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A NEW ECHINOGAMMARUS OF THE BERILLONI-GROUP E. AQUILIFER NOV.SP., FROM THE PYRENEES (CRUSTACEA, AMPHIPODA)

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RESUME

Une nouvelle espèce d'Amphipodes, Echinogammarus aquilifer nov. sp., qui doit être comptée parmi les Echinogammarus du groupe berilloni, a été trouvée dans les Pyrénées occidentales.

Dans cette note, une description détaillée d'Echinogammarus berilloni (Catta, 1878), basée sur des topotypes, a été donnée, suivie d'une description comparative de l'espèce nouvelle.

INTRODUCTION

During a short trip in the western part of the Pyrenees in August 1968 many samples of Gammaridae were collected both on the French and Spanish slopes of this mountain chain. Most of the specimens collected appeared to belong to the species Echinogammarus berilloni (Catta, 1878), or to closely related forms, but likewise it became clear that there exists a great morphological diversity in this group of E. berilloni.

This diversity, often called variability, was noticed already by Spandl (1926) and Margalef (1956) and made a more detailed study desirable. A great difficulty is the absence of a good and detailed description and trustworthy figures of E. berilloni. The following published figures may serve as a basis for recognition of this species:

Catta, 1878, fig. 1.
Chevreux, 1896, figs. 1, 2, 3.
Spandl, 1926, figs. 1, 2, 3, 4.
Margalef, 1956, figs. 1, 2 (for subspecies calvus).
Hoffmann, 1963, figs. 29 - 37.

A further complication is, that it was not possible to locate the type material used by Catta for his description of E. berilloni. This material was collected by Mr. Berillon near the summit of Mount Mondarrain (Basses - Pyrénées, France), at an altitude of 750 m.

Therefore, I based my present investigations on some specimens from the same drainage system as that to which the type-locality of the real E. berilloni belongs.

Although further data are being collected, it is clear already now that at least one form must be considered a new species, which differs from E. berilloni in a large number of characters.

In this paper a detailed description of topotypes of E. berilloni (Catta) is given, followed by a description of the new species, named Echinogammarus aquilifer.

In the figures details of aquilifer and berilloni are given next to each other, indicated by A and B, respectively, in order to show the differences more acurately.

ACKNOWLEDGEMENTS

The author is indebted to Professor Dr. J.H. Stock of the Zoological Museum of the University of Amsterdam, for introducing him to the complicated systematics of Amphipoda and for his critical remarks in all stages of the work. Moreover, thanks are due to Drs. L. Laubier, of Banyuls and J. Forest, of Paris, for providing photocopies of certain rare publications.

Echinogammarus berilloni (Catta, 1878)

Topotypical material.- 54 specimens (males and females), from a stream, la Petite Nive, 1 km south (upstream) of St. Jean-Pied-de-Port, Département Basses-Pyrénées, France. The material has been deposited in the collection of the Zoölogisch Museum Amsterdam (Cat. nr. ZMA Amph. 102.129).

Description.- Male: The general appearance of the species (fig. 1 B - Hab) is characterized by enormous groups of cuticular outgrowths all over the posteriormost 6 or 7 body segments of the animal, and by the relatively bald anterior part.

The greatest body length measured in the topotypical material was 12 mm. In samples from other localities a length of up to 18 mm was measured.

The lateral headlobes are truncated; the truncated margin is shorter than the length of the eye.

The eyes are about twice as long as wide and situated not very close to the middorsal line.

The first antenna (fig. 3 B - A1) is more than half as long as the whole body length of the animal. Peduncle segments 1 and 2 are about equal in length, segment 3 is about half as long as 2. The flagellum is long and overreaches that of A2. The accessory flagellum is short, having only 6 segments. Both bear small groups of short setae near the top of each segment.

The second antenna (fig. 1 B - A2) has very slender and elongate peduncle segments 4 and 5. The gland cone reaches nearly halfway the 3rd peduncle segment. The 4th and 5th peduncle segments bear several groups of setae on the inferior margin, those of the 4th being very short, those of the 5th a little longer. The setae on the flagellum are always short. Calceoli are completely absent.

The mouth-parts (fig. 2) of this species do not show obvious differences from other species within the family Gammaridae, except in the finer details of the mandibular palp. This mandibular palp (fig. 4 B - palp) has an unarmed 1st segment, the 2nd segment is provided with setae along its lower margin, increasing in length towards the articulation with the 3rd segment. Segment 3 carries 5 terminal setae, 3 of them being plumose, 3 lateral groups of setae and a row of spinules along its lower margin. Most of these spinules are rather short and plumose and subequal in length, but a few among them are longer and more setiform.

The hand of the 1st gnathopod is piriform (fig. 4 B - P1), the palm is very oblique. The strong medial palmar spine is separated from the angle spines (fig. 5 B - Pa1). The posterior palmar margin is provided with several spines ("Stiftstacheln"), which merge gradually into the angle group. In total there are 7 spines plus 1 medial palmar spine on the hand. The merus and carpus of this gnathopod bear large groups of long, somewhat curved and mostly plumose setae.

The 2nd gnathopod (fig. 4 B - P2; fig. 6 B - Pa2) as a whole is much stronger than the first. The hand is strongly elongate, more than twice as long as wide, and less piriform and less tapering than

that of the 1st gnathopod. As in gnathopod 1 the medial palmar spine is longer than the other spines and separated from them by a gap. The palm is oblique. Much more than in gnathopod 1, the hand is provided with large groups of long and often curved setae at the posterior margin. The merus bears less setae than that of gnathopod 1.

The antero-inferior and postero-inferior corners of the 1st and 2nd coxal plates are rounded.

