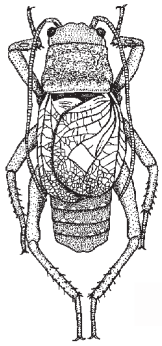

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NEW SPECIES AND SUBSPECIES OF THE GENUS *APATANIANA* (TRICHOPTERA: APATANIIDAE) FROM KAZAKHSTAN AND KYRGYZSTAN

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Summary. One new species and one new subspecies from the genus *Apataniana* are described: *Apataniana koshkimbaevi* **sp. n.** from Kazakhstan and Kyrgyzstan and *Apataniana cornuta medimontana*, **ssp. n.** from Kazakhstan. The list of the genus *Apataniana* includes 21 species, of which three species are noted for Kazakhstan and two for Kyrgyzstan.

Key words: caddisflies, Trichoptera, Apataniidae, taxonomy, new taxa, Central Asia.

В. Д. Иванов, С. И. Мельницкий, Д. А. Смирнова. Новый вид и новый подвид рода *Apataniana* (Trichoptera: Apataniidae) из Казахстана и Киргизии // Дальневосточный энтомолог. 2025. N 536. С. 1-11.

Резюме. Описаны один новый вид и один новый подвид рода *Apataniana*: *Apataniana koshkimbaevi* **sp. n.** из Казахстана и Киргизии и *Apataniana cornuta medimontana* **ssp. n.** из Казахстана. Список видов ручейников рода *Apataniana* насчитывает 21 вид, из которых 3 вида отмечены для Казахстана и 2 – для Киргизии.

INTRODUCTION

The genus *Apataniana* Mosely, 1936 consists of 21 species distributed in mountain systems of North Eurasia. Three endemic species from Greece are known in Europe (*A. hellenica* Malicky, 1987, *A. stropones* Malicky, 1993 and *A. vardusia* Malicky, 1992); they are represented by local mountain populations nearby each other. More species are known from the Palaearctic Asia: the genus is represented by 17 species there, and is recorded in 9 countries in different mountain systems in Asia. Northernmost part of the *Apataniana* distribution includes 3 species: *A. bulbosa* (Martynov, 1918) distributed in Russia (Altai and Sayan Mountains); *A. impexa* Schmid, 1968 in Altai (Russia, Mongolia and China); *A. tschuktschorum* Levanidova, 1979 in Russia (Siberia, Chukotka, Yakutia, Magadan Region, Khakassia and Krasnoyarskiy Kray). Five species of this genus were described from Central Asia and Kazakhstan: *A. cornuta* Ivanov, 1991 (Kazakhstan), *A. rauschorum* Malicky, 1999 (Kyrgyzstan), *A. elongata* (McLachlan, 1875), *A. pamirensis* Mey et Levanidova, 1989, and *A. propria* Mey, 1986 from Tajikistan. Nine more species have been described from Palearctic of India (*A. charadija* Schmid, 1968), China (*A. hutchinsoni* Mosely, 1936, *A. spinosa* Yang et Tao, 2011), Turkey (*A. borcka* Sipahiler, 1996) and Georgia (*A. bacurianica* Oláh et Vinçon, 2020, *A. goderdza* Oláh et Kovács, 2020, *A. kintrisha* Oláh et Vinçon, 2020, *A. bakhmara* Oláh et Vinçon, 2024, and *A. gouria* Oláh et Vinçon, 2024). The last five species from Georgia are very similar to *A. borcka*.

The genus *Apataniana* has a sister group genus *Talgara* Mey, 1991. The genus *Talgara* differs from *Apataniana* in the structural features of the 9th segment of females, the basal segment of maxillary palps, and the absence of hairs on the costal margin of the hind wing; it is known from the only locality in Kazakhstan (Mey, 1991).

