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GAMMARUS LEOPOLIENSIS NOV. SP. (CRUSTACEA, AMPHIPODA) FROM EASTERN CARPATHIANS

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RÉSUMÉ

On présente la description d'une nouvelle espèce de gammares provenant de ruisseaux de la partie septentrionale de Carpates Orientales. L'espèce est voisine de *G. kischineffensis* mais s'en distingue par quelques particularités; entre autres, *G. leopoliensis* ne possède pas de calcéoles, tandis que *G. kischineffensis* est une espèce calcéolifère.

INTRODUCTION

Since the description of *Gammarus kischineffensis* 50 years ago (Schellenberg, 1937) information on this species appeared in few papers only: by Roumanian, Czechoslovakian and Soviet zoologists (Dobreanu & Manolache, 1939; Caraușu, Dobreanu & Manolache, 1955; Straškraba, 1962, 1967, 1969; Dedju, 1967, 1980; Jalynskaja, 1968, 1970). A brief summary of the information on the geographical range of this species together with some morphological remarks and new localities of "*G. kischineffensis*" discovered in south-eastern Poland were presented by Jażdżewski & Van Mansvelt (1973). Jażdżewski (1975, 1977), after the examination of the type material of *G. kischineffensis* in the Zoological Museum of the Humboldt University in Berlin, revealed, described and figured the differences between gammarids of the type material as well as of some sam-

ples from Roumania and Ukrainian SSR, and the gammarids from south-eastern Poland considered to be *G. kischineffensis* by Jażdżewski & Van Mansvelt (1973). In these two papers Jażdżewski (1975, 1977) has called the former gammarids the "typical form" and the latter - the "form occurring in Poland". These observations were not taken into consideration by Karaman & Pinkster (1977) who have redescribed *G. kischineffensis* based on the type material from Berlin. It is noteworthy that these authors as well mentioned two morphological differences between the type specimens and those from Polish samples. They considered, however, these differences mere variability.

The present authors (Jażdżewski & Konopacka, 1988) when elaborating new materials from the Dniester River basin and from eastern Carpathians came finally to the conclusion that Polish non-typical

