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REMARKS TO THE FRESHWATER GAMMARUS SPECIES  
(FAM. GAMMARIDAE) FROM KOREA, CHINA, JAPAN AND  
SOME ADJACENT REGIONS  
(CONTRIBUTION TO THE KNOWLEDGE OF THE AMPHIPODA  
134)

OSVRT NA SLATKOVODNE VRSTE RODA GAMMARUS (FAM.  
GAMMARIDAE) IZ KOREJE, KINE, JAPANA I NEKIH SUSJEDNIH  
OBLASTI

(134. PRILOG POZNAVANJU AMPHIPODA)

Abstract

The morphological characters and taxonomic position of freshwater *Gammarus* species (*Amphipoda: Gammaridae*) from Korea, China, Japan and adjacent regions of USSR are discussed and distributions of all these species are mentioned. Several new taxa are established: *Gammarus sobaegensis leei*, n. ssp., *G. sobaegensis marginalis*, n. ssp., *G. sobaegensis kimi*, n. ssp., *G. chimkenti*, n. sp., *G. sangirdaki*, n. sp., *G. sangirdaki hissari*, n. ssp. and *G. belli*, n. sp. Key to the freshwater *Gammarus* species of Korea, Japan, China and some adjacent regions is presented. *G. pulex koreanus* Ueno 1940 is removed to the specific rank.

Izvod

Morfološki karakteri i taksonomski položaj slatkovodnih vrsta iz roda *Gammarus* (*Amphipoda: Gammaridae*) iz Koreje, Kine, Japana i obližnjih oblasti SSSR-a su analizirani i navedeno je rasprostranjenje ovih vrsta. Postavljeno je nekoliko novih taksona: *Gammarus sobaegensis leei*, n. ssp., *G. sobaegensis marginalis*, n.

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ssp., *G. sobaegensis kimi*, n. ssp., *G. chimkenti*, n. sp., *G. sangirdaki*, n. sp., *G. sangirdaki hissari*, n. ssp. i *G. belli*, n. sp.

Sastavljen je ključ za determinaciju svih slatkovodnih vrsta iz roda *Gammarus* iz Koreje, Japana, Kine i susjednih oblasti SSSR-a. Vrsta *G. pulex koreanus* Ueno 1940 je podignuta na nivo samostalne vrste.

#### INTRODUCTION

The members of the genus *Gammarus* are very widely distributed over whole Europe, North Africa, central and north part of Asia, Japan and North America, in fresh waters as well as in the brackish waters along the coasts of the seas.

The number of known freshwater species of genus *Gammarus* in Europe is relatively very high, because of very intensive study of this genus by numerous scientists. The number of the freshwater *Gammarus* species known from whole Asia is relatively small, because of scarce study of this genus in that area and because of absence of larger collections of material of *Gammarus* from that region. Only in the restricted areas, where more detailed collecting and study of genus *Gammarus* was made, (as in Korea, for example), many new species have been discovered and described. On the other hand, only several species are known from whole China, where numerous species will be still discovered and described.

First new species from China was described by Tattersall (1924) from Yeh-Shih in Yunnan region (S. China), *Gammarus gregorii*, n. sp. Later, Uchida (1935) described a second new species, *Gammarus nekkensis*, n. sp. from the stream at Wu-Ling-Shan (N. of Peking).

Schellenberg mentioned (1937) *Gammarus lacustris* Sars, 1963, for several localities of China (Shor-Kol Lake NE. of Kashgar, NW. China; Tarbagataj Mt. on USSR-China border, etc.).

Chen described (1939) third new species, *Gammarus spinipalmus*, n. sp. from vicinity of Peking (Jade Fountain Hill), mentioning also *Gammarus pulex* from Nao-Kou near Peking (that last mentioned species probably belong to some other species, maybe new one).

Ueno mentioned (1940) the presence of *Gammarus suifunensis* Martynov, 1925 in the springs near lake Chingpo in eastern China, but the exact taxonomic status of this population must be reexamined.

Ueno mentioned also (1940) *Gammarus lacustris* Sars for the lake Dalai-Nuur (400 km N. of Peking) and from Tuchuan (N. China), but the taxonomic status of all these populations must be reexamined.

Shen described (1954) a new species, *Gammarus taliensis*, n. sp. from Ta-Li (=Er-Hai) Lake in Yunnan province, China.

The first freshwater *Gammarus* species from Korea have been described by Ueno (1940), *Gammarus (Rivulogammarus) pulex koreanus*, n. ssp. from Kalinei in NE. Korea, removed here to the specific rank as a distinct species. Ueno mentioned also (1940b) the presence of *Gammarus suifunensis* Martynov, 1925, in Korea, but without any localities cited.

Ueno described (1966) *Gammarus (Rivulogammarus) pulex sobaegensis*, n. ssp. from Simboggul cave and Hwanseongul cave in southern part of Korea.

Kim and Lee (1977) reported three groups of *Gammarus* from various parts of Korea. Lee and Kim (1980) removed *G. sobaegensis* to the specific rank, recognizing 7 local populations (=types) within *G. sobaegensis* in southern part of Korea (*G. galgosensis*, *G. odaensis*, *G. soyoensis*, *G. zeongogensis*). We elevated now three of the *G. sobaegensis* types (No. 2, 4, 5) to the subspecific level (ssp. *leei*, n. ssp., ssp. *kimi*, n. ssp. and ssp. *marginalis*, n. ssp.).

Only known freshwater *Gammarus* species from Japan is *Gammarus nipponensis* Ueno, 1940, known from Kiyotaki in Kyoto; several authors mentioned *Gammarus pulex* L. for some localities of Japan, (Tattersall, 1922, for Biwa lake-vicinity; Ueno, 1927 for Taiki-Ana cave on Honshu Island, etc.), but all these populations belongs to other *Gammarus* species, underscribed actually.

Regarding the numerous existing names of *Gammarus*-species over the World (over 100), the names of some later described species are nom. preocc. because of existing of previous described species with the same name. In this light, we erected a new names for three taxons of genus *Gammarus* from USSR and one from Scotland.

The key to the freshwater *Gammarus* species from China, Korea, Japan and some adjacent areas is presented.

## TAXONOMIC PART

### I. KOREA

#### *GAMMARUS GALGOSENSIS* Lee & Kim, 1980

Syn.: *Gammarus galgosensis* Lee & Kim, 1980:64, fig. 16—17.

Loc. typ.: Galgod-ri, southern part of Korea.

Localities cited: known only from type-locality (Lee & Kim, 1980)

Remarks: This species belongs with *G. koreanus* and *G. zeongogensis* to the poorly setose antenna 2-group.

*G. galgosensis* is characterized by poorly setose antenna 2 without calceola (males). Peduncle of antenna 1 poorly setose also.

Gnathopods 1—2 with short straight setae. Pereopods 3—4 poorly setose, setae at posterior margin short. Pereopods 5—7 with short setae at posterior margin of article 2, articles 3—6 at both margins with spines accompanied by scarce short setae. Uropod 3 moderately setose, with inner ramus reaching or exceeding 4/5 of outer ramus; outer margin of outer ramus poorly setose, with all simple (=smooth) setae, other margins of both rami with plumose setae.

*G. galgosensis* differs from *G. koreanus* by poorly setose pereopods 3—4, longer inner ramus of uropod 3, poorly setose gnathopods 1—2, etc.

