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53. Contribution to the Knowledge of the Amphipoda. Some new or very interesting *Gammarus* species from southern Europe and Asia Minor.

Abstract

Four new *Gammarus* species from Asia Minor and isle Tasos are described: *Gammarus abscisus* n. sp. from Kirseljir in Asia Minor, *Gammarus accolae* n. sp. from Kirgöz by Antalya (Turkey), *Gammarus monspeliensis agrarius* n. ssp. from several localities in Asia Minor (Kirgöz by Antalya, Ilgin, Dinar Karakugu Pinarbasi, Dinar Karakugu Dudenler, Nigde) and *Gammarus cantor* n. sp. from island Tasos in Aegean Sea.

Gammarus dulensis (S. Kar. 1929) known from spring Dulo near Skopje in Macedonia, is redescribed based on holotype (lectotype) paratypes and specimens of several other new localities from Yugoslavia.

Gammarus rambouseki (S. Kar. 1931) known from Galičica mountain between Ohrid and Prespa Lakes, is redescribed based on holotype and paratypes. This species is mentioned now from mountain Perister in southern Macedonia also.

Introduction

The fauna of *Gammarus* species living in freshwaters in southern Europe and Asia Minor is very rich in the number of the species.

Except a *Gammarus* species extended over a big part of Europe and Asia Minor, *Gammarus pulex* (L.), *G. lacustris* Sars and partially also *G. fossarum* Koch, there were discovered numerous *Gammarus* species in that region.

Chevreaux (in 1895) described *Gammarus syriacus* from Syria. Later were described many other *Gammarus* species belonging to *G. pulex* group; Schäferna described in 1922 *G. bosniacus* from Sarajevo and *G. komareki* from Bulgaria. Later S. Karaman described in 1929 *G. dulensis* from Dulo (Macedonia), in 1931 *G. pulex gallicus* from southern France and *G. rambouseki* from Galičica mountain (Macedonia).

Martynov described in 1932 several new species from southern Caucasus near the shores of Black Sea (*G. crispus*, *G. chostensis*, *G. caucasicus*). S. Karaman described in 1934 *G. kesslerianus weneri* and *G. stolickae* from Asia.

Later many authors have described numerous new species of *Gammarus* from Asia (Martynov 1935, Schellenberg 1937, Birstein 1945, 1948, Ueno 1940, etc.).

S. Karaman described in 1935 *G. gauthieri* from N. Africa; Margalef described in 1951 *G. ibericus* from Spain, Roux described in 1967 *G. wautieri* from France. Recently Pinkster described in 1971 *G. acalceolatus* from Morocco, and in 1972 *G. pulex araurensis* and *G. monspeliensis* from France.

Thanks to Prof. Dr. G. Hartmann and Prof. Dr. C. Kosswig from the Zoological Institute and Museum, Hamburg, I have studied the material of *Gammarus* species from Asia Minor deposited in that Museum and there were established three new species: *G. accolae*, *G. abscisus* and *G. monspeliensis agrarius*.

Gammarus dulensis and *G. rambouseki* were described by S. Karaman in a few lines only, so these species were difficult to identify. Now I redescribed these species based on typical material (holotype and paratypes) of ex-collection of S. Karaman and my recent material.

G. cantor is described from isle Tasos based on several samples.

For completion of this work, I am obliged for the material assistance to Dr. V. Gueorguiev and Dr. I. Buresch from Museum of Natural History in Sofia (Bulgaria), to Dr. G. Hartmann and Dr. C. Kosswig from Zoologisch Institute und Museum der Universität in Hamburg (Germany), to Mg. K. Žunjić from Zavod za zaštitu prirode, Titograd and to Dr. Zora Karaman from the University of Skopje (Yugoslavia).

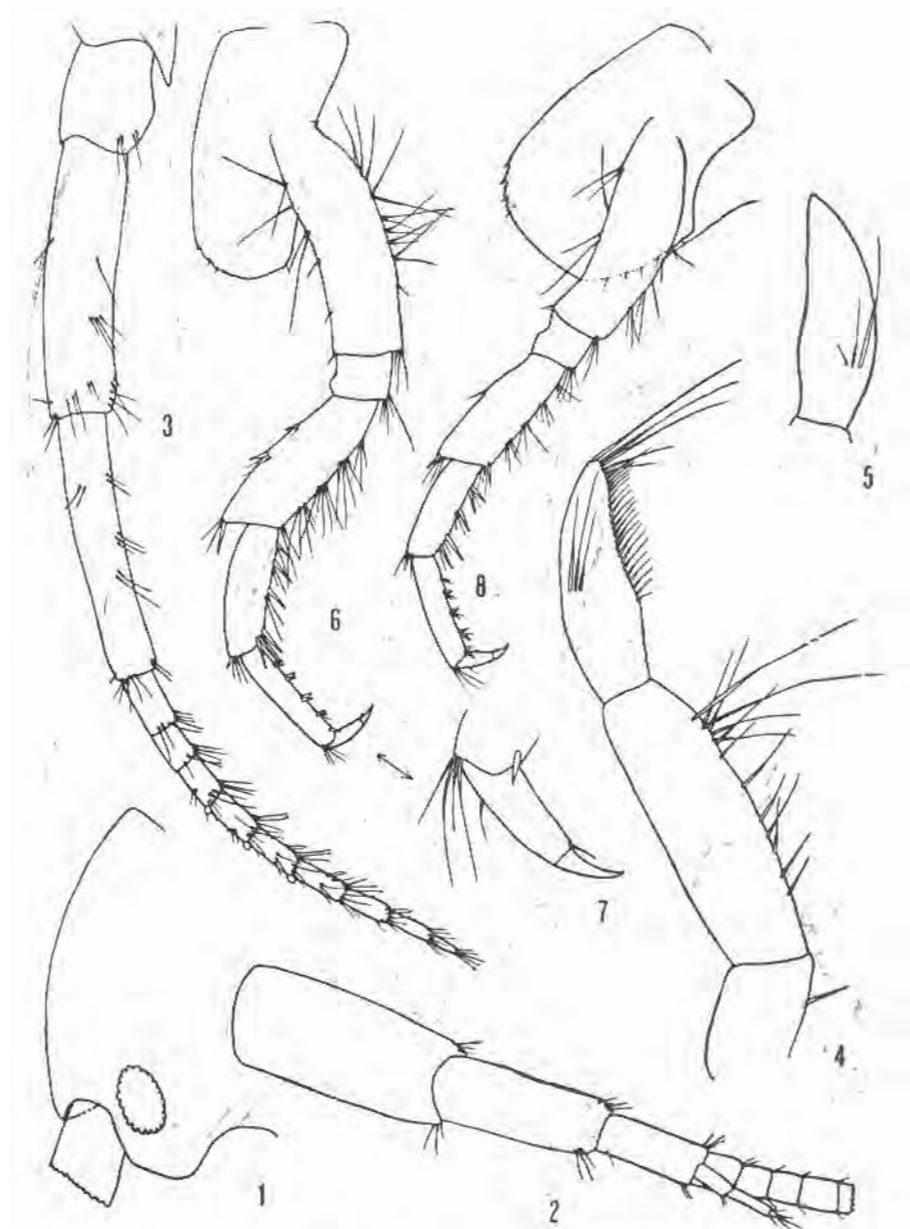


Fig. 1. *Gammarus abscisus*, n. sp., Kirseljir, male 11 mm: 1 = head; 2 = antenna 1; 3 = antenna 2; 4 = mandibular palp, inner face; 5 = third palpar article of mandible, outer face; 6-7 = pereopod 3; 8 = pereopod 4.

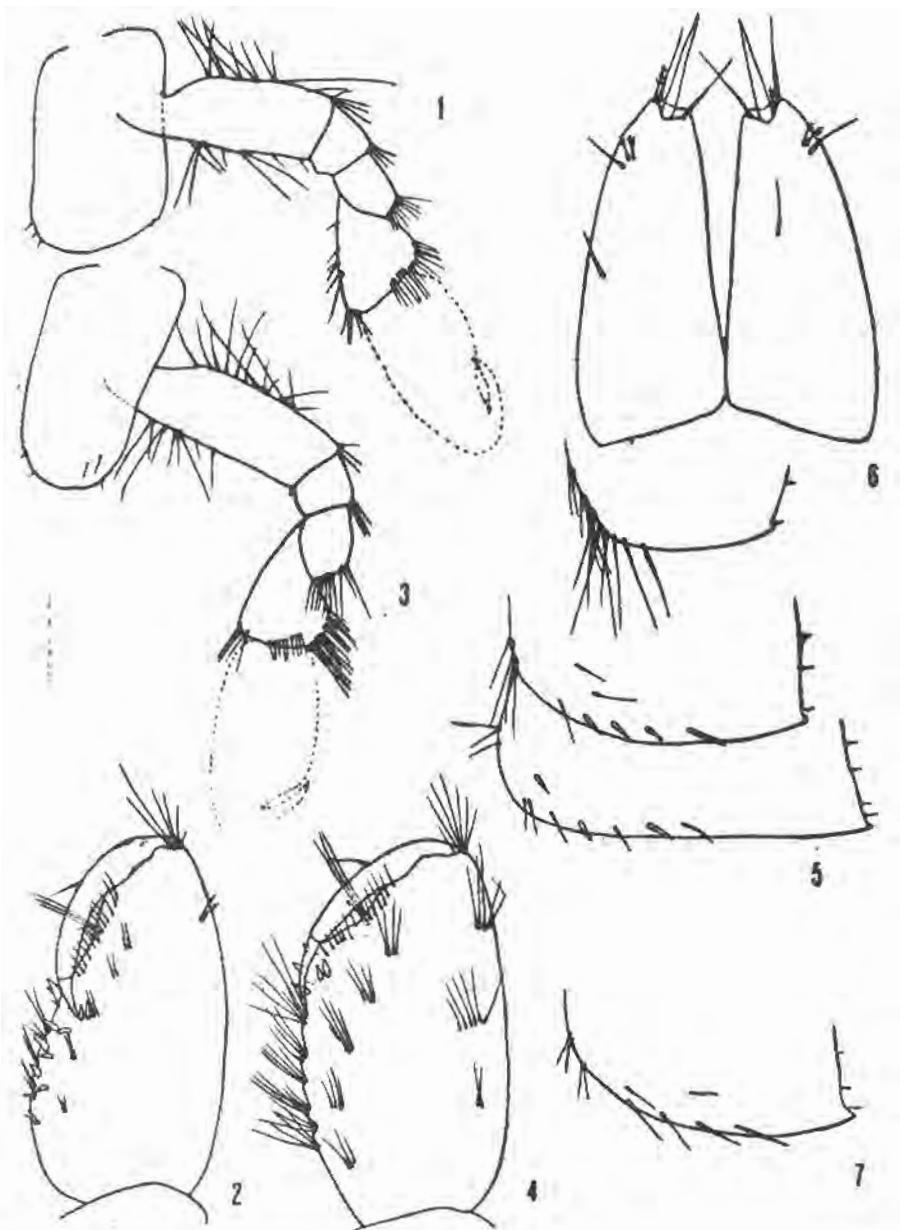


Fig. II. *Gammarus absclusus*, n. sp., Kirseljir, male 11 mm: 1-2 = gnathopod 1; 3-4 = gnathopod 2; 5 = epimere; 6 = telson; 7 = epimera 2 of male, 10,9 mm.

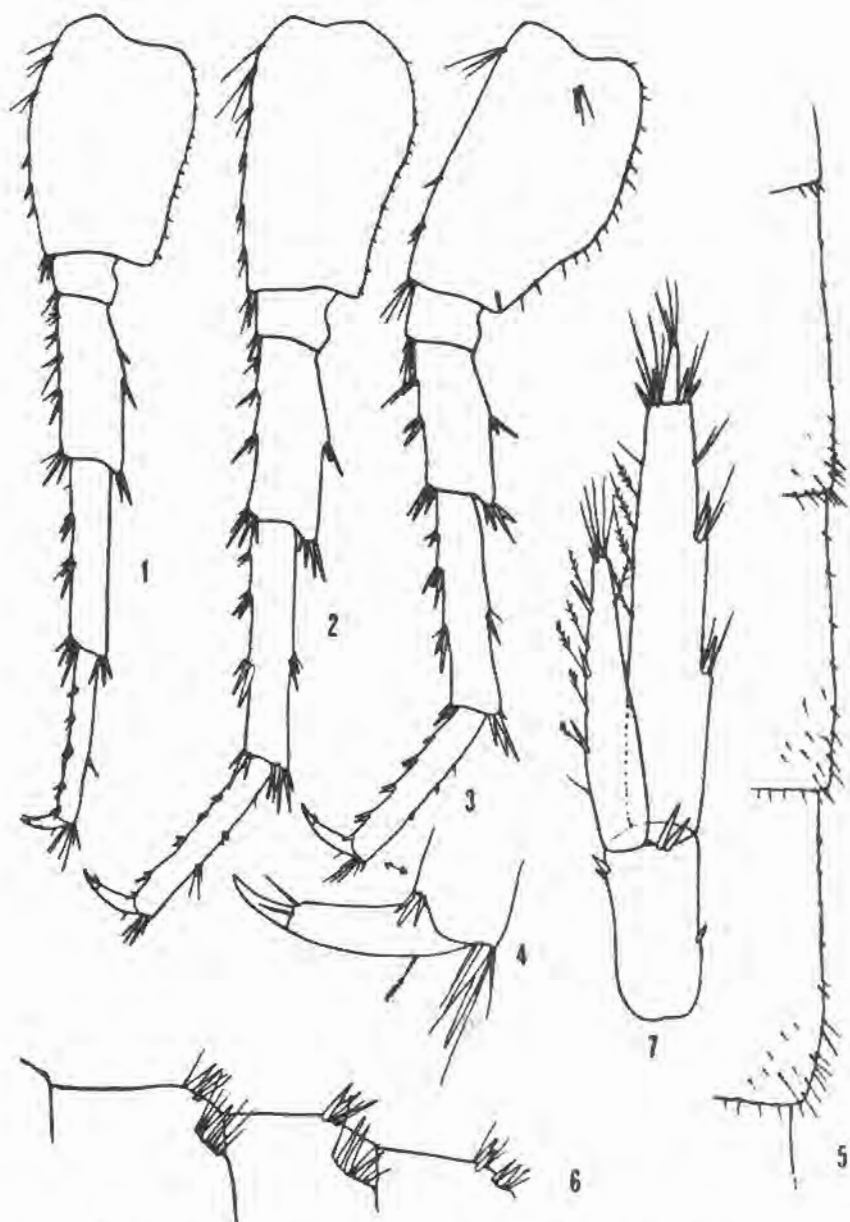


Fig. III. *Gammarus abscisus*, n. sp., Kirseljir, male 11 mm: 1 = pereopod 5; 2 = pereopod 6; 3-4 = pereopod 7; 5 = metasome; 6 = urosome; 7 = uropod 3.

Gammarus abscisus n. sp.

figs. I-III

Description: Male: Body-length up to 11.5 mm. Mesosome smooth, metasome bears short dorsal setae on dorsal surface of all three segments (fig. III, 5). Urosome weakly elevated, not compressed, urosomites with one dorsal and two dorsolateral groups of elements (spines and setae) each (fig. III, 6).

Lateral cephalic lobes rounded, eyes small, subrounded, shorter than the diameter of the peduncle of antenna 1 (fig. I, 1).

