# BEAUFORTIA

SERIES OF MISCELLANEOUS PUBLICATIONS

INSTITUTE OF TAXONOMIC ZOOLOGY (ZOOLOGICAL MUSEUM)
UNIVERSITY OF AMSTERDAM

No. 301 Volume 23 April 24, 1975

# On two new freshwater species of the genus *Gammarus* from North Africa (Crustacea, Amphipoda)

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ABSTRACT

Two new gammarid species from Morocco are described. The first new species, *Gammarus rouxi* nov. spec. is characterized by a very typical seventh leg and was found together with *Gammarus gauthieri* Karaman, 1931 in a well; the second species *Gammarus microps* nov. spec. is characterized by very small eyes and was the only amphipod species found in a cave.

## INTRODUCTION

In the last few years both Pinkster, 1971 and Stock, 1974 described a new freshwater gammarid from North-Africa. Nevertheless it became clear that our knowledge of the amphipod fauna of this part of the world is still very poor and incomplete. In almost every sample from this region animals occur which cannot be identified with the existing literature. Very often one cannot be sure whether new species or certain developmental stages of a known species are involved. Much work and systematic sampling must be done before a clear understanding of the taxonomy of the freshwater amphipods of northern Africa can be achieved. In the meantime, we decided that new species were to be described merely when one could be completely sure that one is dealing with adult forms or if the morphological features are so characteristic that confusion with any developmental stage of one of the known species is impossible.

The first new species, described in this paper was found during the hybridization experiments carried out by Goedmakers and Roux in the summer of 1972 (Goedmakers & Roux, 1975). For these experiments many thousands of *Gammarus gauthieri* were collected in a well near Fez in Morocco. The

Received: November 27, 1974

population, which had been known for a long time, was supposed to be a homogenous one. Suddenly, mixed with very larged-sized precopulation couples of *gauthieri*, small-sized couples appeared. It was hard to believe that small animals with a length not exceeding 10 mm could be adults of *Gammarus gauthieri*. The precopulations were isolated and studied under a dissecting microscope and it was at once clear that we had to do with a new species.

The second new species was collected by a British expedition in a cave in Morocco. These animals are very long and have reduced eyes, being almost blind. These striking characters, together with some other distinct features, made us conclude that another new species was found.

ACKNOWLEDGEMENTS

The authors are indebted to Dr. A. L. Roux, Mr. and Mrs. J. Ducruet of the University of Lyon, France who collected the first species, and to Dr. M. F. Thurston of the National Institute of Oceanography, Wormley, Great Britain and Miss M. Hazleton of the British Cave Research Association, for sending us the material in which the second species was found.

## **Gammarus rouxi** nov. spec.

Material examined:

Oued crossing road P 24, upstream of Imouzzer du Kandar, province Fez, Morocco, 16 June, 1972, many specimens, many of them in precopulation. The ♂ holotype, ♀ allotype and about 50 paratypes have been deposited in the Zoölogisch Museum, Amsterdam. (cat. no. Amph. 105.002 a, b and c).

Male. In general appearance (fig. 1A) the species looks very characteristic by the very short antennae, which give the animal a rather robust impression. The maximum length observed in our material is 10 mm. The eyes are rather small, hardly longer than wide, the upper margin of which is widely separated from the mid-dorsal line (fig. 1B).

The first antenna is short (fig. 1C), about 1/4 of the total body length of the animal. The main and accessory flagellum have 12 to 15 and 1 segments, respectively.

The second antenna (fig. 1D) is even shorter than the first. The short gland-cone is half as long as the third peduncle segment. Its fourth and fifth peduncle segments are almost equal in length, both armed with some tufts of long setae along the inferior margin. The short (7- to 8-segmented) flagellum is never swollen or compressed in a *Gammarus p. pulex*-like way. Calceoli are always present in the 2 to 4 proximal flagellar segments.

The mouth parts of the species do not show obvious differences from the members of the *Gammarus pulex*-group. The mandible palp (fig. 1E) has an unarmed first segment. The setae along the inferior margin of the third segment are equal in length, forming a regular comb.

