

# First record of *Sphenoptera* (*Chilostetha*) *egena* Mannerheim, 1852 (Coleoptera: Buprestidae) from Kazakhstan with notes on its bionomics and distribution

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During the fieldwork conducted between 2021 and 2023 in the territory adjacent to the Tarbagatai Natural Park, a new species of jewel beetle (Coleoptera, Buprestidae), *Sphenoptera* (*Chilostetha*) *egena* Mannerheim, 1852, was discovered, marking a noteworthy addition to the fauna of Kazakhstan. Specimens of this species were collected in June from arid shrub-steppe slopes in the western part of the Tarbagatai Range, specifically near the village of Taskesken in the Karakol River floodplain. Prior to this discovery, *Sphenoptera* *egena* had only been reported from regions in Russia (Western and Eastern Siberia) and Mongolia. This paper presents a concise diagnostic overview of the genus *Sphenoptera* Dejean, 1833, along with a brief description of the species. Using ArcGIS PRO 3.1.1, we created a distribution map and modeled the favorable habitat conditions for *Sphenoptera* *egena*. Additionally, we provide a description of the background vegetation in the species' collection site. Photographs of the jewel beetle were captured using a Canon Kiss X4 camera with a Canon 60 mm Macro USM lens, illustrating the collection site of *S. egena*. Furthermore, other species, such as *Agrilus* *sericans* Kiesenwetter, 1857, and *Meliboeus* *morawitzi* (Semenov, 1905), were concurrently identified in the fauna of these steppe slopes. The identification of *Sphenoptera* *egena* not only enriches the inventory of jewel beetles in Kazakhstan, which currently includes over 200 species and subspecies across five subfamilies, twelve tribes, and twenty-eight genera, but also extends the known distribution range of this species.

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**First record of *Sphenoptera* (*Chilostetha*) *egena* Mannerheim, 1852 (Coleoptera: Buprestidae) from Kazakhstan with notes on its bionomics and distribution**

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## Abstract

During the fieldwork conducted between 2021 and 2023 in the territory adjacent to the Tarbagatai Natural Park, a new species of jewel beetle (Coleoptera, Buprestidae), *Sphenoptera (Chilostetha) egena* Mannerheim, 1852, was discovered, marking a noteworthy addition to the fauna of Kazakhstan. Specimens of this species were collected in June from arid shrub-steppe slopes in the western part of the Tarbagatai Range, specifically near the village of Taskesken in the Karakol River floodplain. Prior to this discovery, *Sphenoptera egena* had only been reported from regions in Russia (Western and Eastern Siberia) and Mongolia. This paper presents a concise diagnostic overview of the genus *Sphenoptera* Dejean, 1833, along with a brief description of the species. Using ArcGIS PRO 3.1.1, we created a distribution map and modeled the favorable habitat conditions for *Sphenoptera egena*. Additionally, we provide a description of the background vegetation in the species' collection site. Photographs of the jewel beetle were captured using a Canon Kiss X4 camera with a Canon 60 mm Macro USM lens, illustrating the collection site of *S. egena*. Furthermore, other species, such as *Agrilus sericans* Kiesenwetter, 1857, and *Meliboeus morawitzi* (Semenov, 1905), were concurrently identified in the fauna of these steppe slopes. The identification of *Sphenoptera egena* not only enriches the inventory of jewel beetles in Kazakhstan, which currently includes over 200 species and subspecies across five subfamilies, twelve tribes, and twenty-eight genera, but also extends the known distribution range of this species.

## Keywords

Bionomics, Buprestidae, distribution, East Kazakhstan, fauna, new record, Tarbagatai Ridge

## Introduction

During the fieldwork conducted from 2021 to 2023 under the grant project of the Laboratory of Entomology at the Institute of Zoology, Committee of Science, Ministry of Science and Higher Education of the Republic of Kazakhstan, we studied the diversity of insects within the state natural park "Tarbagatai," located in the Abai region of East Kazakhstan. In the course of this research, a new species of jewel beetle (Coleoptera, Buprestidae), *Sphenoptera (Chilostetha) egena* Mannerheim, 1852, was discovered, marking a significant addition to the fauna of Kazakhstan. Adults of this species were collected in June from arid shrub-steppe slopes in the western part of the Tarbagatai Range, near the village of Taskesken in the Karakol River floodplain. Prior to this finding, *Sphenoptera egena* had only been documented in Russia (Western and Eastern Siberia) and Mongolia (Alexeev 1975, 1989; Alexeev & Volkovitsh 1989; Kalashian et al. 2005).