Antenna 1 relatively short, as long as or shorter than the half of the body-length; peduncle weakly setose, principal flagellum up to 21-articulate. Accessory flagellum 3-articulate, short (fig. I, 2).

Antenna 2: slender, peduncular articles 4 and 5 bear several groups of short setae each. Flagellum slender and poorly setose, practically not dorsoventrally compressed; articles bear groups of setae as long as the diameter of the articles themselves. Calceola present. Antennal gland cone short (fig. I, 3).

Mouthpart basic. Mandibular palp: first article with or without setae, second article bears 4-6 setae in proximal portion and 7-9 setae in distal portion. Third palpar article bears 19-22 marginal D-setae and 4-5 longer E-setae; on outer surface appears one group of A-setae, on inner surface one group of B-setae; C-setae absent (fig. I, 4, 5).

Coxae 1-4 with several short setae at distal margin, sometimes provided with 2-3 setae on inner surface (figs. I, 6, 8; II, 1, 3).

Gnathopod 1: article 2 long, articles 3-4 short, article 5 triangular. Article 6 pyriform, with several groups of short spines at posterior margin accompanied by several setae. Palm provided with one median and 1-2 corner spines on outer surface, and 1-3 subcorner spines on inner surface. Dactyl with one seta at superior margin (fig. II, 1, 2).

Gnathopod 2: rather longer than gnathopod 1; articles 2-5 nearly like those of gnathopod 1. Article 6 elongated, with 5-7 groups of setae at posterior margin. Palm provided with one median and 3 corner spines on outer surface, and 2-3 subcorner spines on inner surface. Dactyl like that of gnathopod 1. The setae of article 6 are relatively short, straight (fig. II, 3, 4).

Pereopod 3 is moderately setose, articles slender. Article 4 bears 4-5 groups of setae at posterior margin, these setae are as long as the diameter of the article (fig. I, 6, 7). Article 5 bears 4-5 spines accompanied by several short setae at posterior margin. Article 6 bears several groups of short spines at posterior margin.

Pereopod 4 like pereopod 3 but it is slightly shorter and remarkably less setose. Dactyl of pereopods 3-4 relatively slender (fig. I, 7).

Pereopod 5: article 2 with distoposterior corner, posterior margin provided with 10-15 short setae, no setae on inner surface. Articles 4-6 slender, provided with groups of spines at both margins (fig. III, 1).

Pereopod 6: it is longer than pereopod 5; article 2 elongated and narrowed distally, with well developed distoposterior corner. Posterior margin of article 2 bears 11-16 short setae, no setae on inner surface (fig. III, 2). Articles 4-6 slender and provided with groups of spines at both margins.

Pereopod 7 like pereopod 6, but it is rather shorter, its article 2 with less remarkable distoposterior corner; posterior margin bears 11-17 short or middle-long setae. Article 2 more narrow distally. Articles 3-7 like those of pereopod 6. Dactyl of pereopods 5-7 is relatively slender (fig. III, 3, 4).

Pleopods with 2 retinacula each. Epimere 1-3 with moderately pointed distoposterior corner (fig. II, 5, 7). Epimera 1 with numerous long setae at distoanterior margin. Epimera 2 with a row of distal setae accompanied by spines; several setae appear on outer surface of epimera 2 also. Epimera 3 with distal row of spines accompanied by several setae; no setae on outer surface of epimera.

Uropod 1: rami subequal to each other, provided with lateral and distal spines. Uropod 2: inner ramus is slightly longer than outer one, both bear lateral and distal spines.

Uropod 3: inner ramus is slightly longer than the half of the first article of outer ramus, provided at inner margin with several spines, plumose and simple setae. Outer ramus biarticulate, second article short, but longer than the spines. First article of outer ramus bears 2-3 groups of spines at outer margin accompanied by several plumose and simple setae; at inner margin appears a row of plumose setae as long as the diameter of the article itself (fig. III, 7).

Telson longer than broad, each lobe bears one, rarely 2 distal spines, accompanied by several setae; 1-3 setae or one spine appear on outer surface of the lobes (fig. II, 6).

Gills simple.

The females possess setose metasome like that in the males.

Variability. The number of the spines and setae on epimere 2-3 is variable. The stable characteristics are the shape and pilosity of antenna 2, of pereopods 3-7, of uropod 3 and pilosity of metasome.

Material examined: Kirseljir, source, 19 May, 1959, ca 15 spec. (Coll. Hamburg Museum).

Loc. typ.: Kirseljir (Asia Minor).

Holotype: male 11 mm. Holotyp and paratypes are deposited in Zoologisch Museum Hamburg. Several paratypes are deposited in my collection in Titograd.

Remarks and Affinity. *G. abscisus* is close to *Gammarus balcanicus* group based on the body-pilosity, but it differs from all other *Gammarus* species from southern Europe and Asia Minor by the presence of setae on dorsal surface of metasomsegments like that of some *Echinogammarus* species.

Ecology: living in freshwater.

Gammarus accolae n. sp.
figs. IV-VI

Description: Male: Body-length up to 12.5 mm. Mesosome smooth, metasomsegments slightly bulging, crenellated and provided with a row of short spines and setae at their distoposterior margin (fig. V, 5). Urosome dorsally rather elevated, laterally compressed: urosomites 1-3 bear one median and two dorsolateral groups of strong spines each, accompanied by several short setae (fig. V, 5, 6).

Eyes ovoid, nearly as long as diameter of the peduncle of antenna 1. Lateral cephalic lobes rounded (fig. IV, 1).

Antenna 1 very long, $2/3$ to $3/4$ of the body-length. Peduncle poorly setose, third peduncular article 2.5 to 4 times as long as broad. Principal flagellum up to 44-articulate, articles slender, bearing one aesthetasc each as long as or shorter than the diameter of the flagellar articles. Accessory flagellum relatively short, 3-4 articulate (fig. V, 1).

Antenna 2: slender, peduncular articles 4-5 provided with groups of short setae nearly as long as the diameter of the articles themselves. Flagellum slender, rather dorsoventrally compressed and sparsely setose; setae are nearly as long as the diameter of the articles. Calceola absent. Antennal gland cone slender, short (fig. V, 2).

Mouthparts basic. Mandibular palp: second article bears 4-6 setae in proximal portion and 6-9 setae in distal portion. Article 3 bears 23-27 D-setae and 4-6 long E-setae; on outer surface appears one group of A-setae and on inner surface one group of B-setae, C-setae absent (fig. V, 3, 4).

Coxae 1-3 bear one short seta at distoanterior and distoposterior corner, coxa 4 bears several setae at posterior margin; sometimes appear 1-2 setae on inner surface of the coxae (figs. IV, 2, 3; VI, 1, 3).

Gnathopod 1: article 2 slender, articles 3-4 short, article 5 triangular. Article 6 pyriform, with several short spines at posterior

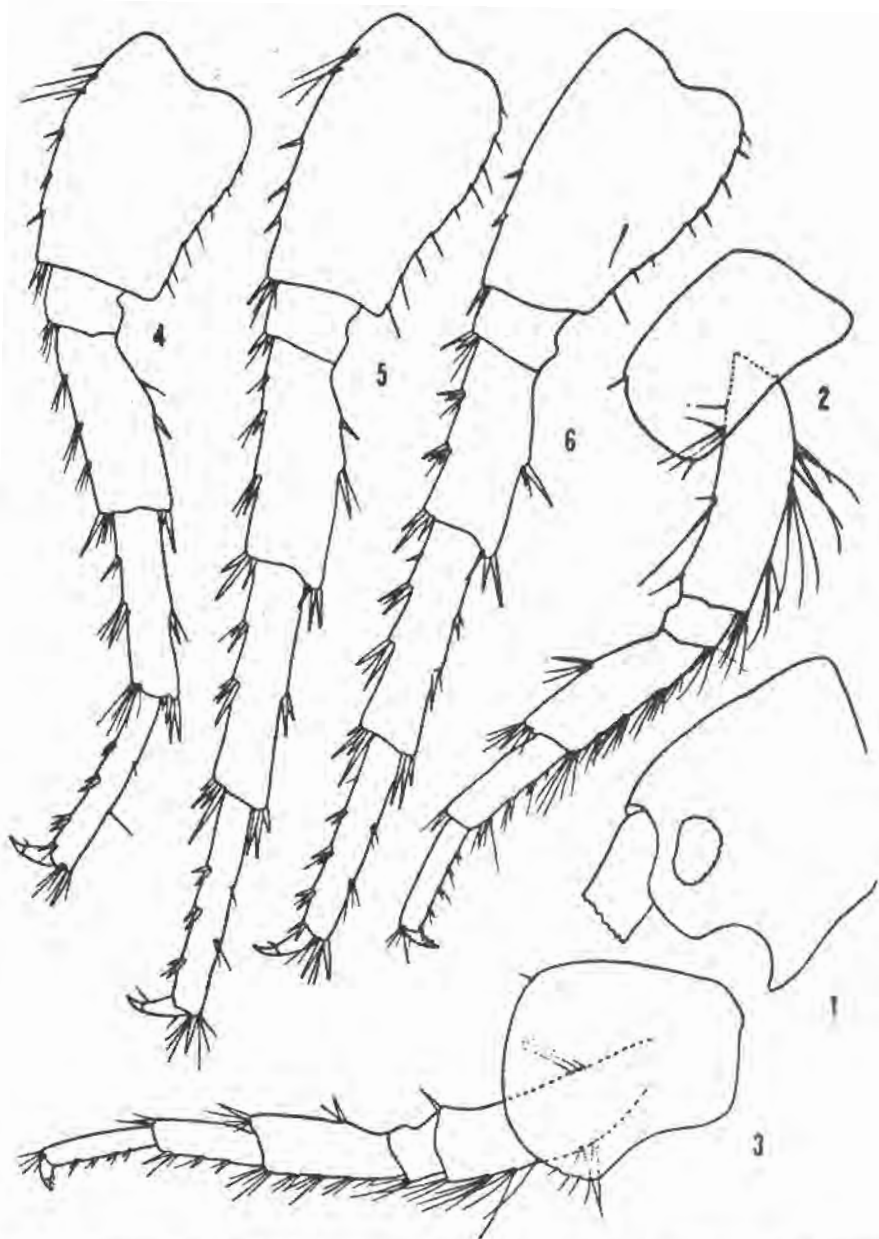


Fig. IV. *Gammarus accolae*, n. sp., Kirgöz by Antalya, male 11,5 mm: 1 = head; 2 = pereopod 3; 3 = pereopod 4; 4 = pereopod 5; 5 = pereopod 6; 6 = pereopod 7.

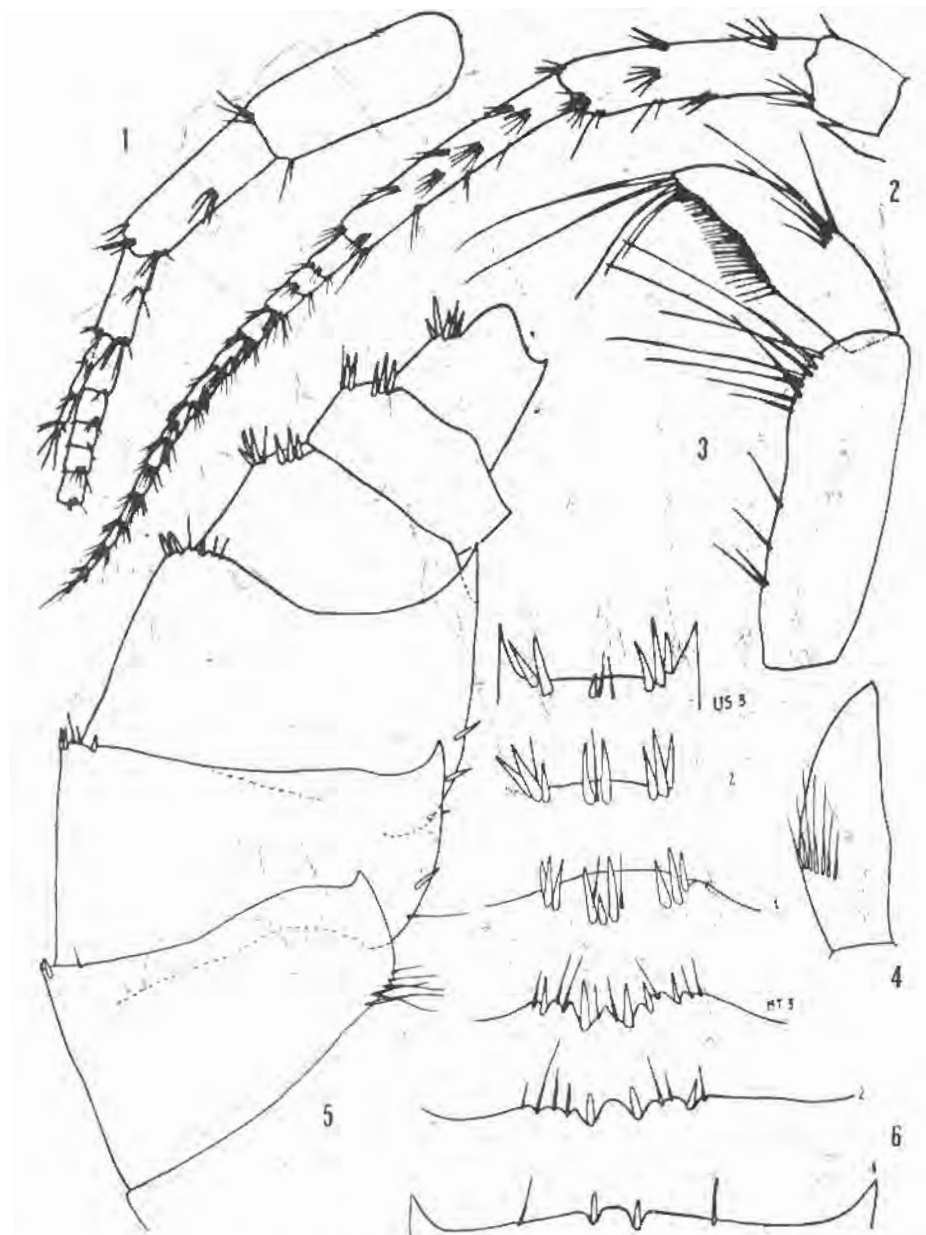


Fig. V. *Gammarus accolae*, n. sp., Kirgöz by Antalya, male 11,5 mm: 1 = antenna 1; 2 = antenna 2; 3 = mandibular palp, inner face; 4 = third palpar article of mandible, outer face; 5 = metasome and urosome with epimere, lateral projection; 6 = metasome and urosome, dorsal projection.

