

New data on the genus *Escaryus* Cook et Collins, 1891 (Chilopoda: Geophilomorpha: Schendylidae) from Kazakhstan

Новые данные по геофилам рода *Escaryus* Cook et Collins, 1891 (Chilopoda: Geophilomorpha: Schendylidae) из Республики Казахстан

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КЛЮЧЕВЫЕ СЛОВА: Geophilomorpha, Schendylidae, фаунистика, новые локалитеты, Казахстан.

ABSTRACT. The genus *Escaryus* Cook et Collins, 1891 comprises at least 5 species in the Republic of Kazakhstan: *E. alatavicus* Titova, 1972, *E. retusidens* Attems, 1904, *E. kusnetzowi* Lignau, 1929, *E. koreanus* Takakuwa, 1937 and *E. japonicus* Attems, 1927, and two undetermined forms: one from the South Kazakhstan Region which seems to be a new species (designated below as *Escaryus*-1) and the second form is *Escaryus* sp. from the Kazakh part of the Altai Mts. Both *E. koreanus* and *E. japonicus* are new species to the fauna of Kazakhstan. The family Schendylidae, the genus *Escaryus* and *E. kusnetzowi* Lignau, 1929 are reported in the South Kazakhstan Region for the first time. Remarks are provided for all species encountered, all being mapped as well. A key to the *Escaryus* species of Central Asia is given.

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РЕЗЮМЕ. Род *Escaryus* Cook et Collins, 1891 в Республике Казахстан на данный момент включает 5 видов: *E. alatavicus* Titova, 1972, *E. retusidens* Attems, 1904, *E. kusnetzowi* Lignau, 1929, *E. koreanus* Takakuwa, 1937, *E. japonicus* Attems, 1927 и две неопределенные формы: одна из Южно-Казахстанской области, которая, по-видимому, является новым видом (обозначена ниже как *Escaryus*-1) и вторая — *Escaryus* sp. из казахстанской части Алтая. Два вида *E. koreanus* и *E. japonicus* являются новыми для фауны Казахстана. Семейство Schendylidae, род *Escaryus* и вид *E. kusnetzowi* Lignau, 1929 впервые отмечены для Южно-Казахстанской области. Для всех видов приведены примечания и картирование находок. Составлен определительный ключ для видов *Escaryus* Центральной Азии.

Introduction

The Holarctic genus *Escaryus* Cook et Collins, 1891 comprises some 33 species [Bonato *et al.*, 2011, 2016], which are mostly associated with mountain regions [Titova, 1972a, b; Pereira, Hoffman, 1993].

The centipede fauna of Kazakhstan is still poorly known. To date, the family Schendylidae was represented in Kazakhstan by *Escaryus alatavicus*, *E. retusidens*, *E. kusnetzowi* and *Escaryus* sp. [Lignau, 1929; Titova, 1972a, b; Tuf, 2007].

Material and methods

The studied material was collected in eastern and southern Kazakhstan in 1983, 2001, 2016–2018 (Map). All specimens were collected by hand and preserved in 70% ethanol.

The pictures have been taken using Axio Cam ERc-5s (Zeiss) digital camera attached to a Stemi 2000-C stereomicroscope. The images were prepared using Helicon Focus 6.7.1 software.

The studied material is deposited in the Altai State University (ASU, Barnaul), the Perm State University (PSU, Perm) and the Zoological Museum of the Moscow Lomonosov State University (ZMMU, Moscow) as indicated in the text.

In the systematic part, the standardized terminology proposed by Bonato *et al.* [2010] is followed. Abbreviations of collectors used in the text are as follows: YD — Yu.V. Dyachkov, AF — A.A. Fomichev, SG — S.I. Golovatch, AI — A. Ivanov, AN — A.E. Naydenov, VR — V.V. Rudoi, RY — R.V. Yakovlev.



Map. Distribution of *Escaryus* Cook et Collins, 1891 in Kazakhstan: triangle — *Escaryus alatavicus*; square — *E. retusidens*; circle — *E. kusnetzowi*; diamond — *E. koreanus*; star — *E. japonicus*; cross — *Escaryus*-1.

