

New data on the family Mecistocephalidae Bollman, 1893 (Chilopoda: Geophilomorpha) from Middle Asia

Новые данные о геофилах семейства Mecistocephalidae Bollman, 1893 (Chilopoda: Geophilomorpha) из Средней Азии

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KEY WORDS: Geophilomorpha, Mecistocephalidae, *Arrup*, *Krateraspis*, faunistics, new records, Kazakhstan, Uzbekistan, Kyrgyzstan, Tajikistan.

КЛЮЧЕВЫЕ СЛОВА: Geophilomorpha, Mecistocephalidae, *Arrup*, *Krateraspis*, фаунистика, новые локалитеты, Казахстан, Узбекистан, Кыргызстан, Таджикистан.

ABSTRACT. The family Mecistocephalidae in Middle Asia contains five accepted species. New records based on material from several collections allow for the distributions of three species to be refined: *Arrup asiaticus* (Titova, 1975) is new to the fauna of Uzbekistan (Tashkent Region) and to the South Kazakhstan Region of Kazakhstan, *A. edentulus* (Attems, 1904) is recorded from the Chuy Region of Kyrgyzstan for the first time, while *Krateraspis meinerti* (Sselivanoff, 1881) is new to the Jambyl Region of Kazakhstan. Remarks are provided for all of the species encountered, their distributions being mapped as well. A key to all five Mecistocephalidae species occurring in Middle Asia is given.

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РЕЗЮМЕ. Семейство Mecistocephalidae в Средней Азии насчитывает пять признанных видов. Новые находки и изучение материала из некоторых коллекций позволяют уточнить распространение трех видов: *A. asiaticus* (Titova, 1975) — новый для фауны Узбекистана (Ташкентская область) и для Южно-Казахстанской области Казахстана, *A. edentulus* (Attems, 1904) впервые отмечен в Чуйской области Кыргызстана, *K. meinerti* (Sselivanoff, 1881) — новый для Жамбылской области Казахстана. Для всех видов приведены примечания и картирование находок. Составлен определительный ключ для видов семейства Mecistocephalidae Средней Азии.

Introduction

The first data on the family Mecistocephalidae from Middle Asia belong by Sselivanoff [1881a, b, 1884] who described *Mecistocephalus meinerti* Sselivanoff, 1881 from the Tashkent Region of Uzbekistan. A couple decades later, Attems [1904] described another species, *M. edentulus* Attems, 1904, from the Issik-Kul Region of Kyrgyzstan.

Lignau [1929a, b] proposed a new genus, *Krateraspis* Lignau, 1929, for *Mecistocephalus meinerti* and compared it with *Nodocephalus* Attems, 1928 (synonymized later by Crabill [1964] with *Arrup* Chamberlin, 1912). At the same time, Verhoeff [1930] described *Tygarrup asiaticus* (also from the Tashkent Region, just as *K. meinerti*). Titova [1975] considered *T. asiaticus* as a junior synonym of *K. meinerti*, based on a comparison of their descriptions.

Titova [1965, 1969, 1975] described three new species: two from Tajikistan, *Tygarrup muminabadicus* Titova, 1965 (Muminabad) and *Krateraspis sselivanovi* Titova, 1975 (Sharak and Fayzabad), as well as *Nodocephalus asiaticus* Titova, 1975 from the Almaty Region of Kazakhstan (Trans-Ili Alatau Mt. Range). In addition, she confirmed the correctness of the descriptions of *N. edentulus* and *K. meinerti* and refined the distributions of these taxa, albeit unfortunately often without precise locations.

As a result, the family Mecistocephalidae is represented in Middle Asia by five accepted species: *Arrup asiaticus*, *A. edentulus*, *Krateraspis meinerti*, *K. sselivanovi* and *Tygarrup muminabadicus* [Titova, 1969, 1975]. Since 1975, no data on mecistocephalid centipedes from that huge region have been added.