Leg 3 (fig. 6 B - P3) has an elongate coxal plate with a rounded antero-inferior corner and an almost angular postero-inferior corner. It increases in width towards its insertion. The merus bears 2 groups of elements (each of 1 spine and a number of setae) on its anterior margin, 7 groups of distally curved setae on its posterior margin. The carpus has an unarmed anterior margin (except of course the distal group of elements) and 6 groups of elements on the posterior margin. Four of these groups consist of 1 spine and a number of curved setae, the other 2 consist only of setae. The propodus bears 3 groups of elements (spines + a few setae) on the posterior margin.

The coxal plate of the 4th leg (fig. 7 B - P4) is almost as wide as long. The merus bears 2 small groups of anterior elements. The posterior margin bears 7 groups of slightly curved setae. The carpus lacks anterior elements, but possesses 6 small groups of elements, 5 of them with a spine along the posterior margin.

The 5th leg (fig. 7 B - P5) has a rather short basal segment tapering towards its distal end. It is about 1.5 times as long as wide. Four groups of setae are implanted near its posterior margin, which is finely crenulate. The anterior margin is provided with 7 small groups of elements, the distal 4 of them with a spine. The distal corners of the basal segment bear a few spines and a few setae, which are as long as or a little longer than the spines. The ischium is characterized by the presence of a second group of setae (the distal group being always present) halfway its anterior margin. The merus and carpus each have 4 groups of elements (the distal one included) on their posterior margin, consisting of spines and setae.

The 6th leg (fig. 7 B - P6) has a rather elongate basal segment, bearing 6 groups of setae (the distal one included) near its posterior margin, which is finely crenulate. The anterior margin is provided with 8 groups of elements, 5 of them with a spine. The number of setae of these groups increases towards the distal end of the segment. The ischium is also characterized by the presence of a second group of setae (the distal group being always present) halfway its anterior margin. The merus and carpus have several large groups of elements, both on their anterior and posterior margins.

The basal segment of leg 7 (fig. 8 B - P7) is covered with many groups of setae near its posterior margin. Moreover, this margin is provided with several fine crenulations, each set with a long seta. The anterior margin bears many groups of elements, most of them consisting of a spine and some long setae. The ischium shows 3 groups of elements, the distal one included. The merus and carpus show large groups of elements, both on their anterior and posterior margins, consisting of spines and curved setae which are much longer than the spines.

Uropod 3 (fig. 3 B - Ur3) consists of a short pedunculus and of 2 rami. The inner ramus is very short and reduced, and attains about 1/6 of the length of the first exopod segment. It is 1.5 - 2 times as long as wide, bearing 1 terminal and 1 marginal spine, and a number of long setae near its top. The outer ramus is large and elongate, with clusters of setae (some with 1 or 2 spines in between them) on its inner and outer margin. The terminal segment is reduced to about the size of the 3 terminal spines.

The telson (fig. 8 B - T) is a little shorter than the pedunculus of the uropod 3. A spine and an additional seta are implanted on the outer margin. Moreover, there are 2 terminal spines, surrounded by a number of generally much longer setae.

The urosome segments (fig. 1 B - Ur), more particularly the 1st and 2nd, bear a dorsal hump

and are, like the metasome segments, ornamented with enormous clusters of long, curved setae, sometimes with small spines in between them.

The 2nd and 3rd epimeres (fig. 1 B - Ep) have both much produced, pointed posterior corners. Long setae are implanted on their ventral and posterior margins, as well as on the lateral surface.

Female: There exists a remarkable sexual dimorphism in this species. A characteristic difference is that the number of setae, especially on the metasome and urosome, and on the P5 through P7, is much reduced. This is shown for the 7th leg in fig. 8 B - P7 ♀. Very striking is the complete lack of long setae on the basal segment of this leg. This is also the case in P5 and P6.

The shape of the gnathopods differs sharply from that in the male. In the female the palm (fig. 5 B - Pa1 ♀ and 5 B - Pa2 ♀) is almost transverse. Moreover, the medial palmar spine is completely absent, both in gnathopod 1 and in gnathopod 2. The number of spines implanted on the hand is lower in the female than in the male, since the "Stiftstacheln" are lacking.

Echinogammarus aquilifer nov.sp.

Material and types.- 29 specimens (males and females), from a stream, la Petite Nive, about 5 km south (upstream) of Valcarlos, prov. of Navarra, Spain. The ♂ holotype, ♀ allotype and 27 paratypes have been deposited in the collection of the Zoölogisch Museum Amsterdam (Cat.nr. ZMA Amph. 102.126, 102.127 and 102.128). The species was accompanied by specimens of E. berilloni (Catta).

Description.- Male: The new species can easily be distinguished from E. berilloni because of the different position of the cuticular outgrowths on its abdomen and appendages (fig. 1 A - Hab). While in E. berilloni the metasome and urosome are densely covered by setae, the abdomen of the new species is almost naked, except for a few tufts of rather short, curved setae. In contrast with that in E. berilloni, the second antenna of E. aquilifer is bearing a flag-like brush of long setae. For this reason the species is called E. aquilifer (aquilifer, Latin, means: standardbearer). The maximum body length measured in the type-material was 9 mm.

The lateral lobes of the head (fig. 3 A - Head) are rounded at their dorsal corner, otherwise they are truncated. The truncated margin is longer than the length of the eye.

The eyes are more than twice as long as wide and situated not very close to the middorsal line.

The 1st antenna (fig. 3 A - A1) is more than half as long as the total body length of the animal, as in E. berilloni. Peduncle segments 1 and 2 are about equal in length, the third segment is less than half as long as the second. The flagellum and accessory flagellum resemble those of E. berilloni.

The 2nd antenna (fig. 1 A - A2), as in E. berilloni, has slender and elongate peduncle segments 4 and 5. The gland cone (fig. 1 A - Gland), however, attains the proximal end of the 3rd peduncle segment. The 4th peduncle segment is bearing 3 rows of spines, some with additional setae. The 5th peduncle segment bears 3 rows of short setae. The flagellum differs completely from that in E. berilloni by the possession of very long, slightly curved setae, forming a flag-like brush along its inferior margin. Calceoli have not been found.