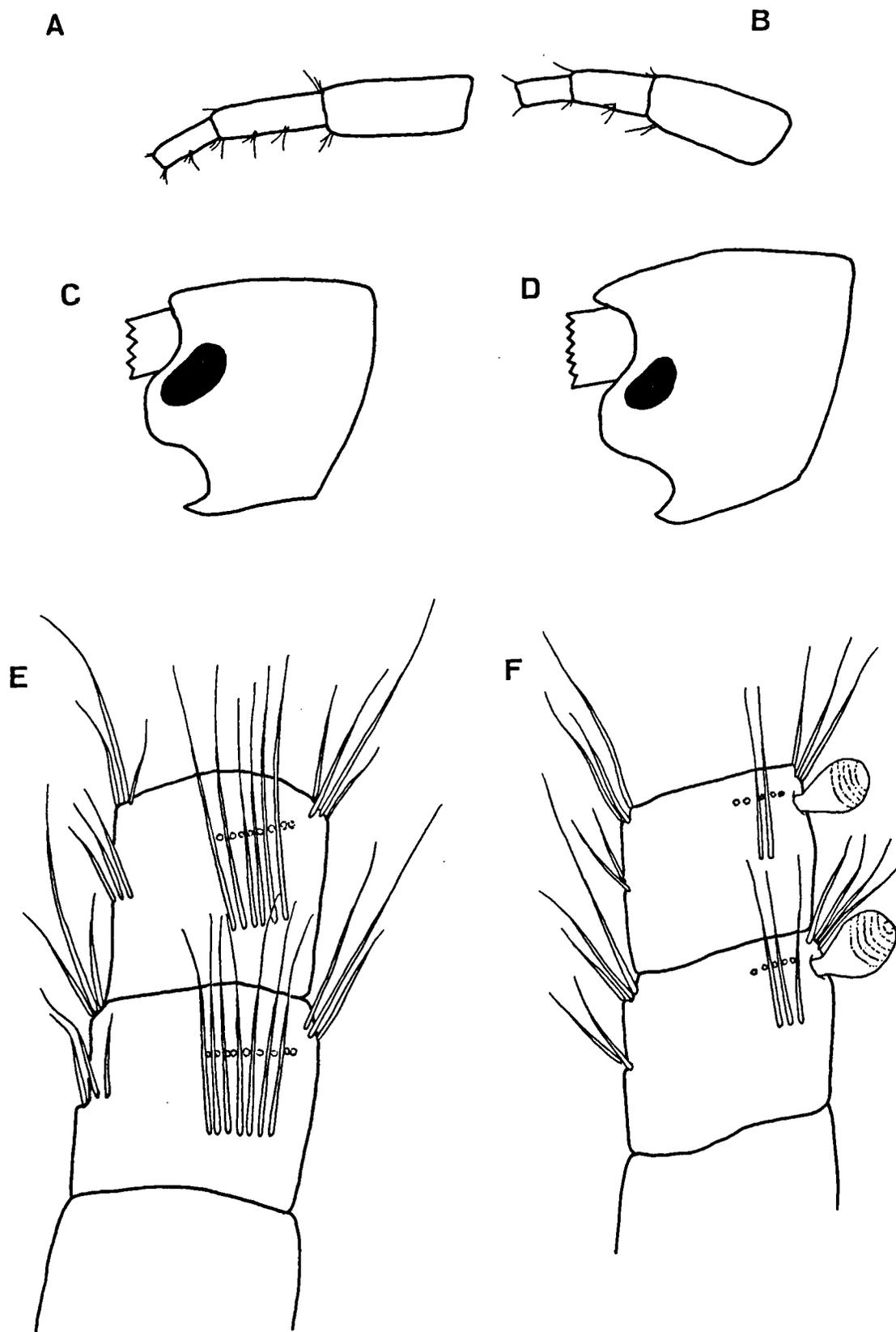


Fig. 1. A1 peduncle (A,B), head (C, D) and A2 central flagellum segments (E, F) of *G. leopoliensis* (σ 12 mm; A, C, E) and of *G. kischineffensis* (σ 12 mm; B, D, F).

form should be separated as a valid species; in that paper they have used, however, a provisional name "*G. kischineffensis* forma *leopoliensis*" signaling only the need of the proper description that is now presented below.

DESCRIPTIVE PART

Gammarus leopoliensis nov. sp.

Figs. 1A,C,E; 2A, B; 3A, B, C; 4A, B.

Gammarus kischineffensis, Jażdżewski & Van Mansvelt, 1973, figs. 3A, F, G, H, I.

Gammarus kischineffensis (aberrant form), Jażdżewski, 1975, figs. 9A, D, F, H.

Gammarus kischineffensis (form occurring in Poland), Jażdżewski, 1977, figs. 3A, D, F, H.

Gammarus kischineffensis forma *leopoliensis*, Jażdżewski & Konopacka, 1988: 78.

Material examined

All samples mentioned in the papers by Jażdżewski & Van Mansvelt (1973), Jażdżewski (1975) and Jażdżewski & Konopacka (1988) taken in the localities presented in the latter paper (mostly in Polish Bieszczady Mts., and four localities in the upper Dniester basin).

This material consists of 70 samples with nearly 2500 specimens, deposited in the Department of Invertebrate Zoology and Hydrobiology, University of Łódź, Poland and 12 samples cat. nos. Amph. 103.381, 103.382, 103.385-8, 103.401 and 103.405-9, deposited in Zoologisch Museum, University of Amsterdam, the Netherlands.

Type locality: River Strwiąż in Brzegi Dolne, Bieszczady Mts., leg. K. Jażdżewski, A.L. Roux, 6.06.1976.

Holotype: male 14 mm, paratype 54 males, 75 females, 2 juveniles.

Type material deposited in Dept. Inv. Zool. Hydrobiol., Univ. Łódź, No. cat. Amph. 815, paratypes (10 males, 10 females) in Zool. Mus. Univ. Amsterdam (ZMA Amph. 108.516).

DIAGNOSIS

Rather slender, medium large species, poorly setose. Outer margin of the exopodite of uropod 3 with rather sparse and short setae inserted in distal half only, few of them (1-5) being feathered. Second antenna in males always lacking calceoli.

DESCRIPTION

Male: Maximum length observed 14 mm. Body dorsally smooth. Few short setules inserted along the posterior margin of metasome segments 2 and 3. Spines of medial groups of urosomites 1 and 2 widely set apart – gap between these spines as wide as

length of spines or even wider.

Lateral head lobes rounded. Eyes large, reniform, twice as long as wide. Eye length being about one third of head length and equalling or surpassing width of proximal part of antenna 1 (fig. 1C).