Mey and Levanidova (1989) identified three groups of species (*impexa*, *bulbosa*, and *elongata* group) based on morphological and zoogeographic features. Oláh have delineated four lineages in genus *Apataniana*. These lineages are called as species groups: *bulbosa*, *elongata, hellenica* and *cornuta* group (Oláh *et al*., 2020). Larval stages were described and identification keys were compiled for 7 species (Mey & Levanidova, 1989; Waringer & Malicky, 2016). Zoogeographic considerations and a preliminary map of species distribution were published by Levanidova (1982) as a part of monograph on the amphibiotic insects of the Far East of Russia.

MATERIAL AND METHODS

The material described and listed here has been collected during the visit of V.D. Ivanov and S.I. Melnitsky to Kyrgyzstan in June 2011 and to Kazakhstan in July–August 2017. We also used material from Kazakhstan, collected by K. Koshkimbaev in 1989–1990 and O. Kosterin in 1993. The material was collected in the daytime near the water bank vegetation and on stones by hand, with entomological

net and occasionally by light traps. Representatives of the genus *Apataniana* are daytime caddisflies, which are active during the daylight hours. Larvae and pupae were picked from stones in the brooks and rivers. The material is preserved in 70% or 90% ethanol. The types of new species and subspecies are deposited in the Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia [ZIN].

TAXONOMY

Order Trichoptera Kirby, 1813

Suborder Integripalpia Martynov, 1924

Family Apataniidae Wallengren, 1886

Tribe Apataniini Wallengren, 1886

Genus *Apataniana* Mosely, 1936

***Apataniana koshkimbaevi* Ivanov, Melnitsky et Smirnova, sp. n.**

https://zoobank.org/References/34760009-88BE-43D6-83D2-731B9904409E

Figs 1–9

MATERIAL. Holotype: ♂, **Kazakhstan**: Ketmen ridge, upper of the Temirlik River, Leppaisay stream, by light, 27.07.1990, leg. Koshkimbaev [ZIN]. Paratypes: **Kazakhstan**: Zailiyskiy Alatau, 70 km E Almaty, brook Kysylbulak, Oyzhailyau gorge, 43º13′N, 77º47′E, height 2000 m, 27.III 1989, 2♂, 9 pupae, 1 larva, leg. Koshkimbaev; Ketmen ridge, upper of the Temirlik River, Leppaisay stream, by light, 43º08′N, 79º23′E, height 1620 m, 23.VII 1990, 1♂, 1♀, leg. Koshkimbaev; Ketmen ridge, Bolshoe Akkau Lake, 23.VII 1990, 10♀, leg. Koshkinbaev; Zailiyskiy Alatau, 80 km W Almaty, small springs near river Karakastek, 43º00′N, 76º03′E, height 1610 m, 14.VII 1990, 9♂, leg. Koshkimbaev; Dzungarian Alatau, vicinity Tekeli, upper of the Kora River, 44º56′N, 79º20′E, height 2500–2700 m, 19.VI 1993, 1♂, leg. Kosterin. **Kyrgyzstan**: 90 km SW of Karakol, 20 km S Issyk Kul Lake, Barskoon waterfall, under stones, 42º00′35′′N, 77º36′27′′E, height 2498 m, 26.VI 2011, 25♂, 5♀, leg. Melnitsky & Ivanov [all ZIN].

DESCRIPTION. Male. (Fig. 1–5). Fore wing length 9.2, body length 7.3. Head dark brown, eyes surrounded by yellow circles; thorax brown, abdomen and antennae fuscous, legs light fuscous. Antenna shorter than fore wing. Third segment of maxillary palp approximately equal to the 2nd one. Fore wing fork F3 two times longer F5; DC slightly longer its stalk. Live insect with dark fore wings ornamented by lighter speckles (Fig. 9); material stored in alcohol loose this coloration except for dark spots at ends of RS and M branches. Pterostigma slighly darker than wing membrane coloration. Hind wing with narrow and short costal roll covered with short ordinary hairs at wing base anterior to RS base, roll length approximate half of RS stalk and devoid of androconial scales or hairs. Costal margin hairs of hind wing long but not thickened.