The genus *Sphenoptera* Dejean, 1833, belongs to the subfamily Chrysochroinae Laporte, 1835, and comprises approximately 1,000 species (Bellamy 2008, updated). Within the territory of the former USSR, 165 species of this genus have been recorded, with 54 species identified in Kazakhstan (Volkovitsh 2013). This makes *Sphenoptera* the most diverse genus of jewel beetles in Kazakhstan. The larvae of *Sphenoptera* typically develop in the roots of shrubs, occasionally in deciduous trees, and also in the roots of herbaceous plants; they are rarely found beneath the bark of trees and shrubs (Alexeev 1989). Some larvae of this genus inhabit the soil, feeding on roots from within. A distinctive characteristic of *Sphenoptera* is the presence of a suture that separates the clypeus from the forehead, forming a crescent-shaped plate above the labrum. *Sphenoptera egena* is classified within the subgenus *Chilostetha* Jakovlev, 1889, which is characterized by a posterior process of the prothorax bordered by a groove and triangularly rounded apices of the elytra. Currently, Kazakhstan is home to over 200 species and subspecies of jewel beetles, classified into five subfamilies, twelve tribes, and twenty-eight genera (Kostin 1973; Tleppaeva 2011; Jendek & Grebennikov 2011; Volkovitsh 2013).

## Materials and methods

The jewel beetle was collected through sweeping with an entomological net on the arid shrub-steppe slopes of the Western Tarbagatai range. The Tarbagatai ridge spans the Urzhar, Ayagoz, and Tarbagatai districts of the Abay region in Eastern Kazakhstan. This mountain range serves as a watershed between the Zaysan and Balkhash-Alakol depressions, extending approximately 300 km in a latitudinal direction and ranging from 30 to 50 km in width. To the east, it continues into the Saur Range. The western end of the Tarbagatai ridge is located 75 km southeast of the city of Ayagoz, from which it stretches southeast for about 55 km to Mount Sandyktas before proceeding east along the border between Kazakhstan and China. The highest point of the Tarbagatai range is an unnamed peak that reaches an elevation of 2,992.7 m (Chupakhin 1987).

The specimen studied has been deposited in the collection of the Institute of Zoology of the Ministry of Science and Higher Education of the Republic of Kazakhstan (IZRK). Additionally, materials from the Zoological Institute of the Russian Academy of Sciences in St. Petersburg, Russia (ZIN), were utilized to map the distribution of this species. Photographs of the specimen were taken using a Canon Kiss X4 camera equipped with a 60 mm Macro USM lens. The modeling of the distribution map and the identification of favorable habitat conditions for the species were conducted using ArcGIS PRO 3.1.1. The modeling techniques employed are detailed in several publications (Dujsebayaeva, Malakhov 2017; Malakhov, Zlatanov 2020; Malakhov, Islamgulova 2021).

The following abbreviations are used throughout this text: IZRK – Institute of Zoology of the Ministry of Science and Higher Education of the Republic of Kazakhstan; ZIN – Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia; c. – city; W – west; E – east; N – north; S – south; sh. – shore; R. – river; st. – station; ex. – exemplar; h – height; dist. – district; v. – village; WNW – west-north-west; vr. – versts; env. – environs.

## Results

*Sphenoptera egena* Mannerheim, 1852

Fig. 1

Synonym: *carinulata* Jakovlev, 1902

Taxonomic position: subgenus *Chilostetha* Jakovlev, 1889

**Diagnosis.** The posterior process of the prosternum is entirely bordered by a groove. Apices of elytra rounded-triangular, not with three large teeth; middle tooth not sharp. Elongated, elytra more than twice as long as wide at humeri. Pronotal disc with four smooth, shining reliefs or areas with more sparse weak punctures separated by depressions. Pronotum with S-shaped curved or arcuately rounded lateral sides. Elytra with smeared punctate-rugose sculpture and with rows of elongated punctures in weakly expressed grooves. The marginal spacings in the tops – of elytra are often raised, sometimes forming a rather sharp keel. Elytral suture in posterior third sometimes indistinctly elevated. Black bronze. 5.5–7.5 mm. (Alexeev 1989; Alexeev, Volkovitsh 1989).