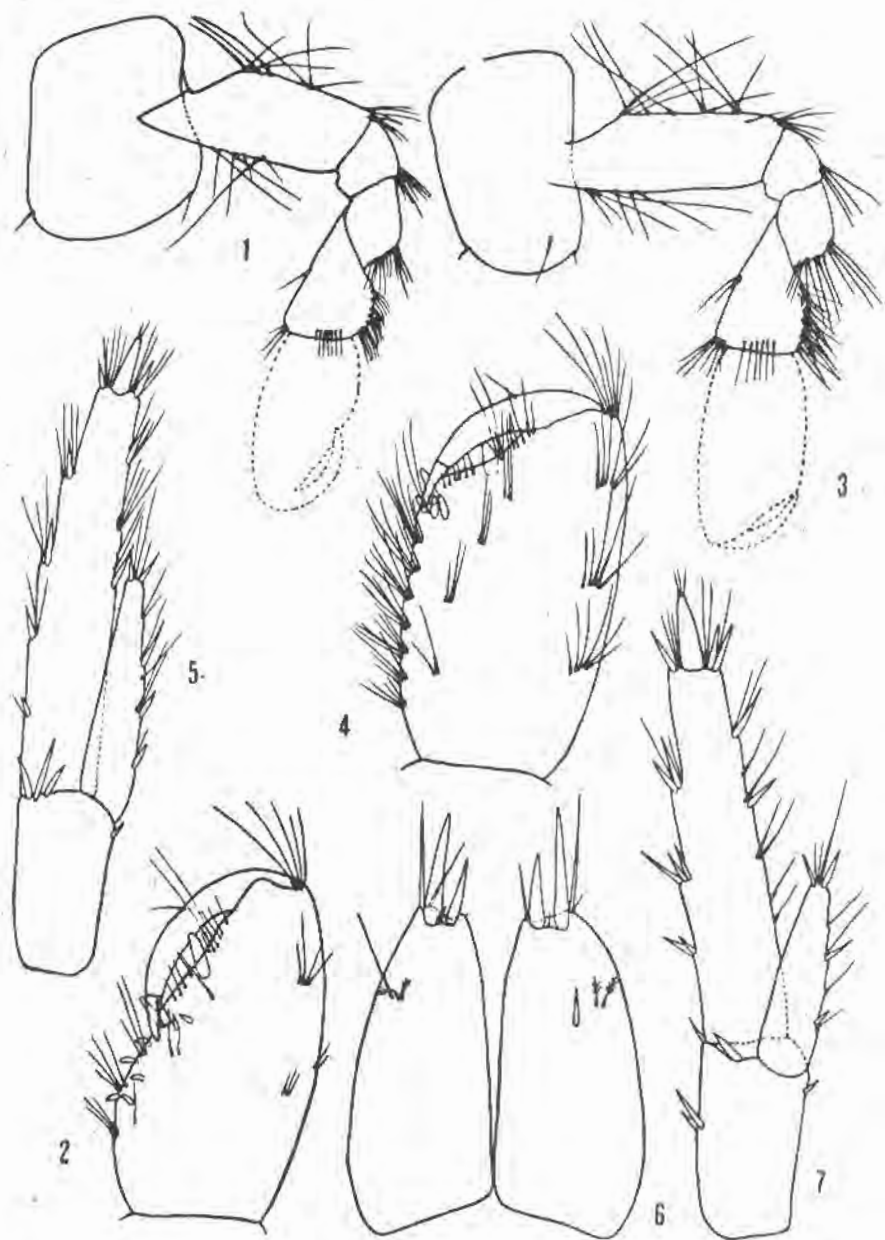


Fig. VI. *Gammarus accolae*, n. sp., Kirgöz by Antalya, male 11,5 mm: 1-2 = gnathopod 1; 3-4 = gnathopod 2; 5 = uropod 3; 6 = telson; 7 = uropod 3 of male 11,6 mm.

margin. Palm inclinate, provided with one median and one strong corner spine on outer surface, and 2-3 subcorner spines on inner surface. Dactyl with one median seta at superior margin (fig. VI, 1, 2).

Gnathopod 2 likes gnathopod 1 in the size. Articles 2 and 5 are more elongated. Article 6 elongated, longer than broad, with nearly parallel lateral margins. Posterior margin of articles 2 bears 6-8 groups of setae, anterior margin bears several groups of simple straight setae. Palm inclined, bearing on outer surface one median and 2 corner spines, on inner surface 2 corner spines. Dactyl like that of gnathopod 1 (fig. VI, 3, 4).

Pereopod 3 with slender articles. Article 4 bears at posterior margin 5-6 groups of setae as long as or shorter than the diameter of the article. Article 6 bears at posterior margin several short spines accompanied by small number of middle-long setae (fig. IV, 2), all setae are straight.

Pereopod 4 like pereopod 3, but all articles are shorter (fig. IV, 3), bearing less number of setae at posterior margin.

Pereopod 5: article 2 dilated, with developed distoposterior corner; posterior margin bears 6-8 middle-long setae. Articles 3-6 provided at both margins with groups of spines, practically lacking setae (fig. IV, 4). Dactyl short.

Pereopod 6: article 2 longer, with distoposterior corner, at posterior margin appear 7-9 setae. Articles 3-7 like those of pereopod 5.

Pereopod 7: like pereopod 6, but its article 2 lacking distoposterior corner or dilatation; sometimes appear 1-2 setae on inner surface of article 2. Articles 3-7 like those of pereopod 6 (fig. IV, 6).

Pleopods with 2 retinacula each. Epimere with very strong pointed distoposterior corner (fig. V, 5). Epimera 1 bears several setae at distoanterior margin. Epimera 2 bears a small number of setae and spines ad distal margin. Epimera 3 bears several spines at distal margin.

Uropod 1: rami of subequal size, provided with lateral and distal spines. Uropod 2: inner ramus is slightly longer than outer one, both bear lateral and distal spines.

Uropod 3: weakly setose, inner ramus nearly half of the outer ramus length, provided with several spines and shorter setae at inner margin (fig. VI, 5, 7). Outer ramus biarticulate, second article short, but longer than a distal spines. Both margins of outer ramus bear several groups of spines accompanied by relatively small number of simple and plumose setae.

Telson longer than broad, each lobe provided with 1-2 distal spines accompanied by several setae; dorsal surface of the lobes possesses usually one seta or one spine (fig. VI, 6).

Gills simple, ovoid.

The females are much more setose than the males, their metasome is also provided with setae and spines like those in the males.

Variability. There are very variable the length of antenna 1, the number of the articles of principal flagellum (34-44 articles), as well as the number of the setae and spines at dorsolateral margin of metasomsegments 1-3.

Material examined: Kirgöz by Antalya (Turkey), small brook, 30 Mars, 1959, many spec. accompanied by *Echinogammarus thoni antalyae* G. Kar. 1971, and *Gammarus monspeliensis agrarius* n. ssp. (Coll, Museum Hamburg).

Loc. typ.: Kirgöz by Antalya.

Holotype: male, 11.5 mm. Holotype and paratypes are deposited in Zoologisch Museum Hamburg. Several paratypes are deposited in my collection in Titograd.

Remarks and Affinity. *Gammarus accolae* n. sp. is very characteristic by the presence of dorsomarginal spines on all three metasomsegments and by very long antenna 1.

Spinose metasomsegments possesses also *Gammarus ohridensis* Schäf. described from Ohrid Lake in Macedonia, but *G. accolae* differs from former by longer antenna 1, by the pilosity of antenna 2 etc.

Martynov described in 1932 *Gammarus caucasicus* from the mountainous river Reproa near Gagry from west Caucasus mountain. The second and third segment of metasome possess about 8 minute spinules on each segment, on the first segment these spinules are »almost invisible«; but on the figure of this species of Martynov, these spines on all metasomsegments are absent.

G. accolae differs from *G. caucasicus* by much longer antenna 1 (by *caucasicus* half of the body only), by shorter inner ramus of uropod 3 (by *caucasicus* inner ramus reaches 2/3 of outer ramus), by absence of calceola on antenna 2 in males, etc.

Schellenberg described in 1937 *Gammarus balcanicus anatoliensis* from Akschehir torrent in Asia Minor, one species with a row of longer dorsomarginal setae on all three metasomsegments. *G. anatoliensis* differs from *G. accolae* by presence of calceola on antenna 2 in males, by much shorter antenna 1, by only setose metasomsegments etc.

Ecology: living in freshwaters, accompanied (sometimes?) by *Echinogammarus thoni antalyae* and *Gammarus monspeliensis agrarius*.

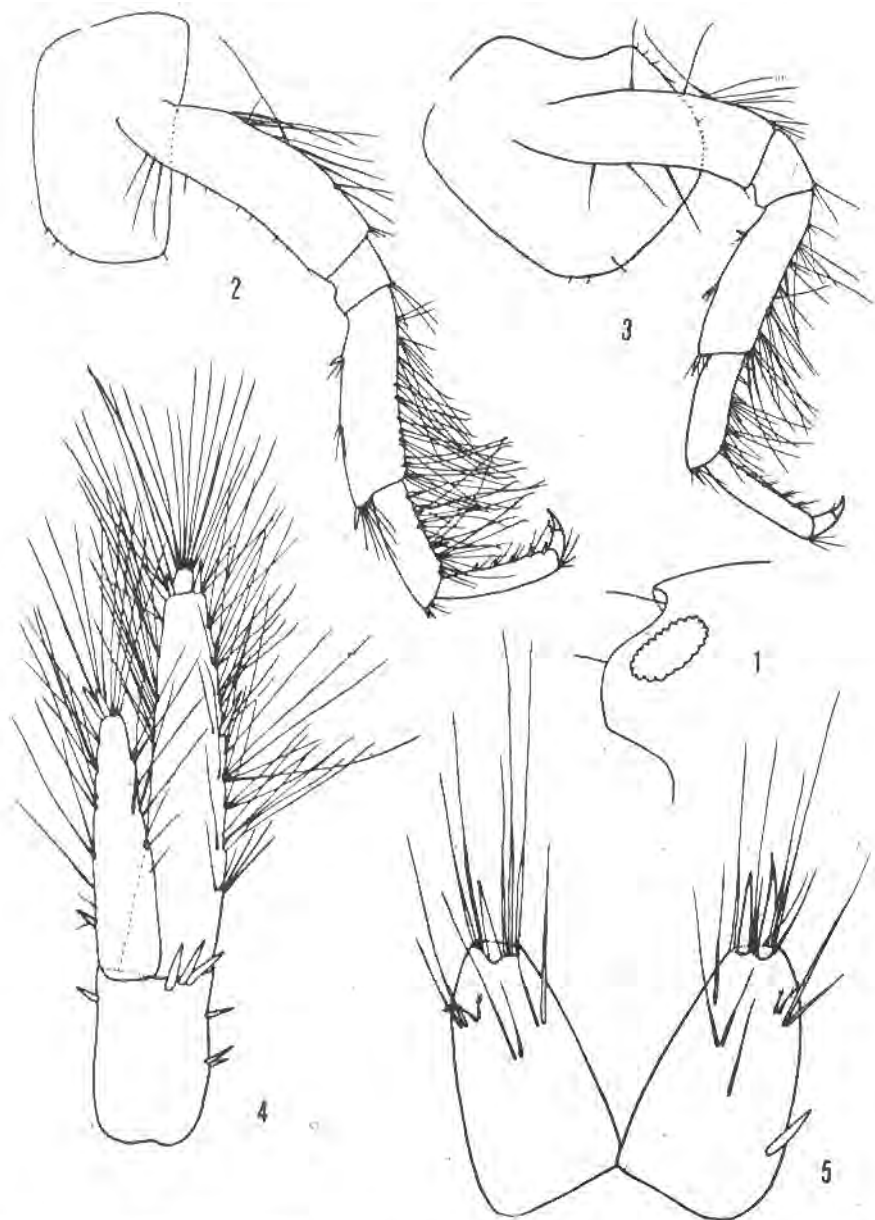


Fig. VII. *Gammarus cantor*, n. sp., island Tasos, Patomja spring, male 10 mm:
 1 = head; 2 = pereopod 2; 3 = pereopod 3; 4 = uropod 3; 5 = telson.

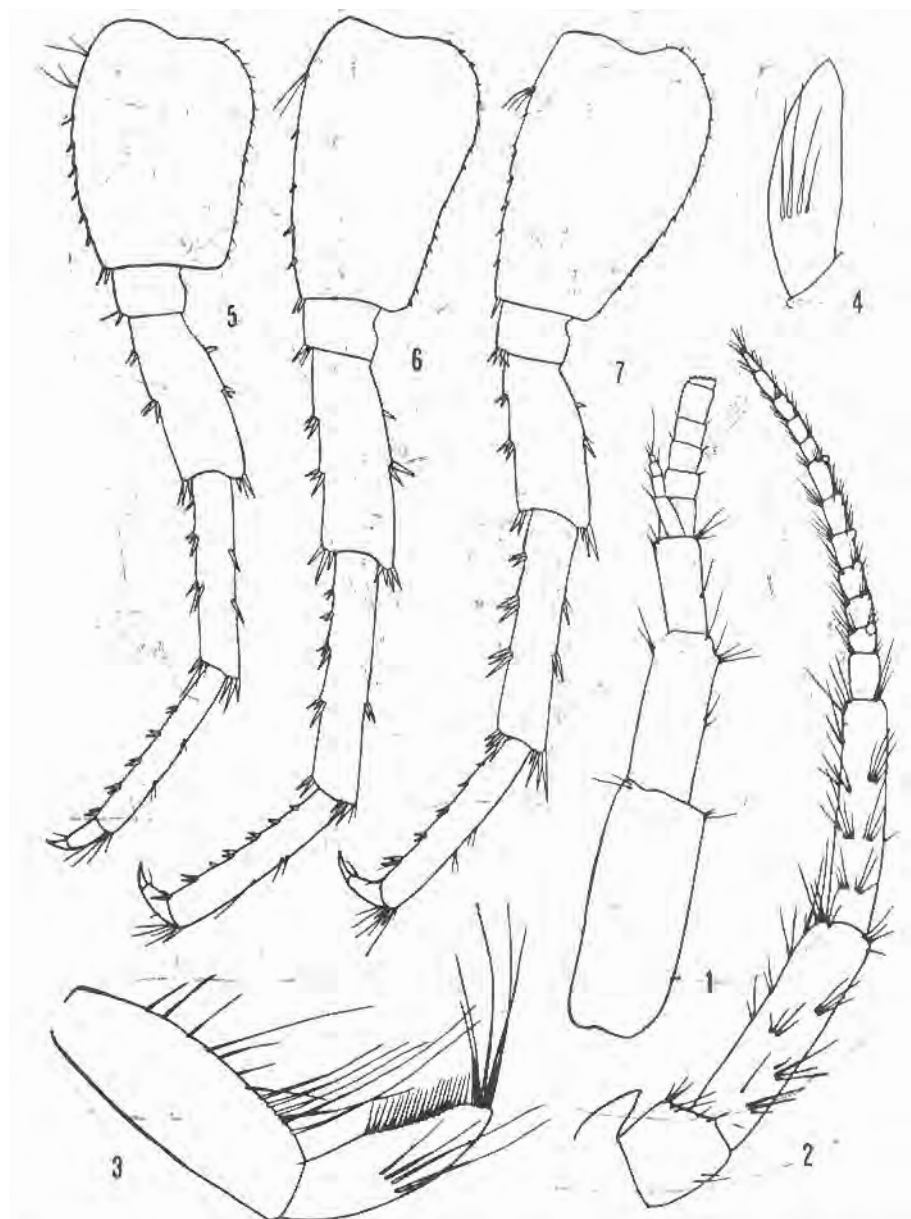


Fig. VIII. *Gammaus cantor*, n. sp., island Tasos, Patomja spring, male-10 mm:
 1 = antenna 1; 2 = antenna 2; 3 = mandibular palp, inner face; 4 = third
 palpal article of mandible, outer face; 5-7 = pereopods 5-7.