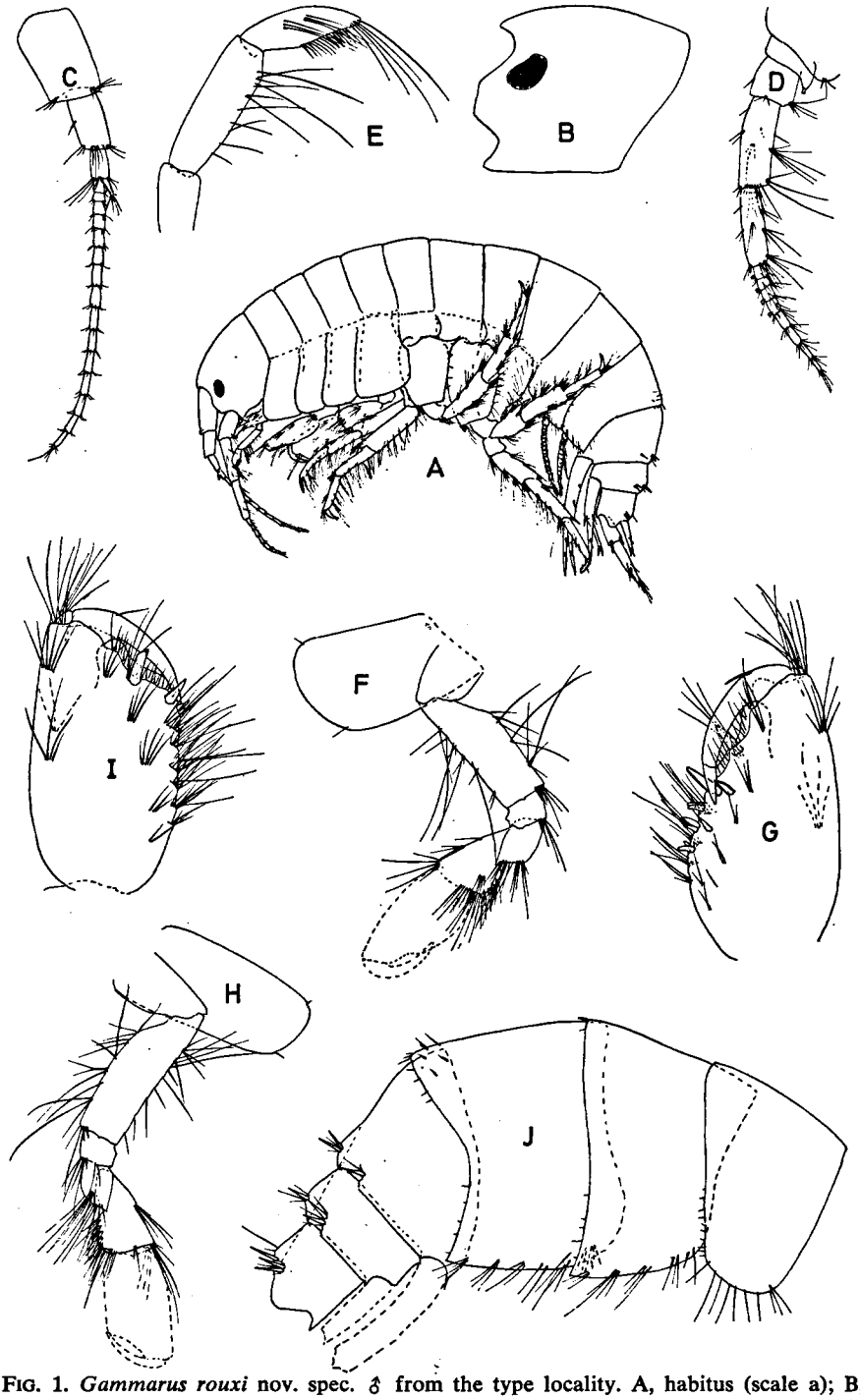


FIG. 1. *Gammarus rouxi* nov. spec. ♂ from the type locality. A, habitus (scale a); B, cephalic segment (b); C, first antenna (b); D, second antenna (b); E, mandible palp (c); F, first leg (b); G, hand of first leg (c); H, second leg (b); I, hand of second leg (c); J, pleosome and urosome (b). For scales, see fig. 2.