Карта. Распространение *Escaryus* Cook et Collins, 1891 в Казахстане: треугольник — *Escaryus alatavicus*; квадрат — *E. retusidens*; круг — *E. kusnetzowi*; ромб — *E. koreanus*; звезда — *E. japonicus*; крестик — *Escaryus*-1.

Results

Family SCHENDYLIDAE Pocock, 1896

Genus *Escaryus* Cook et Collins, 1891

Type species: *Escaryus phyllophilus* Cook et Collins, 1891 (by subsequent designation of Cook [1895]), synonymized later with *Escaryus urbicus* (Meinert, 1886).

Escaryus alatavicus Titova, 1972

Figs 1–3.

Escaryus alatavicus Titova, 1972a: 135; 1972b: 105–107, fig. 10 (1–4).

Type locality: unknown. According to the original description, this species occurs in “Dzhungarian Alatau and

Trans-Ili Alatau” (Almaty Region), but there is no indication of the type locality.

MATERIAL. Almaty Region, Trans-Ili Alatau Mt. Range: 3 ♂♂, 3 ♀♀ (ASU No 20), Levy Talgar River Valley, *Picea* forest, under stones, N43°04', E77°09', 2680 m a.s.l., 17–18.VIII.2017; 1 ♂ (ASU No 105), same place, 17–18.VIII.2017; 3 ♂♂, 1 ♀, 1 juv. (ASU No 21), same place, under stones, N43°07', E77°08', 2180 m a.s.l., 19.VIII.2017, all YD.

DIAGNOSIS. According to the original description, the body length is 15–20 mm, males have 43–49; females have 45–49 leg-bearing segments. Labral median arc widely concave and has 14–16 denticles. Ultimate sternite trapeziform with rounded corners. Coxal pores 8–11. Ultimate legs of male incassate. Anal pores absent.

DISTRIBUTION. Kazakhstan, Almaty Region (Dzhungarian Alatau and Trans-Ili Alatau Mt. Ranges) [Titova, 1972a, b].

REMARKS. The studied specimens are much larger (23 to 44 mm) and have 49 leg-bearing segments.



Figs 1–3. *Escaryus alatavicus* Titova, 1972: 1 — forcipular segment, ventral view; 2 — terminal part of body, ventral view; 3 — labrum, ventral view. Scale 0.1 mm.

Рис. 1–3. *Escaryus alatavicus* Titova, 1972: 1 — ногоchelюсть, снизу; 2 — задний конец тела, снизу; 3 — лабрум, снизу. Масштаб 0,1 мм.



Figs 4–6. *Escaryus retusidens* Attems, 1904: 4 — forcipular segment, ventral view; 5 — terminal part of body, ventral view; 6 — labrum, ventral view. Scale 0.1 mm.

Рис. 4–6. *Escaryus retusidens* Attems, 1904: 4 — ногочелюсть, снизу; 5 — задний конец тела, снизу; 6 — лабрум, снизу. Масштаб 0,1 мм.

Escaryus retusidens Attems, 1904
Figs 4–6.

E. retusidens pallidus Folkmanová, 1956: 1635.

Escaryus retusidens Attems, 1904: 121–122, fig. 4–6; Lignau, 1929b: 164–165; Folkmanová, 1956: 1635, fig 1 (3); Titova, 1972a: 135; 1972b: 110–111, fig. 13 (1–5); Pereira, Hoffman, 1993: 9; Volkova, 2016: 675; Nefediev *et al.*, 2017a: 11–13; 2017b: 13; 2017c: 222–223; 2018: 239.

Type locality: “Przewalsk” [now Karakol City in the Issyk-Kul Region of Kyrgyzstan].

MATERIAL. Almaty Region: 1 ♂ (ASU No 22), Trans-Ili Alatau Mt. Range, Levy Talgar River Valley, *Picea* forest, under stones, N43°04', E77°09', 2680 m a.s.l., 17–18.VIII.2017; 1 ♂ (ASU No 23), same place, under stones, N43°07', E77°08', 2180 m a.s.l., 19.VIII.2017; 2 ♂♂ (ASU No 24), Kungey Alatau Mt. Range, 14.5 km SW Saty Village, between Kolsay-1 and Kolsay-2 lakes, *Picea* forest, under stones, N42°57', E78°18', 1870 m a.s.l., 21–22.VIII.2017; 1 ♀ (ASU No 107), same place, 21–22.VIII.2017, all YD.

