the second leg:

a. The ischium grows more slowly than the merus.
b. The merus and the carpus grow with the same rapidity.
c. The palm grows faster than the carpus.
d. The fingers grow less rapidly than the palm and slightly faster than the merus and the carpus.

These rules generally are confirmed by my material, though exceptions are found. So for instance in *M. idae* and *M. weberi* the carpus grows faster than the chela, a feature which is thought by Ortmann (1891, pp. 694, 695) to be impossible in the present genus: "Andererseits kann ein Carpus, der schon in der Jugend kürzer ist als die Scheere, niemals im Alter die Länge der letzteren erreichen oder gar übertreffen."

B. Differences due to sex.

The differences between full grown males and females generally are very large, especially with regard to the shape of the second legs. These differences are:

1. The carapace and abdomen of the female generally are smooth (they seldom are rugose in very old females of some species), while in several species the full grown males have the carapace and sometimes also the abdomen covered with numerous small closely packed tubercles.

---

1) Müller's 1892 paper could not be examined by me.

2. In most species the full grown males have the second legs enormously developed, being much longer than the body, sometimes the left and right leg are conspicuously different in shape. In the females these legs are much shorter and much more slender than in the males and furthermore equal in shape. The relation between the lengths of the various joints of the second legs in the female shows much resemblance to that of young males and differs from that of the adult male. The spinulation of the female leg also is less strong than that of the male.

3. The last three legs in the males of some species are granulated, while these granules are absent or at least very indistinct in the females.

Concluding we may remark that the females most resemble not full grown males.

I intentionally have used here the word "full grown" instead of "adult", as of a large number of species of *Macrobrachium* it is known that they reach sexual maturity long before attaining their final size and shape. So for instance often males are found, which still show the characters of not full grown specimens (resembling thereby the females) but which nevertheless are sexually mature. Such males have been named by Coutière (1901, p. 209) "mâles féminisés". Henderson & Matthai (1910) examined such "mâles féminisés" and found them sexually mature, with free spermatozoa in the vasa deferentia. In full grown males, it is true, the testes were proportionally larger and the vasa deferentia more coiled. Even in very small males free spermatozoa were found. Also the females of some species may be sexually mature long before the full size is reached. So for instance in *M. pilimanus* ovigerous females generally are about 40 mm in length, but instances are known in which specimens of 16 mm are provided with eggs. In my opinion we may not speak here of dimorphism, but must consider the "mâles féminisés" to be sexually mature but not yet fully developed males. In all probability these males afterwards will attain the shape of the full grown males.

Still more difficult than defining the species of the present genus is to divide the genus into subgenera. This for the first time was attempted by Ortmann (1891) who divided the genus into four subgenera: *Eupalaemon, Parapalaemon, Macrobrachium* and *Brachycarpus,* which are characterized by the cylindrical or flat palm of the second leg and by the relation in length between the carpus and merus. As already pointed out by Henderson & Matthai (1910) and as is also found by myself in my material, this subdivision of the genus is untenable as the characters used by Ortmann are not sufficient to divide the genus into sharply defined groups. So Henderson & Matthai give the example of *Macrobrachium asperulum,* of which species the young specimens according to Ortmann's division should have to be placed in the subgenus *Eupalaemon,* older specimens in *Parapalaemon* and fullgrown males in *Macrobrachium.* There are of course several natural groups in the present genus, but still too little is known of the various forms to make a sharp and useful separation into subgenera of the genus *Macrobrachium* possible. Therefore in the present paper the genus *Macrobrachium* is considered as a unity and no splitting of it into subgenera is tried, as this only will lead to confusion.

In the following key it is attempted to distinguish all kown indo-westpacific species of *Macrobrachium,* the species incertae excluded. The characters for the larger part are based on fullgrown males, as the females and young males generally provide no characters which may be used in a key. Some reserve is needed with the use of this key, as some of the species said to be described in literature after full grown males in reality are described after young males or "mâles féminisés", so that the

characters used here to distinguish them from other species may prove to be due only to the age of the specimens. There can not be laid too much stress on the fact that it generally is next to worthless to describe new species after material in which no full grown male is represented.

The key is followed by a more extensive account of all the species mentioned in it.

Key to the indo-westpacific species of the genus *Macrobrachium* [1])

1.	Carpus distinctly longer than the merus.	2
—	Carpus about as long as or shorter than the merus	28
2.	Rostrum with a distinct elevated basal crest, generally very long or with a distinct naked portion in the distal half of the upper margin	3
—	Rostrum without a distinct elevated basal crest	6
3.	Lower margin of rostrum with 8-14 teeth. Rostrum long and curved upwards. Tip of telson reaching beyond the tip of the longer posterior spines	*rosenbergii*
—	Lower margin of rostrum with 4-7 teeth. Rostrum generally straight. The distal part of the rostrum bears no dorsal teeth. Tip of the telson overreached by the longer posterior spines	4
4.	Basal crest not much elevated, provided with 5-9 teeth. Small species (up to 60 mm in length). Palm not swollen, fingers shorter than palm	*lamarrei*
—	Basal crest distinctly elevated, provided with 9-12 teeth. Large species (up to 230 mm in length). In young specimens of about 60 mm the second leg has the palm swollen and the fingers longer than the palm	5
5.	Carpus in adult males shorter than the chela	*malcolmsonii*
—	Carpus in adult males longer than the chela	*weberi*
6.	Fingers of the large chela of the adult male with numerous teeth placed on the cutting edges	7
—	Fingers of the large chela of the adult male at most with 1 or 2 teeth in the proximal part of the cutting edges, the rest of the cutting edge entire. . .	9
7.	4-6 teeth of the upper margin of the rostrum behind the orbit. Second chelae of the large male very unequal. Large chela with the palm strongly compressed	*latidactylus*
—	2 or 3 teeth of the upper margin of the rostrum behind the orbit. Second chelae of the adult male more or less cylindrical	8
8.	Rostrum directed straight forwards, teeth evenly dispersed over the dorsal margin of the rostrum. The palm of the second leg of the adult male slightly compressed. The fingers of the second legs in the adult male with 6-10 denticles, fingers about as long as the palm	*caledonicum*
—	Rostrum with the tip directed upwards. The ultimate tooth of the upper margin of the rostrum generally separated from the penultimate by an interspace, which is larger than that between the other teeth. Palm of the second leg of the adult male cylindrical, the fingers generally with more than 10 denticles on the cutting edges and distinctly shorter than the palm	*australe*
9.	4-6 teeth of the dorsal margin of the rostrum behind the orbit.	*aemulum*
—	2 or 3 teeth of the dorsal margin of the rostrum behind the orbit	10

1) See also the addendum at the end of this paper.

10. Second leg of adult male smooth, without tubercles; fingers of this leg without or with 1 or 2 microscopical small denticles in the proximal part of the cutting edges 11
— Second leg of adult male with many distinct tubercles; fingers of this leg with 1 or 2 distinct proximal teeth on the cutting edges 15
11. Rostrum distinctly longer than the scaphocerite, lower margin with 5-8 teeth 12
— Rostrum as long as or shorter than the scaphocerite, lower margin with 2-4 teeth 14
12. Carpus of the second leg of the adult male shorter than the chela . . . . . *naso*
— Carpus of the second leg of the adult male much longer than the chela . . 13
13. Rostrum straight. Last three pereiopods of about equal length. Fifth leg reaching with dactylus only beyond scaphocerite . . . . . *lamarrei*
— Rostrum distinctly curved upwards at the apex. Fourth and fifth leg conspicuously longer than the third. Fifth leg reaching with the larger part of the propodus beyond the scaphocerite . . . . . *palaemonoides*
14. Upper margin of rostrum with 5-9 teeth . . . . . *lanchesteri*
— Upper margin of rostrum with 13-15 teeth . . . . . *superbum*
15. Carpus of the second leg of adult males longer than the chela 16
— Carpus of second leg in adult males shorter than the chela 18
16. Small species up to about 40 mm in length. Chela of second leg in adult male with tubercles along each side of the cutting edge . . . . . *minutum*
— Larger species. Chela of second leg in the adult male without tubercles at each side of the cutting edges 17
17. Rostrum with 9 to 11 dorsal teeth, 3 of which generally are placed behind the orbit . . . . . *idae*
— Rostrum with 12 to 15 dorsal teeth, 2 of which generally are placed behind the orbit . . . . . *idella*
18. Large chela of adult male with tubercles at both sides of the cutting edge of the dactylus 19
— Fingers of the large chela of the adult male without a row of tubercles along each side of the cutting edge 23
19. Fingers of large chela of adult male naked or with some few scattered setae . *mammillodactylus*
— Fingers of large chela (at least the dactylus) of the adult male at least in their basal half provided with numerous long hairs, which form a velvety coat . . 20
20. All joints of the second legs of the adult male pubescent . . . . . *rude*
— Only the fingers of the second legs of the adult male pubescent 21
21. Dactylus of large chela of adult males measuring more than $^3/_4$ of the length of the palm. Velvety covering of hairs of the mobile finger of the large chela of adult male reaching as far forwards as that of the fixed finger; more than $^1/_3$ of the mobile finger remaining naked. Second legs of the adult male equal in size. Eggs large, 1.0-1.5 mm in diameter . . . . . *sintangense*
— Dactylus of large chela of adult male measuring less than $^3/_4$ of the length of the palm. Velvety coat of hairs of the mobile finger of the large chela of the

adult male reaching much farther forwards than that of the fixed finger; the velvety hairs of the mobile finger reaching almost the apex. Second legs unequal in size in the adult male. Eggs small, being 0.5-1.0 mm in diameter . . . . *lanceifrons* 22

22. Rostrum in old specimens curved slightly upwards at the top. Rostral formula $\frac{10-13}{3-5}$ . . . . . *lanceifrons lanceifrons*

— Rostrum straight. Rostral formula $\frac{8-10}{2-3}$ . . . . . *lanceifrons montalbanense*

23. Chelae of the second legs in adult males naked or with a row of short hairs at each side of the cutting edge only 24

— Chelae of the second legs in adult males with the fingers covered with stiff or velvety hairs on the entire surface or in the proximal part only 27

24. Lower margin of the rostrum with 5 teeth . . . . . *novae-hollandiae*

— Lower margin of rostrum with 2 or 3 teeth 25

25. Rostrum with upper margin provided with 7-9 teeth. Fingers of large chela of adult male very high (and compressed ?) . . . . . *venustum*

— Rostrum with upper margin provided with 10-15 teeth. Fingers of large chela of adult male slender and cylindrical 26

26. Fingers of large chela of adult male half as long as the palm or shorter. Carpus as well as palm of that leg slender, at least 9 times as long as broad *formosense*

— Fingers of large chela of adult male half as long as the palm or longer. Carpus as well as palm of that leg more robust, less than 7 times as long as broad . . *hainanense*

27. Lower margin of rostrum with 5-7 (seldom 4) teeth. Rostrum generally distinctly curved upwards . . . . . *equidens*

— Lower margin of rostrum with 2 or 3 teeth. Rostrum straight . . . . . *nipponense*

28. Fifth legs conspicuously (about $^4/_3$) longer than the fourth. Rostrum short and high, with many dorsal teeth. Second legs of adult male smooth . . . . . *mirabile*

— Fifth legs of about the same length as the fourth 29

29. Second chelae of the adult male equal or subequal in shape. Fingers of the smaller leg closing, not provided with stiff and long inwards directed hairs along the cutting edges. Fingers of the smaller leg usually shorter than the palm 30

— Second chelae of the adult male very unequal in shape. Fingers of the smaller leg usually gaping, longer than the palm and provided with long and stiff inwards directed setae along the cutting edges 59

30. Fingers of the second legs of the adult males with one or two (seldom without) fairly large teeth; sometimes there are some smaller teeth present between the first tooth and the base of the finger, but never between the last large tooth and the apex of the finger 31

— Fingers of second legs of the adult male with numerous (more than 4) teeth, which are placed at regular intervals; sometimes these teeth are placed in the proximal part of the cutting edge of the fingers only. The teeth generally are of equal size, if, however, one is larger, than this always is one of the proximal teeth 51

31. Carpus about as long as merus, more or less elongate 32
— Carpus distinctly shorter than merus, more or less triangular in longitudinal section 48
32. Fingers of large chela of adult male entirely covered with a thick clothing of velvety hairs . . . . . *australiense*
— Fingers naked or at most with some short hairs along the cutting edges only 33
33. Chelae of adult male smooth, without tubercles or spines . . . . . *hildebrandti*
— Chelae of adult male distinctly tuberculate 34
34. Two or three teeth of the upper margin of the rostrum behind the orbit . . 35
— Four or more teeth of the upper margin of the rostrum behind the orbit . . 44
35. Rostrum short and blunt, not reaching beyond the second segment of the antennular peduncle . . . . . *insulare*
— Rostrum generally slender, reaching to or beyond the end of the antennular peduncle 36
36. Chelae of the adult males without longitudinal grooves or carinae on the fingers 37
— Second chelae of adult males with distinct longitudinal grooves or carinae on both lateral surfaces of the fingers 43
37. Carpus of the second legs of adult males distinctly shorter than the palm . . 38
— Carpus of the second legs of adult males as long as or longer than the palm . . 41
38. Upper margin of rostrum with 7 or 8 teeth . . . . . *lar*
— Upper margin of rostrum with 10 to 13, seldom 9 teeth 39
39. Teeth on the cutting edges of the fingers of the second chela of the adult male large, the anterior tooth of the dactylus placed in or slightly before the middle of the finger. . . . . *javanicum*
— Teeth on the cutting edges of the fingers of the second chela of the adult male very small and placed in the proximal third of the fingers 40
40. Rostrum rather slender, reaching beyond antennular peduncle . . . . . *asperulum*
— Rostrum short and high, not reaching beyond antennular peduncle . . . . *altifrons*
41. Upper margin of rostrum with 7 or 8 teeth. Fingers of second leg of adult male distinctly shorter than the palm. China . . . . . *kiukianense*
— Upper margin of the rostrum with 9-13 teeth. Fingers of second leg of adult male as long as or distinctly longer than the palm. Africa 42
42. One of the dorsal rostral teeth is placed behind the orbit. A distinct naked space is present between the last dorsal tooth and the tip of the rostrum. Lower margin of the rostrum with 1 or 2 teeth . . . . . *niloticum*
— Two or three dorsal rostral teeth are placed behind the orbit. Rostral teeth divided regularly over the upper margin. Lower margin of the rostrum with 3-5 teeth . . . . . *moorei*
43. Rostrum curved upwards, generally with a naked space behind the two or three subapical teeth. 5 or 6 lower teeth on the rostrum. Fingers of second leg of adult male with setose grooves . . . . . *dayanum*
— Rostrum directed slightly downwards, upper teeth divided regularly over the dorsal margin of the rostrum. Lower margin of the rostrum with 2 or 3 teeth.

