

# Brief revision of the genus *Leptochela* with description of two new species (Crustacea, Decapoda, Pasiphaeidae)

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## ABSTRACT

Eight species of the genus *Leptochela*, subgenus *Leptochela*, from the Indian and West Pacific Oceans were studied, showing *L. (L.) aculeocaudata* and *L. (L.) robusta* species groups. Two new species were described and illustrated : *L. (L.) chacei* from Viet-Nam, New Caledonia and Madagascar, and *L. (L.) crosnieri*, from New Caledonia. Each species belongs to the respective species group. The taxonomic position of eight species is discussed. A key is provided for identification of six species of these species groups.

## RÉSUMÉ

Révision du genre *Leptochela* (Crustacea, Decapoda, Pasiphaeidae) avec la description de deux espèces nouvelles.

Huit espèces du genre *Leptochela*, sous-genre *Leptochela*, de l'océan Indien et de l'Ouest Pacifique sont étudiées, mettant en évidence les groupes d'espèces *L. (L.) aculeocaudata* et *L. (L.) robusta*. Deux espèces nouvelles sont décrites : *L. (L.) chacei* du Viet-Nam, de Nouvelle-Calédonie et de Madagascar, et *L. (L.) crosnieri* de Nouvelle-Calédonie. La position taxonomique des huit espèces est discutée dans chacun des groupes et une clef d'identification est fournie.

## INTRODUCTION

According to CHACE's (1976) revision, the genus *Leptochela* Stimpson was composed of two subgenera *Leptochela* and *Probolura* with 12 species. Recently, HANAMURA (1987) described the second species of the latter subgenus, which is the first representative of this subgenus from the Indo-West Pacific region.

The other subgenus *Leptochela* contains eleven species (CHACE, 1976). Among nine Indo-West Pacific species, *L. (Leptochela) gracilis* Stimpson, 1860 and *L. (Leptochela) japonica* Hayashi and Miyake, 1969, are readily distinguished from the other members by the special modifications of the fifth abdominal somites.

*L. (Leptochela) pugnax* De Man, 1916 bears the pointed suborbital angle, which is unique character in this genus. *L. (Leptochela) hawaiiensis* Chace, 1976, restricted its distribution to the Hawaiian waters only, has the minutely serrated orbit, though this character is occasionally observed in other species.

The remaining four species share common features such as smooth abdomen and smooth orbit, and are known from the wide tropical area in the Indo-West Pacific region (CHACE, 1976). Of these, *L. (Leptochela) robusta* Stimpson, 1860 and *L. (Leptochela) irrobusta* Chace, 1976 have two pairs of dorsolateral spines on the telson and a small tooth directed mesially on the orbit, while *L. (Leptochela) aculeocaudata* Paulson, 1875 and *L. (Leptochela) sydniensis* Dakin and Colefax, 1940 are characterized by one pair of dorsolateral spines and no tooth on the orbit. The former two are now defined as *L. (L.) robusta* species group, and the latter as *L. (L.) aculeocaudata* species group.

Among collections of the Muséum national d'Histoire naturelle and MUSORSTOM's cruises obtained from various areas of the Pacific and Indian Oceans by joint expeditions of ORSTOM and the Muséum, I found eight species, including two new species belonging to each of the above-mentioned species group. With some material referable to all species of both groups as well as the other known species, I present a brief revision of this genus, paying special attention to additional small spines on ventrolateral margin of the sixth abdominal somite. Although this character has been entirely ignored by previous authors, because of their small size and concealment by a row of setae, it seems to be useful for the distinction among the species, especially of these two species groups.

The new species, *L. (L.) crosnieri*, taken from New Caledonian waters has no such spines, like *L. (L.) robusta*. On the other hand, *L. (L.) irrobusta* known from a wide area in the Indo-West Pacific region, has two additional spines, a character to distinguish the species from the most closely related species, *L. (L.) robusta*. The other new species, *L. (L.) chacei*, belonging to the "*L. (L.) aculeocaudata*" species group, also has two additional spines there. *L. (L.) aculeocaudata* and *L. (L.) sydniensis* have two such spines, the position and size of them are rather different from one another. Furthermore, *L. (L.) gracilis*, *L. (L.) japonica* and *L. (L.) pugnax* also have such additional spines. The newly proposed species are fully described with a short definition like CHACE's (1976) paper. For the other known species only short remarks are presented. A key to the six species referable to the two species groups are provided.

The material examined is preserved at the Muséum national d'Histoire naturelle, Paris (MNHN). The type series of *L. (L.) irrobusta* is in the National Museum of Natural History, Washington (USNM) and the reference material of *L. (L.) gracilis* is in the Shimonoseki University of Fisheries, Japan (SUF). The specimen size is shown in carapace length (CL).

## DESCRIPTION OF SPECIES

### *Leptochela (Leptochela) aculeocaudata* Paulson, 1875

(Fig. 1 a-b)

MATERIAL EXAMINED. — Red Sea, Djibouti, H. COUTIÈRE leg. : 1 sp. , 2.2 mm, (MNHN - Na 1817).

REMARKS. — In spite of long preservation, the specimen has retained typical specific characters in good condition, though totally mutilated. The basicerite of second antenna is entirely concealed by the carapace (Fig. 1a). The rostrum is lanceolate in shape and the carapace is tricarinate. The sixth abdominal somite is armed with a large spine near the ventrolateral corner and also a small additional spine on the right side of ventrolateral margin, which is probably equivalent to the posterior one as seen in the related species. This small spine is not discernible on the left side (Fig. 1b).

DISTRIBUTION : The species is known from two localities in the Indo-West Pacific region with certainty (CHACE, 1976); Red Sea and Australia.

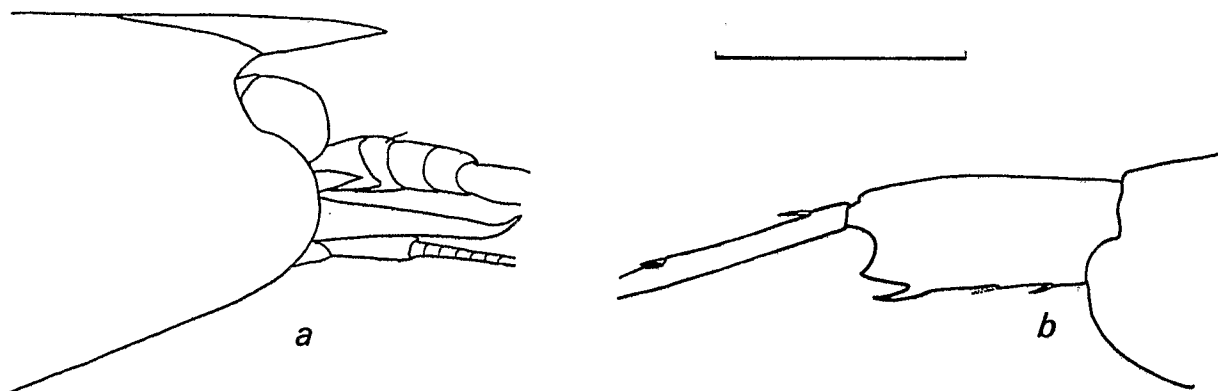


FIG. 1. — *Leptochela (L.) aculeocaudata* Paulson, 1875. Specimen from Red Sea (2.2 mm in CL), *a*, anterior part of body ; *b*, posterior part of abdomen. Scale: 1.0 mm.

*Leptochela (Leptochela) chacei* sp. nov.  
(Figs 2-4)

MATERIAL EXAMINED. — **Madagascar**, west coast, Pracel reef, 25 m, brown mud, June 1959, A. CROSNIER leg. : 1 ♂ paratype, 2.5 mm, (MNHN, Na).

**Viet-Nam**, Cai Dua, collected with light, November 11, 1928, 18:00, A. KREMPF leg. : 49 ♂ paratypes, 2.1-2.6 mm, 8 ovig. ♀ paratypes, 2.2-4.0 mm, 3 ♀ paratypes, 2.4-2.6 mm, (MNHN - Na 8340). — Cai Dua, collected with light, November 11, 1928, 18:00, A. KREMPF leg. : 18 ♂ paratypes, 2.8-2.2 mm, 1 ovig. ♀ holotype, 2.5 mm, 1 ovig. ♀ paratype, 2.7 mm, 3 ♀ paratypes, 2.2-2.6 mm, (MNHN - Na 8341).

**New Caledonia**. LAGON : st. DW 1119, 19°35.5'S, 163°48.4'E, 43 m, October 26, 1989 : 1 ♂ paratype, 2.8 mm, (MNHN - Na).