Prompted by new material derived from Kazakhstan and mostly based on the material housed in the

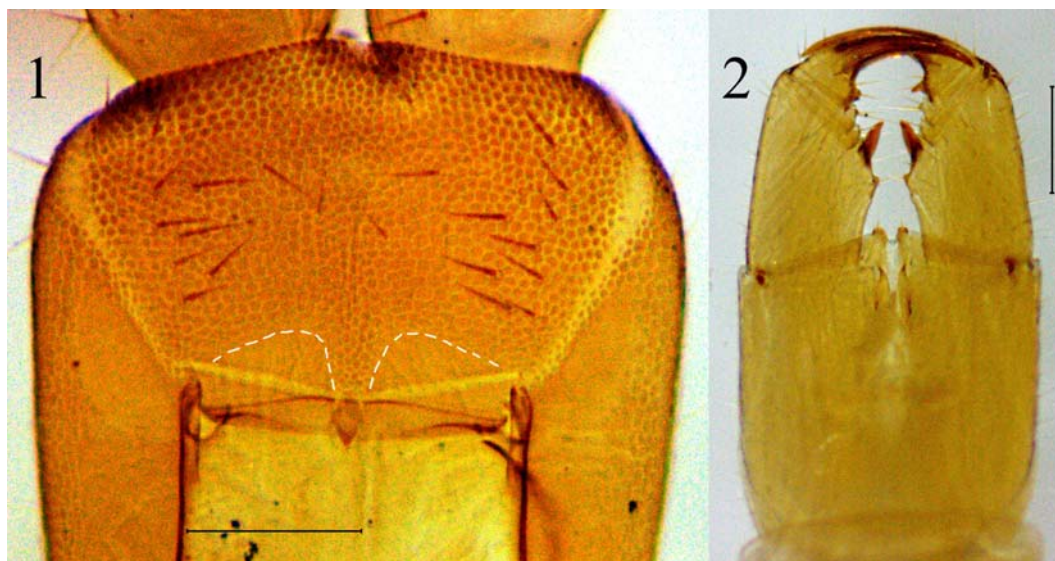


Fig. 1–2. *Arrup asiaticus* (Titova, 1975): 1 — clypeus and labrum, ventral view; 2 — forcipular segment, ventral view. Scale: 0.1 mm (1), 0.25 mm (2).

Рис. 1–2. *Arrup asiaticus* (Titova, 1975): 1 — клипеус и лабрум, вентрально; 2 — ногочелюстной сегмент, вентрально. Масштаб: 0,1 мм (1), 0,25 мм (2).

Zoological Museum of the Moscow Lomonosov State University, and partly also from the Perm State University, I provide new faunistic records and refine the distributions of three of the species. No types have been revised, as previous taxonomic papers by Titova, Sselivanoff and Lignau contain sufficiently detailed descriptions of these species.

Material and methods

The material studied is deposited in the Zoological Museum of the Moscow Lomonosov State University (ZMMU, Moscow), the Perm State University (PSU, Perm) and the Altai State University (ASU, Barnaul), as indicated in the text. The material from the collection of ASU under study was collected by the author in 2017 (Map). Specimens were taken by hand and preserved in 70% ethanol.

Specimens were photographed using an Axio Cam ERc-5s (Zeiss) digital camera attached to a Stemi 2000-C stereo microscope. Mouthparts and forcipules were mounted in permanent slides using euparal.

The terminology for external anatomy follows that of Bonato *et al.* [2010].

Abbreviations of collectors used in the text are as follows: YD — Yu.V. Dyachkov; AM — A. Martynov; MG — M.S. Ghilarov; AR — A. Ryvkin; TT — T.K. Tuneva; VY — V.V. Yanushev.

Results

Genus *Arrup* Chamberlin, 1912

Type species: *Arrup pylorus* Chamberlin, 1912 (by original designation) [Bonato *et al.*, 2016].

Arrup asiaticus (Titova, 1975) Figs 1–2, Map.

Nodocephalus asiaticus Titova, 1975: 43–44.

Arrup asiaticus — Foddai *et al.*, 2003: 1249–1252.

Terra typica: Kazakhstan, Trans-Ili Alatau Mt. Range [Titova, 1975].