Male genitalia. Segment IX narrowed dorsally. Preanal appendages equal to segment X in length, roughly triangular with long setae along dorsal margin including apex. Segment X consists of dorsal and ventral parts: dorsal curved beak-like downwards on lateral view and rounded apically on dorsal view. Ventral parts of segment X elongate, somewhat longer than dorsal part of segment X. Gonopods long, gonostylus with 9 spines at apex. Dorsal gonostyle spines larger than ventral. Aedeagus acute and curved downwards on lateral view; subdivided to 2 branches and widened apically on ventral view. Parameres 0.9 times shorter aedeagus, with numerous spines along medial margins, reach apex of extended aedeagus but shorter than aedeagus at contracted genitalia.

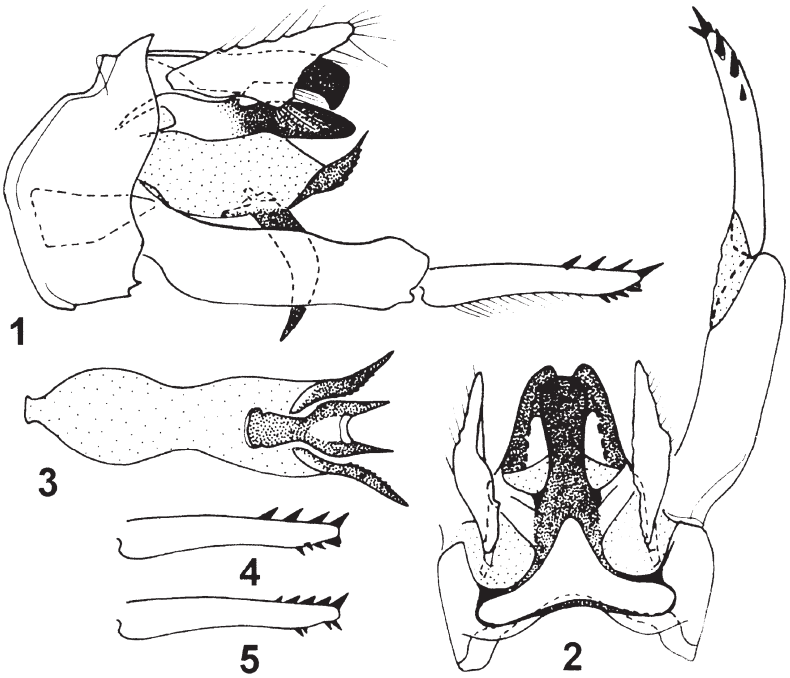

Fig. 1–5. *Apataniana koshkimbaevi* sp. n. (male): 1 – genitalia, lateral (holotype); 2 – genitalia, dorsal (holotype); 3 – aedeagus and parameres (holotype); 4 – gonostyle of paratype from locality Kazakhstan (Dzungarian Alatau); 5 – gonostyle of paratype from Kyrgyzstan.

Feamle (Fig. 6 – 8). Fore wing length 9.6. Body length 7.8.

Female genitalia. Segment IX not subdivided to sternum and tergum, ventral part as long as dorsal. Segment X significantly narrowed at apex on lateral view, its posterior margin with small medial incision on dorsal view. Dorsal surface of segment X with 2 large sclerites covered with setae; lateral parts of these sclerites extended to lateral parts of segment X. Supragenital plate elongated.