*G. zeongogensis* differs from *G. galgosensis* by presence of long setae at posterior margin of pereopods 3—4, by presence of calceola on antenna 2 in males, by shorter inner ramus of uropod 3, by presence of plumose setae at outer margin of outer ramus of uropod 3, etc.

GAMMARUS KOREANUS Ueno, 1940 (new rank)

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

Loc. typ.: Kainei, north-eastern Tyosen, Korea.

Localities cited: loc. typ.; Zenkyori, north-eastern part of Korea (UENO, 1940).

Remarks. This species is characterized by poorly setose antenna 2 in males with calceola. Gnathopod 1 is with straight setae only, gnathopod 2 with long curled setae. Posterior margin of pereopod 3 with long, partially curled setae; pereopod 4 with long straight setae only. Pereopods 5—7 with article 2 provided with short posterior setae, no setae on inner face, segments 3—6 seems to be poorly setose at both margins. Epimeral plates 2—3 pointed slightly, with subdistal spines only (setae absent). Urosomites 1—2 normal, with spines and short setae. Uropod 3 with inner ramus reaching 2/3 of outer ramus; outer margin of both rami with plumose setae, inner margin of both rami with simple setae. Telson with 2 apical spines accompanied by several setae longer than spines.

Based on these characters, *koreanus* don't belongs to the species *G. pulex*, but represents a distinct species, *Gammarus koreanus*, Ueno 1940.

*Gammarus koreanus* is rather similar to *G. suifunensis* Mart. 1925 (sensu Birstein, 1939), but differing from later in shorter inner ramus of uropod 3, straight setae on gnathopod 2 and pereopod 3, maybe in different pilosity of uropod 3. The exact taxonomic status of *koreanus* regarding *suifunensis* must be reexamined based on type-specimens of *suifunensis*.

*GAMMARUS ODAENSIS* Lee & Kim 1980

Syn.: *Gammarus odaensis* Lee & Kim, 1980:52, fig. 10—11.  
*Gammarus* sp. (first group) Kim & Lee 1977:29.

Loc. typ.: Mt. Odae, Sangwangbong, Korea.

Localities cited: Korea: loc. typ.; Mt. Sogeumgang; Weoljeongsa (Mt. Odae); Yongyeonsa; Mt. Sohoe; Mt. Obong; Cheonpyeong-ri (LEE & KIM, 1980).

This species is characterized by setiferous antenna 2 without calceola; gnathopods 1—2 with straight setae only; pereopods 3—4 very poorly setose, setae not exceeding the diameter of articles. Article 2 of pereopods 5—7 with short posterior marginal setae, anterior margin of their articles 4—6 with spines accompanied by 0—1 short single setae not longer than spines.

Epimeral plates sharply pointed. Uropod 3 moderately setose, inner ramus reaching  $2/3$  to  $4/5$  of outer ramus, both margins of both rami with plumose setae or outer margin of outer ramus with simple setae.

*GAMMARUS SOBAEGENSIS SOBAEGENSIS* Ueno 1966

Syn.: *Gammarus (Rivulogammarus) pulex sobaegensis* Ueno 1966:525, fig. 14—18.

*Gammarus* sp. (second group, part.) Kim & Lee 1977:29.  
*Gammarus sobaegensis* Lee & Kim 1980:47, fig. 2—8.

Loc. typ.: Korea: cave Simboggul (Geaumdade, Galgeum-ri, Yeonpung-myeon, Geosan-gun, Chungcheongbug-do).

Localities cited: loc. typ.; cave Hwanseongul (Daei-ri, Dogye-eub, Samcheog-gun, Gangweon-do, southern part of Korea) (UENO, 1966); Korea: Mt. Chiag; Cheonbu; Jeodong; Sadong; Eoem-ri; Heungjeong-ri; Unmunsa; Bulgugsa; Tongdosa; Beomeosa; Haeumdae; Gadeog Island; Seongoggol; Gohyeon-ri; Gujora-ri; Mt. Gaya; Yeonsusa; Sangyu-ri; Hwaeomsa; Mt. Baegun; Ilsin-ri; Cheongpyong-ri; Mapyeong-ri; Yecheon; Daeheungsa; Jindo Island; Mt. Sindal; Dabosa; Juweoldong; Mt. Mudeung; Gaeamsa; Songgwangsa; Mt. Jugsan; Mt. Mireug; Gucheondong; Mt. Buso; Mt. Gyeryong; Mt. Gogni; Sudeogsa; Yesan; Geumdae; Mumbagmyeon; Mt. Dobong; Mt. Cheonima; Haeryong-ri; Eoryong-ri; Unagsa; Mt. Wangbang; Seungbangdong; Mt. Duryu; Mt. Obong; Seogwipo, Jeju Island (LEE & KIM, 1980).

Remarks. *G. sobaegensis* is characterized by moderately setose antenna 2 having up to 9 bunches of setae on peduncular segments 4—5, setae are as long as or longer than the diameter of segments; flagellum thick, without calceola. Gnathopod 1 normal,

gnathopod 2 with long straight setae. Pereopod 3 with numerous long straight posterior setae, pereopod 4 less setose than 3.

Pereopods 5—7 with short setae at posterior margin of article 2, articles 4—6 at both sides (margins) with spines intermixed with bunches of long setae. Epimeral plates 2—3 pointed, with spines at ventral margin. Urosomites normal, spinose. Uropod 3 densely setose, outer margin of outer ramus with many simple setae, other margins of both rami with plumose setae, inner ramus reaching 4/5 of outer ramus. Telson with distal spines accompanied by setae longer than spines.

Variability of type-population: outer margin of outer ramus of uropod 3 sometimes with single plumose setae (fide Lee & Kim, 1980).

Variability of other populations: Lee et Kim rederscribed *G. sobaegensis* based on the specimens from type-locality. They collected the samples of this species from numerous localities around whole southern part of Korea. They recognized 7 different groups of populations (=types) within this species based on their taxonomic characters and the geographical distribution in Korea. Three of these groups (types) we removed to the sub-specific rank (types 2, 4, 5). Other 4 groups (types) for the moment remain under the name of *Gammarus sobaegensis* because of unknown many other underscribed taxonomic characters (shape of eyes, pilosity of antenna 1, armature of urosomites, etc.).

The populations of type 1 (=typical *G. sobaegensis sobaegensis*) have been found by Lee et Kim (1980) in numerous localities over whole southern part of Korea, including islands.

The population of type 3 from Mt. Wangbang, Seungbangdong, Ilsin-ri and Mumbagmyeon is characterized by lower number of ventrolateral tufts of setae on peduncular segments 4—5 of antenna 2, but these setae are much longer; the pilosity of uropod 3 is abundant, long plumose setae appear at both margins of both rami of uropod 3.

This type 3 is very similar to the populations of *Gammarus nipponensis* from Japan, but differs from later only in slightly more setose anterior margin of article 5 in pereopods 5—7. Because of absence of knowledge of other taxonomic characters of both species, it was not possible to establish the exact common status of both species.

The populations of type 6 from Heungjeong-ri and Unmunsa are characterized by very densely setose uropod 3 having only simple setae at outer margin of outer ramus, like that in typical *sobaegensis*. The pilosity of antenna 2 like that of type 5 (=ssp. *kimi*), with very long setae at peduncle and flagellum of antenna 2.