The mouth-parts are like those of E. berilloni, except for the mandible palp whose ornamentation is slightly different. On the 2nd segment of this palp (fig. 4 A - palp), the arrangement of setae differs only slightly from that in E. berilloni. The 3rd segment, however, has only 4 terminal setae, 2 of them being plumose (versus 5 setae in berilloni), and 2 lateral groups of setae. Moreover, the row of plumose spinules along the lower margin is regular and comb-like, without longer elements intermixed with it.

The hand of the 1st gnathopod is piriform (fig. 4 A - P1), relatively shorter than in E. berilloni. The palm (fig. 5 A - Pa1) is very oblique. The medial palmar spine is not separated from the

angle spines. This group of angle spines merges gradually into the spines along the posterior margin, the so-called "Stiftstacheln". In total the hand bears 7 spines in a row, the medial palmar spine included.

The 2nd gnathopod (fig. 4 A - P2) is much stronger than the first. The hand is less elongate, about 1.5 times as long as wide, more swollen, and less tapering than in E. berilloni. Moreover, the palm is less oblique, more transverse. There is no medial palmar spine (fig. 6 A - Pa 2), but only a group of 6 spines near the angle of the palm. Large groups of long, curved setae occur along the posterior margin.

The postero-inferior corners of the 1st and 2nd coxal plates, which are rounded in E. berilloni, are almost rectangular in the new species.

Leg 3 (fig. 6 A - P3) has a larger coxal plate than E. berilloni. The basal portion of this plate is slightly protruding backward. The carpus has a spine and some additional setae halfway its anterior margin. The other features are almost like those in E. berilloni.

The coxal plate of the 4th leg (fig. 7 A - P4) is a little longer than wide and has a rounded inferior margin. The posterior excavation is rather deep. For the rest, this leg resembles that of E. berilloni.

The 5th leg (fig. 7 A - P5) has a short, subrectangular segment, less than 1.5 times as long as wide. The group of setae halfway the anterior margin of the ischium is lacking in this species. The merus and carpus each have 3 groups of elements (the distal one included) on their posterior margins.

Leg 6 too has a relatively shorter and more rectangular basal segment than in E. berilloni. There are only 4 groups (instead of 6) of setae on the medial surface near the posterior margin. The 2nd group of setae, halfway the ischium, is lacking. The setation along the posterior margin of the merus and carpus is strongly reduced in comparison with E. berilloni. The propodus is relatively longer and bears more groups of elements than in E. berilloni.

The 7th leg (fig. 8 A - P7) has a wide subrectangular basal segment, bearing 4 small groups of short seate on the medial surface near the posterior margin. This margin is finely crenulated, but the long setae, which are so characteristic for E. berilloni, are lacking here. The anterior margin only bears a few spines. The ischium is provided with a distal group of setae only. The posterior margin of the merus bears 2 groups with 1 or 2 spines and only a few setae. The other characters are similar to those in E. berilloni, although there are small differences in the numbers of setae.

The uropod 3 (fig. 3 A - Ur3) is more strongly developed than in E. berilloni. The pedunculus is provided with several groups of long setae and some spines. The inner ramus is about 2.5 times as long as wide. It attains about 1/4 of the length of the 1st exopod segment. A large group of setae is implanted about halfway its inner margin, while a 2nd group, consisting of 1 spine and a number of setae, is found on the top of the segment. The large and elongate outer ramus bears clusters of elements on its inner and outer margins. The lengths of the 4 terminal spines exceed that of the 2nd exopodal segment.

The telson (fig. 8 A - T), which is a little shorter than the pedunculus of the 3rd uropod, bears a spine on its outer margin, accompanied by 2 groups of setae. On the upper surface, near the interior margin, 2 groups of setae are found. The 2 terminal spines are surrounded by larger numbers of setae than in E. berilloni.

The urosome segments 1 and 2 (fig. 1 A - Ur) do not show the dorsal hump that is found in E. berilloni. Moreover, the urosome segment 1 is longer. The urosome segments bear, like the metasome segments, small tufts of short, slightly curved setae.

The 2nd and 3rd epimeres (fig. 1 A - Ep) have much produced, pointed posterior corners, and bear only some small spines and setae on their ventral margin and some fine setules on their pos-

terior margins.

Female: As in E. berilloni, there is sexual dimorphism in E. aquilifer. The ornamentation of the metasome, of the urosome and of the 2nd antenna is almost like that in the male, but differences can be found in the telson, the gnathopods and P5 through P7. The number of setae on P5 to P7 is much reduced in the female. This is illustrated for P7 (fig. 8 A - P7 ♀).

As in the males, the differences between E. berilloni and E. aquilifer in the shape of the basal segments of these legs are also visible in the females.

Like E. berilloni, the gnathopods are sexually dimorph. Here too the palm of both is almost transverse. The number of spines is 1 less, both on the hand of gnathopod 1 and on that of gnathopod 2, while the arrangement (see fig. 5 A - Pa 1 ♀ and 5 A - Pa 2 ♀) of these spines is different from that in the male, especially in gnathopod 1. Just as in the males, differences between the females of the two species can be found in the arrangement of the spines on the hand.

The telson of the female is markedly different from that in the male in that the lateral, subbasal spine is accompanied by 1 seta only, instead of by 2 large groups of setae, and in that the medial group of setae is entirely lacking. Consequently, the telson of a female aquilifer looks almost exactly like that of a male berilloni.