DIAGNOSIS. — Rostrum moderate in length, reaching beyond end of eye. Dorsal margin faintly sinuous, apex curved upward. Carapace with three longitudinal dorsal carinae in both males and females. Orbital margin entire, not serrated, without mesially directed tooth on ventral portion; suborbital angle unarmed. Fifth abdominal somite entire, without dorsal elevations or posterior tooth; posteroventral corner rounded in females and slightly angular in males. Sixth somite with curved spine posteriorly on ventrolateral surface, usually with two additional small spines on ventrolateral margin. Telson with one pair of dorsolateral spines in addition to anterior mesial pair; posterior margin without pair of minute mesial spines in addition to usual five pairs of prominent spines in adults. Antennal scale about half as long as carapace. First pereopod with 14 to 18 spines on opposable margin of movable finger. Second pereopod with 16 to 21 spines on opposable margin of movable finger. Third pereopod with exopod not reaching distal end of ischium. Endopod of first pleopod of male rounded distolaterally, not flared. Appendix masculina, not including spines, as long as appendix interna. Maximum carapace length 2.8 mm.

DESCRIPTION. — Small species (Fig. 2). Rostrum moderate in length, dorsal margin faintly sinuous, apex sometimes slightly upward; extending beyond eye, usually reaching distal margin of first segment of antennular peduncle. Carapace tricarinate in both males and females (Fig. 3a); lateral carinae well defined near posterior margin of carapace. In male, mid-dorsal carina disappearing in posterior half and dorsal area

between lateral carinae usually rather deeply concave in posterior half. In female, mid-dorsal carina developed along entire margin, showing typical tricarinate feature in dorsal view, though mid-dorsal carina concealed by lateral carinae in lateral view (Fig. 3*b*) ; shallow hepatic depression sometimes present. Abdomen smooth without dorsal carina and posteriorly projected spine; posteroventral corner of fifth somite rounded in females and somewhat angular in males. Sixth somite with usual transverse swelling near anterior end of dorsal surface; ventrolateral surface with relatively long spine, and with two, rarely three, additional small spines (Fig. 3*c*) ; spine on posterolateral lobe small. Telson with pair of dorsolateral spines slightly posterior to midlength of telson; posterior margin without minute spines between bases of mesial pair of usual five pairs of spines.

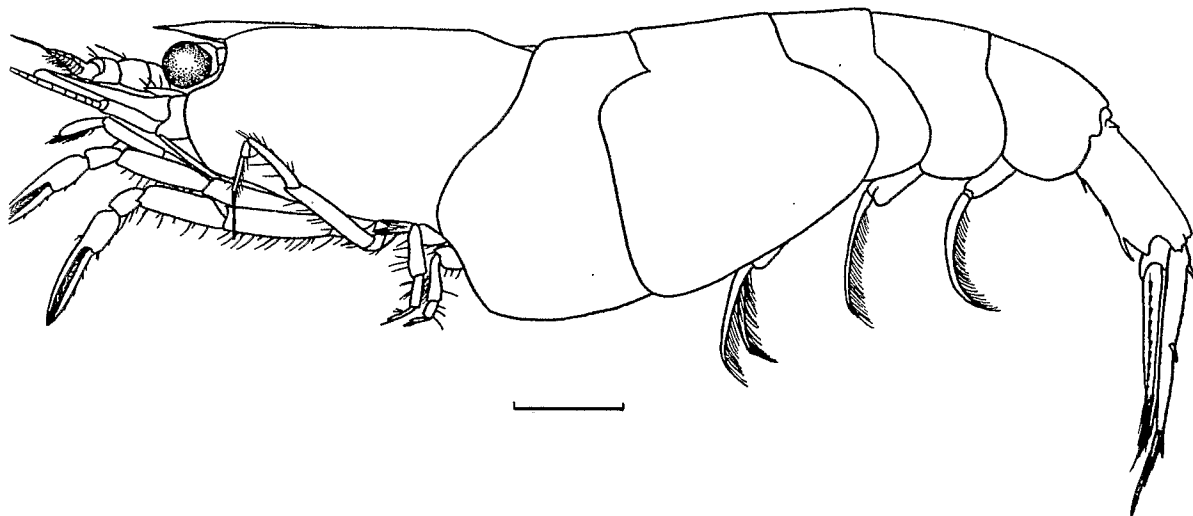


FIG. 2. — *Leptochela (L.) chacei* new species. Paratype, ovigerous female from Viet-Nam (2.8 mm in CL). Scale: 1.0 mm.

Eye with papilla on dorsomesial surface of stalk near juncture with cornea (Fig. 3*a*); cornea slightly wider than stalk. Antennular peduncle with stylocerite reaching distolateral margin of basal segment (Fig. 3*f*). Antennal scale as long as or slightly shorter than carapace, 2.5-4.0 times as long as wide; lateral margin concave at about midlength, distal tooth with blunt shoulder at beginning of mesial margin of blade (Fig. 3*g*). Carpocerite reaching midlength of scale; basicerite with obtuse process on ventrolateral end.

Mouthparts typical for genus (Fig. 4*a-f*). Third maxilliped falling short of distal end of antennal scale. First pereopod (Fig. 4*g*) overreaching third maxilliped by length of fingers; dactylus with 14-18 spines on opposable margin. Second pereopod (Fig. 4*h*) reaching anteriorly nearly as far as first pereopod ; dactylus with 16-21 spines on opposable margin. Third pereopod (Fig. 4*i*) overreaching anterior margin of carapace by length of dactylus; exopod falling far short of distal end of ischium; ischium with row of two or three stout spines near posterior margin; merus with about three or four stout spines near posterior margin; dactylus slightly shorter than propodus. Fourth and fifth pereopods short, ischium of fourth pereopod with stout spine on posterior margin (Fig. 4*j, k*).

Endopod of first pleopod of male subelliptical. Appendix masculina, not including spines, as long as appendix interna, not including spines, with 4-5 long spines (Fig. 4*m*). Exopod of uropod with 9-14 movable spines along lateral margin and endopod with three or four similar spines near distal margin (Fig. 3*d*).

SIZE : Males, 2.2-2.9 mm; ovigerous females, 2.5-2.7 mm; non-ovigerous females, 2.1-2.6 mm. Eggs with eyed embryos, 0.43-0.47 x 0.32-0.37 mm in diameter.