Antenna 1 as long as head plus 6 pereon segments. First peduncle segment of A1 slightly longer than second one, third segment 2 to 2.5 times shorter than first one (proportions of these segments ca. 12 : 9 : 5). Medial setation (groups) of the lower surface of peduncle segments most often I-0, II-2, III-1; length of these setae nearly equal to width of respective segment (fig. 1A). Main flagellum of A1 20- to 30-segmented, accessory flagellum 3- to 4-segmented.

Antenna 2 as long as head plus 4 pereon segments. Gland cone 2/3 to 3/4 of length of third peduncle segment. Peduncle segments 4 and 5 subequal in length, each with 3-5 groups of setae on inferior surface (fig. 3A). Flagellum of A2 9- to 13-segmented; segments in medial part of the flagellum with regular medial rows of 4 to 8 setae (fig. 1E). Together with distal setae giving flagellum an appearance somewhat resembling the well-known "brush" of *G. pulex*. Calceoli always absent.

Second segment of mandibular palp in adult animals with 12-20 setae (depending on the size of an animal, but most often 13-17; figs. 2A, B).

Third segment of mandibular palp with over 25 D-setae, 3 to 5 E-setae, 1 group of A-setae, and 1 to 2 groups of B-setae.

Both pairs of gnathopods of *G. pulex* type; moderately setose.

Pereiopods 3 and 4 also moderately setose, length of setae of P3 surpassing slightly diameter of segments 4 and 5 (fig. 3B).

Pereiopods 5 to 7 rather slender; length/width ratio of basis of P7 in adults more than 1.5, attaining in larger specimens nearly 1.7. Distoposterior corner of basis of P7 slightly produced into moderately acute lobe of the angle of 90° or less (fig. 3C). Inner surface of this lobe usually devoid of armature, rarely with one short setule or a small spine. Other segments of pereiopods 5 to 7 mainly armed with spines.

Posteroinferior corner of second epimeral plate moderately pointed, hind margin slightly concave.