DIAGNOSIS. According to Titova [1972b], the body length is to 35 mm, 49–55 leg-bearing segments. Labral median arc widely concave and has 14–18 labral denticles. Ultimate sternite trapeziform. Numerous coxal pores placed lateroventrally. Anal pores absent.

DISTRIBUTION. *E. retusidens* occurs in Eastern Europe (Moldova and Ukraine) and is also widespread in SW Siberia (Kemerovo Area and Altai Province) and Central Asia (Kazakhstan and Kyrgyzstan) [Titova, 1972a, b; Nefediev *et al.*, 2017a, b, c].

In Kazakhstan it is known from the Almaty Region (Dzhungarian Alatau, Kungey Alatau and Trans-Ili Alatau Mt. Ranges) [Titova, 1972a, b].

REMARKS. The studied specimens have body length to 44 mm; 47, 49, 51 leg-bearing segments (1, 2 and 2 specimens respectively).

Escaryus kusnetzowi Lignau, 1929
Figs 7–9.

Escaryus kusnetzowi Lignau, 1929a: 205–206, fig. 3–6; Lignau, 1929b: 164; Titova, 1972a: 135; 1972b: 108–110, fig. 12 (1–5).

Type locality: “Telety, am Fl. Dschety-Ogus, beim Issykul-See, und Tumartscha-Brunnen, 108 km südöstlich vom Balchasch-See”; see Remarks below.

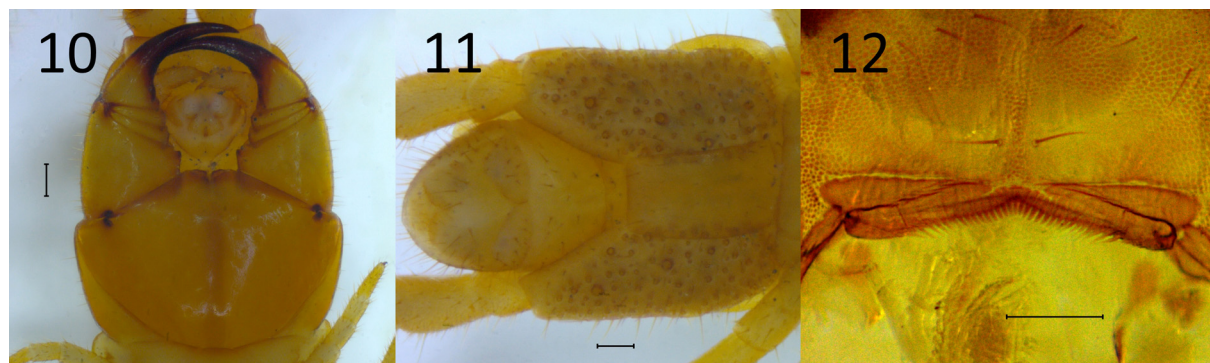
MATERIAL. South Kazakhstan Region, Western Tian-Shan Mts, Ugam Mt. Range, Sayram-Ugam National Park: 3 ♂♂, 9 ♀♀ (ASU No 25), Sazanata River Valley, *Betula*, N42°09', E70°24', 1845 m a.s.l., 19–20.V.2017; 4 ♂♂, 13 ♀♀ (ASU No 26), same place, N42°10', E70°25', 1957 m a.s.l., 3.VI.2017; 1 ♀ (ASU No 106), same place, 3–6.VI.2017, all YD.

DIAGNOSIS. According to Titova [1972b], the body length is to 48 mm, males have 57–65; females have 59–67 leg-bearing segments. Labral median arc widely concave and has 22 labral denticles. Ultimate sternite trapeziform. Numerous coxal pores placed lateroventrally and can be located also at the edge of the ultimate sternite. Ultimate legs of males and females are the same. Anal pores absent.



Figs 7–9. *Escaryus kusnetzowi* Lignau, 1929: 7 — forcipular segment, ventral view; 8 — terminal part of body, ventral view; 9 — labrum, ventral view. Scale 0.1 mm.