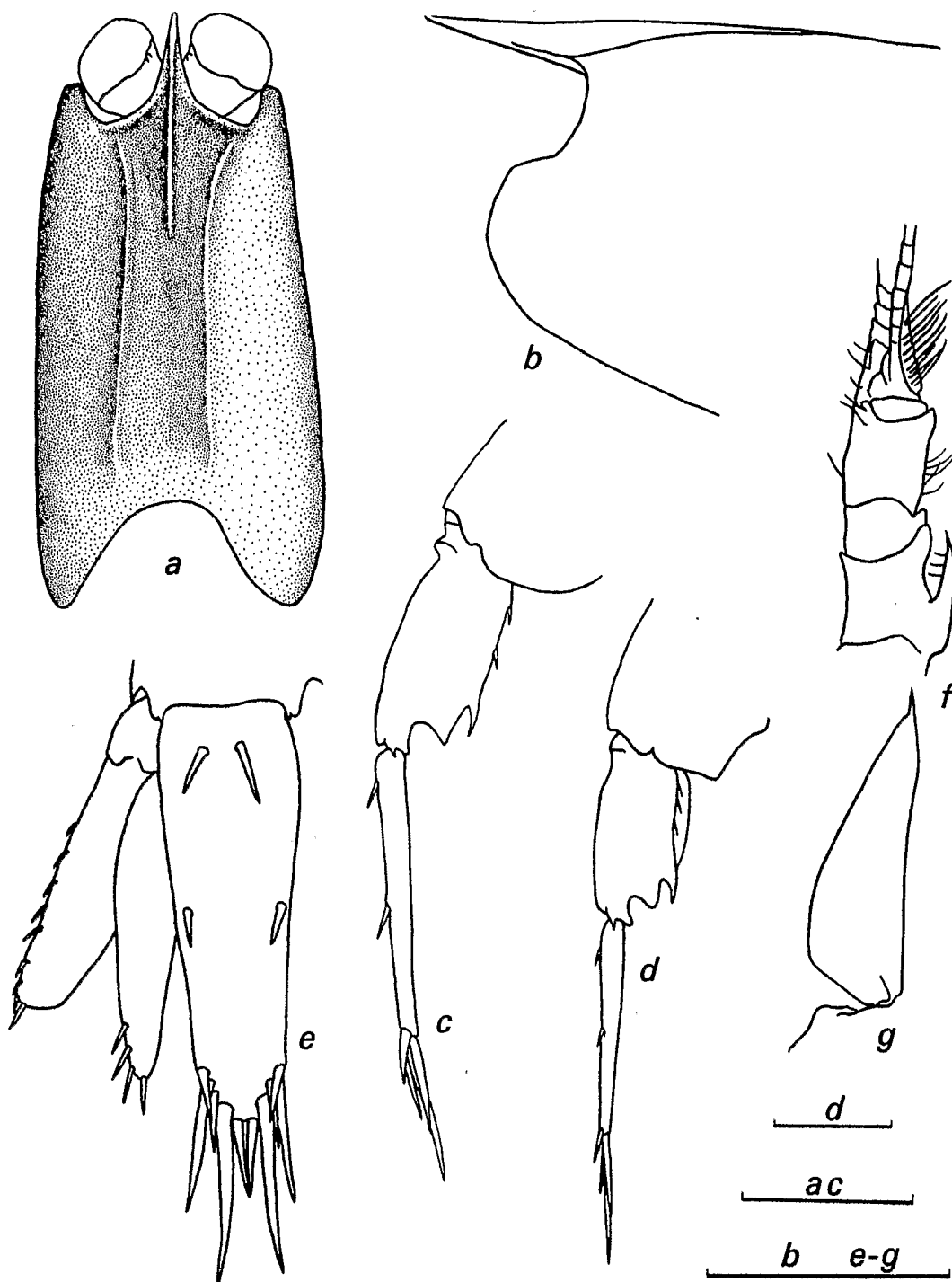


FIG. 3. — *Leptochela (L.) chacei* new species. *a-c, e-g*, paratypes from Viet-Nam, *d* paratype from New Caledonia. *a, e*, male (2.4 mm in CL), *b*, female (2.6 mm in CL), *c, f, g*, male (2.5 mm in CL), *d*, male (2.8 mm in CL), *a*, carapace in dorsal view; *b*, anterior part of carapace in lateral view; *c*, posterior part of abdomen; *d*, tail fan; *e*, antennular peduncle; *f*, antennal scale. Scale: 1.0 mm.

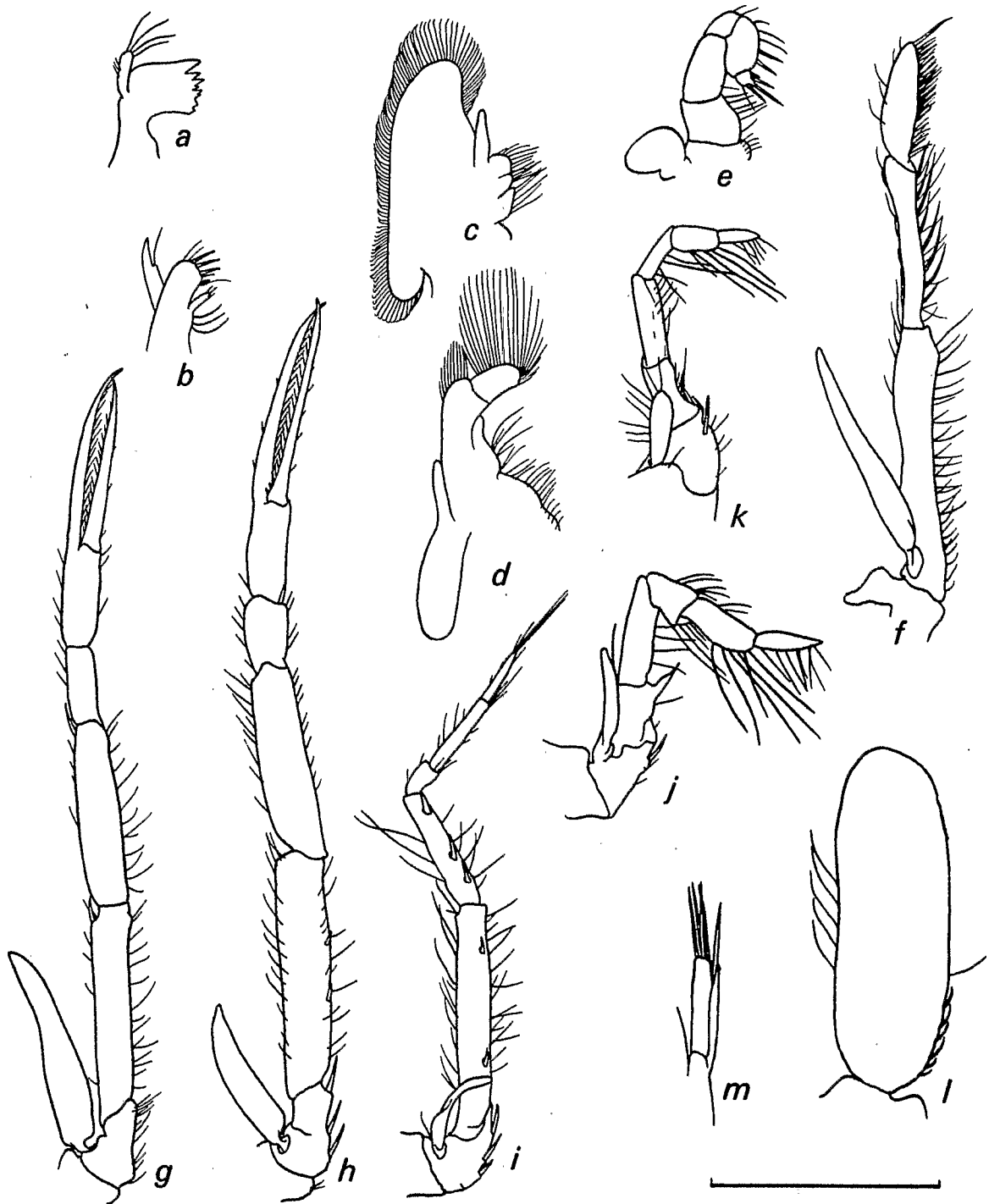


FIG. 4. — *Leptochela (L.) chacei* new species. Paratype, male from Viet-Nam (2.5 mm in CL). *a*, mandible; *b*, maxillule; *c*, maxilla; *d*, first maxilliped; *e*, second maxilliped; *f*, third maxilliped; *g*, first pereopod, *h*, second pereopod, *i*, third pereopod; *j*, fourth pereopod; *k*, fifth pereopod; *l*, endopod of first pleopod; *m*, appendix masculina and appendix interna. Scale for *a-k*: 1.0 mm; *l, m*: 0.5 mm.

DISTRIBUTION : The present new species is known from shallow waters of Viet-Nam, Madagascar and Samoan Islands (?). The specimens from Viet-Nam were collected, using light at night together with a considerable number of *L. (L.) pugnax* and *L. (L.) sydniensis*.

REMARKS. — The new species belongs to the "*L. (L.) aculeocaudata*" species group and is more closely related to *L. (L.) aculeocaudata* than to *L. (L.) sydniensis*. These three species are separated by the following characters.

1) The new species is small in size, less than 3.0 mm in CL, like *L. (L.) aculeocaudata*, whereas *L. (L.) sydniensis* is larger than these two species, 3.3-4.4 mm in ovigerous females.

2) In *L. (L.) aculeocaudata* and *L. (L.) chacei* sp. nov., the carapace has a tricarinate feature in both males and females, while in *L. (L.) sydniensis* breeding females only show the tricarinate carapace.

3) The basicerite of the second antenna is never concealed by the anterior part of the carapace in more than 80 specimens of the type series of this new species, as well as the other known species, except for *L. (L.) aculeocaudata*. The concealed basicerite is one of the important characters of *L. (L.) aculeocaudata* (see CHACE, 1976). As mentioned above, I examined one specimen from Djibouti, the Red Sea, which is old and totally mutilated, but the basicerite is concealed by the carapace.

4) In *L. (L.) sydniensis* the rostrum bears the dorsal margin nearly straight or sinuous, while in *L. (L.) aculeocaudata* and *L. (L.) chacei* sp. nov., the rostral shape somewhat resembles each other but is more slender in the new species than in *L. (L.) aculeocaudata*, namely weaker dorsal convexity in the former and lanceolate in the latter.

The additional small spines on the sixth abdominal somite are slightly variable in number. The male from New Caledonia and two males from Viet-Nam have three spines on one or both sides of the sixth somite.

The specimens from the Samoan Islands referred to *L. (L.) aculeocaudata* without positive identification by CHACE (1976) may probably be the present species, because the basicerite of the antenna was not concealed by the carapace.

*Leptochela (Leptochela) crosnieri* sp. nov.