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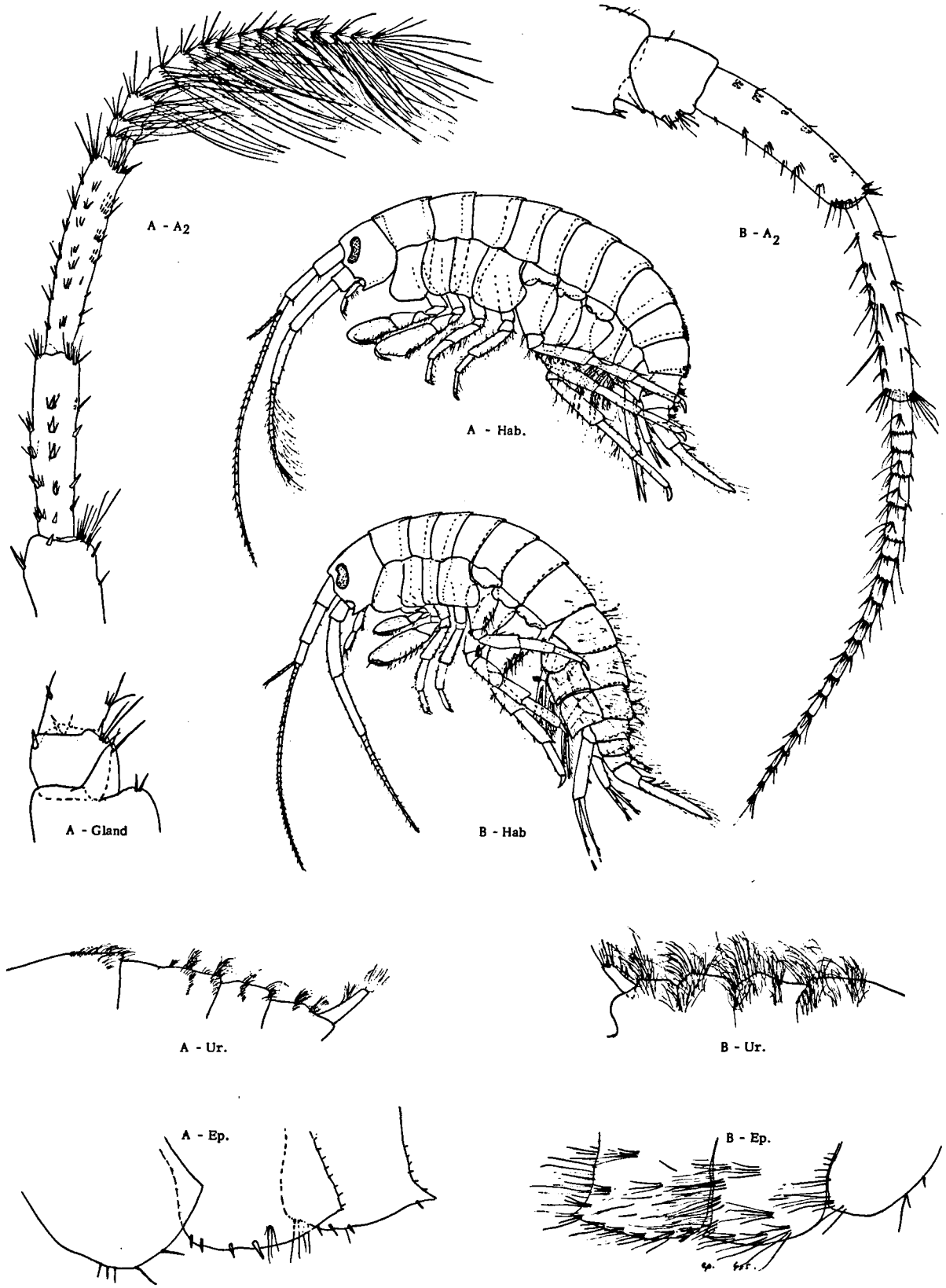

Fig. 1. Echinogammarus aquilifer nov.spec. (A) and Echinogammarus berilloni (Catta) (B). Hab, habitus of male (scale A); A2, second antenna of male (scale B); Gland, gland cone (scale C); Ur, urosome of male (scale B); Ep, epimeres of male (scale B).