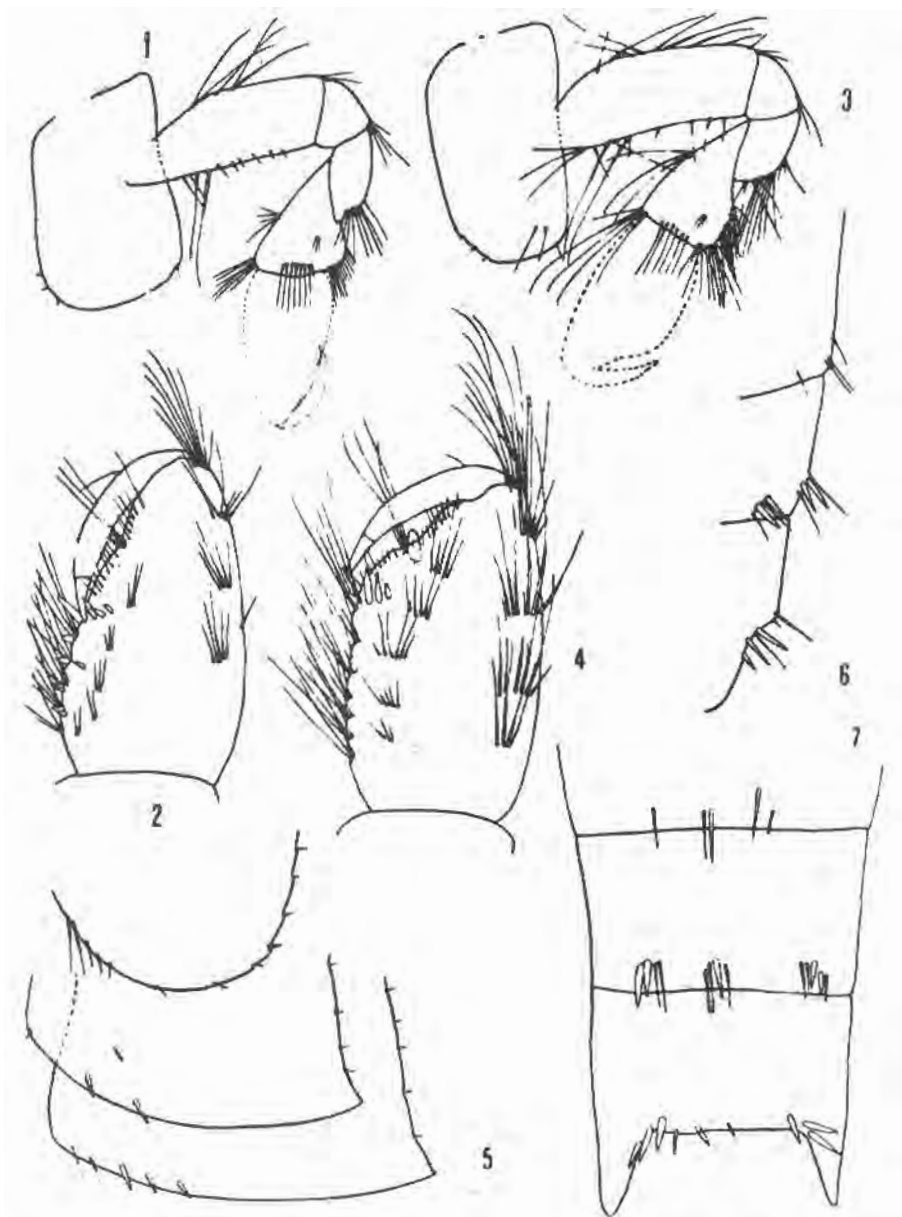


Fig. IX. *Gammarus cantor*, n. sp., island Tasos, Patomja spring, male 10 mm: 1-2 = gnathopod 1; 3-4 = gnathopod 2; 5 = epimere; 6 = urosome, lateral projection; 7 = urosome, dorsal projection.

Gammarus cantor n. sp.

figs. VII-IX

Description: Males: Body-length up to 12 mm. Body dorsally smooth, urosome very flat, lacking elevation. Urosomite 1 with 3-5 dorsal setae, no lateral groups of elements. Urosomite 2 and 3 with one median and two dorsolateral groups of elements (setae and spines) (fig. IX, 6, 7).

Eyes elongated, nearly as long as the diameter of the peduncle of antenna 1 or slightly longer. Lateral cephalic lobes rounded (fig. VII, 1).

Antenna 1 nearly half of the body length, its principal flagellum up to 27-articulate, weakly setose. Accessory flagellum 3-4 articulate (fig. VIII, 1).

Antenna 2: relatively sparsely setose; peduncular articles 4 and 5 provided with several bunches of setae each, nearly as long as the diameter of the articles themselves. Flagellum up to 12-articulate, compressed dorsoventrally, sparsely setose, articles medially slender like those of *G. fossarum*. The setae of flagellar articles provided usually with setae as long as or rather longer than the diameter of the articles. Calceola present. Antennal gland cone short (fig. VIII, 2).

Mouthparts basic. Mandibular palp: first article smooth, second article provided with 4-7 setae in proximal portion and 6-9 setae in distal portion. Article 3 with 20-24 marginal D-setae and 4-6 long E-setae. On outer surface of article 3 appears one group of A-setae, on inner surface appears one group of B-setae; C-setae are absent (fig. VIII, 3, 4).

Coxae 1-4 with very short distal setae; sometimes appear 1-3 setae on inner surface of the coxae also (figs. VII, 2, 3; IX, 1, 3).

Gnathopod 1: articles 2-5 medially setose, article 6 pyriform, provided with several groups of short spines accompanied by longer setae at posterior margin. Palm inclined, provided with one median and one corner spine on outer surface, and 3 subcorner spines on inner surface. Dactyl with one median seta at superior margin (fig. IX, 1, 2).

Gnathopod 2: articles 2-5 medially setose, setae at anterior margin of article 5 are long and sometimes weakly curled. Article 6 elongated, with 5-7 groups of setae at posterior margin and 4-5 groups of longer setae at subanterior margin (fig. IX, 3, 4). Palm concave, provided with one median and 3 corner spines on outer surface, and 3 subcorner spines on inner surface. Dactyl like that of gnathopod 1. The setae on gnathopod 2 are prevalently straight, sometimes rather curled.

Pereopod 3: articles medially slender, very densely setose. Article 4 bears numerous groups of setae at posterior margin, much

longer than the diameter of the article. Article 5 bears at posterior margin 3-5 spines and 4-7 groups of long setae. Article 6 provided at posterior margin with 4-6 couples of short spines accompanied by shorter setae. Dactyl short (fig. VII, 2).

Pereopod 4 like pereopod 3 but it is slightly shorter and rather less setose (fig. VII, 3).

Pereopod 5: article 2 with 11-17 very short setae at posterior margin, lacking setae on inner surface, with well developed distoposterior corner. Articles 3-6 bear groups of short spines at both margins, usually lacking setae. Dactyl short (fig. VIII, 5).

Pereopod 6: article 2 elongated, with a short setae at posterior margin, lacking setae on inner surface; distoposterior corner less developed. Articles 3-6 slender and provided with short spines at both margins. Dactyl short (fig. VIII, 6).

Pereopod 7 like pereopod 6, but its distoposterior corner on article 2 is weakly developed (fig. VIII, 7).

Pleopods with 2 retinacula each. Epimere 1-3 with less pointed distoposterior corner. Epimera 1 is subrounded with several setae at distoanterior margin and single setae at distal margin. Epimera 2 bears 2-4 distal short spines and one subdistal spine. Epimera 3 bears at distal margin several spines accompanied sometimes by 1-2 setae slightly longer than the spine-length (fig. IX, 5).

Uropod 1: rami subequal or the outer ramus is rather longer, both rami provided with lateral and distal spines.

Uropod 2: inner ramus is longer than outer one, both with lateral and distal spines.

Uropod 3: relatively short, very densely setose. Inner ramus nearly 60 percent as long as outer ramus, provided with 2 distal spines and numerous very long, prevalently simple (smooth) setae at both margins. Outer ramus biarticulate, second article short, shorter than the spines. Both margins of outer ramus provided with numerous bunches of prevalently simple (smooth) very long setae; at outer margin appear also several spines (fig. VII, 4).

Telson longer than broad, each lobe bears 1-2 distal spines accompanied by very long setae (setae are longer than the length of the telson); several setae and sometimes one spine appear also on outer (dorsal) surface of telson lobes (fig. VII, 5).

The female: Urosome like that in the males, oostegytes broad.

Variability. There are variable the number of the spines on telson, on urosome and epimere, as well as the number of the setae on pereopods and telson.

The absence of the setae on inner surface of article 2 on pereopods 5-7, the shape and pilosity of antenna 2 and urosome are constant in all our specimens.

Material examined: Tasos isle, Patomja spring, 28 May, 1943, several spec.; Tasos isle, Limen, spring near river, 23 Oct., 1942, 4 spec. accompanied by *Gammarus komareki* Schäf.; Tasos isle, village Rahoni, 27 Oct., 1942, several spec. accompanied by *Gammarus komareki*.

Loc. typ.: Patomja spring, Tasos isle.

Holotype: male, 10 mm. Holotype and paratypes are deposited in my collection in Titograd.

Remarks and Affinity: *Gammarus cantor* is characterized by absence of lateral groups of elements on urosomite 1, by strong setose uropod 3 etc.

G. cantor differs from *G. gracilis* Mart. 1935 described from Tshimkent, eastern Karatau (Turkestan) by absence of lateral groups of elements on urosomite 1, by broader article 2 of pereopods 5-7, by shorter antenna 1, longer setae on pereopods 3-4 etc.

G. cantor differs from *G. turanus* Mart. 1935 described from river Tshimganka (Turkestan) by absence of setae on articles 3-5 of pereopods 5-7, by the shape and pilosity of telson etc.

G. cantor differs from *G. brevicornis* Mart. 1935 described from the river Kitshkine (Karatau, Turkestan) by more setose telson, by the pilosity of urosome, uropod 3 etc.

G. cantor differs from *G. caucasicus* Mart. 1932 described from Gagry (Caucasus) by the spinulation of urosome, by absence of curled setae on article 6 of gnathopod 2, by absence of spines at dorsoposterior margin of metasomsegments 1-3 etc.

The more detailed relation between *G. cantor* and other *Gammarus* species described in the shores of Black Sea and Turkestan is very difficult to establish since the absence of more detailed description of all these species.

Ecology: living in freshwaters, sometimes accompanied by *Gammarus komareki* Schäf.

Gammarus monspeliensis n. ssp.
figs. X-XII

Description: Male: Body-length up to 19 mm. Body smooth, metasomsegments provided with a short setae at dorsoposterior margin. Urosome keeled like that of *Echinogammarus* species; each urosomite bears one median and two dorsolateral groups of elements (spines and setae) (fig. XII, 4).

Lateral cephalic lobes subrounded, eyes ovoid, nearly as long as the diameter of the antenna I peduncle (fig. X, 1).

Antenna 1 nearly half of the body-length. Peduncle weakly setose, principal flagellum up to 38-articulate. Accessory flagellum 4-5 articulate (fig. X, 2).

Antenna 2: peduncular articles 4 and 5 provided with 3 rows of 5 groups of short setae each (setae are usually shorter than the diameter of the articles themselves). Flagellum up to 16-articulate, inflated and dorsoventrally compressed, like that of *G. pulex pulex*. The pilosity of flagellum and calceola like those of *G. pulex pulex*. Antennal gland cone short (fig. X, 3).

Mouthparts basic. Mandibular palp: second article bears in proximal portion 4-7 setae, in distal portion 13-16 setae. Third article bears 29-34 marginal short D-setae and 4-6 long E-setae; on inner surface appear 1-2 groups of B-setae, on outer surface one group of A-setae; C-setae are absent (fig. XI, 1, 2).

Coxae 1-4 with small number of short marginal setae (figs. X, 4, 6; XII, 1, 2).

Gnathopod 1: articles 2-5 medially setose, setae are usually straight. Article 6 pyriform, with 4-6 groups of setae at posterior margin, accompanied by several groups of short spines. Palm with one median and 1-2 corner spines on outer surface, and 3-4 sub-corner spines on inner surface. Anterior margin of article 6 bears small number of straight short setae. The setae on inner surface of article 6 are straight (fig. X, 4, 5).

Gnathopod 2: articles 2-5 medially setose, setae are usually straight. Article 6 elongated, with 5-6 groups of curled setae at anterior margin and 10-12 groups straight setae at posterior margin. Palm with one median and 3 corner spines on outer surface, and 3-4 subcorner spines on inner surface. The setae on inner surface of article 6 are partially curled or curved (fig. X, 6, 7).

Pereopod 3: articles slender, with numerous curled and straight setae at posterior margin. Article 6 bears 5-6 groups of short spines accompanied by long setae at posterior margin. Dactyl moderately slender. Anterior margin of articles 4-6 provided with groups of setae accompanied by single slender spines (fig. XII, 1).

Pereopod 4 like pereopod 3 but slightly shorter and less setose (fig. XII, 2).

Pereopod 5: article 2 with marked distoposterior corner. Anterior margin of article 2 bears 6-8 groups of short spines accompanied by single setae as well as two groups of longer setae in proximal portion. Posterior margin of article 2 bears small number of short setae. Article 4 bears several groups of setae at anterior margin (setae are as long as the diameter of the article), and two groups of spines at posterior margin. Article 5 bears 3-4 groups of spines

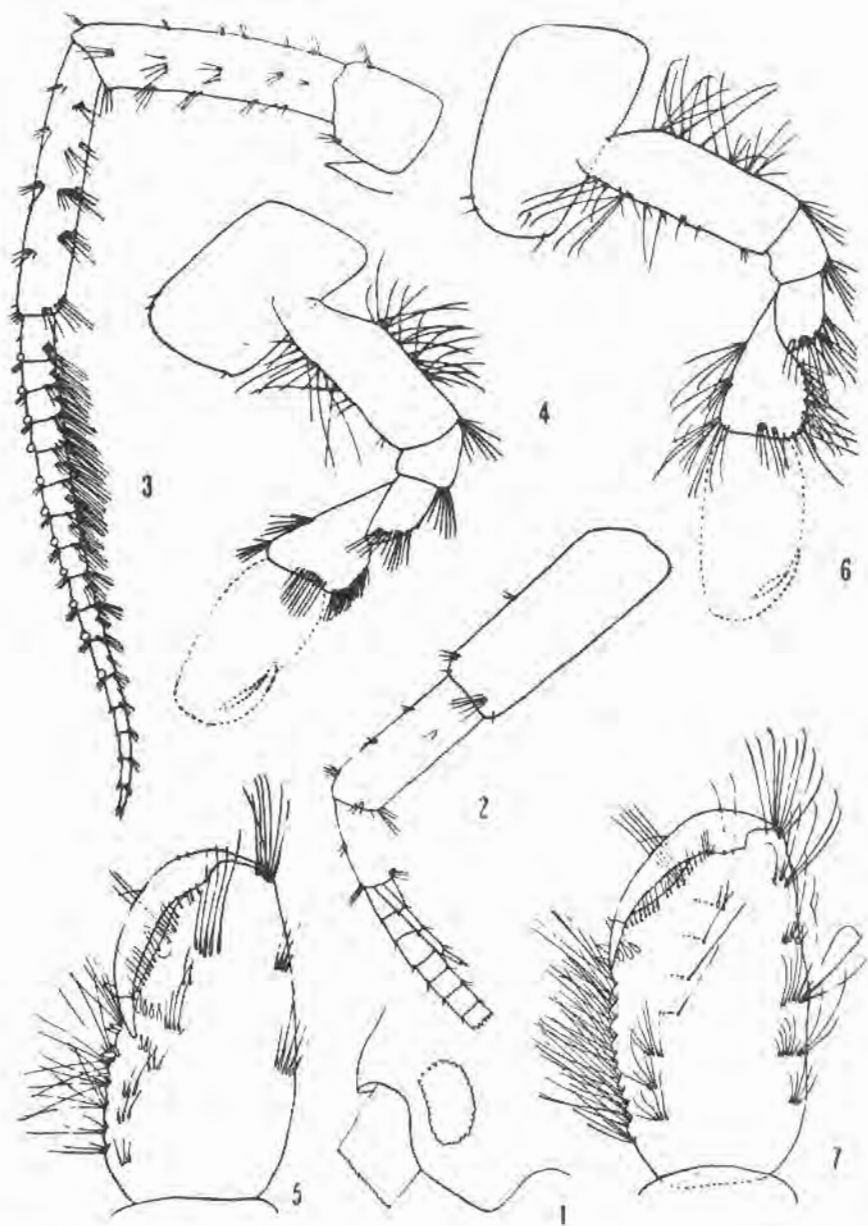


Fig. X. *Gammarus monspeliensis agrarius*, n. ssp., Dinar Karakugu Pinarbasi, male 14,5 mm: 1 = head; 2 = antenna 1; 3 = antenna 2; 4-5 gnathopod 1; 6-7 = gnathopod 2.