(Figs 5-7)

MATERIAL EXAMINED. — New Caledonia, st. Balabio, 20°03.6'S, 164°07.7'E, 13 m, December 13, 1982 : 1 ovig. ♀ holotype, 3.9 mm (MNHN). — LAGON : st. CP 2, 22°17.3'S, 166°19.1'E, 25 m, May 24, 1984 : 1 ♂ paratype, 4.0 mm (MNHN). — St. DW 52, 22°14.4'S, 166°14.0'E, 13 m, May 25, 1984 : 1 ♀ paratype, 3.1 mm (MNHN). — St. DW 85, 22°28.6'S, 166°32.4'E, 21 m, August 21, 1984 : 1 ovig. ♀ paratype, 3.8 mm (MNHN). — St. DW 101, 22°31.0'S, 166°35.9'E, 18 m, August 21-22, 1984 : 1 ♂ paratype, broken (MNHN). — St. DW 111, 22°24.3'S, 166°47.7'E, 25 m, August 22, 1984 : 1 ♀ paratype, 4.3 mm (MNHN). — St. DW 112, 22°23.6'S, 166°47.9'E, 42 m, August 22, 1984 : 1 ovig. ♀ paratype, 4.1 mm (MNHN). — St. DW 113, 22°22.9'S, 166°48.3'E, 32 m, August 22, 1984 : 1 ovig. ♀ paratype, 3.9 mm, 1 ♀ paratype, 4.0 mm (MNHN). — St. DW 155, 22°31.5'S, 166°38.4'E, 23 m, August 24, 1984 : 1 ♂ paratype, 3.6 mm, 2 ♀ paratypes, 3.2, 3.6 mm (MNHN). — St. DW 247, 22°24.0'S, 166°50.9'E, 43 m, October 24, 1984 : 1 ovig. ♀ paratype, 3.9 mm (MNHN). — St. DW 280, 22°22.4'S, 166°25.2'E, 24 m, November 9, 1984 : 1 ♂ paratype, 3.5 mm (MNHN). — St. DW 297, 22°38.9'S, 166°45.6'E, 30 m, November 26, 1984 : 1 ovig. ♀ paratype, 3.1 mm (MNHN). — St. DW 1134, 19°31.3'S, 163°34.6'E, 40 m, October 26, 1989 : 1 ♂ paratype, 3.7 mm, 1 ♀ paratype, 3.8 mm (MNHN). — St. DW 1209, 19°45.1'S, 163°38.6'E, 21 m, November 2, 1989 : 1 ♀ paratype, 3.4 mm (MNHN).

DIAGNOSIS. — Rostrum short, not reaching end of eye. Dorsal margin slightly convex. Carapace with three longitudinal dorsal ridges in breeding females only. Orbital margin entire, not serrated, without mesially directed tooth on ventral portion; suborbital angle unarmed. Fifth abdominal somite entire, without dorsal elevations or posterior tooth; posteroventral corner of pleuron angular, not rounded. Sixth somite with curved spine posteriorly on ventrolateral surface, without additional small spine on ventrolateral margin. Telson with two pairs of dorsolateral spines in addition to anterior mesial pair; posterior margin without pair of minute mesial spines in addition to usual five pairs of prominent spines in adults. Antennal scale a little more than half as long as carapace. First pereopod with 22 to 30 spines on opposable margin of movable finger. Second

pereopod with 22 to 34 spines on opposable margin of movable finger. Third pereopod with exopod not reaching distal end of ischium. Endopod of first pleopod of male rounded distolaterally, not flared. Appendix masculina, not including spines, slightly overreaching appendix interna. Maximum carapace length 4.3 mm.

DESCRIPTION. — Small species (Fig. 5). Rostrum short, apex directed slightly downward, not extending beyond eye, usually reaching border between cornea and eyestalk in dorsal view. Carapace largely rounded in males and immature females, but tricarinate in ovigerous females (Fig. 6a, b); dorsal carina slightly concave near midlength, concealed by lateral carina in some ovigerous females in lateral view. In some specimens shallow depression present just below suborbital angle, continuous with shallow hepatic depression.

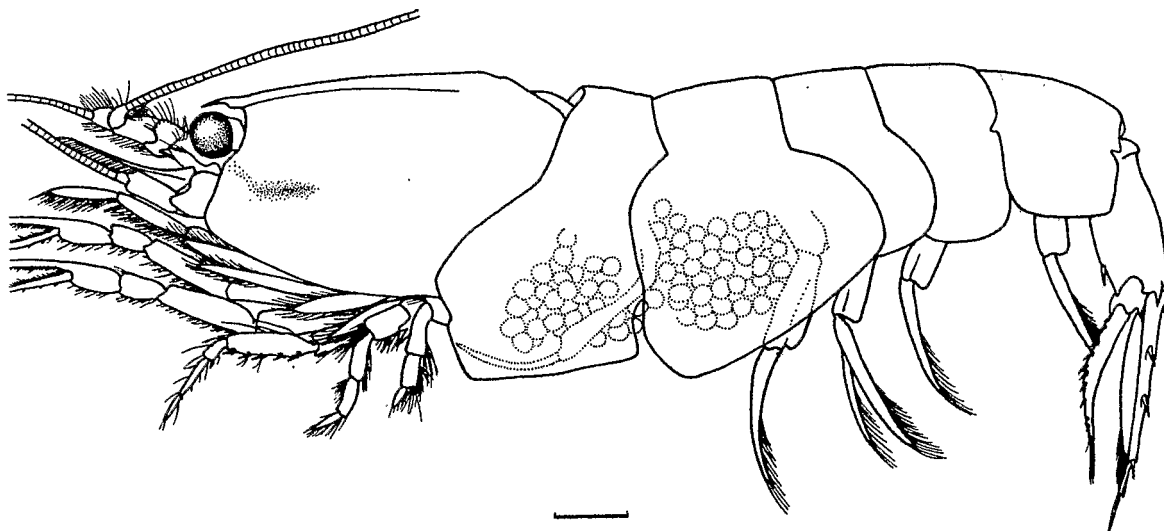


FIG. 5. — *Leptochela (L.) crosnieri* new species. Holotype, ovigerous female from New Caledonia (3.9 mm in CL). Scale: 1.0 mm.

Abdomen smooth without dorsal carina and posterior projected spine; posteroventral corner of fifth somite angular, but not sharply pointed in all specimens including ovigerous females examined. Sixth somite with usual transverse swelling near anterior end of dorsal surface; ventrolateral surface with relatively long spine, but no additional small spines at all (Fig. 6c); spine on posterolateral lobe well developed; distal margin with two small convexities (Fig. 6d). Telson including distal spines as long as carapace; with two pairs of dorsolateral spines subequally developed, posterior pair near  $3/5$  and anterior pair near  $2/5$  length of telson length excluding distal spines; posterior margin without minute spines between bases of mesial pair of usual 5 pairs of spines (Fig. 6c).

Eye with papilla on dorsomesial surface of stalk near juncture with cornea; cornea slightly wider than stalk. Antennular peduncle with stylocerite reaching distolateral margin of basal segment (Fig. 6a). Antennal scale 0.5-0.6 times as long as carapace, 2.1-3.6 times as long as wide; lateral margin concave at about midlength, distal tooth continuous with mesial margin of blade (Fig. 6f). Carpocerite not reaching midlength of scale; basicerite with obtuse process on ventrolateral end. Mouthparts typical for genus (Fig. 7a-f). Third maxilliped long, reaching or sometimes exceeding distal end of antennal scale.

First pereopod (Fig. 7g) overreaching antennal scale by length of fingers; dactylus with 19-31 spines on opposable margin. Second pereopod (Fig. 7h) nearly as long as first pereopod; dactylus with 22-34 spines on opposable margin. Third pereopods (Fig. 7i) overreaching anterior margin of carapace by length of dactylus and distal half of propodus; exopod falling short of distal end of ischium; ischium with row of three or four