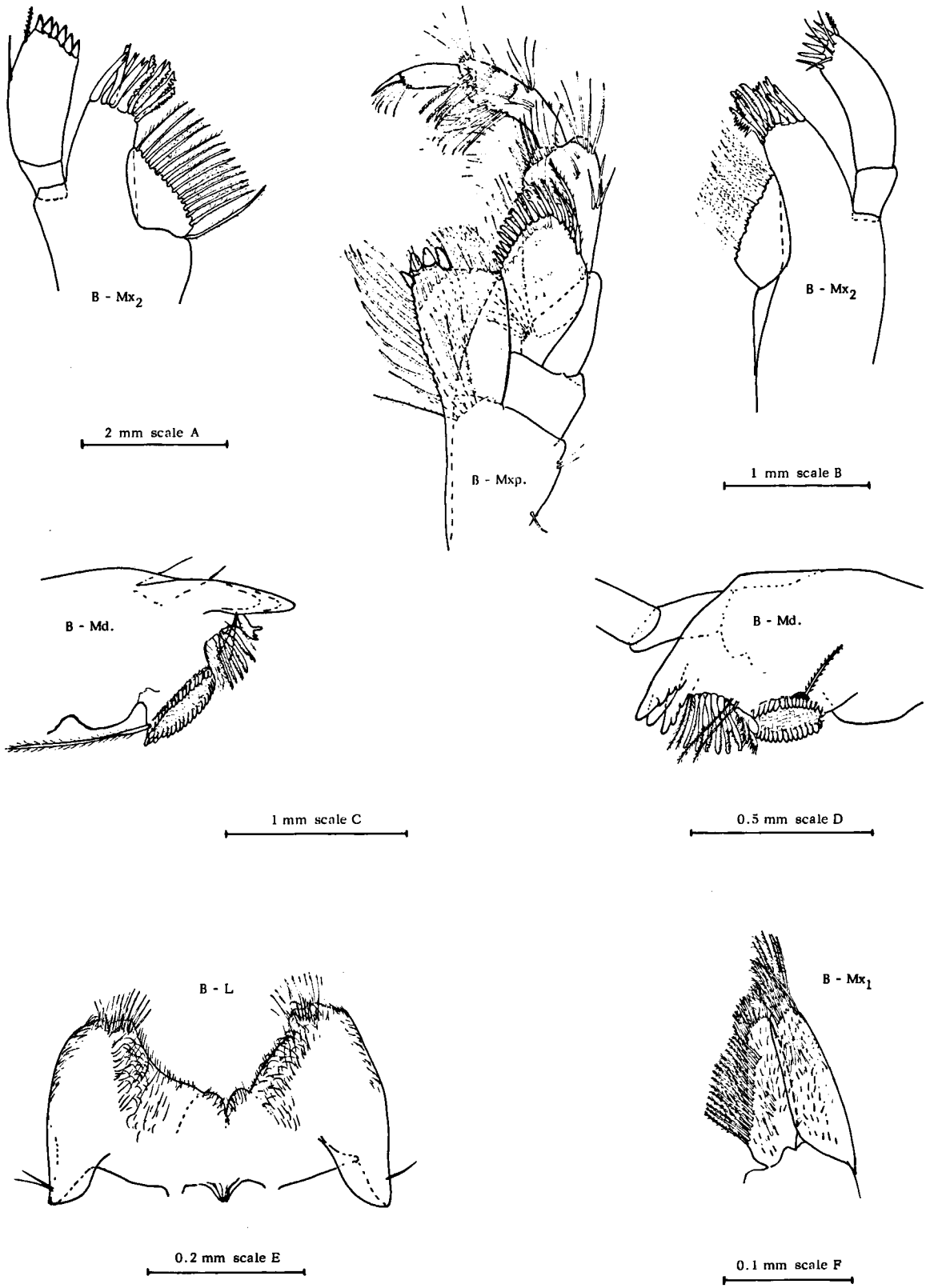

Fig. 2. Echinogammarus berilloni (Catta) (B), male. Mxp, maxilliped (scale D); Mx 2, maxilla 2 (scale D); Md, mandibles (scale D); L, lower lip (scale D); Mx 1, maxilla 1 (scale D).

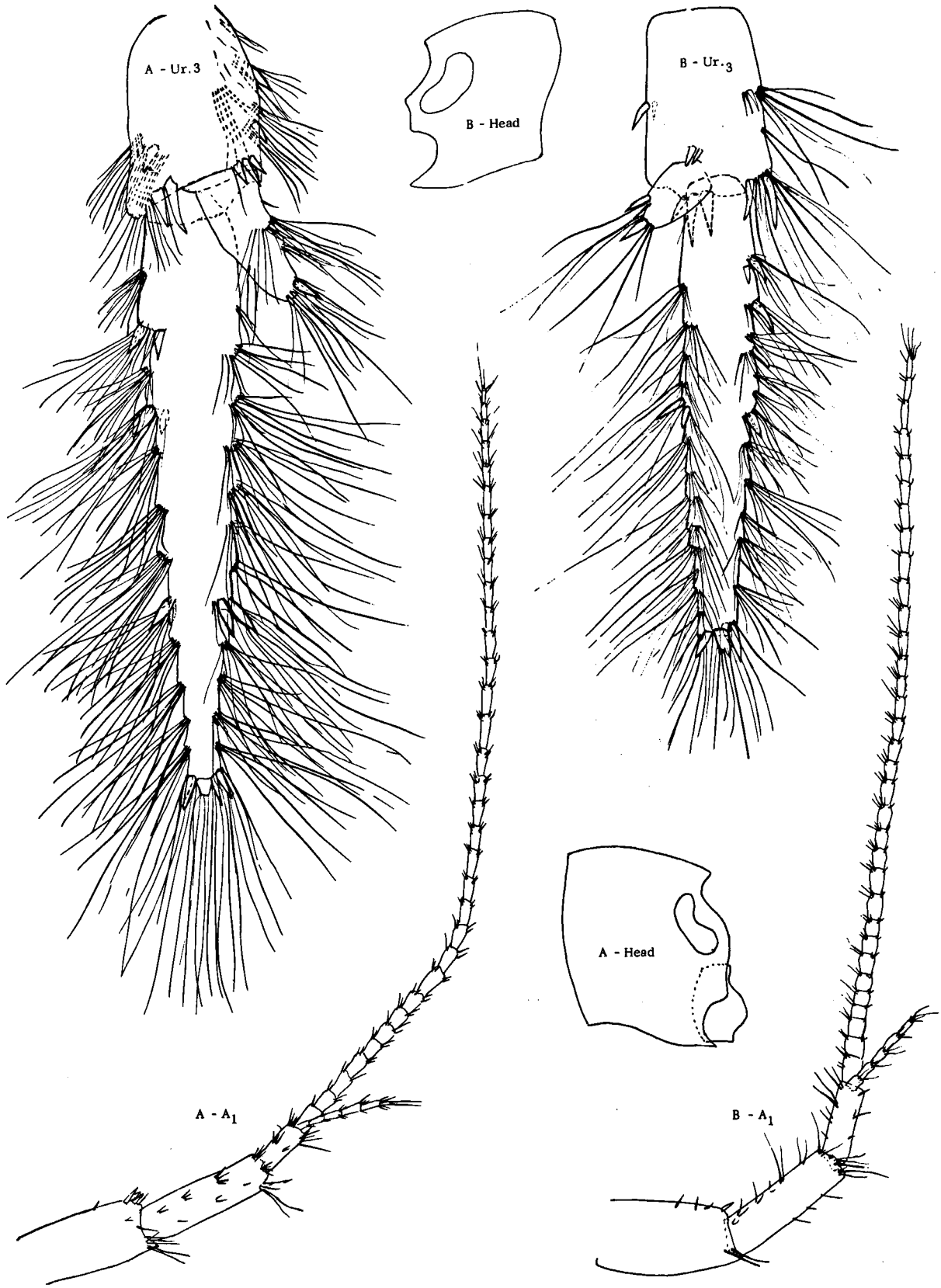

Fig. 3. Echinogammarus aquilifer nov.spec. (A) and Echinogammarus berilloni (Catta) (B). Ur 3, third uropod of male (scale D); A 1, first antenna of male (scale B); Head, head of male from the right (scale B).