The hand of the first gnathopod (fig. 1F, 1G) is pyriform, the palm being oblique. A strong medial palmar spine is separated from the strong angle spines by a wide gap. Some smaller spines occur along the posterior margin of the hand.

The hand of the second gnathopod (figs. 1H, 1I) is less pyriform, more quadrangular and oblong. The palm is almost transverse. A strong obtuse medial palmar spine is separated from the angle group consisting of 1 strong and 2 or 3 smaller spines. More than in gnathopod 1, the hand is set with groups of setae.

The last three segments of the 3rd leg (fig. 2A) bear groups of long, sometimes curved setae along their posterior margin.

The 4th leg (fig. 2B) closely resembles the 3rd, although the setation is less dense. The 1st to 4th coxal plates have almost rectangular inferior corners.

The basal segment of the fifth leg (fig. 2C) is little longer than wide. Its distal end is much wider than the proximal end of the ischium, forming a backward protruding lobe. The armature of the next four segments not only consists of spines but also of setae intermixed with them, the setae being much longer than the spines.

The basal segment of leg 6 (fig. 2D) is little longer than in leg 5 and set with some setae on its inner surface. For the remainder this leg resembles the fifth one.

Leg 7 is very characteristic in this species, because of (1) the typical shape of its basal segment with its wide proximal and very constricted distal portion (fig. 2E), as well as (2) the long setae both on the inner surface and the posterior margin. The other segments bear long setae in between the spines. The dactylus in P3 through P7 is always very slender (fig. 2G).

The inner ramus of the third uropod (fig. 2H) is slightly longer than half the outer ramus. Although the setation is rather poorly developed we can always find some long plumose setae along the outer margin of the exopod.

The telson lobes (fig. 2I) overreach the peduncle of the 3rd uropod. They are elongate, twice as long as wide and armed with a terminal group of setae and spines and varying number of setae on the dorsal surface.

The dorsal surface of the third metasome segment is set with some small setules. The urosome segments (fig. 2J) have low but distinct elevations. The armature consists of a middorsal group of spines, with one group of spines on each side. The number of spines is somewhat variable. Each group of spines can be accompanied by one or more setules, which almost equal the spines in length. The postero-inferior corners of the second and third epimeral plates (fig. 1J) vary from almost rectangular to slightly pointed. The inferior margin of these plates are armed with setae.

Female. Smaller than the male (maximum length observed: 6 mm). Like in all other freshwater gammarids a distinct sexual dimorphism can be found,

