

THE SURVEY OF DESCRIBED AND CITED FRESHWATER
GAMMARUS SPECIES
(FAM. GAMMARIDAE) FROM SOVIET UNION WITH
REDESCRIPTION OF TWO TAXA
(CONTRIBUTION TO THE KNOWLEDGE OF THE AMPHIPODA 205)

Gordan S. KARAMAN

Biological Institute, 81000 Titograd, Yugoslavia

ABSTRACT

The survey of study of freshwater members of the genus *Gammarus* Fabr. (*Amphipoda Gammaridea*, Fam. *Gammaridae*) from the Soviet Union (U.S.S.R.) is given and the results of the taxonomical investigations on *Gammarus suifunensis* Mart. 1925 and *Gammarus koreanus* Ueno 1940, both from Primorye region in Far Eastern part of U.S.S.R., are provided. A new name, *Gammarus spooneri*, n. sp., is proposed for *Gammarus salinus* Spooner, 1947 (nom. preocc.).

ABSTRAKT

Dat je pregled dosadašnjih istraživanja slatkovodnih predstavnika roda *Gammarus* Fabr. (*Amphipoda Gammaridea*, fam. *Gammaridae*) iz Sovjetskog Saveza (S.S.S.R.), i prezentirani su rezultati taksonomskih istraživanja vrsta *Gammarus suifunensis* Mart. 1925 i *Gammarus koreanus* Ueno 1940, oba na osnovu materijala iz regiona Primorje na Dalekom Istoku S.S.S.R.-a. Predloženo je novo ime, *Gammarus spooneri*, n. sp. za vrstu *Gammarus salinus* Spooner, 1947 (nom. preocc.).

INTRODUCTION

The species of the genus *Gammarus* Fabr. (*Amphipoda Gammaridea*, fam. *Gammaridae*) from the freshwaters of U.S.S.R., are still very poorly known, despite the descriptions of numerous taxa of this genus in U.S.S.R. during last century by various scientists.

Almost all these taxa are very poorly described and figured, making real taxonomical position of many of them relatively indistinct.

Many authors have described various new taxa without comparison with other similar species from U.S.S.R., or other countries, or without knowledge of already described similar taxa by other authors.

On the other hand, they have removed single taxa from one species to another, one as synonyms or as distinct subspecies, only based on poor descriptions and figures of these taxa (for example various taxa attributed to *G. balcanicus*, *G. pulex* or to *G. lacustris*).

By this way, the present knowledge of freshwater *Gammarus* species in U.S.S.R. is very confusing and requests full redescriptions of all known taxa and establishing a real taxonomic characters for each taxon. Trying to facilitate further studies on this problem, we collected all more important citations and data regarding the freshwater *Gammarus* species from U.S.S.R.

Recently, Dr I. M. Levanidova from the Institute of Biology and Pedology in Vladivostok, sent us very kindly various samples of *Gammarus* from Far East part of U.S.S.R., including two freshwater *Gammarus* species, redescribed and figured here in detail, and attributed to already poorly known taxa from this region of U.S.S.R.

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CITATION OF GENUS GAMMARUS IN U.S.S.R.

Andrzejowski (1839) mentioned for the collection of Kiev three species: *Gammarus marinus* Leach (from Odessa, probably *Echinogammarus* sp.), *Gammarus pulex* Fabr., and he described a new species *Gammarus stagnalis*, n. sp.

Brandt (1851) mentioned *Gammarus pulex* from Nachiki River on Kamchatka peninsula (fide Dershavin 1927 a) (= ? *G. koreanus*).

Gerstfeldt (1859) mentioned *Gammarus pulex* De Geer for Siberia (Angara River) (= ? *G. lacustris*).

Kessler (1868) described *Gammarus sibiricus* n. sp. from Onezhsko (= Onega) Lake (E. of Leningrad, Karelija) (? *G. lacustris*), and he mentioned (1878) *Gammarus pulex* and *G. sibiricus* for the Sevan Lake in Armenia (Zakavkazie).

Dybowski (1874) mentioned *Gammarus pulex* auct. for Baikal Lake, Kossogol Lake, mouth of Kultushnaia River into Baikal Lake (? *G. lacustris*).

Brandt (1879, 1880 a) mentioned *Gammarus lacustris* for Tabatskuri Lake (Gruzia, Zakavkazie).

Brandt (1880 b) mentioned *Gammarus pulex* for the Sevan Lake (Armenia).

Semenovskii (1880) mentioned *G. pulex sibiricus* Kess. from Siberia. He described a new taxa: *G. pulex salinus*, n. sp., from two salt lakes of Orenburg (= Chkalov) region (N. of Kazakhstan), *G. pulex subneglectus* n.ssp. from region of upper part of Wolga River and related regions (Ostrova Kotlina; Orienbaum on Sterzh Lake; Gluboko Lake S. of Pskov; Pudost River), and *G. pulex grimmi*, n. ssp. from Lai (on Onezhskoe Lake), Uktozere (near Onezhskoe Lake), Keregozh Lake (upper part of Wolga River); Maloe Lake near Trubezh River (? E. of Kiev).

Belke (1886) mentioned *Gammarus pulex* for Kiev region (Radomislovsk).

Kortschagin mentioned (1887) *Gammarus neglectus* from Kosin (fide Alpatov & Kozmina, 1927).

Sowinsky cited (1888) *Gammarus pulex* for region of Kiev (Trukhanov island near Dniepr; between Kiev and Vishgorod).

Rossyskaja-Kojevnikova (1897) mentioned in her embryological studies, *Gammarus pulex* var. *kossinensis* from Kosine, but without any description (nomen nudum).(fide Alpatov & Kozmina, 1926).

Sars (1903) mentioned *Gammarus pulex* from Teletskoe Lake (= *Gammarus teletzkensis* Martynov 1930).

Chevreaux (1908) cited *Gammarus pulex* for Kirgizstan and Tadzikistan (Issyk-Kul Lake; Koisara; Tchatyr-Koule Lake, on 3200 m; The pass of Karakol, 2000 m.).

Behning (1914 a, 1914 b) mentioned *Gammarus pulex* from vicinity of Kiev (Dniepr river and many other localities) accompanied by *Gammarus sowinskyi*.

Sowinsky (1915) mentioned *Gammarus pulex* Fabr. for southern part of Baikal Lake (Krutaia Bay; Sor Lake near Pokoinikov), Angarskii Sor; Peschanka; Darmagli Lake near mouth of Selenga River; Goloustnoe (= ? *G. lacustris*).

Behning (1921) described *Gammarus pulex* De Geer morpha *jeruslanensis* n. m. from Jeruslan River (tributary of Wolga River) (Jeruslan = Kamyschin).

Beklemishev (1923) mentioned *Gammarus pulex* De Geer for Jurchim River near Kamy Lake, Perm).

Dershavin (1923 a) mentioned *Gammarus pulex* for lower part of Pechora River basin (Lake in Ust'-Tsylymy; Lake in Rosvinskoi; Stella Polare; Pechora River near Stella Polare).

Dershavin (1923 b, 1927 a) mentioned *G. pulex* for various localities of Kamchatka peninsula (see G. Karaman 1984: 152 for localities).

Behning (1924) mentioned *Gammarus pulex* for medial and lower part of Wolga River and other localities (rivers Kama and Oka, torrents in region of Moskwa; Kasan, Wladimir, Perm) etc.

Dolgov (1925) mentioned *Gammarus pulex* accompanied by *Pallasea quadrispinosa* for the Seliger Lake in upper part of Wolga River.

Martynov described (1925) a new species from South Ussurian Region (Suifun River, Dulkeiton), *Gammarus suifunensis*, n. sp.

Alpatov and Kozmina (1926) described *Gammarus pulex grimmi kossinensis*, n. natio, from Beloe Lake near Kosina (Rossiiskaia S.S.R.).

Behning (1926) mentioned *Gammarus pulex* for Samara River (Kujbishev, drainage of Wolga River).

Dershavin cited (1927 b) *G. pulex* for various localities of Ussurian region (Amur River basin, Suifun River, small rivers going into Petar Veliki Bay).

Behning mentioned (1928 b) *Gammarus pulex* for the Dniestr River (Rechentsy; Kamenets-Podolska).

Pirozhnikov cited (1928, 1931) *Gammarus pulex* var. for Jenissej River (Mikhalevoi; Krasnojarsk).

Gurjanova (1929) described from lower part of Jenissei River: the new species *Gammarus pellucidus*, n. sp. (Ladeiskij) and *Gammarus* sp. (Niasha; Khudonog).

Dershavin (1930 a) mentioned *G. pulex* for Sakhalin Island, telling that this species is absent on the islands of the Okhotsk Sea and Bering Sea. He told that *G. suifunensis* exists in the South of the country and represents a geographical subspecies of *G. pulex*.

Martynov (1930 a) described from various localities of region of Issyk-Kul Lake (Kirgizstan) the taxa: *G. ocellatus*, n. sp., *G. ocellatus* f. *minor*, n. f., *Gammarus bergi*, n. sp., *Gammarus pulex* (L.), *Gammarus pulex* (L.) var.? and *Gammarus* sp.

Martynov (1930 b) described several new taxa from region of Teletskoe Lake (Altaj): *Gammarus korbuensis*, n. sp. from Korbu River; *G. korbuensis* forma *reducta*, n. f., *G. teletzkensis*, n. sp. and *G. ocellatus angulatus*, n. sp. from Teletskoe

Lake and its basin; as well as the species from upper part of Ob River (Novosibirsk region): *Gammarus angustatus*, n. sp. (spring on Iniuski river) and *G. angustatus* forma *obensis*, n. f. (Ob River near Novosibirsk and Bersk; bay of Jarensk). He mentioned also *Gammarus pulex* var. from Tchernoe Lake and Biia River.

Pliginskii (1930) mentioned *Gammarus pulex* var. *sowinskii* from Kisil-Kola Cave on Krim peninsula (fide Martynov 1931) (= ? *G. spelaeus* Mart.).

Ueno (1933) mentioned indirectly the presence of *Gammarus pulex* group intermixed with *G. annandalei* in Iturup Island (Kurilskie Islands).

Martynov (1931 a) described from Krim (= Crimea) peninsula several new taxa: *Gammarus tauricus*, n. sp., *G. nudus*, n. sp., *G. spelaeus*, n. sp., *G. kesslerianus*, n. sp. and *G. kesslerianus* forma *salgyrus*, n. f.

Martynov (1931 b) described from northern Yakutia *Gammarus pulex* *extensus*, n. ssp. (Gorbachevo Lake near Tixi Bay), and he mentioned *G. lacustris* s. str. from Olenžego Lake in Lapland and from Novaia Zemlja region.

Birstein (1932) mentioned *Rivulogammarus pulex* for Armenia (Sevan Lake, Arpa-gel Lake, Ala-gel; Parzlich Lake; Zanga River; Gilli Lake; Tabisckhuri Lake). He mentioned also that his specimens from Kamchatka can be attributed to *G. pulex sibiricus*.

Martynov (1932) described from Black Sea coast region of Caucasus: *Gammarus crispus* n. sp. from Grushevaia Poliana and Kardyvach Lake; *Gammarus chostensis*, n. sp. from small brooks near Khost River and vicinity; *G. caucasicus*, n. sp. from Repra River near Gagry; *G. caucasicus* f. *batumicus*, n. f. from the waters near Batum and *G. caucasicus* f. *soisshensis*, n. f. from Agur River near Sochi.

Birstein (1933) described *Rivulogammarus komareki imeretinus*, n. ssp. from cave near Zchal-Ziteli River (Georgian, Transcaucasus).

Sadovskij (1933, fide Kasymov, 1972) mentioned *Gammarus lacustris* for Taparavan.

Birstein (1935) described *Gammarus brachyurus*, n. sp. and *G. brachyurus* var. *oligochaetus*, n. var., both from Syr Darja River region.