MATERIAL. 1 ♂ (ZMMU Rc 7918), **Kazakhstan, South Kazakhstan Region**, Kazygurt District, Taldybulak Village, 7.V.1973; 4 ex. (ZMMU Rc 7919), same Region, Karatau Mt. Range, Aktas, in soil, 0–10 cm deep, 14.V.1974; 3 ad., 3 juv. (ZMMU Rc 7920), **Uzbekistan, Tashkent Region**, Bostanliq District, Khumsan Village, *Juglans*, *Malus*, *Pyrus* etc. forest, soil sample No. 4, 4.V.1974, MG; 1 ad. (ZMMU Rc 7925), same place, *Juglans*, *Malus*, *Pyrus* etc. forest, 4.V.1974, MG; 3 ad., 2 juv. (ZMMU Rc 7923), same place, *Juglans* stand, soil sample, 3.V.1974; 2 ad. (ZMMU Rc 7926), same District, Ugam Mt. Range, Sidzhak Village, *Juglans* forest, 29.IV.1974; 4 ad. (ZMMU Rc 7928), same place, *Juglans* forest, soil sample No. 1, 28.IV.1974, MG; 1 ad., 2 juv. (ZMMU Rc 7929), same place, *Juglans* forest, soil sample No. 2, 28.IV.1974, MG; 1 ad. (ZMMU Rc 7927), same Region, Okhangaron District, Qurama Mt. Range, Nadok-Say, soil sample No. 8, 0–10 cm deep, 20.IV.1974; 1 ad. (ZMMU Rc 7921), **Tajikistan, Sughd Region**, Isfara District, Isfara City, Zumrad, trees and bushes, 14.V.1972; 1 juv. (ZMMU Rc 7922), same place, 14.V.1972.

DESCRIPTION OF THE MATERIAL STUDIED. Morphological characters correspond well to the original description: body coloration yellow, cephalic plate and forcipules a bit darker; 41 leg-bearing segments. Clypeal areolate part (with 18–20 setae) ca. 4–5 times larger than a pair of plagulae (divided in the middle by a wide longitudinal areolate strip reaching the labrum) (Fig. 1). Maxillary complex as in Titova [1975]. Forcipular coxosternite without chitin-lines, as in Fig. 2. Forcipular trochanteroprefemur with a large, dark coloured, distal denticle, tibia with a very small tubercle (mentioned by Titova [1975]), while tarsungulum with a basal denticle, femur with neither tubercles nor denticles. Ultimate metasternite subtriangular, length to breadth ratio ca. 0.5:1. Coxopleural pores placed lateroventrally. Ultimate legs slender, without pretarsus.



Map. Distribution of *Arrup asiaticus* (Titova, 1975) (star), *A. edentulus* (Attems, 1904) (circle) and *Krateraspis meinerti* (Sseliwanoff, 1881) (square) in Middle Asia (type localities marked in black).

Карта. Распространение *Arrup asiaticus* (Titova, 1975) (звезда), *A. edentulus* (Attems, 1904) (круг) и *Krateraspis meinerti* (Sseliwanoff, 1881) (квадрат) в Средней Азии (черный цвет обозначает типовые локалитеты).

DISTRIBUTION. Kazakhstan: Almaty Region (Trans-Ili Alatau Mt. Range), South Kazakhstan Region (Karatau Mt. Range); N Tajikistan: Sughd Region (Istaravshan and Isfara Districts); Kyrgyzstan: Jalal-Abad Region (Sary-Chelek); Uzbekistan: Tashkent Region [Titova, 1975].

REMARKS. This species is new to the South Kazakhstan Region of Kazakhstan, also being recorded from Uzbekistan (Tashkent Region) for the first time. Unfortunately, as the material is in very poor condition, it was impossible to prepare good illustrations. This species is very close to *A. edentulus* (Table 1).

Arrup edentulus (Attems, 1904)
Figs 3–5, Map.

Mecistocephalus edentulus Attems, 1904: 119–120.
Nodocephalus edentulus — Attems, 1929: 148; Titova, 1969: 165; 1975: 39, 44.
Arrup edentulus — Crabill, 1964: 165; Foddai *et al.*, 2003: 1249.

