CONTRIBUTIONS TO THE KNOWLEDGE OF AMPHIPODS (CRUSTACEA: AMPHIPODA) FROM ROMANIA.
III. AMPHIPODS FROM SOUTH-WESTERN DOBROGEA

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Chez *G. pulex* on effectue des observations sur les exemplaires pigmentés et non pigmentés. La sousespèce de *Niphargus* est pour la première fois signalée en Roumanie (elle a été décrite du NE de la Bulgarie).

The best known zones of Dobrogea concerning the fauna of amphipods are the Danube Delta and the Black Sea coast.

Its Southern half, with plateaus and dry limestone valleys, sometimes having a little water, but with an interesting hypogean network, which was investigated especially in its Eastern part: Casimcea (Botoşâneanu, Negrea Burghele, Dancău, Decou, 1959), Techirghiol (Băcescu, 1959), Agigea, Techirghiol, Mangalia and surroundings (Dancău, 1963, 1964, 1970) (Fig. 1).

Two epigean species was identified since now: *Gammarus balcanicus* Schäferna (Casimcea) and *G. pulex* L. (Techirghiol) and three hypogean species: *Niphargus dobrogicus* Dancău, 1964, *N. gallicus* Schellenberg and *Pontoniphargus racovitzai* Dancău, 1970, the last one belonging to a new genus for science, endemic in Romania as it is known since yet, *N. dobrogicus* being found also in Bulgaria on the Black Sea coast.

The „Grigore Antipa“ National Museum of Natural History from Bucharest has studied the fauna from South-Western Dobrogea between 1993 and 1995 for completing the faunistical inventory of the region, sporadically – or even not at all approached since now – for all the animal groups.
Fig. 1 – Recording places for amphipods from SE Romania and NE Bulgaria
MATERIAL AND METHOD

The material was represented by 368 specimens of amphipods, collected in 4 limnocrene collected springs, on partially dried valleys.

Negureni – two wells (in the Cișmelelor Forest), arranged for watering the animals, non covered, with stone drains deep of 0.5 m, not cleaned. These are linked with a system of storage of the underground waters and their conduct till the locality Negureni supplying it with drinking water. Deep layer of vegetal detritus in the drains (these are old wells, built about the 1930 years). Shady biotope. (Fig. 2). The collectings were made in 25.VI.1995.

Şipote – well on the outskirts of the locality, on the Urluia valley (dried) arranged for watering animals (like the two ones from Negureni), intensely used for watering, not cleaned, a few vegetal detritus, deep silt on the bottom, with larva of Erystalis sp., an indication of organic pollution compared to the other investigated wells. The sample was collected in 17.V.1994.
Fig. 3 – *Gammarus balcanicus* Schäferna, 1922 A-C, male; D, E, female; A, uropod 3; B, telson; C, telson; D, uropod 3; E, telson.
Furnica – well on the slope of a limestone hill, at 100 m South-East of the Dumbrăveni forest; arranged in the same way, clean water, without gross vegetal detritus (dead leaves), more utilized for human use as for animal watering; at 2 km North from the locality Furnica. The sample was collected in 24.VI.1995.

RESULTS

There were identified 3 species, belonging to 2 genera and 2 families, 2 epigean and one hypogean.

FAMILY GAMMARIDAE

*Gammarus balcanicus* Schäferna, 1922

(Figs 3, 22)

Collected only at Sipote: 4 ♂, 5 ♀.

Description

Body length: the males, 12.25–15.5 mm, the females, 8.9–10.9 mm.

Uropods 3 ♂ (Fig. 3 A) has the distal article a little shorter than of the specimens mentioned by Cărăuşu and coll. (1955), also with more spines.

Telson ♂ (Fig. 3 B, C) shows a variability of the number of terminal spines of the lobes: 1–3, more often by two; spines on the surface of the lobes and towards the inner edge.

Uropod 3 ♀ (Fig. 3 D) shorter and broader than the male’s one, with more setae on the outer edge of exopod and more spines on the inner edge of endopod.

Telson ♀ (Fig. 3 E), lobes having 2 terminal spines; less lateral spines and also on the lobe’s surface; longer setae than in male.

Remarks

The species was since now recorded only from Isaccea (Petrescu, 1994) and Casimcea, only from rivulets, not from springs.