Martynov (1935) described from Turkestan (region between Uzbekistan, Kirgizstan and S. part of Kazakhstan) a new taxa: *Rivulogammarus turanus*, n. sp. (Chimganka River), *R. turanus* morpha *subnivalis*, n. m. (springs near Chimganka River), *R. turanus* forma *karabasicus*, n. f. (torrent Karabas-tau, E. Karatau), *R. turanus karabasicus* morpha *excisus*, n. m. (spring on Bakhaibas-tau Mt., Galkino, Karatau), *R. turanus* natio *kulukensis*, n. n. (Chirchik River, Tashkent), *R. turanus* subsp. *coxalis*, n. ssp. (Kulan, near Dmitrievka, Aleksandrovskii Khrebet), *R. gracilis*, n. sp. (Chimgankent, E. Karatau), *R. truncatus*, n. sp. (Kishlak Sangirdak, Surkhana, E. Bukhara), *R. hirsutus*, n. sp. (rivers: Kulan and Arysi, NE. Karatau; River Chakpak, Kremnevka, E. Karatau), *R. hirsutus* morpha *hirsutissimus*, n. m. (Kel'ty-Mashat, E. Karatau), *R. subaequalis*, n. sp. (Lake near Galinka vil., E. Karatau), *R. subaequalis* forma *zarudnyi*, n. f. (Bulaki, central Karatau), *R. subaequalis* forma *bianchii*, n. f. (irrigation canal in Aulie-ata near Talas River), *R. subaequalis bianchii* morpha *compressus*, n. m. (spring near Aulie-ata; spring between Saks and Aleksandrovskia), *R. brevicornis*, n. sp. (torrents in the basin of Kichkine River and Ishfan-Mazar, Karatau), *R. angusticoxalis*, n. sp. (River Dzhungan and River Ala-archa (Pishpek and Semirechenskii regions), *R. spinulatus*, n. sp. (torrent Issyk (Semirechenskii region), *R. bucharensis*, n. sp. (Eastern Bukhara), *R. truncatus* subsp. *montanus*, n. ssp. (Khan-takhta; Tuna River (northern part of Hissar Mt.).

Dorogostaiskii (1936) mentioned *Gammarus pulex* De Geer for Bay of Bargusin (Baikal Lake) (= ? *G. lacustris*).

Martynov (1936) cited *Gammarus angustatus* for Kirgizia (Alamedinka River).



Ueno (1936) mentioned *G. pulex* for freshwater lakes in North Kurile Islands : Paramyshir (= Paramushir) Island and Shumshu (= Shimushir) Island.

Birula (1937) described *Gammarus pulex karae*, n. ssp. from lower part of Kara River (Siber), together with several *Gammarus* species from brackish waters.

Schellenberg (1937) mentioned *Gammarus lacustris* for Ak-Balik (Alichur Pamir, Tadzikistan); Shore-kul-Lake on Eastern part of Pamir (near U.S.S.R./China border); Tarbagataj Mt. (Eastern Kazakhstan, near border with China) and *Gammarus pulex* for N. part of Caucasus Mt. (Podkumok near Pjatigorsk). He described a new species *Gammarus barnaulensis* from Barnau (Tomsk) in Burgusutai (W. Siberia), *G. kischineffensis*, n. sp. from Kischineff (Ukraina), mentioning various species (*G. hirsutus* Mart. from Kara Tau Mts. (E. of Aral Lake), *G. pulex fossarum* for Altai reg. (near W. border of Mongolia), etc.

Dershavin (1938) described from Nakhichevan A.S.S.R. (near Iran) the taxa *Gammarus araxenus*, n. sp. (spring Kerbalai-Gambar, Shakhtakhty); *G. balcanicus alarodius*, n. ssp. (Ordubad, Nair; spring in upper part of Nakhichevan-chai River, Bichenag); *G. matienus*, n. sp. (Zangezurskii Mt., Bichenag Pass; Durnali-gel spring; spring in Bata-bata) and *G. matienus f. stagnalis*, n. f. (Nakhichevan-chai River).

Birstein (1939) mentioned *G. lacustris* for Amur River (lower part), Sakhalin Island, Kamchatka peninsula, Kurile Islands, delta of Lena River, Kara River (lower part), Ural. He mentioned also *Gammarus pulex suifunensis* for Okeanskaia, Amurskii liman, Pronge Corn and Sabakh Corn.

Dershavin (1939) described *Gammarus balcanicus talyschensis*, n. ssp. from Talysh (Azerbaijan).

Veisig (1939) mentioned *Gammarus lacustris* for basin of Lenkorani.

Birstein (1940, 1941) and Birstein & Lopaschov (1940) cited *Gammarus pulex* for the cave fauna of Abkhazia (cave Adzaba near Sukhumi; cave near village Zebelda; cave Tarquildze).

Behning (1940) mentioned *Gammarus komareki* for the Bakurianka River and the vicinity of Bakuriani (Gruzija).

Behning & Popova (1947) described from Armenia a new taxa: *Gammarus komareki armeniacus*, n. ssp., *G. balcanicus zangensis*, n. ssp. and *G. lacustris erevanensis*, n. ssp., mentioning also *G. lacustris* from the same region.

Birstein (1945) cited from Turkmenia: *Gammarus pulex* (rivers Sherlok and Firiuzinka) and *Gammarus balcanicus turcomanicus*, n. ssp. (Ashkhabad; Kara-su; Zolotoi spring near Bagir; Chulinka; Sakiz-iab).

Bazikalova (1946) mentioned *Gammarus lacustris* Sars and he described a new species *Rivulogammarus koshovi*, n. sp., both from the Kossogol Lake. She mentioned also that Dybowski (1901) cited already *G. lacustris* for this lake (not seen this paper of Dybowski).

Elanidze (1946) mentioned *Gammarus lacustris* for Bazaleti Lake.

Markosian (1946) mentioned *Gammarus lacustris* for Sevan Lake and *G. araxenus* Der. from Lake Sevan and rivers: Kiavar, Adiaman, Gedakbulag, Mazra, and spring in Erevan (not seen, fide Kasymov, 1972).

Birstein (1948a) cited *Gammarus syriacus subaequalis* (Mart.) for Tadzikistan (Hissar).

Ushakov (1948) mentioned *Gammarus suifunensis* for mouth of Amur River (Pronge; Sabakh).

Martynov & Behning (1948) mentioned *Rivulogammarus ocellatus* Mart. for Lake Iskander-kul, and the mouth of River Serima into the Issyk-Kul Lake (Khissarskii Mts.).

Nikolsky & Volk (1948) mentioned *Rivulogammarus* sp. (= *Gammarus* sp.) from Arba-Kaldy Lake (lower part of Syr--Darzi River, SE. of Aralskoe Lake).

Tarnogradskii (1948) mentioned *Gammarus lacustris* for the basin of Ardon (North Osetin A.S.S.R.).

Birstein (1950) mentioned from Altai the taxa: *Gammarus lacustris* (lakes: Teletskoe, Verkhnee, Nizhnee Itu-kol; Sorulu-gol; V. Arysoek; Saigonys; Kaiachek; Kichik-soru; Nizhnee Koliushitu; Kara-kol; River Itu-kol); *Gammarus korbuensis* Mart. from lakes in the valley of the Kygi River, Kygi Bay, Teletskoe Lake, Kamga bay, as well as *Gammarus balcanicus* from Listvianka River (Iurginskii reg.).

Dershavin (1951) mentioned *Gammarus araxenus* Der., *G. balcanicus alarodius* Der. and *G. matienus* Der. for various localities of Azerbaijan (not seen, fide Kasymov, 1972).

Gurjanova (1951) mentioned *Gammarus pellucidus* for lower part and mouth of Jenisej River.

Deksba kh (1952) cited from Central Ural and Zauralye several species: *Gammarus lacustris* for region of Sverdlovsk (lakes Shartash, Baltym, Tavatui, Chernobrovskoe, Dikoe, Ianychkovo, Moltaevo), region of Cheliabin (lakes: Khokhlovatoo, Selezian, Chebarkul, Turgoiak, Sinara, Kagan, Baraus, Etkul', Atkul', Kainkul', Karagush,); salt lakes: Mainan, Aidykul, Uolgi; Region of Kurgansk (lakes: Achikul, Itkul, Shchuch'e, Maloe Krivinskoe, Gorkoe, Ostrovnoe, Krivinskoe, Utich'e). He mentioned also that specimens from lake Chasha (region Kurganskaia) are close to *G. pulex*, and these from lakes Lebiash'ego (in the same region) are between *G. pulex* and *G. lacustris*.

Bekman (1954) mentioned *Gammarus lacustris* for several lakes near Baikal Lake and Angara River (lakes: Staro, Gluboko, Uglovo, Baklan) and for delta of River Selenga, Posolskii and Kultuchnic Lakes. He mentioned also *Gammarus pulex mesasiaticus* (p. 363) in his discussion without any data, but I couldn't trace the original description of this last taxon.

Kurenkov and Mednikov (1959) mentioned *Gammarus lacustris* for Kamchatka (Kurilskoe Lake), and they established *Gammarus lacustris krokurensis*, n. ssp. from Krokur Lake on Kamchatka, based on prevalently 2-segmented accessory flagellum of antenna I (3-4 segmented in *G. lacustris* s. str. from Kamchatka).

Sergeeva (1959) mentioned *Gammarus lacustris* for the lakes Tabatskuri and Sagamo.

Dediu (1960) mentioned *Gammarus balcanicus* for Dniestr basin (= *G. kischineffensis*, fide Dediu, 1962) (not seen).

Birstein (1961, 1963) cited *Gammarus balcanicus* from various subterranean and epigeal localities of Krym, discussing the synonymy of this species in U.S.S.R.

Dediu (1961, 1962) mentioned *Gammarus kischineffensis* for Moldavia, basin of Dniestr and Prut rivers (Prut, Reuta, Chigura, Kubolty; Ialpuja;); *G. balcanicus* and *G. balcanicus dacicus* for basin of Dniestr and Prut, and later (1963) for Ukrain Carpats.

Tsotmelidze et al. (1961) mentioned *Gammarus lacustris* for lakes: Khanchali, Madatapa and Baretu.

Kasymov (1965) mentioned *G. lacustris* for spring in Chkalov near Khachmas (fide Kasymov, 1972).

Nadashvili (1966) mentioned from region of Lagodekhs kij (Gruzia) the taxa: *Gammarus balcanicus* and *Gammarus komareki arachenus* (Dersh.).

N a d a s h v i i i (1969 a) mentioned *Gammarus caucasicus* from various localities of Western part of Gruzia (= Georgia).

N a d a s h v i i i (1969 b) mentioned *Gammarus balcanicus* and *G. komareki* from some localities of western part of Gruzia (regions of Batumsk and Sukhum).

D e d i u (1967) mentioned the taxa: *Gammarus balcanicus*, *G. balcanicus dacicus* and *G. kischineffensis* for the basins of the rivers Dniestr and Prut.

A l i m o v (1968) cited *Gammarus lacustris* for the Neva River.

K a s y m o v (1972) mentioned *Gammarus lacustris* for numerous localities of Kavkaz (= Caucasus) : Tangal-Alty (Kubinsk reg.), Karasu near Zakatal, Tasmaly (Kakhski reg.), Giandzhachai, Zurnabad, Bala-Bagmanly, River Karasu (Kirovabad reg.), Turshsu River, rivers on road Shusha-Lachin, River Khalifachai, Zarosly (Shushin reg.), Bardy, River Soiugbulag, Kury River, vil. Shikhly (Kazakhski reg.), Agrichai River near Sheki, (basin of Nakhichevanskoi A. S. S. R.), Urvan River (Nal'chik), Sunzha near Grozny, Goluboe Lake near Nal'chik, Zolka River, Lake Bekanges, Kardzhin Severnoi Osetii, Zelenokumsk; rivers Kambaleevka, Chernaia in Gudermes, Lake Karaiazy on Azerbaijan/Gruzia border, Lake Maralgel, Lake Karagel, Lake Zalligel (Khanlarski reg.), Sevan Lake (Armenia), Baret Lake (Tsaklinski reg.); waters in vil. Bichenag (Nakhichevanska A.S.S. R.).

He cited also *G. pulex* for Kislovodsk basin. He mentioned *G. komareki* f. *borschomiensis* Behn. from Bakurianka River in Caucasus (sub citation of Murvanidze, 1949) and *G. komareki karthlianus* Dershavin from River Dabakhana, Caucasus (sub citation of Kakauridze, 1946). I couldn't trace original descriptions of *borschomiensis* and *karthlianus* in papers of Behning and Dershavin, although I have not seen the papers of M u r v a n i d z e and K a k a u r i d z e .

He mentioned *Gammarus balcanicus talyschensis* Dersh. 1939 for various regions of Caucasus: Lerijski (Kosmalian), Lenkoranski and Jardymlinski.

M a r k o s i a n (1974) cited *Gammarus lacustris* for the Sevan Lake (Armenia).

G a s i u n a s (1975) mentioned *Gammarus lacustris* for Dusia Lake (Litvanian S.S.R.).

J a z d z e w s k i (1975) described a new species, *Gammarus varsoviensis*, n. sp. from Poland and U.S.S.R. (Belorussian S.S.R., Starucha River; Zajelenskie Lake).

V o r o n i n (1975) mentioned *Gammarus pulex* for the lakes of Pribaikalie (not in Baikal Lake itself).