Terra typica: “Przewalsk”, now Karakol City, Issyk-Kul Region, Kyrgyzstan [Attems, 1904].

MATERIAL. 1 ♂ (ASU No. 218), **Kazakhstan, Jambyl Region**, Kyrgyz Ala-Too Mt. Range, Dzhundybay River Valley (tributary of Merke River), stony mountain steppe with rocks and *Juniperus*, under stones, N42°35'33", E73°18'21", 2370 m a.s.l., 12–14.VIII.2017, YD; 1 ad. (ZMMU Rc 7924), **Kyrgyzstan, Chuy Region**, near Bishkek City, in litter, slope with grass, 2.VI.1976, VY.

DESCRIPTION OF THE MATERIAL STUDIED. Morphological characters correspond well to the original and subsequent descriptions by Attems [1904, 1929] and Titova [1975]: body coloration pale yellow, head a bit darker; 41 leg-bearing segments. About ¾ clypeus consisting of a large areolate part reaching the labrum by a narrow row between a pair of plagulae. Labrum tripartite, as in Fig. 4. Maxillary complex as in Titova [1975]. Forcipular coxosternite with neither chitin-lines nor denticles. Forcipular trochanteroprefemur with a large, dark coloured, distal denticle, tarsungulum with a small, acute, basal denticle; femur and tibia with neither tubercles nor denticles (Fig. 3). Ultimate metasternite subtriangular, as in Fig. 5. Coxopleural pores placed lateroventrally. Ultimate legs swollen and densely setose, without pretarsus. Anal pores present (termed “simple” by Titova [1975]).

DISTRIBUTION. Kyrgyzstan: Issyk-Kul Region (Karakol City) [Attems, 1904] and Chuy Region (Bishkek City); Tajikistan; Kazakhstan: Jambyl Region (Kyrgyz Ala-Too Mt. Range) [Titova, 1969, 1975]. Crabill [1964: 165] erroneously indicated Siberia as the distribution range of this species. In addition, *A. edentulus* has erroneously been recorded from Taiwan [Wang, 1956; Uliana *et al.*, 2007].

REMARKS. This species is new to the centipede list of the Chuy Region of Kyrgyzstan. Previous records from Tajikistan and Kazakhstan were published without precise locations [Titova, 1969, 1975].

Genus *Krateraspis* Lignau, 1929

Type species: *Mecistocephalus meinerti* Sseliwanoff, 1881 (by original designation) [Bonato *et al.*, 2016].

Table 1. Morphological differences between *Arrup asiaticus* (Titova, 1975) and *A. edentulus* (Attems, 1904).
Таблица 1. Морфологические отличия между *Arrup asiaticus* (Titova, 1975) и *A. edentulus* (Attems, 1904).

morphological characters		<i>A. asiaticus</i>	<i>A. edentulus</i>
number of leg-bearing segments		41	
forcipular	trochanteroprefemur	with a large, dark, distal denticle	
	femur	with neither a denticle nor a tubercle	
	tibia	with a very small tubercle	with neither denticles nor tubercles
	tarsungulum	with a basal denticle	with a small basal denticle
clypeus		areolate part ca. 4–5 times larger than pair of plagulae; reaching the middle part of labrum by a wide line	areolate part ca. 2–3 times larger than pair of plagulae; reaching the middle part of labrum by a narrow line
ultimate sternite		triangular; length to breadth ca. 1:0.5	triangular; length to breadth ca. 0.75:1
anal pores		“undulate” [Titova, 1975]	not visible [Attems, 1904], “simple” [Titova, 1975]
material studied		Titova: 4 ex. (Kazakhstan), 4 ex. (Tajikistan), 53 ex. (Kyrgyzstan); this study: 5 ex. (Kazakhstan), 22 ex. (Uzbekistan), 2 ex. (Tajikistan)	Attems: 2 ex.; Titova: ?; the present study: 2 ex.
source		Titova, 1975; the present study	Attems, 1904, 1929; Titova, 1975; the present study

