

A RE-EXAMINATION OF *PALAEMONETES SINENSIS* (SOLLAUD, 1911)
(CRUSTACEA; DECAPODA; PALAEMONIDAE).

A.J. BRUCE

Museum and Art Gallery of the Northern Territory,
P.O. Box 4646, Darwin, Australia 0801.

CRUSTACEA LIBRARY
SCIENTIFIC INSTITUTION
RETURN TO W-119

ABSTRACT

The aberrant species of *Palaemonetes*, *P. sinensis* (Sollaud, 1911) is re-examined. Its unusual mouthparts are described and illustrated in further detail. Its position in the genus *Palaemonetes* Heller, 1869, is confirmed. The distribution of some species of *Palaemonetes* is discussed.

KEYWORDS: *Palaemonetes sinensis* (Sollaud, 1911), Crustacea, Decapoda, Palaemonidae, systematic position confirmed.

INTRODUCTION

The genus *Palaemonetes*, characteristic of coastal brackish and estuarine waters and fresh waters, is of widespread distribution, but with only *P. africanus* Balss, 1916, in sub-Saharan Africa and *P. sinensis* (Sollaud, 1911) in Asia. Gurney (1938) remarked that the study of caridean mouthparts was much neglected, an observation that is still valid. On account of its unusual mouthparts, the species *P. sinensis* was initially considered sufficiently different to be placed in a new genus, *Alloccaris* Sollaud, 1911. In view of its isolated geographical distribution, its systematic position was considered worth re-investigation, and specimens for this purpose were kindly provided by Prof. J.C. Liu, from the collections of the Institute of Oceanology, Qingdao, the People's Republic of China.

CL refers to the postorbital carapace length and NTM to the Northern Territory Museum, Darwin.

SYSTEMATICS

Palaemonidae Rafinesque, 1815
Palaemoninae Rafinesque, 1815

Palaemonetes sinensis (Sollaud, 1911)
(Figs 1-3)

Restricted synonymy

Alloccaris sinensis, Sollaud, 1911: 50-52, figs 1-2.
Palaemonetes varians var. *loci sinensis* Pesta, 1913: 26, fig. 11.

Palaemonetes sinensis Kemp 1918: 272; Kemp 1925: 316 (key); Holthuis 1950: 91-95, figs 20-21; Holthuis 1980: 116; Liu 1990: 248-249, 254 (table), fig. 39.

Palaemonetes (Alloccaris) sinensis Sollaud, 1923: 589.

Material examined. 6 spms (four males, two females, largest male, CL 6.6 mm), Qingdao, north China, coll. 30 August 1957, NTM Cr.010142.

Description. The specimens agree well with the previously published descriptions.

Some mouthparts were briefly described by Sollaud, who illustrated only the first maxilliped. Further detail was provided by Holthuis, who provided figures of the mandible and first and second maxillae.

Mandible (left) without palp; molar process stout, with several blunt teeth, occlusal surface obliquely divided into dorsal and ventral parts by deep groove; incisor process robust, with four acute teeth distally, ventral edge thickened, dorsal, edge sharply carinate.

Maxillula with palp deeply bilobed, upper lobe slender, non-setose, lower lobe stouter, with small ventral tubercle with minute simple terminal spinule; upper lacinia curved, feebly tapering, obliquely truncate distally with about 13 short, acute simple spines, dorsal margin with four simple setae proximally, ventral margin with numerous short setulose setae distally, four simple spinules proximally; lower lacinia swollen, with numerous setulose setae distally, extending along dorsal margin.

