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CRITICAL REMARKS TO THE FOSSIL AMPHIPODA WITH DESCRIPTION OF SOME NEW TAXA

(Contribution to the knowledge of the Amphipoda 137).

Abstract

Critical remarks to some fossil Amphipoda is given and some new taxa are established and described: *Alsacomelita semipalmata*, n. gen. n. sp. from Alsace, NE. France (Oligocene), genus *Condiciogammarus* n. gen. (type species: *Gammarus retzi* Maikovsky 1941) from Alsace, NE. France (lower Oligocene) and new genus *Jubeogammarus*, n. gen. (type species: *Gammarus alsaticus* Van Straelen 1924) from Pechelbronn, NE. France (lower Oligocene).

The list of all known fossil Amphipoda with their synonymy and bibliography is presented, and the key to determination of all fossil genera of Amphipoda is given.

Introduction

Although there are known over 1500 genera and 8.000 species of *Amphipoda* living in the fresh, brackish and sea waters over the World, only about 8 fossil genera and 18 fossil species are known.

All known taxa of fossil *Amphipoda* belong to the suborder *Gammaridea*; the fossil number of the suborders *Ingolfiellidea*, *Hyperiidea* and *Caprellidea* are still unknown. So scarce number of fossil *Amphipoda* is discovered and known prevalently because it was never took a big attention to the detailed investigations of geological strata with higher probabilities of containing of fossil amphipods. There were never organized a special geological inve-

stigations regarding the intensive search of microcrustacea including *Amphipoda*. All known species have been found occasionally, often during the geological investigations regarding oil or similar sources, or in the pieces of amber.

The best preserved specimens are these found in amber (*Palaeogammarus*), where external morphology is very well visible and known.

We can expect the discovering of numerous new fossil *Amphipoda* only if we will start to search them intensively, because amphipods can be preserved well in various geological strata and sediments.

The absence of known fossil primitive amphipods take the reconstruction of evolution of *Amphipoda* very difficult. On the other hand, almost all known fossil amphipods are already highly specialized, what the study of evolution of *Amphipoda* makes still more complicated.

Based on the present value of taxonomic characters of recent amphipods on specific and generic levels, we analyzed the taxonomic characters of some of known fossil amphipods. Based on these analysis, we separate some species into different distinct genera and species of fossil amphipods, mentioned below.

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TAXONOMIC PART

KEY TO THE FOSSIL GENERA OF AMPHIPODA (GAMMARIDEA)

1. Coxae 1-4 very small and shallow (antennae 1 and 2 short, pereopods 5-7 very long, linear HELLENIS Petunnikov 1914
- Coxae 1-4 moderate to long 2
2. Metasomsegments 1-3 carinate, with dorsal tooth (antennae 1 and 2 very short and stout) 3
- Metasomsegments 1-3 without dorsal teeth, smooth 4
3. Rostrum short. Mesosomal segments 1-5 smooth
ANDRUSSOVIA Derzhavin 1927
- Rostrum absent. Mesosomal segments 1-7 each with one tubercle at lateral side PRAEGMELINA Derzhavin 1927
4. Peduncle of antennae 1 and 2 long and very strong, subequal, conical CONDICIOGAMMARUS n. gen.
- Peduncle of antennae 1 and 2 distinctly unequal to each other in shape, shorter 5

5. Peduncle of antenna 2 strong, stronger and larger than peduncle of antenna 1 ALSACOMELITA n. gen.
 — Peduncle of antenna 2 is slender 6
6. First peduncular segment of antenna 1 is strong, peduncular segments 2-3 more slender; segment 2 of pereopods 5-7 ovoid, lobed (antenna 1 is longer than antenna 2)
 PALAEOGAMMARUS Zaddach 1864
 — Peduncle of antenna 1 slender, segment 2 of pereopods 5-7 unlobed 7
7. Antenna 2 is more than twice longer than antenna 1
 JUBEOGAMMARUS n. gen.
 — Antenna 2 as long as or shorter than antenna 1
 (GAMMARUS Fabr. 1775)

Genus ALSACOMELITA n. gen.

Syn.: *Melita* Hessler 1969: R 390; Hurley 1973:214.

Mai k o v s k y (1941) described one fossil species of *Amphipoda* from the potash of Alsace (stratum sanoissian, Lower Oligocene, NE. France). This species has been described under the name *Melita palmata* (Montagu), one seawater species recently present along the coast of Western Europe and the Mediterranean Sea.