Fingers of the second legs of the adult male with a longitudinal carina at each side. . . . . *callirhoë*

44. Lower margin of rostrum with 4 or 5 teeth . . . . . *petiti*
— Lower margin of rostrum with 2 or 3 teeth 45
45. Rostrum very narrow, first tooth of lower margin placed anteriorly of the antepenultimate dorsal tooth . . . . . *sophronicum*
— Rostrum rather broad, lamelliform. First tooth of lower rostral margin placed posterior of the antepenultimate dorsal tooth. 46
46. Distal part of the cutting edge of the fingers of the second legs in the adult male without a row of tubercles at both sides . . . . . *japonicum*
— A row of blunt tubercles is placed at each side of the distal part of the cutting edge of the fingers of the second leg in the adult male. The outer of these rows often is placed so close to the edge, that it seems to be placed on it 47
47. Fingers of both second chelae of the adult male distinctly shorter (about $^3/_4$) than the palm. No thick row of short hairs along the cutting edges of the fingers. *horstii*
— Fingers of the smaller second leg of adult male longer than, those of the larger leg as long as the palm. A thick row of hairs along the cutting edge of both fingers . . . . . *jaroense*
48. Mandibular palp two-jointed. Eyes with the cornea strongly reduced, being much narrower than the eyestalk . . . . . *cavernicola*
— Mandibular palp three-jointed. Eyes with the cornea well developed, distinctly broader than the eyestalk 49
49. Both dactylus and fixed finger of large chela of the adult male with only 1 or 2 large teeth on the cutting edge 50
— Behind the 1 or 2 large teeth of the cutting edges of the fingers of the large chela of the adult male several smaller teeth are present, which, however, sometimes almost obtain the size of the larger teeth. . . . . *latimanus*
50. The fingers of the large chela of the adult male with numerous longitudinal grooves, which are filled with closely packed hairs. Tubercles on the large second pereiopod of the adult male small and inconspicuous . . . . . *hendersoni*
— Fingers of the large chela of the adult male without grooves and hairs. Tubercles on the second leg of the adult male very strong . . . . . *clymene*
51. Large chela of adult male naked or with some scattered hairs. 52
— Large chela of adult male with numerous feltlike or woolly hairs on the palm or fingers or on both 53
52. Carpus of second chela of adult male longer than the palm . . . . . *patsa*
— Carpus of second chela of adult male shorter than the palm . . . . . *yui*
53. Palm of large chela of adult male for the larger part naked or with some scattered hairs only (sometimes the extreme distal part of the palm is pubescent). The hairs on the fingers numerous and placed close together, woolly 54
— Palm or large chela of adult male entirely covered with velvety hairs (sometimes the extreme distal part is naked). Fingers naked or velvety pubescent . . 55

54. Upper margin of the rostrum straight. Rostrum with 10 to 12 dorsal and 4 to 6 ventral teeth. Hepatic and antennal spine situated in one line . . . . . *trompii*
— Upper margin of rostrum distinctly convex. Rostrum with 12 to 14 dorsal and 2 to 4 ventral teeth. Hepatic and antennal spine not situated in one line . . . *lorentzi*
55. Fingers of large chela of adult male entirely covered with velvety hairs. Carpus of second legs of adult male conical, usually much shorter than the merus. . *pilimanus*
— Fingers of large chela of adult male partly or entirely naked. Carpus of second legs of adult male generally of the same length as the merus . . . 56
56. Carpus of second legs of adult male with 2 distinct longitudinal grooves . . *sulcicarpale*
— Carpus of second legs without longitudinal grooves 57
57. Palm of large chela of adult male, sometimes also the basal part of the fingers, velvety pubescent. Carpus, merus and ischium without this pubescence . . . 58
— Palm of large chela, as well as carpus, merus and ischium of both second legs of the adult male provided with a thick coat of velvety hairs; only the fingers and a small distal portion of the palm naked . . . . . *petersii*
58. Fingers of the large chela of the adult male with a velvety pubescence in their basal portion. Dorsal teeth of the rostrum beginning in the distal third of the carapace . . . . . *scabriculum*
— Fingers and distal part of the palm of the large chela of the adult male entirely naked. Dorsal teeth of the rostrum beginning in the middle of the carapace . . . . . *jacobsoni*
59. Carpus of large chela of adult male about as long as the merus 60
— Carpus of large chela of adult male distinctly shorter than the merus . . 67
60. Palm of large chela of adult male with many closely packed long hairs near the base 61
— Palm of the large chela of the adult male naked or with some scattered short hairs 62
61. Palm of larger leg of adult male rather short and high, not more than 2.5 times as long as broad, distinctly broader proximally than distally. Distal large tooth of the dactylus placed some distance anterior of the distal large tooth of the fixed finger; gap between the large teeth of the fingers thereby not sharply defined . . . . . *grandimanus*
— Palm of larger leg of adult male slender, more than thrice as long as broad, of about the same breadth throughout its length. The distal large tooth of the dactylus placed just opposite of the distal large tooth of the fixed finger. A distinct gap is present behind these large teeth . . . . . *joppae*
62. Fingers of smaller second leg of adult male much (1.5 times to twice) longer than the palm 63
— Fingers of smaller second leg of adult male much shorter than to about as long as the palm 66
63. Rostrum rather high, teeth slender, directed forwards. Large chela of adult male with small conical tubercles. Last three pereiopods of adult male with some scattered hairs, but without scale-like tubercles 64

— Rostrum narrow, with the teeth broad and erect. Large chela of adult male as well as the last three pereiopods covered with numerous scale-like tubercles . 65

64. Merus always somewhat longer than the carpus. Fingers of the large chela in the adult male closing over their entire length . . . . . *bariense*

— Merus always somewhat shorter than the carpus (often, especially in adult males, the difference is considerable). Fingers of the large chela in the adult male strongly curved and gaping . . . . . *latidactylus*

65. Upper margin of rostrum with 11 to 14 teeth, the first of which is placed in the anterior third of the carapace. Tip of the rostrum generally reaching to the end of the antennular peduncle. Carpus of the large chela of the adult male generally somewhat shorter than the merus . . . . . *lepidactylus*

— Upper margin of the rostrum with 10 to 13 teeth, the first of which is placed slightly before the middle of the carapace. Tip of the rostrum seldom reaching beyond the end of the second segment of the antennular peduncle. Carpus of the large chela of the adult male generally somewhat longer than the merus *hirtimanus*

66. Fingers of the large chela of the adult male as long as the palm or longer. Carpus of this leg somewhat longer than the merus . . . . . *placidum*

— Fingers of the large chela of the adult male $^2/_3$ as long as the palm or shorter. Carpus of this leg somewhat shorter than the merus . . . . . *placidulum*

67. Large chela of the adult male with the palm naked or with a few scattered hairs only. . . . . *oenone*

— Large chela of adult male with the palm entirely or partly covered with a thick coat of woolly hairs 68

68. Palm of large chela of adult male with two distinct patches of closely packed woolly hairs near the base, rest of the palm naked . . . . . *cowlesi*

— Palm or large chela of adult male entirely covered with woolly hairs 69

69. Cutting edge of the fingers of the large chela of the adult male with numerous small teeth regularly divided over its entire length . . . . . *esculentum*

— Cutting edge of the fingers of the large chela of the adult male, apart from some inconspicuous denticles near the base, only with two large teeth . . . *geron*

Macrobrachium rosenbergii (De Man) (fig. 25)

Locusta Marina Rumphius, 1705, Amboin. Rariteitkam., ed. 1, p. 3, pl. 1 fig. B.
Locusta Marina Indica Rumphius, 1711, Thesaurus Imag., ed. 1, p. 1, pl. 1 fig. B.
Locusta Marina Indica Rumphius, 1739, Thesaurus Imag., ed. 2, p. 1, pl. 1 fig. B.
Locusta Marina Rumphius, 1740, Amboin. Rariteitkam., ed. 2, p. 3, pl. 1 fig. B.
Locusta Marina Rumphius, 1741, Amboin. Rariteitkam., ed. 3, p. 3, pl. 1 fig. B.
Cancer (*Astacus*) *Carcinus* Herbst, 1792, Vers. Naturgesch. Krabben Krebse, vol. 2, p. 58, pl. 28 fig. 1 (non Linnaeus, 1758).
Palaemon carcinus Fabricius, 1798, Suppl. Ent. Syst., p. 402.
Palaemon carcinus Bosc, 1801, Hist. nat. Crust., ed. 1 vol. 2, p. 104.
Palaemon carcinus Latreille, 1802, Hist. nat. Crust. Ins., vol. 6, p. 260, pl. 54 fig. 3.
Palaemon carcinus Olivier, 1811, Encycl. méth. Hist. nat., vol. 8, p. 659.
Palaemon carcinus Lamarck, 1818, Hist. nat. Anim. s. Vert., ed. 1 vol. 5, p. 207.

Palaemon carcinus A. G. Desmarest, 1823, Dict. Sci. nat., vol. 28, p. 329.
Palaemon carcinus A. G. Desmarest, 1825, Considér. gén. Class. Crust., p. 237.
Palaemon carcinus Henschel, 1833, Vita Rumphii, p. 203.
Astacus (*Palaemon*) *Carcinus* Voigt, 1836, Cuvier's Thierreich, ed. 2 vol. 4, p. 183.
Palemon carcinus H. Milne Edwards, 1837, Hist. nat. Crust., vol. 2, p. 395.
Palaemon carcinus H. Milne Edwards, 1838, in Lamarck, Hist. nat. Anim. s. Vert., ed. 2 vol. 5, p. 366.
Palaemon carcinus Thon & Reichenbach, 1838, Insekt. Krebs. Spinn., p. 476, pl. 127 fig. 39a.
Palemon carcinus Gibbes, 1845, Proc. Boston Soc. nat. Hist., vol. 2, p. 70.
Palemon Carcinus De Haan, 1849, Siebold's Fauna Japonica, Crust, pl. P.
Palemon carcinus Gibbes, 1850, Proc. Amer. Ass. Adv. Sci., vol. 3, p. 198.
Palemon carcinus Gibbes, 1850a, Proc. Acad. nat. Sci. Philad., 1850, p. 25.
Palaemon carcinus Tennent, 1861, Ceylon, p. 486.
Palaemon carcinus Von Martens, 1868, Arch. Naturgesch., vol. 34 pt. 1, p. 34.
Palaemon carcinus Von Martens, 1876, Preuss. Exped. Ost-Asien, Zool., vol. 1, p. 235.
Palaemon carcinus De Man, 1879, Notes Leyden Mus., vol. 1, p. 165.
Palaemon Rosenbergii De Man, 1879, Notes Leyden Mus., vol. 1, p. 167.
Palaemon carcinus Miers, 1880, Ann. Mag. nat. Hist., ser. 5 vol. 5, p. 382.
Palaemon carcinus Walker, 1887, Journ. Linn. Soc. Lond. Zool., vol. 20, p. 112.
Palaemon carcinus De Man, 1888a, Journ. Linn. Soc. Lond. Zool., vol. 22, p. 280.
Palaemon carcinus Ortmann, 1891, Zool. Jb. Syst., vol. 5, p. 700, pl. 47 fig. 1.
Palaemon carcinus rosenbergii Ortmann, 1891, Zool. Jb. Syst., vol. 5, p. 701.
Palaemon (*Eupalaemon*) *carcinus* De Man, 1892, Weber's Zool. Ergebn., vol. 2, p. 421.
Palaemon carcinus Thallwitz, 1892, Abh. zool-anthrop. Mus. Dresden, 1890-1891 pt. 3, p. 15.
Palaemon carcinus Sharp, 1893, Proc. Acad. nat. Sci. Philad., 1893, p. 121.
Palaemon whitei (Guérin MSS) Sharp, 1893, Proc. Acad. nat. Sci. Philad., 1893, p. 122.
Palemon carcinus Casto de Elera, 1895, Catal. Faun. Filip., vol. 2, p. 567.
Palaemon carcinus De Man, 1897, Zool. Jb. Syst., vol. 9, p. 766.
Palaemon (*Eupalaemon*) *carcinus* De Man, 1898a, Notes Leyden Mus., vol. 20, p. 137.
Palaemon (*Eupalaemon*) *carcinus* Nobili, 1899, Ann. Mus. Stor. nat. Genova, vol. 40, p. 236.
Palaemon (Eupalaemon) Rosenbergi Nobili, 1899, Ann. Mus. Stor nat. Genova, vol. 40, 236.
Palaemon carcinus Doflein, 1900, S. B. Bayer. Akad. Wiss., vol. 30, p. 128.
Palaemon carcinus Lamarrei Lanchester, 1900, Ann. Mag. nat. Hist., ser. 7 vol. 6, p. 263.
Palaemon (*Eupalaemon*) *carcinus* Nobili, 1900, Ann. Mus. Stor. nat. Genova, vol. 40, p. 480.
Palaemon carcinus Lanchester, 1901, Proc. zool. Soc. Lond., 1901 pt. 2, p. 565.
Palaemon carcinus lamarrei Lanchester, 1901, Proc. zool. Soc. Lond., 1901 pt. 2, p. 565.
Palaemon carcinus Thompson, 1901, Catal. Crust. Mus. Dundee, p. 19.
Palaemon (*Eupalaemon*) *carcinus* De Man, 1902, Abh. Senckenb. naturf. Ges., vol. 25, p. 763.
Palaemon (*Eupalaemon*) *carcinus* De Man, 1902a, Rumphius Gedenkboek, p. 101.
Palaemon spinipes Schenkel, 1902, Verh. naturf. Ges. Basel, vol. 13, p. 501, pl. 9 fig. 7.
Palaemon carcinus Schenkel, 1902, Verh. naturf. Ges. Basel, vol. 13, p. 504.
Palaemon (*Eupalaemon*) *carcinus* De Man, 1904, Miss. Pavie, vol. 3, p. 330.
Palaemon carcinus Coulon, 1907, Bull. Soc. Étud. Sci. nat. Elbeuf, vol. 26, p. 191.
Palaemon carcinus De Man, 1908, Rec. Indian Mus., vol. 2, p. 224, pl. 19 fig. 5.
Palaemon carcinus Henderson & Matthai, 1910, Rec. Indian Mus., vol. 5, p. 281, pl. 15 fig. 1.
Palaemon carcinus Cowles, 1914, Philipp. Journ. Sci., sect. D vol. 9, p. 324, pl. 1. fig. 1.
Palaemon (*Eupalaemon*) *carcinus rosenbergi* J. Roux, 1917, Nova Guinea, vol. 5, p. 595.
Palaemon carcinus Kemp, 1918a, Mem. Asiat. Soc. Bengal, vol. 6, p. 255.
Palaemon (Eupalaemon) carcinus rosenbergi J. Roux, 1921, Nova Guinea, vol. 13, p. 587.
Palaemon (Eupalaemon) carcinus rosenbergi J. Roux, 1923, Capita Zool., vol. 2 pt. 2, p. 4.
Palaemon d'Acqueti Sunier, 1925, Tijdschr. Nederl. dierk. Ver., ser. 2 vol. 19, p. cxvii.
Palaemon (*Eupalaemon*) *carcinus rosenbergi* J. Roux, 1927, Nova Guinea, vol. 15, p. 321.
Palaemon (*Eupalaemon*) *carcinus* J. Roux, 1928a, Treubia, vol. 10, p. 219.