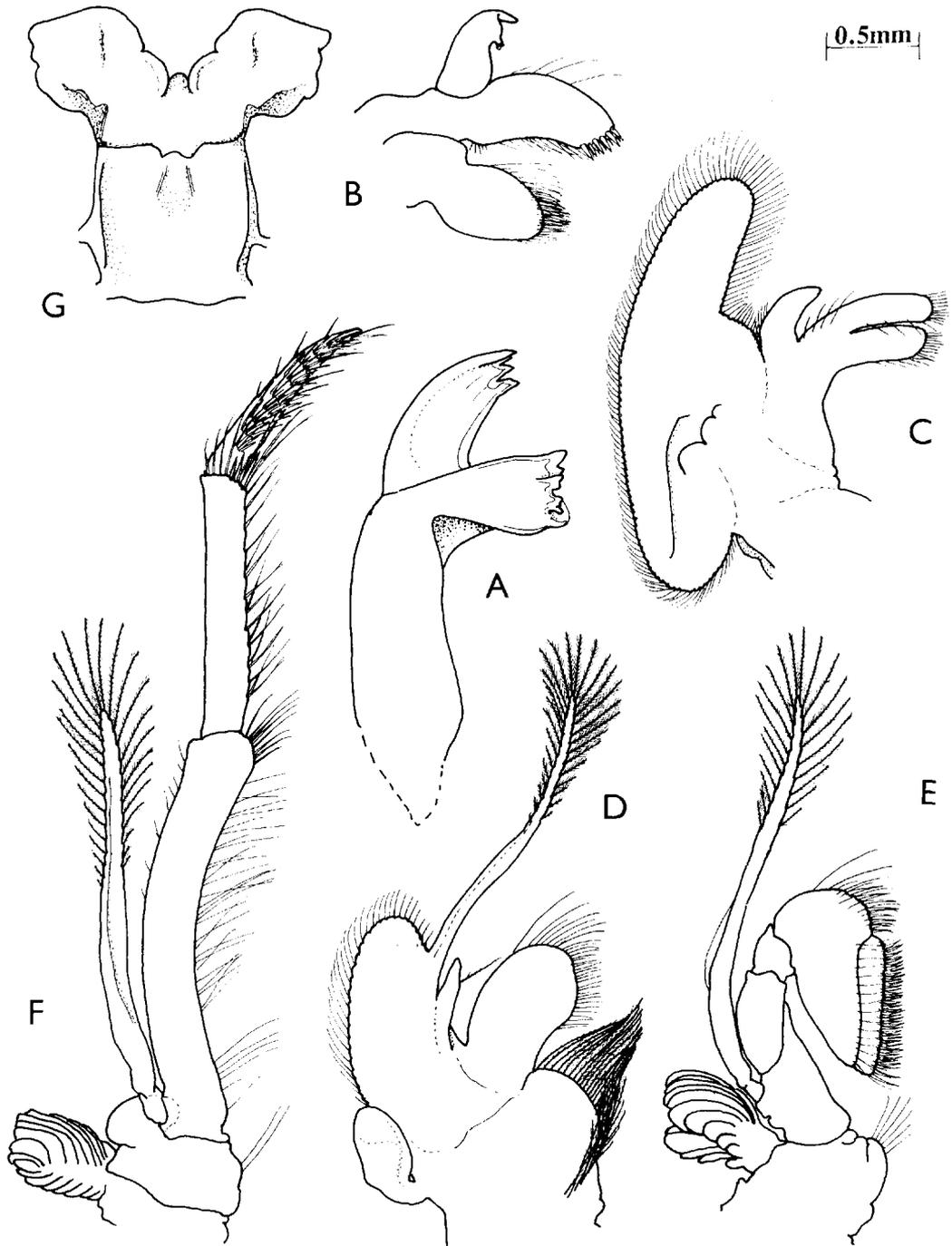


Fig. 1. *Palaemonetes sinensis* (Sollaud), male, CL 5.4 mm, Qingdao, China. A, mandible. B, maxillula. C, maxilla. D, first maxilliped. E, second maxilliped. F, third maxilliped. G, paragnaths.