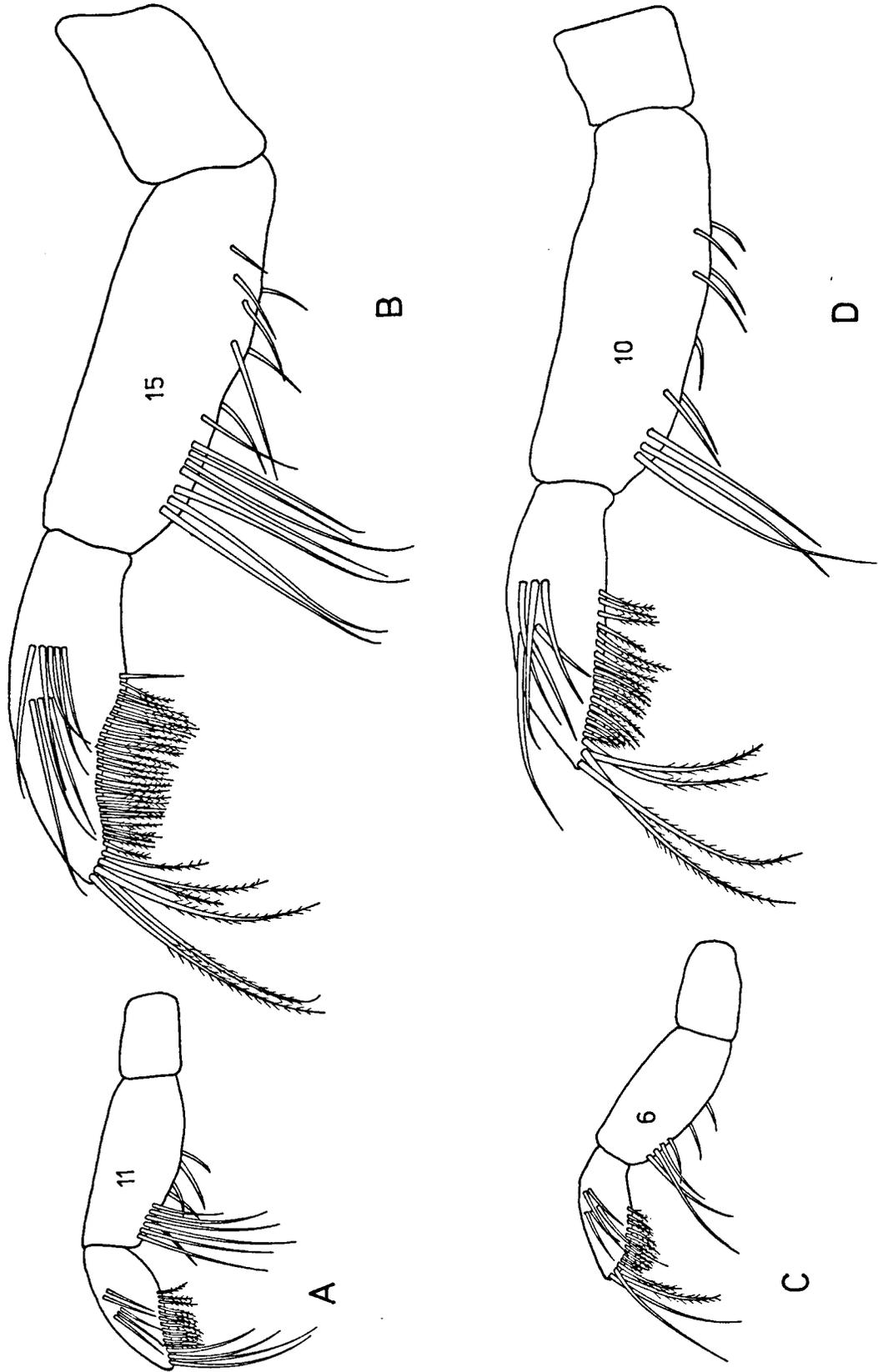


Fig. 2. Mandibular palp of young (5 - 5.5 mm) and adult (12-13 mm) male specimens of *G. leopoliensis* (A,B) and *G. kischineffensis* (C, D). Number of setae of the 2nd segment is indicated.

Third uropod: Setation of outer exopodite margin absent in basal part. Distal part with few feathered setae (up to 5, usually 2-4); even in young specimens of 5-6 mm in length usually 1 feathered seta on outer exopodite margin. U3 exopodite slender; with convex outer margin and slightly concave or straight inner margin, of somewhat sabre-like shape. U3 endopodite about 2/3 of exopodite (figs. 4A, B).

Telson lobes about twice as long as wide. Apical group of usually 2-3 spines and 2-3 setae, up to twice longer than spines. Some 1 or 2 spines and/or 1 to 3 setae on the surface of each telson lobe usually in subapical and/or lateral position.

Female: Setation of antennae and of P3 and P4 seems richer because setae are comparatively longer than in males. Along outer margin of U3 exopodite feathered setae less numerous (1-3) than in males, however at least single seta (nearly) always present.

Derivatio nominis

The name of the new species comes from the Latin name of the town of Lwów (Ukr. - L'viv, Latin - Leopoli), a big scientific and cultural centre situated at foot of the Eastern Carpathians, a town so strongly and gloriously connected with Polish history.

Material of *G. kischineffensis* examined for comparison:

1. Type sample: Kischineff (= Kišinev), 20 Apr. 1932, Lepsi coll., A. Schellenberg det., No. 24684 Zool. Mus. Berlin.
2. Mouth of rivulet Kamienica in village Gruszowce, 14 July 1928, leg. ?, No. 45/51 IZ PAN (Zool. Int. Pol. Acad. Sci.) Warsaw.
3. Stream emptying into Dniester River in village Nagórzany, 24 July 1928, leg. ?, No. 45/51 IZ PAN Warsaw.
4. Lake Cirié, near Jassy, 9 Nov. 1958, leg. P. Trojan, No. 95/58 IZ PAN Warsaw.

DISCUSSION

In general the newly described species is similar to *G. kischineffensis* in having characters intermediate between *G. balcanicus*-group and *G. pulex*-group

(P3, P4 and U3 setation). On the other hand it is easily distinguished from *G. kischineffensis* mainly by the lack of calceoli, by the large eye of a length surpassing or at least equalling the A1 base width (in *G. kischineffensis* smaller), and by the distinctly higher number of setae bordering the inferior margin of the 2nd segment of the mandibular palp with non-overlapping ranges in each particular length class. These, and some additional discriminating features of both species discussed, are shown in table 1 and in figs. 1, 2, and 5.

Out of 9 "stable characters" that are used in discrimination of freshwater taxa of *Gammarus* as suggested by Karaman & Pinkster (1977), at least three can be indicated as easily distinguishing *G. leopoliensis* from *G. kischineffensis*. They are: (1) the setosity of the mandibular palp, (2) the proportions and setosity of the A1 peduncle, (3) the setosity of the inner surface of the P7 basis.

