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RESEARCH ARTICLE

Two new species of the subgenus *Pleurosticha* of the genus *Chrysolina* (Coleoptera: Chrysomelidae) from the mountains of southern Siberia (Altai and Tyva)

Два новых вида подрода *Pleurosticha* рода *Chrysolina* (Coleoptera: Chrysomelidae) из горных районов южной Сибири (Алтай и Тыва)

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Abstract. Two new species from the subgenus *Pleurosticha* of the genus *Chrysolina* are described from the mountains of southern Siberia (Russia): *Ch. reshetnikovi* **sp. nov.** (Republic of Altai) and *Ch. borisi* **sp. nov.** (Republic of Tyva). *Chrysolina reshetnikovi* **sp. nov.** has a slightly convex body, blue-green coloration of the upper side, regular puncture rows of the elytra and mostly flat elytral intervals, which distinguish this species from all species of the subgenus, except for *Ch. shapkini* Mikhailov et Gus'kova, 2013. The main distinguishing features of the male of the new species from *Ch. shapkini* are the strongly broadened tarsomeres 1–3, the pygidium with an impression along its entire length, the last abdominal sternite with a semicircular depression, and the apex of the aedeagus bent at 90°. *Chrysolina borisi* **sp. nov.** has a convex small body, black coloration of the upper side, femora and tibiae, regular puncture rows of the elytra and slightly convex elytral intervals, and the aedeagus near the apex with a narrow protrusion of the lateral side directed toward the aedeagus base.

Резюме. Описаны два новых вида из подрода *Pleurosticha* рода *Chrysolina* из горных районов южной Сибири (Россия): *Ch. reshetnikovi* **sp. nov.** (Республика Алтай) и *Ch. borisi* **sp. nov.** (Республика Тыва). У *Ch. reshetnikovi* **sp. nov.** слабо выпуклое тело, сине-зеленая окраска верхней стороны, правильные точечные ряды и преимущественно плоские междурядья надкрылий, что отличает этот вид от всех видов подрода, кроме *Ch. shapkini* Mikhailov et Gus'kova, 2013. Главные отличительные признаки самца нового вида от *Ch. shapkini* – это сильно расширенные 1–3-й членики лапок, вдавление пигидия вдоль всей его длины, последний стернит брюшка с полукруглым вдавлением и вершина эдеагуса, отогнутая на 90°. У *Ch. borisi* **sp. nov.** выпуклое небольшое тело, черная окраска верхней стороны, бёдер и голеней, правильные точечные ряды и слабо выпуклые междурядья надкрылий, и эдеагус с направленным к его основанию узким выступом боковой стороны вблизи вершины.

Keywords: Asian Russia, systematics, morphology, distribution, leaf beetles, Chrysomelidae, *Chrysolina*, new species

Ключевые слова: азиатская часть России, систематика, морфология, распространение, листоеды, Chrysomelidae, *Chrysolina*, новые виды

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Introduction

The subgenus *Pleurosticha* Motschulsky, 1860 of the genus *Chrysolina* Motschulsky, 1860 is distributed in Arctic Asia and America from Taimyr to Chukotka and Alaska, in the mountainous regions of the Urals, southern Siberia, the Russian Far East, eastern Kazakhstan, Mongolia and Japan (Hokkaido) (Mikhailov, 2006a). In total, according to various estimates, there are twelve or eleven valid species (Mikhailov, 2007a and Bieńkowski, 2019, respectively).

Two subgenera, *Pleurosticha* and *Arctolina* Kontkanen, 1959, being taxonomically close to each other, occupy a separate position in the genus *Chrysolina* due to the unique structure of the male aedeagus. In the members of these subgenera, the aedeagus bears paired sclerites called "alae", on the sides of the apical orifice. The alae vary in different species, from narrow, crescent-shaped to broadly triangular; they are pressed to the dorsal side of the aedeagus or more or less projecting. In the subgenus *Arctolina*, the alae are small, while in the subgenus *Pleurosticha*, they are large and well-developed. This is the main diagnostic difference between the subgenera. In the species of *Arctolina* with the most developed alae [*Ch. octocosta* (Jacobson, 1924), *Ch. saurica* (Jacobson, 1924) and *Ch. valichanovi* Lopatin, 1990], the apex of the aedeagus is extended into a narrow process, while in the species of *Pleurosticha* the aedeagal apex never has this shape (Bieńkowski, 2019).

All species of *Pleurosticha* are flightless and have strongly reduced hind wings; many of them inhabit the highlands. They live in conditions of strong geographical isolation, which leads to speciation. Locally distributed species of this subgenus were recently described from different mountain regions of the Urals, Siberia and Mongolia (Mikhailov, 2000, 2006a, 2006b, 2007a, 2007b; Mikhailov & Gus'kova, 2013).