Maxilla with short curved tapering palp, with several short, plumose setae proximolaterally; basal endite well developed, with two lobes, upper lobe slightly longer, more slender than

lower, with short simple setae distally, four longer simple setae proximodorsally, lower lacinia with setulose setae distally and ventrally; coxal endite obsolete, medial margin feebly con-

vex; scaphocerite about 2.7 times longer than wide, posterior lobe 1.5 times longer than width, anterior lobe 1.4 times longer than wide, distally narrow, medial margin with deep subrectangular emargination.

First maxilliped with short, slender tapering palp with short preterminal plumose seta; basal endite expanded, forming large rounded sub-

oval medial lobe with numerous long, slender, simple marginal setae, separated by deep angular notch from coxal endite; coxal endite feebly bilobed, distal lobe dorsally concave, medial margin convex, fringed with long, coarsely setulose setae, proximal lobe thickened, non-setose; exopod well developed with slender flagellum with numerous long, plumose setae

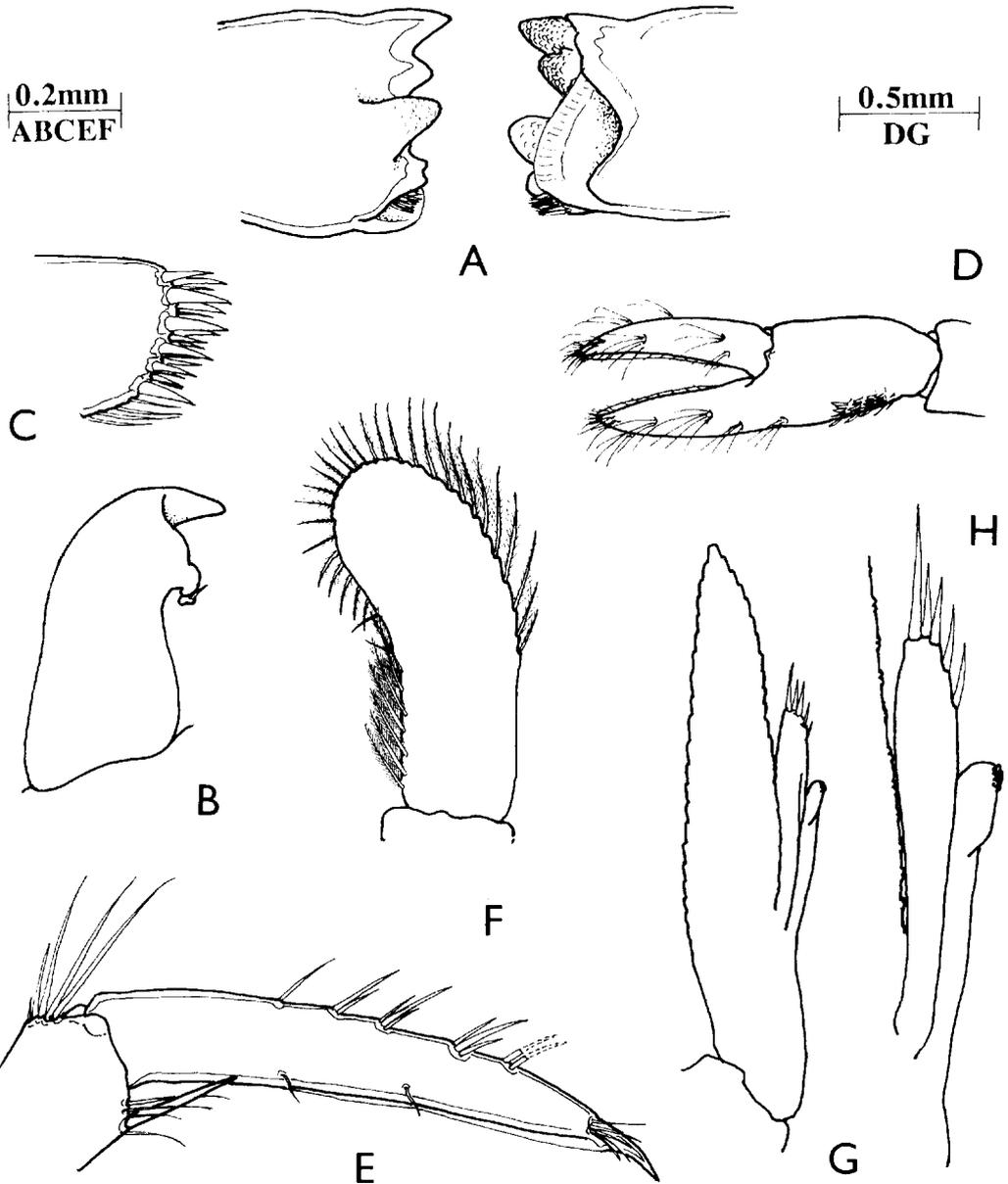


Fig. 2. *Palaemonetes sinensis* (Sollaud), male, CL 5.4 mm, Qingdao, China. A. mandible, left, molar process, dorsal and ventral aspects (left and right). B. maxillula, palp. C. same, distal upper lacinia. D. first pereiopod, chela. E. third pereiopod, dactyl. F. first pleopod, endopod. G. second pleopod, endopod. H. same, appendices.

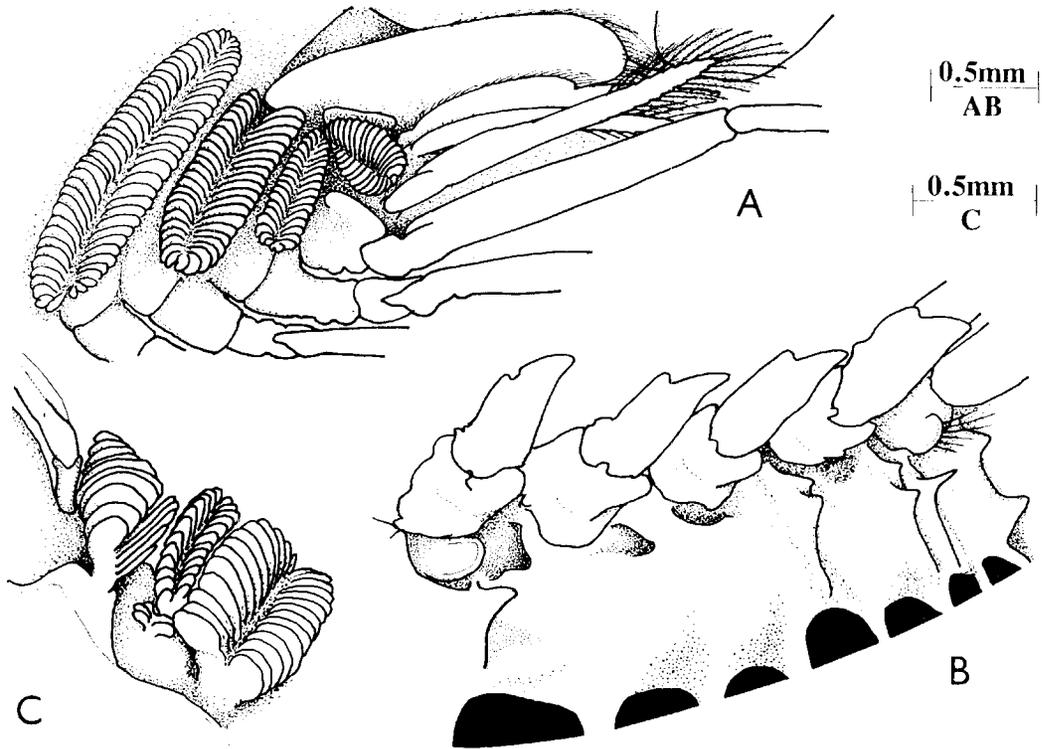


Fig. 3. *Paiaemonetes sinensis* (Sollaud), male, CL 5.4 mm, Qingdao, China. A, right anterior branchiae. B, thoracic sternites, ventral oblique. C, right anterior branchiae, dorsal aspect, second maxilliped podobranch, third maxilliped arthrobranchs and first pereopod pleurobranch (left to right).

distally, caridean lobe large, broadly expanded laterally; epipod small, sub-oval.