K a r a m a n , G. and P i n k s t e r (1977) cited *G. pulex* for northern part of U.S.S.R. including Lake Baikal, *G. lacustris*, *G. kischineffensis* (several localities in Ukraina), *G. komareki* (southern part of U.S.S.R. around the Black Sea ; mouth of river Rybniza, Moldavia), *G. bergi* (Issyk-Kul Lake, Koisara). They described also *G. inberbus*, n. sp. from Issyk-Kul Lake (Kazakhstan) and *G. birsteini*, n. sp. (= *G. brachyurus* Birstein, 1935) from Syr Darya region (Talasskiy Alatau Mts., Kazakhstan).

J a z d z e w s k i (1980) cited distribution of *Gammarus varsoviensis* Jazdz. in various localities of both sides of U.S.S.R./ Polish border.

K a r a m a n , G. (1984) mentioned *G. suifunensis* Mart., *G. lacustris* Sars, " *G. pulex* " and *G. mathienus* f. *stagnalis* (Dersh.) from eastern part of U.S.S.R., establishing a new taxa: *Gammarus chimkenti*, n. sp. (Chimkent, Kirgizstan), *Gammarus sangirdaki*, n. sp. (San-Girdak, Bukhara) and *G. sangirdaki hissari*, n. sp. (Khan-Takhta, Hissar Dagh, Tadzikistan).

K a r a m a n , G. and P i n k s t e r (1987) mentioned *Gammarus balcanicus* for SW. part of U.S.S.R.

J a z d z e w s k i and K o n o p a c k a (1988) cited *Gammarus kischineffensis* forma *leopoliensis* from Dniestr River.

J a z d z e w s k i and K o n o p a c k a (1989) described *Gammarus leopoliensis*, n. sp. from Eastern Carpathians (U.S.S.R. and Poland) and they mentioned *G. kischineffensis* Schell. from Ukraina (Kischineff, etc.).

TAXONOMICAL PART

GAMMARUS SUIFUNENSIS Martynov 1925

Figs.:I-V, VI,1-5

Syn.: *Gammarus suifunensis* Martynov 1925: 189, figs.: 1-4; Dershavin 1927 b : 176; Dershavin 1930: 2, 7; G. Karaman 1984 : 148.

Eogammarus suifunensis Birstein 1933: 149.

nec (?) *Gammarus* (*Rivulogammarus*) *suifunensis* Ueno 1940 a: 67, fig. 17-30; Ueno 1940 b: 315, fig. 28-41.

nec (?) *Gammarus* (*Rivulogammarus*) *pulex suifunensis* Birstein 1939: 60, fig. 4.

MATERIAL EXAMINED: U.S.S.R. (Far East):

- 19.(0930) PRIMORYE, Razdolnaya River Basin, Kamenka River, April 26, 1973 , many spec., accompanied by *Gammarus koreanus* Ueno 1940 (leg. Chereshevnev);

- 20.(0366), Kamenka River, Dec. 1, 1972, many spec. (leg. Chereshevnev);

- 21.(563) Kamenka River, Nov. 2, 1972, 13 spec.(leg. Chereshevnev);

- 22.(419), Solontsovy spring, Febr. 3, 1972, 8 spec., accompanied by one spec. of *Gammarus koreanus*;

- 23.(0964) Solontsovy spring, April 27, 1973, many spec., accompanied by one juv. sp. of *Gammarus koreanus* (leg. Chereshevnev);

DESCRIPTION: MALE 13 mm. Body smooth, metasomsegments 1-3 with 2-4 dorsoposterior marginal short setae each (fig. IV, 3). Urosome low, urosomites 1-2 each with one median and two dorsolateral groups of spines (1-2 spines) and several setae as long as or hardly longer than spines themselves (fig. I, 5, 6); urosomite 3 with 2 dorsolateral groups of spines (1-2 spines) and short setae, and with two median pairs of short setae.

Head with short rostrum, lateral cephalic lobes short, subrounded; eyes ovoid to slightly reniform, as long as or shorter than diameter of first peduncular segment of antenna 1 (fig. III, 5, 6).

Antenna 1 exceeding half of body (ratio: 13 : 10); peduncular segments 1-3 progressively shorter, poorly setose (fig. II, 4); peduncular segment 3 without medial lateral setae (fig. II, 4); main flagellum long, consisting of 41 articles poorly setose (most of articles with one short aesthetasc). Accessory flagellum 6-segmented (fig. II, 4).

Antenna 2: peduncular segments 3-5 poorly setose, bearing short setae (fig. II, 5, 6); peduncular segment 5 hardly longer than 4; flagellum distinctly dorsoventrally compressed, relatively slender (remarkably less slender than that in *G. pulex*), consisting of 16 articles bearing short setae only (not brush like as in *G. pulex*), calceoli present in many of flagellar segments (fig. II, 5, 6). Antennal gland cone short.

Mouthparts normal. Labrum entire; labium without inner lobes. Left mandible: incisor with 5 distal teeth, lacinia mobilis with 4 teeth (fig. II, 8). Right mandible: incisor with 4 teeth, lacinia mobilis consisting of two pluritoothed lamellae (fig. II, 7); mandibular palp segment 2 with 13 setae, palp segment 3 shorter than 2, bearing cca 25 marginal D-setae and 6 long distal E setae (fig. II, 9), on inner face with one group of 5 B setae, on outer face with one group of 4 A setae.

Maxilla 1: inner plate triangular, with row of distolateral plumose setae, outer plate with 11 spines bearing 1-9 lateral teeth each (the number of lateral teeth increasing towards inner side of plate); palp of right mandible dilated, strong, bearing 6 distal teeth and one spine and one seta; left palp is more narrow, bearing distally 8 slender spines and 4 setae.

Maxilla 2: inner plate with facial oblique row of setae.

Maxilliped: inner plate with 3 distal strong spines.

Coxae 1-4 longer than broad, bearing only 2 ventral marginal setae each (fig. I, 1, 3; II, 1, 3), coxa 4 with ventroposterior lobe bearing additional 2-3 short setae (fig. II, 3). Coxae 5-6 bilobed, coxa 7 entire; with concave ventromedial margin (fig. III, 1-3).

Gnathopods 1-2 relatively poorly setose, all setae are straight. Gnathopod 1: segment 5 shorter than 6; segment 6 pyriform, oblique, with one medial palmar spine and 4 posterior groups of marginal spines, as well as with several facial spines along inner face (fig. I, 2); dactyl normal, with one seta along outer margin.

Gnathopod 2: segment 5 slightly shorter than 6 (fig. I, 3, 4); segment 6 almost twice as long as broad, with parallel lateral margins; palm concave, oblique, bearing one strong median spine and 2 corner spines and 3-4 spine-like setae on outer face, as well as 2 strong subcorner spines on inner face; dactyl normal, with one median seta at outer margin.

Pereopods 3-4 slender and relatively poorly setose. Pereopod 3: segment 4 along posterior margin with 5-6 bunches of straight setae slightly exceeding the diameter of articles themselves (fig. II, 1); posterior margin of segments 5-6 with single or pairs of short spines accompanied by short setae; dactyl short.

Pereopod 4 like pereopod 3, but posterior margin of segments 4-6 bearing lower number of shorter setae than these in pereopod 3 (fig. II, 3).

Pereopods 5-7 moderately slender, their segment 2 with well developed ventroposterior short wing (lobe) and bearing short posterior marginal setae (figs. III, 1-3); no setae on inner face of segment 2; segments 4-6 of pereopods 5-7 along both margins with bunches of spines sometimes accompanied by single very short seta; dactyl short (fig. III, 4). Pereopod 6 is the longest one.

Epimeral plate 2 with poorly pointed ventroposterior corner, epimeral plate 3 with distinctly pointed ventroposterior corner and concave posterior margin (fig. IV, 3); epimeral plates 2-3 with several subventral spines each.

Pleopods 1-3 with 2 retinacula accompanied by 1-2 setae (fig. I, 7) (pleopod 1 with 1 seta, pleopods 2 and 3 with 2 setae). Peduncle of pleopod 1: anterior margin with 1 proximal and 1 distal group of setae, posterior margin with 1 proximal group of setae.

Pleopod 2 peduncle: anterior margin with 4 groups of setae, posterior margin with 3-4 groups of setae.

Pleopod 3 peduncle: anterior margin with 3 groups of setae, posterior margin with 4 groups of setae (all in proximal part).

Urosomite 1 near basis of peduncle of uropod 1 with short spine. Uropod 1: peduncle with 1 basifacial spine and with dorsoexternal row of spines; dorsointernal row of spines present by 1-2 proximal and 1 distal spine only; rami subequal long, bearing lateral and distal short spines.

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

Uropod 3 long, but relatively scarcely setose. Peduncle short; inner ramus short, reaching 1/3 of outer ramus, bearing simple and plumose setae along both margins (fig. IV, 1), accompanied by single spines; outer ramus 2-segmented, second segment short; first segment along both margins with spines and relatively short simple and plumose setae (simple setae are much more numerous than plumose setae).

Telson almost as long as broad, each lobe with 2 distal spines accompanied by 3 short setae (fig. IV, 2); several short setae appear on the dorsal face of the telson.

Coxal gills ovoid, appear on mesosomal segments 2-7 (fig. II, 1, 3; III, 1-3).

FEMALE: 9 mm with numerous eggs: Like males but antenna 1 slightly shorter; antenna 2 with peduncle slightly more setiferous than that in males; flagellum slightly more slender, 14-segmented, without calceoli, poorly setose also (fig. V, 3).

Gnathopods 1-2 small, moderately setose, all setae are straight. Gnathopod 1: segment 5 hardly shorter than 6 (fig. V, 4); segment 6 ovoid; palm oblique, without median palmar spine, but with groups of marginal corner spines and with 2 groups of subcorner spines on inner face, dactyl normal.

Gnathopod 2: segment 5 slightly longer than 6, bearing longer straight setae (fig. V, 5); segment 6 like that in male, but weaker, palm without median spine, not concave, defined by 3 corner marginal spines and by 2 subcorner spines on inner face; dactyl normal.

Pereopods 3-4 poorly setose along posterior margin, like these in males, all setae are straight (figs. V, 1, 2), dactyl short.

Pereopods 5-7 like these in males but shorter and with slightly broader segment 2 bearing ventroposterior short lobe (figs. IV, 4-6); no setae on inner face of segment 2; segments 3-6 along both margins with spines accompanied sometimes by single short setae only.

Metasomsegments 1-3 with 4 dorsoposterior short setae each; epimeral plates like these in males but epimeral plate 3 with as well as or more weakly pointed ventroposterior corner (fig. VI, 4).

Urosomites 1-3 remarkably much more setiferous than these in males (fig. VI, 1, 2), all spines are accompanied by long setae.

Uropod 3 short, bearing long simple and plumose setae along both margins of both rami (fig. VI, 3); although outer margin of outer ramus is provided with only single plumose setae and numerous simple setae; inner ramus reaching 1/3 of outer ramus.

Telson like that in males but the setae are remarkably longer (fig. IV, 7).

Coxal gills like these in males. Oostegites broad, setose, occur on mesosomal segments 2-5.

VARIABILITY. The specimens from all samples are very similar to each other, only the specimens from Solontsovy spring are with slightly more elongated extremities.

Eyes ovoid to slightly reniform, never exceeding the diameter of peduncle of antenna 1.

Main flagellum of antenna 1 reaching up to 52 articles, accessory flagellum up to 7 articles; flagellum of antenna 2 up to 14 articles, always with calceoli in males.

Urosomites 1-3 with spines accompanied by setae as long as or hardly longer than spines in males, and with very long setae in females.

Inner ramus of uropod 3 in males and females reaching 1/3 to 2/5 of outer ramus, rami are more setiferous in females than in males (fig. VI, 5).

The setae on telson are often longer in females than in males.

REMARKS AND AFFINITIES. The specimens in hands are very similar to the species *Gammarus suifunensis* described by Martynov (1925) from the river Suifun, N. of Vladivostok (U.S.S.R., Primorye) near the Soviet- China border.

The specimens described by Martynov are slightly smaller (12 mm), but otherwise they agree with our specimens from Primorye region (not far from Suifun River) by shape of eyes, head, shape and pilosity of antennae 1-2, mouthparts, gnathopods 1-2, pereopods 5-7, epimeral plates, telson (except the pilosity of pereopods 3-4, undescribed by Martynov, and therefore unknown).

The pilosity of uropod 3 on figure of Martynov is very scarce, and the inner ramus reaching 1/4 of outer one . Our specimens are provided with inner ramus of uropod 3 reaching 1/3 to 2/5 of outer ramus, also with scarce pilosity in males.