Рис. 7–9. *Escaryus kusnetzowi* Lignau, 1929: 7 — ногочелюсть, снизу; 8 — задний конец тела, снизу; 9 — лабрум, снизу. Масштаб 0,1 мм.



Figs 10–12. *Escaryus koreanus* Takakuwa, 1937: 10 — forcipular segment, ventral view; 11 — terminal part of body, ventral view; 12 — labrum, ventral view. Scale 0.1 mm.

Рис. 10–12. *Escaryus koreanus* Takakuwa, 1937: 10 — ногочелюсть, снизу; 11 — задний конец тела, снизу; 12 — лабрум, снизу. Масштаб 0,1 мм.

DISTRIBUTION. Kazakhstan: Almaty Region (Dzhungarian Alatau and Trans-Ili Alatau Mt. Ranges) [Lignau, 1929a, b; Titova, 1972a, b] and South Kazakhstan Region (Ugam Mt. Range); Kyrgyzstan: Issik-Kul Region (?).

REMARKS. The studied specimens have the body length to 53 mm; 57 (3 ♂♂, 11 ♀♀), 59 (4 ♂♂, 9 ♀♀), 61 (3 ♀♀) leg-bearing segments. This species is new to the South Kazakhstan Region.

This species has been described by Lignau [1929a] based on 2 specimens; one from “Dschety-Ogus” (village/canyon, environs Karakol City, Issik-Kul Region, Kyrgyzstan) and the other from “Tumartscha” well [“Brunnen”] 108 km SE Balkhash Lake (Almaty Region, Kazakhstan). Titova [1972b] suggested the first specimen to be *E. retusidens* and the second to be *E. kusnetzowi*, according to the number of leg-bearing segments — 53 and 57, respectively. Thus, the indication of the type locality becomes ambiguous. Moreover, L.P. Titova [1972b] mentioned the lectotype (*sic!*) of this species stored in the collections of the A.N. Severtsov Institute of Ecology and Evolution in Moscow, but no such material is placed there (Golovatch, pers. comm.). Titova probably designated a neotype (but not a topotype) from her collection, but without specification of its locality.

Unfortunately Bonato *et al.* [2016] mentioned “*Escaryus kusnetzowi* Lignau, 1929” as a nomen nudum without explanation.

Escaryus koreanus Takakuwa, 1937 Figs 10–12.

Escaryus koreanus Takakuwa, 1937: Titova, 1972a: 135; 1972b: 112–113, fig. 14 (1–5); Pereira, Hoffman, 1993: 9; Nefediev *et al.*, 2017a: 11–13; 2017b: 13; 2017c: 222; 2018: 238.

Terra typica: Korea.

MATERIAL. East Kazakhstan Region: 1 ♂ (ASU No 27), Listvyaga Mt. Range, Bukhtarma River Valley, 6 NNE Katon-Karagay Village, scree, under stones, N49°14', E85°38', 780 m a.s.l., 1.IX.2016, AF; 2 ♂♂, 1 ♀ (ZMMU No 7763), same Region, Ubinsky Mt. Range, ~55 km SE from Ust-Kamenogorsk City, Zimovie Village, *Abies* and *Populus* forest, soil and litter, 22.VI.1983, SG.

DIAGNOSIS. According to Titova [1972b], the body length is to 65 mm, 45–53 leg-bearing segments. Labral median arc slightly concave and has 2 kinds of labral denticles: middle ones obtuse and lateral ones pointed. Ultimate sternite rectangular. Coxopleura covered with numerous small pores and an extra pair of large pores. Anal pores small.

DISTRIBUTION. Korea [Takakuwa, 1937]. Japan [Takakuwa, 1940]. Russia: Western Siberia (Kemerovo Area, Altai and Tomsk Area), Eastern Siberia (Krasnoyarsk Province) and Russian Far East (the Maritime Province and Cisamuria) [Titova, 1972a, b; Rybalov, 2002; Vorobiova *et al.*, 2002; Nefediev *et al.*, 2017c]. Kazakhstan (East Kazakhstan Region).