Second maxilliped with normal endopod, dactylar segment with medial margin straight, with numerous short strong denticulate spines; propodal segment with distomedial angle rounded, with numerous long simple spines or spiniform setae; exopod with slender flagellum with numerous plumose setae distally, central third with narrow laminar expansion laterally; coxa with low ventromedial lobe with six slender simple setae distally; with small simple epipod laterally, bearing well developed podobranch.

Third maxilliped with endopod extending to distal end of carpocerite, ischiomerus completely fused to basis, combined segment bowed ventrally, about seven times longer than central width, subuniform, medial, margin sparsely fringed with simple setae, with group of stouter spiniform setae distomedially, lateral border sparsely setose, without spines, penultimate segment 6.0 times longer than width, 0.6 of antepenultimate segment length, medial margin with sparse spiniform setae, with several stouter serrulate spines distomedially, terminal segment 0.7 of penulti-

mate segment length, 6.0 times longer than proximal width, tapering distally, with 10 transverse rows of serrulate spines medially, with stout distal spine; exopod well developed, with slender flagellum with numerous plumose setae distally; coxa without ventromedial lobe, with small oval epipod laterally; with large outer arthrobranch and small inner arthrobranch with three pairs of lamellae.

Paragnaths with well developed irregular alae; corpus broad, with shallow anterior medial depression margined by feeble carinae laterally.

Third thoracic sternite with low unarmed transverse ridge; fourth with slender acute median process anteriorly, with transverse ridge with small acute submedian teeth posteriorly; fifth with posterior transverse ridge with acute teeth laterally; sixth-seventh sternites unarmed; eighth with stout acute anterovertd median tooth in male only.

Male first pleopod with endopod about 0.5 of exopod length, 3.4 times longer than proximal width, slightly expanded distally, curved medially, without accessory lobule, distal margins with short plumose setae, about 27, medial mar-

gin proximally with eight long setulose spines, with two short simple spines at 0.5 of medial margin length.

Male second pleopod with endopod bearing appendices at about 0.33 of medial border length; appendix masculina about 0.36 of endopod length, 6.5 times longer than distal width, slightly swollen distally with one simple lateral terminal spine about 0.33 of corpus length, with two similar shorter spines medially, two distomedially; appendix interna reaching to about 0.6 of appendix masculina length, with few distal cincinnuli only.

Other minor morphological features are: the ventral margin of the rostrum bears a double row of plumose setae; the ventomedial border of the proximal segment of the antennular peduncle bears a strong acute tooth, the fingers of the first pereopods have sharp entire lateral cutting edges and lack acute hooked tips; the dactyl of the third ambulatory pereopod is about 0.33 of the propod length, six times longer than the proximal depth, compressed, feebly curved ventrally, ventral margin sharply carinate, without clearly demarkated unguis, with five small groups of spiniform setae dorsally; propod with single distoventral spine only; first and second abdominal sternites with acute median processes, fifth with low longitudinal median carina and the anterior dorsal surface of the telson lacks a median transverse row of short setae.

Systematic Position. The species described by Sollaud is correctly placed in the genus *Palaemonetes*, as first proposed by Pesta (1913), who considered Sollaud's species to be only a variety of *P. varians*. This latter assessment was emphatically refuted by Kemp (1918), who considered *P. sinensis* a valid species of *Palaemonetes* closely related to *P. varians* (Leach) although he considered the first maxilliped to be rather aberrant for this genus. In *P. varians* (Fig. 4b, from the Netherlands) this appendage is typical of the majority of palaemonine shrimps, and is not dissimilar to that of *P. sinensis*, particularly if examined in an unflattened attitude. The basal endite is broad and suboval, clearly separated from the coxal endite by a deep angular notch, medially fringed with numerous slender simple setae; the coxal endite is feebly bilobed, the distal lobe laminar, medially fringed with long, coarsely setulose setae, the proximal lobe is thickened and devoid of setae medially. The basal and distal coxal endites are deeply concave dorsally. The epipod is distinctly bilobed, with the proximal