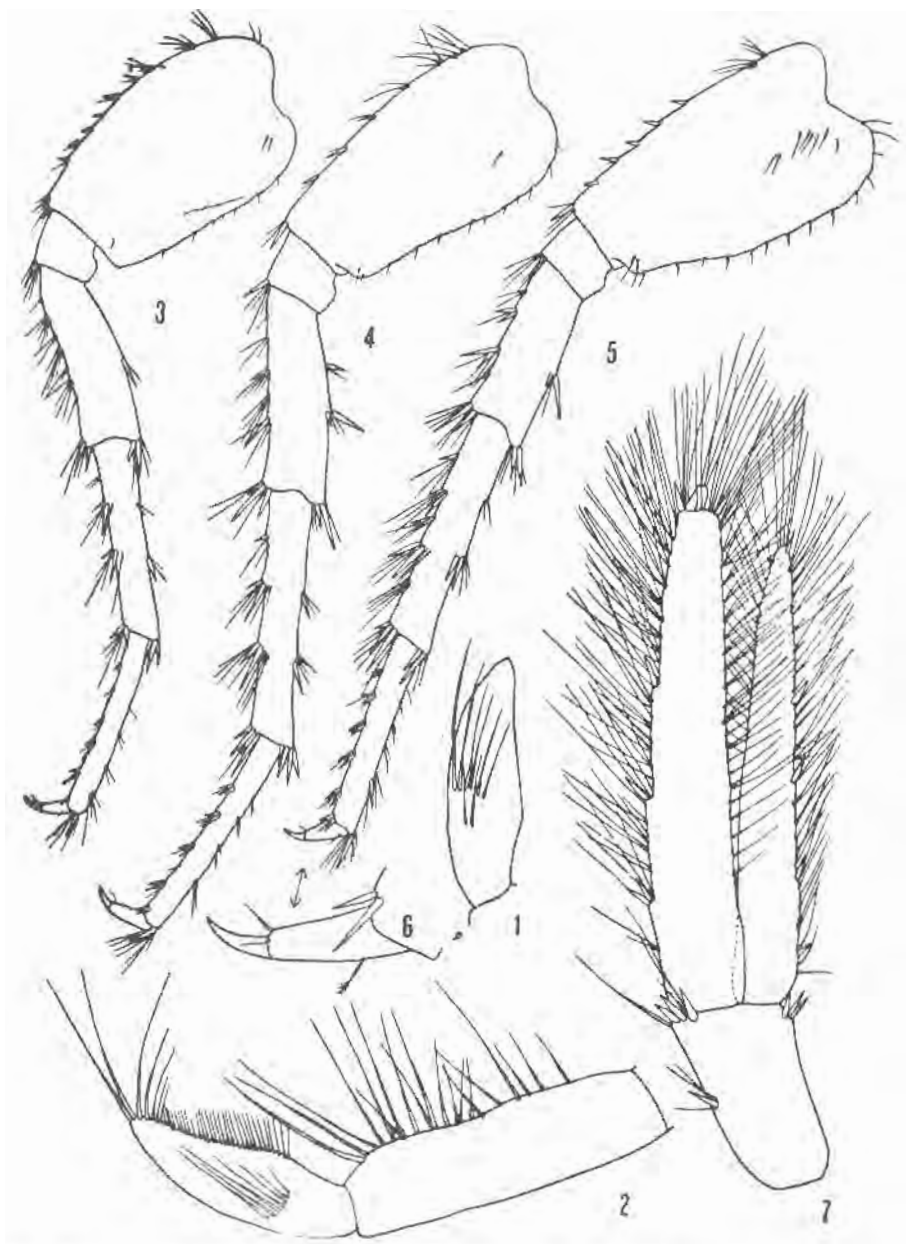


Fig. XI. *Gammarus monspeliensis agrarius*, n. ssp., Dinar Karakugu Pınarbası, male 14,5 mm: 1 = third palpar article of mandible, inner face; 2 = mandibular palp, outer face; 3 = pereopod 5; 4 = pereopod 6; 5-6 = pereopod 7; 7 = uropod 3.

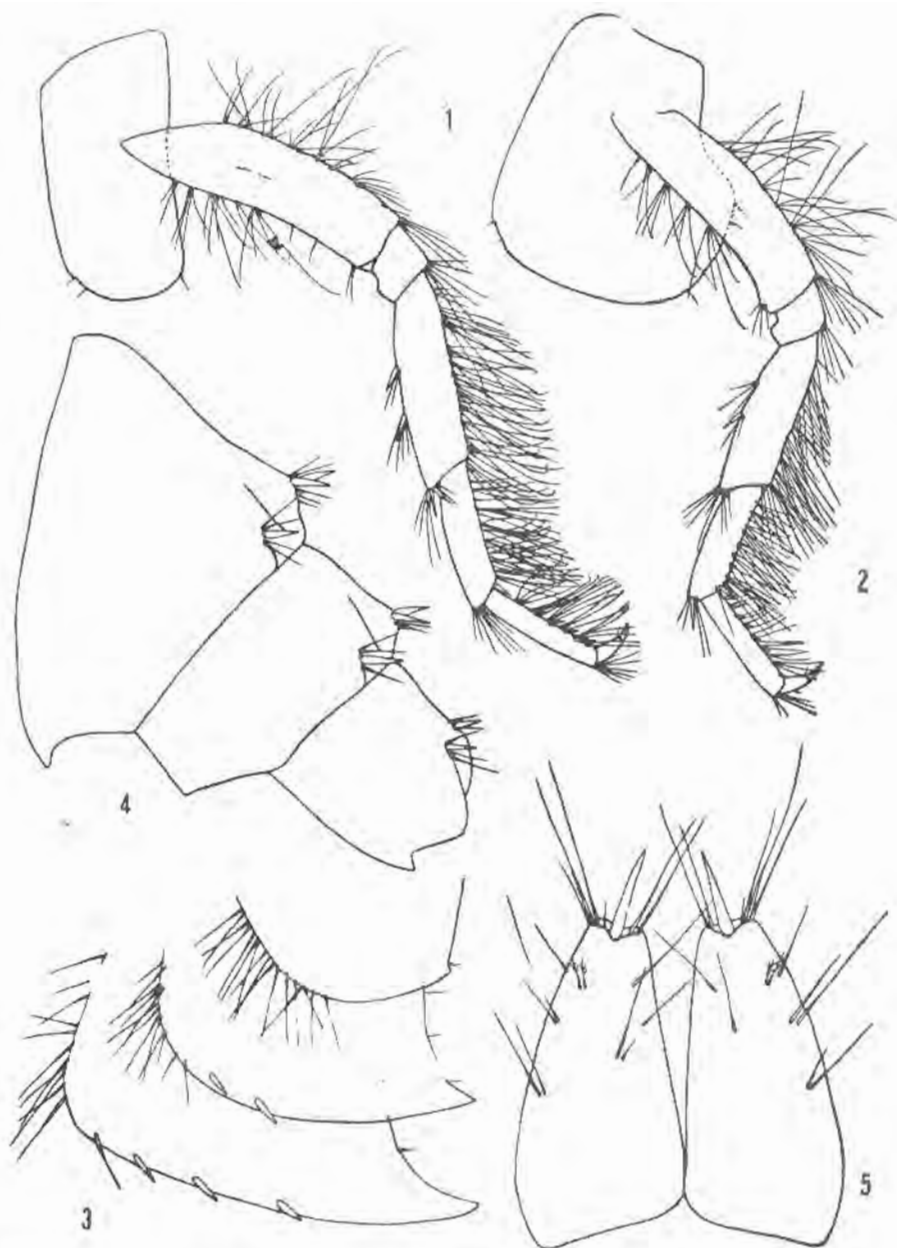


Fig. XII. *Gammarus monspeliensis agrarius*, n. ssp., Dinar Karakugu Pinarbasi, male 14,5 mm: 1 = pereopod 3; 2 = pereopod 4; 3 = epimere; 4 = urosome; 5 = telson.

accompanied by long setae at anterior and posterior margin. Article 6 bears several groups of spines at anterior margin and several groups of setae at posterior margin. Dactyl moderately slender (fig. XI, 3).

Pereopod 6: article 2 slender, its pilosity and spine-presence like those of pereopod 5. Articles 4 and 5 bear at anterior margin 4-6 groups of longer setae accompanied sometimes by 1-3 spines, and 2-3 groups of setae at posterior margin. Article 6 like that of pereopod 5 (fig. XI, 4).

Pereopod 7 like pereopod 6, articles slender. Article 2 more dilated in proximal portion, with several setae in proximal part of inner surface. Articles 3-7 like those of pereopod 6 (fig. XI, 5, 6).

Pleopods with 2 retinacula each. Epimere: epimera 1 pointed, with numerous long setae at distoanterior margin. Epimere 2-3 with very strong pointed distoposterior corner, bearing several spines accompanied sometimes by 1-2 setae at distal margin (fig. XII, 3).

Uropod 1: rami subequal. Uropod 2: inner ramus slightly longer than outer one.

Uropod 3: rami long and slender. Inner ramus 5/6 to 11/12 of the first article of outer ramus, provided with simple and plumose setae at both margins, sometimes accompanied by single spines at outer margin. Outer ramus biarticulate, second article short, as long as the spines. Both margins of outer ramus provided with long simple and plumose setae, sometimes accompanied by several groups of 1-2 spines at outer margin (fig. XI, 7).

Telson elongated, each lobe usually with one distal spine accompanied by several long distal setae. Several setae appear on dorsal surface of each lobe (fig. XII, 5).

The females possess also elevated urosome like that in the males.

Variability. The number of the setae on epimere, telson and uropod 3 is variable. The stable characteristics are: the shape and pilosity of antennae 1-2, gnathopods, of pereopods 3-7, the shape of epimere and urosome.

The length of inner ramus of uropod 3 is rather variable (see before).

Material examined: Kirgöz by Antalya (Asia Minor), small brook, 30 Mars, 1959, several spec. accompanied by *Echinogammarus thoni antalye* G. Kar. 1971 and *Gammarus accolae* n. sp. (Coll. Museum Hamburg);

— Ilgin, in the water of one ditch near Kaplica (Asia Minor), 10 May, 1959, many spec. (Coll. Museum Hamburg).

— Dinar Karakugu Pinarbasi, (Asia Minor), 7 July, 1959, several spec. accompanied by *Gammarus* cf. *argaeus* group (Coll. Museum Hamburg).

— Dinar Karakugu »Dudenler«, 7 May, 1959 (Asia Minor), cca 12 spec. accompanied by *Gammarus* cf. *argaeus* group. (Coll. Museum Hamburg).

— Nigde (Asia Minor), 3 Aug., 1947, several spec. (Coll. Museum Hamburg).

Loc. typ.: Dinar Karakugu Pinarbasi (Asia Minor).

Holotype: male 14.5 mm. Holotype and paratypes are deposited in Zoologisch Museum Hamburg. Several paratypes are deposited in my collection in Titograd.

Remarks and Affinity. *Gammarus monspeliensis agrarius* is very closed to *G. monspeliensis* Pinkster 1972 described from the river Lez in southern France (well developed dorsal carina i. e. elevation compressed laterally on urosome) and at the first glance it seems to be identic with *G. monspeliensis*.

But, based on the short description of *G. monspeliensis*, *G. Monspeliensis agrarius* differs from former by shorter and less sagmented principal flagellum of antenna 1 (antenna 1 reaches to the half of the body and is composed of up to 38 articles; by *G. monspeliensis* antenna 1 is longer and consists of up to 50 articles). The flagellar articles of antenna 2 are swollen and dorsoventrally compressed (by *G. monspeliensis* articles are »never compressed or swollen«). Article 6 of gnathopod 2 is covered by curled setae (by *monspeliensis* by straight setae). Pinkster mentioned that »the other appendages including third uropod and telson (of *G. monspeliensis*) do not show noteworthy differences from *G. p. pulex*«. The specimens of *G. m. agrarius* show more setose articles 4-6 of pereopods 5-7 than those of *G. pulex pulex*, as well as slightly more slender pereopods 3-7. Uropod 3 possesses longer inner ramus than that in *G. p. pulex*.

Based on all these differences I couldn't identify the specimens of Asia Minor with these of southern France (*monspeliensis*), and I segregate the specimens from Asia Minor in one new subspecies *G. monspeliensis agrarius* n. ssp.

G. m. agrarius was found together with *E. thoni anatalye*; at the other side, Pinkster was found *G. monspeliensis* in France together with *E. thoni thoni*.

Ecology: living in freshwaters, sometimes accompanied by *Echinogammarus thoni anatalyae*, *Gammarus accolae* and *G. cf. argaeus* group.

Gammarus dulensis (S. Karaman 1929)
figs. XIII-XV

Syn.: *Gammarus pavlovići dulensis* (part.) S. Karaman 1929, p. 96, fig. 9b.

Gammarus balcanicus (part.) G. Karaman 1966, p. 119.

Description: Male: Body-length up to 12 mm. Body smooth, metasomsegments bear on dorsoposterior margin several setae of different length. Urosome flatt, urosomites bear one median (dorsal) and two dorsolateral groups of elements (spines and setae). The setae are as long as or longer than the spines (fig. XIV, 7).

Lateral cephalic lobes subrounded, eyes round-elongated, as long as or shorter than the diameter of the peduncle of antenna 1 (fig. XIII, 1, 8).

Antenna 1: it reaches half of the body-length, principal flagellum up to 25-articulate, each article bears one short aesthetasc. Accessory flagellum 3-5 articulate, short (fig. XIII, 2).

Antenna 2: peduncular article 5 is slightly shorter than 4, both bear several groups of very short setae, shorter than the diameter of the articles themselves. Flagellum slender, non inflated, rather dorsoventrally compressed; articles weakly setose, setae are as long as or shorter than the diameter of the articles. Calceola present. Antennal gland cone short (fig. XIII, 3).