Based on Martynov's description and scarce figures, no remarkable differences between *G. suifunensis* of Martynov and our specimens have been established. On the other hand, *G. suifunensis* and our specimens have been collected in the same region (sensu lato) of Primorye .

Dershavin (1927 b: 176) mentioned that the length of rami of uropod 3 given by Martynov (1925) are presented only in juvenile specimens, and that adult specimens often are provided with inner ramus of uropod 3 reaching half of outer ramus. In these cases, mentioned Dershavin also, the pilosity of uropod 3 is more rich than presented on figure 4 of Martynov; Dershavin's adult specimens reaching 22 mm, and he mentioned this species also for small springs / torrents of Muravev Amurski peninsula near the vicinity of Vladivostok.

Dershavin recognized (1927 b) both taxa, *G. pulex* (= probably *G. koreanus* Ueno 1940) and *G. suifunensis*.

Dershavin (1930) mentioned that " In the South it takes the form of *Gammarus suifunensis* Martynov, which in all probability must be recognised as a geographical sub species of the family."

As we found in the same region of Primorye both species, often mixed together in the same sample, we considered the specimens with shorter inner ramus of uropod 3 as members of *Gammarus suifunensis* Martynov 1925 (despite having less setose pereopods 3-4 in males), and we can not exclude the possibility that Dershavin has been observed samples containing mixed both species as one species. Consequently, later, the following authors considered the specimens with longer inner ramus of uropod 3 (1/2 -3/4 of outer ramus) and with long setae on pereopods 3-4 in males (belonging really to *G. koreanus*), as members of *G. suifunensis* (Birstein 1939, Ueno 1940 a, 1940 b).

Gammarus gregoryi Tattersall 1924, described from Stream at Yeh-shih (= Yi-chin) on the terrace besides the Mekong River (Yunnan region, S. China) is also provided with short inner ramus of uropod 3, poorly setose antennae 1-2, by presence of calceoli on flagellum of antenna 2, absence of setae along anterior margin of segments 3-6 of pereopods 5-7, etc. But, despite the fact, that this species has been very poorly described (unknown shape of flagellum of antenna 2, etc.) this species differs from our specimens in hands (*G. suifunensis*) by presence of long setae on pereopods 3-4, by partially reduced spines on urosomite 1.

Gammarus zeongogensis Lee et Kim 1980, known from Jeongog in southern part of Korea, agree with our specimens by poorly setose antenna 2 bearing calceoli, by presence of plumose and simple setae along both margins of both rami in uropod 3, etc. But, this species differs from our specimens by slightly longer inner ramus of uropod 3, by long posterior setae on pereopods 3-4, etc.

Gammarus shanxiensis Barnard & Dai Ai-yun 1988, known from Shanxi, Yangcheng (China) is provided with scarcely setose antenna 2 with calceoli, absence of setae on segments 4-6 of pereopods 5-7, short setae on uropod 3, etc.

But, this species differs from our specimens by long inner ramus of uropod 3 reaching or exceeding 2/3 of outer ramus, by presence of facial spines on lobes of telson, slightly longer setae on posterior margin of pereopods 3-4 in males, etc.

In any case, we based our determination on the opinion that the paratypes of *G. suifunensis* in this region (Primorye- Vladivostok- Suifun) have the shortest inner ramus of uropod 3 among all *Gammarus* species and that pereopods 3-4 are with short setae. (if not, our specimens belong to the other, probably new species).

LOC. TYP.: Suifun River N. of Vladivostok, Dulkeit, U.S.S.R.

LOCALITIES CITED: Loc. typ. (Martynov, 1925); Muravev Amurski peninsula, vicinity of Vladivostok (Dershavin, 1927 b); Kamenka River; Solontsovy Spring (Primorye, U.S.S.R.)(present work).

DISTRIBUTION: U.S.S.R.: Primorye region near Vladivostok (Far East).

ECOLOGY. Within the specimens from Solontsovy spring, one coupling pair of specimens have been preserved: male is taking the female by right gnathopod 1 on dorsal surface between the mesosomal segments 5 and 6, and by left gnathopod 1 on dorsal surface of female between the head and mesosomal segment 1.

G. suifunensis has been collected in mixed population with *Gammarus koreanus* (Kamenka River; Solontsovy spring).

GAMMARUS KOREANUS Ueno 1940

Figs.: VI, 6, 7; VII-XI

Syn.: *Gammarus (Rivulogammarus) pulex koreanus* Ueno 1940 a: 78, fig. 74-90; Lee & Kim 1980: 44.

Gammarus koreanus G. Karaman 1984: 142.

Gammarus (Rivulogammarus) pulex suifunensis Birstein 1939: 60, fig. 4.

? *Gammarus pulex* Dershavin 1923: 184; 1927 a: 2, fig. 1, G. p.; 1927 b: 176; Dershavin 1930: 7; Martynov 1930: 62.

? *Gammarus (Rivulogammarus) suifunensis* Ueno 1940 a: 67, fig. 17-30; Ueno, 1940 b: 315, fig. 28-41.

MATERIAL EXAMINED: U.S.S.R. (Far East):

5.(2921) Khabarovsk Region, Fortovy spring, June 10, 1982, 12 spec. (leg. Makarchenko)(forma C);

6.(2843) Khabarovsk Region, Kiya River, June 9, 1982, one female (leg. Makarchenko)(cf. C);

7.(4049) Khabarovsk region, Chistovodnaya River, May 10, 1986, 3 spec. (leg. Teslenko)(C);

8.(-) Khabarovsk Region, Amur river basin, Jan. 8, 1963, 6 spec. (leg. Levanidova)(C);

9.(4691) Khabarovsk Region, Bikin River, June 28, 1990, 5 spec. (leg. Medvedeva)(C);

10.(4690) Khabarovsk Region, Bikin River, July 4, 1990, 9 spec. (leg. Medvedeva)(C);

11.(4408) Khabarovsk Region, Bikin river Basin, Bogelaza River, July 2, 1990, 8 spec. (leg. Medvedeva)(C);

- 12.(3888) Primorye, Yedinka River basin, Kollektivka River, May 28, 1985, many spec. (leg. Semenchenko)(C);
- 13.(-) Primorye, Lozovsky reserve, Petrov Island, spring, August 7, 1985, 2 females, accompanied by other *Amphipoda* (leg. Gostyukhina)(cf. B);
- 14.(-) Primorye; Upper tributaries of Ussuri River, Sokolovka River, August 24, 1976, many spec. (leg. Vshivkova)(A);
- 15.(02837) Primorye, Suchan River basin, Frolovka River, June 8, 1984, many spec. (leg. Korionov)(C);
- 16.(02826) Frolovka River, June 9, 1984, 10 spec. (leg. Korionov)(C);
- 17.(02806) Frolovka River, July 24, 1984, 10 spec. (leg. Korionov)(C);
- 18.(02849) Frolovka River, June 11, 1984, 7 spec. (leg. Korionov)(A);
- 19.(0930) Primorye, Razdolnaya R. basin, Kamenka River, April 26, 1973, one spec. accompanied by *Gammarus suifunensis* Mart. (leg. Chereshev) (C);
- 22.(419) Solontsovy spring, February 3, 1972, one male, accompanied by *Gammarus suifunensis* Mart. (leg. -)(C);
- 23.(0964) Solontsovy spring, April 27, 1973, one female juv. accompanied by *Gammarus suifunensis* Mart. (leg. Chereshev);
- 24.(325) Primorye, "Kedrovaya Pad" Reserve, Kedrovaya River, August 14, 1973, 5 spec. (leg. Vshivkova)(A-C);
- 25.(01243) Kedrovaya River, April 21, 1973, 6 spec. (leg?)(no data)(A);
- 26.(0531) Kedrovaya River basin, Goraysky spring, August 16, 1972, many spec. (leg. Budnikova)(B);
- 27.(0542) Goraysky spring, June 23, 1972, many spec. (leg. Tolstikova)(B);

Gammarus cf. koreanus:

28 (4551) Sakhalin Isl., Belaya River Basin, spring, July 25, 1986, 3 spec. (leg. Makarchenko)(forma D);

29 (4540) Sakhalin Isl., Zalom River, July 16, 1986, 4 spec. accompanied by *Amphipoda* (leg. Makarchenko)(D).

DESCRIPTION: (No. 14, Sokolovka River), MALE 15 mm: Body smooth, metasomites 1-3 with cca 4 dorsoposterior short marginal setae each (fig. IX, 3); urosomites low, non carinate (fig. IX, 6); urosomites 1-2 with one dorsomedian and 2 dorsolateral groups of elements each (1-2 spine accompanied by 2-5 setae as long as or hardly longer than spines themselves)(fig. IX, 6, 7); urosomite 3 with similar dorsolateral groups of elements, but median group of elements is presented by 4 setae only.

Head with short rostrum, lateral cephalic lobes subrounded, eyes as long as or hardly exceeding the diameter of peduncular segment 1 of antenna 1 (fig. VII, 5).

Antenna 1 up to 3/4 of body-length, peduncular segment 1-3 progressively shorter, poorly setose, all setae are very short (fig. VII, 6); peduncular segment 2 with 3 ventral groups of setae, peduncular segment 3 with 2 ventral groups of setae (1 median and 1 distal group); main flagellum consisting of 37 articles bearing short setae each (most of articles with 1 short aesthetasc). Accessory flagellum consisting of 5 articles (fig. VII, 6).

Antenna 2: peduncular segments 4-5 poorly setose, all setae very short and straight; ventral margin of articles 4-5 with 4-5 ventral groups of setae 9 (fig. VII, 7, 8); main flagellum relatively slender, dorsoventrally compressed, but without brush of short setae (many of flagellar segments bearing one calceoli); antennal gland cone short.

Mouthparts basic, normal. Left mandible: incisor with 5 teeth, lacinia mobilis

with 4 teeth. Right mandible: incisor with 4 teeth, lacinia mobilis consisting of 2 pluritoothed lamellae; mandibular palp segment 2 with 15 setae (fig. IX, 1), palp segment 3 on outer face with one group of A setae, on inner face with 1 group of B setae, at posterior margin with cca 26 D setae and 5-6 long distal E setae.

Coxae 1-4 normal, longer than broad, coxae 1-3 with 3 ventral setae only (fig. VII, 1, 3; VIII, 5); coxa 4 with several posterior short setae (fig. VIII, 7); coxae 5-7 short (fig. VIII, 1-3).

Gnathopods 1-2 moderately setose, numerous setae on segments 4-5 long straight or slightly recurved.

Gnathopod 1: segment 5 triangular, with 3 anterior marginal bunches of straight setae (fig. VII, 1, 2); segment 6 pyriform, at both margins with bunches of moderately long straight setae; palm very oblique, convex, with median palmar spine; on outer face with 2 corner and several marginal spines, on inner face with 4 subcorner and several facial spines; dactyl slender.

Gnathopod 2: segment 5 along anterior margin with 3 bunches of long straight or slightly recurved setae; segment 6 with parallel lateral margins and along anterior margin bearing several bunches of long straight or slightly recurved setae (fig. VII, 3, 4); palm concave, with median palmar spine, defined on outer face by 3 corner spines, on inner face by 2 strong subcorner spines; dactyl exceeding posterior margin of segment 6, slender.

Pereopods 3-4 densely setose, all setae very long, straight or slightly recurved. Pereopod 3: posterior margin of segments 4-6 with bunches of long setae only, that of segment 6 with several pairs of short spines accompanied by long setae; dactyl short (fig. VIII, 5, 6).

Pereopod 4 like pereopod 3, but slightly less setiferous, all setae are straight (fig. VIII, 7).

Pereopods 5-7 moderately slender, pereopod 6 is the longest one. Segment 2 of pereopods 5 and 6 with straight or slightly concave posterior margin, that of pereopod 7 with convex posterior margin (fig. VIII, 1-3), bearing short posterior marginal setae; ventroposterior dilatation well developed on pereopods 5-6, poorly visible in pereopod 7. Segments 3-6 of pereopods 5-7 along both margins with bunches of short spines, accompanied sometimes by single very short setae; dactyl short and stout (fig. VIII, 4).

Pleopods 1-3 with 2 retinacula and 3 setae each. Peduncle of pleopod 1 with bunches of setae along anterior margin; peduncle of pleopod 3 along posterior margin with 3-4 single short setae.

Epimeral plates 2-3 with moderately pointed ventroposterior corner and bearing a row of 3-4 subventral spines (fig. IX, 3).

Uropods 1-2 like these in *G. suifunensis*, peduncle of uropod 1 with one basifacial spine and with dorsoexternal row of spines; dorsointernal spines absent except 1-2 basal and 1 distal spine.