Palaemon carcinus Balss, 1930, Ergebn. Biol., vol. 6, p. 318.
Palaemon carcinus Tazelaar, 1930, Journ. exper. Biol., vol. 7, p. 165, textfigs. 1-7, pl. 2.
Palaemon carcinus Nouvel, 1932, Bull. Mus. Hist. nat. Paris, ser. 2 vol. 4, p. 409.
Palaemon (*Eupalaemon*) *carcinus* J. Roux, 1932, Arch. Hydrobiol., suppl. vol. 11, pp. 564, 568.
Macrobrachium carcinus Pearse, 1933, Journ. Siam Soc., nat. Hist. Suppl., vol. 9, p. 189.
Palaemon carcinus Rai, 1933, Journ. Bombay nat. Hist. Soc., vol. 36, p. 886.
Palaemon (*Eupalaemon*) *carcinus rosenbergi* J. Roux, 1933a, Rev. Suisse Zool., vol. 40, p. 344.
Palaemon (*Eupalaemon*) *carcinus* Boone, 1935, Bull. Vanderbilt mar. Mus., vol. 6, p. 154, pl. 39
Palaemon carcinus Gordon, 1935a, Ann. Mag. nat. Hist., ser. 10 vol. 16, p. 629.
Palaemon carcinus Chopra, 1936, Curr. Sci., vol. 4, p. 532.
Palaemon carcinus Estampador, 1937, Philipp. Journ. Sci., vol. 62, p. 488.
Palaemon carcinus Panikkar, 1937, Journ. Bombay nat. Hist. Soc., vol. 39, p. 346.
Palaemon carcinus Serène, 1937, Notes Inst. océanogr. Indochine, vol. 30, p. 71.
Macrobrachium carcinus Suvatti, 1937, Check List aq. Fauna Siam, p. 49.
Palaemon carcinus Menon, 1938, Proc. Indian Acad. Sci., vol. 8B, p. 290, figs. 21-23.
Palaemon carcinus Chopra, 1939, Journ. Bombay nat. Hist. Soc., vol. 41, p. 222, pl. 1 fig. 5.
Palaemon carcinus Nataraj, 1942, Curr. Sci., vol. 11, p. 468.
Palaemon carcinus Chopra, 1943, Indian Sci. Congr., vol. 30 pt. 2 sect. 6, p. 4.
Palaemon carcinus Chopra, 1943a, Curr. Sci., vol. 12, p. 71.

Siboga Expedition

Station 82, Batupangal, Mahakam River, E. Borneo; June 15 and 16, 1899. — 32 specimens 71-275 mm (including 2 ovigerous females).

Museum Leiden

Siam; 1877; leg. Winckel. — 2 specimens 217 and 227 mm.
We Island, off northpoint of Sumatra; 1910 and January, 1913; leg. P. Buitendijk. — 2 specimens 122 and 180 mm.
Java Sea; May, 1911 and October, 1911; leg. P. Buitendijk. — 7 specimens 95-275 mm (incl. 1 ovig. female).
Batavia; leg. P. Bleeker. — 3 specimens 196 and 246 mm.
Batavia; 1896; leg. A. G. Vorderman. — 1 specimen 228 mm.
Tandjong Priok near Batavia; 1907, and November, 1927; leg. P. Buitendijk, — 4 specimens (1 ovigerous female) 101-165 mm.
Bay of Batavia; August, 1908; leg. P. Buitendijk. — 3 specimens (1 ovigerous female) 72-161 mm.
Tjiliwong near Batavia; 1904; leg. P. Buitendijk. — 2 specimens (1 ovigerous female) 182 and 210 mm.
N. W. coast of Java near Tjiliwong; 1906; leg. P. Buitendijk. — 3 specimens 75-190 mm.
Tjilatjap, south coast of Java; August, 1905; leg. P. Buitendijk. — 1 specimen 158 mm.
Off Semarang, northcoast of Central Java; December, 1910; leg. P. Buitendijk. — 2 specimens (1 ovigerous female) 131 and 210 mm.
Surabaja, E. Java and Menado, N. Celebes. — 14 specimens 62-230 mm.
Besuki, north coast of E. Java; leg. J. Semmelink. — 1 specimen 154 mm.
Java; leg. P. Bleeker. — 3 specimens 82-180 mm.
Java; leg. H. Kuhl and J. C. van Hasselt. — 1 specimen 154 mm.
Pontianak, S. W. Borneo;1894; leg. A. W. Nieuwenhuis. — 2 specimens 128 and 136 mm.
Pelaihari, near Bandjermasin, S. E. Borneo; 1886; leg. J. Semmelink. – 2 specimens.
Tepuh, Upper Mahakam River, E. Borneo; November, 1897; leg. A. W. Nieuwenhuis. -- 1 specimen 220 mm.
Borneo; leg. C. A. L. M. Schwaner. — 1 specimen 110 mm.

Makassar, S. W. Celebes; 1861; leg. Groen. — 11 specimens 141-206 mm (included ovigerous females)
Makassar; leg. D. M. Piller. — 4 specimens 105-130 mm.
Andai, near N. W. New Guinea; leg. C. B. H. von Rosenberg; type. — 1 ovigerous female 250 mm.
Korime River near Nimboran, North New Guinea; September, 1910; New Guinea Expedition, 1910-1911. — 1 specimen 206 mm.
Malay Archipelago. — 8 specimens 64-146 mm.
? New Ireland; 1855; coll. Frank. — 4 specimens 110-245 mm (dry).
? West Indies; coll. Frank. — 1 ovigerous female 176 mm.
Locality unknown; don. J. Moll. — 3 specimens 136-291 mm.
Locality unknown; don. Rotterdam Zoological Gardens. — 2 specimens 248 and 264 mm.
Locality unknown. — 8 specimens 131-260 mm.

Museum Amsterdam

Calcutta; leg. M. Weber. — 2 specimens 233 and 250 mm.
Deli, N. E. Sumatra; leg. L. P. de Bussy. — 12 specimens (5 ovigerous females) 153-288 mm.
Sungai Suka, N. E. Sumatra; fresh water; May 19, 1919; leg. F. C. van Heurn. — 3 specimens 234-275 mm.
Taluk, Indragiri River, Central Sumatra; leg. J. P. Kleiweg de Zwaan. — 2 specimens 203 and 302 mm.
Djambi, E. Sumatra; leg P. E. Moolenburgh. — 17 specimens (included ovigerous females) 122-274 mm.
Palembang, E. Sumatra; 1909; leg. Salm. — 6 specimens (1 ovigerous female) 137-226 mm.
Java. — 4 specimens (1 ovigerous female) 164-183 mm.
Pajeti, Sumba. — 1 specimen 86 mm.
Riko near Balikpapan, E. Borneo; fresh water; leg. W. J. Tissot van Patot. — 1 specimen 270 mm.
Balikpapan, E. Borneo; bay and river; leg. W. J. Tissot van Patot. — 7 specimens 82-202 mm.
Makassar, S. W. Celebes; captured in sea; 1888-1889; leg. M. Weber. — 3 specimens 81-114 mm.
Wai La, Waigeo, near N. W. New Guinea; January 18, 1910; leg. L. F. de Beaufort. — 2 specimens (1 ovigerous female) 236 and 306 mm.
Waiu Waigee River, W. Waigeo; leg. L. F. de Beaufort. — 1 ovigerous female 230 mm.
Kloof Bivouac, upper Lorentz (= Noord) River, S. W. New Guinea; leg. G. M. Versteeg; S. New Guinea Expedition, 1912. — 8 specimens 107-203 mm.
Kloof Bivouac, upper Lorentz River; January 1913; leg. G. M. Versteeg; S. New Guinea Expedition, 1912. — 3 specimens 115-270 mm.
Alkmaar, upper Lorentz River, S. W. New Guinea; August 8, 1907, September 20 and October 24, 1909; leg. H. A. Lorentz; New Guinea Expeditions, 1907 and 1909. — 9 specimens 131-257 mm.
Alkmaar camp, upper Lorentz River, S. W. New Guinea; left behind by the Exploration detachment. — 5 specimens 120-231 mm.
Sabang, Sago marsh, upper Lorentz River; July 12 and 15, 1907; New Guinea Expedition, 1907. — 5 specimens 85-298 mm.
Rivier camp, near Sabang, upper Lorentz River; February 10-12, 1910; leg. H. A. Lorentz; New Guinea Expedition 1909. — 5 specimens (1 ovigerous female) 137-252 mm.
Regen Island, upper Lorentz River; September 30, October 1 and 2, 1909; New Guinea Expedition, 1909. — 3 specimens (1 ovigerous female) 183-186 mm.
Pandanus creek, Lorentz River, S. W. New Guinea; September 17 and 18, 1909; leg. H. A. Lorentz; New Guinea Expedition, 1909. — 5 specimens 130-200 mm.
Bivak Island, Lorentz River; September 14, 1909; leg. H. A. Lorentz; New Guinea Expedition, 1909. — 1 specimen 116 mm (bopyrized).
Van der Sande (= Bibis) River, tributary of Lorentz River; September 10, 1909; leg. H. A. Lorentz; New Guinea Expedition, 1909. — 1 specimen 162 mm.
Lorentz River, S. W. New Guinea; May 7-9, 13, 15-19, 1907, September 5, 12, 14-16, 23, 1909; leg.

H. A. Lorentz; New Guinea Expeditions, 1907 and 1909. — 23 specimens (3 ovigerous females) 54-200 mm (2 specimens bopyrized).

Creek near Lorentz River, S. W. New Guinea; May 14 and July 6, 1907; leg. H. A. Lorentz; New Guinea Expedition, 1907. — 4 specimens 60-127 mm.

Merauke, S. W. New Guinea; 1905; leg. J. W. R. Koch; New Guinea Expedition, 1904-1905. — 1 specimen about 190 mm (damaged).

S. W. New Guinea; 1912; leg. G. M. Versteeg; New Guinea Expedition, 1912. — 3 specimens 123-233 mm.

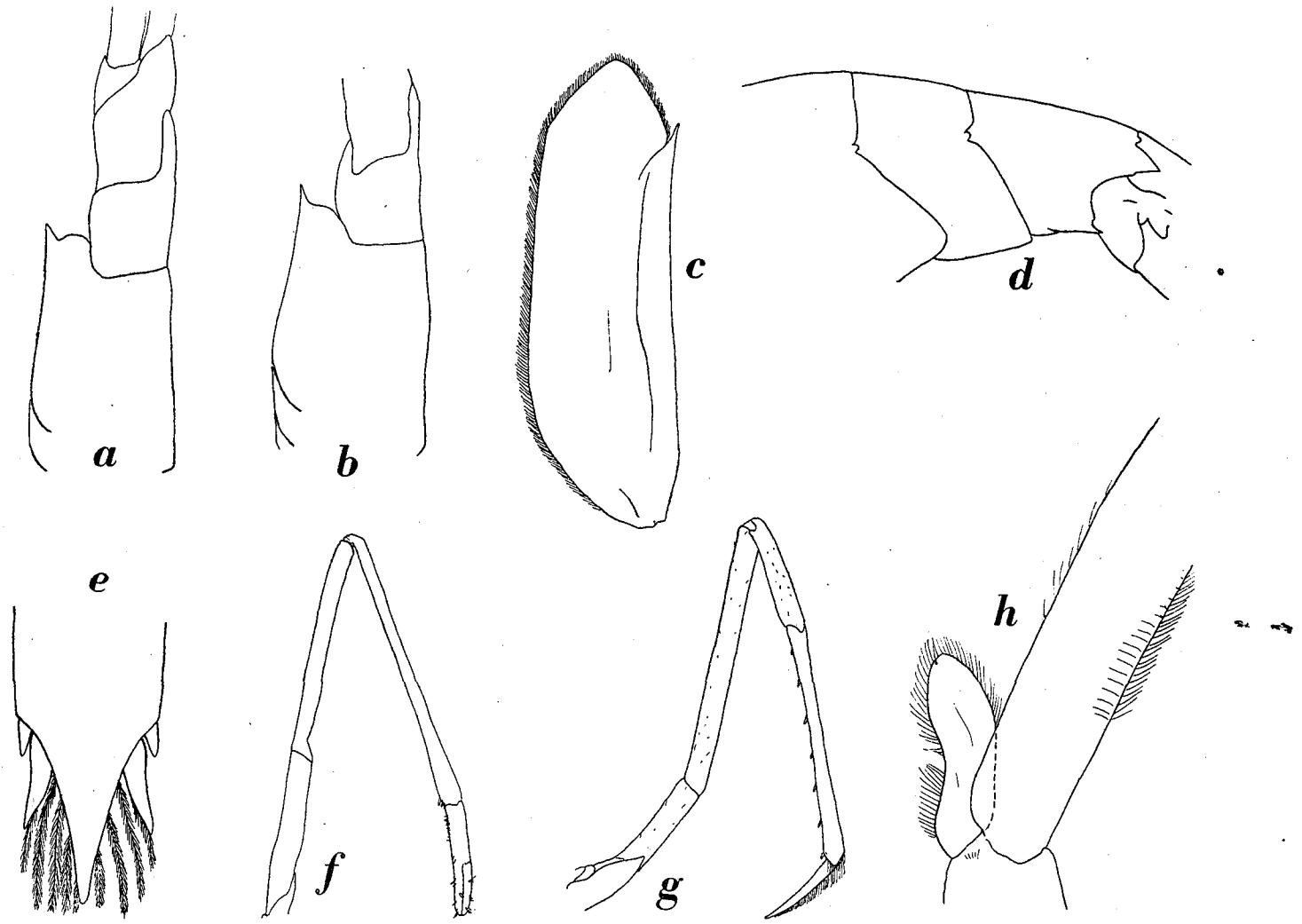

Fig. 25. *Macrobrachium rosenbergii* (De Man). a, b, antennular peduncles; c, scaphocerite; d, abdomen in lateral view; e, tip of telson; f, first pereiopod; g, third pereiopod; h, first pleopod of male. a, b, d, × 2.6; c, f, g, × 2.3; e, × 27; h, × 4.6.

Indonesia; coll. J. G. de Man. — 1 ovigerous female 153 mm.

East Asia. — 1 specimen 253 mm.

Locality unknown. — 5 specimens (1 ovigerous female) 173-273 mm.

This well known and widely distributed species has already extensively been described by Cowles (1915). In my material the same variation in the length of the rostrum is shown as in Cowles's material; the curvature of the rostrum in my specimens is rather variable, it generally follows the rule given by Cowles that in older specimens the rostrum is less curved than in the younger, but there are exceptions to this rule.

The antennula (figs. 25a, b) is of the normal shape. The free portion of the upper flagellum is variable in length and may consist of more than 100 joints.

The scaphocerite (fig. 25c) is thrice as long as broad. The final tooth largely fails to reach the end of the lamella. This lamella is of about the same breadth over its entire length and is triangularly narrowed anteriorly.

The oral parts are quite typical.

The first pereiopods (fig. 25f) are relatively longer in old specimens, in these larger specimens they reach with a distinct part of the carpus beyond the scaphocerite, while in the younger only part of the chela reaches beyond that scale. The carpus is more than twice as long as the chela, which has the fingers about as long as the palm. The shape of the second pereiopod is extensively described by Cowles. The last three pereiopods (fig. 25g) are slender. The dactyli are provided with setae at their anterior margin. The propodus of the third leg is about 2.5 times as long as the dactylus, it is provided with some distinct movable spines at the posterior margin. The carpus is almost half as long as the propodus. The merus is somewhat longer and stronger than the propodus. The fifth leg is much more slender than the third, the propodus is almost thrice as long as the dactylus, its posterior margin bears, apart from some small spinules, several transverse rows of setae in the distal part. The carpus is slightly more than half the length of the propodus, while the merus is slightly shorter than the propodus. All joints are naked or provided with some few small and scattered spinules or hairs.

The pleopods (fig. 25h) are quite typical in shape.

The telson has the dorsal spinules very small. The posterior margin of the telson ends in a median spine, which overreaches the two longer inner spines of the posterior margin of the telson (fig. 25e). This character was first pointed to by Ortmann (1891) and indeed is very important. Between the two inner spines of the posterior margin of the telson four pairs of feathered setae are implanted, while a similar seta is present below the median posterior point of the telson.