The population of type 7 from Seogwiipo (Jeju Island) is characterized by moderately setose antenna 2 having bunches of setae not exceeding the diameter of articles themselves and by nume-

rous longer setae at anterior margin of articles 4—5 of pereopods 5—7 and at ventroposterior part of article 2 in pereopod 7. This type is rather similar to the population of type 2 (ssp. *leei*).

*GAMMARUS SOBAEGENSIS KIMI* n. ssp.

Syn.: *Gammarus sobaegensis* type 5 Lee et Kim 1980:51, fig. 6.

Loc. typ.: Korea: Cheongsong.

Localities cited: known only from type-locality.

This taxon is rather similar to *G. s. sobaegensis* but differs from it in several characters: the setae on peduncular segments 4—5 and flagellum of antenna 2 are very long and numerous, but the number of tufts of setae on peduncular articles is lower than that in *G. s. sobaegensis*. Posterior margin of pereopods 3—4 is provided with numerous very long straight setae. Anterior margin of segments 4—5 on pereopods 5—7 provided with spines intermixed with numerous very long setae. Uropod 3 densely setose, both margins of both rami provided with plumose setae, inner ramus reaching 4/5 of outer ramus.

Taxonomic position of this subspecies is given in the key.

Holotype: male figured on fig. 6 in: Lee & Kim 1980:53.

*GAMMARUS SOBAEGENSIS LEEI* n. ssp.

Syn.: *Gammarus sobaegensis* type 2, Lee & Kim 1980:51, fig. 3.

*Gammarus* sp. (second group, part.) Kim & Lee 1977:29.

Loc. typ.: Uidong, Korea.

Localities cited: Korea: loc. typ.; Jeondeungsa; Yongju Island; Deogjeog Island (LEE & KIM, 1980).

Remarks. Peduncular segments 4—5 of antenna 2 with lower number of ventral tufts of setae, setae are shorter than the diameter of articles themselves, flagellum with bunches of short setae. Calceola absent. Pereopods 3—4 with longer setae at posterior margin. Anterior margin of segments 4—5 and posterior margin of article 2 of pereopods 5—7 with longer setae. Uropod 3 like that in ssp. *sobaegensis*.

Holotype: male figured on fig. 3 in: Lee & Kim, 1980:50.

*GAMMARUS SOBAEGENSIS MARGINALIS* n. ssp.

Syn.: *Gammarus sobaegensis* type 4, Lee & Kim 1980:52, fig. 5.

Loc. typ.: Korea: Bongwha.

Localities cited: Korea: loc. typ.; Socheon; Gipo-ri (LEE & KIM, 1980).

**Remarks.** This subspecies is rather similar to ssp. *sobae-gensis*, but differs from later in several characters: presence of very long setae at posterior margin of article 2 in pereopods 5—7. Anterior margin of pereopods 5—7 with long setae at segments 4—6.

**Holotype:** male figured on fig. 5 in: Lee et Kim, 1980:52.

*GAMMARUS SOYOENSIS* Lee et Kim 1980

**Syn.:** *Gammarus soyoensis* Lee et Kim 1980:59, fig. 12—13.  
*Gammarus* sp. (third group) Kim et Lee 1977:29.

**Loc. typ.:** Korea: Mt. Soyo.

**Localities cited:** Korea: loc. typ.; Dongducheon; Gisan-ri; Seoghyeon-ri; Bugog-ri (LEE et KIM, 1980).

**Remarks.** This species is characterized by moderately setose antenna 2 without calceola, peduncular segments 4—5 bearing tufts of setae nearly as long as the diameter of articles. Gnathopods 1—2 with straight setae only. Pereopods 3—4 with short setae at posterior margin. Pereopods 5—7 with short posterior setae at article 2, anterior margin of articles 3—6 of pereopods 5—7 with bunches of spines accompanied by several short setae. Epimeral plates pointed, with spines.

Uropod 3 moderately setose, inner ramus reaching 3/4 to 4/5 of outer ramus, outer margin of outer ramus poorly setose, both margins of both rami with plumose setae, second article of outer ramus minute.

*GAMMARUS ZEONGOGENSIS* Lee et Kim 1980

**Syn.:** *Gammarus zeongogensis* Lee et Kim 1980:60, fig. 14—15.

**Loc. typ.:** Jeongog, southern part of Korea.

**Localities cited:** loc. typ. (LEE et KIM, 1980).

**Remarks.** This species is characterized by poorly setose antenna 2, especially peduncular segments 4—5, by presence of calceola, by presence of very long straight setae at posterior margin of pereopod 3; gnathopods 1—2 with short straight setae, article 2 of pereopods 5—7 short and broad, with very short posterior marginal setae, articles 3—6 of pereopods 5—7 spinose, with a few short setae along both margins. Inner ramus of uropod 3 reaching nearly half of outer ramus, both margins of both rami with plumose setae.

This species belongs to the Korean group of species with poorly setose antenna 2, and it is rather similar to *G. koreanus*; differing from later by absence of curled setae on gnathopod 2 and



pereopod 3, shorter inner ramus of uropod 3, by presence of plumose setae at both margins of both rami, etc.

*G. zeogogensis* differs from *G. suifunensis* by slightly shorter setae on peduncle and flagellum of antenna 2 and gnathopod 2.

## II. CHINA

### *GAMMARUS GREGORYI* Tattersall 1924

Syn.: *Gammarus gregoryi* Tattersall 1924:430, fig. 1—14; Barnard & Barnard 1983:466.

Loc. typ.: stream at Yeh-shih (= Yi-chih), altitude 6400 feet, on the terrace beside the Mekong River (Yunnan region in S. China near Burma border).

Localities cited: SW. China: loc. typ.; Li-Chiang (= Li-Kiang) snow peak, on the eastern flank of the mountain, one day's march north of the city of Li-Chiang (TATTERSALL, 1924).

Remarks. This species is characterized by relatively short inner ramus of uropod 3 reaching only cca 1/3 of outer ramus, like that in *G. suifunensis* mentioned by Martynov, 1925 from Vladivostok region; outer margin of outer ramus with numerous setae (simple or plumose ??) intermixed with spines.

Eyes ovoid, lateral cephalic lobes subrounded, peduncle of antenna 1 poorly setose. Antenna 2 poorly setose also, peduncular segments 4—5 with low number of bunches of very short setae, shorter than the diameter of articles themselves, calceola present. Gnathopods 1—2 with long straight setae. Posterior margin of pereopods 3—4 with long straight setae. Article 2 of pereopods 5—7 with marked ventroposterior corner and with short posterior marginal setae, anterior margin of segments 4—5 with spines only. Epimeral plates angular to pointed, with spines only. Urosomite 1 with dorsal groups of setae only, urosomites 2—3 with spines and setae. Evidently, the spinulation of urosomite 1 is partially reduced, like that in many *G. balcanicus* populations in Europe. Lobes of telson with dorsal and distal spines accompanied by long setae.

*G. gregoryi* is very similar to *G. zeogogensis* and maybe with *G. spinipalmus*, but differs from both by shorter inner ramus of uropod 3 and partially reduced armature on urosomites. Absence of detailed descriptions of *gregoryi* and *spinipalmus* make impossible one more detailed comparison.

### *GAMMARUS NEKKENSIS* Uchida 1935

Syn.: *Gammarus nekkensis* Uchida 1935:5, pls. I—IV; Barnard & Barnard 1983:468.

Loc. typ.: Stream at Wu-ling-shan (southern Jehol, N. of Peking, China).