lobe larger than the distal. In *P. sinensis* the expanded basal endite serves to occlude the space proximal to the lobes of the basal endite of the maxilla, which is effectively sealed also by the long coarsely setulose setae of the coxal endite, which abut against those of the opposite side. The mechanism appears approximately similar in *P. varians*. The maxillae are essentially similar in the two species, but in *P. varians* the emargination on the anteromedial margin of the scaphocerite is much less marked and the proximal dorsal border of the distal basal endite lacks a row of short simple setae. The maxillulae are also similar but in *P. varians* the palp bears three short simple setae with swollen bases on the outer side of the lower lobe. The distal margin of the upper lacinia bears about 15 finely serrulate spines distally. The paragnaths in *P. varians* are noticeably different from *P. sinensis*: the alae are broader, very feebly bilobed and rather pointed laterally; the corpus is shorter and broader, with a small transversely oval anteromedian fossa, surrounded by a raised rim. The anterodorsal surface of the telson lacks a transverse row of setae in *Palaemonetes varians*, in contrast to *P. sinensis*, and some other palaemonid shrimps, such as *Palaemon affinis* Milne-Edwards (Yaldwyn 1954: figs 2-16), *Palaemonetes australis*, *P. atrinubes*, *Palaemon serenus* and *Macrobrachium intermedium* (Bray 1976). The thoracic sternites in *P. varians* are basically similar to those of *P. sinensis*, but the anterior median process on the fourth thoracic sternite is much smaller, and the eighth thoracic segment lacks a median ventral tooth in both sexes.

DISCUSSION

The genus *Palaemonetes* Heller is at present represented by 31 species. These are found predominantly in American fresh waters. The following species occur outside the American region:

P. africanus Balss, 1916, Nigeria.

P. antennarius (H. Milne-Edwards, 1837), Italy, the Balkans and Syria.

P. atrinubes Bray, 1976, west and north Australia, New Caledonia.

P. australis Dakin, 1915, west and north Australia.

P. mesogenitor Sollaud, 1912, Tunisia, Algeria.

P. mesopotamica Pesta, 1913, Syria, Turkey.

P. sinensis (Sollaud, 1911), eastern China, south-eastern Siberia.

P. varians (Leach, 1814), western Baltic and North Sea coasts to western Morocco, Algeria, Tunisia.

P. zariqueiyi (Sollaud, 1939), Mediterranean Spain.

The Old World distribution of the genus *Palaemonetes* is difficult to explain, partly due to the sparse and widely scattered nature of the available record. Of the nine species, five are of north west European, Mediterranean and north west African distribution. These all occupy primarily coastal habitats, with the exception of *P. mesopotamica*, which presumably has a freshwater preference, in the River Khaburand and the River Kémer. The distribution of the remaining species, *P. africanus* in West Africa, *P. australis* and *P. atrinubes* in western and northern Australia and New Caledonia, and *P. sinensis* in south eastern China and Siberia, suggests that

they are relict populations. *Palaemonetes atrinubes* has not been previously reported from New Caledonia. Specimens of this species from New Caledonia, with a Milne-Edwardsian label, without a more precise locality, were examined in the collections of the Muséum National d'Histoire Naturelle, Paris, through the kindness of Prof. J.Forest.

The mouthparts of *P. sinensis* are quite different to those of *Coutieriella tonkinensis* Sollaud (1914), found in Vietnam and southern China, at one time also placed in the genus *Palaemonetes*, and are completely without the basket-like arrangement of long setae on the maxilla and first maxilliped as found in that species (Bruce 1989).