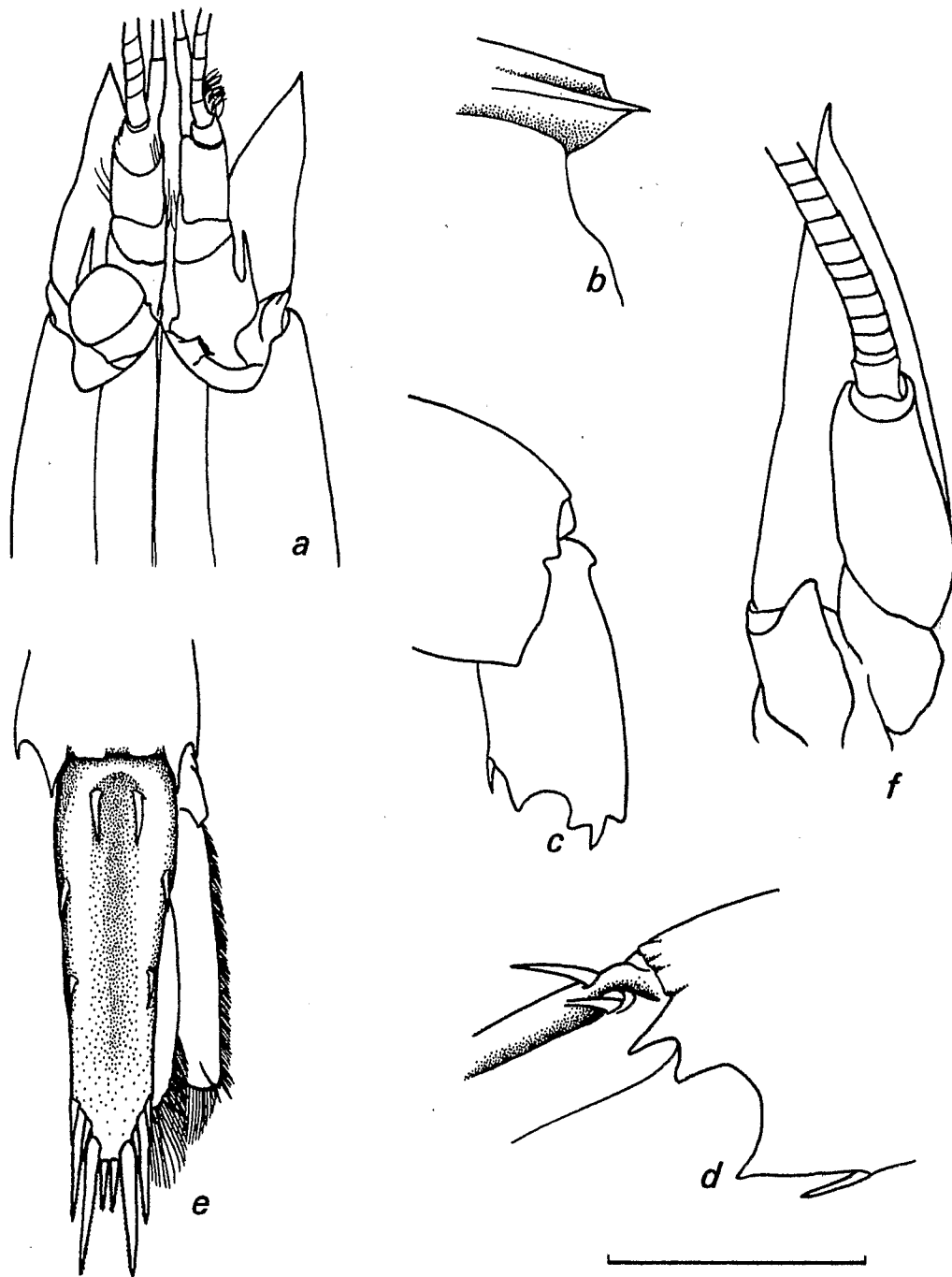


FIG. 6. — *Leptochela (L.) crosnieri* new species. Paratype, ovigerous female from New Caledonia (4.1 mm in CL). *a*, anterior part of body in dorsal view; *b*, anterior part of carapace in oblique view; *c*, fifth and sixth abdominal somites; *d*, articulation between sixth abdominal somite and telson; *e*, tail fan; *f*, antenna in ventral view. Scale for *a*, *c*, *e*: 1.0 mm; *b*, *d*, *f*: 2.0 mm.

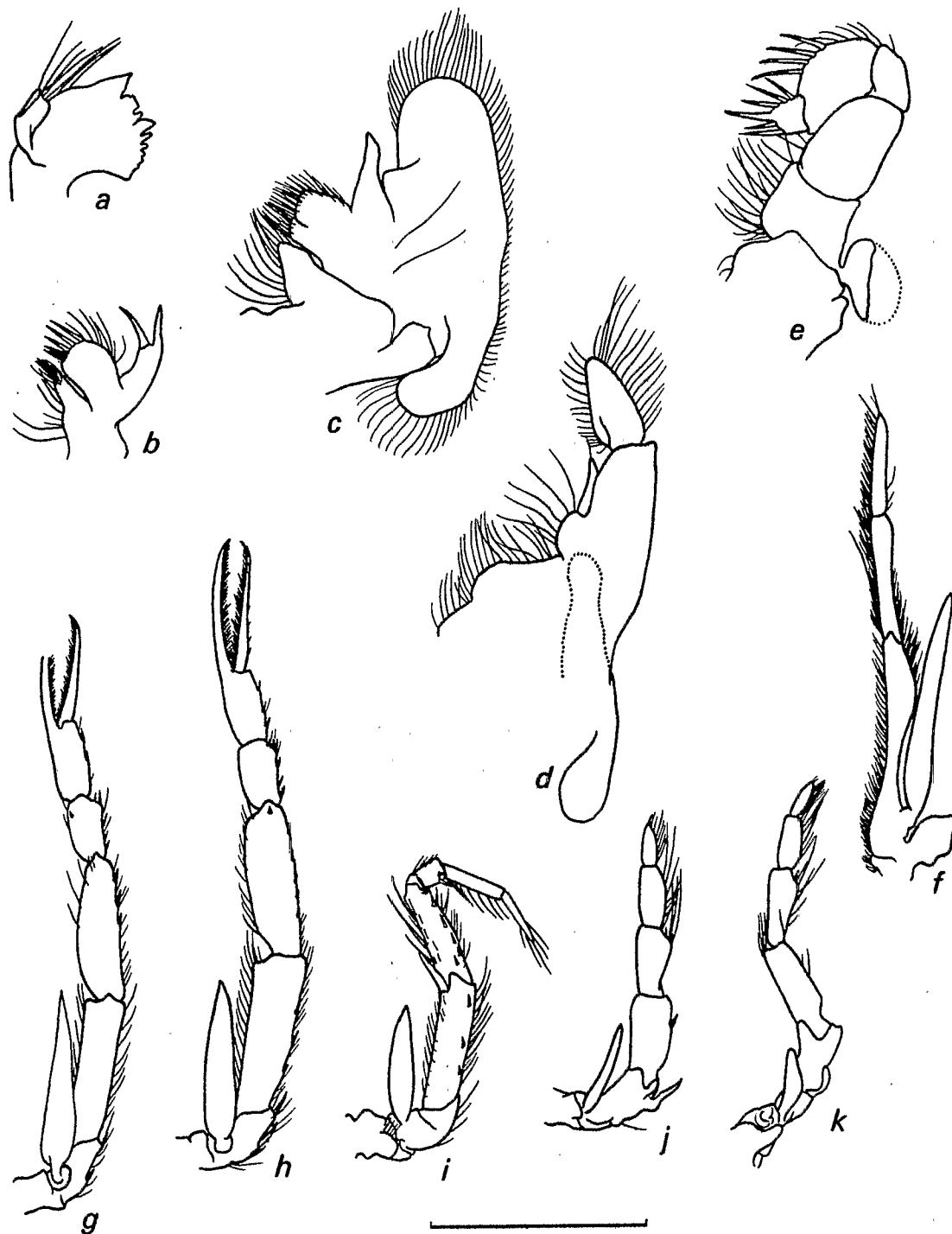


FIG. 7. — *Leptochela (L.) crosnieri* new species. Paratype, ovigerous female from New Caledonia (4.1 mm in CL). *a*, mandible; *b*, maxillule; *c*, maxilla; *d*, first maxilliped; *e*, second maxilliped; *f*, third maxilliped; *g*, first pereopod, *h*, second pereopod, *i*, third pereopod; *j*, fourth pereopod; *k*, fifth pereopod. Scale: 1.0 mm.

stout spines near posterior margin; merus with about five or six stout spines near posterior margin; dactylus slightly shorter than propodus. Fourth and fifth pereopods short, ischium of fourth pereopod with stout spine on posterior margin (Fig. 7j,k).

Endopod of first pleopod of male subelliptical. Appendix masculina with several long spines, longer than appendix interna, not including spines. Exopod of uropod with 9-12 movable spines along lateral margin and endopod with three or four similar spines near distal margin (Fig. 6e).

SIZE : Males, 3.5-4.0 mm; ovigerous females, 3.1-4.1 mm; non-ovigerous females, 3.1-4.0 mm.

DISTRIBUTION : The present new species is known only from shallow waters of New Caledonia, at depths of 13-43 m.

REMARKS. — Two telson spines show that *L. (L.) crosnieri* sp. nov. belongs to the "*L. (L.) robusta*" species group. If the specimens are matured, this new species is readily distinguished from *L. (L.) robusta* by their size difference. The ovigerous females are more than 4.4 mm in CL in *L. (L.) robusta*, while less than 4.1 mm in *L. (L.) crosnieri* sp. nov., and 3.6-4.2 mm in *L. (L.) irrobusta*. The new species is morphologically characterized by the following features.

1) The orbit does not bear a mesially directed small tooth in *L. (L.) crosnieri*, a character to separate the new species from both *L. (L.) irrobusta* and *L. (L.) robusta*.

2) The posteroventral corner of the fifth abdominal somite is angular, not largely rounded even in ovigerous females in *L. (L.) crosnieri* sp. nov., while it is largely rounded in the other two species.

3) The sixth abdominal somite bears no additional small spines on the ventrolateral margin in *L. (L.) crosnieri* like *L. (L.) robusta* (Fig. 9d), instead of two such spines in *L. (L.) irrobusta* (Fig. 8).