Localities cited: southern Jehol, China: loc. typ.; cold spring at Aitao-tsu-lian, 1000 m »in elevation« (UCHIDA, 1935).

Remarks. *Gammarus nekkensis* is very poorly described and its taxonomic status is hardly to establish. This species is characterized by presence of calceola on antenna 2, by poorly setose antenna 2; gnathopods 1—2 with straight setae, pereopod 3 with many long straight setae at posterior margin; article 2 of pereopods 5—7 with short posterior marginal setae and without setae at anterior margin of articles 3—6. Epimeral plates acute. Uropod 3 with inner ramus reaching half of outer ramus, moderately setose. Telson with long distal setae (and some spines probably).

Based on these characters, *G. nekkensis* is very similar to *G. suifunensis* Martynov 1925 from Lake Chingpo (China), but because of poorly known many taxonomic characters of both species, it is not possible to establish exact taxonomic differences between both species without the reexamination of type populations of both species.

For the same reason, the relationship of *G. nekkensis* and *G. zeongogensis* is unclear (unknown pilosity of uropods, antennae, etc.).

#### GAMMARUS SPINIPALMUS (Chen 1939)

Syn.: *Dikerogammarus spinipalmus* Chen 1939:2, fig. 3—5.  
*Gammarus spinipalmus* Barnard & Barnard 1983:469.

Loc. typ.: Stream in Jade Fountain Hill, Peiping (=Peking), China.

Localities cited: known only from type-locality.

Remarks. This species is uncompletely described. Antenna 2 with calceola, probably poorly setose. Gnathopods 1—2 with straight setae. Pereopods 3—4 with long posterior setae (straight or curled?). Pereopods 5—7 with short setae at posterior margin of article 2, anterior margin of articles 4—5 with spines intermixed with a few short setae. Epimeral plates 2—3 pointed, with spines only. Urosomites with spines and setae. Uropod 3 moderately setose, inner ramus reaching nearly 2/3 of outer ramus, both margins of both rami with plumose setae. Telson elongated, with lateral and distal spines and setae much longer than spines.

#### GAMMARUS SUIFUNENSIS Martynov 1925

Syn.: *Gammarus suifunensis* Martynov 1925:189, fig. 1—4;  
Dershavin 1927b:176, 179; Dershavin 1930:2; Barnard & Barnard 1983:469.

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

*Gammarus (Rivulogammarus) suifunensis* Schellenberg 1937: :270; Ueno 1940a:67, fig. 17—30; Ueno 1940b:315, fig. 28—41.

Loc. typ.: Suifun River near Vladivostok, USSR.

Localities cited: USSR: loc. typ. (MARTYNOV, 1925); peninsula Muravev Amurskii near Vladivostok (DERSHAVIN, 1927b); vicinity of Vladivostok: Okeanskaia and Bay of Amursk (crest Pronge; crest Sabalkh) (BIRSTEIN, 1939); CHINA: Chingpo Lake (Manchuokuo, Hei Lung Chiang region, E. China) (UENO 1940a, 1940b).

Remarks: Martynov (1925) described this species from Suifun river near USSR — China border. He mentioned that this species is characterized by very short inner ramus of uropod 3 reaching only 1/4 of outer ramus. Setae on gnathopods 1—2 are straight. Pereopods 5—7 without setae at anterior margin of articles 3—5; posterior margin of article 2 with short setae. Peduncle of antenna 2 with short setae, calceola present. Eyes short, ovoid. Pereopods 3—4 unknown. Telson with distal spines and setae longer than spines.

Dershavin (1927b) mentioned that very short inner ramus of uropod 3 is characterized only for very small specimens, and that adult specimens are with inner ramus of uropod 3 reaching to the 1/2 of outer ramus.

Birstein (1939) mentioned that this species is similar to *G. pulex* by the pilosity of antenna 2, telson, shape of epimeral plates, pilosity of pereopods 3—4, and he removed *suifunensis* to the subspecific rank of *G. pulex*. Birstein mentioned also that *suifunensis* is characterized by elongate antennae, broad article 2 of pereopods 5—7 with well developed distoposterior corner like that in *G. pulex gauthieri*, and by short inner ramus of uropod 3 like that in *G. fossarum*. Inner ramus reaching half of first segment of outer ramus of uropod 3.

Ueno (1940a) elevated *suifunensis* again to the specific level, and he mentioned *suifunensis* for cold spring at the strand of Chingpo Lake (E. China, cca 150 km N. of Korea and cca 250 km W. of Vladivostok). The specimens from Chingpo Lake are similar to these mentioned by Birstein from Vladivostok (1939) with poorly setose antenna 2 having calceola, inner ramus of uropod 3 hardly exceeding half of outer ramus; Some setae on gnathopod 2 seems to be partially curled (based on figure).

Ueno (1940b) published the same figures of *G. suifunensis* again.

Maybe Birstein's and Ueno's specimens belong to the same species, but Ueno's specimens are with uropod 3 without any plumose setae at uropod 3, and Birstein's specimens are with plumose setae on all margins of rami of uropod 3. It remains

unclair if these specimens belong to *Gammarus suifunensis* of Martynov 1925, because of different shape of uropod 3 with inner ramus very short (1/4) and because Birstein has not studied the Martynov's specimens. It is necessary to reexamine Martynov's specimens of *G. suifunensis* to prove the identity of Birstein's and Ueno's specimens with these from Suifun river.

*GAMMARUS TALIENSIS* Shen 1954

Syn.: *Gammarus taliensis* Shen 1954:20, pls. I—II; Barnard & Barnard 1983:469.

Loc. typ.: shore of Ta-Li (Er-Hai) Lake in Yunnan province, China.

Localities cited: China: loc. typ.; South Lake; Sin-sin-I; Bing-I; Shar-Kwan; Butterfly Spring (all from Lake Ta-Li) (SHEN, 1954).

Remarks. This species is characterized by normal, well developed dorsal armature on urosomites consisting of spines and setae. Antenna 1 with moderately setose peduncle and flagellum. Antenna 2 with caecola, peduncular segments 4—5 with numerous setae longer than the diameter of articles, flagellum with longer setae also. Gnathopods 1—2 moderately setose, all setae are straight. Pereopods 3—4 underscribed. Pereopods 5—7 relatively stout, with article 2 bearing longer setae at posterior margin, anterior margin of pereopods 5—7 with spines intermixed with single longer setae. Epimeral plates pointed, with spines only. Uropod 3 densely setose, both margins of both rami with plumose setae, outer margin of outer ramus densely setose; inner ramus reaching 2/3 of outer ramus. Telson with 2 distal spines and several long distal and dorsolateral setae.

*G. taliensis* differs remarkably from *G. gregoryi*, other known species from Yunnan province, by uropod 3, urosomites-armature, shape of pereopods, etc.

*GAMMARUS LACUSTRIS* Sars 1863

Syn.: *Gammarus (Rivulogammarus) lacustris* Schellenberg 1937:490, fig. 2—6; Birstein 1939:59, fig. 3; Ueno 1940a:63, fig. 1—16; Ueno 1940b:315, fig. 16—27.

Remarks. Several authors mentioned *Gammarus lacustris* for many localities over Asia, but all these populations must be reexamined to prove their exact taxonomic status.