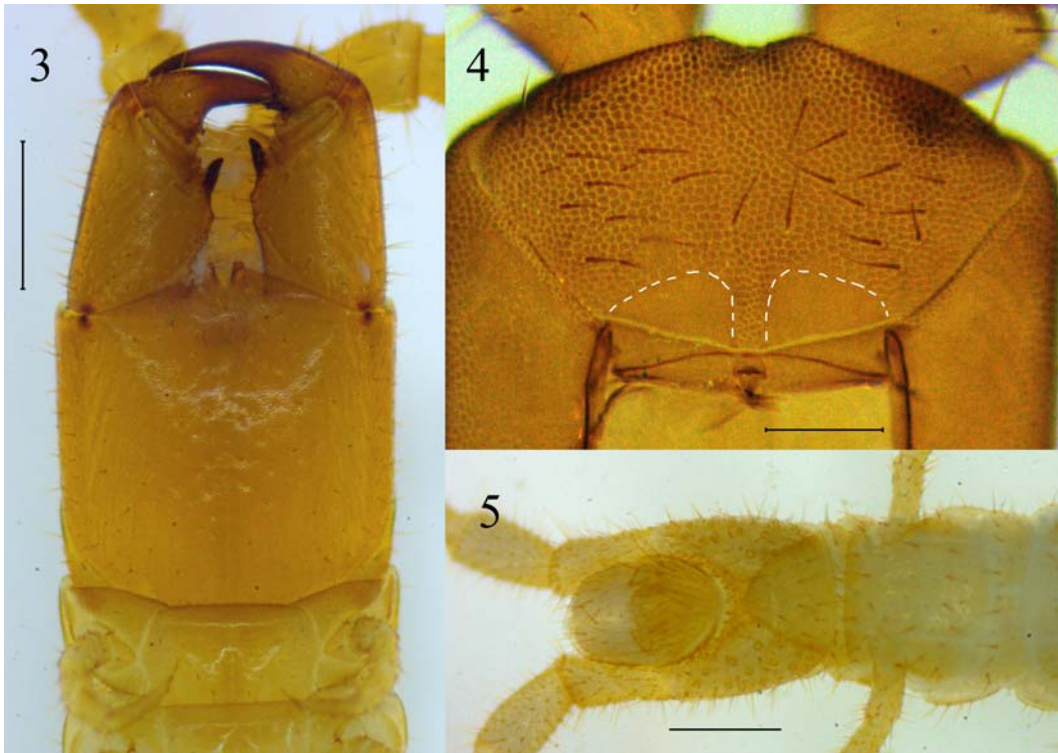


Fig. 3–5. *Arrup edentulus* (Attems, 1904): 3 — forcipular segment, ventral view; 4 — clypeus and labrum, ventral view; 5 — terminal part of body (male), ventral view. Scale: 0.3 mm (3), 0.1 mm (4), 0.25 mm (5).

Рис. 3–5. *Arrup edentulus* (Attems, 1904): 3 — ногощелюстной сегмент, вентрально; 4 — клипеус и лабрум, вентрально; 5 — терминальная часть тела (самец), вентрально. Масштаб: 0,3 мм (3), 0,1 мм (4), 0,25 мм (5).

Krateraspis meinerti (Sseliwanoff, 1881)

Figs 6–10, Map.

Mecistocephalus meinerti Sseliwanoff, 1881a: 9.

Mecistocephalus meinerti – Sseliwanoff, 1881b: 23; 1884: 73–74; Attems, 1904: 115; 1929: 156.

Krateraspis meinerti — Lignau, 1929a: 207–210; 1929b: 165; Titova, 1969: 165; 1975: 39.

Tygarrup asiaticus Verhoeff, 1930: 260–265.

Tygarrup asiaticus — Titova, 1975: 39 (first synonymization with *K. meinerti*).

Type locality: Uzbekistan, Tashkent Region, Chinaz Town («Chinaz near Tashkent»).