4) The acute tooth on the posterolateral lobe of the sixth abdominal somite and two pairs of dorsal spines on the telson are all well developed in *L. (L.) crosnieri* sp. nov. and *L. (L.) robusta*. In *L. (L.) irrobusta*, the proximal pair is more or less small and situated near the lateral margin.

5) The rostrum is comparatively short, never reaching the distal end of the eye in *L. (L.) crosnieri* sp. nov., but it is long, frequently overreaching the eye in *L. (L.) irrobusta*, and moderate in length, rarely overreaching the eye in *L. (L.) robusta*.

6) The antennal scale is short, about half as long as the carapace and the third maxilliped is comparatively long, reaching nearly to the distal end of the antennal scale in *L. (L.) crosnieri* sp. nov. In the two known species, the antennal scale is about 2/3 the length of the carapace, so that the third maxilliped falls short of the distal end of the scale.

### *Leptochela (Leptochela) irrobusta* Chace, 1976

(Fig. 8)

MATERIAL EXAMINED. — **Marshall Islands**, Bikini Atoll, lagoon, Bowditch anchorage, April 24, 1946, L. P. SCHULTZ leg : 1 ovig. ♀ holotype, 3.0 mm (USNM No. 94729), 4 ovig. ♀ paratypes, 2.9-3.2 mm (USNM). — **Rongelap Atoll**, lagoon, 0.9 km off Lomuila Island, 24 m, July 31, 1946, E. S. HERALD leg : 2 ♂ 3 ♀ paratypes, 2.3 mm, 3 ♀ paratypes, 2.1-2.9 mm (USNM No. 94734).

**Philippines Islands**, MUSORSTOM 1, st. CP 56, 13°53.3'N, 120°10.7'E, 134-129 m, March 26, 1976 : 1 ♀ 4.0 mm (MNHN). — MUSORSTOM 3, st. CP 87, 14°00.3'N, 120°18.4'E, 191-197 m, May 31, 1985 : 1 juv. 2.2 mm (MNHN).

**New Caledonia** LAGON : East Lagoon, st. DW 708, 21°23.6'S, 166°05.2'E, 35 m, August 10, 1986 : 1 ♂ 3.0 mm (MNHN). — North Lagoon, st. DW 1128, 19°31.2'S, 163°52.2'E, 26 m, October 26, 1989 : 1 ♀ 3.9 mm (MNHN). — St. DW 1174, 19°21.2'S, 163°13.7'E, 53 m, October 31, 1989 : 14 ♂ (3.4-4.3 mm), 2 ovig. ♀ (3.6, 3.6 mm), 8 ♀ (3.4-4.1 mm) (MNHN).

**Madagascar**, NW coast, 12°49.5'S, 48°30.0'E, 56 m, August 2, 1973, A. CROSNIER leg. : 1 ♂ 4.2 mm, 2 ovig. ♀ broken, 3 ♀ broken (MNHN).

**Mayotte Island**, St. 86, lagoon NE, 53 m, August 25, 1959 : 1 ♂ 2.7 mm (MNHN). — St. 93, Mayotte, lagoon N, depth 44 m, August 25, 1959 : 1 ♀ 4.2 mm (MNHN). — St. 102, Mayotte, lagoon N, 51 m, August 27, 1959 : 1 ovig. ♀

4.2 mm (MNHN). — St. 105, Mayotte, lagoon NW, 49 m, August 27, 1959 : 2 ♂ 2.9, 3.5 mm, 2 ♀ 3.7, 3.7 mm (MNHN).  
— St. 142, Mayotte, lagoon E, 44 m, August 29, 1959 : 1 ♀ 2.3 mm (MNHN).

**DISTRIBUTION :** CHACE (1976) created this species based on much material from various localities of the Indo-West Pacific region, from the Persian Gulf to the Marshall Islands. I also found many specimens of this species from the Philippines, New Caledonia and Madagascar.

**SIZE :** Small species. Males, 2.7-4.3 mm; ovigerous females, 3.6-4.2 mm.

**REMARKS.** — It has not been so easy to distinguish the present species from *L. (L.) robusta*, especially in small specimens (CHACE, 1976). In addition to several characters mentioned in the remarks on *L. (L.) crosnieri*, the presence or absence of the additional spines on the ventrolateral margin of the sixth abdominal somite seem to be the most useful for discriminating the two species, usually two additional spines are present in *L. (L.) irrobusta* as confirmed by examination of the type series (Fig. 8) while they are entirely absent in *L. (L.) robusta*.

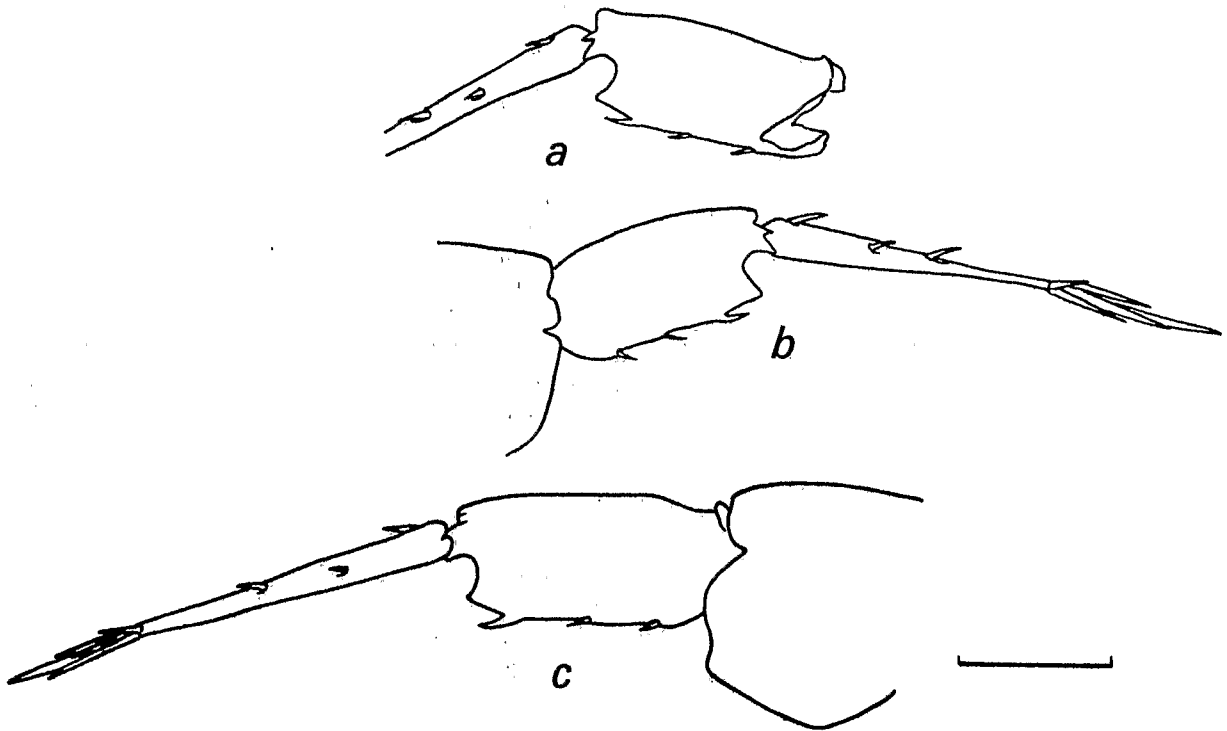


FIG. 8. — Posterior part of abdomen of *Leptochela (L.) irrobusta* Chace, 1976. *a*, holotype, ovigerous female from Bikini Atoll (3.0 mm in CL); *b*, paratype, ovigerous female from Bikini Atoll (3.1 mm in CL); *c*, male from New Caledonia (3.0 mm in CL). Scale: 1.0 mm.

*Leptochela (Leptochela) japonica* Hayashi and Miyake, 1969  
(Fig. 9b)

**MATERIAL EXAMINED.** — New Caledonia, MUSORSTOM 4, st. DW 162, 18°35.00'S, 163°10.30'E, 535 m, September 16, 1985 : 1 ♀ (4.0 mm, MNHN). — LAGON, st. DW 500, 19°04.3'S, 163°30.5'E, 225 m, March 4, 1985 : 1 ♀ 4.4 mm (MNHN).

**Australia**, Granet Cay, Swain Reef, Great Barrier Reef, July 29, 1967 : 4 ♂ 3.6-4.9 mm (MNHN - Na 2353) .

**DISTRIBUTION** : MUSORSTOM specimens were both immature females collected from New Caledonian waters, at depths of 225 and 525 m, representing the deepest record of the species.