De Man (1879) described *Palaemon Rosenbergii* as a species distinct from *Palaemon carcinus* auctt., later he considered *P. Rosenbergii* to be only a variety of *P. carcinus* auctt. In my opinion the two forms cannot be regarded even as varieties. The differences between *Palaemon Rosenbergii* De Man and *Palaemon carcinus* auctt. mentioned by De Man are:

1. The rostrum is almost straight in *P. rosenbergii,* not convex as in *P. carcinus* auctt.

2. The telson in *P. rosenbergii* is somewhat rounded at the end and is not slender and acuminate as in *P. carcinus* auctt.

The first difference falls within the range of variation of the shape of the rostrum. The rostrum in De Man's very old female, which could be studied, is a little arched over the eye and has the tip curved slightly upwards, the rostrum certainly is not quite straight. The telson of the type specimen of *Palaemon Rosenbergii* has the tip broken and the remaining part regenerated, the telson namely is very short and the position of the two dorsal pairs of spinules, the posterior of which is placed very close to the posterior margin, also make it clear that the telson is damaged, moreover the telson ends abruptly in a broad posterior margin, which shows no trace of spines or setae. The fact that the telson of the type specimen of *P. Rosenbergii* is damaged was already supposed by Ortmann (1891). We are thus fully justified to consider *Palaemon Rosenbergii* De Man a synonym of *Palaemon carcinus* auctt. (non *Cancer Carcinus* Linnaeus).

Palaemon spinipes described by Schenkel (1902) too can not be separated from the present form. All the differences mentioned by Schenkel fall within the range of variation of the various characters of the species dealt with here. Schenkel's *Palaemon spinipes* var. *birmanicus,* however, belongs to *Macrobrachium malcolmsonii* as pointed out on p. 121.

The present species is named by most authors *Palaemon carcinus.* As already shown (p. 3) the name *Palaemon* may not be used for this genus, because *Macrobrachium* is the correct name. Also the specific name *carcinus* up till now mostly is incorrectly assigned to the present form.

The original description of Linnaeus's (1758) *Cancer Carcinus* runs as follows:

"C.[ancer] macrourus, thorace laevi, manibus teretiusculis: brachiis hispido-aculeatis.
Sloan. jam. 2. *p.* 271. *t.* 245. *f.* 2. Astacus fluviatilis major, chelis aculeatis.
Habitat in Americae *fluviis".*

The definition of course fits for many species of *Macrobrachium,* but the reference to Sloane's work and the remark that the species lives in American rivers definitively exclude the possibility that *Cancer carcinus* is identical with our present form. The species described and figured by Sloane is at present best known under the name *Palaemon jamaicensis* (Herbst), this species thus has to bear the name *Macrobrachium carcinus* (L.), while the present species needs another name. In the twelfth edition of the Systema Naturae, Linnaeus (1767) gave the same definition as in the tenth edition, while also the remark about the habitat of the species is the same; here, however, Linnaeus refers to two more authors, namely to Seba (1761, vol. 3, pl. 31 fig. A) and to Rumphius (1705, pl. 1 fig. B). Seba's animal belongs to the same species as that of Sloane (1725), the specimen figured by Rumphius distinctly belongs to the present species. Linnaeus thus wrongly identifies Rumphius's species with *Cancer Carcinus.* Fabricius (1775, 1781, 1787, 1793) gives for *Astacus carcinus* almost the same definition as Linnaeus for his *Cancer Carcinus,* only "C. macrourus" is replaced by "A.[stacus] antennis posticis bifidis" the references in Fabricius's works (besides the reference to Linnaeus, 1767, Systema Naturae, ed. 12, p. 105) are the same as in the twelfth edition of Linnaeus' Systema (in Fabricius's Mantissa the references and the habitat are omitted). Herbst (1792) is the first to separate the two forms as distinct species, unfortunately he gives the name *carcinus* to the Indian form, which he, however, believes to occur also in America, he therefore refers here besides to Rumphius, also to Linnaeus, Fabricius, Seba and Sloane; Herbst's description and figure leave no doubt as to the identity of his *Cancer* (*Astacus*) *carcinus* with the present form. The American form is very well described and figured by Herbst under the name *Cancer* (*Astacus*) *Jamaicensis*; here he refers to Gronovius and strangely enough also to Sloane, so that Sloane's *Astacus fluviatilis* is mentioned by Herbst as a synonym of his *Cancer* (*Astacus*) *Jamaicensis* as well as of his *Cancer* (*Astacus*) *Carcinus.* In his Supplementum Entomologiae Systematicae Fabricius (1798) gives a definition of *Palaemon carcinus,* which differs very much from that in his previous works: "P.[alaemon] chelis aequalibus porrectis muricatis, rostro adscendente antennarum squamis longiore". The references and habitat are the same as in his other works. After the habitat he adds: "Corpus amoene coeruleo variegatum. Pedes laeues". There is no doubt that Fabricius with this definition means to indicate the Indian form, in which the rostrum generally is distinctly longer than the scaphocerite and which mostly has the body of a blue colour. His indication "Habitat in Americae fluuiis" and part of his references thus are incorrect. Bosc (1901) gives a French translation of Fabricius's (1798) text. Latreille (1802) also gives Fabricius's definition and references; he, however, adds the following remark: "Je soupçonne que le palémon carcinus de Fabricius n'est pas le cancer du même nom de Linnaeus. A ce dernier répondent les synonymes suivans: Seba, Mus. tom. III, tab. 21, fig. 4. — Sloan. Jamaïc. tom. II, pl. ccxlv, fig. 2. — Herbst, Canc. tab. 27, fig. 2.

Le palaemon carcinus de Fabricius est l'espèce figurée par Herbst, pl. xxviii, fig. 1, et par Rumphius, tab. 1, B."

In the later works the name *jamaicensis* always is used for the American, the name *carcinus* fo the Indo-westpacific form, only L e a c h (1815) named the American form *Palaemon carcinus,* whi his figure and name are used by L a t r e i l l e (1818) in the Tableaux encyclopédiques et méthodique The first who after L a t r e i l l e (1802) drew attention to the fact that *Cancer Carcinus* L. is differe from *Palaemon carcinus,* is, as far as I know, S u n i e r (1925), who in a very short note in the pr ceedings of a session of the Netherlands Zoological Society pointed to this fact. As the name *carcin* could not be used for the Indian form, S u n i e r proposed the name *Palaemon d'Acqueti* for th species, in honour of Dr. H e n r i c u s d'A c q u e t, burgomaster of Delft (1632-1706), who len specimen of the present species from his cabinet to let it be figured for plate I in R u m p h i u s Rariteitkamer. S u n i e r's name, however, cannot be used as the name *Rosenbergii* given by D e M a to the same species is older. As far as I know no other valid name is given to the present species (t name *Palaemon spinipes* Schenkel, 1902, besides being younger than *Palaemon Rosenbergii* De Ma 1879, is preoccupied by the name *Palaemon spinipes* Desmarest, 1817, for a fossil species), so th the correct name of it is *Macrobrachium rosenbergii* (De Man).

The Siboga specimens have already been mentioned by D e M a n (1908), the specimens in t Leiden Museum labelled Siam, Java, Borneo, Makassar and Andai have been mentioned by D e M (1879), those from Pontianak and Tepuh by D e M a n (1898). The specimen from Andai is the ty of the species.

The species is named in Java "udang satang"; in Borneo, near Balikpapan the natives call t species "udang galah". The word "udang" means "prawn", the significance of "satang" as w as of "galah" is "a long pole", the name refers to the very long chelipeds of the large males.

Distribution: This freshwater prawn, which occurs rather often in brackish and occasionally salt water is recorded in literature from: Indian Ocean (O l i v i e r, 1811; L a m a r c k, 18 D e s m a r e s t, 1823, 1825; V o i g t, 1836; H. M i l n e E d w a r d s, 1837; 1838), East In (H e r b s t, 1792), Mandi, Punjab, N.W. India (D o f l e i n, 1900), Surat (R a i, 1933), Bomb (H e n d e r s o n, 1893; S h a r p, 1893; R a i, 1933), Malabar District, S. India (H e n d e r s o & M a t t h a i, 1910), Cochin State (H e n d e r s o n & M a t t h a i, 1910; M e n o n, 193 Travancore State, S. India (H e n d e r s o n & M a t t h a i, 1910; P a n i k k a r, 1937; N a t a r 1942), Ceylon (T e n n e n t, 1861; D o f l e i n, 1900), surroundings of Madras, Chingle District (H e n d e r s o n & M a t t h a i, 1910), Madras (H e n d e r s o n, 1893), Rajahmund and Cocanada, Godaveri District (H e n d e r s o n & M a t t h a i, 1910), Ganjam (H e n d e r s o 1893), Orissa (D o f l e i n, 1900), Garia near Calcutta (K e m p, 1918), Calcutta (V o n M a r t e 1868; H e n d e r s o n, 1893), Ganges (H. M i l n e E d w a r d s, 1837), Hooghly River (S h a r p, 189 Sundarbans (H e n d e r s o n, 1893), Sittang, Burma (H e n d e r s o n, 1893), Tavoy, Tenasserim (H e d e r s o n, 1893), Mergui Archipelago (D e M a n, 1888a), Georgetown, Penang (B o o n e, 193 Singapore (V o n M a r t e n s, 1868, 1876; W a l k e r, 1887; D e M a n, 1897), Kelantan, Malay Pe sula (L a n c h e s t e r, 1901), Siam (D e M a n, 1879), Patani River, Siamese Malay States (K e 1918a), Singora, Siamese Malay States (L a n c h e s t e r, 1901; K e m p, 1918a), Tale Sap, Siam Malay States (L a n c h e s t e r, 1901; S u v a t t i, 1937), Patalung River, Siamese Malay States (K e 1918a), Menam at Pakret, Siam (S u v a t t i, 1937), Klong Ranode, Siam (S u v a t t i, 1937), D Luang, Siam (S u v a t t i, 1937), Nontaburi, Siam (S u v a t t i, 1937), Bangkok, Siam (V o n M a r t e 1868; P e a r s e, 1933; S u v a t t i, 1937), Tale Noi, Siam (S u v a t t i, 1937), Menam Chao Phya, Ba sorn, Siam (S u v a t t i, 1937); Cochinchina (S e r è n e, 1937), Saigon, Cochinchina (O r t m a n n, 18

Thompson, 1901), Cauda near Nha Trang, Annam (Serène, 1937), Hongkong (Thompson, 1901), ? Yedo and Yokohama, Japan (Von Martens, 1868) [1]), Manila, Luzon (Casto de Elera, 1895), San Juan and Pasig Rivers, Luzon (Cowles, 1914; Estampador, 1937), Laguna de Bay, Luzon (Cowles, 1914), Rio Bical, S. Luzon (Von Martens, 1868), Naujan Lake near Calapan, Mindoro (Cowles, 1914; Estampador, 1937), Takloban, Leyte (Von Martens, 1868), Sebu (Thallwitz, 1892), Baram River, Sarawak (De Man, 1902), Sarawak (Lanchester, 1900; Nobili, 1900), Kophiang near Mandor, W. Borneo (Von Martens, 1868), Pontianak, S. W. Borneo (De Man, 1898), Sintang, West Borneo (Von Martens, 1868), Tepuh near Samarinda, E. Borneo (De Man, 1898a), Mahakam (= Kutei) River, E. Borneo (De Man, 1908), Borneo (De Man, 1879), Musi River near Muaraklingi, Sumatra (J. Roux, 1932), Palembang, Sumatra (Von Martens, 1868; De Man, 1892; J. Roux, 1932), Sumatra (Schenkel, 1902), Tjimandiri River, W. Java (J. Roux, 1932), Java (De Man, 1879; Miers, 1880), Bali (Miers, 1880), Pajeti, Sumba, (J. Roux, 1928a), Kema, N. Celebes (Schenkel, 1902), N. Celebes (Thallwitz, 1892), Makassar, S. W. Celebes (De Man, 1879, 1892), Tobelo, Halmahera (De Man, 1902), Waigeo, off N. W. New Guinea (J. Roux, 1923), Pioneer bivouac, Mamberamo River, Dutch N. New Guinea (J. Roux, 1927) Andai, N. W. New Guinea (De Man, 1879; Nobili, 1899), Van der Sande River, S. W. New Guinea (J. Roux, 1923), Lorentz River near Kloof bivouac, near Alkmaar, Sabang, Regen Island and Bivak Island, S. W. New Guinea (J. Roux, 1921), Merauke, S. W. New Guinea, (J. Roux, 1917), Katau near the mouth of the Fly River, Papua (Nobili, 1899), Katherine River, N. Australia (J. Roux, 1933a), Flying Fish Cove, Christmas Island (Gordon, 1935).

Macrobrachium lamarrei (H. Milne Edwards)

Palemon Lamarrei H. Milne Edwards, 1837, Hist. nat. Crust., vol. 2, p. 397.
non *Palaemon Lamarrei* White, 1847, List Crust. Brit. Mus. p. 78.
non *Palemon Lamarrei* De Haan, 1849, Fauna Japonica, Crust., p. 171.
non *"Palaemon Lamarrei?"* Smith, 1869, Trans. Connect. Acad. Arts Sci., vol. 2, p. 40
non *Palaemon Lamarrei* De Man, 1879, Notes Leyden Mus., vol. 1, p. 166.
? *Palaemon Lamarrei* Henderson, 1893, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 5, p. 442.
non *Palaemon lamarrei* Ortmann, 1893, Ergebn. Plankton-Exped., vol. 2Gb, p. 48.
Palaemon lamarrei De Man, 1897, Zool. Jb. Syst., vol. 9, p. 767.
non *Palaemon lamarrei* Nobili, 1897, Boll. Mus. Zool. Anat. comp. Torino, vol. 12 n. 280, p. 5.
non *Palaemon lamarrei* Doflein, 1899, S. B. Bayer. Akad. Wiss., vol. 29, pp. 177, 185.
non *Palaemon carcinus Lamarrei* Lanchester, 1900, Ann. Mag. nat. Hist., ser. 7 vol. 6, p. 263.
non *Bithynis lamarrei* Young, 1900, Stalk-eyed Crust. Brit. Guian., p. 487.
non *Palaemon carcinus lamarrei* Lanchester, 1901, Proc. zool. Soc. Lond., 1901, p. 565.
non *Palaemon lamarrei* Thompson, 1901, Catal. Crust. Mus. Dundee, p. 19.
Palaemon (*Eupalaemon*) *lamarrei* De Man, 1908, Rec. Indian Mus., vol. 2, p. 222, pl. 19 fig. 4.
Palaemon lamarrei Henderson & Matthai, 1910, Rec. Indian Mus., vol. 5, p. 301.
Palaemon lamarrei Kemp, 1915, Mem. Indian Mus., vol. 5, p. 265.
Palaemon Lamarrei Sunier, 1925, Tijdschr. Nederl. dierk. Ver., ser. 2 vol. 19, p. cxv.
Palaemon lamarrei Balss, 1930, Ergebn. Biol., vol. 6, p. 318.
Palaemonetes lamarrei Arndt, 1933, Mitt. zool. Mus. Berlin, vol. 19, p. 250.
Palaemon lamarreii Hora, 1933, Curr. Sci., vol. 1, pp. 4, 5.

1) Von Martens expresses his doubts as to the correctness of the labelling of his specimens from "Japan".