We are aware of course of some taxonomic troubles signaled recently by Pinkster (1983, 1988) connected with the fact that many authors described new taxa without taking into account the seasonal variability of many features hitherto supposed to be stable. The more we have to stress that our material of *G. leopoliensis* was sufficiently large (70 samples with 2472 specimens) and collected during nearly the whole vegetation season (from the beginning of May till the end of September) to be regarded representative for the erection of a new species. The material of the true *G. kischineffensis* was far less numerous (altogether 73 specimens from 4 samples); however these samples came also from the same spring - summer time and the specimens of these samples were fairly uniform in their morphology and the discrimination of the two species offers no trouble.

Moreover the present authors are of the opinion that the lack of calceoli alone, checked in all male specimens of all samples collected in various months, is a sufficiently important character to differentiate a new species. One should bear in mind other examples of *Gammarus* species in which calceoli are permanently absent, for instance *G. acaelolatus* Pinkster, 1971; *G. accolae* G. Karaman, 1973; *G.*

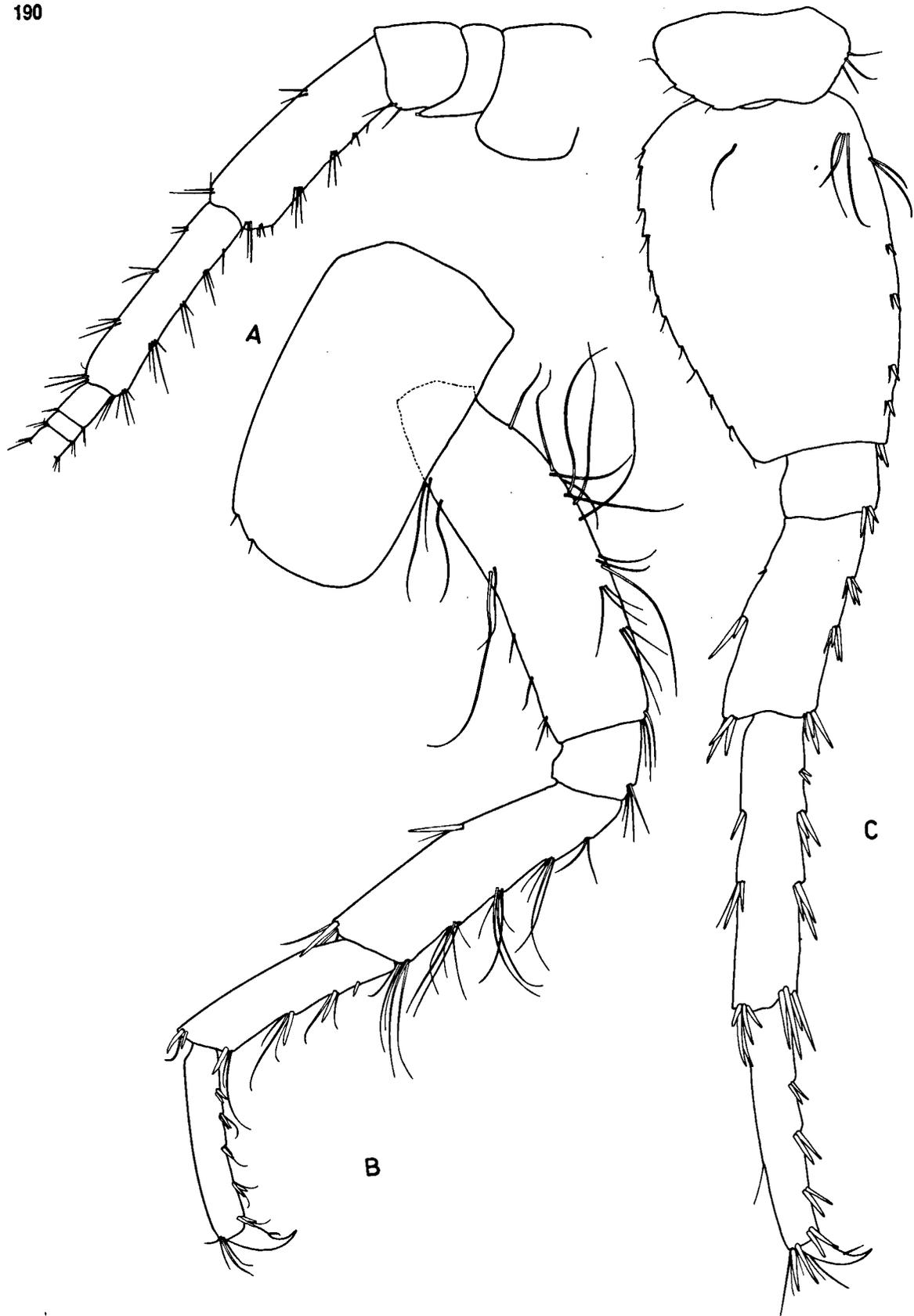


Fig. 3. *G. leopoliensis*: A - A2 peduncle, ♂ 12.5 mm, paratype; B - pereopod 3, ♂ 14 mm, paratype; C - pereopod 7, ♂ 12.5 mm, paratype.