One detailed analysis of the taxonomic characters of this fossil species mentioned and figured (photographies) by M a i k o v s k y, and the taxonomic characters of *Melita palmata*, as well as the genus *Melita* in general, showed that the fossil species from Alsace mentioned under the name of *Melita palmata*, neither belong to the species *Melita palmata*, nor to the genus *Melita*, and we erected a new names for it, *Alsacomelita semipalmata*, n. gen. n. sp.

Diagnosis: Based on descriptions and photographs of M a i k o v s k y, genus *Alsacomelita* is similar to genus *Melita*, but with some differences. Coxae 1-4 moderate, coxa 1 very narrow, coxa 2 nearly two times larger than coxa 1, coxa 3 less broad than coxa 2 (in genus *Melita*, coxa 1 is as broad as coxa 2, often dilated distally, but not narrow; coxa 3 is as broad as coxa 2 (nearly).

Antenna 1 long, with rather strong first peduncular segment. Antenna 2: peduncle is longer and stronger than peduncle of antenna 1 (nearly subequal strong in *Melita*); peduncular segment 5 reaching half of segment 4 (nearly subequal long in *Melita*); peduncular segments 4 and 5 together slightly longer than ped. segment 3 (segment 4-5 much longer than ped. segment 3 in *Melita*).

Head higher than large (usually as large as or larger than high in *Melita*).

Uropod 1 outer ramus stronger than inner ramus (subequal strong in *Melita*). Uropod 3 outer ramus very long, recurved (shorter, straight in *Melita*). Accessory flagellum and telson unknown.

Fossil genus, Oligocene.

Type species: *Alsacomelita semipalmata*, n. sp.

ALSACOMELITA SEMIPALMATA n. sp.

Syn.: *Melita palmata* (nec Montagu 1804) Maikovsky 1941:45, pl. 7, fig. 63, 64, 64a; pl. 8, fig. 66, 67, 67a, 68; pl. 13, fig. 96, 97; pl. 14, fig. 99, 100; Hessler 1969: R 390; Hurley 1973:214.

Description (based on Maikovsky description and figures): Head rather voluminous, higher than large, nearly two times larger than first mesosomal segment; anterior margin of head in nearly two times higher than posterior margin. Anterior margin of head is semicircularly incised on the point where antenna 1 is attached to the head, and obliquely truncate on its inferior corner.

Eyes reniform, sitting under and behind antenna 1. Antenna 1 long, probably reaching body-length; peduncle 3-segmented, peduncular segments 1 and 2 are nearly subequal long, segment 3 reaching half of segment 2; peduncular segment 1 is rather strong, segments 2 and 3 are more slender. Main flagellum consisting of 22-25 segments, accessory flagellum unknown.

Antenna 2 seems to be stronger and shorter than antenna 1; peduncle is stronger and longer than that of antenna 1; peduncular segment 2 (segment 1 in Maikovsky's description) is very short and very strong; peduncular segment 3 (2 in Maikovsky's description) is more slender and nearly 2.5 times longer than ped. segment 2; peduncular segments 4 and 5 (3 and 4 in Maik. description) are together slightly longer and more slender than peduncular segment 3 (2 in Maik. descr.); ped. segment 5 (4 in Maik. des.) is half as long as ped. segment 4 (3 in Maik. des.); flagellum is nearly 2 times stronger than that of antenna 1, visible part of flagellum is consisting of 18 articles.

Mesosomal segments 1-4 nearly of the same size, segments 5 and 6 are slightly larger and similar to each other; segment 7 is still more large. Metasomal segments 1-3 are the largest segments of the body, nearly 2 times larger than first mesosomal segment.

Urosomal segment 1 is smaller than last metasomal segment, urosomal segments 1-3 strongly decreasing in size toward urosomal segment 3.

Coxae are poorly preserved. Coxae 1-4 are long and subrounded at ventral (inferior) margin. Coxa 1 very narrow, coxa 2 is nearly twice larger than 1; coxa 3 is less broad than 2; coxa 4 is the largest coxa, it is »less high at its posterior margin than at its anterior margin«. Coxae 5-7 are shorter than coxae 1-4. Coxa 5 short, bilobe, its anterior lobe is larger than posterior one. Coxa 6 is little longer than coxa 5, having shape of trapeze, with longer basis at inferior margin; this margin is slightly incised (i. e. coxa 6 is slightly bilobe). Coxa 7 is the smallest coxa, semicircular.