Palaemon lamarrei Sewell, 1934, Rec. Indian Mus., vol. 36, pp. 53, 55, 58.
Palaemon lamarrei Nath, 1937, Journ. Morph., vol. 61, p. 149, pls. 1-3.
Palaemon lamarrei Chopra, 1939, Journ. Bombay nat. Hist. Soc., vol. 41, p. 223, pl. 1 fig. 6.
Palaemon lamarrei McCay & White, 1941, Indian med. Gazette, vol. 76, p. 38.
Palaemon lamarrei Chopra & Tiwari, 1949, Rec. Indian Mus., vol. 45, p. 214.

Museum Amsterdam:

Port Canning; from Indian Museum, Calcutta; coll. J. G. de Man. — 4 juveniles 22-29 mm.
Calcutta; from Indian Museum, Calcutta; coll. J. G. de Man. — 4 juveniles 23-32 mm.

The present specimens form part of the material described by De Man (1908). I have nothing to add to De Man's extensive description. The exopods of the uropods have their outer margins ending in a single tooth, the small accessory spine, as is present at the inner side of the final tooth in most species of Palaemonidae, lacks in all my specimens of the present species.

The South American specimens identified by various authors with *Palaemon lamarrei* belong in reality to *Macrobrachium amazonicum*. As already pointed out by De Man (1879) and confirmed by Sunier (1925) the specimen named by De Haan (1849) *Palaemon Lamarrei,* which should originate from Japan, is identical with *Macrobrachium amazonicum* (Heller). Except De Haan's spirit specimen of "*Palaemon Lamarrei*", which still is present in the collection of the Leiden Museum and which could be examined by me, a second specimen of *Macrobrachium amazonicum* was found by Mr. Martin D. Burkenroad among the dry material of Japanese Penaeidae studied by De Haan. The Bopyrid parasite carried by De Haan's spirit specimen under the carapace belongs to *Probopyrus bithynis* Richardson (1904) (= *Probopyrus floridensis* Rich. var. *gigas* Nierstrass & Brender à Brandis, 1925) a species which is common in the West Indies, parasiting on various species of *Macrobrachium* (vid. Sunier, 1925, and Nierstrass & Brender à Brandis, 1925). Herewith the identity of De Haan's specimen is finally settled; it obviously does not originate from Japan, but from the West Indies. The fact that some West Indian material by some error or other has been mixed with De Haan's Japanese material also is confirmed by the fact that De Haan's new species *Palaemon brevicarpus* proves to belong to *Macrobrachium carcinus* (L.) (= *Palaemon jamaicensis* (Herbst)), one of the most common species from the West Indies.

Of the specimens recorded by Henderson (1893) as *P. Lamarrei* from Ganjam, too little is known to ascertain the correctness of Henderson's identification the identity of the specimens is the more incertain as Henderson himself regards them as young specimens of "*Palaemon carcinus*".

Lanchester's (1900) specimens from the Malay Peninsula, recorded under the name *Palaemon carcinus* var. *Lamarrei* do not belong to the present species. Lanchester namely gives as rostral formula $\frac{12}{10}$, a formula never shown by *M. lamarrei,* he furthermore states "there is a wide gap between teeth 8-9 above", this should mean that there are 4 subapical teeth dorsally, a character not shown by either *M. lamarrei* or the two other forms in which the rostrum has the ultimate portion unarmed, *M. malcolmsoni* and *M. weberi.* In all probability Lanchester's specimen is a specimen of *Macrobrachium rosenbergii* (De Man) in which the 8th and 9th tooth are more remote from one another than from the other teeth. The characters of the prickly second legs and the size are in good agreement with those of *M. rosenbergii,* too. The specimen of unknown

locality referred by Lanchester (1901) to *Palaemon carcinus lamarrei* is, as already pointed out by Kemp (1918), a specimen of *Macrobrachium rosenbergii* (De Man) (= *Palaemon carcinus* auctt.).

Arndt (1933) mentions the present species under the name *Palaemonetes lamarrei,* this of course is an error as it distinctly belongs to the genus *Macrobrachium* as is shown by the presence of a well developed three-jointed mandibular palp and the presence of a hepatic and absence of a branchiostegal spine.

Distribution: The species seems to be confined to India. It is recorded from: Near Lahore (Nath, 1937), Patna State (Chopra & Tiwari, 1949), Bengal coasts (H. Milne Edwards, 1837), N.W. Bengal, 130 miles from Calcutta (Mc Cay & White, 1941), Calcutta (De Man, 1908), Saltwater lake near Calcutta (Sewell, 1934), Port Canning (De Man, 1908), Uttarbhag, Lower Bengal (Hora, 1933), Barkul and Rambha, Chilka Lake (Kemp, 1915), ? Ganjam (Henderson, 1893), Villivakkam near Madras (Henderson & Matthai, 1910). The species occurs in fresh and brackish waters sometimes it is subterranean.

Macrobrachium malcolmsonii (H. Milne Edwards)

Palemon Malcolmsonii H. Milne Edwards, 1844, Voy. Inde Jacquemont, vol. 4 pt. 2, p. 8, atlas, vol. 2, pl. 21.
Palaemon spinipes birmanicus Schenkel, 1902, Verh. naturf. Ges. Basel, vol. 13, p. 503, pl. 9 fig. 8.
Palaemon malcolmsonii Henderson & Matthai, 1910, Rec. Indian Mus., vol. 5, p. 283, pl. 15 fig. 2.
Palaemon malcolmsoni Kemp, 1915, Mem. Indian Mus., vol. 5, p. 266.
Palaemon malcolmsonii Balss, 1930, Ergebn. Biol., vol. 6, p. 318.
Palaemon malcolmsonii Patwardhan, 1937, Indian zool. Mem., vol. 6, p. 1, figs. 1-65.
Palaemon malcolmsonii Chopra, 1939, Journ. Bombay nat. Hist. Soc., vol. 41, p. 223, pl. 2 fig. 3.
Palaemon malcolmsonii Chopra, 1943, Indian Sci. Congr. vol. 30 pt. 2 sect. 6, p. 5.
Palaemon malcolmsonii Chopra & Tiwari, 1949, Rec. Indian Mus., vol. 45, p. 214.

The present species, of which no specimens are at my disposal, is closely related to *Macrobrachium weberi.* The differences between the two species will be dealt with under the latter species.

Schenkel (1902) described a new species under the name *Palaemon spinipes*; his specimens, however, belong in reality to *Macrobrachium rosenbergii.* Of his new species Schenkel also described a new variety *Palaemon spinipes* var. *birmanicus.* The specimens of this new variety show all characters mentioned and figured by Henderson & Matthai for *M. malcolmsonii,* so that I see no reason whatever to separate the two forms.

Distribution. The species inhabits fresh and salt waters. It is only known from the eastern part of India and from Burma. The records in literature are: Trichonopoly, S. India (Henderson & Matthai, 1910), Tanjore and Tranquebar, Tanjore District (Henderson & Matthai, 1910), Karoor, Coimbatore District (Henderson & Matthai, 1910), Chingleput, Walajabad, Red Hills and Pallavaram, Chingleput and Madras Districts (Henderson & Matthai, 1910), Renigunta, North Arcot District (Henderson & Matthai, 1910), Bezawada Anicut, Kistna District (Henderson & Matthai 1910), Rajahmundri, Godaveri District (Henderson & Matthai, 1910), Surada Reservoir and Berhampur, Ganjam District (Henderson & Matthai, 1910), Nagpur (H. Milne Edwards, 1844), Barkul and Satpara, Chilka Lake (Kemp, 1915), Ang River at Agalpur, and Tel River at Belgaon, Patna State, India (Chopra & Tiwari, 1949), Bhamo and Mandalay, Burma (Schenkel, 1902).

Macrobrachium weberi (De Man) (fig. 26)

Palaemon (*Eupalaemon*) *Weberi* De Man, 1892, Weber's Zool. Ergebn., vol. 2, p. 421, pl. 25 fig. 33.
Palaemon weberi Borradaile, 1899, Willey's Zool. Res., vol. 4, p. 410.
Palaemon (*Eupalaemon*) *weberi* De Man, 1915, Zool. Jb. Syst., vol. 38, p. 420, pl. 28 fig. 7, pl. 29 fig. 7.
Palaemon (*Eupalaemon*) *weberi* J. Roux, 1917, Nova Guinea, vol. 5, p. 600.
Palaemon (*Eupalaemon*) *weberi* J. Roux, 1927, Nova Guinea, vol. 15, p. 322.

Museum Leiden

Sidenreng Lake, Celebes; 1888-1889; leg. M. Weber; cotypes. — 2 specimens 49 and 60 mm.
Minralang River, Celebes; 1888-1889; leg. M. Weber; cotypes. — 2 specimens 58 and 70 mm.
Hollandia, N. New Guinea; April 5, 1911; leg. K. Gjellerup; New Guinea Expedition, 1910-1911. — 5 specimens 67-74 mm (3 specimens bopyrized).
Zoutbron, N. New Guinea; 1910-1911; New Guinea Expedition, 1910-1911. — 1 specimen 88 mm.
N. New Guinea; 1910-1911; New Guinea Expedition, 1910-1911. — 4 specimens 55-75 mm.

Museum Amsterdam

Tjenrana River near Pampanuwa, Celebes; 1888-1889; leg. M. Weber; cotypes. — 31 specimens 25-85 mm.
Minralang River near Tempe, Celebes; 1888-1889; leg. M. Weber; cotypes. — 13 specimens 45-75 mm.
Lake Tempe, Celebes; leg. Eerdmans; cotype. — 1 specimen 110 mm (adult male).
Lake Sidenreng near Teteassi, Celebes; 1888-1889; leg. M. Weber; cotypes. — 4 specimens 56-90 mm.
Mosso River, N. New Guinea; May 9-12, 1903; New Guinea Expedition, 1903. — 5 specimens 75-87 mm.
Tawarin River, N. New Guinea; June 20, 1903; New Guinea Expedition, 1903. — 2 specimens 42 and 44 mm.
Waudu River, N. New Guinea; June 20, 1903; New Guinea Expedition, 1903. — 1 specimen 82 mm.
Hollandia, N. New Guinea; April 5, 1911; New Guinea Expedition, 1910-1911. — 2 specimens 76 and 88 mm (one bopyrized).
Locality unknown. — 1 specimen 53 mm.

De Man (1892, 1915) gave extensive descriptions of the present species. A large part of the material preserved in the two above Musea has served Dr. de Man for his descriptions, so that I have very little to add.

The antennula is normally shaped. In the adult male from Lake Tempe (coll. Mus. Amsterdam) the basal segment of the right antennule is abnormal in shape by having two distinct anterolateral spines, instead of one; the left antennule is normal.

The scaphocerite (fig. 26 a) is thrice as long as broad, it is of about the same breadth throughout its entire length, only close near the top and near the base it rapidly narrows. The final tooth is far overreached by the lamella. The oral parts are quite typical for the genus.

The first pereiopod is smooth, while the second to fifth legs are provided with scattered spines and hairs. The large chelae of the adult male have the palm covered with many small blunt spinules, the fingers are provided with a thick layer of closely packed hairs; when these hairs are removed, strange irregularly shaped squamiform structures may be seen, which are placed on the upper as well as on the lower finger. These structures in all probability consist of the same material

as the spines on the palm, and are present on both chelae of the adult male, so that it is in my opinion not very probable that they are abnormalities. The cutting edge of the dactylus of the large chela of the adult male bears two distinct teeth, while that of the fixed finger is provided with one large proximal tooth, behind which some small irregularly shaped teeth are visible. In the females and young males the third pereiopod reaches with part of the dactylus, in the adult male with part of the propodus, beyond the scaphocerite. The fifth leg overreaches the scaphocerite with a portion of the propodus. The merus of the third leg in the adult male is longer than the propodus.

The pleopods are quite normal.

The pleurae of the fifth abdominal segment have the apex rounded.

The telson is normal in shape, it is figured by De Man (1915). The anterior pair of dorsal spinules is placed about in the middle of the telson, the posterior pair is situated about halfway between the anterior pair and the posterior margin of the telson. The posterior margin ends in a strong median tooth, which is flanked at each side by two spines and a feathered seta. The inner spine distinctly overreaches the apex of the telson, the outer is very short (fig. 26 b).

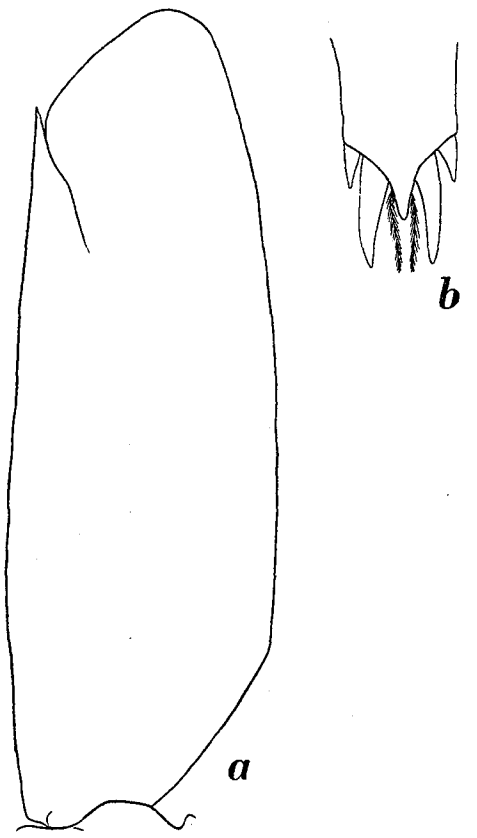

Fig. 26. *Macrobrachium weberi* (De Man). a, scaphocerite; b, tip of telson. a, × 8, b, × 24.

Distribution. The species is only known from fresh water. It is recorded in literature from Celebes, New Guinea and New Britain. Records in literature are: Lake Tempe and Minralang River near Lake Tempe, S.W. Celebes (De Man, 1892), Lake Sidenreng near Teteassi, S.W. Celebes (De Man, 1892), Tjenrana River near Pampanuwa, S.W. Celebes (De Man, 1892), Waudu River, Geelvink Bay, N. New Guinea (J. Roux, 1917), Pionier Bivouac, Mamberamo River, N. New Guinea (J. Roux, 1927), Tawarin River, Walckenaer Bay, N. New Guinea (J. Roux, 1927), Hollandia, N. New Guinea (De Man, 1915), Zoutbron, N. New Guinea (De Man, 1915), Moso River, N. New Guinea (J. Roux, 1917), Schultze Point, New Britain (Borradaile, 1899).

Macrobrachium caledonicum (J. Roux)

Palaemon (*Macrobrachium*) *caledonicus* J. Roux, 1926, Nova Caledonia, Zool., vol. 4, p. 224, figs. 52-54.

This species, of which no material is at my disposal, is closely related to *M. australe,* mainly differing from that species in the characters mentioned in the key. As Roux pointed out it also shows some resemblance to *M. latidactylus,* from which species, however, it at once may be distinguished by the fact that only few teeth of the rostrum are placed behind the orbit. The species is known from various localities in New Caledonia, but has not yet been reported outside that region.