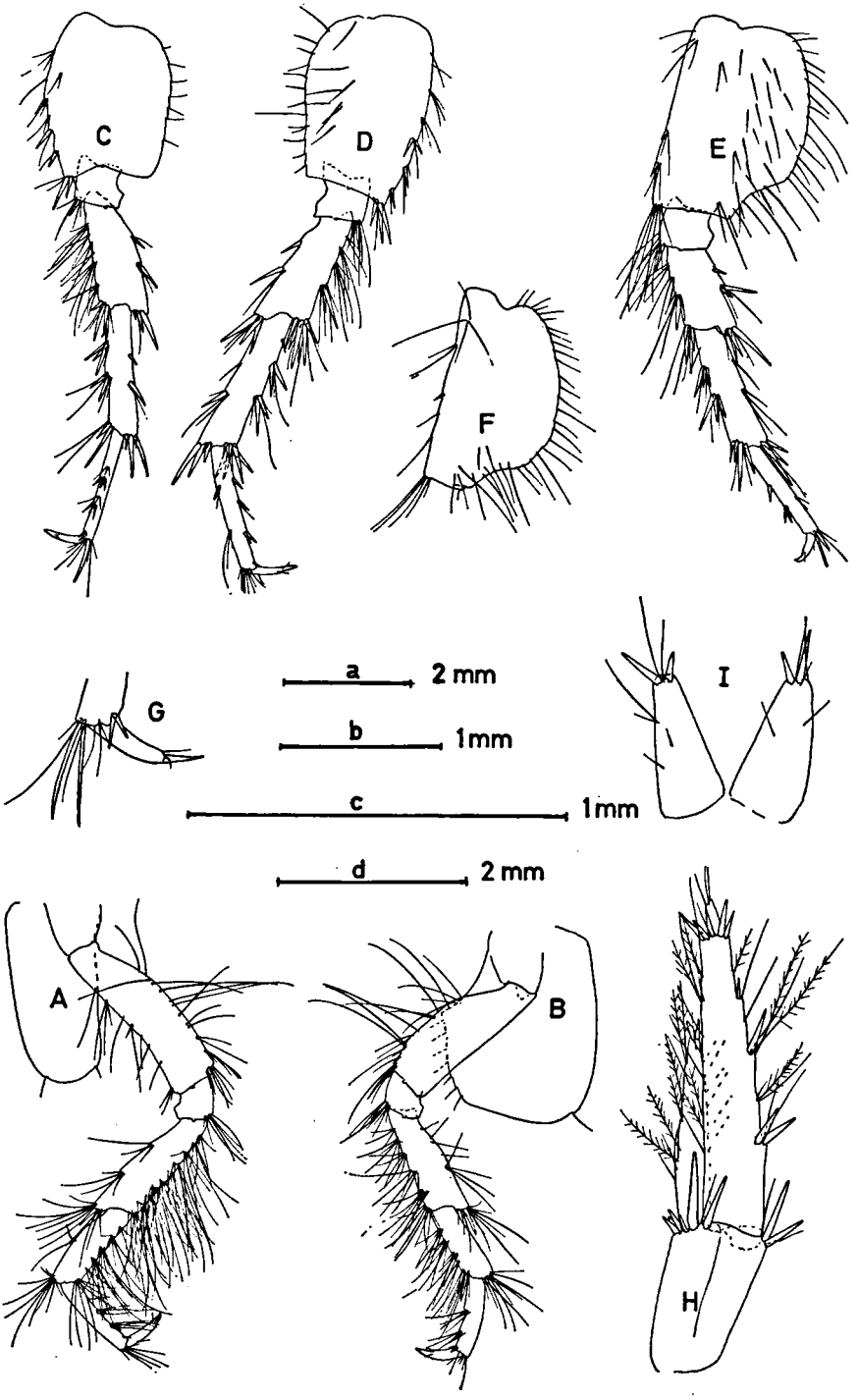


FIG. 2. *Gammarus rouxi* nov. spec. A-E and G-I, ♂ from type locality; F, ♀ from type locality. A, third leg (scale b); B, fourth leg (b); C, fifth leg (b); D, sixth leg (b); E, seventh leg (b); F, seventh leg (b); G, dactylus of seventh leg (c); H, third uropod (c); I, telson lobes (c).

being most conspicious in the smaller gnathopods and in the basal segments of the seventh leg, which is even more characteristic than in the male (fig. 2F). The setation of the antennae is longer than in the other sex.

Remarks. The presence of long setae on legs 5 to 7 and the shape of the eyes are characters that can also be found in *Gammarus acalceolatus* Karaman, 1935, and *Gammarus ibericus* Margalef, 1951. However, the very short antennae, the presence of setae on the inner surface of the basal segments of legs 6 to 7, the shape of the basal segment of leg 7, the poor setation of the 3rd uropod, and the setation of the epimeral plates make this species easily distinguishable from all other known species.

Variability. Although we had only one sample at our disposal, it seems probable that the variability pattern is comparable to that of the members of the *Gammarus pulex*-group.