Mouthparts basic. Mandibular palp: second article bears 4-6 setae in proximal portion and 6-9 setae in distal portion. Article 3 bears 18-22 marginal D-setae and 4-6 long E-setae; outer surface possesses one A-group of setae, inner surface possesses 1-2 groups of B-setae, C-setae absent (fig. XIV, 1, 2).

Coxae 1-4 with subrounded distal margin bearing several setae in anterior and posterior corner (figs. XIII, 4, 6; XV, 1, 2).

Gnathopod 1: article 2 elongated, with numerous longer setae at both margins. Articles 3-4 short, article 5 triangular. Article 6 pyriform, bearing at posterior margin 4-6 groups of short spines accompanied by several longer setae; a row of several groups of submarginal spines appears on inner surface of article 6. Palm concave, with one strong median spine on outer surface. Anterior margin of article 6 bears 2-3 groups of shorter straight setae. Dactyl with one median seta at superior margin (fig. XIII, 4, 5).

Gnathopod 2: it likes gnathopod 1, but article 6 is more elongated, with parallel lateral margin. Posterior margin provided with 7-9 groups of straight setae. Palm concave, provided with one median and 2 corner spines on outer surface, and 3-4 subcorner spines on inner surface. Dactyl like that of gnathopod 1 (fig. XIII, 6, 7).

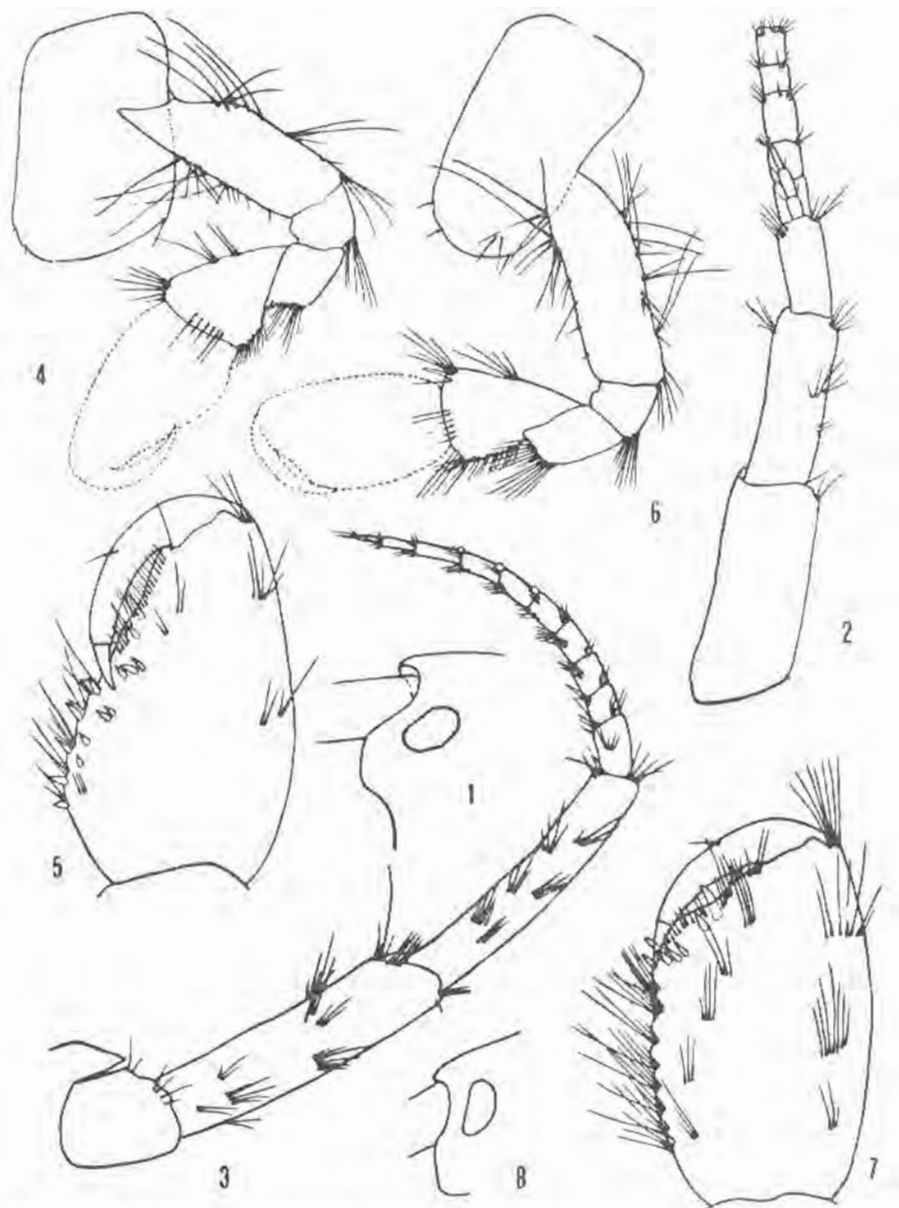


Fig XIII. *Gammarus dulensis* (S. Kar. 1929), Dulo spring, male 11 mm: 1 = head; 2 = antenna 1; 3 = antenna 2; 4-5 = gnathopod 1; 6-7 = gnathopod 2; 8 = head of male, 10,5 mm from monastery St. Ilija, Skopska Crna Gora.

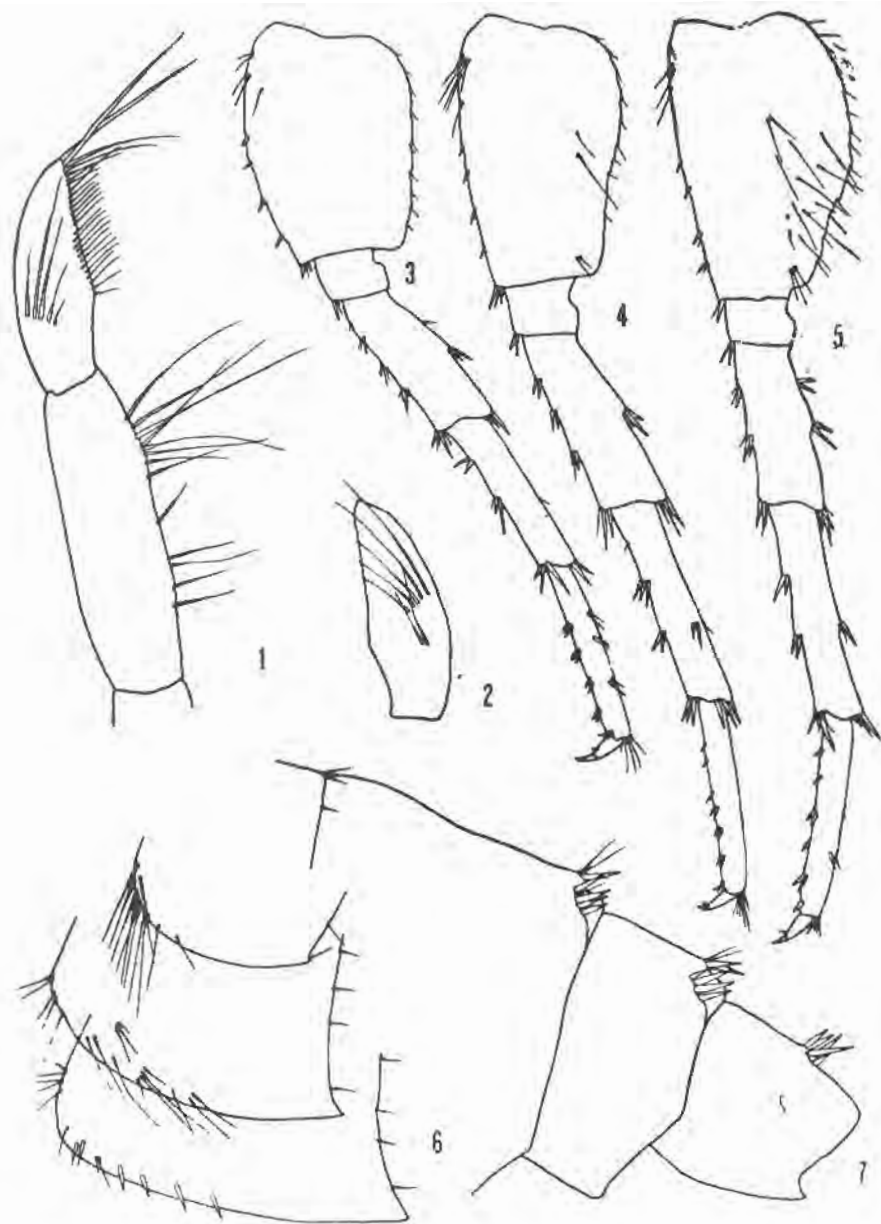


Fig. XIV. *Gammarus dulensis* (S. Kar. 1929), Dulo spring, male 11 mm.: 1 = mandibular palp, outer face; 2 = third palpar article of mandible, inner face; 3-5 = pereopods 5-7; 6 = epimere; 7 = urosome, lateral projection.

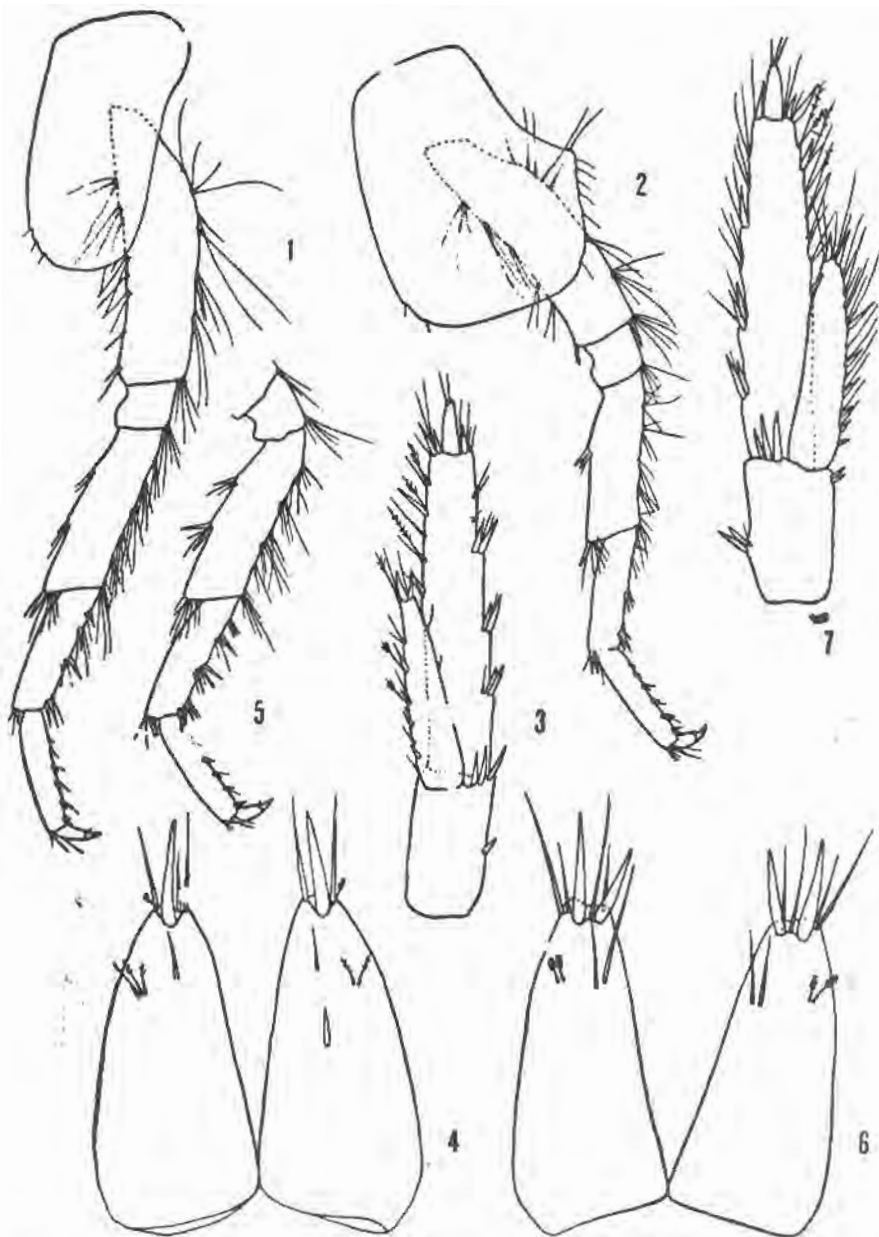


Fig. XV. *Gammarus dulensis* (S. Kar. 1929), Dulo spring, male 11 mm: 1 = pereopod 3; 2 = pereopod 4; 3 = uropod 3; 4 = telson; 5 = pereopod 3 of male 10,2 mm; 6 = telson of male 10,5 mm from monastery St. Ilija, Skopska Crna Gora; 7 = uropod 3 of male, 10,5 mm from monastery St. Ilija, Skopska Crna Gora.

Pereopod 3 moderately setose. Articles slender. Article 4 bears 4-6 groups of setae at posterior margin, setae are as long as or shorter than the diameter of the articles. Article 5 bears at posterior margin 3-4 groups of spines accompanied by several setae longer than the spines (fig. XV, 1, 5). Article 6 bears at posterior margin 5-7 groups of small spines accompanied by short setae.

Pereopod 4 is slightly shorter than pereopod 3, with less setose posterior margin of all articles (fig. XV, 2).

Pereopod 5: article 2 dilated, with marked distoposterior corner. Articles 3-6 bear groups of short spines at both margins, dactyl short (fig. XIV, 3).

Pereopod 6: article 2 bears several shorter setae at posterior margin and 2-3 setae on inner surface. Articles 3-6 are slender, bearing groups of short spines at both margins (fig. XIV, 4).

Pereopod 7: article 2 with narrow distal portion. Posterior margin of article 2 bears 10-16 middle-long setae and several groups of setae on inner surface of article. Articles 3-6 like those of pereopod 6 (fig. XIV, 5).

Epimere 2-3 with strong pointed distoposterior corner, bearing setae at posterior margin. Several groups of setae appear at distal margin and on outer surface of epimera 2. Epimera 3 bears at distal margin several spines, sometimes accompanied by several longer setae; no setae on outer surface of epimera 3 (fig. XIV, 6).

Pleopods with 2 retinacula each.

Uropod 1: rami subequal in length, provided with lateral and distal spines. Uropod 2: inner ramus slightly longer than outer one, both with lateral and distal spines.

Uropod 3 moderately setose. Inner ramus short, about half of the first article of outer ramus. Outer ramus biarticulate, second article longer than the spines. First article bears relatively short marginal setae accompanied by groups of spines; usually all setae of outer ramus are simple (fig. XV, 3, 7).

Telson longer than broad, each lobe provided with 1-2 distal spines accompanied by several setae as long as or longer than the spines. Sometimes setae or one spine appear on distal surface of telson (fig. XV, 4, 6).

Gills simple, ovoid.

The females possess the setae on inner surface of article 2 of pereopods 6-7 like those in the males. Oostegites broad.

Variability. The length of the setae on uropod 3, at posterior margin of pereopods 3-4 and the length of the setae on me-

tasomsegments 1-3 appear rather variable, as well as the size of the eyes and the number of the setae and the spines on urosomites 1-3.