**Figure 1.** *Sphenoptera egena*: imago, dorsal and ventral views (photo by S. Kolov).

**Material: Kazakhstan:** Abay region, Western Tarbagatai, env. of Taskesken v., Karakol floodplain, N 47.25871, E 080.80906, h~640 m, 08.07.2022, 1 ex., Tleppaeva

A.M. leg. (IZRK). **Russia:** Republic of Altai, Kosh-Agach, Altai, mountains, 15 km N, 19.VI.964, 49.995828 N, 88.675497E, 1 ex., I.M. Kerzhner leg. (ZIN); 14 km NW, H~2000 m, 1 ex., K.Ya. Grunin leg. (ZIN); Kosh-Agach, Altai, Chuyskaya steppe, 19.VI.964, 1 ex., E.P. Narchuk leg. (ZIN); Altai Territory, Kosh Agach, Chuyskaya steppe, h~1700-1800 m, 49.995828 N, 88.675489 E, 16.16.1989, 2 ex., Pisanenko leg. (ZIN); Tuva, Kaa-Khemsy district, v. Kundustug (= Fedorovka), right side of Kaa-Khema, 51.5733 N, 95.179269 E, 20.VI.1979, on *Artemisia frigida*, 2 ex., B.A. Korotjaev leg. (ZIN); same place, on *Artemisia santolinifolia*, 1 ex., B.A. Korotjaev leg. (ZIN); Tuva, Kyzyl, right bank, 51.715083 N, 94.457486 E, 6-10, 18.VI.1979, 3 ex., B.A. Korotjaev leg. (ZIN); Kyzyl, 3.VII.19773, 51.715083 N, 94.457486 E, 1 ex., Korotjaev leg. (ZIN); Tuva, 20 km. E Kyzyl, Yenisei right bank, 3 ex., 4.VI.1980, B.A. Korotjaev leg. (ZIN); Tuva, Kyzyl, S of v. Kaa-Khem, 15, 16.VI.1979, on *Artemisia santolinifolia*, 3 ex., B.A. Korotjaev leg. (ZIN); Tuva, Turan, 52.142828 N, 93.923022 E, 14.VI.1979, 1 ex., B.A. Korotjaev leg. (ZIN); Tuva, v. Mugur-Aksy, 3.VI.1971, 10.VI.1972, 19, 31.VII.1973, 4 ex., B.A. Korotjaev leg. (ZIN); Tuva, v. Taeli, 51.425 N 90.213581 E, 28.VI.1971, 1 ex., B.A. Korotjaev leg. (ZIN); 2.VIII.1973, 1 ex., B.A. Korotjaev leg. (ZIN); Tuva, Erzin, 50.252667 N, 95.157997 E, 5.VII.1973, 1 ex., B.A. Korotjaev leg. (ZIN); Tuva, 30 km W Sagly, 9.VII.1980, 1 ex., B.A. Korotjaev leg. (ZIN); Sagly v., 50.494694 N, 91.319861 E, 7.VII.1973, 1 ex., B.A. Korotjaev leg. (ZIN); 10 km WNW Sagly v., H~1600-1800 m, 28.VI.1980, 2 ex., B.A. Korotjaev leg. (ZIN); 5 km E Sagly v., 1 ex., 14.VII.1980, B.A. Korotjaev leg. (ZIN); Tuva, Ovyursky district, r. Irbitey. stone steppe, 50.874511 N, 93.080658 E, 21.V.974, 1 ex., B.A. Korotjaev leg. (ZIN); Tuva, Kyzyl, 8.VI.1949, steppe, sweeping, 1 ex., Dyatlova leg. (ZIN); Tuva, Kyzyl, under stone, 8.VI.1949, 2 ex., Dyatlova leg. (ZIN); Tuva, Kyzyl, sweeping, steppe, 4.VII.1948, 1 ex., A.I. Cherepanov leg. (ZIN); Tuva, Uschug-Khem, on grass, 22, 24.VI.1949, 2 ex., A.I. Cherepanov leg. (ZIN); Tuva, Monchun-Tayginskyi distr., Mochur-Aksy, h~1800 m, 50.382222 N, 90.441278 E, 14.VI.1989, 1 ex., Logunov leg. (ZIN); Tuva, Monchun-Tayginskyi distr., 5 km. N Kyzyl-Khaya, 50.052167 N,