Macrobrachium australe (Guérin-Méneville) (figs. 27-30)

Palaemon australis Guérin-Méneville, 1838, Duperrey's Voy. Coquille, Zool., vol. 2 pt. 2, p. 37.
Palaemon sundaicus Heller, 1862, S. B. Akad. Wiss. Wien, vol. 45 pt. 1, p. 414, pl. 2 figs. 38, 39.
Palaemon sundaicus Heller, 1865, Reise Novara Zool., vol. 2 pt. 3, p. 115.
Palaemon Danae Heller, 1865, Reise Novara Zool., vol. 2 pt. 3, p. 120, pl. 11 fig. 3.
Palaemon dispar Von Martens, 1868, Arch. Naturgesch., vol. 34 pt. 1, p. 41.
Palaemon alphonsianus Hoffmann, 1874, Rech. Faune Madagascar, vol. 5 pt. 2, p. 33, pl. 9 figs. 63-65.
Palaemon parvus Hoffmann, 1874, Rech. Faune Madagascar, vol. 5 pt. 2, p. 35, pl. 7 fig. 59.
Palaemon dispar Miers, 1879, Philos. Trans. Roy. Soc. Lond., vol. 168, p. 493.
Palaemon dispar Miers, 1880, Ann. Mag. nat. Hist., ser. 5 vol. 5, p. 383.
Palaemon Malliardi Richters, 1880, Beitr. Meeresf. Maur. Seych., p. 166, pl. 18 figs 1-3.
Palaemon Danae Haswell, 1882, Catal. Aust. Crust., p. 197.
Palaemon dispar De Man, 1888, Arch. Naturgesch., vol. 53 pt. 1, p. 556.
Palaemon dispar Ortmann, 1891, Zool. Jb. Syst., vol. 5, p. 718.
Palaemon sundaicus Ortmann, 1891, Zool. Jb. Syst., vol. 5, p. 719.
? *Palaemon danae* Ortmann, 1891, Zool. Jb. Syst., vol. 5, p. 719.
Palaemon parvus Ortmann,1891, Zool. Jb. Syst., vol. 5, p. 720.
Palaemon (*Eupalaemon*) *dispar* De Man, 1892, Weber's Zool. Ergebn., vol. 2, p. 427, pl. 26 fig. 34.
Palaemon sundaicus Koelbel, 1892, in De Man, Weber's Zool. Ergebn., vol. 2, p. 437, footnote.
Palaemon Danae Koelbel, 1892, in De Man, Weber's Zool. Ergebn., vol. 2, p. 438, footnote.
Palaemon dispar Thallwitz, 1892, Abh. zool.-anthrop. Mus. Dresden, 1890-1891, pt. 3, p. 15.
Palaemon dispar Henderson, 1893, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 5, p. 442.
Palaemon (*Eupalaemon*) *dispar* De Man, 1893, Notes Leyden Mus., vol. 15, p. 304.
Palaemon dispar Ortmann, 1894, Denkschr. med.-naturw. Ges. Jena, vol. 8, p. 18.
Palaemon (*Eupalaemon*) *ustulatus* Nobili, 1899, Ann. Mus. Stor. nat. Genova, vol. 40, p. 241.
Palaemon (*Eupalaemon*) *dispar* Coutière, 1900, C. R. Acad. Sci. Paris, vol. 130, p. 1266.
Palaemon (*Eupalaemon*) *Danae* Coutière, 1900, C. R. Acad. Sci. Paris, vol. 130, p. 1266.
Palaemon (*Eupalaemon*) *dispar* Nobili, 1900, Ann. Mus. Stor. nat. Genova, vol. 40, p. 480.
Palaemon Danae Coutière, 1901, Ann. Sci. nat. Zool., ser. 8 vol. 12, p. 325, pl. 13 figs. 38, 39.
Palaemon dispar Coutière, 1901, Ann. Sci. nat. Zool., ser. 8 vol. 12, p. 329, pl. 14 figs. 41-43.
Palaemon (*Eupalaemon*) *dispar* De Man, 1902, Abh. Senckenb. naturf. Ges., vol. 25, p. 766.
Palaemon dispar Schenkel, 1902, Verh. naturf. Ges. Basel, vol. 13, p. 508.
? *Palaemon* (*Eupalaemon*) *Danae* Nobili, 1903, Boll. Mus. Zool. Anat. Comp. Torino, vol. 18 n. 452, p. 7.
Palaemon (*Eupalaemon*) *dispar* Borradaile, 1907, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 12, p. 67.
Palaemon (*Eupalaemon*) *dispar* Nobili, 1907, Mem. Accad. Sci. Torino, ser. 2 vol. 57, p. 361.
non ? *Palaemon* (*Eupalaemon*) *danae* De Man, 1908a, Ann. Mag. nat. Hist., ser. 8 vol. 1, p. 363, pl. 16.
Palaemon (*Eupalaemon*) *dispar* Lenz, 1910, Voeltzkow's Reise O. Afr., vol. 2, p. 567.
Palaemon dispar Koningsberger, 1913, Java zoöl. biol., p. 401.
Leander lepidus De Man, 1915, Zool. Jb. Syst., vol. 38, p. 410, pl. 28 fig. 6.
Palaemon ustulatus De Man, 1915, Zool. Jb. Syst., vol. 38, p. 431, pl. 29 fig. 12.
Palaemon (*Eupalaemon*) *dispar* De Man, 1915, Zool. Jb. Syst., vol. 38, p. 435, pl. 29 fig. 14.
Palaemon (*Eupalaemon*) *dispar* J. Roux, 1917, Nova Guinea, vol. 5, p. 595.
Palaemon (*Eupalaemon*) *dispar* J. Roux, 1919, Abh. Senckenb. naturf. Ges., vol. 35, p. 336.
Leander lepidus J. Roux, 1919, Abh. Senckenb. naturf. Ges., vol. 35, p. 342.
Palaemon (*Eupalaemon*) *sundaicus* p.p. J. Roux, 1923, Capita Zool., vol. 2 pt. 2, p. 6.
Palaemon (*Eupalaemon*) *dispar* J. Roux, 1923, Capita Zool., vol. 2 pt. 2, p. 7.
Leander lepidus J. Roux, 1928a, Treubia, vol. 10, p. 214.
Palaemon (*Eupalaemon*) *dispar* J. Roux, 1928a, Treubia, vol. 10, p. 219.
Palaemon (*Eupalaemon*) *dispar* J. Roux, 1930, Rev. Suisse Zool., vol. 37, p. 356.

Palaemon (*Eupalaemon*) *dispar* J. Roux, 1933, Rés. sci. Voy. Ind. Princ. Belg., vol. 3 pt. 14, p. 6.
Palaemon (*Eupalaemon*) *dispar* J. Roux, 1934, Faune Colon. Franç., vol. 5, p. 531.
Palaemon (*Eupalaemon*) *dispar* J. Roux, 1934a, Rev. Suisse Zool., vol. 41, p. 227.
Palaemon dispar Adamson, 1935, Occ. Pap. Bishop Mus. Honolulu, vol. 11 n. 10, p. 17.
Palaemon dispar Adamson, 1939, Bull. Bishop Mus. Honolulu, vol. 159, p. 36.
? *Palaemon danae* Rick, 1942, Queensland Nat., vol. 12, p. 12.
Palaemon maillardi Ward, 1942, Mauritius Inst. Bull., vol. 2, p. 57.
Macrobrachium australe Holthuis, 1949, Nova Guinea, n. ser. vol. 5, p. 291.

Siboga Expedition

Station 4, Anchorage off Djangkar, E. Java, 7° 42′ S, 114° 12′.6 E; shore; depth 9 m; bottom coarse sand; March 9, 1899. — 2 specimens 24-34 mm.
Station 47, Bay of Bima, Sumbawa; trawl, dredge and shore exploration; depth 55 m; bottom mud, with patches of fine coral sand; April 8-12, 1899. — 7 specimens 15-20 mm.
River near Station 53, Bay of Nangamesi, Sumba; April 21 and 22, 1899. — 16 specimens 22-25 mm (1 specimen bopyrized).
Station 58, Anchorage off Seba, Sawu Island; dredge and shore exploration; depth up to 27 m; bottom sand; April 25, 1899. — 1 ovigerous female 70 mm, and 5 juveniles 21-24 mm.
River near Station 114, Kuandang Bay entrance, 0° 58′.5 N, 122° 55′ E; July 8, 1899. — 4 specimens 24-30mm.

Snellius Expedition

Beo, Talaud Islands; fresh water; June 14-21, 1930. — 1 specimen 89 mm.
Rivulet at Amboina; September 13, 1930. — 5 specimens (included 2 ovigerous females) 48-70 mm. (1 specimen bopyrized).

Museum Leiden

We Island, off N. Sumatra; February, 1927, July, 1930; leg. P. Buitendijk. — 4 specimens (1 ovigerous female) 57-90 mm.
Tjisanggiri River near desa (= village) Kalong, S.W. Java; June 15 and 16, 1939; leg. C. P. J. de Haas. — 58 specimens 12-26 mm.
Tjimangke River near desa Tjidjambe, S.W. Java; June 13 and 14, 1939; leg. C. P. J. de Haas. — 3 specimens 17-18 mm.
Tanahabang, Weltevreden, near Batavia; March 2, 1908; leg. P. N. van Kampen. — 7 specimens 36-40 mm.
Berit River, Flores; 1888-1889; leg. M. Weber. — 2 specimens 54 and 58 mm.
Maumere, Flores; 1891; leg. H. ten Kate. — 2 ovigerous females 65 and 77 mm.
Besar Island (= Groot Bastaard), off N.E. Flores; 1891; leg. H. ten Kate. — 1 specimen 92 mm.
North Sumba; leg. H. ten Kate. — 1 ovigerous female 61 mm.
Koinino River near Kupang, Timor; 1888-1889; leg. A. Wichmann. — 1 specimen 41 mm.
Air Lorike, Hitu Peninsula, Amboina; March 17, 1923; leg. F. Kopstein. — 25 specimens (included 1 ovigerous female) 17-49 mm (1 specimen bopyrized).
Amboina; in rapidly running mountain rivulets and waterfalls; October, 1922; leg. F. Kopstein. — 1 specimen 39 mm.
Armo River near Jahari, N. New Guinea; August 28, 1910 or Tarfia, N. New Guinea; fresh water; September 10, 1910; leg. K. Gjellerup. — 1 specimen 84 mm.
Oinaké River, N. New Guinea; May 31, 1910; New Guinea Expedition, 1910-1911; leg. K. Gjellerup; cotypes of *Leander lepidus* De Man. — 3 specimens 18-20 mm.
Tahiti; Museum Godeffroy. — 1 specimen 41 mm.

Museum Amsterdam

Lolowau, S. Nias; 1910; leg. J. P. Kleiweg de Zwaan. — 10 specimens 41-96 mm.
Western Nias; leg. J. P. Kleiweg de Zwaan. — 71 specimens (included ovigerous females) 44-80 mm (1 specimen bopyrized).
Nias; 1910; leg. J. P. Kleiweg de Zwaan. — 1 specimen 60 mm.
Sungai Pati Bubur near Airbangis, Padangsche Bovenlanden (Hills near Padang), W. Sumatra; fresh water; November, 1913; leg. E. Jacobson. — 6 specimens 32-56 mm.
Sibolga, W. Sumatra; fresh water; August, 1913; leg. E. Jacobson. — 1 specimen 35 mm.
Buleleng, Bali; January 25, 1907. — 3 specimens 53-60 mm.
River near Berit, Flores; fresh water; 1888-1889; leg. M. Weber. — 15 specimens (1 ovigerous female) 11-68 mm.
Rivers near Berit and near Reo, Flores; 1888-1889; leg. M. Weber. — 13 specimens 24-57 mm.
River near Raka-mbaha, Flores; upstreams of a waterfall; 1888-1889; leg. M. Weber. — 4 specimens (1 ovigerous female) 46-62 mm.
Dona River near Ende, Flores; 1888-1889; leg. M. Weber. — 1 specimen 57 mm.
Ba River near Ende, Flores; 1888-1889; leg. M. Weber. — 6 specimens (included 3 ovigerous females) 32-69 mm.
Nargi River near Konga, Flores; 1888-1889; leg. M. Weber. — 2 specimens (1 ovigerous female) 49 and 62 mm.
River near Konga, E. Flores; October 30, 1909; leg. G. A. J. van der Sande. — 8 specimens (included ovigerous females) 38-62 mm.
Tanah merah, Adonara Island, E. of Flores; 1888-1889; leg. A. Wichmann. — 4 specimens 44-58 mm.
Pajeti, Sumba; July, 1924; leg. P. J. Lambooy. — 18 specimens (included ovigerous females) 37-105 mm (1 specimen bopyrized).
River near Kupang, Timor; several m above springtide; May 13, 1908; leg. G. A. J. van der Sande. — 15 specimens (included 1 ovigerous female) 16-42 mm.
Koinino River near Kupang, Timor; 1888-1889; leg. A. Wichmann. — 8 specimens 45-72 mm.
Tjenrana River, near Pampanuwa, Celebes; 1888-1889; leg. M. Weber. — 1 specimen 76 mm.
River near Parepare, Celebes; 1888-1889; leg. M. Weber. — 2 specimens 45 and 52 mm.
Bonea River, Salajar, off S. E. Celebes; 1888-1889; leg. M. Weber. — 1 specimen 74 mm.
Amboina; leg. J. Brock; coll. J. G. de Man. — 1 specimen 50 mm.
Tubah River, W. Ceram; February 7, 1910; leg. L. F. de Beaufort. — 2 specimens 64 and 98 mm.
Rivulet near Keratu, W. Ceram; February 20, 1910; leg. L. F. de Beaufort. — 4 specimens 38-44 mm.
Waiho River, Waigeo; upstreams of a rapid; December 20, 1909; leg. L. F. de Beaufort. — 3 specimens 44-48 mm.
Wai La River, Waigeo; January 18, 1910; leg. L. F. de Beaufort. — 1 ovigerous female 74 mm.
Wai Meniel River, Waigeo; January 5, 1910; leg. L. F. de Beaufort. — 2 specimens 65 and 72 mm.
Klipong, N. New Guinea; July 9, 1903; New Guinea Expedition, 1903. — 4 specimens 41-54 mm.
Moso River, N. New Guinea; May 9-12, 1903; New Guinea Expedition, 1903. — 4 specimens 58-84 mm.