It may also be noted that the posterior margin of the third abdominal tergite in both *P. sinensis* and *P. varians* is entire and without minute denticulations. These have been reported re-

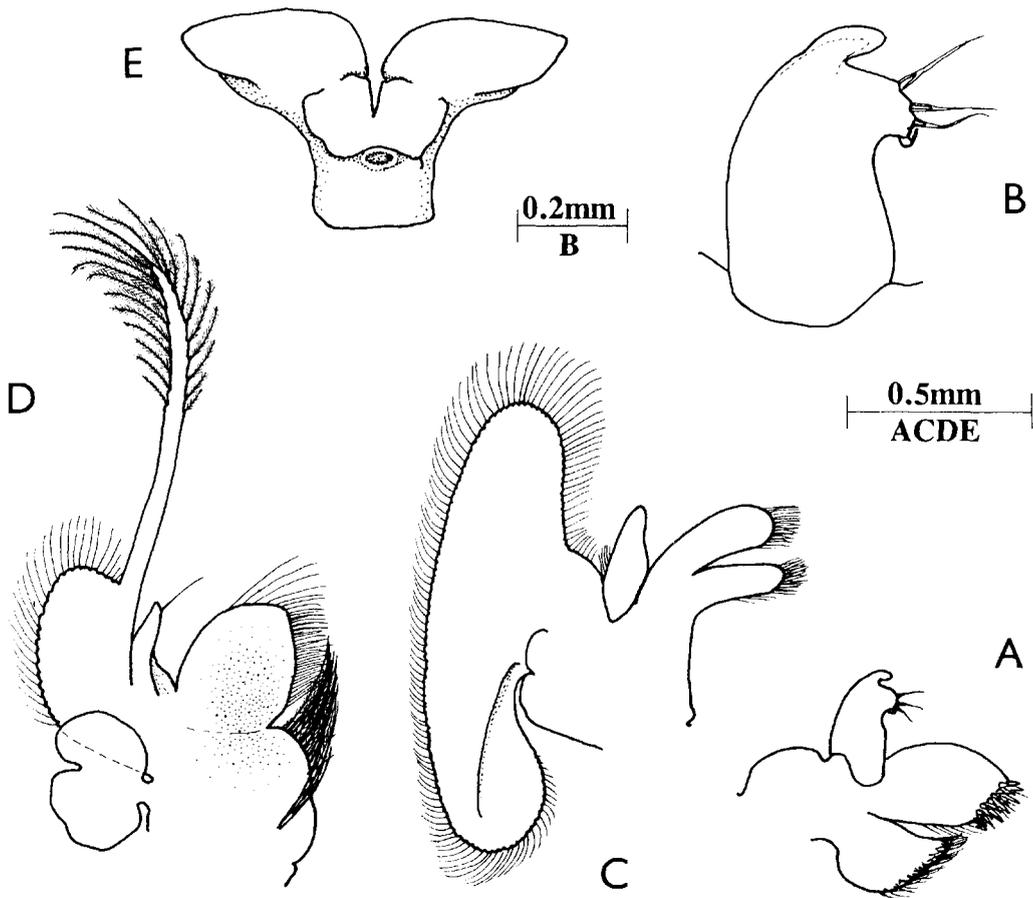


Fig. 4. *Palaemonetes varians* (Leach), male, CL 6.3 mm, Vesterputten, Netherlands. A, maxillula. B, same, palp. C, maxilla. D, first maxilliped (unflattened). E, paragnaths.

cently in several palaemonid genera (Duris and Bruce, in press) and are at present of unknown distribution in the Palaemonidae. Bray (1976) drew attention to a small transverse row of short setae on the anterior dorsal surface of the telson in both *Palaemon serenus* and *Macrobrachium intermedium*, but which were lacking in both *P. australis* and *P. atrinubes*. These are also lacking in *P. sinensis*. The appendix masculina in *P. sinensis* is essentially similar those of the North American species reported upon by Fleming (1969), in which it is short with relatively few simple spines distally.