This species is dedicated to Prof. Dr. A. L. Roux, of the University of Lyon, France, who collected the material and in recognition for his contributions to the knowledge of French amphipods.

**Gammarus microps** nov. spec.

Material examined:

Cave Ikhfou Ouan, about 50 km S.W. of Taza, province of Taza, Morocco; 14 specimens. The ♂ holotype and 13 paratypes have been deposited in the British Museum (Natural History), London, under cat. no. 1974: 912 and 1974: 913 respectively.

Male. This large species belongs to the *Gammarus pulex*-group. The largest male observed in the sample was 24 mm. The lateral lobes of the head (fig. 3A) are more or less rounded. The eyes are characteristic in being very small, in some specimens almost invisible because of lack of pigment.

The first antenna (fig. 3B) is half as long as the body of the animal. The flagellum is very long having up to 46 segments in its main, and 5 or 6 segments in its accessory flagellum.

The second antenna (fig. 3C) is rather robust, somewhat shorter than the first. The gland cone is short, reaching the middle only of peduncle segment 3. Peduncle segments 4 and 5 are about equal in length; both are provided with groups of rather long setae, implanted in 3 longitudinal rows. The flagellum is shorter than the peduncle, containing 15 to 19 segments in larger specimens. Each segment is provided with a transverse row of 5 (on the first segment) to 10 (on the 7th and 8th segment) setae which usually are longer than the length of the segments, giving the antennae a rather "hairy" impression. Calceoli have been found on the first to tenth segment.

The mouth parts of the species do not show obvious differences from other species in the *Gammarus pulex*-group. For mandible palp see fig. 3D.