Description. The rostrum reaches to or slightly beyond the end of the scaphocerite, the tip is curved upward (only in large specimens the rostrum fails to reach the end of the scaphocerite). The upper margin is provided with 9-13 (mostly 10 or 11) teeth, the first two or three (seldom the first 4) of which are placed on the carapace behind the orbit. The teeth are large and generally widely separated, often the distance between the ultimate (anterior) and penultimate teeth is much larger than that between the other teeth, sometimes the distance between the first (posterior) and the second teeth is larger than that between the second and the third tooth. The lower margin bears

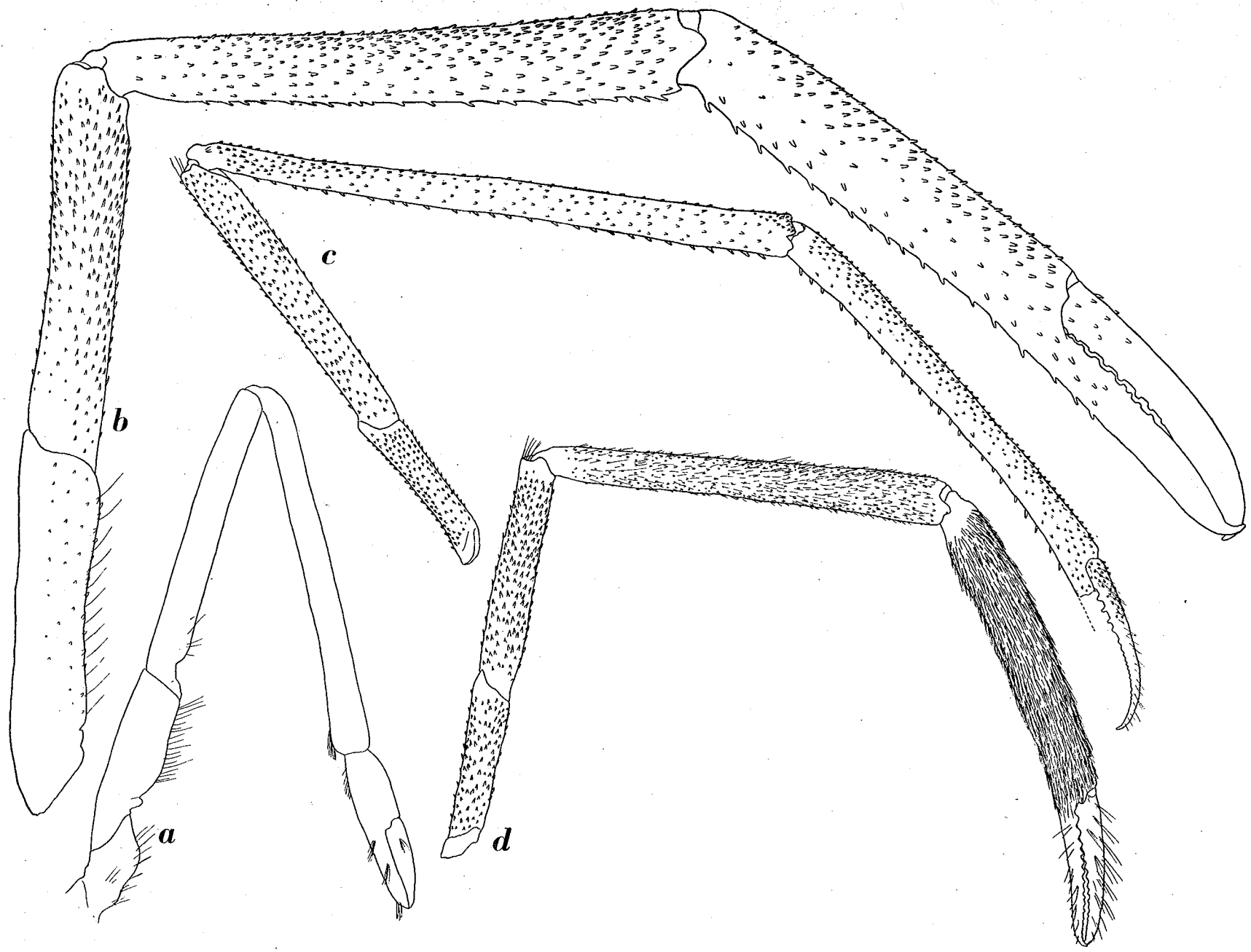

Fig. 27. *Macrobrachium australe* (Guérin). a, first pereiopod; b, second pereiopod of female; c, larger second pereiopod of male; d, smaller second pereiopod of male. a, b, × 8; c, d, × 2.

2-6 teeth (generally 3, and very rarely 8). The carapace is smooth, in adult males it is somewhat roughened by spinules in the anterior and ventral regions. The hepatic spine is smaller than the antennal and is placed on a distinctly lower level.

The apex of the fifth abdominal segment is about rectangular and ends in a rather acute point. The length of the fifth segment is about $^3/_4$ to $^2/_3$ of that of the sixth segment.

The telson is about 1.5 times as long as the sixth abdominal segment or is somewhat shorter. It bears the usual armament of 2 pairs of dorsal spines. The telson gradually narrows posteriorly, the posterior margin ends in a distinct median point, which is flanked by two pairs of spines and several feathered setae. The inner spines distinctly overreach the apex of the telson.

The eyes are large, the cornea is about as long as, but distinctly broader than the stalk. A distinct ocellus is present.

The antennular peduncle is quite typical in shape.

The scaphocerite (fig. 28 a) is elongate, its outer margin is straight or slightly convex, the inner margin is somewhat concave. The greatest breadth lies just above the base, towards the top the scale narrows rapidly. The lamella distinctly overreaches the final tooth.

The oral parts are quite typical in shape.

The first pereiopod (fig. 27 a) reaches with about the entire chela beyond the scaphocerite in the adult male, in the females and the young males it reaches with the fingers only beyond the scaphocerite or even just fails to reach the end of that scale. The fingers are as long as the palm. The carpus is twice to slightly more than twice as long as the chela (in adult males it is relatively longer than in the females). The merus measures $^4/_5$ of the length of the carpus. The ischium is about half as long as the merus. The second pereiopods in the adult male are distinctly unequal in shape and length. The larger leg (fig. 27 c) reaches with a large part of the merus beyond the scaphocerite. The fingers are slender and measure slightly less than $^2/_5$ of the length of the palm. The dactylus is provided with small sharp spinules, which are placed closest together in the basal portion of the dactylus. The cutting edge of the dactylus is provided with numerous (about 20) denticles over the entire length; these denticles are largest in the proximal part, becoming smaller and less distinct anteriorly. The palm is elongate and cylindrical, it is more than 10 times as long as broad and covered with numerous spinules; these spinules are smallest and placed closest together in the upper and outer surface of the palm: the spinules of the lower and inner surfaces are distinctly longer and placed farther apart from one another. Some scattered hairs are present on the chela, they are however, most distinct on the fingers; no velvety hair covering is present either on the palm or on the fingers. The carpus is as long as the length of the chela or is slightly shorter (up to $^7/_9$ of the length of the chela), it is widest distally and narrows proximally, it shows the same armament of spinules as does the palm. The merus is slightly more than half as long as the carpus; the ischium is $^1/_2$ to $^5/_8$ as long as the merus. Both merus and ischium are covered with many spinules, while a velvety coat of short hairs is present on the ischium and merus and sometimes also in the dorsal part of the carpus. The smaller second leg in the adult male (fig. 27 d) reaches with the entire carpus or only with part of it beyond the scaphocerite. The fingers are slender and measure about $^2/_5$ to $^1/_2$ of the length of the palm. Like in the larger leg the cutting edges of both dactylus and fixed finger are provided with numerous denticles over their entire length; here too the denticles diminish in size gradually distally. Both fingers are provided with spinules, which are most numerous in the proximal portion. The palm is relatively shorter than in the larger leg, it is also less slender, being

6-8 times as long as broad. Like in the larger leg the smaller leg has the palm covered with spinules, but these spinules are entirely obscured by a thick velvety coat of rather long hairs, which cover the entire palm and the bases of the fingers. The carpus is slightly shorter than the chela. The merus measures $^4/_7$ of the length of the carpus. The ischium is about $^2/_3$ of the length of the merus. The carpus, merus, and ischium show similar spinules as in the larger leg. A velvety coat of hairs is present on all these three segments; these velvety hairs are similar to those of the merus and ischium of the larger leg, but distinctly shorter than those of the palm of the smaller leg. The very old male

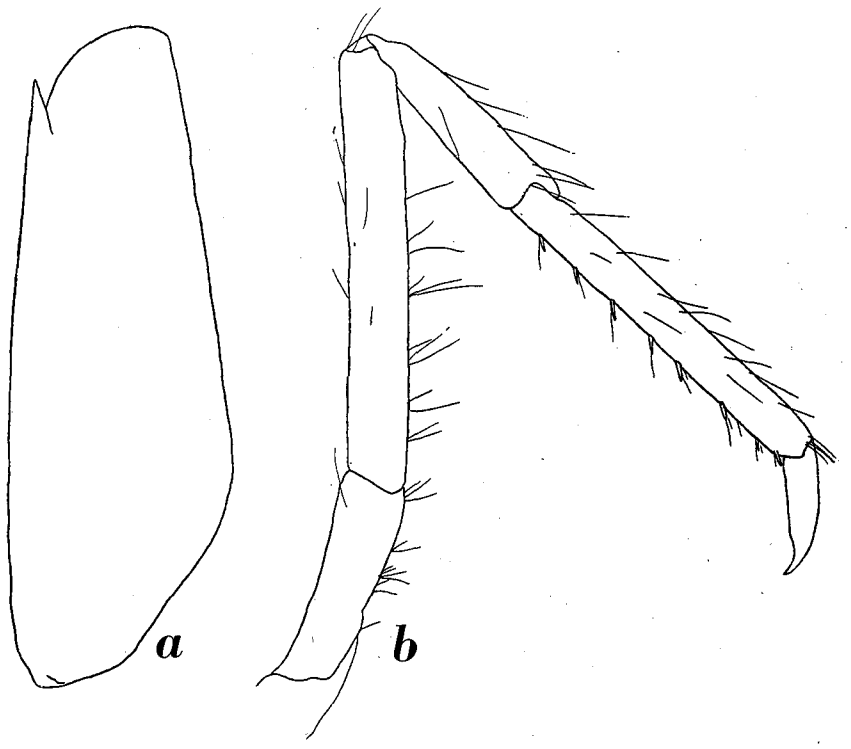

Fig. 28. *Macrobrachium australe* (Guérin). a, scaphocerite; b, third pereiopod. a, b, × 7.

from Pulu Besar (Leiden Museum) possesses only one of the second legs, presumably the shorter; this leg differs from the above description by having the fingers $^3/_5$ of the length of the palm and the carpus distinctly shorter than the chela. The tubercles and hairs are worn off. In the ovigerous females (length about 70 mm) the chelae (fig. 27 b) are equal in length and shape. They reach with the ultimate third (or somewhat more) of the carpus beyond the scaphocerite. The fingers are slender, they measure $^2/_3$ of the length of the palm. The cutting edge of the fingers is armed in the proximal half with 4 to 6 small teeth, which distally become gradually less conspicuous, the distal half of the cutting edge is entire. The palm is about thrice as long as broad. The carpus is slightly shorter than the chela (in very young specimens it is often longer than the chela). The merus is $^2/_3$ of the length of the carpus. The ischium is as long as or even slightly longer than the merus. All limbs are provided with stiff and long hairs, while the merus, carpus and chela moreover are provided with spinules, which are placed in more or less distinct longitudinal rows. The second cheliped of the females and the younger males most resembles the smaller second leg of the adult male. In the young specimens only one or two proximal small teeth are visible on the cutting edge,

in larger specimens this number gradually increases, also the spinulation of the second legs is less distinct or even fails entirely in young specimens. The third pereiopod of the adult male (fig. 28 b) reaches with part of the dactylus beyond the scaphocerite, while the fifth pereiopod just fails to reach the end of that scale. The propodus of the third leg is slightly less than 4 times as long as the dactylus. The posterior margin of the propodus bears a number of spinules. The carpus measures $^3/_5$ of the length of the propodus. The merus is slightly longer and distinctly broader than the propodus. The ischium is about half as long as the propodus. All joints are provided with scattered stiff long hairs, while the merus in the adult male moreover is provided at its posterior surface with numerous small spinules. The fifth pereiopod has the propodus slightly less than 4 times as long as the dactylus, here too the posterior margin is provided with spines, while the usual transverse rows of hairs are present in the distal part of the posterior margin. The carpus measures $^1/_2$ to $^3/_5$ of the length of the propodus. The merus is as long as, but distinctly broader than the propodus. The ischium is about half as long as the merus. All joints are smooth and provided with scattered long stiff hairs. In the females and the young males the third leg fails to reach the end of the scaphocerite, while the fifth just attains or just fails to reach the tip of the scale. The propodus of the third leg is slightly less than thrice as long as the dactylus. In very young specimens the propodus of the fifth leg too is relatively shorter.

The pleopods are typical in shape. The endopod of the first pleopods in the males is ovate, with the inner margin concave.

The uropods are longer than the telson. The exopod has the outer margin convex and ending into a tooth, which bears a movable spine at its inner margin.

The eggs are numerous and small, their diameter is about 0.4-0.5 mm.

I have at my disposal specimens of the present species varying in size between 12 and 105 mm. The very young specimens differ from the larger in the following respects:

1. the rostrum in young specimens is relatively much longer. In very young specimens (up to about 20 mm) the tip is entirely styliform (fig. 29 a), while in larger individuals small subapical teeth are visible (fig. 29 b), which in half grown and adult specimens are very distinct (fig. 30 a).
2. in very young specimens (less than 20 mm) the hepatic spine is situated on the anterior margin of the carapace, in larger specimens (20-30 mm) it becomes more remote from that margin, in specimens of more than 30 mm size it finally reaches its characteristic place obliquely behind the antennal spine (figs. 29 c-e). *Leander lepidus* De Man has been described after specimens in which the hepatic spine is still situated close to the anterior margin of the carapace and therefore was taken by De Man to be a branchiostegal spine, which was his reason to insert the specimens in the genus *Leander* auct. The fine series of specimens of various sizes at my disposal shows the real nature of this spine.
3. In specimens of less than 20 mm length a blunt supraorbital tubercle is visible, this probably is the last trace of the supraorbital spine of the larva. In larger stages the tubercle disappears.
4. In young specimens the sixth abdominal segment is more elongate than in older specimens.
5. The mandible in very young specimens (less than 20 mm) has the palp not yet developed, it then consists of only one small joint (fig. 29 f). In older specimens the palp is distinctly three-jointed (fig. 30b).
6. In young and very young specimens the second legs are smooth (figs. 29 h, 30 d), while they are distinctly tuberculate in larger specimens.