Uropod 3 long, densely setiferous, all setae are long; both margins of both rami provided with numerous long simple and plumose setae, accompanied at outer margin of outer ramus and inner ramus by single spines (fig. IX, 2); inner ramus reaching 2/3 of outer ramus; second segment of outer ramus short.

Telson longer than broad, each lobe provided with 2 distal spines and several long distal and laterofacial setae (fig. X, 8).

Coxal gills broad, occur on mesosomsegments 2-7 (fig. VIII, 1, 2, 3, 5, 7).

FEMALE: with numerous eggs: 11.8 mm. Very similar to the males, setae on urosomites 1-3 as long as or slightly longer than these in males (fig. IX, 6). Antenna 1 like that in males, peduncular segment 2 with 3 ventral groups of setae,

ped. segment 3 with 2 ventral groups of setae (fig. XI, 1); main flagellum and accessory flagellum are consisting of lower number of articles (up to 30 and 4 respectively).

Antenna 2 : peduncular segments 4-5 with 3-4 ventral groups of straight setae longer than these in males; flagellum slender, 11-articulate, without calceoli (fig. XI, 2).

Gnathopods 1-2 : segments 5-6 with numerous long straight or slightly recurved setae, median palmar spine on segment 6 absent. Palm of segment 6 of gnathopod 1 defined on outer face by row of marginal spines (fig. X, 1, 2).

Gnathopod 2: palm defined on outer face by 2 corner spines, on inner face by 2 subcorner spines (fig. X, 3, 4).

Pereopods 3-4 : posterior margin of their segments 4-5 bearing numerous long but straight setae (fig. IX, 4, 5); segment 6 along posterior margin with spines accompanied by low number of longer setae, dactyl short. Pereopod 4 bearing shorter setae than these in males (fig. IX, 5).

Pereopods 5-7 like these in males but stouter, their segments 4-6 along both margins with spines, sometimes accompanied by single short setae (fig. X, 5, 6).

Pleopods, epimeral plates and uropods 1-3 like these in males (fig. IX, 7).

Telson bearing on each lobe 2 distal spines and numerous long distal and laterofacial setae (fig. X, 7).

Oostegys broad, occur on mesosomal segments 2-5.

VARIABILITY of specimens from No. 14:

Setae on segments 5-6 of gnathopods 1-2 are straight or some of them are slightly recurved distally (but never curled like these in *G. pulex*).

Both margins of segments 4-6 of pereopods 5-7 bearing groups of spines accompanied by 0-2 short setae each.

GENERAL VARIABILITY : Urosome always relatively low, never laterally compressed, sometimes the dorsomedian group of elements (spines and setae) can be consisting by setae only; the number and length of setae on urosomites 1-3 is always more scarce in males than in females.

Eyes usually reniform or ovoid, but sometimes small and elliptic only (No. 16).

Peduncular segment 3 of antenna 1 with or without ventral median group of setae, main flagellum bearing 30 (No. 14, 19) to 40 articles.

Peduncular segments 4-5 of antenna 2 with 4-5 (No. 11, 14, 19), rather 6-7 ventral groups of setae (No. 27); flagellum in males more or less slender, dorsoventrally compressed, always bearing calceoli.

Gnathopods 1-2 with longer straight or slightly recurved setae. Pereopods 3-4 with long straight or slightly recurved setae.

Segments 4-6 of pereopods 5-7 in males and females along both margins with spines (No. 5, 10, 14, 19), accompanied sometimes by single short setae (males of No. 27,) or elevated number of shorter or longer setae (females of No. 26, 27) (fig. XI, 4, 5).

Epimeral plates 2-3 more or less pointed. Uropod 3 densely setose, both margins of both rami provided with long plumose and simple setae accompanied sometimes by spines; inner ramus usually reaching 2/3 to 3/4 of outer ramus (most of samples), rather inner ramus reaching only 1/2 - 3/5 of outer ramus (No. 15, 16, 17, 18, 19, 24) (fig. XI, 3).

All studied populations in hands can be selected in three different forms, not always clearly distinguishing:

Forma A: article 3 of peduncle of antenna 1 bearing one medial ventral group of

setae; peduncular segments 4-5 of antenna 2 provided with 4-5 ventral groups of setae each; anterior and posterior margin of segments 4-6 of pereopods 5-7 in males and females provided with spines only, setae are practically absent;

Forma B: article 3 of peduncular segment 3 of antenna 1 with 1 medial ventral group of setae (1 or more setae) like that of forma A; peduncular segments 4-5 of antenna 2 bearing up to 6-7 ventral groups of setae; anterior and posterior margin of segments 4-6 of pereopods 5-7 in males with spines accompanied by single short setae, in females provided with spines accompanied by numerous setae often longer than spines themselves (figs. XI, 4, 5);

Forma C: peduncular segment 3 of antenna 1 without median ventral group of setae; peduncular segments 4-5 of antenna 2 with 4-5 ventral groups of setae each; anterior and posterior margin of segments 4-6 of pereopods 5-7 in males and females practically with spines only.

To the forma A belong the samples from localities No.: 14, 18, 25, 17 (A-C), 24 (A-C);

To the forma B: 13 (cf.), 26, 27;

To the forma C: 5, 7, 8, 9, 10, 11, 12, 15, 16, 19, 22, 6 (cf.);

To the forma D: 28, 29.

It was not possible to recognize these forms as a distinct taxa, because some transitional populations have been observed: the specimens from the localities No. 17 and 24 have a transitional position between forma A and C (peduncular segment 3 of antenna 1 with or without median ventral group of setae; number and length of setae near spines on both margins of segments 4-6 of pereopods 5-7 in females of some localities have been very variable (for example No. 27, see fig. XI, 4, 5), and the number of ventral groups of setae on peduncular segments 4-5 of antenna 2 reaching up to 7, but often are bringing only 5 or 6 groups of ventral setae.

The samples No. 6 and 13 contained small number of specimens, females only, what made determination less certain.

The specimens from Sakhalin Island (*forma D*, samples No. 28 and 29) differ slightly more from all other populations in hands by elevated and laterally compressed urosome bearing dorsomedian group of spines in central position of each segment, and antenna 2 in males seems to be slightly more inflated (peduncular segment 3 of antenna 1 with or without ventral median group of setae, peduncular segments 4-5 of antenna 2 with 4-5 ventral groups of setae, segments 4-6 of pereopods 5-7 in males and females bearing spines only, setae on gnathopods and pereopods are long, often slightly recurved distally). Because of scarce material in hands (only a few specimens, mostly females) attribution of these populations to this species requests further studies on new material.

LOC. TYP.: Kainei, Tyosen (NE. part of Korea).

REMARKS AND AFFINITIES. D e r s h a v i n (1923; 1927 a) mentioned *Gammarus pulex* from the rivers and lakes of Kamchatka peninsula (see G. Karaman 1984: 152), although the figure of epimeral plate 3 bearing subventral spines and setae suggested possible similarity with *G. lacustris* Sars.

D e r s h a v i n (1927 b: 176) mentioned *Gammarus pulex* from Ussurian District of U.S.S.R (Basin of Amur River, Suifun River and small rivers of Bay of Petar Veliki) having inner ramus of uropod 3 "usually not exceeding 2/3 of outer ramus".

D e r s h a v i n (1930) mentioned that " *Gammarus pulex* is spread over the whole continental part of the district and also in the island of Sakhalin", and later, that " It seems that the form *G. pulex* is absent in the islands of the Okhotsk and Bering seas".

Gammarus shanxiensis Barnard & Dai Ai-yun 1988 from China (Shanxi, Yangcheng) is very similar to our specimens by numerous characters, but differs from our specimens by less number and shorter posterior setae on pereopods 3-4, less setose uropod 3 and gnathopods 1-2 bearing shorter setae, by presence of basifacial spines on telson.

Gammarus hongyuanensis Barnard & Dai Ai-yun 1988 from Hongyuan, Sichuan Province, China) is also very similar to our specimens in almost all characters, but differs from our specimens by slightly less setiferous pereopods 3-4 bearing shorter posterior setae on segments 5-6, segment 2 of pereopods 5-7 is narrowed and long, urosomites 1-3 bearing spines intermixed with lower number of short setae, telson with basifacial spines. Based on the established variability of our specimens from U.S.S.R., the differences between our specimens and *G. hongyuanensis* are relatively small, based on all often variable characters, and we can not exclude the possibility that both taxa can be the different forms of the same species.

Gammarus lasaensis Barnard & Dai Ai-yun 1988 known from Xizang (Tibet, China) is also rather similar to our specimens by long setae on pereopods 3-4, by scarce pilosity of antennae 1-2, presence of calceoli, uropod 3, absence of basifacial spines on lobes of telson, etc. This species differs from our specimens by poorly setose telson bearing 3-4 distal spines, facial setae on lobes of telson are absent; epimeral plate 3 are with sharply produced ventroposterior point, gnathopods 1-2 slightly less setose bearing shorter setae, especially in females, segment 2 of pereopods 5-7 is slightly more thin, and urosomite 3 provided with median group of spines and setae.

Gammarus nekkensis Uchida 1935, known from southern Jehol (streams at Wuling-shan and from spring at Aitao-tsu-lian (China) has been later redescribed again by G. K a r a m a n (1989) based on material from southern part of China (torrent N. of Peking). This species agrees with our specimens from U.S.S.R. by presence of long setae on pereopods 3-4, absence of setae on segments 4-6 of pereopods 5-7 in males, presence of calceoli, etc; but this species differs from our specimens from U.S.S.R. by less setiferous uropod 3 provided by slightly shorter inner ramus; outer margin of outer ramus in uropod 3 without plumose setae, telson is provided with basifacial spines.

Gammarus taliensis Shen 1954 known from shore of Ta-Li (Er-Hai) Lake in Yunnan Province, China, species very poorly known, differs from our specimens by presence of long setae on peduncle of antenna 2, longer setae on flagellum of antenna 1, short and stout pereopods 5-7.

Gammarus gregorii Tattersall 1924, known from Yunnan region in Southern China (Yeh-shih) differs from our samples by absence of lateral groups of elements on urosomite 1, by short inner ramus of uropod 3 reaching 1/3 of first segment of outer ramus and poorly pointed epimeral plate 3, lobes of telson with 3 distal spines.

Gammarus spinipalmus (Chen 1939) known from Stream in Jade Fountain Hill, Peeping (= Peking), species poorly described, seems to be similar to our specimens by presence of calceoli, long setae on pereopods 3-4, long inner ramus of uropod 3 reaching 2/3 of outer one, both rami of uropod 3 having plumose setae, presence of long setae on gnathopods 1-2, remarkably pointed epimeral plate 3, shape and armature of pereopods 5-7, telson with 2 distal spines and long setae, etc. But this species differs from our specimens from Soviet Union by presence of basifacial spines on lobes of telson. As many other taxonomic characters of this species are unknown, further relations between both taxa are not possible to establish without the redescription of *G. spinipalmus*.

The several taxa known from southern part of U.S.S.R. (*Gammarus sangirdaki*

G. Kar. 1984, *G. sangirdaki hissari* G. Karaman 1984, *G. chimkenti* G. Karaman 1984, *G. matienus* DersHAVIN 1938, etc.) differ remarkably from our specimens also.

From the Japan there are known only two species of genus *Gammarus*: *G. nipponensis* Ueno 1940 and *G. sobaegensis* (Ueno 1966) (see G. Karaman 1986: 82), but both species differ remarkably from our species by absence of calceoli on antenna 2 in males, and other characters.

The species known from Korea (*Gammarus sobaegensis*, various types of Lee & Kim 1980, *G. sobaegensis kimi* G. Karaman 1984, *G. sobaegensis marginalis* G. Karaman 1984, *G. odaensis* Lee & Kim 1980, *G. soyoensis* Lee & Kim 1980, *G. galgosensis* Lee & Kim 1980, *G. hoonsooi* Lee 1986, *G. wangbangensis* Lee & Seo 1990, *G. leei* G. Karaman 1984 (= *G. kyonggiensis* Lee & Seo 1990) differ from our species by absence of calceoli on antenna 2 in males, etc.

Gammarus zeongogensis Lee & Kim 1980 known from Korea (Jeongog) is very similar to our species in numerous characters (presence of calceoli, densely setose uropod 3 and pereopods 3-4) although peduncular segments 4-5 of antenna 2 are poorly setose, and peduncular segments 1-3 of antenna 1 and segment 2 of pereopods 5-7 are stout and short, (telson unknown), inner ramus of uropod 3 hardly exceeding half of outer ramus.

Gammarus koreanus Ueno 1940 known from Korea (Kainei, Tyosen; Zenkyori) is provided also with calceoli and short setae on antenna 2 in males, long, partially recurved setae on pereopods 3-4, long inner ramus of uropod 3, etc., but this species differs from our species by absence of plumose setae on inner margin of both rami and slightly more curled setae on gnathopod 2. It is not enough to separate our specimens from this species and we can consider provisory our specimens very close to *G. koreanus*.