**SIZE** : The type series of this species was all females, 5.5-6.2 mm in CL in ovigerous females, 4.2 mm in non ovigerous females. CHACE (1976) mentioned two males, 4.0 and 5.8 mm.

**REMARKS**. — Both the females from MUSORSTOM 4 and New Caledonia agree with previous descriptions of *L. (L.) japonica* (HAYASHI & MIYAKE, 1969, FUJINO & MIYAKE, 1970, CHACE, 1976). Dorsal surface of the carapace appears to be entirely rounded in the smaller female, and of the tricarinate nature, though not well defined in the larger female. Four specimens from Australia are all males, 3.9-4.9 mm in CL, and show the tricarinate feature. In these six specimens, the fifth abdominal somite bears the typical three distinct elevations in the dorsal midline. The sixth somite bears two additional small spines on the ventrolateral margin; these spines are more proximal in position and more close to each other than in *L. (L.) irrobusta*. In females from New Caledonian waters, the opposable margins of the fingers bear 36-40 spines on the first pereopod, and 45-51 spines on the second pereopod. These numbers are slightly fewer than those of the males from Thailand (CHACE, 1976) and Australia. The exopod of the uropod is armed with 15-18 movable spines which is more numerous than those of other species.

***Leptochela (Leptochela) pugnax* De Man, 1916**  
(Fig. 9c)

**MATERIAL EXAMINED**. — **Viet-nam**, Cai Dua, collected with light, November 11, 1928, 18:00, A. KREMPF leg : 37 ♂ (3.1-2.8 mm), 1 ovig. ♀ (3.4 mm), 1 ♀ 3.1 mm (MNHN - Na 8340). — Cai Dua, collected with light, November 11, 1928, 18:00, A. KREMPF leg : 20 ♂ (3.2-2.4 mm), 1 ♀ 3.2 mm (MNHN - Na 8341).

**DISTRIBUTION** : The present species is known from the eastern part of the Indian Ocean and the South East Asian and Japanese waters in depths of 8 to 55 m (CHACE, 1976).

**SIZE** : Small-sized species. Males, 2.4-3.2 mm; a single ovigerous female, 3.4 mm.

**REMARKS**. — The additional small spines on the ventrolateral margin of the sixth abdominal somite are close to each other in the present species (Fig. 9c), as well as *L. (L.) gracilis* (Fig. 9a) and *L. (L.) japonica* (Fig. 9b). The number of these spines are rather variable, one ovigerous female bearing three spines on the right side.

***Leptochela (Leptochela) robusta* Stimpson, 1860**  
(Fig. 9d)

**MATERIAL EXAMINED**. — **Philippines Islands**, MUSORSTOM 3, st. DR 117, 12°31.3'N, 120°39.5'E, 92-97 m, June 3, 1985 : 2 ♂ 6.3 mm, 1 ♀ 7.0 mm (MNHN). — St. DR 137, 12°03.5'N, 122°05.8'E, 56 m, June 6, 1985 : 3 ♂ 4.1, 4.3, 4.6 mm, 2 ovig. ♀ 4.4, 4.7 mm, 2 ♀ 4.7, 5.0 mm (MNHN). — St. CP 142, 1°47.3'N, 123°03'E, 26-27 m, June 7, 1985 : 3 ♀ 5.9, 6.2, 7.0 mm (MNHN).

**New Caledonia**, LAGON : st. DW 21, 22°22.8'S, 166°23.4'E, 10 m, May 23, 1984 : 1 ♂ 5.6 mm (MNHN). — St. DW 73, 22°17.9'S, 166°38.5'E, 15 m, August 20, 1984 : 1 ♂ 5.7 mm (MNHN). — St. DW 221, 21°50.8'S, 165°45.2'E, 55-65 m, September 21, 1984 : 2 ♀ 5.2, 5.6 mm (MNHN). — St. DW 240, 22°22.6'S, 166°59.0'E, 42 m, October 23, 1984 : 1 ♂ broken (MNHN). — St. DW 244, 22°25.0'S, 166°59.6'E, 47 m, October 23, 1984 : 1 ♀ 6.6 mm (MNHN). — St. DW 413, 22°38.9'S, 167°16.6'E, 40-60 m, January 24, 1985 : 1 ♀ 5.0 mm (MNHN). — St. DW 446, 18°19.0'S, 163°04.0'E, 36 m, February 28, 1985 : 1 ♂ 5.0 mm (MNHN). — St. DW 681, 21°34.5'S, 166°20.3'E, 33 m, August 9, 1986 : 1 ♂ 3.8 mm (MNHN). — St. DW 707, 21°25.3'S, 166°04.1'E, 38 m, August 10, 1986 : 1 ♀ 4.5 mm (MNHN). — St. DW 723, 21°21.6'S, 165°56.7'E, 45 m, August 12, 1986 : 1 ♂ 4.1 mm (MNHN). — St. DW 730, 21°17.2'S, 165°54.5'E, 43 m, August 12, 1986 : 1 ♀ broken (MNHN). — St. DW 731, 21°17.2'S, 165°52.0'E, 42 m, August 12,

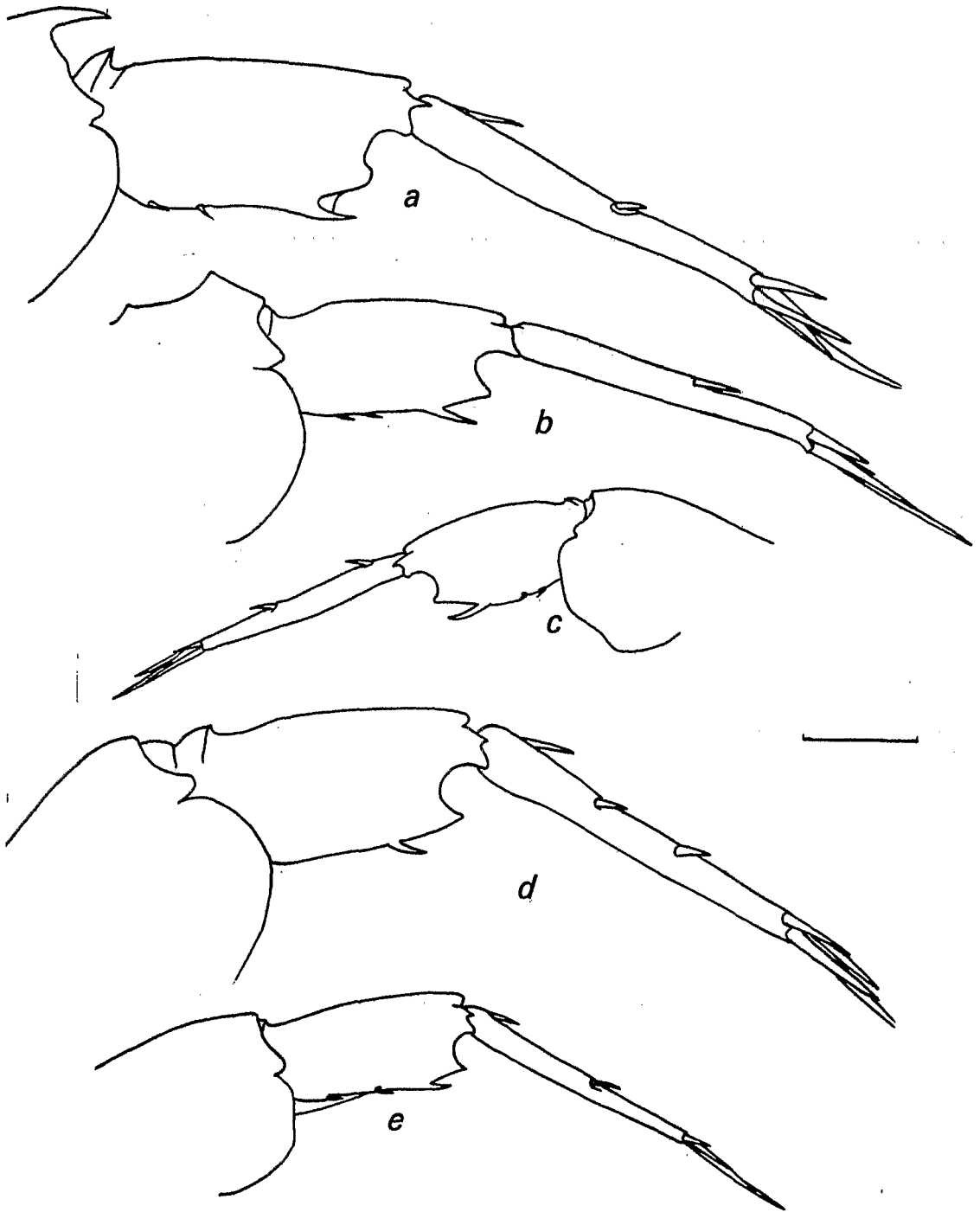


FIG. 9. — Posterior part of abdomen. *a*, *Leptochela (L.) gracilis* Stimpson, 1860. Female from East China Sea (SUF, 6.0 mm in CL); *b*, *Leptochela (L.) japonica* Hayashi and Miyake, 1969. Female from New Caledonia (4.4 mm in CL); *c*, *Leptochela (L.) pugnax* De Man, 1916. Ovigerous female from Viet-Nam (3.4 mm in CL); *d*, *Leptochela (L.) robusta* Stimpson, 1860. Ovigerous female from Philippine (4.4 mm in CL); *e*, *Leptochela (L.) sydniensis* Dakin and Colefax, 1940. Ovigerous female from Chesterfield (3.1 mm in CL). Scale: 1.0 mm.