MATERIAL. 5 ♂♂, 3 ♀♀, 3 juv. (ASU No. 214), **Kazakhstan, South Kazakhstan Region**, 10 km SW Abay Village, Karatau Mt. Range, Karatau State Nature Reserve, grass and tulip steppe, under stones, N43°47'04.2", E68°46'42.0", 1020 m a.s.l., 6–7.V.2017, YD; 1 ♀ (ASU No. 215), same Region, 50 km NW of Achisay Village, shore of Lake Kyzylkol, in clay stones, N43°46'34.0", E69°30'36.4", 328 m a.s.l., 8–9.V.2017, YD; 5 ♂♂, 10 ♀♀, 5 juv. (ASU No. 216), same Region, Karatau Mt. Range, Syrdarya-Turkestan Natural Park, near Terekty Village, Boralday River bank, *Morus* and grasses, under stones, N42°51'48.2", E69°51'55.0", 529 m a.s.l., 14–15.V.2017, YD; 1 ♀ (PSU), same Mt. Range, 7 km NE Boraldaytau Mts, 11–13.V.2010, TT; 9 ♂♂, 6 ♀♀, 3 juv. (ASU No. 217), same Region, Western Tian-Shan, Ugam Mt. Range, Sayram-Ugam National Park, 10 km NE of Tylkubas Village, Irsu River Valley, meadow, under stones, N42°24'58.0", E70°21'30.08", 1296 m a.s.l., 16–18.V.2017, YD; 1 ♂ (ZMMU Rc 7749), same Mt. Range, Karabastau Village, Kashkarata River Valley, 28.VI–2.VII.1924, AM; 1 ad., 2 subad. (ZMMU Rc 7704), same region, Aksu River, 1974; 1 ♀ (ZMMU Rc 7750), **Jambyl Region**, Karatau Mt. Range, near Shakpak Village (Kremnevka),

3.VI.1925, AM; 1 ad. (ZMMU Rc 7930), **Uzbekistan, Tashkent Region**, Karzhantau Mt. Range, Konsay River, *Juglans* forest, 5.V.1974, VY; 1 ♀ (ZMMU Rc 7747), same place, *Juglans* forest, 30.IV.1974, MG; 6 ad. (ZMMU Rc 7406), same Region, Khumsan Village, right bank of Ugam River, *Juglans* forest, 1.V.1974, MG; 2 ad. (ZMMU Rc 7407), same Region, Khamsay Village, near Humsan, *Juglans* forest, 3.V.1974, MG; 1 ♂, 1 ♀ (ZMMU Rc 7745), same place, *Juglans, Malus, Pyrus* etc. forest, soil sample, 4.V.1974, MG; 1 ♂ (ZMMU Rc 7742), same Region, near Humsan, 3.V.1974, VY; 3 ♂♂, 2 juv. (ZMMU Rc 7748), same place, *Juglans* forest, 3.V.1974; 1 ad. (ZMMU Rc 7408), same region, Ugam Mt. Range, Sigzhak Village, *Juglans* forest, soil samples, 28.IV.1974, MG; 1 ♀, 1 fragm. (ZMMU Rc 7746), same place, soil sample No. 2, 28.IV.1974, MG; 1 ♂ (ZMMU Rc 7741), same Region, Ugam Mt. Range, Sigzhak Village, *Juglans* forest, IV.1974, MG; 1 ad. (ZMMU Rc 7413), same Region, Chimgan Mts, *Juglans* forest, 7.V.1974, MG; 1 ♂ (ZMMU Rc 7743), same Region, Qurama Mt. Range, Nadok-Say, soil sample No. 7, in soil, 0–10 cm deep, 18.IV.1974, VY; 1 ad. (ZMMU Rc 7409), **Tajikistan, Sughd Region**, Mogoltau Mts, southern slope, mountain foot, under stones, 11.IV.1974; 1 ad. (ZMMU Rc 7667), **Kyrgyzstan, Jalal-Abad Region**, Sary-Chelek Nature Reserve, near Kyttselays well, *Juglans* forest, in litter, under stones and in dead wood, 4.VII.1983, AR; 1 ad. (ZMMU Rc 7670), same place, near Arkyt Village, *Juglans* forest with *Acer*, in litter and dead wood, 3.VII.1983, AR.