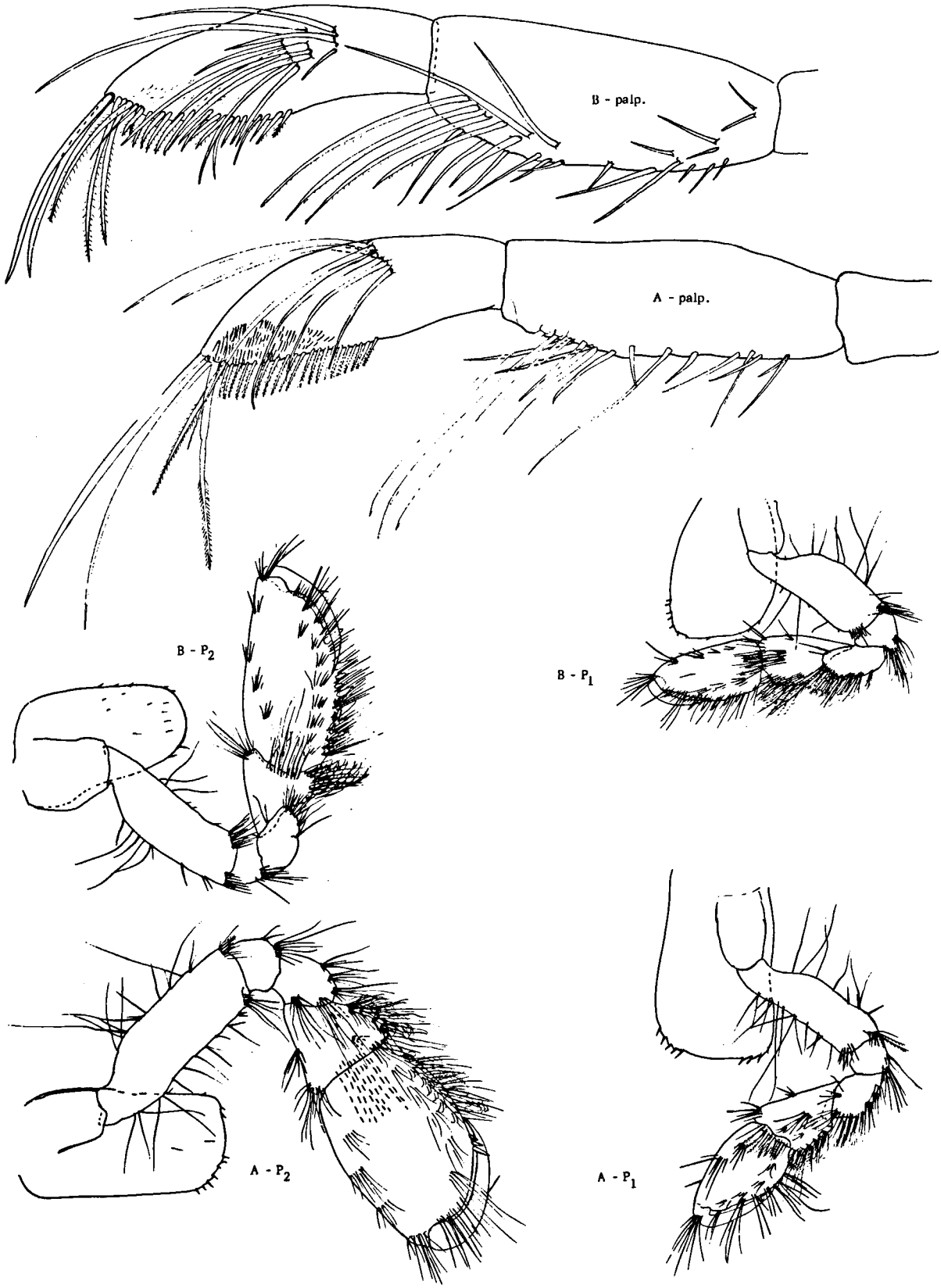

Fig. 4. Echinogammarus aquilifer nov.spec. (A) and Echinogammarus berilloni (Catta) (B). Palp, mandibular palp of male (scale E); P 1, first gnathopod of male (scale B); P 2, second gnathopod of male (scale B).

Fig. 5. Echinogammarus aquilifer nov.spec. (A). Pa 1, palp of first gnathopod of male (scale E); Pa 1♀, palm of first gnathopod of female (scale F), Pa 2♀, palm of gnathopod of female (scale F). Echinogammarus berilloni (Catta) (B). Pa 1, palm of first gnathopod of male (scale E); Pa 1♀, palm of first gnathopod of female (scale E); Pa 2♀, palm of second gnathopod of female (scale E).