7. A very strange feature moreover is shown by the very young specimens (less than 20 mm). Here namely the dactylus of the last three pereiopods is distinctly biunguiculate (figs. 29 i, k), the additional claw disappears gradually in the older forms. (A similar feature is shown by the young specimens

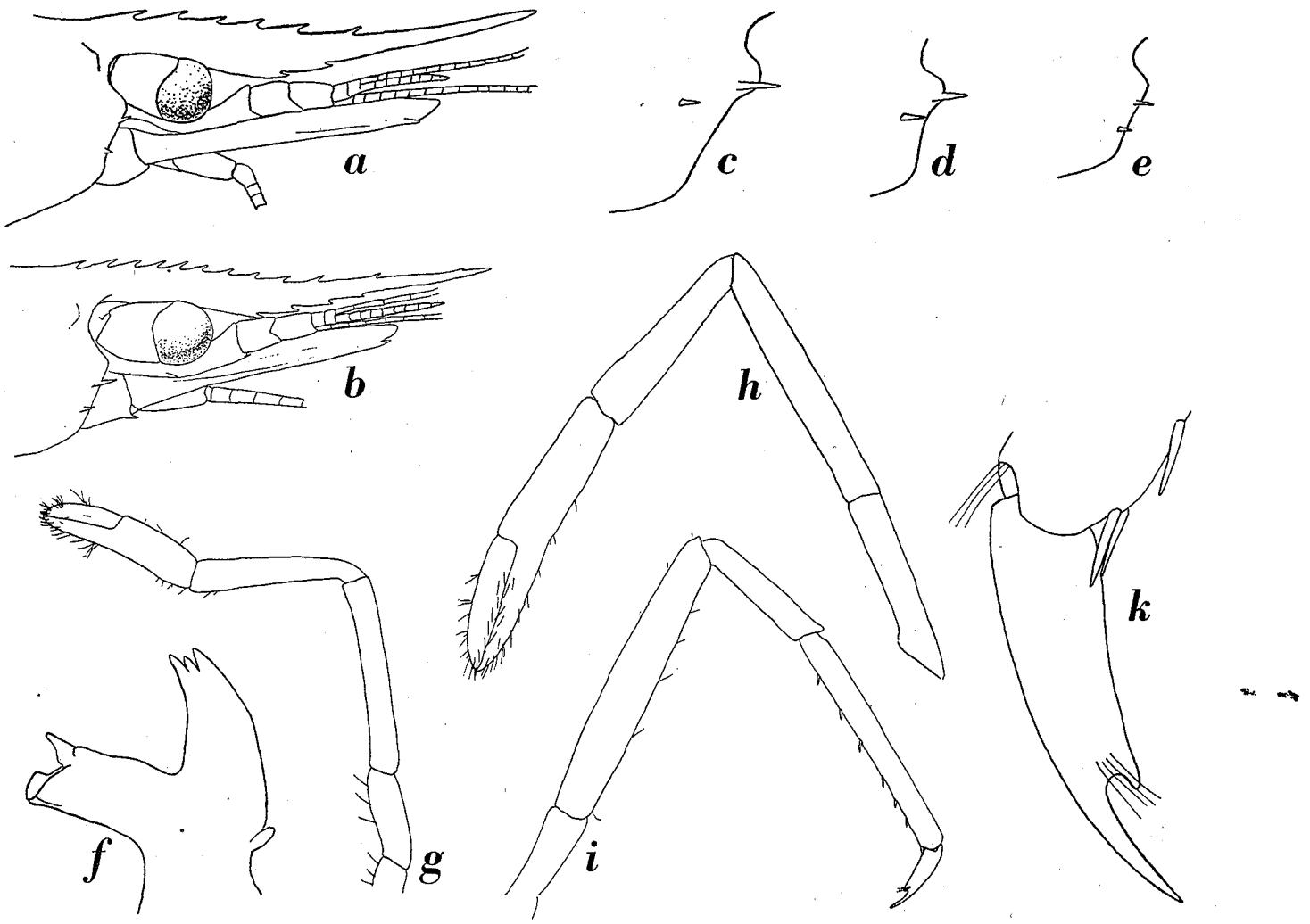

Fig. 29. *Macrobrachium australe* (Guérin), "*dionyx*" stage. a, b, anterior part of body in lateral view; c, d, e, position of hepatic spine in specimens of various size (c = 30 mm, d = 24 mm, e = 20 mm in length); f, mandible; g, first pereiopod; h, second pereiopod; i, third pereiopod; k, dactylus of third pereiopod. a-e, × 13; f, × 66; g-i, × 28; k, × 130.

of *Macrobrachium lar*; here the very young stages have been described as a separate species "*Leander dionyx* Nobili".)

The present species is best known under the name *Palaemon dispar* Von Martens. Before Von Martens published his description, however, the species had already been described twice. *Palaemon sundaicus* of Heller (1862) namely is identical with Von Martens's species. Heller's description gives no certainty about the identity of his species, but in the figure of the second leg numerous denticles are shown on the cutting edges of both fingers, which makes the identity with *Palaemon dispar* certain. De Man (1892, p. 437 footnote) publishes some additional details about the typespecimens of Heller's species, which he received from Dr. Koelbel, the then curator of the Vienna Museum. It is probable that the largest typespecimen of *Palaemon sundaicus*

is missing as according to H e l l e r a specimen of 75 mm length was present among the type material, while K o e l b e l found the largest specimen from the type set to be 50 mm. In all probability the second leg figured by H e l l e r is of the largest specimen, because K o e l b e l found only one specimen with a second leg. This leg shows 4 denticles in the proximal part of the cutting edge of the dactylus and 3 on that of the fixed finger; the leg obviously belongs to a young specimen as it measured only 29.5 mm; this also explains the small number of denticles on the cutting edges. The number of three and four denticles on the cutting edges of the fingers also proves the identity of the species, in the related species namely this number is never more than one or two (for instance in *Macrobrachium equidens* = *Palaemon sundaicus* auct., non Heller). *Palaemon sundaicus* Heller

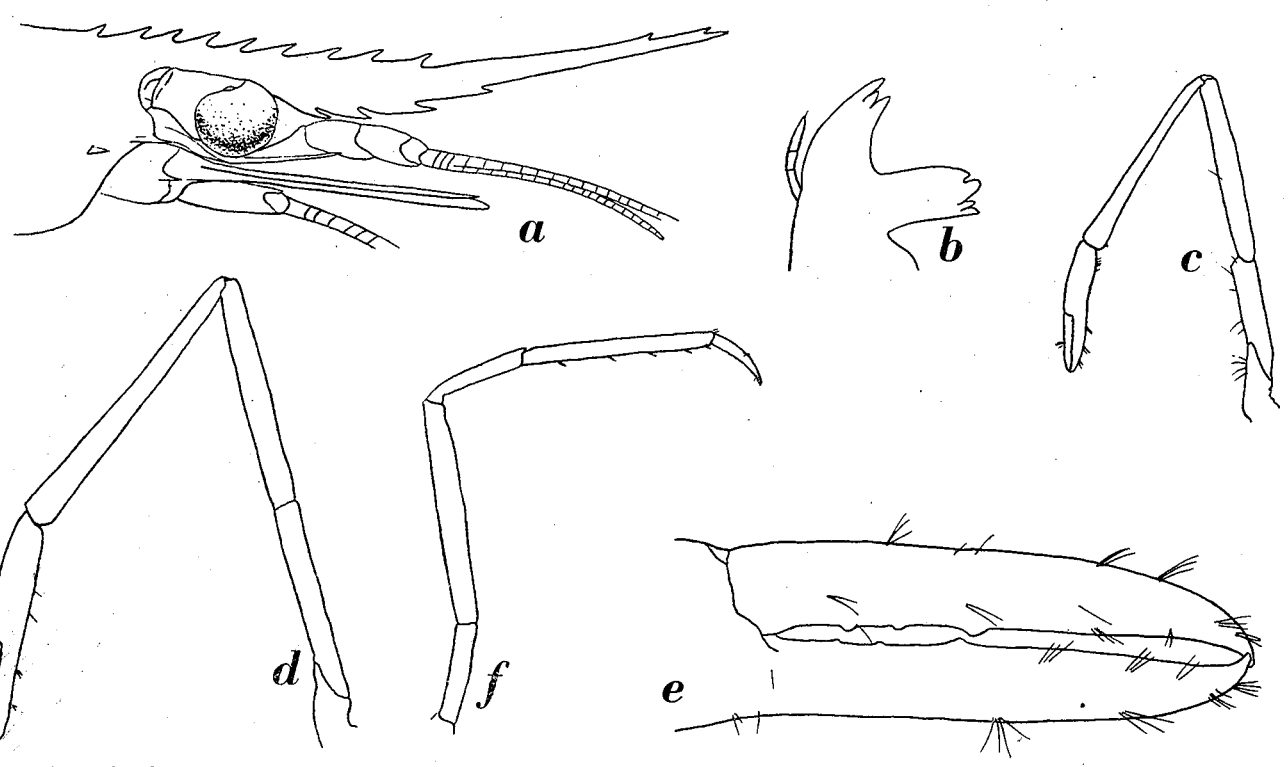

Fig. 30. *Macrobrachium australe* (Guérin) *"lepidus"* stage. a, anterior part of body in lateral view; b, mandible; c, first pereiopod; d, second pereiopod; e, fingers of second pereiopod; f, third pereiopod. a, × 10; b, × 33; c, d, f, × 14; e, × 66.

therefore is different from the species to which this name generally is given, and is identical with *Palaemon dispar* Von Martens. This possibility has already been pointed at by D e M a n, 1897, p. 781 and K e m p, 1918, p. 263, who, however, thought the changing of the names very undesirable.

G u é r i n M é n e v i l l e (1838) in the zoological part of the results of D u p e r r e y's voyage around the world described a new species, *Palaemon australis* from Tahiti. The species is described by G u é r i n as follows:

"P.[alaemon] rostro ferè eâdem longitudine quam testâ, subascendente, suprà duodecim dentato, spinis lateralibus thoracis per seriem ordine digestis. Il est long de près de six décimètres, depuis le bout du rostre jusqu'à l'extrémité de la queue; son rostre a presque la longueur de la carapace; il est un peu relevé en avant, armé de douze dents distribuées à des distances presque égales dans toute sa longueur et en dessus, et en ayant quatre en dessous. Son thorax est lisse, arrondi, sans carènes ni sillons; le bord antérieur est armé d'une épine aiguë, dirigée en avant; on en aperçoit une autre en

arrière de celle-là, placée sur la même ligne, et non plus bas, comme chez les espèces européennes. Les filets des antennes sont très-longs, minces; l'écaille des antennes externes est plus courte que le rostre et n'atteint qu'à la hauteur de sa quatrième dent du dessous. L'abdomen est lisse; ses derniers segments n'ont pas de sillon en dessus. Les lames caudales sont plus longues que l'intermédiaire, ciliées au bord. Les pattes sont toutes grêles, de forme ordinaire."

The description in all respects agrees with *Palaemon dispar* Von Martens, especially in the upward curved part of the rostrum and the dentition of that organ. The statement that the specimen is 6 decimeters long of course is an error and has to be 6 centimeters; the same error namely is made with *Hippolyte Leachii* (= *Saron marmoratus*) described on the same page, here too the length is given in decimeters instead of in centimeters. That *Palaemon australis* really is identical with *Palaemon dispar* is confirmed by the fact that in eastern Polynesia only four species of *Macrobrachium* occur, namely *Macrobrachium dispar, M. lar, M. latimanus* and *M. aemulum,* while Guérin's description does not fit for the latter three species. Furthermore *Palaemon dispar* seems to be very common on Tahiti, as Nobili (1907) states of that species: "Questa specie fu raccolta ..... in grande abbondanza nelle riviere di Tahiti." The use of the name *australe* for the present species therefore is entirely justified, the more as the use of the name *sundaicus* Heller will cause an enormous confusion, because that name is used by most authors for a very common and largely distributed species, which shows much resemblance to the present species, and the range of distribution of which for a large part coincides with that of *P. dispar.* The name *Palaemon australis* has been given by Ortmann (1891), who like almost all other carcinologists evidently was ignorant of the existence of the name *Palaemon australis* Guérin, to an Australian species, which therefore needs a new name, for which I propose here the name *Macrobrachium australiense* nom. nov.

Heller (1865) described and figured under the name *Palaemon Danae* a specimen of *Macrobrachium* from Sydney, which in the shape of the rostrum and the place of the branchiostegal spine closely resembles *Macrobrachium australe.* Also the relation between the joints of the second leg are like those in a young specimen of that species; that Heller's specimen in all probability is not yet fullgrown is shown by the smoothness and the shortness of the second chelae. Final certainty about the identity of *Palaemon danae* with *Macrobrachium australe* is given by the notes of Koelbel (in De Man, 1892, p. 438 footnote) on the type specimen of Heller's species: "Was die Bezahnung der Finger [of the second leg] anbelangt, so muss ich noch bemerken, dass der Dactylus auf seinem Innenrande in der Nähe des Gelenkes fünf Zähne trägt." This now finally settles the question about the identity of *P. danae* as only *Macrobrachium australe* shows the combination of the character of having more than two teeth on the cutting edge of the dactylus of the second legs and the other characters known of *Palaemon danae.* The record of *Palaemon danae* by Haswell (1882) is based on that of Heller (1865). The identity of Ortmann's specimens identified by him with *Palaemon danae* can not be made out with certainty as this author gives too little details of his material. Coutière (1901) refers some specimens from Madagascar to Heller's species, his identification is correct as his material proves to consist of juvenile specimens of *Macrobrachium australe* as is distinctly shown by his description and figures. The specimens identified by Nobili (1903) with *Palaemon danae* are considered by Henderson & Matthai to belong to *"Palaemon" malcolmsonii,* but I find too little data in Nobili's description to make this supposition certain. De Man (1908) described a species, which he provisionally identified with *Palaemon danae*; this species, however, is quite distinct from Heller's form and is, as far as I know, not described

before; therefore the name *novae-hollandiae* proposed by De Man for it in case it should prove to be different from *P. danae,* must be used. The paper in which Rick (1942) mentions "*Palaemon danae*" from Queensland is not at my disposal, so that I do not know the real identity of his material.

Palaemon alphonsianus Hoffmann (1874) belongs, as is clearly shown by Hoffmann's figure, to the present species, to which *Palaemon parvus* of the same author probably belongs too. *P. parvus* namely, concluding from the shape of the rostrum and the second legs, is a young specimen of either *Macrobrachium australe* or *M. equidens*; the position of the hepatic spine, which in Hoffmann's figure is placed much below the antennal, makes the identity of *P. parvus* with *M. australe* almost certain. It is to be regretted that the type specimens of both *Palaemon alphonsianus* and *P. parvus* are no longer extant in the collection of the Rijksmuseum van Natuurlijke Historie at Leiden, where all material dealt with by Hoffmann is preserved.

Palaemon Malliardi Richters (1880) (spelled *Palaemon Maillardi* by Coutière, 1901, p. 329) also belongs to the present species as is distinctly shown by Richter's figure and description. Ortmann (1891) and Coutière (1901) already pointed to this fact.

A further synonym of *Macrobrachium australe* is *Palaemon ustulatus* of Nobili (1899). As De Man (1915) already pointed out the only difference between Nobili's type specimens, which could be examined by De Man, and *P. dispar* was the fact that the specimens of *P. ustulatus* had a blackish colour, but this colour is of no specific value as it was found also in specimens of other species and probably is caused by an external factor.

As already pointed out above, *Leander lepidus* De Man (1915) is nothing else but a young stage of the present species, in which the hepatic spine has not yet attained its typical place. In some of the specimens the denticulation of the fingers of the second chela is already visible.

The specimens of the Leiden and Amsterdam Museums collected by M. Weber and A. Wichmann from Celebes and the Lesser Sunda Islands have already been dealt with by De Man (1892), the specimens from Flores collected by H. ten Kate (Museum Leiden) have already been reported upon by the same author (De Man, 1893), who (De Man, 1915) also dealt with the specimens collected by K. Gjellerup from N. New Guinea (Museum Leiden); the specimen from Amboina (Museum Amsterdam) is treated by De Man (1888). The specimens from Sumba (Museum Amsterdam) were reported upon by J. Roux (1928), those from Tubah River, Ceram and the male from Waigeo by J. Roux (1923) and those from New Guinea (Museum Amsterdam) by J. Roux (1917) under the name *Palaemon* (*Eupalaemon*) *dispar.* The ovigerous females from Waigeo were identified by J. Roux (1923) as *Palaemon sundaicus* (= *Macrobrachium equidens*). The position of the hepatic spine, however, showed the identity of these specimens with the present species; the second pereiopods are lacking in these specimens. The specimens from the rivulet near Keratu, W. Ceram (Museum Amsterdam) too were identified by J. Roux (1923) as *Palaemon* (*Eupalaemon*) *sundaicus,* here too the position of the hepatic spine showed the real identity, while moreover one of the specimens has the cutting edges of fingers of the second leg provided with the large number of denticles, characteristic for *M. australe.*

Distribution. This freshwater species is recorded in literature from: Silhouette Island, Seychelles (Borradaile, 1907), Fali Island, N. W. Madagascar (Hoffmann, 1874), Mananara River, bay of Antongil, N.E. Madagascar (Coutière, 1900, 1901; Lenz, 1910), Sainte Marie Island, E. Madagascar (Coutière, 1900, 1901), Tamatave, E. Madagascar (Lenz, 1910), Réunion