*Gammarus pulex* L., 1758

(Figs 4–17, 22)

Identified only at Negureni, in both wells. Dr. Corneliu Pârvu warned me that there are also some unpigmented amphipods together with pigmented ones. I collected from each well one sample – 350 specimens, 278 of them pigmented and 72 unpigmented (122 ♂, 228 ♀). The
Fig. 4 – *Gammarus pulex* L., 1758 Pigmented male A. head; B. epimeral plates; C. antennula; D. antenna; E. labium; F. left mandible; G. maxillula; H. maxilla.
Fig. 5 – *Gammarus pulex* L., 1758 Pigmented males. A. maxilliped; B. gnathopod 1; C. gnathopod 1. detail; D. gnathopod 2; E. gnathopod 2. detail.
Fig. 6 – *Gammarus pulex* L., 1758 Pigmented males A, gnathopod 1, detail; B, gnathopod 2, detail; C, D, pereopods 1.
Fig. 7 – Gammarus pulex L., 1758 Pigmented male A, pereopod 2; B, pereopod 3; C, pereopod 4; D, pereopod 5.
Fig. 8 – *Gammarus pulex* L., 1758 Pigmented males A. uropod 3; B, C, telsons.
proportion of unpigmented specimens in the two samples was: 13.5% in the first well and 29.03% in the second one. All specimens belong to the species *G. pulex*. In the rivulet supplied with water by the wells all specimens were pigmented.

**Description**

I studied the variability of the morphological characters to the pigmented and unpigmented specimens.

**Pigmented males** (Figs 4–8)

Our specimens present a great morphological variability, excepting some characters – shape of the head, of the epimeral plates and the number of spines on them, the shape of mouth pieces, of the antennae, gnathopods, uropods and of the telson. The other characters present a great variability, so as Pinkster (1970) noted it.

I am figuring the drawings of the head, epimeral plates, antennae and mouth pieces all of them being absent in the descriptions of Cărăuşu, Dobreanu and Manolache (1955).

*Urosome* of all studied males has a lateral spine on the 1st and 3rd segments and a lateral and a dorsal spine in the 2nd segment.

*Antennula* (Fig. 4 C), the main flagellum formed of 21–28 articles; accessory flagellum, 4–5 articles.

*Antenna* (Fig. 4 D), flagellum formed of 10–13 articles.

The variability is manifested at:

*Gnathopod 1* (Figs 5 B, C, 6 A), the number of spines and especially of spinules on the propodus.

*Gnathopod 2* (Figs 5 D, E, 6 B), the number of spines on the propodus.

*Pereopod 1* (Fig. 6 C, D), long or short setae on the outer margin of merus, carpus and propodus, right or curly on merus.

*Pereopods 4 and 5* (Fig. 7 C, D), the number of spines and hairs on the articles.

*Uropod 3* (Fig. 8 A), the number of spines on the exopod and endopod. I identified a specimen with both uropods of the 3rd pair reduced, with a few curved spines, malformation probably determined by an endoparasite.

*Telson* (Fig. 8 B, C) the number of setae and terminal spines of the lobes even on the same specimen (1 or 2).

**Pigmented females** (Figs 9–12)

*Body length*: 7.7–9.8 mm.

*Urosome* like in the males as it concerns the number and disposition of the spines.

*Antennula* with the main flagellum formed of 20–23 articles; the accessory flagellum of 3–4 articles.
Fig. 9 – *Gammarus pulex* L., 1758 Pigmented females A. antenna; B, C, D gnathopods 1. details; E, F, gnathopods 2, details.
Fig. 10 – *Gammarus pulex* L., 1758 Pigmented females A. pereopod 1; B. pereopod 2; C. pereopod 3; D. pereopod 4; E. pereopod 5.
Fig. 11 – *Gammarus pulex* L., 1758 Pigmented females

A. normal shaped uropod 3;
B. C. anomalous uropods 3.
Antenna (Fig. 9 A) with the flagellum formed of 6–10 articles.
Gnathopods 1 and 2 (Fig. 9 B–F) with a greater variability than in males in the number and disposition of the spines on the propodus.
Pereopods 1 and 2 (Fig. 10 A, B) without curly hairs.
Pereopods 3–5 (Fig. 10 C–E) with great variation concerning the number of spines and hairs on the articles, especially on propodus.
Uropod 3 (Fig. 11 A–C) may also present the females malformations determined by parasitism (as well on both uropods Fig. 11 B, as only on one of the Fig. 11 C). By normal specimens, the endopod may have a variable number of spines on the inner margin.
Telson (Fig. 12) with a greater variation than in the males of simple setae (length, disposition), of sensitive hairs (on the lower third of lobes) or their absence and of the spines (shorter, longer, lobes with the same number or a different one, 1–3 terminal spines or even a lateral one).