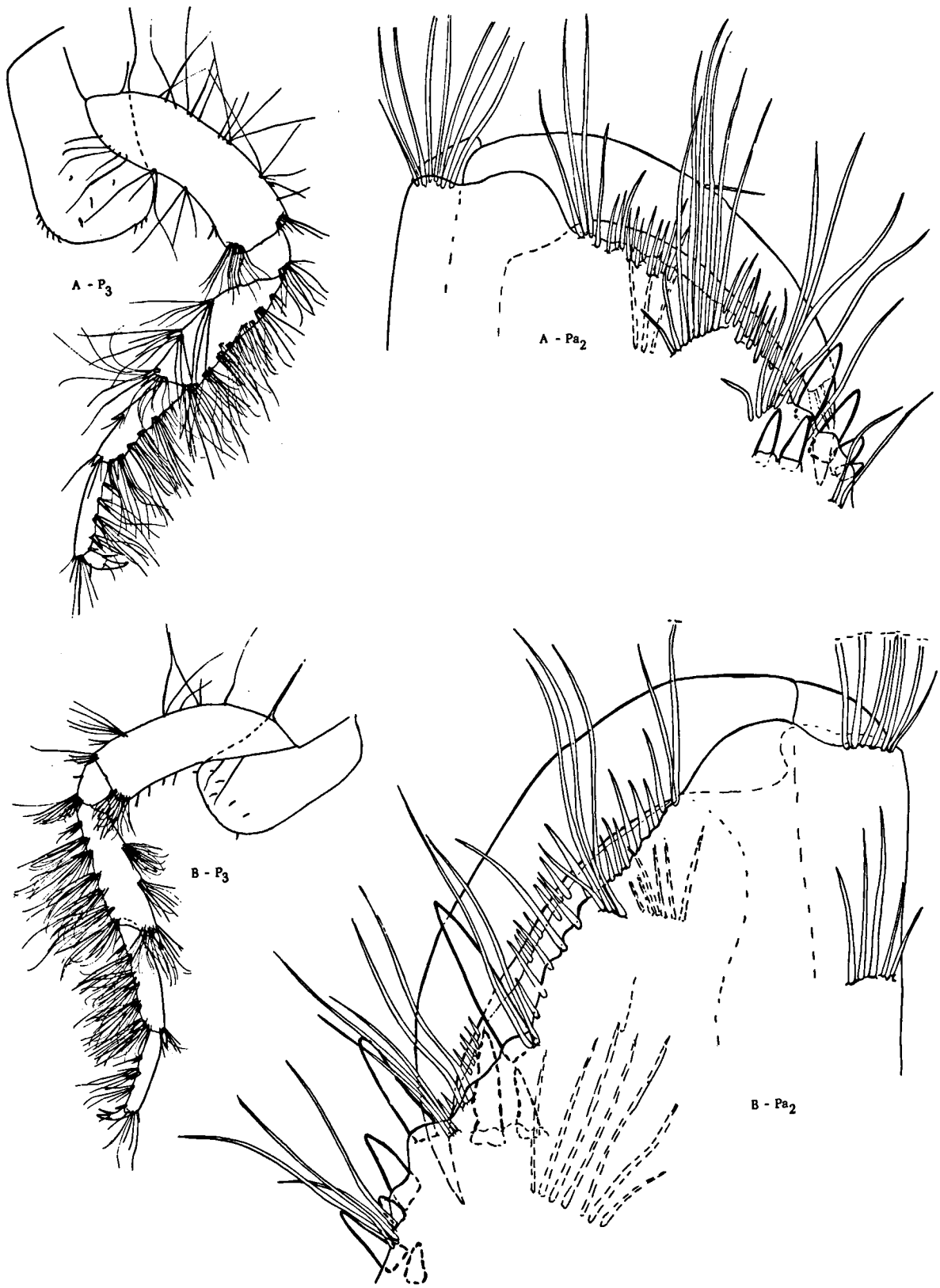

Fig. 6. Echinogammarus aquilifer nov.spec. (A) and Echinogammarus berilloni (Catta) (B). Pa 2, palm of second gnathopod of male (scale E); P3, third leg of male (scale B).