ACKNOWLEDGEMENTS

I am most grateful to Dr C.H.J.M.Fransen, Nationaal Natuurhistorisch Museum, Leiden, for the donation of specimens of *Palaemonetes varians* for comparative purposes.

REFERENCES

- Bray, D.M. 1976. A review of two Western Australian shrimps of the genus *Palaemonetes*, *P. australis* Dakin 1915, and *P. atrinubes* sp. nov. (Decapoda, Palaemonidae). *Records of the Western Australian Museum* 4(1): 65-84.
- Bruce, A.J. 1989. Reestablishment of the genus *Coutierella* Sollaud, 1914 (Decapoda: Palaemonidae), with a redescription of *C. tonkinensis*, from the Mai Po Marshes, Hong Kong. *Journal of Crustacean Biology* 9(1): 176-187.
- Duris, Z., and A.J.Bruce. (In press) A revision of the "petithouarsii" group of species of the genus *Periclimenes* Costa (Crustacea: Decapoda: Palaemonidae). *Journal of Natural History*.
- Fleming, L.E. 1969. Use of male external genitalic details as taxonomic characters in some species of *Palaemonetes* (Decapoda, Palaemonidae). *Proceedings of the Biological Society of Washington* 82: 443-452.
- Gurney, R. 1938. The larvae of the Decapod Crustacea, Palaemonidae and Alpheidae. *Scientific Reports of the Great Barrier Reef Expedition* 6: 1-60.
- Holthuis, L.B. 1950. The Decapoda of the Siboga Expedition, X. The Palaemonidae collected by the Siboga and Snellius Expeditions with remarks on other species I. Subfamily Palaemoninae. *Siboga Expedition Monograph* 39a^o: 1-268.
- Holthuis, L.B. 1980. *Shrimps and prawns of the world*. FAO Species Catalogue 1: i-xvii, 1-271.
- Kemp, S. 1918. Decapod and Stomatopod Crustacea. In: Annandale, N. (ed.) *Zoological results of a tour in the Far East. Memoirs of the Asiatic Society of Bengal* 6: 217-297.
- Kemp, S. 1925. On various Caridea. Notes on the Crustacea Decapoda in the Indian Museum. *Records of the Indian Museum* 27: 249-343.
- Liu, J.Y. 1990. A study of the Palaemoninae (Crustacea Decapoda) from China II. *Palaemon, Exopalaemon, Palaemonetes and Leptocarpus. Studia Marina Sinica* 31: 229-265.
- Pesta, O. 1913. Crustaceen, II und III. Teil. Wissenschaftliche Ergebnisse der Expedition nach Mesopotamien. *Annalen des Naturhistorischen Museum in Wien* 27: 18-35.
- Rafinesque, C.S. 1815. *Analyse de la Nature, ou Tableau de l'Univers et des Corps Organisés*. Palermo.
- Sollaud, E. 1911. *Allocaris sinensis* n.g., n.sp., crevette des eaux douces des environs de Pékin. Infusoire commensal de ce Crustacé. *Bulletin du Muséum d'Histoire Naturelle* 17: 50-56.
- Sollaud, E. 1914. Sur deux nouveaux Palémonides, a developement condensé, vivant dans les eaux douces du Tonkin: *Leander mani* n.sp. et *Coutierella tonkinensis* n.gen. n.sp. *Bulletin de la Société Zoologique de France* 39: 314-324.
- Sollaud, E. 1923. Le développement larvaire des "Palaemoninae". *Bulletin biologique de la France et de la Belgique* 57: 509-603.
- Yaldwyn, J.C. 1954. *Palaemon affinis* M.-Edw. 1837, (Crustacea, Decapoda, Natantia) Part I. Synonymy and external morphology. *Transactions of the Royal Society of New Zealand* 82(1): 169-187.

Accepted 15 June 1993

•
•
•

•
•
•

•
•
•