Regarding the gnathopods and pereopods, Maikovskiy used different unusual names for single segments of the legs, and I tried to identify his names with valid names of segments present in recent literature (»hanche« = segment 2; »cuisse« = segments 3-4; »tibia« = segments 5-6; »tarsus« = segment 7; »fausse pince« = segment 6-7 or gnathopod). In this light, description of the legs is following:

Gnathopod 1: segment 5 is longer than segment 6, conus-like with basis directed toward head; segment 6 is ovoid-elongate, provided with nail (dactyl) recurved toward down.

Gnathopod 2: segment 5 is much larger than that of gnathopod 1 in the point of attachment of segment 5 with segment 6; superior part is not visible and it is not possible to see the shape. Segment 6 is larger than that of gnathopod 1, subrounded, provided with one nail (= dactyl) like that in gnathopod 1.

Pereopod 3: segment 2 which is band-like, rather long; segment 3 is very short, segment 4 is slender and long; segment 5 is still more slender and almost as long as segment 4.

Pereopod 4: of this pereopod is visible only inferior part, i. e. segments 4-7: segment 6 is slightly shorter than segment 5, segment 7 with straight nail.

Pereopods 5-7: segment 2 of these pereopods is directed toward posterior part of body. Pereopod 5: segment 2 is lamellar, long and ovoid; segment 3 is very short, segment 4 is almost as long as segment 2, but two times less broad than segment 2. Segments 5-6 are remarkably more slender and much more longer than segment 4; segment 7 (dactyl) is short, with small nail. Pereopods 6-7 and pleopods are not visible.

Uropod 1: peduncle reaching tip of last body-segment; outer ramus is stronger and slightly shorter than inner ramus; inner ramus is slender.

Uropod 2: peduncle is shorter than that in uropod 1; among both rami, outer ramus is only visible, it is almost as strong as that of uropod 1.

Uropod 3: peduncle as long as urosomite 3, biramous: inner ramus is very short and slender; outer ramus is very long and very strong, recurved, forming one large «saillie en arrière». Telson unknown.

Variability: Specimens from pl. 8, fig. 66 and pl. 14, fig. 99 (sondage in Schoenensteinbach on depth of 498 meters) are slightly longer, eyes are oval and of medium size, sitting on anterior margin of head, behind antenna 2. Last pair of legs is slightly less strong than that of type specimens. Terminal segment is bipartite (? telson).

Specimens from pl. 7, fig. 63 and pl. 13, fig. 96 (sondage in Hombourg, depth 192 meters) are with more slender body; eyes reniform, sitting behind antenna 1. Antenna 1 is more slender than that in type-specimens, main flagellum consisting of cylindric 25 segments, very fine and long; antenna probably reaching body-length. Antenna 2 reaching nearly 2/3 of body.

Localities: Bassin of potash of Alsace (NE. France), deposit Sanoissian, «zone salifère moyenne, niveau supérieur» (Lower Oligocene):

— sondage in Schoenensteinbach-D. P. II, on 498 meters depth (specimens on fig. 66 and 99) and on 525 meters depth (specimens on figs. 64, 64a, 97 of Maikovskiy, 1941);

— sondage in Hombourg — D. P. III, on 192 meters depth (specimens on fig. 63 and 96 of Maikovskiy, 1941);

— sondage in Heiteren — D. P. V., on 670 meters depth (specimens on fig. 68 and 100 of Maikovskiy, 1941).

Loc. typ.: sondage in Schoenensteinbach — D. P. II. on 525 meters depth (bassin of potash in Alsace, NE. France, Sanoissian, Lower Oligocene).

Holotype: specimen figured on pl. 13, fig. 97 of Maikovskiy, 1941; paratypes: specimens figured on pl. 7, fig. 64, 64a in Maikovskiy, 1941.

Other specimens: specimens figured on pl. 7, fig. 63; pl. 8, fig. 66, 67, 67a, 68; pl. 13, fig. 96; pl. 14, fig. 99, 100 (in Maikovskiy, 1941).

Fossil species, Lower Oligocene.

Remarks. *Melita palmata* (Montagu, 1804) differs from fossil species *Alsacomelita semipalmata*, n. sp. by: head broader than high, ovoid eyes; first peduncular segment of antenna 1 is relatively slender, ped. segment 2 is longer than ped. segment 1 in antenna 1; antenna 2 is as slender as antenna 1; peduncle of antenna 2 nearly as long as that of antenna 1; peduncular segment 2

of antenna 2 is short, normal; peduncular segment 3 of antenna 2 is two times longer than segment 2; peduncular segments 4-5 of antenna 2 combined are much longer than segment 3; ped. segment 5 is nearly as long as segment 4; flagellum of antenna 2 is consisting of less than 18 segments.