DESCRIPTION OF THE MATERIAL STUDIED. The morphological characters correspond well to the descriptions by Sseliwanoff [1881a], Lignau [1929b] and Verhoeff [1930]: body yellow, head and basal antennomeres dark brown; length up to 59 mm, width up to 17 mm; 45 leg-bearing segments. Cephalic plate with a well-developed transverse suture (Fig. 9). Antennae ca. 2 times as long as head. Clypeus consisting of two parts: anterior part areolate, mid-

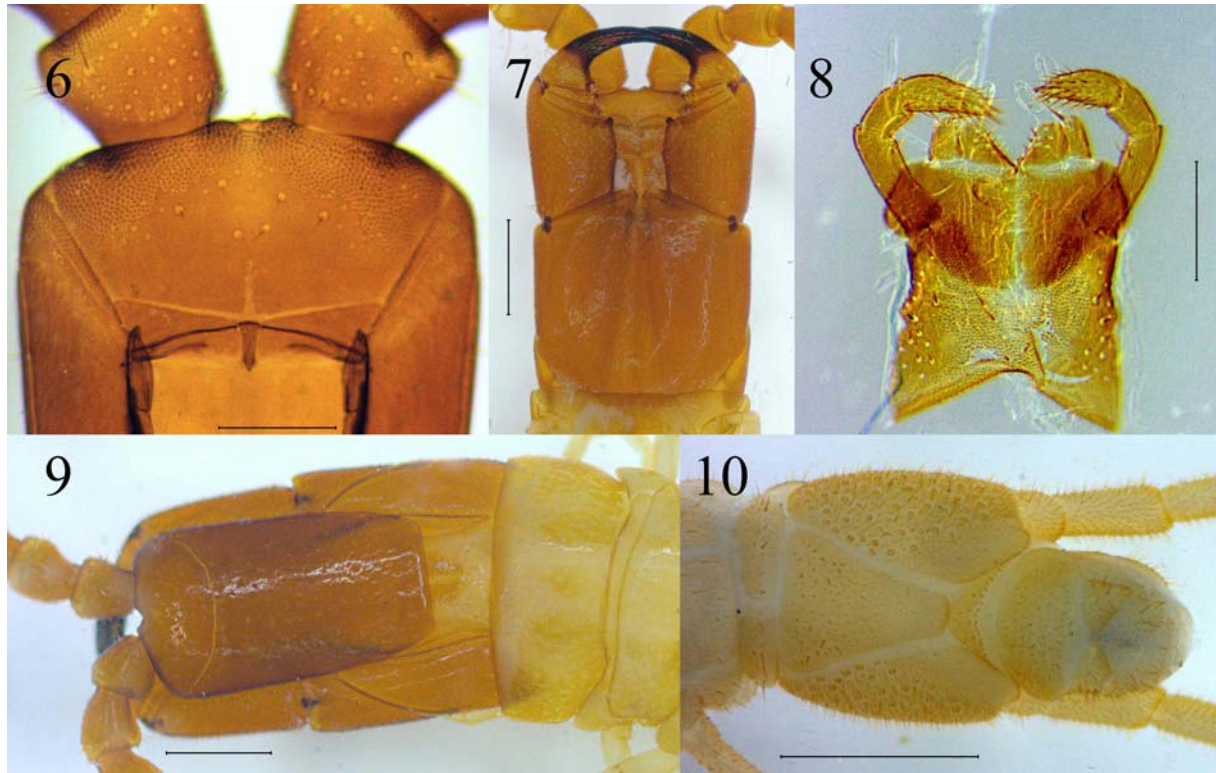


Fig. 6–10. *Krateraspis meinerti* (Sselivanoff, 1881): 6 — clypeus and labrum, ventral view; 7 — forcipular segment, ventral view; 8 — maxillary complex, ventral view; 9 — head and forcipular tergite, dorsal view; 10 — terminal part of body, ventral view. Scale: 0.25 mm (6, 8), 0.5 mm (7, 9, 10).