The hand of the first gnathopod (fig. 5A) is pyriform, very elongate, being

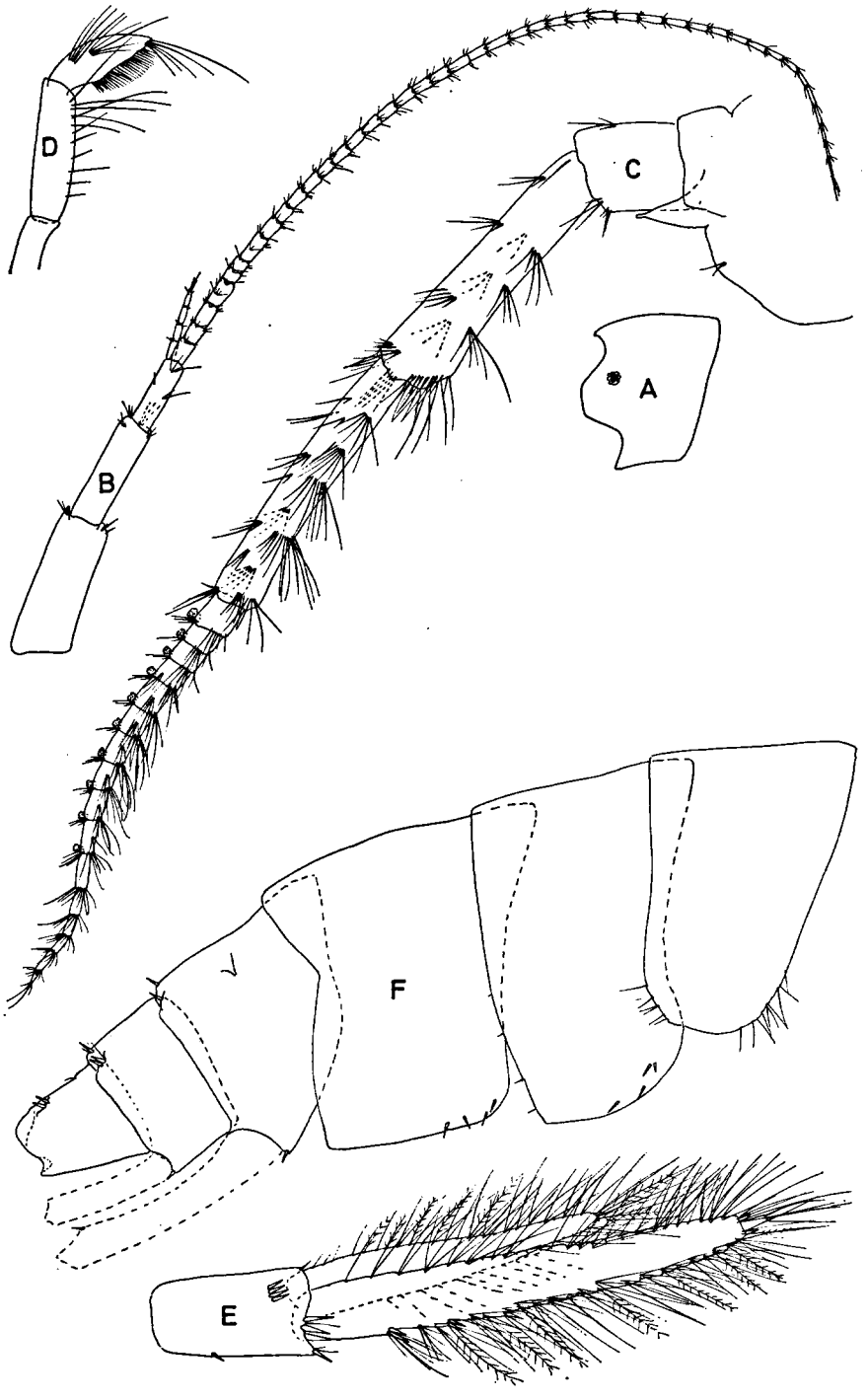


Fig. 3. *Gammarus microps* nov. spec. ♂ from the type locality. A, cephalic segment (scale a); B, first antenna (d); C, second antenna (b); D, mandible palp (b); E, third uropod (b) F, pleosome and urosome (d). For scales, see fig. 2.