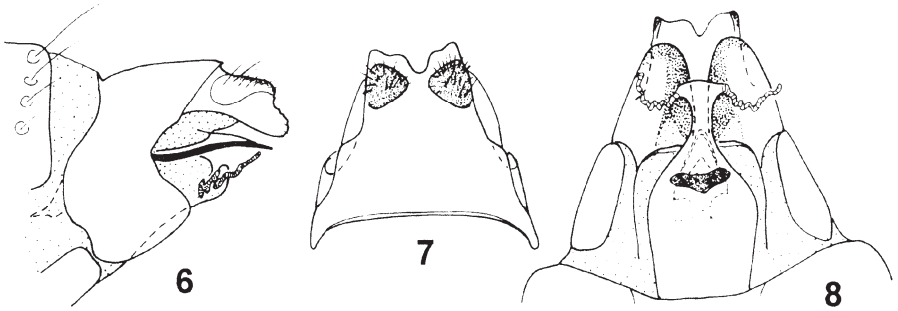

Fig. 6–8. *Apataniana koshkimbaevi* sp. n. (female): 6 – genitalia, lateral; 7 – genitalia, dorsal; 8 – genitalia, ventral.

COMPARISON. The new species in its genital structures is similar to *Apataniana impexa* Schmid, 1968, despite these two species belong to different species groups according to Mey & Levanidova (1989). The principal character distinguishing these groups, the presence of costal turn in all species groups except impexa, suggests the new species to belong to bulbosa group. Nevertheless, the male genitalia of *A. bulbosa* and other related species are more deviant from both *A. impexa* and *A. koshkimbaevi* sp. n. retaining the similar, probably ancestral, structure of segment X, preanal appendages, and two rows of spines on gonocoxite. The new species lack the medial suture on dorsal part of segment X comparing to the former species; ventral parts of segment X more narrow on lateral view, basoventral finger-like projection of preanal appendages shorter. Aedeagus in *A. koshkimbaevi* sp. n. has abrupt narrowing in medial part unlike *A. impexa* devoide of this narrowing. Contrary to *A. impexa* having only 4–5 gonostyle dorsal apical spines the new species has 9 spines on both dorsal and ventral margins. Unfortunately, lacking of female description in *A. impexa* limits the comparison.

REMARKS. A position of spines in gonostyle (Fig. 4–5) differs in northern populations from Dzungarian Alatau comparing to southern population from vicinities of Issyk-Kul Lake (Barskoon valley). Fore wing length varies from 8 to 11.5 mm depending on population. Wing coloration of non-type live specimen is illustrated on Fig. 9.

DISTRIBUTION. Kazakhstan and Kyrgyzstan.

ETYMOLOGY. The new species is named in honor of the collector, Dr. Karshiga C. Koshkimbaev.

***Apataniana cornuta medimontana* Ivanov, Melnitsky et Smirnova, ssp. n.**

https://zoobank.org/NomenclaturalActs/71FD9D3C-2DA2-4F85-8CE5-DC7E709F4865

Fig 10

MATERIAL. Holotype: ♂, **Kazakhstan**: 32 km N Zharkent, spring near river Nizhnyaya Taldy, 44º26′15′′N, 79º52′39′′E, height 1338 m, on stones, 21.VIII 2017, leg. Ivanov, Melnitsky &, Smirnova [ZIN]. Paratypes: the same data as holotype, 24♂, 5♀ [ZIN and collection of D. Smirnova].

DESCRIPTION. Male. Fore wing length 5.5, body length 4.8. Thorax, head and its appendages brown. Abdomen and legs yellowish brown. Wing veins with brown hairs. Forewings black-brown (fading to brown in alcohol collections) with groups of golden hairs forming small spots along the costal and postcostal margins of wings. There is a darker black–brown spot in the DC area. Spur formula 0.2.2.

Male genitalia. Structures of male and female genitalia are the same as in its nominative subspecies, *A. cornuta cornuta* Ivanov, 1991.

Figs 9–10. Live specimens of *Apataniana* spp.: 9 – *A. koshkimbaevi* sp. n.; 10 – *A. cornuta medimontana* ssp. n.