Mesosomal segments 5-7 nearly subequal broad. Coxa 1 hardly narrower than coxa 2, normal; coxa 3 is as broad as coxa 2; coxa 6 is shorter than coxa 5.

Segment 6 of pereopod 4 is not shorter than segment 5. Segments 5-6 of pereopod 5 are not or hardly longer than segment 4. Outer ramus of uropod 1 is slightly longer than inner ramus, but both rami are slender. Outer ramus of uropod 2 is slender also. Uropod 3 is neither very long nor recurved.

Evidently, *Alsacomelita semipalmata* remarkably differs from *Melita palmata* on specific as well as on generic level, nevertheless some unprecise Maikovskiy's data regarding some segments of pereopods.

On the other hand, we can not exclude the possibility that the specimens with reniform eyes (sondage Hombourg, 192 meters depth) (fig. 63 and 96 in Maikovskiy, 1941) belong to some other species.

Genus ANDRUSSOVIA Derzhavin 1927

Syn.: *Andrussovia* Derzhavin 1927:190; Hessler 1969: R 390; Hurley 1973:213; Barnard & Barnard 1983:543.

Type-species: *Andrussovia sokolovi* Derzhavin 1927 (selected by Birstein, 1960).

Taxa: *bogacevi* Derzhavin 1927; *sokolovi* Derzhavin 1927; *vassolevitschi* Derzhavin 1941.

Fossil genus (Miocene).

ANDRUSSOVIA BOGACEVI Derzhavin 1927

Syn.: *Andrussovia bogacevi* Derzhavin 1927: 191, text fig. 4, 5, pl. 3, fig. 7, 8; Hurley 1973:213; Barnard & Barnard 1983: 544.

Fossil species, Middle Miocene (Upper Sarmatian) (Groznyj, Caucasus, USSR).

ANDRUSSOVIA SOKOLOVI Derzhavin 1927

Syn.: *Andrussovia sokolovi* Derzhavin 1927:190, text fig. 3, pl. 3, fig. 5. 6; Hessler 1969: R 390, fig. 207/3; Hurley 1973:213; Barnard & Barnard 1983:544.

Fossil species, Middle Miocene (Upper Sarmatian) (Groznyj, Caucasus, USSR).

ANDRUSSOVIA VASSOLEVITSCHI Derzhavin 1941

Syn.: *Andrussovia vassolevitschi* Barnard & Barnard 1983:544.

Fossil species, Middle Miocene (Upper Sarmatian) (El' Dari, Caucasus, USSR).

Genus CONDICIOGAMMARUS n. gen.

Syn.: *Gammarus* (part.) Van Straelen 1931:62; Hessler 1969: R 389; Hurley 1973:214.

Diagnosis: Based on Maikovsky's description and figures, this genus is characterized by *Gammaridae*-like body. Antennae 1-2 nearly of the same shape and size; peduncle of antennae 1 and 2 are relatively long and very strong, conical, tapering distally; flagellum of both antennae is very slender and long. Pereopods very long, reaching distal end of uropod 3. Uropod 3 strong and long, biramous, rami long.

Type-species: *Gammarus Retzi* Maikovsky 1941.

Taxa: *retzi* (Maikovsky 1941).

Fossil genus, Lower Oligocene (Alsace, NE. France).

Remarks: Strong peduncles of antennae 1 and 2 are similar to these of some recent freshwater amphipods from Lake Baikal. Among fossil genera, very long and slender pereopods are known in genus *Hellenis* Pet. 1914 known from Lower Miocene of Caspian Basin (USSR), but genus *Hellenis* is provided with short antennae 1-2 and very short coxae.

Fossil genus *Palaeogammarus* Zadd. 1864, is provided with strong peduncle of antenna 1, but antenna 2 is slender, uropod 3 is short, etc.

Because of scarce knowledge of other taxonomic characters of genus *Condiciogammarus*, it was not possible to establish more precise place of this genus within the family *Gammaridae* and related families.

CONDICIOGAMMARUS RETZI (Maikovsky 1941)

Syn.: *Gammarus Retzi* Maikovsky 1941:48, pl. 7, fig. 65, 65a; pl. 14, fig. 98.

Gammarus retzi Hurley 1973:214; Barnard & Barnard 1983:470.