inaequicauda Stock, 1966; *G. komareki*, Schäferna, 1922; *G. roesellii* Gervais, 1835, or *G. stupendus* Pinkster, 1983. This feature is usually put in the species diagnoses. We have to refer also to the recent papers by Hurley (1980) and Lincoln & Hurley (1981), who have amply discussed the taxonomic importance of these structures.

Let us return to the problem of geographical distribution of *G. kischineffensis* treated in the papers by Jażdżewski & Van Mansvelt (1973), Karaman & Pinkster (1977) and J.L. Barnard & C.M. Barnard (1983). In view of the present results all Polish material of "*G. kischineffensis*", a part of the material of this species coming from the Ukrainian Carpathians, and probably the findings of *G. kischineffensis* in Slovakia (Straškraba, 1962) concern in reality the new species, *G. leopoliensis*. At the moment only 4 samples checked by present authors did contain true *G. kischineffensis* - the type-material from Kischineff, two samples from the Dniester River affluents (Ukrainian SSR), and one sample from the Roumanian Cirie Lake near Jassy. Further studies, especially in Ukrainian and Moldavian Soviet republics are needed to delimit the boundaries of both species and their ecological preferences that also seem to differ. The present authors suppose that *G. leopoliensis* is a submontane species preferring swift streams and rivulets and altitudes of 400-800 m a.s.l., whereas *G. kischineffensis* might be a comparatively more eurytopic (and eurythermic) species, inhabiting both running and stagnant waters at altitudes of 200-500 m a.s.l.

Especially the second statement is a tentative one and is to be verified. We suspect however that a very wide ecological plasticity of *G. kischineffensis* reported by Dedju (1967, 1980) comes in fact from the composite nature of this taxon as understood by this author, being in fact a mixture of our *G. leopoliensis* and true *G. kischineffensis*. We suppose that only this last species s.str. is to be found in lakes and ponds of south-western parts of Ukraina and Moldavia and in Roumania.

Owing to the courtesy of Dr. Sjouk Pinkster of Amsterdam we have received for comparison four samples of his Turkish material of gammarids identi-

fied by Karaman & Pinkster (1977) as *G. kischineffensis*. Turkish localities of these authors were, in consequence, included in the map of *G. kischineffensis* distribution by J.L. Barnard & C.M. Barnard (1983). A preliminary survey of this material has led us to the opinion that it is probably not conspecific, neither with *G. leopoliensis* nor with typical *G. kischineffensis*. However for various reasons we refrain at the moment from the formal creation of another new taxon contenting ourselves with the description of *G. leopoliensis* and putting in the map (fig. 6) only the certain localities of *G. kischineffensis*.