REMARKS. The studied specimens have 53 leg-bearing segments. This species is new to the fauna of Kazakhstan.

Escaryus japonicus Attems, 1927 Figs 13–15.

Escaryus japonicus Attems, 1927: Takakuwa, 1935: 47; 1940: 35–36, figs 27–29; Byzova, Chadaeva, 1965: 337; Titova, 1972a: 135; 1972b: 113–114, fig. 15 (1–4); Pereira, Hoffman, 1993: 9; Farzaliev, 2008: 67–69; Nefediev *et al.*, 2017a: 11; 2017c: 222.

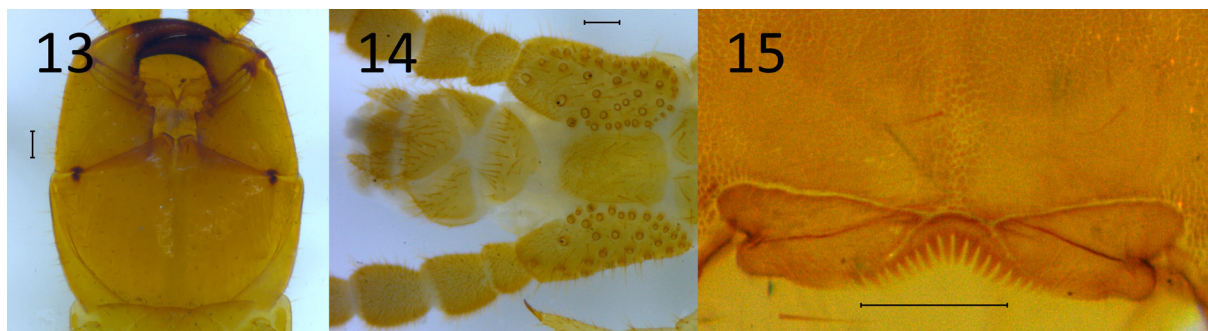
Type locality: “Todohokhe. Hohango”, Japan.

MATERIAL. 1 ♂, 1 ♀ (PSU), East Kazakhstan Region, Altai Mts, Tarbagatai Mt. Range, Burkhat pass, 15–17.VI.2001, AI; 4 ♂♂, 3 ♀♀ (ASU No 86), same Mts, Listvyaga Mt. Range, near Aksharbak, Village, N49°32', E85°32', 1400 m a.s.l., 3–5.VII.2018, RY, VR, AN; 1 fragm. (ASU No 108), same place, 3–5.VII.2018, RY, VR, AN.

DIAGNOSIS. According to Titova [1972b], a large schendylid (up to 43 mm), 51 leg-bearing segments. Labral median arc slightly concave, all labral denticles are obtuse. Ultimate sternite rectangular. Coxopleura with numerous pores, all pores of the same size. Ultimate legs of male incrassate, female with slender ones. Anal pores present.

DISTRIBUTION. Japan [Attems, 1927]. Northern China [Takakuwa, Takashima, 1949]. Widespread from the Urals and the middle Volga Region (Russia) to the Russian Far East through Siberia [Byzova, Chadaeva, 1965; Titova, 1972a; Farzaliev, 2008; Volkova, 2016; Nefediev *et al.*, 2017a]. Kazakhstan (East Kazakhstan Region).

REMARKS. According to Titova [1972b], *E. japonicus* has 51 leg-bearing segments (Tab. 2), according to Takakuwa [1935, 1940], this species has 47, 51, 55 leg-bearing segments. The studied specimens have 43 (1 ♂, 1 ♀, PSU), 47 (2 ♂♂, 1 ♀), 49 (1 ♂, 2 ♀♀) and 51 (1 ♂, 1 fragm. all ASU) leg-bearing segments. All other features (such as the structure of labral denticles, the shapes of both ultimate sternite and ultimate legs; Figs 13–15) are similar to Titova's description. Thus, we consider these specimens as *E. japonicus*. This species is new to the fauna of Kazakhstan.



Figs 13–15. *Escaryus japonicus* Attems, 1927: 13 — forcipular segment, ventral view; 14 — terminal part of body, ventral view; 15 — labrum, ventral view. Scale 0.1 mm.