89.866142 E, h~1800 m, 1 ex., 1.VI.1989, Logunov leg. (ZIN); Tuva, Boyarovka v., 51.546392 N, 95.349944 E, 3.VII.1949, 1 ex., Perevozchikova leg. (ZIN); Tuva ASSR, floodplain of the river Tes-Khem, 1962, 1 ex., Berman leg. (ZIN); Buryatia, r. Tamir, 10 vr. below mountains Taglo, 19.VII.1924, 1 ex., P.K. Kozlov leg. (ZIN); Buryatia, Transbaikalia mr. occ. Fl. Selenga, Ustj-Kjachta, 16.VII.1928, 16.VII.1928, 1 ex., Th. Lukjanovitsh leg. (ZIN). **Mongolia:** Ara-Khangai aimag, r. Tamryn-Gol, 10 vr. below mountains Taglo, 47.758333 N, 102.42 E, 19.VII.24, P.K. Kozlov leg. (ZIN); Central: "North-Western Mongolia", 10–23.V.1894, E.N. Klementz leg. (ZIN); Sukhbaatar aimag: Ikh-Bulak spring, 9 km WSW Darigangi, 45.290556 N, 113.807778 E, 8.VII.1971, I.M. Kerzhner leg. (ZIN); Dzutol-Khan-Ula, 12.VII.1971, A.F. Emelyanov leg. (ZIN); Bayan-Khongor aimag: Lamyn-Gegen, 47.908056 N, 106.884722 E, 19–20.VII.1928, A.N. Kirichenko leg. (ZIN); Uver-Khangai aimag: Mt. Ushugin-Nuru, 10 km from Barun-Bayan-Ulan, 45.2675 N, 101.283333 E, 27.VI.1972, L.N. Medvedev leg. (ZIN); South Gobi: Bulgan, 44.095556 N, 103.543611 E, 17.VII.1972, L.N. Medvedev leg. (ZIN); "Mongolia" V.A. Kashkarov leg. (ZIN); Selenginsky aimag: between the r. Ero-Gol and r. Khara Golo, 49.368333 N, 107.376111E, 1 ex.; G.N. Potanin leg. (ZIN); Gobo-Altai: 25 km SE Altai (Yusun-Bulak), 46.367139 N, 96.254639 E, 12.VII.1970, 1 ex., I.M. Kerzhner leg. (ZIN); Uver-Khangai aimag: Deun-Bayan-Ulan, 25 km from Arbai-Khere, 46.484722 N, 102.668611 E, 12.VII.1970, 1 ex., L.N. Medvedev leg. (ZIN); Bayan-Bulak, 13.VII.1971, 1 ex.; L.N. Medvedev leg. (ZIN); Middle Gobi: 10 km W Gobi-Ugtal (Govi-Ugtaal), 46.050278 N, 107.464167 E, 23.VI.1971, 1 ex., L.N. Medvedev leg. (ZIN); Bulgan aimag: r. Tola, Telengiin-Baimin, 16.VI.1975, L.N. Medvedev leg. (ZIN); Bayan-Khongor aimag: 15-17 km S Shina-Jinsta, 44.5455 N, 99.281778 E, 28.VI.1981, B.A. Korotjaev leg. (ZIN); same place, 21.VIII.1981, B.A. Korotjaev leg. (ZIN); Uver-Khangai aimag: 90 km E Bayan Khongor, 24.VI.1981, B.A. Korotjaev leg., 21.VIII.1981, B.A. Korotjaev leg. (ZIN).

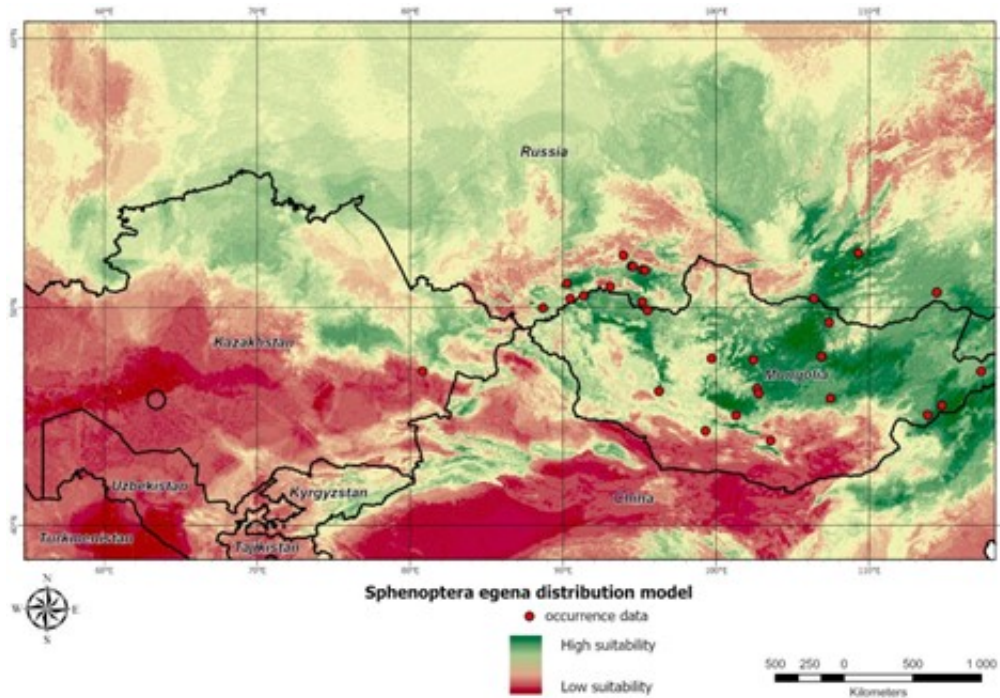
The localities mentioned above were included on a distribution map, and a model illustrating the favorable habitat conditions for the species was created (Fig. 2).