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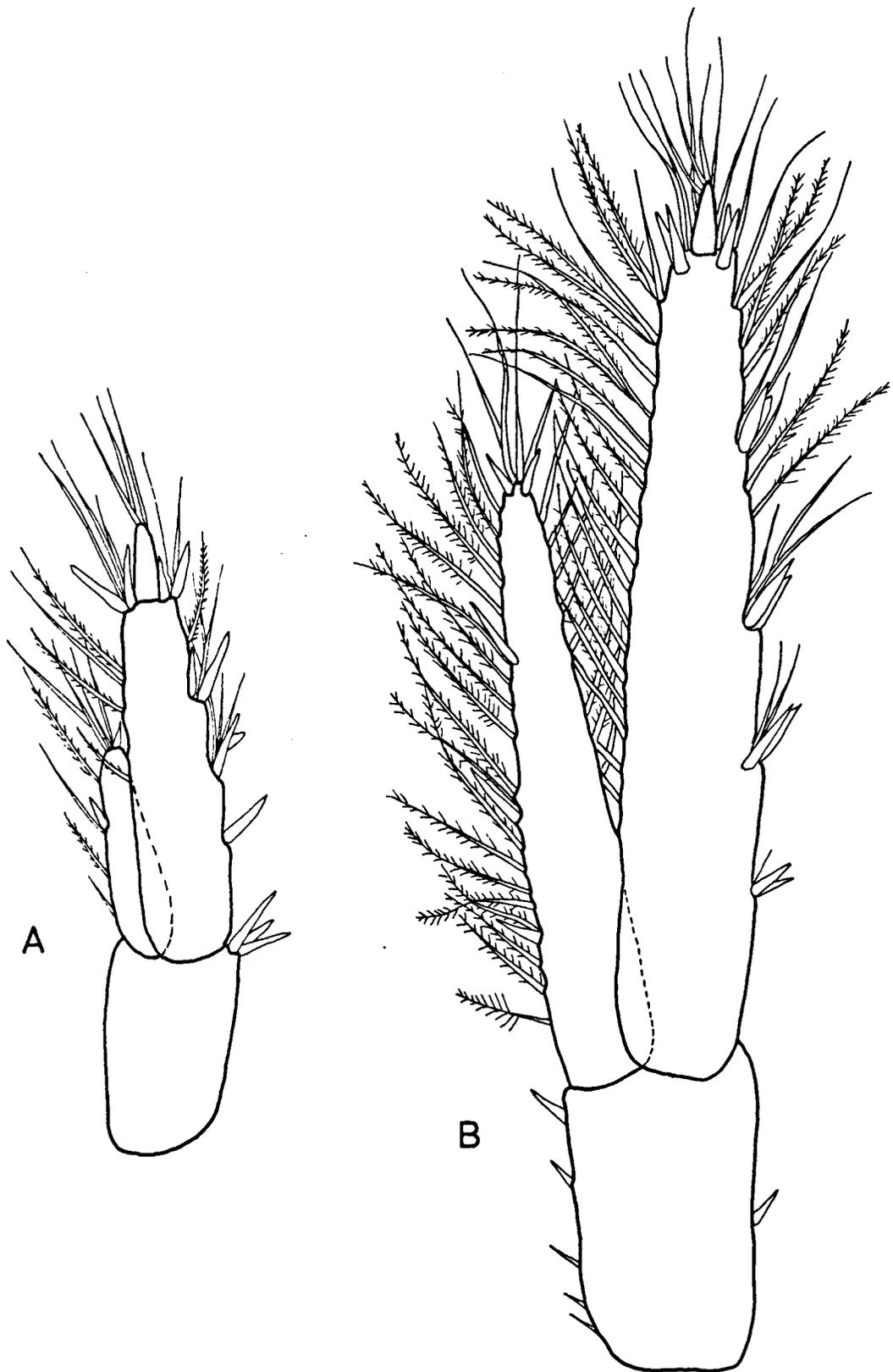


Fig. 4. *G. leopoliensis*, uropod 3: A - young, 5.5 mm; B - ♂, 13 mm.