Рис. 13–15. *Escaryus japonicus* Attems, 1927: 13 — ногочелюсть, снизу; 14 — задний конец тела, снизу; 15 — лабрум, снизу. Масштаб 0,1 мм.

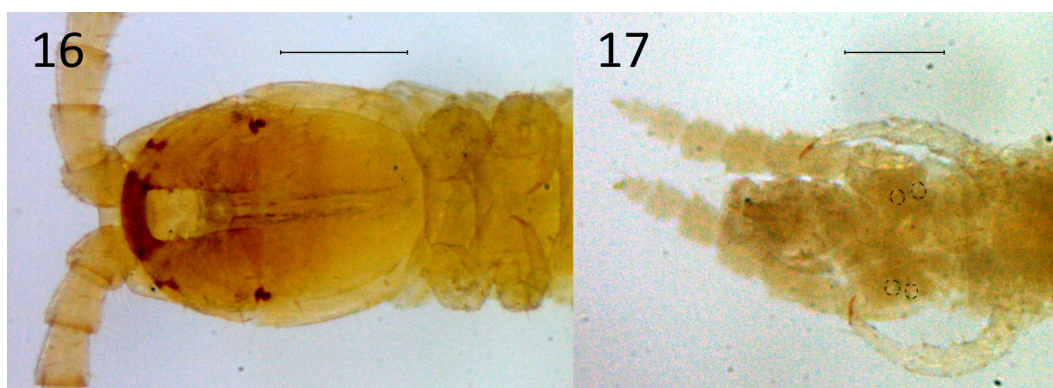


Fig 16–17. *Escaryus-1*: 16 — forcipular segment, ventral view; 17 — terminal part of body ventral view. Scale 0.1 mm.

Рис. 16–17. *Escaryus-1*: 16 — ногочелюсть, снизу; 17 — задний конец тела, снизу. Масштаб 0,1 мм.

Escaryus-1 Figs 16–17.

Type locality: Karatau Mt. Range (South-Kazakhstan Region).

MATERIAL. South Kazakhstan Region, Karatau Mt. Range: 36 juv. (ZMMU No 7758), Aktas Village, in soil, 0–10 cm, 14.V. 1974; 6 juv. (ZMMU No 7759), Aktas Village, slope of mountain, *Crataegus* and *Malus* forest, in soil, 12.V.1974.

DIAGNOSIS. The body length is to 11 mm, 43 leg-bearing segments. Ultimate sternite trapeziform with rounded corners. Coxal pores 2. Basal denticle on forcipular tarsungulum well-developed.

REMARKS. Material is in poor condition. This form seems to be particularly similar to *E. chadaevae* Titova, 1972 from Western Siberia (Kemerovo Area and Altai Republic) [Titova, 1972b]. The latter species has 33–35 leg-bearing segments and 5–7 coxal pores, whereas the studied specimens have 43 leg-bearing segments and 2 pores (juvenile condition?). *Escaryus-1* is also similar to *E. latzeli* (Sseliwanoff, 1881) from the eastern Tian-Shan (41 or 43 leg-bearing segments and 9–12 coxal pores) [Sseliwanoff, 1881].

Conclusions

The genus *Escaryus* in the fauna of Kazakhstan presently comprises at least 5 species: *E. alatavicus*, *E.*

retusidens, *E. kusnetzowi*, *E. koreanus* and *E. japonicus* and two undetermined forms: *Escaryus-1* from the South Kazakhstan Region which seems to be one more species but adult specimens should be studied to determine the taxonomic status of this form; *Escaryus* sp. from the Kazakh part of the Altai Mts.

Three species are known from the Almaty Region: *E. alatavicus*, *E. kusnetzowi* (Dzhungarian Alatau and Trans-Ili Alatau Mt. Ranges) and *E. retusidens* (Dzhungarian Alatau, Kungey Alatau and Trans-Ili Alatau Mt. Ranges); *E. kusnetzowi* is also recorded from the South Kazakhstan Region (Ugam Mt. Range). Two species are known from the East Kazakhstan Region (Altai Mts): *E. japonicus* (Tarbagatai and Listvyaga Mt. Ranges) and *E. koreanus* (Listvyaga and Ubinsky Mt. Ranges).