Ueno (1940 a, 1940 b) mentioned and figured the species *Gammarus suifunensis* Mart. 1925 from spring near Lake Chingpo, but pereopods 3-4 with long setae, calceoli and short setae on antenna 2 in males, shape of rami of uropod 3 (although shape of setae on uropod 3 is undescribed), epimeral plates, pereopods 5-7 and telson, suggested, that this species can be identical with our species from U.S.S.R., mentioned here under the name of *G. koreanus*, and not to the species *G. suifunensis*.

By this way, because of large variability regarding the presence or absence of plumose setae on inner margins of both rami of uropod within the same population as well as between different populations, we ignored the absence of plumose setae on some margins of rami of uropod 3 in typical *G. koreanus* as an important taxonomic character, considering our populations from U.S.S.R. as the same species. On the other hands, our populations seems to be rather between *G. koreanus* and *G. zeongogensis*.

GAMMARUS SPOONERI, new name

Syn.: *Gammarus zaddachi* ssp. *salinus* Spooner 1947: 18, fig. 4 C, 5 D-E, 6 B, D.

Gammarus (*Lagunogammarus*) *salinus* Tzvetkova 1975: 51, fig. 11, 17.

Gammarus salinus Lincoln 1979: 250, fig. 111 f, 115 a-j.

REMARKS: Fabricius (1775) established *Gammarus salinus*; he mentioned it again later (1781).

Olivier (1791) mentioned again *G. salinus*.

Latreille (1803) mentioned also *G. salinus* Fabr.

Semenovskii (1880) described also *Gammarus pulex salinus*.

Spooner (1947) described a new subspecies *Gammarus zaddachi* ssp. *salinus*, n.ssp. from estuary of River Weser as a type locality (p. 19), and many other authors mentioned it as a distinct species (Lincoln, 1979; Barnard and Barnard, 1990).

By this way, Spooner's species becomes nom. preocc. and we proposed a new name for it, *Gammarus spooneri*, n. sp., with the type locality: estuary of Wesser River).

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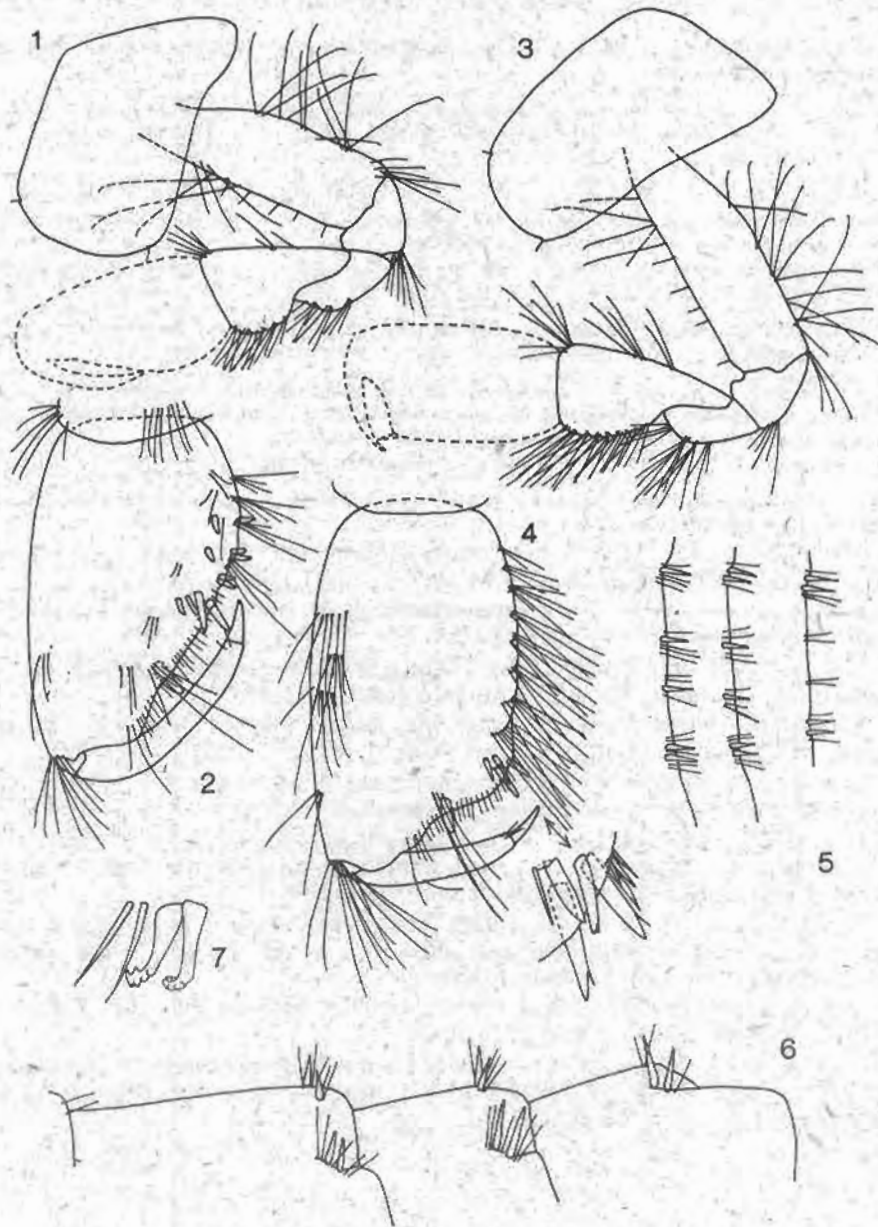


Fig. 1. *Gammarus stiftunensis* Mart. 1925, Kamenka River, male 13 mm: 1-2 = gnathopod 1; 3-4 = gnathopod 2; 5-6 = urosome, dorsal and lateral projection; 7 = retinaculi on pleopod 2.

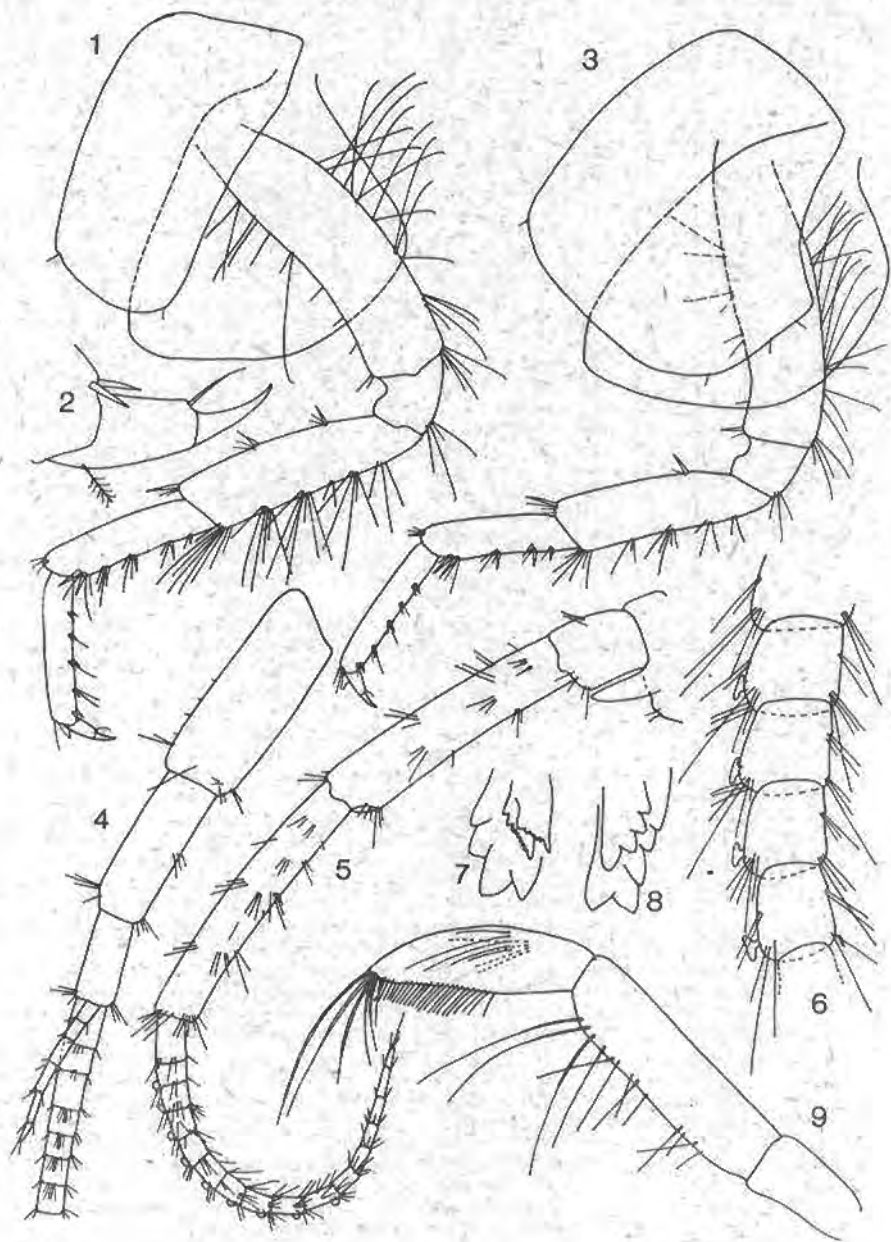


Fig. II. *Gammarus suifinensis* Mart. 1925, Kamenka River, male 13 mm: 1-2 = pereopod 3; 3 = pereopod 4; 4 = antenna 1; 5-6 = antenna 2; 7 = tip of right mandible; 8 = tip of left mandible; 9 = mandibular palp.

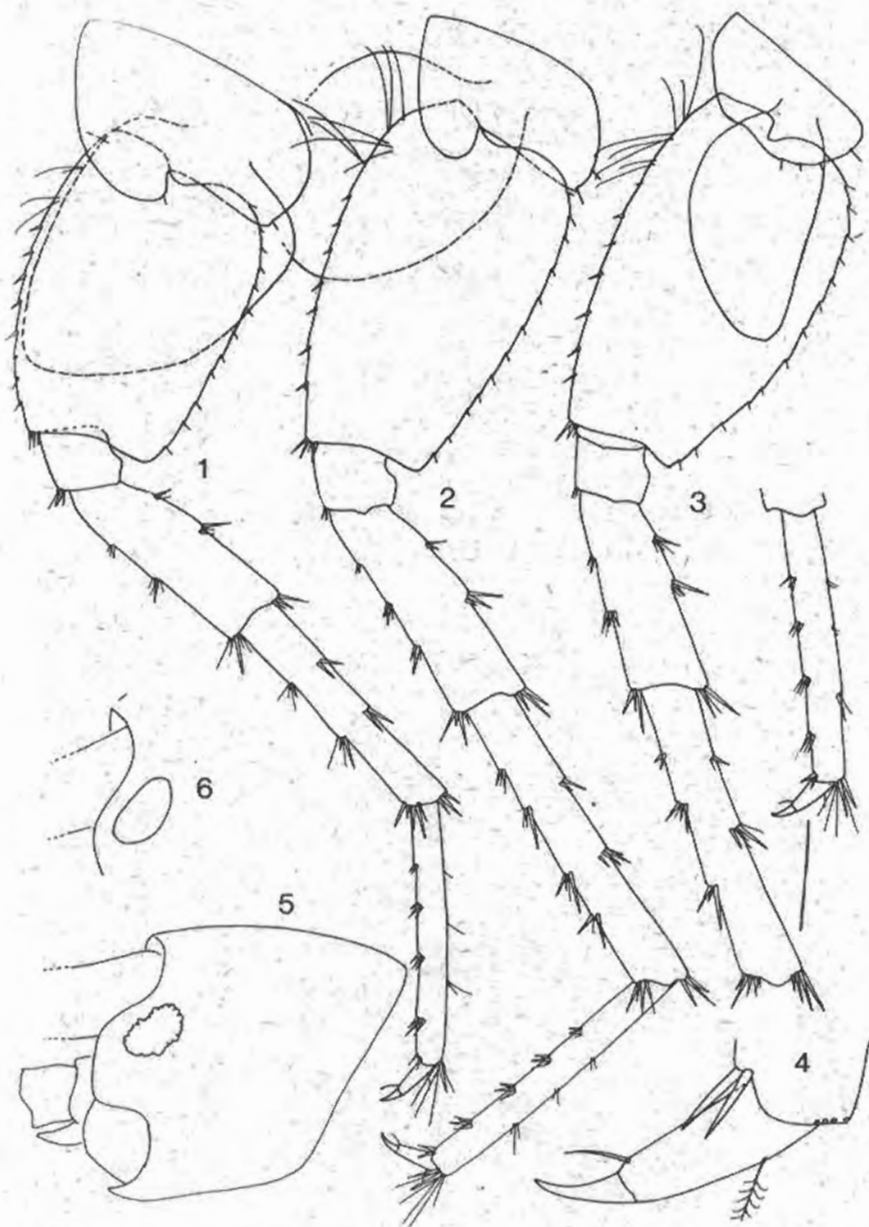


Fig. III. *Gammarus suiftiöensis* Mart. 1925, Kamenka River, male 13 mm: 1 = pereopod 5; 2 = pereopod 6; 3-4 = pereopod 7; 5 = head; 6 = head, male 12.8 mm.