Diagnosis: Antennae 1 and 2 are subequal strong and long, with conical strong peduncle tapering distally, and with long, very slender flagella. Mesosomal segments 5-7 are the largest segments of the body. Metasomal and urosomal segments diminished toward the posterior part of the body.

Pereopods 3-4 with band-like segment 2, segment 3 short; segments 4, 5 and 6 are long, segment 7 with short nail (? »tarse à deux membres«, probably error). The pereopods are very long, reaching posterior distal tip of uropod 3. Uropod 3 very long, biramous, rami long, probably nearly subequal long.

Localities: Bassin of potash in Alsace (NE. France), deposit Sanoissian, »zone salifère moyenne, niveau supérieur« (Lower Oligocene):

— sondage in Schoenensteinbach — D. P. II, in 483 meters depth, many fossil specimens.

Loc. typ.: Schoenensteinbach, Alsace, 483 m. depth.

Holotype: fossil specimen figured on pl. 14, fig. 98 (in Maikovsky, 1941).

Fossil species, Lower Oligocene.

Genus GAMMARUS Fabricius 1775

Syn.: *Gammarus* Van Straelen 1931:390; Hessler 1969: R 390; Hurley 1973:214; Barnard & Barnard 1983:463.

Remarks: Probably all fossil species described and known under genus *Gammarus* Fabr. belong to other genera. But, based on scarce knowledge of their taxonomic characters, it was not possible for us to recognize the generic differences and characteristics of these species.

GAMMARUS BELLI G. Karaman 1984

Syn.: *Gammarus fluviatilis* (nec. Milne Edwards) Bell 1921: 7 (homonym); Van Straelen 1924:3 (327); Van Straelen 1931: 63; Hurley 1973:214; Barnard & Barnard 1983:470.

Gammarus belli G. Karaman 1984:

Fossil species, Pleistocene (Scotland: Kirkland, Fife).

GAMMARUS OENINGENSIS Heer 1865

Syn.: *Gammarus oeningensis* Heer 1865:353, fig. 209; Van Straelen 1924:2 (326), 7 (331); Van Straelen 1931: 63, 84, 95; Hurley 1973:214; Barnard & Barnard 1983: 470.

Fossil species, Sarmatian, Miocene (Oeningen, S. Germany). Probably freshwater species.

GAMMARUS OENINGENSIS MINIMUS Petunnikov 1914

Syn.: *Gammarus oeningensis* var. *minimus* Petunnikov 1914: —; Van Straelen 1924:2 (326); Derzhavin 1927: 185; Van Straelen 1931:63; Hurley 1973:214; Barnard & Barnard 1983:470.

Fossil species, Lower Miocene (village Binagady in Baku region, Caspian Basin, USSR).

Remarks: Doubtful taxon fide Derzhavin 1927; the validity of this taxon must be reexamined based on recent taxonomic values of morphological characteristics of the *Amphipoda*. Probably freshwater species.

GAMMARUS PRAECYRIUS Derzhavin 1941

Syn.: *Gammarus praecyrius* Barnard & Barnard 1983:470.

Fossil species, Miocene (Caucasus, USSR).

GAMMARUS SP. (A)

Syn.: *Gammarus sp.* Förster 1888:147, 165; Förster 1892:242, 243, pl. 12, fig. 15a, b, c, d, e, f; Van Straelen 1924:4 (328); Van Straelen 1931: 63, 84, 95; Hurley 1973:214; Barnard & Barnard 1983:470.

Fossil species, Tongrian, Lower Oligocene (Alsace: Brunstatt; Sundgau; Lümschweiler). Probably brackishwater species.

GAMMARUS SP. (B)

Syn.: *Gammarus sp.* Mieg & Bleicher & Fliche 1890:415, 416; Mieg & Bleicher & Fliche 1892:182; Van Straelen 1924: 4 (328); Van Straelen 1981:63; Hurley 1973: 214; Barnard & Barnard 1983:470.

Fossil species, Lower Oligocene (Alsace: Brunstatt; Stapfel near Kleinkrems). Probably brackishwater species.

Genus HELLENIS Petunnikov 1914

- Syn.: *Hellenis* (= *Hellenidae*) Petunnikov 1914:150, 153.
Hellenis Derzhavin 1927:186; Van Straelen 1931:63;
Hessler 1969: R 390; Hurley 1973:214; Barnard &
Barnard 1983:611.
Prionchelius (= *Prionchelidae*) Petunnikov 1914:149
(type species: *Prionchelius mantilloides* Petunni-
kov 1914, orig. design.); Van Straelen 1931:64.
Tetrachelius (= *Tetrachelidae*) Petunnikov 1914:150,
152 (type species: *Tetrachelius binagadensis* Pe-
tunnikov 1914 orig. design.); Van Straelen 1931:64.