According to Titova [1972b], the studied species constitute 2 groups of similar species in the Kazakhstan fauna: with trapeziform (*E. alatavicus*, *E. kusnetzowi* and *E. retusidens*) and rectangular-shaped (*E. japonicus* and *E. koreanus*) ultimate sternites. The first group members (with trapeziform ultimate sternite) have also a similar number of labral denticles: 14–16 in *E. alatavicus*, 14–18 in *E. retusidens* and 22 in *E. kusnetzowi*. The main differences between these species are

Table 1. Differences between *Escaryus alatavicus* Titova, 1972, *E. kusnetzowi* Lignau, 1929, *E. retusidens* Attems, 1904 and *Escaryus*-1.
Таблица 1. Различия между *Escaryus alatavicus* Titova, 1972, *E. kusnetzowi* Lignau, 1929, *E. retusidens* Attems, 1904 и *Escaryus*-1.

Species	<i>E. alatavicus</i>	<i>E. kusnetzowi</i>	<i>E. retusidens</i>	<i>Escaryus</i> -1
size of body, mm	from 15–20 to 23–44	up to 53	up to 44	to 11
leg-bearing segments	45–47 (rarely 43, 49)	57–63 (rarely 65, 67)	49 (rarely 47, 51, 53, 55)	43
number of labral denticles	14–16	22	14–18	?
ultimate sternite	trapeziform	trapeziform	trapeziform	trapeziform
number of coxal pores	8–11	numerous	numerous	2
anal pores	absent	absent	absent	?

Table 2. Differences between *Escaryus koreanus* Takakuwa, 1937 and *Escaryus japonicus* Attems, 1927.
Таблица 2. Различия между *Escaryus koreanus* Takakuwa, 1937 и *Escaryus japonicus* Attems, 1927.

Species	<i>E. koreanus</i>	<i>E. japonicus</i>
size of body, mm	55–65	up to 43
leg-bearing segments	47–53 (rarely 45–49)	51 (rarely 43, 47, 49, 55)
number and structure of labral denticles	middle denticles are obtuse, lateral denticles are pointed	all denticles are obtuse
ultimate sternite	rectangular long and narrow	rectangular long and narrow
anal pores	small	present

the body size and the number of leg-bearing segments (Tab. 1). The second group members have a rectangular-shaped ultimate sternite; the main differences between these species are the number of leg-bearing segments and the structure of labral denticles (Tab. 2).

KEY TO THE *ESCARYUS* COOK ET COLLINS, 1891 SPECIES FROM CENTRAL ASIA

1. Ultimate sternite rectangular 2
– Ultimate sternite trapeziform 3
2. Middle denticles are obtuse, lateral denticles are pointed *Escaryus koreanus* Takakuwa, 1937
– All denticles are obtuse *Escaryus japonicus* Attems, 1927
3. Body size up to 11 mm, 43 leg-bearing segments, 2 coxal pores *Escaryus*-1
– Number of coxal pores more than 2 4
4. Body size 9–15 mm, coxal pores 5–7 *Escaryus chadaevae* Titova, 1972
– Number of coxal pores more than 7, body size up to 20 mm 5
5. 39–41 leg-bearing segments, 8 coxal pores
..... *Escaryus kirgizicus* Titova, 1972
– More than 43 leg-bearing segments, coxal pores 8 or more 6
6. 8–12 coxal pores, 45–47 (rarely 43, 49) leg-bearing segments *Escaryus alatavicus* Titova, 1972
– 9 or more coxal pores, body size 22–32 mm 7
7. 41–43 leg-bearing segments, 9–12 coxal pores
..... *Escaryus latzeli* (Sseliwanooff, 1881)
– Numerous coxal pores 8
8. 35–41 leg-bearing segments
..... *Escaryus oligopus* Attems, 1904

- More than 47 leg-bearing segments 9
9. 49 (rarely 47, 51, 53, 55) leg-bearing segments
..... *Escaryus retusidens* Attems, 1904
– 61–63 (rarely 57, 59, 65, 67) leg-bearing segments
..... *Escaryus kusnetzowi* Lignau, 1929

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