Unpigmented males (Figs 13–15, 17 A, B)
Body length: 9.75–11.5 mm.
Urosome. the first segment may have also a dorsal spine besides the lateral one.
Antennula with the main flagellum formed of 23–30 articles; the accessory flagellum of 4–5 (more often 5).
Antenna with the flagellum formed of 9–14 articles.
Gnathopods 1 and 2 (Fig. 13) have greater variability concerning the spines than by the pigmented specimens.
Pereopod 1 (Fig. 14 A) may have curly hairs on merus and on carpus.
Pereopods 3–5 (Fig. 14 B–D) with a variable number of spines on the articles.
Uropod 3 (Fig. 15) with a variable number of spines especially on endopod, which may also be without spines on the inner margin (Fig. 15 A). I identified a male with aberrant uropods, both of them shorter than the normal ones, the left one being shorter than the right one, with curved spines, in little number (more numerous on the inner margin of endopod at the right uropod Fig. 15 C).
Telson (Fig. 17 A, B), as by the pigmented males, presenting variations in the number and disposition of setae (the apical ones longer than the spines, a constant character in all specimens) and in the number of terminal spines of the lobes (variations at the same specimen – 1 or 2).

Unpigmented females (Figs 16, 17 C, D)
Body length: 7–8.5 mm.
Urosome with more spines. On the first segment there may appear dorsal spines, on the second segment 1–2 lateral spines and 1–2 dorsal ones; the third segment with 1–3 lateral spines.
Fig. 12 – *Gammarus pulex* L., 1758 Pigmented females A–F, different telsons.
Fig. 13 – *Gammarus pulex* L., 1758 Unpigmented males. A, gnathopod 1; B–E, gnathopods 1. details: F, gnathopod 2; G, H, gnathopods 2. details.
Fig. 14 – *Gammarus pulex* L., 1758 Unpigmented male A, pereopod 1; B, pereopod 2; C, pereopod 4; D, pereopod 5.
Fig. 15 – *Gammarus pulex* L., 1758 Unpigmented males A. normal shaped uropod 3; B. C. anomalous uropods 3 of the same male (B, left; C, right).
Fig. 16 - *Gammarus pulex* L., 1758 Unpigmented females A, B, gnathopods 1, details; C, pereopod 1; D, pereopod 3; E, pereopod 4; F, pereopod 5.
Fig. 17 – *Gammarus pulex* L., 1758 Unpigmented specimens A. B. telsons of males; C. D. telsons of females.
Gnathopod 1 (Fig. 16 A, B) with less variability of the number and disposition of the spinules of the propodus. The median spine may lack and the spinules of the outer margin may be longer (Fig. 16 A) or with the same conformation as the pigmented females.

Pereopod 1 (Fig. 16 C) without curly hairs.

Pereopods 3–5 (Fig. 16 D–F) with a variable number of spines and hairs.

Uropod 3 with less spines on exopod and endopod (three in a row on the outer margin of exopod, two in a row on the inner margin of endopod). I did not find unpigmented ♀♀ with aberrant uropods.

Telson (Fig. 17 C, D) with variability only by setae, hairs, and sensitive hairs. The lobes have constantly 2 terminal spines.

Remarks

In conclusion, at this moment, the study of the morphology of these specimens, although there are some differences, for example the urosome of unpigmented ♀♀ with more spines, can not determine me to affirm that there are two distinct populations and also that there could exist a correlation between their way of life, their biotope (excepting the pigmentation) and their morphology.

It is most likely that the entire population is proceeding from the subterranean waters, in contact with the light, the specimens grey pale becoming again pigmented, as Pierce and Cox (1977) observed in the waters which are draining a cave from England.

It follows that a more thoroughly study permits to clear up the origins of the population of *Gammarus pulex* from the two wells in Negureni, the limestone zone from Southern Dobrogea offering diverse possibilities of refuge.