Schellenberg (1937) mentioned *G. lacustris* for Sagüs-Kul Lake in NW. Tibet and Pangong Lake in western Tibet; Shor-Köl

lake (=Schor Kul) NE. of Kashgar, NW. China, on 3750 m over sea level; Sancha, N. Kumaon (southern side of Himalaya Mts.; Ak-Balik (pilk Alichur (=Alitschur), Pamir (Tadzikistan, USSR) on 4100 m over sea level; Tributary of Indus River in Dorbuck (Kashmir); Tarbagataj Mt. (at China—USSR border).

Birstein (1939) mentioned *G. lacustris* for lower part of Amur river (E. part of USSR), citing the distribution of this species also for Sakhalin Island, Kamchatka peninsula, delta of Lena River, lower part of Kara River, Ural Mt. (all in USSR), Japan, Pamir, Tibet, Himalaya Mts., etc. Based on Birstein's figures was not possible to prove the existing of real *G. lacustris* in all these localities.

Ueno mentioned (1940a) *Gammarus lacustris* for the outlet of the lake and for cold springs near lake Dalai-Nor (=Dalai-Nuur) (Hulunpeierh region, cca 400 km N. of Pecking, N. China near Mongolian border); He mentioned this species for two other localities also: Tuchuan (100 km W. of Taonan in region of Ta-Khing-An-Ling-Shan-Mo, northern China) and Hsilamulun (Southern Chaharh, NE. China). Ueno mentioned that the specimens from Dalai-Nor are with »dactyls of all pereopods relatively short and not slender as in the typical form«, and that the specimens from Hsilamulun are with all appendages shorter than in the usual forms of *G. lacustris*.

Probably both these populations don't belong to *G. lacustris* but to some other species similar to *lacustris*, because in Asia there are several species very similar to *G. lacustris* with slightly shorter pereopods and their dactyls (see Karaman and Pinkster, 1977).

»GAMMARUS PULEX« L. (=various species)

Syn.: *Gammarus pulex* Chevreux 1908:96; Tattersall 1914:214; Tattersall 1922:451, pl. 20, fig. 19—27; Dershavin 1923:184; Ugamskili 1925:216; Dershavin 1927a:2, pl. I, Gp; Dershavin 1927b:176, 179; Ueno 1927:363; Dershavin 1930a:2; Dershavin 1930b:91, 92; Martynov 1930:62; Ueno 1933:112; Ueno 1934:63, pls. III—VII; Ueno 1936:244; Chen 1939:2, fig. 2;

? *Gammarus annandalei* (part.) Ueno 1933:112.

Remarks. Many authors mentioned *Gammarus pulex* from various parts of Asia, but almost not any of these populations belong to the *G. pulex*.

Brandt (1851) mentioned *Gammarus pulex* for river Nachiki on Kamchatka, USSR (fide Dershavin, 1927a:2).

Chevreux (1908) mentioned *G. pulex* for Issyk-Kul Lake, on 1615 m over sea level (Kirgizstan, USSR); The pass of Karakol (on 2000 m) and for Tchatyur-Kul lake (on 3200 m). (see Karaman et Pinkster, 1977).

Tattersall mentioned (1914) *Gammarus pulex* for Pass between northern Hunza Range and the Taghdumbash, Pamir (on 15,600 feet over sea level), and for Lake Tali-Fu (Erh-Hai, Shan-Kuan) Yunnan province, China, on 7000 feet, pools near bank of Killik river (= ? *Gammarus taliensis* Shen, 1954).

Tattersall (1922) cited *Gammarus pulex* for the hills above Otsu (Biwa Lake, Japan) (= maybe *Gammarus nipponensis* Ueno, 1940).

Dershavina (1923) mentioned *Gammarus pulex* for Kamchatka peninsula (USSR): Kamchatka River (near Ust-Kamchatska); river Blizhnaia (near vil. Paratunka); lakes: Kuruliskoe, Dalnee, Karakuli, Mednoe (near vil. Kliuchevskogo); torrent near vil. Paratunka; swamp near vil. Kamaki; warm spring Kiikinauschich (Kurilskoe Lake). He mentioned that the specimens from Kamchatka slightly differs from *G. pulex* described by Sars and Stebbing because of inner ramus of uropod 3 for 1/5 to 1/4 shorter than the first segment of outer ramus, urosomites are more spiniferous, accessory flagellum 3-segmented.

Ugamskii (1925) mentioned that Sars (1901) cited *Gammarus pulex* for Huntu-Nur Lake (central Asia).

Dershavina (1927a) mentioned again *G. pulex* for many localities of Kamchatka, near these mentioned already in 1923: Kronotskoe Lake; Turpane Lake; Kursin Lake near vil. Nizhne Kamvalnoe Lake near Mt. Shisha Chaz Suzuche Lake; Azabache Lake; Perevalnoe Lake near Mt. Shisha Chazhenskogo; coast of Nizkogo Lake.

Dershavina (1927b) mentioned *Gammarus pulex* for Ussurian region (USSR) (bassin of Amur River, Suifun River, small rivers in the Bay of Petar Veliki); these specimens are with inner ramus of uropod 3 usually not exceeding 2/3 of outer one. Many of these populations probably belong to *G. suifunensis*.

Ueno mentioned (1927) *Gammarus pulex* for Talki-Ana cave (in sinter-pool Sencho-Da) on Yamaguchi region on Honshu island (Japan), accompanied by *Pseudocrangonyx shikokunis* Akaat. & Komai. That population of *pulex* probably belongs to *G. nipponensis*.

Dershavina (1930a) mentioned *G. pulex* for island Sakhalin and Far Eastern part of USSR.

Martynov (1930) mentioned *G. pulex* for Issyk-Kul region: Lake Issyk-Kul; gorge Karakol (near Przhivalski); bay of Isidorovskii; small river Kara-Su and its mouth in lake Issyk-Kul; bay of Rogatyi; Son-Kul Lake; Chatyr-Kul Lake.

Ueno (1933) mentioned that in Lake Biwa (Hokkaido, Honshu, Japan) on the shores of the lake *Gammarus annandalei* is replaced by *Gammarus pulex*. Ueno mentioned also in his study of freshwater crustacea of Iturup island (Kurilskie Islands, USSR)

under *Gammarus annandalei* Tatt. that »a few specimens have the third uropod of a very large inner ramus which is as long as the outer ramus as in *Gammarus pulex*«. Evidently, *G. annandalei* was intermixed together with some other *Gammarus* species.

Ueno (1934) mentioned *Gammarus pulex* for numerous localities of Kashmir region: Rampur (on 1200 m over sea level); Takht-I-Sulaiman (Srinagar, 1585 m); E. of Gagirbal (1580 m); Nishat-Bagh (1585 m); Wular Lake, at Kiuhnus spring (1573 m);

Ladakh region (N. of India): Pangong-Tso (4241 m over sea level); Man (4269 m); Togom-Tso (5334 m); Ororotse-Tso (5297 m); Kyam (4725 m); Chushoi (4336 m); Tukmuru-Tso (4385 m); Mitpal-Tso (4875 m); Yaye-Tso (4686 m, S. of Ladakh Range); Khyagar-Tso (4672 m); Tso-Moriri (4528 m); Sta-Rtsak-Pulk-Tso (4536 m); stream between Tangtse and Mogleb (4175 m); W. of Mogleb (4200 m); Charga, spring (4636 m); Pangur-Tso (4329 m); Chushol, spring (4330 m over sea level).

Maybe some of these populations belong to *G. lacustris* or some adjacent species.