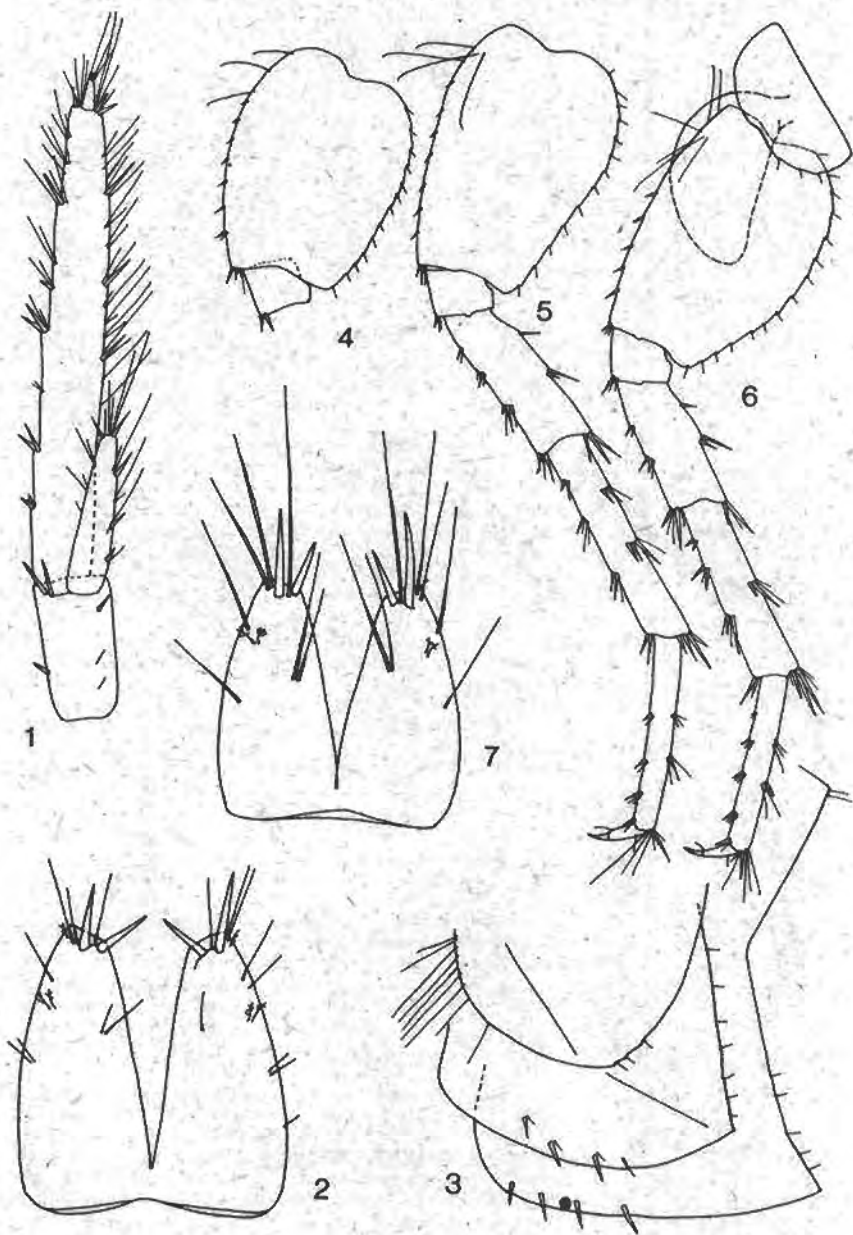


Fig. IV. *Gammarus suifunensis* Mart. 1925, Kamenka River, male 13 mm: 1 = uropod 3; 2 = telson; 3 = epimeral plates 1-3; 4-6 = pereopods 5-7, female 9 mm; 7 = telson, female 9 mm.

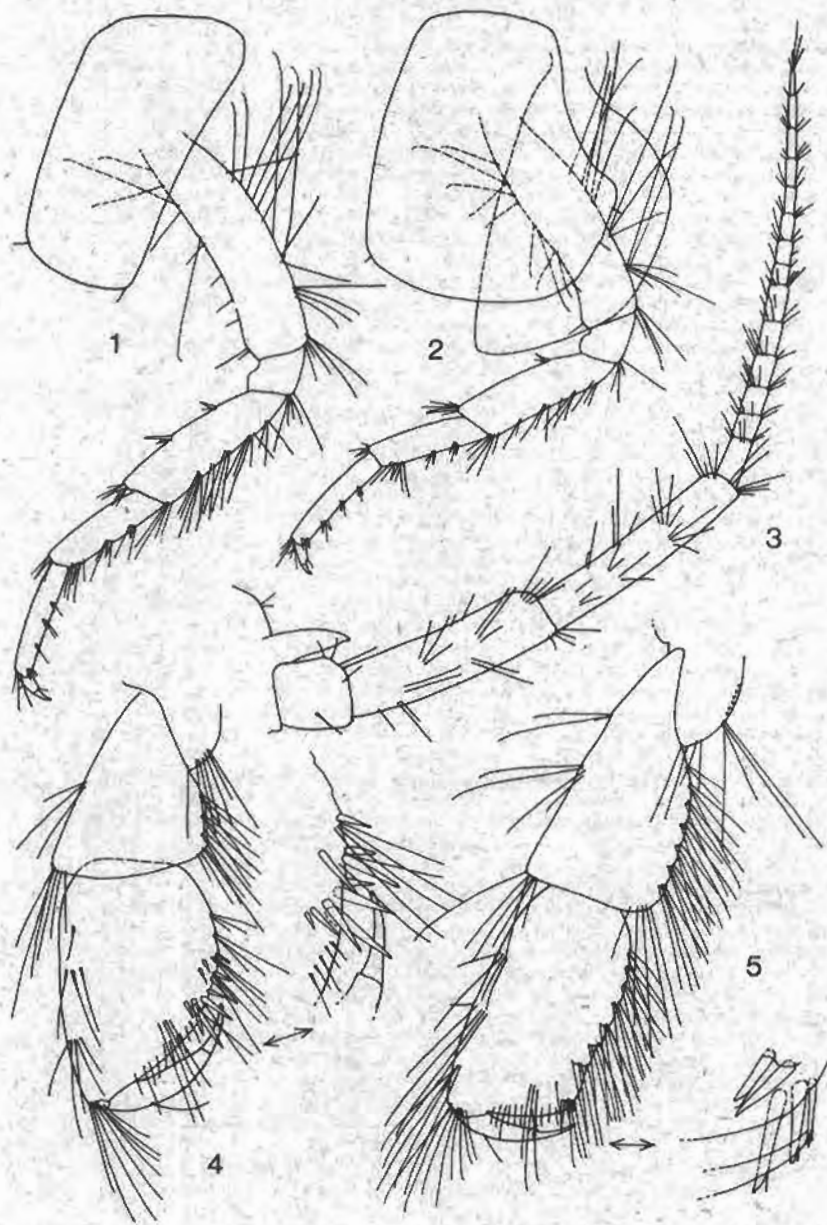


Fig. V. *Gammarus suisfunensis* Mart. 1925, Kamenka River, female 9 mm: 1 = pereopod 3; 2 = pereopod 4; 3 = antenna 2; 4 = gnathopod 1; 5 = gnathopod 2.

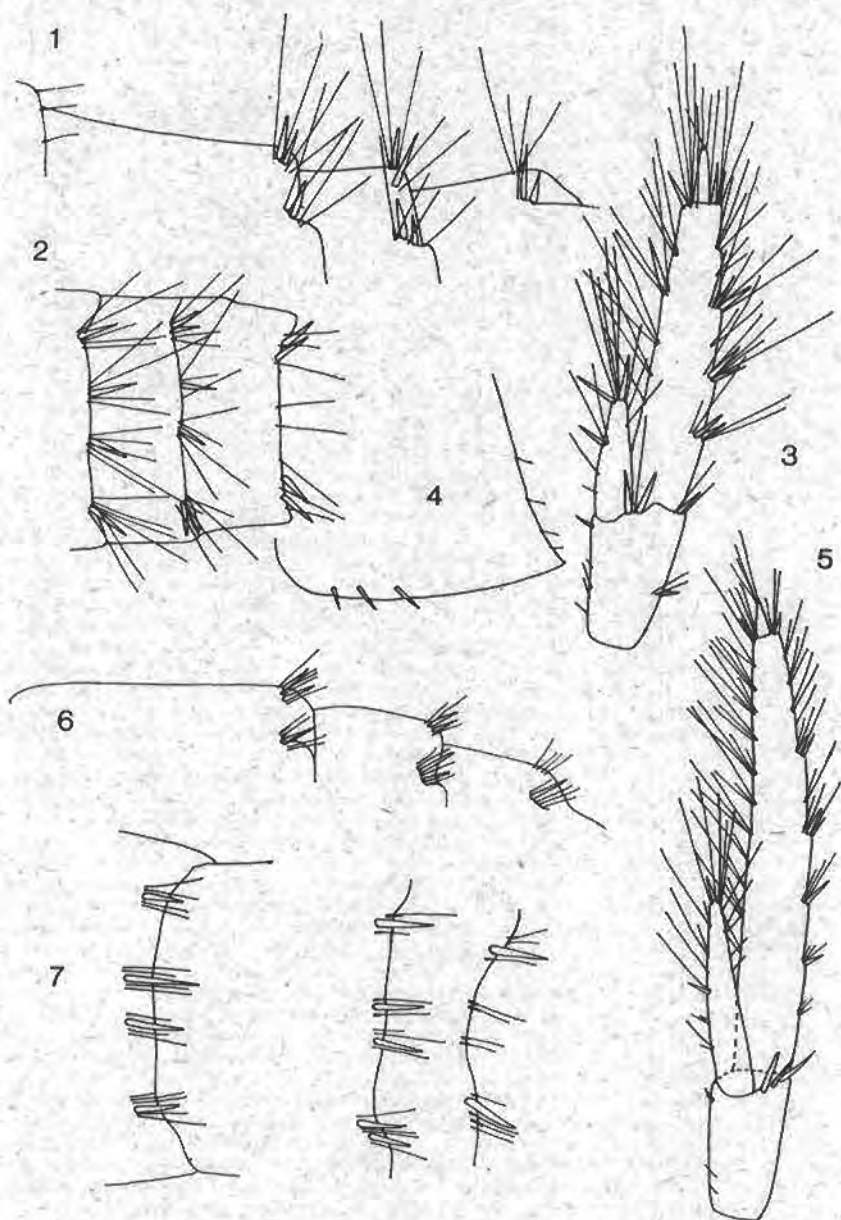


Fig. VI. *Gammarus suiifunensis* Mart. 1925, Kamenka River, female 9 mm: 1-2 = urosome, lateral and dorsal projection; 3 = uropod 3; 4 = epimeral plate 3; 5 = uropod 3, male 12.6 mm from Solontsovy Spring.
Gammarus koreanus Ueno 1940, Sokolovka River, male 15 mm: 6-7 = urosome, lateral and dorsal projection.