It is the first recording of malformations determined by parasitism to this species in Romania. There were previous cases detected to some populations of *Gammarus kischineffensis* Schellenberg in Northern Moldova (Florescu, 1941) and to *Gammarus balcanicus* Schäferna in the Piatra Craiului Mountains and in the Maramureş Depression (Petrescu, 1994, 1996). *Gammarus pulex* was since now mentioned in Romania only in Dobrogea, in the springs from Lanuri, in the locality Techirghiol by Băcescu (Cărăuşu and coll., 1955) and in the spring from the locality Urluchioi, at the Western extremity of the Techirghiol Lake, likewise by Băcescu (1959). The respecting springs were polluted and under way to become dry when the observations were made, while in the Cișmelelor Forest (Negureni) the development conditions were excellent ones.
Fig. 18 – *Niphargus carpathicus meridionalis* Dobreanu et Manolache, 1942 A, epimeral plates; B. antennula; C. left mandible; D. right mandible; E. maxillula.
**Niphargus carpathicus meridionalis** Dobreanu et Manolache, 1942  
(Figs 18–22)

The subspecies was described from Ceatalar (Batovo), a village in NE Bulgaria, on the Batova valley, in a well abandoned for 4 years, since 1938.

**Description**

*Body length:* 4.7–6.8 mm, bigger than to the specimens from Ceatalar.  
*Urosome* with 2 lateral spines on the 2nd and 3rd segments.  
*Epimeral plates* with a similar conformation as to the specimens from Bulgaria, but with more spines.

I am completing the figures for the subspecies with antennula, mouth pieces, gnathopods, pereopods and uropod 3 (in the original description there were presented only the epimeral plates and the telson).

*Antennula* (Fig. 18 B), the accessory flagellum does not exceed the second article of the main flagellum.  
*Mandible* (Fig. 18 C, D) resembling that of *N. ablaskiri romanicus* (Dobreanu et Manolache, 1942). Lacinia mobilis with a few denticles.

*Maxillula* (Fig. 18 E), the inner lobe with 2 subterminal setae and 2 terminal ones, the outer lobe with 7 spines, one of them pectinate (with 3 denticles) and 6 with a single denticle. The palp with 4 terminal setae and 4 subterminal ones. The palp is exceeding the base of the spines of the outer lobe, but not their tip.

*Maxilliped* (Fig. 19 A), the inner lobe with 3 broadened spines, does not exceed the first article of the palp. The outer lobe shorter than the second article of the palp, with 8 spines on the outer margin.

*Gnathopod 1* (Fig. 19 B), the propodus a little longer than broad, a strong spine with sensory bristle and other 4 ones shorter, pectinated. The dactylus with 5 hairs.

*Gnathopod 2* (Fig. 19 C), the propodus a little bigger than to the first pair; a big spine with sensory bristle and a little one pectinated. Dactylus with 2 hairs.

*Pereopod 1* (Fig. 20 A) with the basis longer than 1/3 of total length of the pereopod; 3 spines on inner margin of merus; 3 on the outer margin of carpus; 4 on the outer margin of propodus; dactylus as long as its claw.

*Pereopod 2* (Fig. 20 B) with basis broader than by the first pair; 2 spines on the inner margin of merus; 3 on carpus; 3 on propodus; dactylus equal with its claw.

*Pereopod 3* (Fig. 20 C) shorter than pereopods 4 and 5. The claw a little longer than the dactylus.

*Pereopods 4 and 5* (Fig. 20 D, E) with basis longer than broad, subeuals: claw shorter than dactylus.

*Pleopods* with 2 retinacula.

*Uropod 3* (Fig. 21 A), exopod 7 times longer than endopod; proximal article of exopod 4.7 times longer than distal one; spines on its outer
Fig. 19 – *Niphargus carpathicus meridionalis* Dobreanu et Manolache, 1942 A. maxilliped; B. gnathopod 1; C. gnathopod 2.
Fig. 20 – *Niphargus carpathicus meridionalis* Dobreanu et Manolache, 1942. A. pereopod 1; B. pereopod 2; C. pereopod 3; D. pereopod 4; E. pereopod 5.
margin, spines and long simple setae on the inner one, 3 spines in a row at
distal end of first article, on one side and on the other one of second article;
endopod with a spine and a simple seta, terminals. Resembles the uropod 3
of *Niphargus ablaskiri romanicus*, but the last one has plumose setae on
inner margin of exopod and a less conic endopod. It has the same
conformation on both sexes.

**Remarks**

The great majority of the morphological characters, especially the
most important ones, more constant – the shape and the spines on the
epimeral plates, the shape of gnathopods and of telson are alike by our
specimens and by those from Ceatalar.