Type species: *Hellenis saltatorius* Petunnikov 1914, orig.
design.

Taxa: *saltatorius* Petunnikov 1914.

Fossil genus, Miocene.

HELLENIS SALTATORIUS Petunnikov 1914

- Syn.: *Hellenis saltatorius* Petunnikov 1914:150, pl. 7, fig. 4a,
b; Van Straelen 1924:2 (326); Derzhavin 1927:185,
195; Hessler 1969: R 390, fig. 207/2; Hurley 1973:
214; Barnard & Barnard 1983:611.
Hellenis saltatoria Van Straelen 1931:63.
Prionchelius mantilloides Petunnikov 1914: 149, 152,
pl. 7, fig. 2a, b; Van Straelen 1924:2 (326); Van
Straelen 1931:64, 84, 95.
Tetrachelius binagadensis Petunnikov 1914:150, 152,
pl. 7, fig. 3; Van Straelen 1924: 2 (326); Van Stra-
elen 1931:64, 84, 95.

Fossil species, Lower Miocene (village Binagady in Baku re-
gion, Caspian Bassin, USSR).

Remarks: Derzhavin (1927) removed *Prionchelius*
mantilloides Pet. 1914 and *Tetrachelius binagadensis* Pet. 1914 to
the species *Hellenis saltatorius* Pet. 1914 as synonyms.

Genus JUBEOGAMMARUS n. gen.

- Syn.: *Gammarus* (part.) Van Straelen 1931:62; Hurley 1973:
214; Barnard & Barnard 1983:463.

Diagnosis: Based on Van Straelen's descriptions and
figures (1924), genus *Jubeogammarus* is rather similar to the ge-

nus *Gammarus* Fabr. (shape of body, coxae 1-4) but with some different characteristics.

Head with very narrow anterior margin. Body smooth, urosomites free. Antenna 1 very short and slender, with very short and slender peduncle and short flagellum. Antenna 2 is slender, more than two times longer than antenna 1, with slender peduncle. Coxae 5-6 with distinct lobes. Uropod 3 with well developed ramus.

Type-species: *Gammarus alsaticus* Van Straelen 1924.

Taxa: *alsaticus* (Van Straelen, 1924).

Fossil genus, Lower Oligocene (France).

JUBEOGAMMARUS ALSATICUS (Van Straelen 1924)

Syn.: *Gammarus alsaticus* Van Straelen 1924:4 (328), one text fig.; Van Straelen 1931: 63, 84, 95; Hurley 1973:214; Barnard & Barnard 1983:470.

Description (based on Van Straelen's description and figure): Body *Gammarus*-like, smooth, urosomites free. Head is remarkably longer than first mesosomal segment, with anterior margin much lower than posterior one. Lateral cephalic lobes seems to be angular. Eyes present, small, circular.

Coxae 1-4 *Gammarus*-like, subrounded ventrally; coxa 1 not dilated distally, coxa 2 hardly longer than 1. Coxa 4 not longer, but larger than coxa 3, with strong ventroposterior lobe. Coxae 5-7 progressively smaller, coxa 5 remarkably smaller than coxa 4; coxa 6 with weak ventromedial incision (= i. e. lobed).

Antenna 1 slender and short, as long as head, peduncular segments short (? telescopic); main flagellum very short, consisting of only few segments.

Antenna 2 is 2.5 times longer than antenna 1, slender, reaching nearly 1/4 of body-length; peduncular segments short, flagellum consisting of more segments. Gnathopods 1-2 poorly preserved, with rest of large dactyls.

Pereopods are long and »probably very flexible« forming one mass within which is not possible to recognize the single appendages.

Epimeral plates with concave posterior margin. Uropods 1-2 and telson unknown. Uropod 3 moderate, ramus twice longer than peduncle.

Localities: Formation petroliferous in Pechelbronn (Alsace, NE. France) in sondage No. 2277 on 432 meters depth, and in sondage No. 2374 on 456 meters depth, numerous specimens (Tongrian, Lower Oligocene).

L o c . t y p .: Pechelbronn, on 432 meters depth (NE. FRANCE)

H o l o t y p e: one fossil specimen from 432 meters depth from sondage No. 2277 (Pechelbronn).