Ueno (1936) mentioned *Gammarus pulex* for freshwater lakes in Northern Kurile Island (USSR): Paramushir island (Siginosumairai Murakamiwan) and Shimushir island (Kaihyo-ilke; Hyakuike). These populations belong to some other *Gammarus* species, similar to *G. suifunensis*.

Chen (1939) mentioned *Gammarus pulex* for China: pool in the valley Chia-er-Chien near Nan-Kou (vicinity of Peking), mentioned the presence of calceola on antenna 2, moderately setose uropod 3, plumose setae appear at outer margin of outer ramus also, inner ramus reaching 1/2 of outer ramus. Maybe this population belongs to *Gammarus nekkensis* of Uchida, 1935.

### III. JAPAN

#### *GAMMARUS NIPPONENSIS* Ueno 1940

Syn.: *Gammarus (Rivulogammarus) nipponensis* Ueno 1940a: 81, fig. 91—116.

? *Gammarus pulex* Tattersall 1922:451, pl. 20, fig. 19—27.  
*Gammarus nipponensis*: Barnard & Barnard 1983:468.

Loc. typ.: Kiyotaki in Kyoto, Japan.

Localities cited: Japan: loc. typ.; Syuhodo at Akiyosi (western Honshu Island) and probably on Kyushu island (UENO, 1940).

Remarks. This species is characterized by presence of numerous long straight setae on peduncle and flagellum of antenna 2, calceola absent. Gnathopods 1—2 with straight setae only. Pereopods 3—4 with long straight setae at posterior margin. Article

2 of pereopods 5—7 with short setae at posterior margin, articles 3—6 at both margins with single short setae intermixed with bunches of spines. Epimeral plates pointed, with spines only. Uropod 3 densely setose, both margins of both rami with plumose setae, inner ramus reaching or exceeding 3/4 of outer ramus. Telson with distal spines accompanied by several setae longer than spines.

Ueno (1940) suggested that maybe *G. pulex* mentioned by Tattersall from Otsu-Lake Biwa (Japan) belongs to this species.

\* KEY TO THE FRESHWATER GAMMARUS SPECIES FROM CHINA, KOREA, JAPAN AND SOME ADJACENT REGIONS (MALES ONLY)

- |                                                                                                                                                            |                                       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| 1. Peduncular segments 4—5 of antenna 2 with a few bunches of setae shorter than the diameter of corresponding segments                                    | 2                                     |
| — Peduncular segments 4—5 of antenna 2 with many setae as long as or longer than the diameter of corresponding segments                                    | 6                                     |
| 2. Flagellum of antenna 2 with calceola                                                                                                                    | 3                                     |
| — Flagellum of antenna 2 without calceola                                                                                                                  | 5                                     |
| 3. Urosimites with partially reduced dorsal groups of spines and setae (inner ramus of uropod 3 reaching 1/3 of outer ramus)                               |                                       |
|                                                                                                                                                            | GREGORYI                              |
| — Urosimites with normally developed dorsal groups of spines and setae                                                                                     | 4                                     |
| 4. Gnathopod 2 and pereopod 3 with long curled setae; inner ramus of uropod 3 reaching 2/3 of outer ramus                                                  | KOREANUS                              |
| — Gnathopod 2 and pereopod 3 with straight setae only; inner ramus of uropod 3 reaching or hardly exceeding 1/2 of outer ramus                             | ZEONGOGENSIS ± SPINIPALMUS            |
| 5. Pereopod 3 with long posterior setae. Articles 4—5 of pereopod 7 at anterior margin with spines intermixed with numerous setae longer than spines       | SOBAEGENSIS LEEI                      |
| — Pereopod 3 with relatively short posterior setae. Articles 4—5 of pereopod 7 with spines intermixed with single setae not exceeding the length of spines | GALGOSENSIS                           |
| 6. Antenna 2 with calceola                                                                                                                                 | 7                                     |
| — Antenna 2 without calceola                                                                                                                               | 9                                     |
| 7. Inner ramus of uropod 3 reaching or hardly exceeding 1/2 of outer ramus                                                                                 | SUIFUNENSIS + NEKKENSIS ± SPINIPALMUS |
| — Inner ramus of uropod 3 reaching or exceeding 2/3 of outer ramus                                                                                         | 8                                     |

\* Because of unknown pilosity of antenna 2, *Gammarus spinipalmus* is mentioned alternatively twice in the key.

»*G. pulex*« mentioned by many authors from China, Japan, etc. is not given in the key because of unknown taxonomic characters and because various species are mentioned under this name.



8. Pereopods 5—7 stout and short, with strong dactyl TALIENSIS  
 — Pereopods 5—7 slender and long, with slender dactyl LACUSTRIS
9. Pereopod 3 with relatively short posterior setae. Outer margin of outer ramus in uropod 3 poorly setose 10  
 — Pereopod 3 with numerous relatively long posterior setae. Outer margin of outer ramus more or less densely setose 11
10. Pereopods 3—4 with very short posterior setae. Segments 4—5 of pereopod 7 at anterior margin with spines intermixed with a few single short setae not longer than spines. Distal segment of outer ramus of uropod 3 well developed ODAENSIS  
 — Pereopods 3—4 with longer posterior setae. Segments 4—5 of pereopod 7 at anterior margin with spines intermixed with numerous setae longer than the spines. Distal segment of outer ramus in uropod 3 minute SOYOENSIS
11. Outer margin of outer ramus in uropod 3 with simple setae only (occasionally 1—2 plumose setae appear) 12  
 — Outer margin of outer ramus in uropod 3 with numerous plumose setae, sometimes intermixed with simple setae 13
12. Peduncle and flagellum of antenna 2 with numerous very long setae SOBAEGENSIS type 6  
 — Peduncle and flagellum of antenna 2 with numerous shorter setae SOBAEGENSIS SOBAEGENSIS (= type 1)
13. Pereopod 7 with short setae at posterior margin of article 2 14  
 — Pereopod 7 with long setae at posterior margin of article 2 16
14. Article 5 of pereopod 7 at anterior margin practically without setae NIPPONENSIS  
 — Article 5 of pereopod 7 at anterior margin with spines and setae 15
15. Articles 3—5 of pereopod 7 at anterior margin with lower number of shorter setae. Antenna 2 with lower number of shorter setae SOBAEGENSIS type 3  
 — Articles 3—5 of pereopod 7 at anterior margin with numerous long setae. Antenna 2 with high number of very long setae SOBAEGENSIS KIMI
16. Antenna 2 like that in sobaegensis. Posterior margin of article 2 in pereopod 7 with very long setae SOBAEGENSIS MARGINALIS  
 — Antenna 2 with shorter setae than these in sobaegensis. Posterior margin of article 2 in pereopod 7 with shorter setae in proximal part SOBAEGENSIS type 7

## IV. USSR

*GAMMARUS CHIMKENTI* n. sp. (new name)

Syn.: *Rivulogammarus gracilis* Martynov 1935:427, fig. 15—20;  
*Gammarus gracilis* Barnard et Barnard 1983:466.  
 nec. *Gammarus gracilis* Rathke 1837:374, pl. 5, fig. 7—10  
 (other genus)

Loc. typ.: Chimkent (Kirgizstan, USSR), torrent.