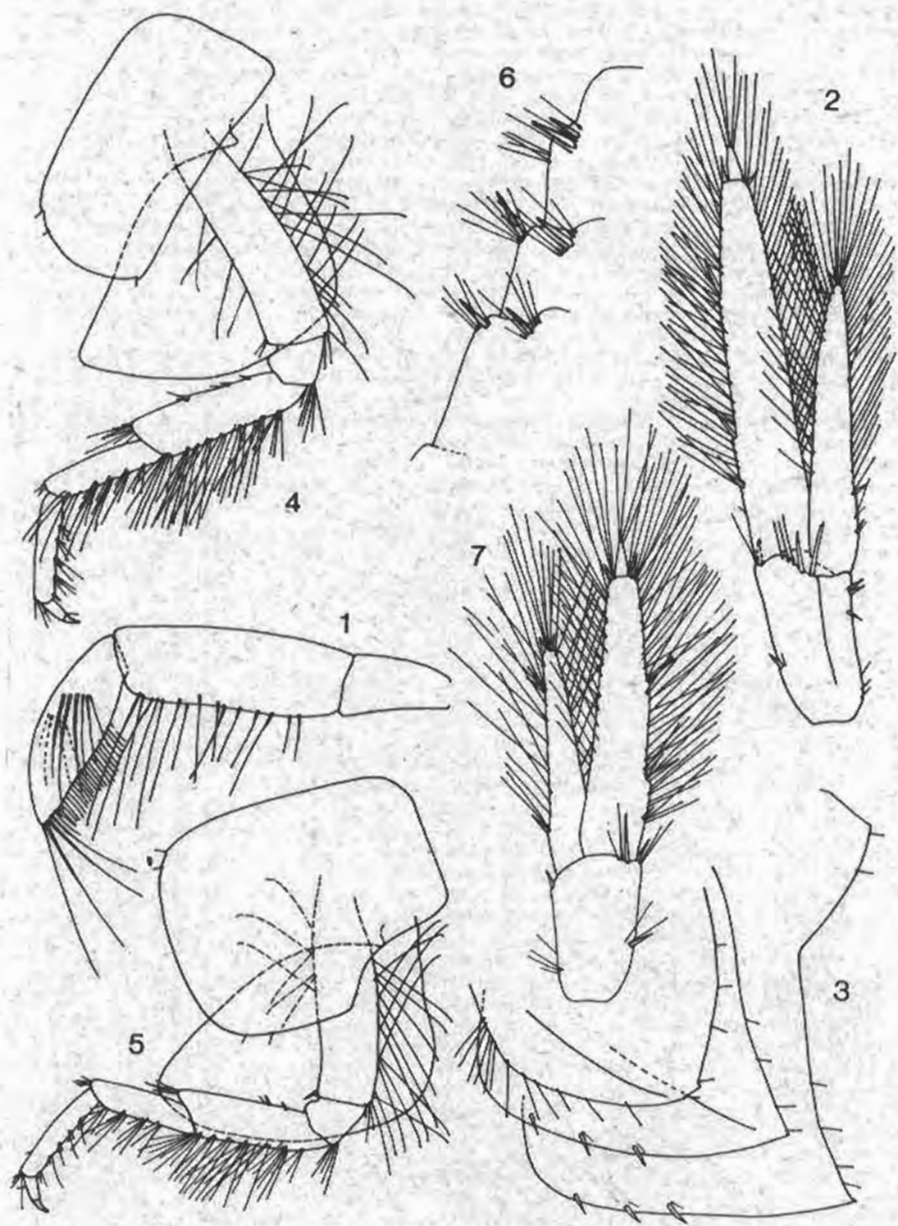


Fig. IX. *Gammarus koreanus* Ueno 1940, Sokolovka River, male 15 mm: 1 = mandibular palp; 2 = uropod 3; 3 = epimeral plates 1-3; 4-5 = pereopods 3-4, female 11.8 mm; 6 = urosome, female 11.8 mm; 7 = uropod 3, female 11.8 mm.

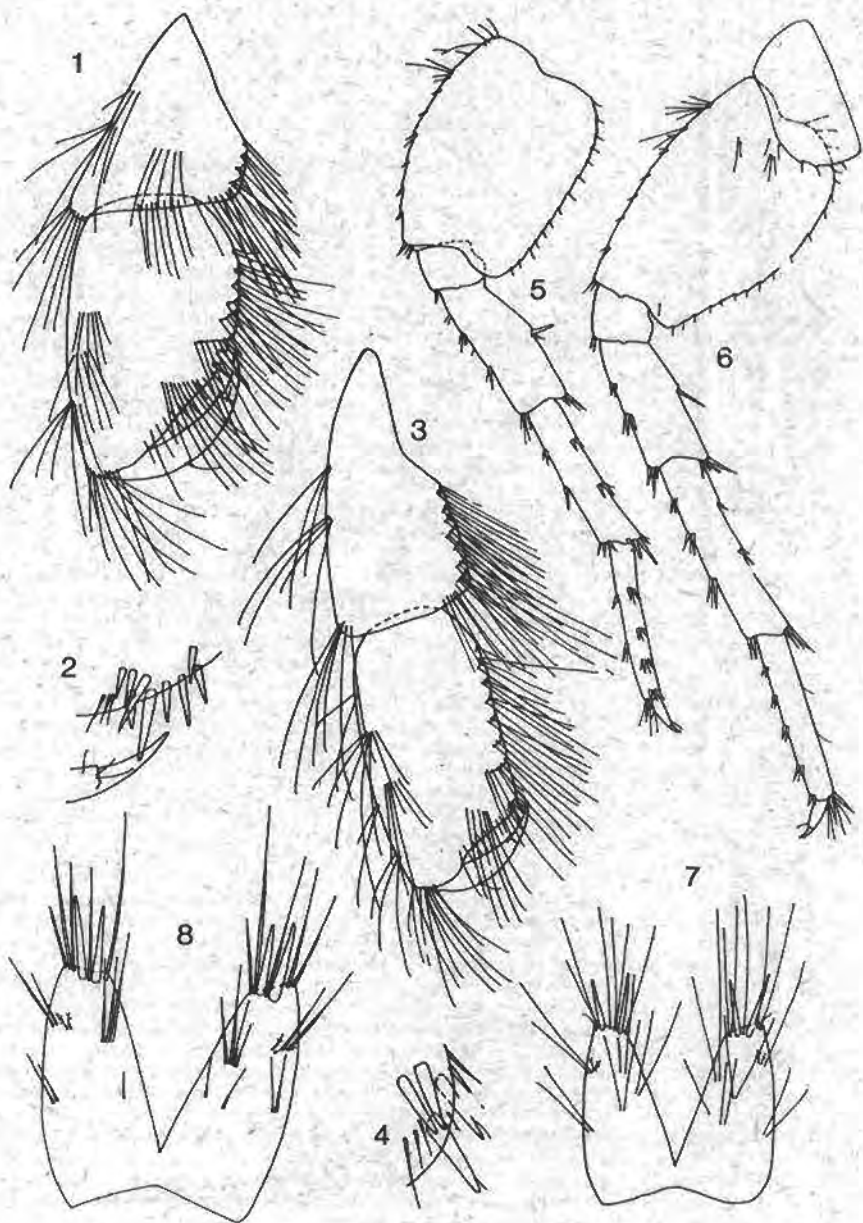


Fig. X. *Gammarus koreanus* Ueno 1940, Sokolovka River, female 11.8 mm: 1-2 = gnathopod 1; 3-4 = gnathopod 2; 5 = pereopod 5; 6 = pereopod 7; 7 = telson; 8 = telson, male 15 mm.

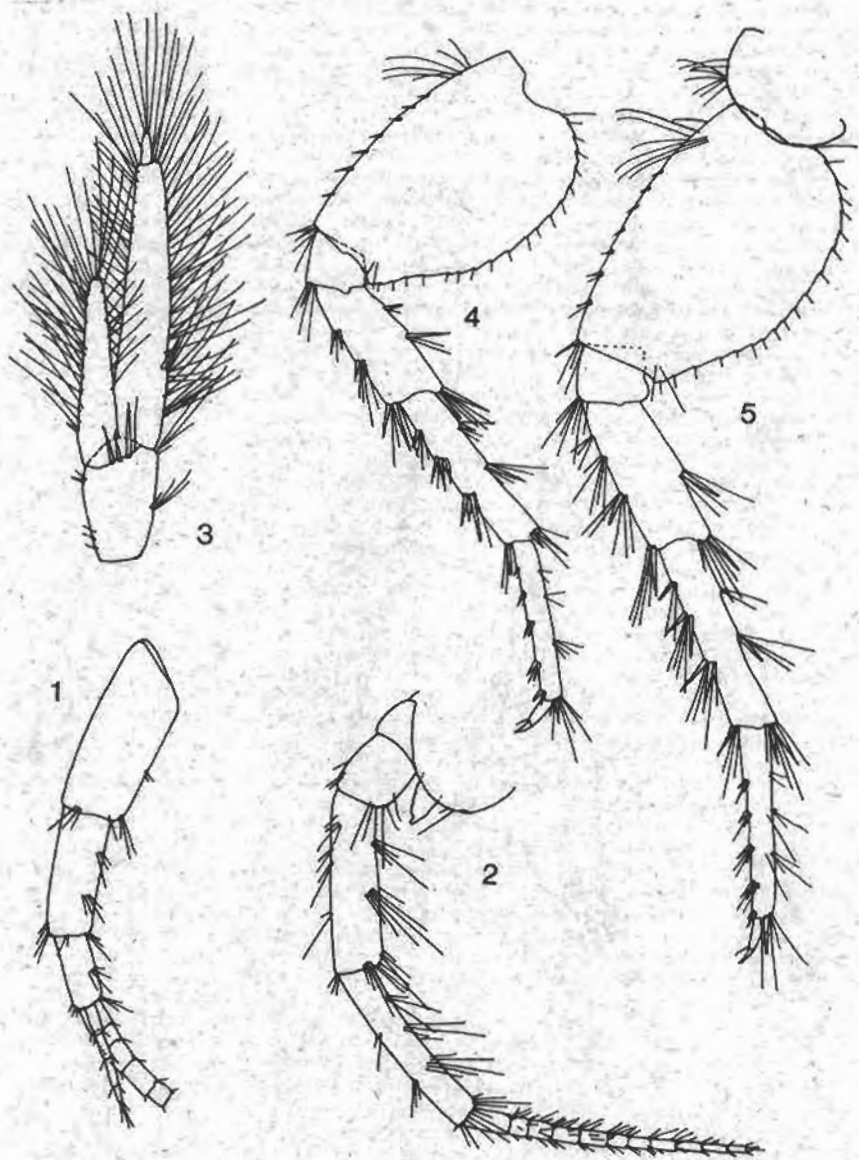


Fig. XI. *Gammarus koreanus* Ueno 1940, Sokolovka River, female 11.8 mm: 1 = antenna 1; 2 = antenna 2; 3 = uropod 3, male 10.2 mm from Goraysky Spring; 4 = pereopod 7, female 9.5 mm from Goraysky Spring; 5 = pereopod 7, female 10 mm from Goraysky Spring.

REZIME

PREGLED OPISANIH I CITIRANIH SLATKOVODNIH GAMMARUS VRSTA (FAM. GAMMARIDAE) IZ SOVJETSKOG SAVEZA SA OPISOM DVA TAKSONA (205. PRILOG POZNAVANJU AMPHIPODA)

Iako je slatkovodna fauna *Amphipoda* još uvijek nedovoljno proučena u Sovjetskom Savezu, vrstama roda *Gammarus* Fabr. koji žive u slatkim vodama tog područja, bavio se je niz istraživaca tokom posljednjih stotina godina, opisujući veliki broj novih taksona, od granica prema Rumuniji pa do Vladivostoka. Međutim, većina tih opisa je veoma oskudna i ne obuhvata mnogobrojne važne taksonomske karaktere tih vrsta, pa sve te vrste treba ponovo proučiti i opisati detaljno kako bi se odredilo njihovo pravo taksonomsko mjesto.

Kako su mnogi autori opisivali nove vrste, ne znajući za opise nekih sličnih, već ranije opisanih vrsta iz istih područja, u radu smo sakupili sve važnije autore i njihove citate vrsta opisanih iz Sovjetskog Saveza od 1839 godine pa do danas.

Istovremeno, imajući na raspolaganju materijal iz oblasti Primorja (obala Pacifika kod Vladivostoka i prema granici sa Kinom), dali smo detaljni opis dvaju vrsta roda *Gammarus* koje na osnovu postojeće literature odgovaraju karakteristikama vrsta *Gammarus suifunensis* Martinov 1925 i *Gammarus koreanus* Ueno 1940.

G. suifunensis je prvobitno bila opisana iz rijeke Suifun sjeverno od Vladivostoka, blizu Sovjetsko-kineske granice, i sada smo tu vrstu nasli u većem broju lokaliteta Primorja.

G. koreanus bila prvobitno opisana iz sjevero-istocnog dijela Koreje blizu granice sa Sovjetskom Savezom i Kinom, i sadašnji nalaz te vrste u oblasti Primorja znatno proširuje areal rasprostranjenja ove vrste.

Predloženo je novo ime, *Gammarus spooneri*, n. sp. za vrstu *Gammarus salinus* Spooner 1947 opisanu iz ušća rijeka zapadne Evrope, buduci da je ime *salinus* nom. preocc. , već upotrebljavano od 1775 godine. (Fabricius) pa nadalje, za druge predstavnike roda *Gammarus*.