There are still some differences:
- **maxillula** (Fig. 18 E) – at the specimens from Bulgaria there are
also 2 spines with 2–4 denticles each. The palp has more setae by our
specimens (8 versus 4–6).
- **maxilliped** (Fig. 19 A) – the inner lobe with 3 spines versus 4, the
outer lobe shorter (it does not exceed the first article of the palp).
- **pereopod 5** (Fig. 20 E) with a longer claw.
- **pleopods** with 2 retinacula, not with 3.
- **telson** (Fig. 21 B) with one hair on each inner margin of lobes,
absent at the Bulgarian specimens.

The variability of the number of denticles on the spines of the outer
lobe of maxillula, of spines on the inner lobe of maxilliped and of retinacula
is also present to the related species *N. ablaskiri romanicus*.

This subspecies was described in 1942 by Dobreanu and Manolache
as belonging to Romanian fauna, refering to the country’s border of that
time. Since then it was no more recorded, even in Bulgaria. Therefore, the
identification of the specimens from Furnica means its first mention in
Romania, with the present borders, but also the second founding of the
species after 53 years. There are also other species of the genus *Niphargus*
common in SE Romania and NE Bulgaria, a reason asserting the theory of
the existance of vast phreatic connections in this zone: *N. dobrogicus*
Dancău found at Schitu, 2 Mai and Vama Veche in Romania and at Chabla
in Bulgaria, near the Black Sea (Andreev, 1972). Like this species could
spread also *N. carpathicus meridionalis*. Now there is a complete lack of
data about the hypogean amphipods from NE Bulgaria, in proximity of the
zone I studied in Dobroega. Andreev mentioned only a *Niphargus* sp. in
the zone of Baltchik (where exists also Ceatalar).

The comparative study in the future of a greater number of specimens
proceeding from Romania and Bulgaria (from the proximity of the type
locality Ceatalar) could clarify the importance of the observed differences.
At this moment nothing is known about the type material, if it still exists,
where is it deposited, however there are enough clues that it is lost.
Fig. 21 – *Niphargus carpathicus meridionalis* Dobreanu et Manolache, 1942 A, uropod 3; B, telson.
The geographical area of the species of amphipods from SW Dobrogea

The areas of the three species are overlapping in this zone of Romania. Their repartition in the 3 localities with different ecological conditions may be explained on the one hand by the fact that 2 species are epigean (*G. pulex* may live also in subterranean environment, but has a biology adapted to the epigean environment) and one hypogean (Fig. 22).

On the other hand, *G. balcanicus*, a preglaciar species (Karaman, 1968) tends to regain its ancient area, it has a greater ecological plasticity than *G. pulex* being able to live also in waters with a feable organic loading. *G. pulex* is a glaciar immigrant, less adapted, especially concerning its reproduction, seems to be more limited to the extreme SE Romania and to NE Bulgaria (mentioned in 1939 by Dobreanu and Manolache on the Batova valley).

The area of the subspecies *Niphargus carpathicus meridionalis* Dobr. et Man. is much more limited, probably only to the limestony valleys with springs from SE Romania and NE Bulgaria, where it could be endemic.

I have the opportunity to better localize the area of this subspecies, mentioned with a note of interrogation by Barnard and Barnard (1983) in South-Eastern Romania.

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CONTRIBUȚII LA CUNOÂȘTEREA AMFIPODELOR (CRUSTACEA: AMPHIPODA) DIN ROMÂNIA:

III. AMFIPODE DIN DOBROGEA DE SUD-VEST

REZUMAT

specie este găsită acum practic în toată Dobrogea; G. pulex fusese semnalată doar în 1955 de Băcescu în izvoare din Sudul Lacului Techirghiol; cea de a treia specie este la prima colectare în România (descrișă de la Ceatalar = Batovo din Nord-Estul Bulgariei) și regăsită după 53 ani.

În cazul speciei G. pulex se face un studiu al variabilității morfologice a exemplarilor pigmentate și nepigmentate colectate din două fântâni din Negureni. Se evidențiază malformațiile ale uropodului 3 produse de endoparaziti (posibil de acanthocephali), necunoscute până acum în România la această specie.

Pentru subspecia de Niphargus se completează figurarea și descrierea și se semnalează deosebiri față de descrierea materialului din Bulgaria.

Sunt făcute considerații privind răspândirea acestor specii în România.

REFERENCES


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