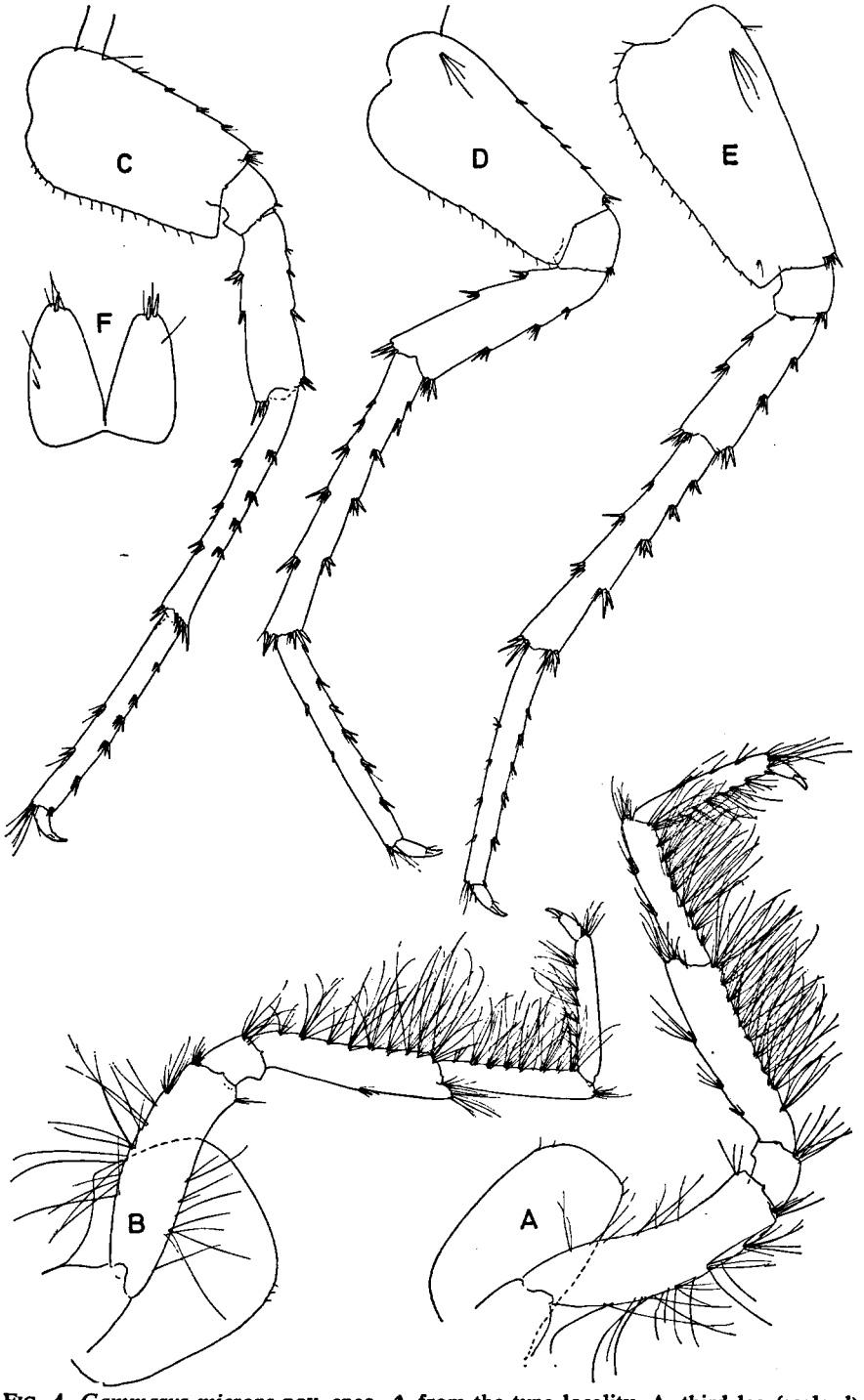


FIG. 4. *Gammarus microps* nov. spec. ♂ from the type locality. A, third leg (scale d); B, fourth leg (d); C, fifth leg (d); D, sixth leg (d); E, seventh leg (d); F, telson lobes (b). For scales, see fig. 2.