Remarks. Martynov described (1935) a new species *Rivulogammarus gracilis* n. sp. from torrent in Chimkent (Kirgizstan, USSR). But Rathke described (1837) a new species *Gammarus gracilis*, n. sp. from the Krym peninsula (near Niikiita and near Cap Parthenion), later removed to the other genus. Genus *Rivulogammarus* S. Kar. 1931 was removed (1969) to the genus *Gammarus* Fabr. 1775 as synonym by Stock. For these reason, *Gammarus gracilis* Martynov 1935 is nom. preocc. and we proposed a new name for it, *Gammarus chimkenti*, n. sp. (new name).

Short description: Length of males up to 10.5 mm. Ocular lobes subrounded, eyes reniform. Antenna 1 reaching 2/3 of body, peduncular segments poorly setose, main flagellum up to 32-articulate, accessory flagellum 3-articulate.

Antenna 2 moderately setose, peduncular segments 4—5 each with several groups of straight setae at ventral margin, setae are longer than the diameter of articles, flagellum slender, moderately setose.

Gnathopods 1—2 moderately setose, with straight setae, medial palmar spine on gnathopod 2 present. Pereopods 3—4 densely setose, at posterior margin with long straight setae longer than the diameter of articles. Pereopods 5—7 with elongated article 2 bearing short posterior marginal setae; no median setae at inner face of article 2; anterior margin of articles 3—6 with spines intermixed with small number of short setae. Epimeral plates unknown. Uropod 3 densely setose, both margins of both rami with numerous plumose setae, inner ramus hardly exceeding half of outer ramus. Telson elongated, each lobe with 2—3 distal spines and 1—2 facial spines accompanied by setae longer than spines.

*GAMMARUS SANGIRDAKI* n. sp. (new name)

Syn.: *Rivulogammarus truncatus* Martynov 1935:430, fig. 21—23.

*Gammarus truncatus* Barnard & Barnard 1983:470.

nec *Gammarus truncatus* Viviani 1805:8, pl. 2, fig. 5—6.

Loc. typ.: vil. San-Girdak, river-branch Surkhana, eastern Bukhara (Uzbekistan, USSR).

Localities cited: known only from type-locality.

Remarks. Martynov described (1935) a new species *Rivulogammarus truncatus*, n. sp. from vil. San-Girdak in eastern Bukhara (Uzbekistan, USSR). But already Viviani described (1805) other new species with the same name, *Gammarus truncatus*, n. sp. from the sea water near Genoa (Italy). Genus *Rivulogammarus* was (1969) removed to the genus *Gammarus* as synonym.

For this reason, *Gammarus truncatus* Martynov 1935 is nom. preocc. and we proposed a new name for it, *Gammarus sangirdaki*, n. sp. (new name).

Short diagnosis of *G. sangirdaki*: Body rather stout, eyes moderate. Antenna 1 reaching half of body, main flagellum with 21—24 articles, accessory flagellum 2-articulate. Gnathopods 1—2 with straight setae. Pereopods 3—4 with long setae at posterior margin. Pereopods 5—7 normal, anterior margin of articles 3—6 unknown. Epimeral plates angular, with ventral spines only. Urosomites 1—3 with dorsal groups of spines and setae. Uropod 3 densely setose, inner margin of inner ramus with plumose setae, other margins of both rami with simple setae only, intermixed with spines; inner ramus reaching half of outer ramus, second segment of outer ramus absent. Telson short and broad, each lobe with 4—5 distal spines and 1 dorsolateral spine, spines accompanied by very long setae.

*GAMMARUS SANGIRDAKI HISSARI* n. ssp. (new name)

Syn.: *Rivulogammarus truncatus montanus* Martynov 1935:483.

*Gammarus truncatus montanus* Barnard & Barnard 1983:470.

nec *Gammarus montanus* A. Costa 1851:44.

Loc. typ.: upper torrent in Khan-Takhta, on 2650 m over sea level (Hissar Dagh Mt., W. Tadzhikistan, USSR).

Localities cited: USSR, Tadzhikistan, northern part of Hissar-Dagh. loc. typ.; torrent on Khan-Takhta, on 2750 m over sea level; *ibid.*, on 2400 m over sea level; Tuna River in village Kzil-Tash on 2080 m over sea level (MARTYNOV, 1935).

Remarks. Martynov described (1935) a new subspecies *Rivulogammarus truncatus montanus*, n. ssp. from Hissar Dagh Mt. (Khan-Takhta) in Tadzhikistan, USSR. But already A. Costa described (1851) a new species under the same name, *Gammarus montanus*, n. sp. from Matese Lake in Italy (now member of genus *Niphargus*). Genus *Rivulogammarus* was (1969) removed to the genus *Gammarus* as synonym.

For these reasons, *Gammarus truncatus montanus* Martynov 1935 is nom. preocc. and we proposed a new name for it, *Gammarus sangirdaki hissari*, n. ssp. (new name).

Short diagnosis of *G. sangirdaki hissari*: Rather similar to *G. sangirdaki sangirdaki* Mart. Antenna 1 reaching 1/3 of body, main flagellum with 23 articles, accessory flagellum 3-articulate. Pereopod 3 with very long setae at posterior margin, setae on pereopod 4 are slightly shorter. Pereopods 5—7 normal. Urosomites 1—3 with dorsal groups of spines and setae. Inner ramus of uropod 3 reaching 2/3 of outer ramus, both margins of both rami densely setose; outer margin of outer ramus with plumose setae, but setae are less numerous than these of typ. *sangirdaki*. Second segment of outer ramus very short. Epimeral plates 2—3 with spines only. Telson stout, like that in *sangirdaki*, with 3 distal spines accompanied by setae, facial spines absent.

## GAMMARUS MATIENUS forma STAGNALIS (Dershavin 1938)

Syn.: *Gammarus matienus* f. *stagnalis* Dershavin 1938:176,  
Barnard & Barnard 1983:467.  
nec *Gammarus stagnalis* Andrzejowski 1839:23.

Remarks. Dershavin described (1938) a new taxon *Gammarus matienus* f. *stagnalis*, nov. from Zangerzuriskij Mt. (in small lake) (Nakhichevan, USSR, near Iranian border). This taxon is nom. preocc. (homonym) because Andrzejowski (1839:23) described other taxon under the same name, *Gammarus stagnalis*, n. sp.

But, taxon *stagnalis* of Dershavin 1938 is very poorly described, »scarcely distinguishable from typical *G. matienus* except in having antenna 1-st flagellum 29-jointed, accessory flagellum 3 jointed; antenna 2-d flagellum 11 jointed, L female 13 mm«. Dershavin mentioned that single female was damaged (uropod 3 missing). In this light, it was very difficult to establish any valid taxonomic difference between *G. matienus matienus* and forma *stagnalis*, and maybe *stagnalis* is identic with typical form. For this reason we have not proposed a new name for *stagnalis*.

## V. EUROPE

## GAMMARUS BELLI n. sp.

Syn.: *Gammarus fluviatilis* Bell 1921:7; Van Straelen  
1924:3(327);  
Van Straelen 1931:63; Hurley 1973:214; Barnard 1983:470.  
nec *Gammarus fluviatilis* Milne Edwards 1830:368.

Loc. typ.: Pleistocene of Kirkland (Fife), Scotland.

Localities cited: known only from type-locality.

Remarks. *Gammarus fluviatilis* Milne Edwards 1830 mentioned by Bell (1921) for the pleistocene stratum in Kirkland (Fife, Scotland, England) is not identic with *Gammarus fluviatilis* of Milne Edwards 1830. For this reason the name *Gammarus fluviatilis* of Bell is homonym and we proposed a new name for the specimens from pleistocene specimens of Bell from Kirkland, *Gammarus belli*, n. sp. with characters mentioned by Bell (1921).