Fossil species, Lower Oligocene, probably brackishwater species.

Genus PALAEOGAMMARUS Zaddach 1864

S y n.: *Palaeogammarus* Zaddach 1864:10; Zaddach 1879:31; Van Straelen 1931:64; Hessler 1969:R 390; Hurley 1973:215; Holsinger 1977:255; Barnard & Barnard 1983:432.

T y p e - s p e c i e s: *Palaeogammarus sambiensis* Zaddach 1864 (monotypy).

T a x a: *balticus* Lucks 1928; *danicus* Just 1974; *sambiensis* Zaddach 1864.

Fossil genus, Upper Eocene to Lower Oligocene.

PALAEOGAMMARUS BALTICUS Lucks 1928

S y n.: *Palaeogammarus balticus* Lucks 1928:1, pl. I, fig. 1-5; Gurjanova 1965:228; Hessler 1969:R 390, fig. 207/4; Hurley 1973:215; Just 1974:95; Barnard & Barnard 1983:433.

Fossil species, Upper Eocene- Lower Oligocene, in amber (Baltic sea coast, probably freshwater species).

PALAEOGAMMARUS DANICUS Just 1974

S y n.: *Palaeogammarus danicus* Just 1974:94, fig. 1; Barnard & Barnard 1983:433.

Fossil species, early or middle Upper Eocene (coast of Jutland (= Julland), in western Baltic amber, Denmark); probably freshwater species.

PALAEOGAMMARUS SAMBIENSIS Zaddach 1864

S y n.: *Palaeogammarus sambiensis* Zaddach 1864:1, pl. I, fig. 1-14; Zaddach 1879:31; Van Straelen 1924: 2 (326); Van Straelen 1931:64, 84, 95; Hessler 1969:R 390; Hurley 1973:215; Barnard & Barnard 1983:433.

Gammarus sambiensis Van Straelen 1924:6 (330), 7 (331).

Fossil species, Upper Eocene — Lower Oligocene (in amber from Baltic coast of peninsula Samland near Kaliningrad (= Königsberg, USSR). Probably freshwater species.

Genus PRAEGMELINA Derzhavin 1927

Syn.: *Praegmelina* Derzhavin 1927:187; Hessler 1969:R 390; Hurley, 1973:215; Barnard & Barnard 1983:544.

Type-species: *Praegmelina andrussovi* Derzhavin 1927 (selected by Birstein 1960).

Taxa: *andrussovi* Derzhavin 1927; *archangelskii* Derzhavin 1927.

Fossil genus, Miocene, Sarmatian (USSR).

PRAEGMELINA ANDRUSSOVI Derzhavin 1927

Syn.: *Praegmelina andrussovi* Derzhavin 1927: 188, text fig. 1, pl. III, fig. 1; Hessler 1969:R 390, fig. 207/5; Barnard & Barnard 1983:545.

Praegmelina andrussovia Hurley 1973:215.

Fossil species, Middle Miocene (Upper Sarmatian) (Grozny, Caucasus, USSR).

PRAEGMELINA ARCHANGELSKII Derzhavin 1927

Syn.: *Praegmelina archangelskii* Derzhavin 1927:189, text fig. 2, pl. 3, fig. 3, 4; Hurley 1973:215; Barnard & Barnard 1983:545.

Fossil species, Middle Miocene (Upper Sarmatian) (Grozny, Caucasus, USSR).

CONCLUSION

All known fossil genera of *Amphipoda* belong to the suborder *Gammaridea*, more precisely to several different families; but, based on present scarce knowledge of taxonomic characters of these genera, it was not possible to separate distinctly known fossil genera into different families.

Just (1974) and Holsinger (1977) removed genus *Palaeogammarus* to the family *Crangonyctidae*. Genera *Andrussovia* and *Praegmelina* belong to some of pontocaspian families near family *Gammaridae* or *Pontogammaridae*.

Genus *Condicogammarus* is rather similar to some Baikal freshwater families.

Genera *Jubeogammarus*, *Alsacogammarus* and »*Gammarus*« are close to the family *Gammaridae* and *Melitidae*, but now is still not possible to determine their exact familiar status.

Genus *Hellenis* with their very short coxae don't belong to the family *Gammaridae*; it is more close to the family *Bogidiellidae*, but without the reexamination of the material of these species and genus, it is not possible to establish its exact familiar status. In any case, genus *Hellenis* seems to be relatively primitive amphipod, with some apomorphic characters, and we can not exclude the possibility that Petunikov's family *Hellenidae* will be reestablished again for it.