1986 : 1 ovig. ♀ 5.2 mm (MNHN). — St. DW 781, 21°04.6'S, 165°37.8'E, 36 m, January 8, 1987 : 1 ovig. ♀ 5.0 mm (MNHN). — St. DW 782, 21°06.1'S, 165°36.7'E, 30 m, January 8, 1987 : 1 ovig. ♀ 5.2 mm (MNHN). — St. DW 788, 21°01.6'S, 165°34.7'E, 33 m, January 9, 1987 : 1 ovig. ♀ 5.7 mm (MNHN). — St. DW 801, 21°02.0'S, 165°29.3'E, 29 m, January 9, 1987 : 1 ♂ 5.2 mm (MNHN). — St. DW 809, 20°55.9'S, 165°28.4'E, 34 m, January 10, 1987 : 1 ovig. ♀ 4.9 mm (MNHN). — St. DW 815, 21°54.1'S, 165°26.9'E, 32 m, January 10, 1987 : 1 ♀ 5.0 mm (MNHN). — St. DW 863, 20°39.4'S, 165°6.5'E, 28 m, January 13, 1987 : 1 ovig. ♀ 5.4 mm, 2 ♀ 6.3, 6.7 mm (MNHN). — St. DW 1174, 19°21.2'S, 163°13.7'E, 53 m, October 31, 1989 : 1 ♂, 1 ♀ 3.7, 3.8 mm (MNHN). — St. DW 1180, 19°24.2'S, 163°18.0'E, 53 m, October 31, 1989 : 1 ovig. ♀ 5.6 mm, 1 ♀ 5.6 mm (MNHN). — St. DW 1182, 19°27.3'S, 163°16.2'E, 48 m, October 31, 1989 : 1 ovig. ♀ 5.6 mm (MNHN). — Opération Montrouzier, Koumac Chenal, 55-56 m, October 7, 1993, B. RICHER de FORGES coll. : 2 ♂ (MNHN - Na 12165). — Koumac, Chenal dredging, 20°38.97'S, 164°15.53'E, 35-37 m, October 6, 1993 : 1 ♂ (MNHN - Na 12166). — Koumac, 20°39.80'S, 164°15.30'E, 55 m, October 6, 1993 : 2 ♀ (MNHN - Na 12167).

**Chesterfield Islands.** CORAIL 2 : st. DW 56, 19°18.49'S, 158°46.78'E, 66 m, August 24, 1988 : 1 sp. 4.6 mm (MNHN). — St. DW 77, 19°12.01'S, 158°35.98'E, 60 m, August 25, 1988 : 1 ♀ 3.2 mm (MNHN). — St. DW 82, 19°11.96'S, 158°50.04'E, 62 m, August 25, 1988 : 1 ovig. ♀ 5.0 mm (MNHN).

**Mayotte Island,** st. 110, lagoon NW, 48, August 27, 1959 : 1 ♀ 3.0 mm (MNHN).

**DISTRIBUTION :** The distribution of the species with certainty is known from the Philippine waters only, in spite of many published records under that name (CHACE, 1976). The present localities extend the range southward and westward, at depths of 10-97 m.

**SIZE :** This is a large and robust form, males are 3.8-6.3 mm and ovigerous females are 4.4-5.7 mm, which is much smaller than the known size of ovigerous female, but significantly larger than those of *L. (L.) irrobusta* and *L. (L.) crosnieri*. The largest specimen examined is 7.0 mm.

**REMARKS.** — The present specimens agree well with the previous descriptions of *L. (L.) robusta* (DE MAN, 1920; CHACE, 1976). The distinctions between *L. (L.) robusta* and the related species are shown under the remarks of *L. (L.) crosnieri* sp. nov. The sixth abdominal somite is armed with a large curved spine, but without additional small spines on ventrolateral margin (Fig. 9d).

***Leptochela (Leptochela) sydniensis* Dakin & Colefax, 1940**  
(Fig. 9e)

**MATERIAL EXAMINED.** — **Philippines Islands,** MUSORSTOM 1, st. CP 63, 14°00.5'N, 120°16.3'E, 191-195 m, March 27, 1976 : 1 ♀ 4.1 mm (MNHN).

**New Caledonia.** LAGON : st. DW 547, 22°54.5'S, 166°53.0'E, 29 m, July 15, 1985 : 1 ♂ 2.8 mm (MNHN). — Ile Nou, 15 m, October 1, 1992 : 1 ♂ (MNHN - Na 12168).

**Chesterfield Islands.** CORAIL 2 : st. DW 30, 20°34.37'S, 160°51.80'E, 74 m, July 22, 1988 : 1 ovig. ♀, 1 ♀ 3.1, 3.0 mm (MNHN).

**Viet-nam,** Cai Dua, collected with light, November 11, 1928, 18:00, A. KREMPF leg. : 18 ♂ (3.8-3.3 mm), 1 ovig. ♀ 4.1 mm, 1 ♀ 3.5 mm (MNHN - Na 8340). — Cai Dua, collected with light, November 11, 1928, 18:00, A. KREMPF leg. : 6 ♂ (3.7-2.7 mm), 1 ♀ 2.5 mm (MNHN - Na 8341).

**DISTRIBUTION :** The species is widely known from the Indo-West Pacific region, from Australia northward to Japan and East China Sea and westward through Indian Ocean to Arabian Sea, at depths from surface to 300 m. The present localities are one in the Philippines and two from New Caledonia.

**REMARKS.** — The ovigerous female, 3.1 mm in CL, from Chesterfield Islands bears the tricarinate carapace; mid-dorsal carina is not concave in midlength, and never concealed by the lateral carina in lateral view. The male, 3.0 mm in CL, from Viet-Nam bears the smooth carapace, not showing the tricarinate feature; the rostrum is narrow in lateral view but varies in length; usually not reaching the distal end of the eye. The female from St. 63 of MUSORSTOM 1 has a long rostrum, reaching the distal margin of the second segment of the antennular peduncle. These carapacial and rostral features are typical for the species, and distinguish this species from *L. (L.) aculeocaudata* and *L. (L.) chacei* sp. nov. The additional spines on the

sixth abdominal somite are two in this species (Fig. 9e) and are arranged as in *L. (L.) irrobusta*, but slightly more slender and longer in *L. (L.) sydniensis*. All the specimens have the outer margin of the antennal scale concave near midlength, a character that disagrees with that of *L. (L.) hainanensis* Yu, 1936.

The six species belonging to both the *L. (L.) robusta* group and the *L. (L.) aculeocaudata* group, which are characterized by the smooth abdomen without dorsal elevation or posterior spines on any somites, and smooth orbit can be distinguished by the following key.

- 1 - Telson with one pair of dorsolateral spines ..... 2  
 — Telson with two pairs of dorsolateral spines ..... 4
- 2 - Rostrum not lanceolate. Carapace tricarinate in breeding females .....  
 ..... *Leptochela (L.) sydniensis* Dakin and Colefax, 1940  
 — Rostrum lanceolate. Carapace tricarinate in both males and females ..... 3
- 3 - Basicerite of second antenna concealed by carapace .....  
 ..... *Leptochela (L.) aculeocaudata* Paulson, 1875  
 — Basicerite of second antennal not concealed by carapace .....  
 ..... *Leptochela (L.) chacei* sp. nov.
- 4 - Sixth abdominal somite with two pairs of additional spines on ventrolateral margin, in addition to large spine on ventrolateral surface. Size small, ovigerous females less than 4.2 mm in CL ..... *Leptochela (L.) irrobusta* Chace, 1976  
 — Sixth abdominal somite with large spine on ventrolateral surface, without additional spines on ventrolateral margin. .... 5
- 5 - Orbital margin without mesially directed spine. Posteroventral corner of fifth abdominal somite angular in adult. Size small, ovigerous females less than 4.1 mm in CL .....  
 ..... *Leptochela (L.) crosnieri* sp. nov.  
 — Orbital margin with mesially directed spine. Posteroventral corner of fifth abdominal somite rounded in adult. Size large, ovigerous females more than 4.4 mm in CL .....  
 ..... *Leptochela (L.) robusta* Stimpson, 1860

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