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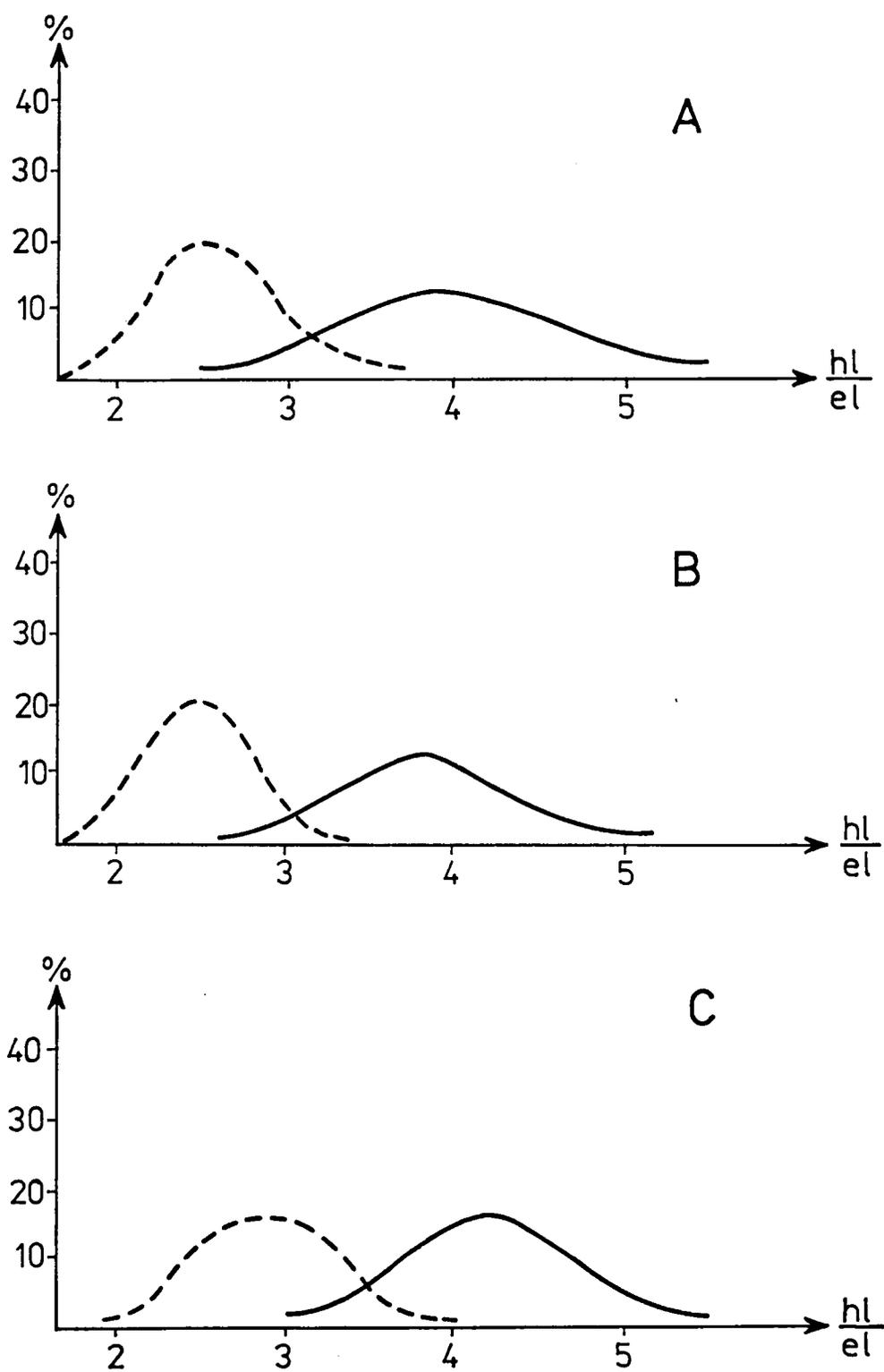


Fig. 5. Ratio head length/eye length (hl/el) in *G. kischineffensis* (continuous line) and in *G. leopoliensis* (dashed line). A - young specimens, B - females, C - males.



Fig. 6. Distribution of *G. leopoliensis* (dots) and *G. kischineffensis* (triangles) based on verified material. Most of the dots denote several neighbouring localities of *G. leopoliensis*.

Table I

Differences between *G. leopoliensis* and *G. kischineffensis*

Feature	<i>G. leopoliensis</i>	<i>G. kischineffensis</i>
Eye	Large, reniform, twice as long as wide, length equal or longer than A1 max. peduncle width; at most 3 times shorter than the head length	Small, suboval, 1.5 times as long as wide, length smaller than A1 max. peduncle width; nearly 4 times shorter than the head length
Antenna 1	1st and 2nd peduncle segments subequal; setae groups on the inferior margin of peduncle segments: I - 0, II - 2, III - 1; setae of the 2nd segment equal the segment's width	1st peduncle segment much longer than the 2nd one; setae groups on the inferior margin of peduncle segments: I - 0, II - 1, III - 0; setae of the 2nd segment distinctly shorter than the segment's width
Antenna 2 peduncle	Richly setose, each of the 4th and 5th segments with 3-5 inferior groups of setae	Sparsely setose, 4th and 5th segments with 1-3 inferior groups of setae
Antenna 2 flagellum male	Calceoli absent, 5-6 central flagellum segments with medial rows of 4-8 setae	Calceoli present, 2-3 central flagellum segments with only 2-4 setae in medial rows
Mandibular palp 2nd segment number of setae	4-7 mm 7-10 mm 10 mm 7-12 11-17 13-19	4-7 mm 7-10 mm 10 mm 6-7 7-11 8-12
Pereiopod 7 basis	Slender, length/max.width ratio 1.5-1.7. Posterodistal corner acute, angle 90° or less. Inner side of this corner without setae or at most with one short setule or spine	Robust, length/max.width ratio 1.3-1.5. Posterodistal corner widely rounded, angle more than 90°. Inner side of this corner with 2-3 comparatively long setules
Uropod 3	Slender, sabre like, outer margin with at most 5 feathered setae but in females at least 1 feathered seta	Stout, lanceolate, outer margin in larger specimens with 6-10 feathered setae or more but in females feathered setae are (usually) lacking