COMPARISON. New subspecies differs from nominative subspecies in the coloration of its wings (Fig. 10); it has blackish-brown wings with small golden spots and large dark brown spot, while the nominative subspecies *A. cornuta cornuta* has yellow-red forewings. The behaviour in the new subspecies is also different. The insects were found walking on stones nearby small springs and brooks close to the water and able to fly only at short distances less than 2 m. Contrary, the nominative subspecies flies at much larger distances and can be found long away from its habitats.

REMARKS. There is polymorphism in the size of the forewing and body length in the populations of the new subspecies. Forewings of males vary from 5.0 mm to 7.5 mm and body length from 3.5 mm to 5.0 mm. Small specimens predominate.

DISTRIBUTION. Kazakhstan (Dzungarian Alatau).

ETYMOLOGY. The name of the new subspecies from *medimontana* lat. – mid-mountain

DISCUSSION

The new species *Apataniana koshkimbaevi* sp. n. is known from six localities in the Tian Shan mountain system (Fig. 14, localities 1, 3–7). The distance between the northern and southern habitats is 350 km, the eastern and western ones is 270 km representing a relatively limited distribution although crossing several high mountain ranges. The male gonostyle variations mentioned above (Fig. 1, 4–5) suggest a limited gene flow between these isolated regions. Adult stages are noted in different seasons from mid-spring to mid-summer at altitudes from 1600 m to 2700 m: in March (at altitudes of about 2000 m), June (at altitudes above 2500 m) and July (at altitudes of about 2000 m). The typical habitat of *A. koshkimbaevi* sp. n. is mountain streams (Fig. 11–12). *Apataniana impexa* Schmid, 1968, a closely related species, is known from Western Mongolia, Xinjiang Uyghur autonomous region of China (Xinjiang) and Russia (Altai Mountains) according to Mey & Levanidova (1989), Huang *et al*. (2005) and Ivanov & Melnitsky (2007). The latter species has more wide distribution than the former one. It is known from at least 7 localities, the northern and southern known populations are separated by more than 850 km. The closest known populations of the two species are separated by a distance of 700 km; the northern boundaries of ranges are separated by 870 km. The new species inhabits the central Tian Shan, while *A. impexa* predominates in the Mongolian Altai mountain system and, according to isolated samples, from the Northern Altai and perhaps Eastern Tian Shan (Huang *et al*., 2005).

Apataniana cornuta is known from locations in the Dzungarian Alatau and also the Tarbagatai and Saur mountain systems (Ivanov, 1991; Smirnova *et al.*, 2020). The nominative subspecies is found at altitudes from 600 to 1200 m. It has a yellowish-red coloration of the forewings. During the day, active individuals of this subspecies are found in low mountain and plain grassy vegetation along the banks of small and medium-sized streams. *Apataniana cornuta medimontana*, ssp. n. is known from one locality in the Dzungarian Alatau at altitudes 1350 m (Fig. 14, locality 2). The surrounding landscape is a mountain alpine pasture (Fig. 13). The specimens of the new subspecies have a black-brown coloration of the forewings as probable adaptation for heating at lower mountain temperatures. They were collected from shaded stones close to water of small brooks; the adults mostly walk and fly at rare occasions in short distance. Contrary, the nominative subspecies occurs in vegetation and fly readily. Darker cryptic coloration hides the adults in their natural stony habitats. This coloration is helpful also for quick warming of adults under mountain sunshine at higher altitudes with low summer temperatures. These two subspecies demonstrate different behavioral adaptations in specific habitats, which confirm their taxonomic status.