**Distribution.** Kazakhstan (East), Russia (Western, Eastern Siberia), Mongolia (Fig. 2).

**Bionomics.** The host plant for the larvae is unknown, but they are likely to develop in the roots of sagebrush (*Artemisia* spp.). The species was collected on rocky steppe slopes near Taskesken village (Fig. 3). There, sagebrush-grass-forb steppes are common with the dominance of sagebrush (*Artemisia sublessingiana* (Kell.) Krasch., *A. marschalliana* Spreng.) and grasses (*Stipa capillata* L., *Festuca sulcata* Hack.). St. John's wort (*Hypericum perforatum* L.), marshmallow (*Althea nudiflora* Lindl.), yarrow (*Achillea millefolium* (Lindl.) Boiss.), (*Gallatella punctata* (Waldst. & Kit.) Nees), (*Gypsophilla altissima* L.), (*Syssymbrium polymorphum* (Murray) Roth), (*Pseudosphora allipeкуроides* L) are present in the forbs as well. Of the shrubs on the slopes grow mainly karagana (*Caragana pumila* Pojark.), maicaragan (*Calophaca soongorica* Kar. et Kir.), spiraea (*Spiraea hypericifolia* L.) and felt cherry (*Cerasus tianschanica* Pojark.).

*Agrilus sericans* Kiesenwetter, 1857 and *Meliboeus morawitzi* (Semenov, 1905) were found simultaneously in same locality.





**Figure 2.** Distribution map and favorable habitat model of *Sphenoptera egena*.

## Discussion

The mountain uplifts of the Saur and Tarbagatai ranges share significant landscape characteristics with those found in Siberia and Mongolia, a similarity attributed to their geographic proximity to these regions (Chupakhin 1989). The low mountains of Inner Mongolia are characterized by semi-desert landscapes, while the Tarbagatai region is defined by a dry continental climate and a poorly developed river network reliant on snowmelt. Although the climate and hydrological regime of this area resemble those of the Southern Altai, precipitation levels are generally lower. This difference is evident in the predominance of semi-desert and steppe landscapes, which occupy the piedmont plains, foothills, low mountains, and lower slopes of the mid-elevations.

Favorable habitat conditions for *Sphenoptera egena* exist in several areas of Kazakhstan, including the Zaisan basin, the foothills of the Southwestern Altai, and the eastern part of the Kazakh uplands, extending from the Kyzylrai Mountains to the Kalbinsky Ridge (see Fig. 2).

Notably, *Sphenoptera egena* is not the first eastern species recorded in the fauna of Kazakhstan. Two other buprestid species have also been documented: *Agrilus ecarinatus* Marseul, 1866, found in the Ili Valley (Jendek & Grebennikov 2011), and *Agrilus fleischeri* Obenberger, 1925, recently discovered in the Altai and Dzungarian Alatau regions (Jendek & Grebennikov 2011; Tleppaeva et al. 2017a, b, c (as *A. ater*); Tleppaeva & Kadyrbekov 2022). The potential for discovering additional species remains high. There is also a possibility of the invasive *Agrilus planipennis* Fairmaire, 1888, which affects ash trees, and *Agrilus mali* Matsumura, 1924, which impacts apple trees; both have been found in China near the Kazakhstan border (Wei et al. 2004; Cui et al. 2015; Bozorov et al. 2018; Cui et al. 2019; Zang et al. 2017; Zhang et al. 2020; Volkovitsh et al. 2022).

In summary, the new record of *Sphenoptera egena* not only enhances the diversity of jewel beetles in Kazakhstan but also expands the known distribution range of this species.

## Conclusion

*Sphenoptera egena* Mannerheim, 1852, a species new to the fauna of Kazakhstan, is an eastern Scythian montane-steppe species previously known only from the steppes of Western and Eastern Siberia and Mongolia. Its discovery in Eastern Kazakhstan suggests that it may inhabit the eastern steppe zone of the republic, as indicated by the favorable habitat model. This raises two possibilities: the species may have always been present in Kazakhstan, or it could represent a westward expansion from its primary range.



**Figure 3.** Tarbagatai Ridge, arid shrub-steppe slope (Photo by S.V. Kolov).

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