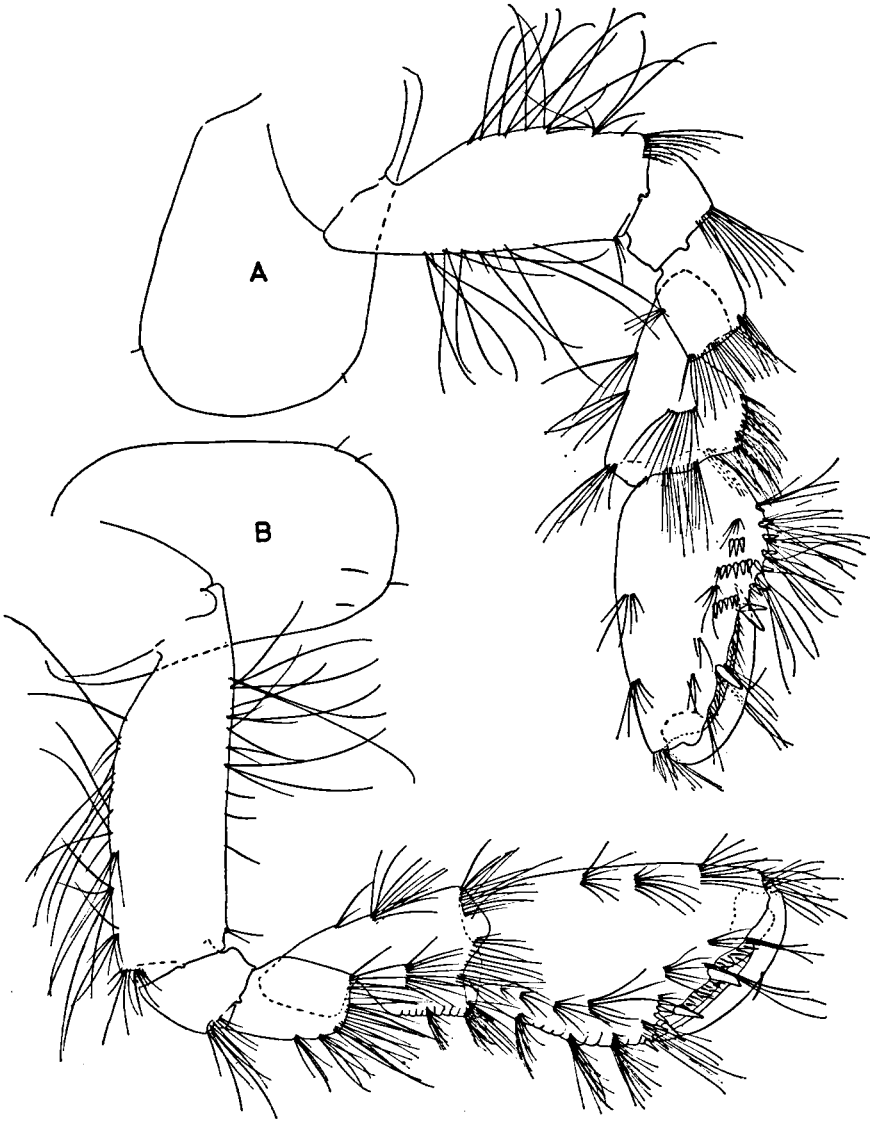


FIG. 5. *Gammarus microps* nov. spec. ♂ from the type locality. A, first leg (scale b); B, second leg (b). For scales, see fig. 2.

almost twice as long as wide. The dactylus is very long. The strong medial palmar spine is separated from the palmar angle group by a wide gap. Transverse rows of spines are implanted in the inner surface of the hand, a feature never observed in other members of the *Gammarus pulex*-group.

The hand of the second gnathopod (fig. 5B) makes a swollen impression. Like in the first gnathopod the dactylus is long. In between the obtuse medial

palmar spine and the palmar angle group of spines, characteristic for the *Gammarus pulex*-group, another spine is implanted. Except for their great lengths, P3 and P4 (figs. 4A, 4B) are not very characteristic; their coxal plates, like those of the gnathopods, have rounded inferior corners; the merus, carpus and propodus bear groups of long setae along their posterior margin.

The basal segment of the fifth leg is rather slender, rectangular near its postero-distal end. The basal segments of legs 6 and 7 (figs. 4D and 4E) are more elongate than that in leg 5 (fig. 4C). Legs 5, 6, and 7, are very long and slender, armed with a varying number of short spines, sometimes intermixed with short setae.

The inner ramus of the third uropod (fig. 3E) attains about 3/4 of the length of the first segment of the outer ramus. The greater part of the setae, on the inner and outer margins of both endopod and exopod are plumose.

The telson lobes (fig. 4F) are slightly less than twice as long as wide. The armature is rather poorly developed and consists of some short terminal spines and some short setae.

The urosome (fig. 3F) has a distinct but shallow excavation ("saddle") in the first segment. There are no dorsal elevations. The armature is poorly developed. In segment 3 the lateral group of spines seems to be absent.

The postero-inferior corner of the first epimeral plate (fig. 3F) is always rounded, set with some setules. The corners of the second and third plates are obtuse-angled to rectangular. A few spinules are implanted along the lower margins of the plates.

Females. Smaller than the male (max. size observed 16 mm), most characters less pronounced, as in all other members of the *Gammarus pulex*-group. Even in this sex the species is still readily recognizable because of the very small eyes and shape of the epimeral plates.

Remarks. The very small eye, the long first antenna (with up to 46 flagellar segments), the shape and spinulation of the first and second gnathopod, and the shape of the epimeral plates distinguish this species from all species in the *Gammarus pulex*-group as described by Pinkster, 1971 and 1972. The proposed specific name *microps*, alludes to the very small eyes of the species.

Variability. As far as could be seen from the few animals at our disposal, the variability pattern resembles that in other members of the *Gammarus pulex*-group.

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