Рис. 6–10. *Krateraspis meinerti* (Sselivanoff, 1881): 6 — клипеус и лабрум, вентрально; 7 — ногочелюстной сегмент, вентрально; 8 — максиллярный комплекс, вентрально; 9 — голова и тергит ногочелюстного сегмента, дорсально; 10 — терминальная часть тела, вентрально. Масштаб: 0,25 мм (6, 8), 0,5 мм (7, 9, 10).

dle and posterior parts covered with a large plagula (with 6 setae). Labrum tripartite, as in Fig. 6. Maxillary complex as in Fig. 8. Forcipules drawn beyond anterior margin of cephalic plate. Forcipular coxosternite with neither chitin-lines nor basal denticles. Forcipular trochanteroprefemur with a well-developed distal denticle; femur and tibia each with small denticles, tarsungulum with a basal denticle (Fig. 7). Tergites from 2nd to penultimate with lateral longitudinal sutures. Sternites with a median longitudinal sulcus. Ultimate metasternite trapeziform, tapering towards caudal margin (subtriangular: anterior margin ca. 4 times wider than posterior one). Ultimate and postpedal segments densely setose. Coxopleural pores small, placed lateroventrally (Fig. 10). Ultimate legs long and slender, without pretarsus. Anal pores present.

DISTRIBUTION. Uzbekistan: Tashkent Region (Western Tian-Shan: Karzhantau, Ugam and Qurama Mt. ranges) [Sselivanoff, 1881b; Lignau, 1929a, b; Verhoeff, 1930; Titova, 1969, 1975]; Tajikistan: Sughd Region (Mogoltau Mts); Kyrgyzstan: Jalal-Abad Region (Sary-Chelek Nature Reserve) and Kazakhstan: South Kazakhstan (Western Tian-Shan: Karatau and Ugam Mt. ranges) [Titova, 1969, 1975] and Jambyl regions (Karatau Mt. Range). There is a doubtful record from Russia (Tatarstan) [Volkova, 2016].

REMARKS. This species is new to the fauna of the Jambyl Region of Kazakhstan. Previous records from Tajikistan and Kyrgyzstan were published without precise locations [Titova, 1969, 1975].

Conclusions

To summarize, the family Mecistocephalidae in Middle Asia contains five accepted species from three genera: *Arrup* Chamberlin, 1912, *Tygarrup* Chamberlin, 1914, and *Krateraspis* Lignau, 1929. All members of this family are Middle Asian endemics: *Arrup asiaticus* (Kazakhstan, Uzbekistan, Tajikistan and Kyrgyzstan), *A. edentulus* (Kazakhstan, Tajikistan and Kyrgyzstan), *Krateraspis meinerti* (Kazakhstan, Uzbekistan, Tajikistan and Kyrgyzstan), *K. sselivanovi* (Tajikistan), and *Tygarrup muminabadicus* (Tajikistan) [Titova, 1969, 1975]. The genera *Arrup* and *Tygarrup* bring the Middle Asian fauna closer to the eastern and southeastern Asian one [Titova, 1975; Foddai *et al.*, 2003; Bonato *et al.*, 2016], while *Krateraspis* is known only from Middle Asia.

KEY TO THE MECISTOCEPHALIDAE SPECIES KNOWN TO OCCUR IN MIDDLE ASIA

1. 41 leg-bearing segments 2
- more than 41 leg-bearing segments 3
2. 3/4 clypeus taken up by a large areolate part; a pair of plagulae divided by a narrow, middle, longitudinal, are-

- olate strip reaching the middle part of labrum (Fig. 4) .
 *Arrup edentulus*
 – areolate clypeal part ca. 4–5 times larger than pair of
 plagulae, these divided by a wide, middle, longitudinal,
 areolate strip reaching the middle part of labrum (Fig. 1)

Arrup asiaticus
 3. 53 leg-bearing segments, forcipular femur without denti-
 cle *Krateraspis sselivanovi*
 – 45 leg-bearing segments 4
 4. ultimate metasternite triangular, coxopleural pores small,
 regularly scattered (Fig. 10) *Krateraspis meinerti*
 – ultimate metasternite trapeziform; coxopleural pores small,
 regularly scattered; a pair of large pores opening at later-
 al edges of ultimate metasternite
 *Tygarrip muminabadicus*

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