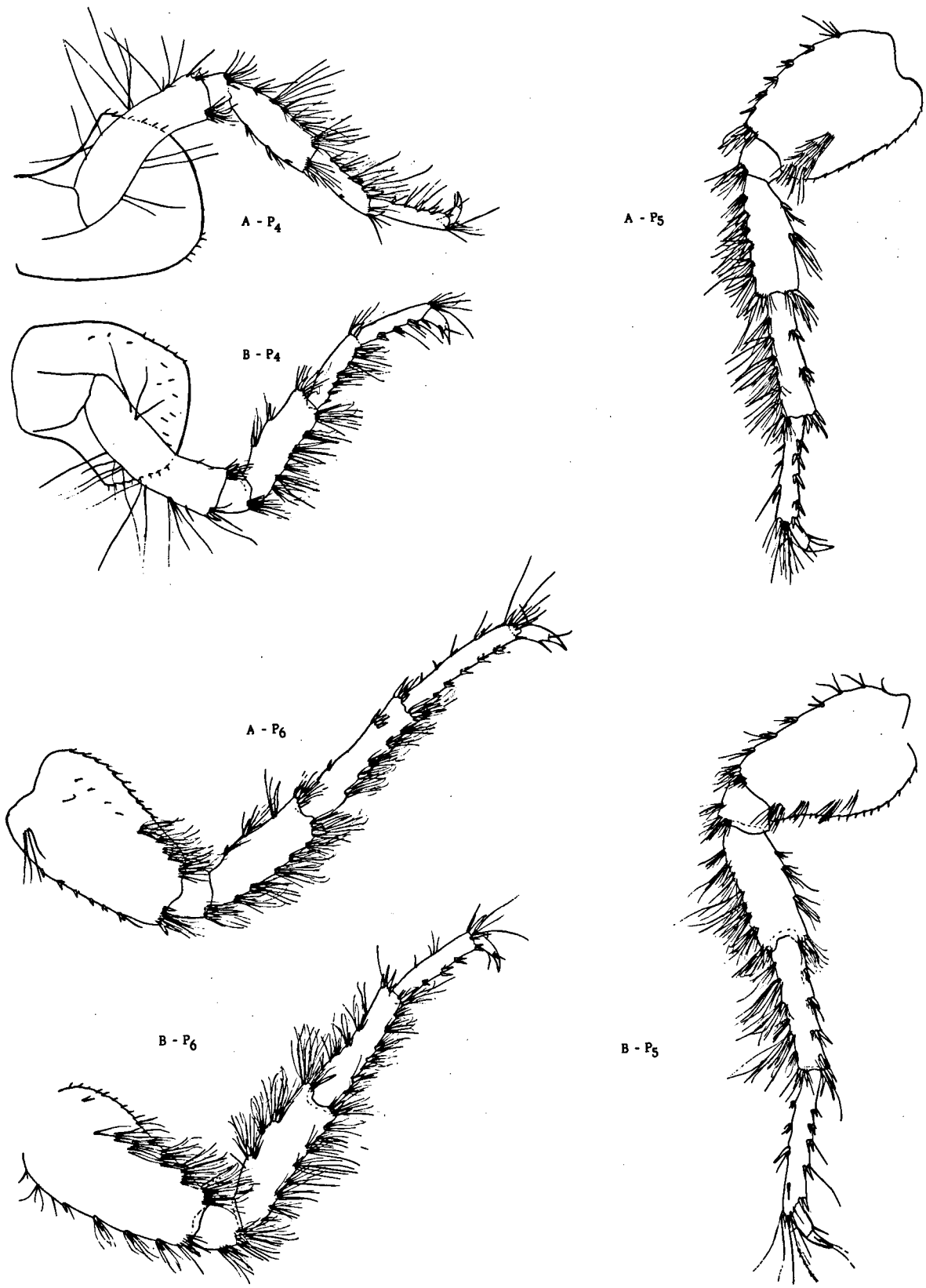

Fig. 7. Echinogammarus aquilifer nov. spec. (A) and Echinogammarus berilloni (Catta) (B). P4, fourth leg of male (scale B); P5, fifth leg of male (scale B); P6, sixth leg of male (scale B).

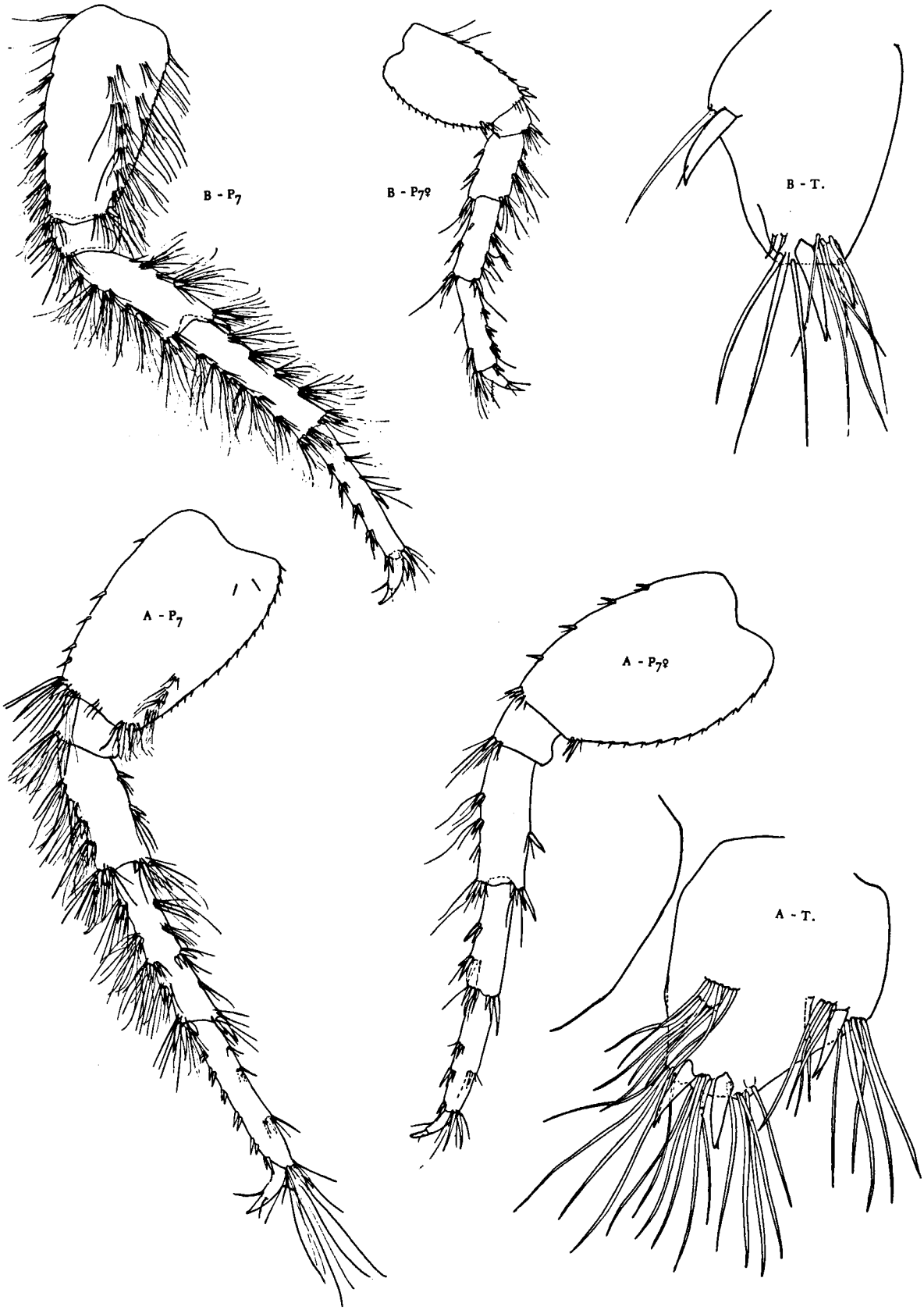

Fig. 8. Echinogammarus aquilifer nov. spec. (A). P7, seventh leg of male (scale B); P7 ♀, seventh leg of female (scale D); T, telson of male (scale B). Echinogammarus berilloni (Catta) (B). P7, seventh leg of male (scale B); P7♀, seventh leg of female (scale B); T, telson of male (scale B).