The constant characteristics are the shape and pilosity of antenna 2, the presence of the setae on inner surface of article 2 of pereopods 6-7, the presence of setae on epimera 2 etc.

Material examined: Dulo spring near village Banjani (Skopska Crna Gora, Macedonia) Oct., 1927, holotype and several paratypes (ex coll. of S. Karaman).

— *ibid*, 27 July, 1969, many spec. accompanied by *Gammarus pavlovici* S. Kar.

— Brook over monastery St. Ilija near Banjane (Skopska Crna Gora, Macedonia), 27 July, 1969, several spec.

— Brook over village Pobožje (Skopska Crna Gora), 27 July, 1969, many spec.

— the springs near the brook over the village Pobožje (Skopska Crna Gora), 27 July, 1969, many spec.

— Skopje, spring near village Butelj, 1960, several spec.

— spring Belbunar near Saraj (Skopje, Macedonia), 29 July, 1969, many spec. accompanied by *G. p. pavlovici*.

— Banjički potok-brook near Gostivar (Macedonia), 10 May, 1963, several spec. accompanied by *G. p. pavlovici*.

— Ivangrad, brook in the city, 19 June, 1969, many spec. (Crna Gora).

— spring of Tvrdaš, tributary of Lim (Crna Gora), 9 June, 1966, several spec. accompanied by *Gammarus cf. balcanicus* (leg. K. Žunjić).

Loc. typ.: Dulo spring near Banjani (Skopska Crna Gora).

Holotype: male of 11 mm from Dulo. Holotype (lectotype) and paratypes are deposited in my collection in Titograd.

Remarks and Affinity. S. Karaman described *G. dulensis* from spring Dulo near Banjani in mountain Skopska Crna Gora. He partially confused this species with *G. pavlovici pavlovici* living together with *G. dulensis*, in the same torrent and spring.

S. Karaman's descriptions of *G. dulensis* was one combination of characteristics of both species (all mentioned characteristics of S. Karaman belong to *G. dulensis* except of telson which belongs to *G. p. pavlovici*). The holotype designated by S. Karaman in his collection belongs to *G. dulensis*.

G. dulensis is very close to *Gammarus fossarum* group by the pilosity of the body etc., but *G. dulensis* differs from *G. fossarum*

by setose epimere 2-3, by setose inner surface of article 2 of pereopods 6-7, by less setose uropod 3 and pereopods 3-4, by the pilosity of antenna 2 etc.

G. dulensis differs from *G. kischineffensis* Schell. 1937 by shorter inner ramus of uropod 3, by less setose uropod 3, by more pointed epimere etc.

G. dulensis differs from *G. balcanicus* Schäf. by more setose pereopods 3-4, by setose epimere 2-3 and uropod 3, etc.

Since *G. dulensis* was found often together with *G. p. pavlovici*, we made the hybridisation experiments with these two species: the males of *G. dulensis* x females of *G. pavlovici*, and the males of *G. pavlovici* x females of *G. dulensis*, but these combinations were not successful in any direction. During the all experimental period (one month) no couples and no ovigerous females were observed. That shows one strong reproductive barrier existing between these two species.

Ecology: living in a freshwaters, sometimes accompanied by *Gammarus pavlovici* S. Kar.

Gammarus rambouseki (S. Karaman 1931)
figs. XVI-XVIII

Syn.: *Rivulogammarus pulex rambouseki* S. Karaman 1931b, p. 103.

Gammarus fossarum (part.) Goedmakers 1972, p. 124;
Pinkster 1972, p. 164.

Description: Male: Body-length up to 10 mm. Body smooth, metasome with short dorsomarginal setae. Urosome flat, non elevated, only in the middle of dorsal surface of each urosomite appears very small elevation provided with median group of elements (fig. XVIII, 5). Urosomite 1 bears one median and two dorsolateral groups of long setae. Urosomite 2: median group consists of several setae only; two dorsolateral groups of elements are composed of setae sometimes accompanied by one spine each (fig. XVIII, 5, 6).

Urosomite 3: median group is composed of setae, two lateral groups are composed of setae usually accompanied by one spine each. The setae are longer than the spines.

Lateral cephalic lobes subrounded, eyes small, ovoid, shorter than the diameter of the peduncle of antenna 1 (fig. XVI, 1).

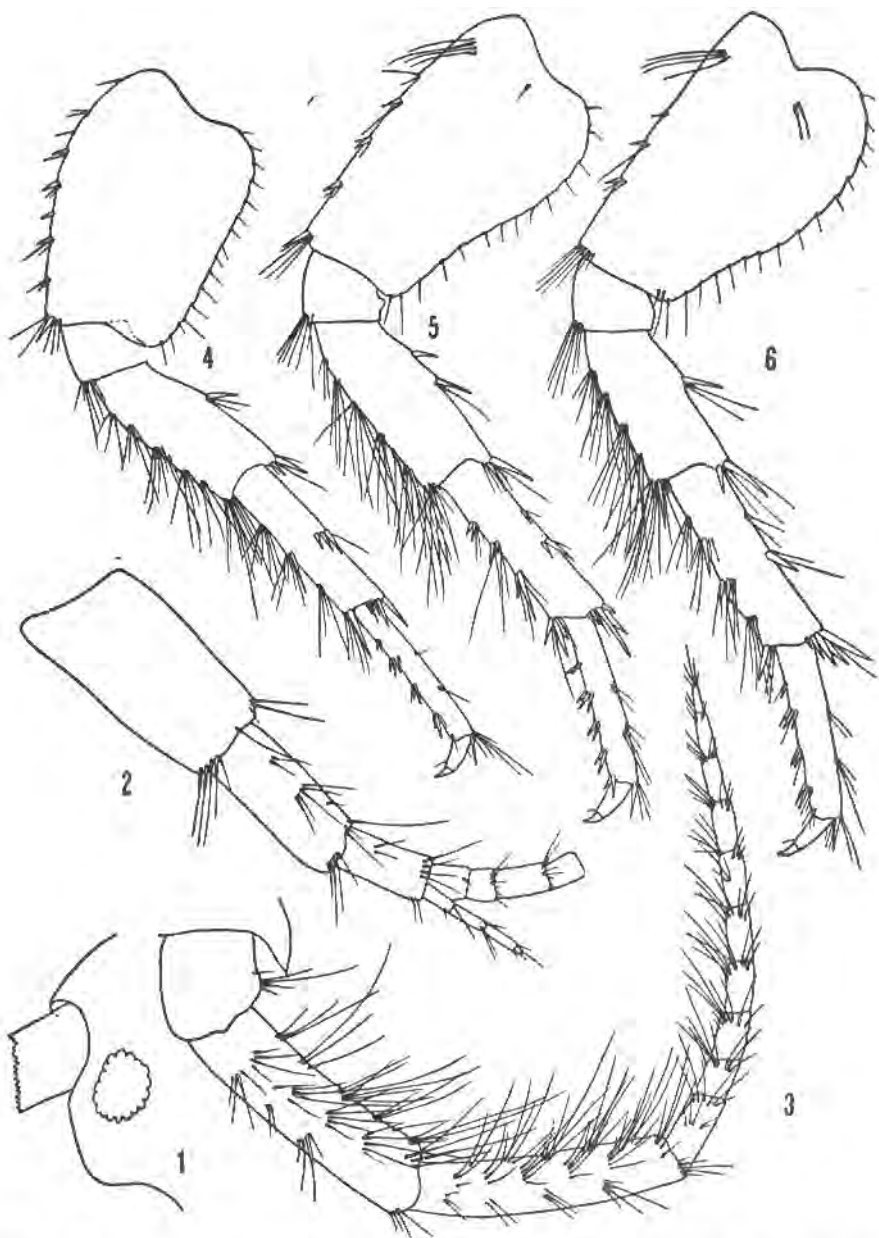


Fig. XVI. *Gammarus rambouseki* (S. Kar. 1931), Galičica mountain, male 10 mm: 1 = head; 2 = antenna 1; 3 = antenna 2; 4 = pereopod 5; 5 = pereopod 6; 6 = pereopod 7.

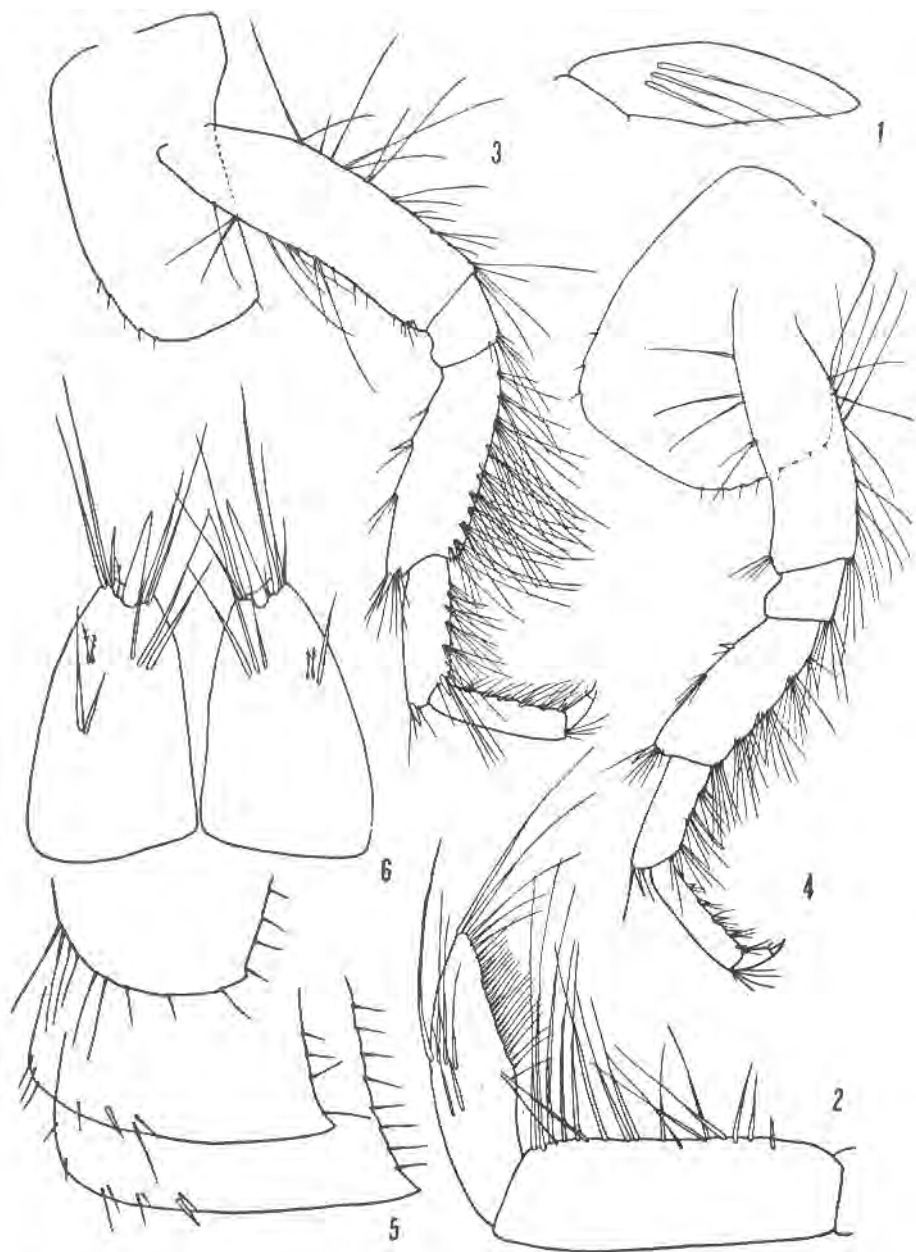


Fig. XVII. *Gammarus rambouseki* (S. Kar. 1931), Galičica mountain, male 10 mm; 1 = third palpar article of mandible, outer face; 2 = mandibular palp, inner face; 3 = pereopod 3; 4 = pereopod 4; 5 = epimere; 6 = telson.

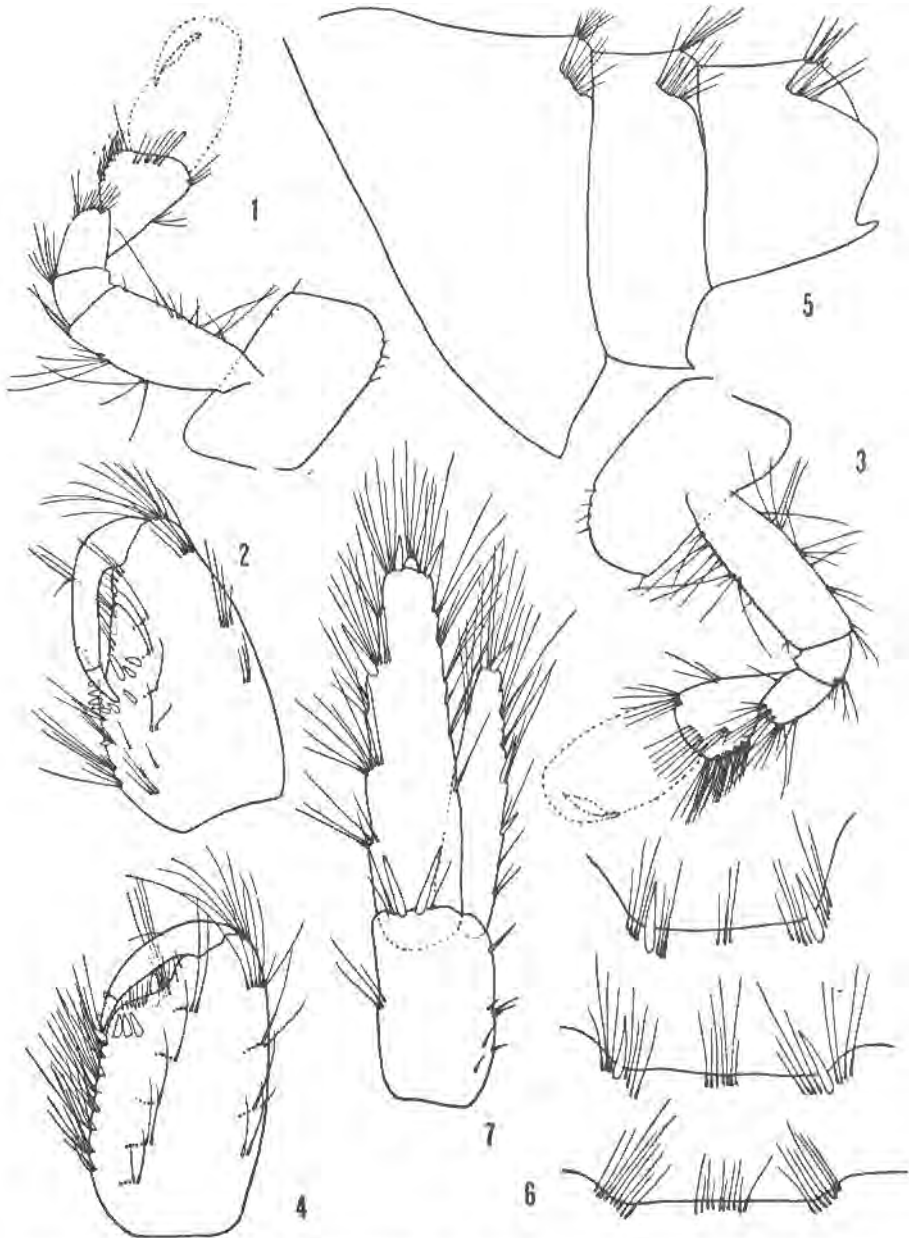


Fig. XVIII. *Gammarus rambouseki* (S. Kar. 1931), Galičica mountain, male 10 mm: 1-2 = gnathopod 1; 3-4 = gnathopod 2; 5 = urosome, lateral projection; 6 = urosome, dorsal projection; 7 = uropod 3.