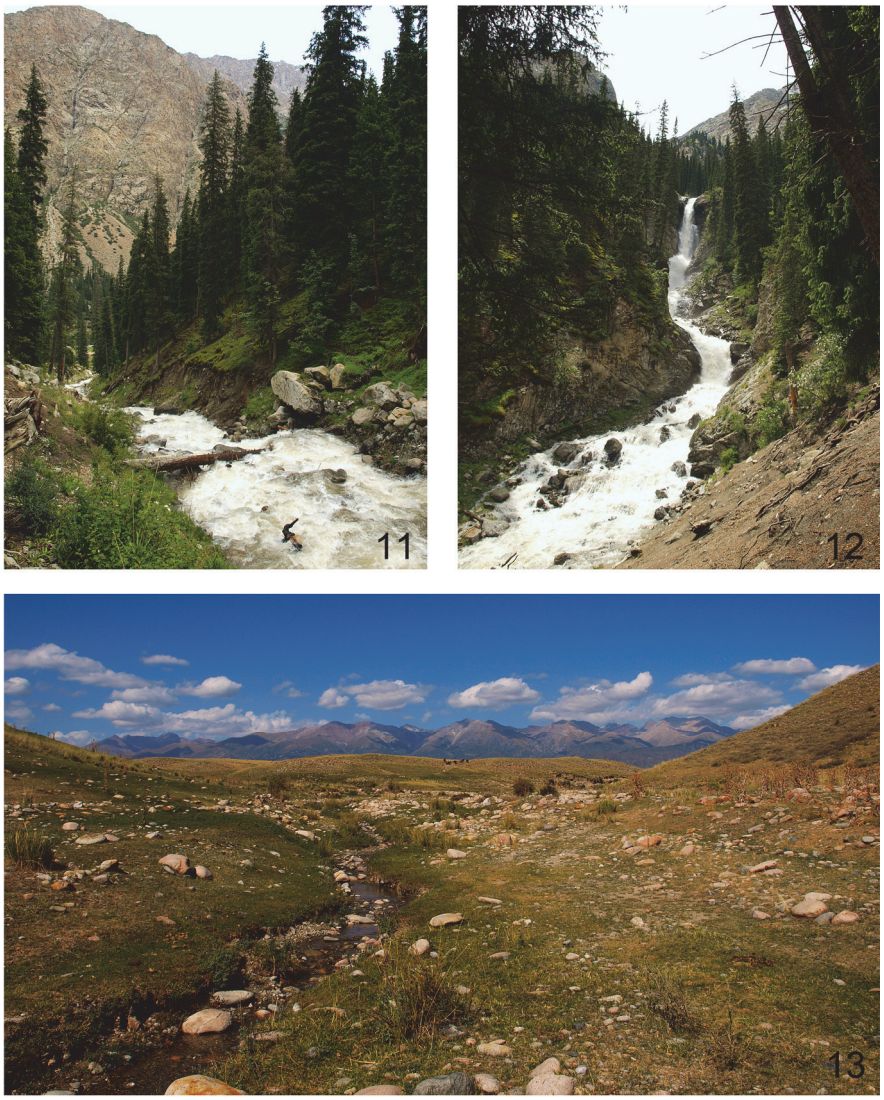

Fig. 11–13. Typical habitats of *Apataniana* spp.: 11–12 – *A. koshkimbaevi* sp. n.; 13 – *A. cornuta medimontana* ssp. n.

The genus *Apataniana* is represented by 21 species in Eurasia. Three groups of species were originally identified: *impexa*, *bulbosa* and *elongata* (Mey & Levanidova, 1989) during the revision of the genus. After this revision, 12 new species were described by Malicky (1987, 1992, 1993), Ivanov (1991), Yang with his co-authors (2011), Sipahiler (1996), and Oláh with his co-workers (Oláh *et al.*, 2020;

Oláh & Vinçon, 2024). The newly described species suggested more diversity in this genus hence Oláh and Vinçon recently proposed the *hellenica* species group from Greece, Turkey and Georgia, and separate *cornuta* species group from China and Kazakhstan (Oláh & Vinçon, 2024). The *impexa* species group was considered as a part of the *bulbosa* group (Oláh *et al.*, 2020).