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## OSVRT NA SLATKOVODNE VRSTE RODA GAMMARUS (FAM. GAMMARIDAE) IZ KOREJE, KINE, JAPANA I NEKIH SUSJEDNIH OBLASTI

(134. Prilog poznavanju Amphipoda)

Gordan S. KARAMAN

## Rezi me

U radu su analizirani poznati morfološki karakteri i taksonomski položaj slatkovodnih vrsta iz roda *Gammarus* (Crustacea Amphipoda: Gammaridae) iz Koreje, Kine, Japana i nekih susjednih oblasti i dato je rasprostranjenje tih vrsta.

Iz Koreje su poznate vrste: *Gammarus galgosensis* Lee et Kim 1980, *G. odaensis* Lee et Kim 1980, *G. sobaegensis* Ueno 1960, *G. soyoensis* Lee et Kim 1980 i *G. zeongogensis* Lee et Kim 1980. Takson *Gammarus pulex koreanus* Ueno 1940 je podignut na nivo samostalne vrste, *Gammarus koreanus* Ueno 1940.

*Gammarus sobaegensis* Ueno 1960 je široko rasprostranjen u južnom dijelu Koreje i Lee i Kim (1980) su njegove mnogobrojne populacije podijelili na sedam tipova na osnovu taksonomskih odlika i geografskog rasprostranjenja u Koreji.

Na osnovu analize taksonomskih odlika vrste *G. sobaegensis*, tri od tih sedam tipova su podignuti na nivo novih podvrsta:

*Gammarus sobaegensis* tip 2 iz Uidong-a (Koreja) podignut je na nivo nove podvrste, *Gammarus sobaegensis leei*, n. ssp;

*Gammarus sobaegensis* tip 4 iz Bongwha (Koreja) podignut je na nivo zasebne podvrste, *Gammarus sobaegensis marginalis*, n. ssp;

*Gammarus sobaegensis* tip 5 iz Cheongsong-a (Koreja) podignut je na nivo zasebne podvrste, *Gammarus sobaegensis kimi*, n. ssp.

Iz Kine su poznate slijedeće vrste: *Gammarus spinipalmus* Chen 1939, *G. suifunensis* Martynov 1939, *G. taliensis* Shen 1954, *G. gregoryi* Tattersall 1924, *G. lacustris* Sars 1863, *G. nekkensis* Uchida 1935.

Iz Japana je poznata vrsta *Gammarus nipponensis* Ueno 1940. Mnogi autori navode vrstu *Gammarus lacustris* za mnogobrojna visokoplaninska jezera u Tibetu, Himalajima, Pamiru, Kamčatki, Uralu, sjevernoj Kini, Kašmiru i dr., često dajući vrlo oskudne opise i poneki crtež pojedinih dijelova ekstremiteta tih jedinki (Schellenberg 1937, Birstein 1939, Ueno 1940a, 1940b). Međutim, nedavna istraživanja nekih azijskih vrsta (Issik-Kul jezero) pokazala su (Karaman i Pinkster 1977) da postoji niz vrsta koje su veoma slične sa vrstom *G. lacustris* ali koje pripadaju drugim vrstama. Stoga vjerovatno i mnogi lokaliteti (populacije) navedeni za vrstu *G. lacustris* širom Azije se ustvari odnose na neke druge vrste slične vrsti *G. lacustris*, od kojih su neke još i neopisane.

Sličan problem je i sa vrstom *Gammarus pulex* koja se vrlo često navodi za razne lokalitete širom Azije (Issik-Kul jezero, jezera i vodotoci na Pamiru, Kamčatki, Japanu, Amurskoj oblasti, Kini, Sahalinu, sjevernoj Indiji, Kurijskim otocima, okolini Pekinga i dr.).

*Gammarus pulex* ustvari nije naden u centralnoj i istočnoj Aziji i mnogobrojni citati ove vrste za mnoge azijske lokalitete (Ueno 1927, 1933, 1934, 1936; Chevreux 1908; Tattersall 1914, 1922; Dershavin 1923, 1927, 1930; Chen 1939 i dr.) se sa sigurnošću odnose na razne druge vrste, a ne na vrstu *G. pulex*.

Budući da rod *Gammarus* sadrži preko 100 taksona, ponekad se događa da se nove vrste nazivaju imenima koja su već bila upotrebljena za vrste ovog roda, i tako postaju homonimi, za koje je potrebno postaviti novo ime.

Tako je vrsta *Rivulogammarus gracilis* Martinov 1935, opisana iz Chimkent-a u Kirgistanu (SSSR) homonim ranije opisane vrste *Gammarus gracilis* Rathke 1837 iz Krima. U međuvremenu je rod *Rivulogammarus* pre-

bačen u rod *Gammarus* kao sinonim. Stoga smo postavili novo ime za vrstu *gracilis* Martinov 1935, *Gammarus chimkenti*, n. sp.

Slično je i za druga dva taksona iz SSSR-a: *Gammarus truncatus* Martinov 1935, opisan iz San-Girdak-a, sela u istočnoj Buhari (Uzbekistan). Ova vrsta je homonim vrste *Gammarus truncatus* Viviani 1805 iz Đenove (Italija), i postavili smo za Martinovljevu vrstu novi naziv (ime), *Gammarus sangirdaki*, n. sp.

*Gammarus truncatus montanus* Martinov 1935, opisan iz potoka u Khan-Takhta u Hissar Dagħ planini (zapadni Tadžikistan), na 2650 m nadmorske visine; ova podvrsta je homonim ranije opisane vrste *Gammarus montanus* Costa 1851 iz jezera Matese u Italiji; za ovu podvrstu smo postavili novo ime, *Gammarus sangirdaki hissari*, n.ssp.

Deržavin je opisao novu formu (1938) *Gammarus matienus* forma *stagnalis*, n. f. iz malog jezera na planini Zangerzurskij (Nahičevanska oblast blizu sovjetsko-iranske granice). Ova forma je homonim vrste *Gammarus stagnalis* Andrzejowski 1839. Međutim, forma *stagnalis* Deršavin-a je veoma nepotpuno opisana i bazirana na samo jednom primjerku (ženki) i iz opisa se ne mogu utvrditi nikakve bitnije razlike ove forme od tipične vrste *matienus*, te nismo sigurni da li forma *stagnalis* možda predstavlja zasebni oblik ili je identična sa tipičnim oblikom *matienus*. Stoga nismo postavili novo ime za ovu formu.

Bell navodi (1921) vrstu *Gammarus fluviatilis* Milne Edwards 1830 za pleistocenske slojeve (stijenja) u Kirkland (Fife, Škotska), i to citiraju i kasniji autori (Van Stralen, Hurley). Međutim, kako vrsta koju navodi Bell nije identična sa vrstom *G. fluviatilis* opisanu od strane Milne Edwardsa 1830, to smo za populaciju iz pleistocenskih slojeva u Kirklandu postavili novo ime, *Gammarus belli*, n. sp.

U radu je dat i ključ za determinaciju svih slatkovodnih vrsta iz roda *Gammarus* iz Koreje, Kine, Japana i nekih susjednih oblasti, radi boljeg sagledavanja taksonomskih razlika među pojedinim vrstama ove grupe.