Antenna 1: it is shorter than the half of the body, peduncle weakly setose. Principal flagellum up to 26-articulate, articles poorly setose. Accessory flagellum up to 4-articulate (fig. XVI, 2).

Antenna 2: peduncle medially setose, peduncular articles 4 and 5 provided with 5-6 groups of setae in each longitudinal row (setae are 2-3 times as long as diameter of the articles). Flagellum up to 11-articulate, slender, weakly dorsoventrally compressed; each article bears 1-2 groups of setae nearly twice as long as the diameter of the articles. Calceola absent. Antennal gland cone short (fig. XVI, 3).

Mouthparts basic. Mandibular palp: second article bears 6-9 setae in proximal portion and 7-10 setae in distal portion. Article 3 bears 20-25 marginal D-setae and 4-6 long E-setae; on outer surface appears one group of A-setae, on inner surface 2 groups of B-setae. C-setae are absent (fig. XVII, 1, 2).

Coxae 1-4 bear several short setae at distal margin in the both corners (figs. XVII, 3, 4; XVIII, 1, 3).

Gnathopod 1: articles 2-5 medially setose. Article 6 pyriform, provided with 3-4 groups of straight long setae at posterior margin, and 4 groups of long straight setae at anterior margin. Palm provided with one median and 3-4 corner spines on outer surface, and 2-4 subcorner spines on inner surface. Several spines and groups of setae appear on inner surface of article 6 (fig. XVIII, 1, 2).

Gnathopod 2: articles 2-5 medially setose. Article 6 elongated, with parallel lateral margins. Posterior margin of article 6 provided with 6-8 groups of setae, and anterior margin provided with 4-5 groups of setae. Inner surface of article 6 bears several groups of setae. All setae on gnathopod 2 are straight (fig. XVIII, 3, 4). Palm bears on median and 3 corner spines on outer surface and 3-4 subcorner spines on inner surface. Dactyl with one median seta at superior margin.

Pereopods 3-7 are relatively short, with rather stout articles.

Pereopod 3: it is densely setose. Article 2 sparsely setose, setae are long. Article 4 bears at posterior margin 8-10 groups of simple setae much longer than the diameter of the article. Article 5 bears 5-6 groups of setae at posterior margin: only one spine appears in distoposterior corner. Article 6 bears 5-6 pairs of small spines at posterior margin accompanied by 1-2 long setae, dactyl short (fig. XVII, 3).

Pereopod 4 likes pereopod 3 but its articles bear shorter setae at posterior margin (fig. XVII, 4).

Pereopod 5: article 2 dilated, with distoposterior corner. Anterior margin of article 2 with several groups of spines accompanied

by 1-2 setae each; posterior margin with 10-17 setae; no setae on inner surface. Articles 4-5 with groups of spines at posterior margin and groups of longer setae at anterior margin. Article 6 bears 4-5 groups of spines at anterior margin and several single setae at posterior margin. Dactyl short (fig. XVI, 4).

Pereopod 6: article 2 narrow distally, lacking distoposterior corner; anterior margin bears 1-2 groups of setae and several groups of spines accompanied by single setae longer than the spines. Posterior margin of article 2 bears 13-17 longer setae. Articles 4 and 5 bear several groups of long setae at anterior margin; on article 5 setae are accompanied by single spines (fig. XVI, 5). Article 6 bears several groups of spines at anterior margin and 2-3 groups of setae at posterior margin.

Pereopod 7 likes pereopod 6, but its article 2 is slightly broader in proximal portion, with cuted distoposterior portion (fig. XVI, 6).

Pleopods with 2 retinacula each. Epimere: epimera 1 less pointed, with long setae at distoanterior margin. Epimere 2 and 3 with stronger pointed distoposterior corner, bearing several pairs or single setae and spines at distal margin. The setae at posterior margin of epimere 1-3 are relatively long (fig. XVII, 5).

Uropod 1: rami subequal in length or inner ramus is slightly shorter. Uropod 2: inner ramus slightly longer than outer one.

Uropod 3: relatively short, peduncle nearly 60 percent of the outer ramus-length. Outer ramus biarticulate, second article shorter than the spines. Both margins of outer ramus provided with long simple setae, accompanied by single spines at outer margin and tip. Inner ramus nearly 60-70 percent of the outer ramus length, its both margins possess simple setae accompanied on tip and at outer margin by 1-2 spines (fig. XVIII, 7).

Telson relatively broad, each lobe bears one distal spine accompanied by several long setae, much longer than the spine. Several setae (1-2 groups of long setae) appear on dorsal surface of telson lobes (fig. XVII, 6).

The females: their pereopods 5-7 are provided with long setae at anterior margin of articles 4-5, like those in the males.

Variability. The number of the setae and spines on epimere 2-3 is variable. They are very constant the presence of long setae at anterior margin of articles 4-5 of pereopods 5-7, the shape of eyes, uropod 3, urosome, telson, antennae, absence of calceola etc.

Material examined: Galičica mountain, southern Macedonia (holotype and paratypes of S. Karaman's collection).

— Perister mountain, southern Macedonia, torrent in the wood, Sept., 1966, many spec. accompanied by *Gammarus* cf. *pavlovici* (Zora Karaman leg.).

Loc. typ.: Galičica mountain (Macedonia).

Holotype: male, 10 mm. Holotype (lectotype) and paratypes are deposited in my collection in Titograd.

Remarks and Affinity. *G. rambouseki* was described by S. Karaman from Galičica mountain between Ohrid and Prespa Lakes. This species is characterized by strong body-pilosity, especially the pilosity of articles 4-5 of pereopods 5-7, by absence of calceola etc.

In Europa only *Gammarus ibericus* (Margalef 1951) possesses setose articles 4-5 of pereopods 5-7, but *G. rambouseki* differs from it by the shape and pilosity of telson, by absence of calceola on antenna 2, etc.

From northern Africa (Marocco) was described *Gammarus acalceolatus* (Pinkster 1971), one another species provided with setae (accompanied by spines) on articles 4-5 of pereopods 5-7 and by absence of calceola on antenna 2 in males. That species is close to *G. rambouseki*, but differs from it by less setose articles 4-5 of pereopods 5-7 (these setae are also shorter), by presence of plumose setae on uropod 3, by the armature of epimere 2-3, by rather more slender uropod 3 etc.

G. rambouseki differs from *G. syriacus* Chevr. 1895, one another species lacking calceola on antenna 2 (described from Syria), by presence of setae on articles 4-5 of pereopods 5-7, by weakly setose antenna 2 etc.

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Re z i m e

54. PRILOG POZNAVANJU AMPHIPODA. NEKOLIKO NOVIH ILI VRLO INTERESANTNIH GAMMARUS VRSTA IZ JUŽNE EVROPE I MALE AZIJE

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Predstavnici roda *Gammarus* žive u slatkim vodama i na području južne Evrope i Male Azije su zastupljeni većim brojem vrsta. Tekuća istraživanja taksonomije ovog roda, kako naša, tako i drugih

istraživača, nesumnjivo ukazuju na postojanje daleko većeg broja vrsta roda *Gammarus*, nego što se ranije pretpostavljalo.

Na osnovu naših istraživanja roda *Gammarus* iz nekih područja Male Azije i južne Evrope, utvrdili smo i opisali 4 nove vrste ovog roda: *Gammarus accolae*, n. sp. iz Kirgöz kod Antalyae (Mala Azija), *Gammarus abscisus*, n. sp. iz Kirseljir u Maloj Aziji, *Gammarus monspeliensis agrarius*, n. ssp. iz nekoliko lokaliteta u Maloj Aziji (Kirgöz kod Antalyae, Ilgin, Dinar Karakugu Pinarbasi, Dinar Karakugu Dudenler, Nigde) i *Gammarus cantor*, n. sp. sa otoka Tasos u Egejskom moru.

S. Karaman je 1929. opisao *Gammarus dulensis* iz izvora Dulo kod sela Banjani u Skopskoj Crnoj Gori (Makedonija). Mi smo, istražujući vodene tokove u Makedoniji i Crnoj Gori, našli ovu vrstu u nekoliko drugih lokaliteta: izvor Tvrdaš u Crnoj Gori (pritoka Lima), potok ispod manastira u Ivangradu (Crna Gora), zatim neki izvori kod Skopja (Belbunar, izvor kod Butelja, potok iznad manastira Sv. Ilija kod Banjana (Skopska Crna Gora), potok i izvori iznad sela Pobožje u Skopskoj Crnoj Gori, Banjički potok kod Gostivara.

Vrsta *Gammarus rambouseki* (S. Karaman 1931) opisana sa planine Galičice u južnoj Makedoniji, sada je nađena također u potocima na planini Peristeru u južnoj Makedoniji.

Kratka dijagnoza vrste *Gammarus abscisus*, n. sp.:

Dužina tijela do 11,5 mm. Metazomalni segmenti su po cijeloj leđnoj površini pokriveni kratkim dlakama. Urozom je nizak, urozomiti nose po jednu leđnu i po dvije bočne grupe trnova i dlaka.

Oči su malene, bočne glavene ploče su zaobljene. Antena 1 je kratka, dostiže oko polovine dužine tijela. Antena 2 je tanka, relativno slabo dlakava, dlake nisu duže od prečnika samih segmenata na kojima one leže. Kalceole na biču antene 2 su uvijek prisutne.

Gnatopodi 1 i 2 su slabo dlakavi. Pereopodi 3-4 su slabo dlakavi. Pereopodi 5-7 imaju pretežno trnovite segmente 3-6. Daktilusi su tanki. Epimere su slabo šiljaste, i nose na donjem rubu trnove i dlake. Uropod 3 je slabo dlakav, njegova unutrašnja grana malo prelazi polovinu dužine vanjske grane. Telzon nosi na vrhu svakog lapa po 1-2 trna i po nekoliko kraćih dlaka.

Kratka dijagnoza vrste *G. accolae*:

Dužina tijela do 12,5 mm. Tijelo relativno slabo dlakavo. Mesosom je gladak, metasomalni segmenti nose na leđnom stražnjem rubu po nekoliko trnova i dlaka. Urozom je nešto izdignut i bočno stisnut.

Oči ovalne, bočne glavene ploče su zaobljene. Antena 1 je veoma duga, dostiže $3/4$ dužine tijela, i njen bič može imati do 44 segmenta.

Antena 2 je tanka i vrlo slabo dlakava. Bič je vrlo slabo spljošten i bez kalceola. Gnatopodi 1 i 2 su slabo dlakavi. Pereopodi 3 i 4 nose kratke dlake na stražnjem rubu. Daktilusi su kratki.

Pereopodi 5-7 imaju pretežno trnovite segmente 3-6, a njihovi daktilusi su kratki. Epimere su jako šiljaste, pretežno sa trnovima na distalnom rubu. Uropod 3 je vrlo slabo dlakav, njegova unutrašnja grana dostiže do polovine dužine vanjske grane, a ponekad je i kraća. Telzon je izdužen, i nosi na svakom lapu po 1-2 trna i po nekoliko kraćih dlaka.

Kratka dijagnoza vrste *Gammarus cantor*, n. sp.:

Dužina tijela do 12 mm. Metazom je gladak, urozom je nizak. Urozomit 1 samo sa srednjom grupom dlaka, dok su bočne grupe trnova i dlaka odsutne. Oči su ovalne, bočne glavene ploče zaobljene.

Antena 1 dostiže polovinu dužine tijela. Antena 2 nešto deblja nego kod *balcanicus*, relativno slabo dlakava. Bič je spljošten i po debljini liči na isti kod *G. fossarum*, kalceole su prisutne.

Gnatopodi 1 i 2 su prilično jako dlakavi, dlake duge.

Pereopodi 3 i 4 nose duge dlake na stražnjem rubu, a daktilusi su kratki. Pereopodi 5-7 nose na segmentima 3-6 pretežno trnove.

Epimere su slabije zašiljene, pretežno sa trnovima na donjem rubu. Uropod 3 je jako gusto dlakav, dlake su duge i pretežno glatke. Unutrašnja grana uropoda 3 dostiže oko 60 procenata dužine vanjske grane. Telzon nosi jako duge dlake i po 1-2 trna na svakom lobusu.

Kratka dijagnoza vrste

Gammarus monspeliensis agrarius, n. sp.:

Ova vrsta je veoma slična vrsti *Gammarus pulex pulex*, ali se od nje razlikuje po veoma visokim urosomalnim segmentima, po mnogo jače šiljastim epimerama i po dlakavijim segmentima 3-6 od pereopoda 5-7.

S druge strane, ova vrsta je veoma slična vrsti *G. monspeliensis* opisane iz južne Francuske, ali se ssp. *agrarius* razlikuje od nje po znatno kraćoj anteni 1, jače dlakavim pereopodima i dužom unutrašnjom granom uropoda 3.

Kratka dijagnoza vrste *G. dulensis* (S. Kar. 1929):

Dužina tijela do 12 mm. Tijelo je znatno dlakavije nego kod *G. balcanicus* grupe ali slabije dlakavo nego kod *G. fossarum*. Oči ovalne, bočne glavene ploče zaobljene. Antena 1 dostiže polovinu dužine tijela. Antena 2 vrlo slabo dlakava, njen bič je tanak kao kod *G. fossarum* i nosi kalceole.

Gnatopodi su srednje dlakavi. Pereopodi 3 i 4 nose kraće dlake nego *G. fossarum*, ali su dlakaviji nego *G. balcanicus*. Pereopodi 6-7 imaju drugi segment pokriven dlakama po unutrašnjoj površini, dok su segmenti 3-6 pokriveni pretežno trnovima, a daktilusi su kratki.

Epimere su srednje šiljaste, i nose dlake i trnove na donjem rubu. Uropod 3 je vrlo slabo dlakav, njegova unutrašnja grana dostiže polovinu dužine vanjske grane. Telzon izdužen, sa po 1-2 distalna trna i po nekoliko kratkih dlaka na svakom lobusu.

Kratka dijagnoza vrste *G. rambouseki* (S. Kar. 1931):

Dužina tijela do 10 mm. Oči male, bočne glavene ploče zaobljene. Antena 1 je kraća od polovine dužine tijela. Antena 2 je prilično gusto dlakava, njen bič je relativno tanak i bez kalceola.

Gnatopodi su kratko dlakavi. Pereopodi 3-7 su kratki. Pereopodi 3-4 nose duge dlake na stražnjem rubu. Pereopodi 5-7 nose duge dlake na prednjem rubu 4-5 segmenta, dok nema dlaka po unutrašnjoj površini drugog segmenta.

Epimere su slabo šiljaste i nose dlake i trnove na donjem rubu. Uropod 3 je kratak, sa dugom drškom. Unutrašnja grana dostiže 70 procenata dužine vanjske grane: obje grane nose veliki broj glatkih dlaka sa obje strane. Telzon je relativno širok, sa po jednim distalnim trnom i većim brojem dugih dlaka na svakom lobusu.