Except genus *Hellenis*, all other known fossil genera of amphipods are very similar to the recent genera and families of *Gammaridean Amphipoda* and highly specialized. As the oldest known fossil *Amphipoda* is known from Upper Eocene (genus *Palaeogammarus*), that means that the first amphipods appears on the Earth much earlier, probably during the Cretaceous period.

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Rezime

KRITIČKI OSVRT NA FOSILNE AMPHIPODA SA OPISOM NEKIH NOVIH TAKSONA (137. Prilog poznavanju Amphipoda).

U radu je iznijeta lista svih poznatih vrsta fosilnih *Amphipoda* i data je njihova sinonimika i bibliografija. Sastavljen je ključ za determinaciju svih poznatih rodova fosilnih *Amphipoda*.

Izvršena je kritička analiza nekih fosilnih *Amphipoda* i opisano je nekoliko novih taksona:

Alsacomelita semipalmata, novi rod i nova vrsta iz slojeva u bazenu potaše u Alzasu (sjevero-istočna Francuska) iz Donjeg Oligocena.

Postavljen je novi rod *Condiciogammarus*, n. rod (tip roda: *Gammarus retzi* Maikovski 1941) iz slojeva u bazenu potaše u Alzasu (S. I. Francuska) iz Donjeg Oligocena.

Postavljen je novi rod *Jubeogammarus*, novi rod, (tip roda: *Gammarus alsaticus* Van Straelen, 1924) iz naftnih slojeva u Pechelbronn-u (Alzas, Francuska), iz slojeva Donjeg Oligocena sa dubine od 432 metra.

Svi poznati fosilni rodovi i vrste *Amphipoda* pripadaju podredu *Gammaridea*, vjerovatno nekolicini familija; međutim, zbog oskudnih poznatih morfoloških karaktera ovih rodova i vrsta, nije za sada moguće tačno razdjeliti ove taksone u pojedine familije. *G. oeningensis minimus*, *G. praecyrius*, *G. sp. (A)*, *G. sp. (B)*,

Poznati su slijedeći rodovi: rod *Alsacomelita (A. semipalmata)*, rod *Andrussovia (A. bogacevi, A. sokolovi, A. vassolevitschi)*, rod *Condiciogammarus (C. retzi)*, rod *Gammarus (G. belli, G. oeningensis, G. oeningensis minimus, G. praecyrius, G. sp. (A), G. sp. (B))*, rod *Hellenis (H. saltatorius)*, rod *Jubeogammarus (J. alsaticus)*, rod *Palaeogammarus (P. balticus, P. danicus, P. sambiensis)*, rod *Praegmelina (P. andrussovi, P. archangelskii)*.

Just (1974) i Holsinger (1977) prebacili su rod *Palaeogammarus* u familiju *Crangonyctidae*. Rodovi *Andrussovia* i *Praegmelina* pripadaju nekom od pontokaspijskih familija blizu familija *Gammaridae* i *Pontogammaridae*.

Rod *Condiciogammarus* je dosta sličan nekim slatkovodnim rodovima iz Bajkalskog jezera u SSSR.

Rodovi *Jubeogammarus*, *Alsacogammarus* i »*Gammarus*« stoje blizu familije *Gammaridae* i *Meliidae*, ali za sada nije moguće odrediti pobliže njihovu familijarnu pripadnost.

Rod *Hellenis*, sa svojim veoma karakterističnim kratkim kokosama, ne pripada familiji Gammaridae; on je mnogo bliži familiji *Bogidiellidae*, ali bez detaljnog pregleda originalnog materijala ove vrste i roda nije moguće bliže odrediti familijarni status. Genus *Hellenis* izgleda da je relativno primitivan amfipod sa nekim apomorfnim karakteristikama, i mi ne možemo isključiti mogućnost da *Petunikova* familija *Hellenidae* bude ponovo postavljena za ovaj rod.

Osim roda *Hellenis*, svi ostali fosilni rodovi amfipoda su veoma slični sadašnjim savremenim rodovima i familijama gamaridskih *Amphipoda* i već su relativno visoko specijalizovani. Kako je najstariji fosilni amfipod poznat iz slojeva Gornjeg Eocena (rod (*Palaeogammarus*), to pokazuje da su se prvi, primitivni *Amphipoda* pojavili na Zemlji mnogo ranije, vjerovatno već u periodu Krede.