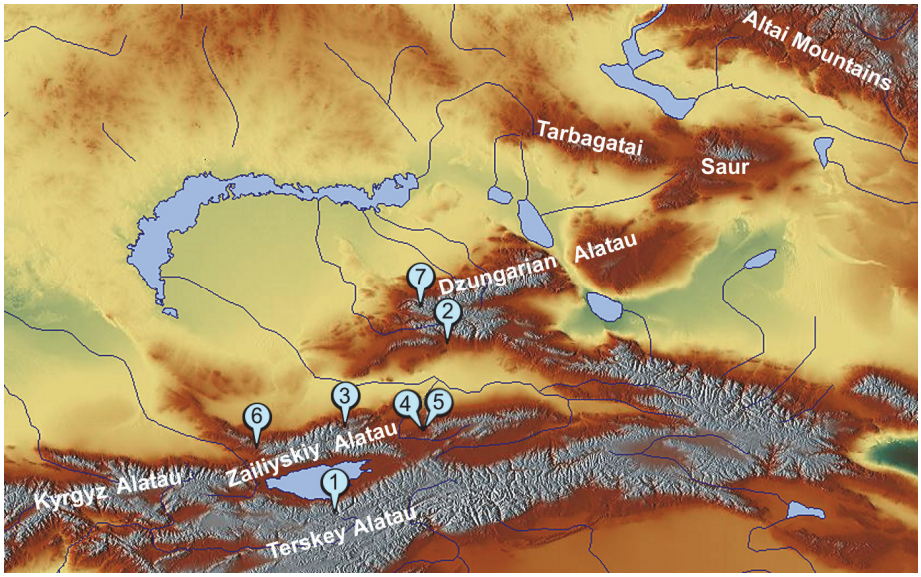

Fig. 14. Map of the sampling localities in Kyrgyzstan (1) and Kazakhstan (2–7): 1 – Barskoon waterfall; 2 – spring near Nizhnyaya Taldy River; 3 – Oyzhailyau gorge; 4 – Leppaisay stream; 5 – Bolshoe Akkau Lake; 6 – small springs near Karakastek River; 7 – Kora River.

We generally agree with the species group composition proposed in the recent publication (Oláh *et al.*, 2020). The presumably ancestral character (Mey & Levanidova, 1989), the costal roll of the hind wing in *A. impexa* is a possible secondary loss. If this hypothesis would turn true, the species group composition in *Apataniana* should be altered with less number of species groups. Representatives of the *cornuta* group are the most evolutionarily advanced. They are distributed from 39º to 47º N (more than 800 km) and from 78º to 106º E (more than 3000 km). There could be more species in the Asia transitive between these two known species showing a significant structural distance in genital morphology exceeding that in other species groups of *Apataniana*. The new subspecies described here suggest the continuing speciation in this genus.

The most archaic species of *Apataniana*, *A. impexa* and *A. koshkimbaevi* sp. n. are known from the mountain ranges of Central Asia. The distribution boundary between the two species from this group possibly runs along the Irtysh (Kara-Irtysh) valley, the natural border between Siberian and Middle Asian regions.

Several species of *Apataniana* recently described from Georgia (Oláh *et al.*, 2020; Oláh & Vinçon, 2024) look related to *Apataniana borcka*. We have no original material to discuss their affinities. Besides the Georgian species, relatively small distinctions of male genitalia are noted in the three *Apataniana* species from Greece (Malicky, 1987, 1992, 1993) and in probably related pair of species from Siberia, *A. bulbosa* and *A. tschuktschorum*. These similarities of characters suggest a relatively small input of male genital strictures in the species recognition in *Apataniana*.

Speciation and formation of modern groups of the genus *Apataniana* presumably occurred in the mountain systems of Central Asia. Recently formed species evolved in the Pleistocene (during the cooling of the climate) and widely distributed across the cold plains and foothills of Eurasia. They were dispersed across the highlands during the Holocene warming of climate. Species like *Apataniana cornuta*, *A. impexa*, *A. tchuktchorum* survived in the lowlands and on the plains only in the low competition and the contrasting climate of Siberia, Mongolia and Eastern Kazakhstan.

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