This article includes the descriptions of two new species of *Pleurosticha* from the mountains of southern Siberia in Asian Russia, specifically the Altai Mountains and the Tannu-Ola Ridge.

Material and methods

The holotypes and paratypes of both new species are deposited at the Zoological Institute, St Petersburg, Russia (ZIN). One paratype is kept in the author's collection (BC) and one paratype, in Yu.E. Mikhailov collection (MC). For comparison, the holotype of *Ch. shapkini* Mikhailov et Gus'kova, 2013 (deposited at Siberian Zoological Museum, Novosibirsk, Russia; SZM) was examined. Morphology, description plan and terminology of structural details follow Bieńkowski (2019).

Results

Order **Coleoptera**

Family **Chrysomelidae**

Subfamily **Chrysomelinae**

Genus ***Chrysolina*** Motschulsky, 1860

Subgenus ***Pleurosticha*** Motschulsky, 1860

***Chrysolina* (*Pleurosticha*) *reshetnikovi* sp. nov.**
(Figs 1–3, 17–24)

Holotype. Male, **Russia**, *Altai Republic*, Ulagan Distr., env. of Aktash Vill., Retranslyator Mt., 3000 m a.s.l., 50°20′26.52″N 87°44′52.80″E, 11.VIII.2022, A.N. Reshetnikov leg. (ZIN).

Paratypes. **Russia**, *Altai Republic*, Ulagan Distr.: 1 male, Kuray Range, NE of Aktash Vill., upper reaches of Yarlyamry River, 2100–2300 m a.s.l., 50°19′10.5″N 87°45′14.2″E, 30.VI.2005, B.M. Kataev leg. (ZIN); 1 male, env. of Aktash Vill., 3000 m a.s.l., 50°20′24″N 87°58′12″E, 11.VII.2000, O.G. Gorbunov leg. (BC); 1 female, Kurai Range, upper reaches of Yarlyamry River, 10 km E of Aktash Vill., 2400–2800 m a.s.l., 50°20′N 87°45′E, 29.VI.–3.VII.2008, R.Yu. Dudko leg. (MC).

Description. *Holotype* (male). Body 6.6 mm long, 3.8 mm wide, elongate oval, 1.7 times as long as wide, weakly convex, depressed dorsally; elytron 2.7 times as long as high. Body dorsally shining, with head and pronotum sericeous shining, bluish green, with following parts violet: border between frons and clypeus, pronotal lateral calli (except near base), four indistinct spots on pronotal disc, elytral extreme lateral interval and epipleura; antennae, mouth parts, legs, and underside black, with violet reflection on prothoracic hypomera.

Last maxillary palpomere broadly oval, obliquely truncate, 1.2 times as long as wide, 1.2 times as wide as previous palpomere and 1.3 times as long

as the latter. Antenna inserted 2.5 times as close to clypeus as to eye.

Pronotum (Fig. 19) 1.9 times as wide as long (length measured from anterior to posterior border along middle), with maximum width before base, slightly narrowed towards base, more narrowed anteriorly, with anterior and posterior angles rounded. Lateral calli convex, narrow, 0.1 times as wide as pronotum (in dorsal view), separated from disc by deep narrow furrow in basal half and by narrow, moderately deep, gently sloping impression with wrinkled punctures in anterior half. Pronotal disc and lateral calli covered by obsolete microreticulation (cells rounded) and distinct micropunctules (diameter about 0.02 mm). Pronotum entirely marginated and ciliate anteriorly. Anterior setiferous pore of pronotum absent.

Prothoracic hypomeron convex, with irregular wrinkles laterally; basal fold broad and deep. Prosternal intercoxal process convex anteriorly, slightly impressed posteriorly. Metasternum entirely marginated anteriorly.

Two elytra combined 1.4 times as long as wide, narrowed towards base and here not wider than pronotal base. Elytron without humeral callus, without scutellar puncture row, with ten rows of dense, moderately large punctures (diameter 0.05 mm); rows distinct up to apex. Puncture rows regular, slightly wavy here and there. Second interval 1.4 times as wide as sutural interval. Interval between rows 8 and 9 convex, other intervals flat but looking slightly convex due to deepened puncture rows. Intervals covered by numerous punctures being as large as those on pronotal disc but shallower. Elytral microreticulation and micropuncturation similar to those on pronotum. Elytral epipleuron inclined outside, visible along entire length in lateral view, densely ciliate apically. Hind wings strongly reduced, as long as metathorax.

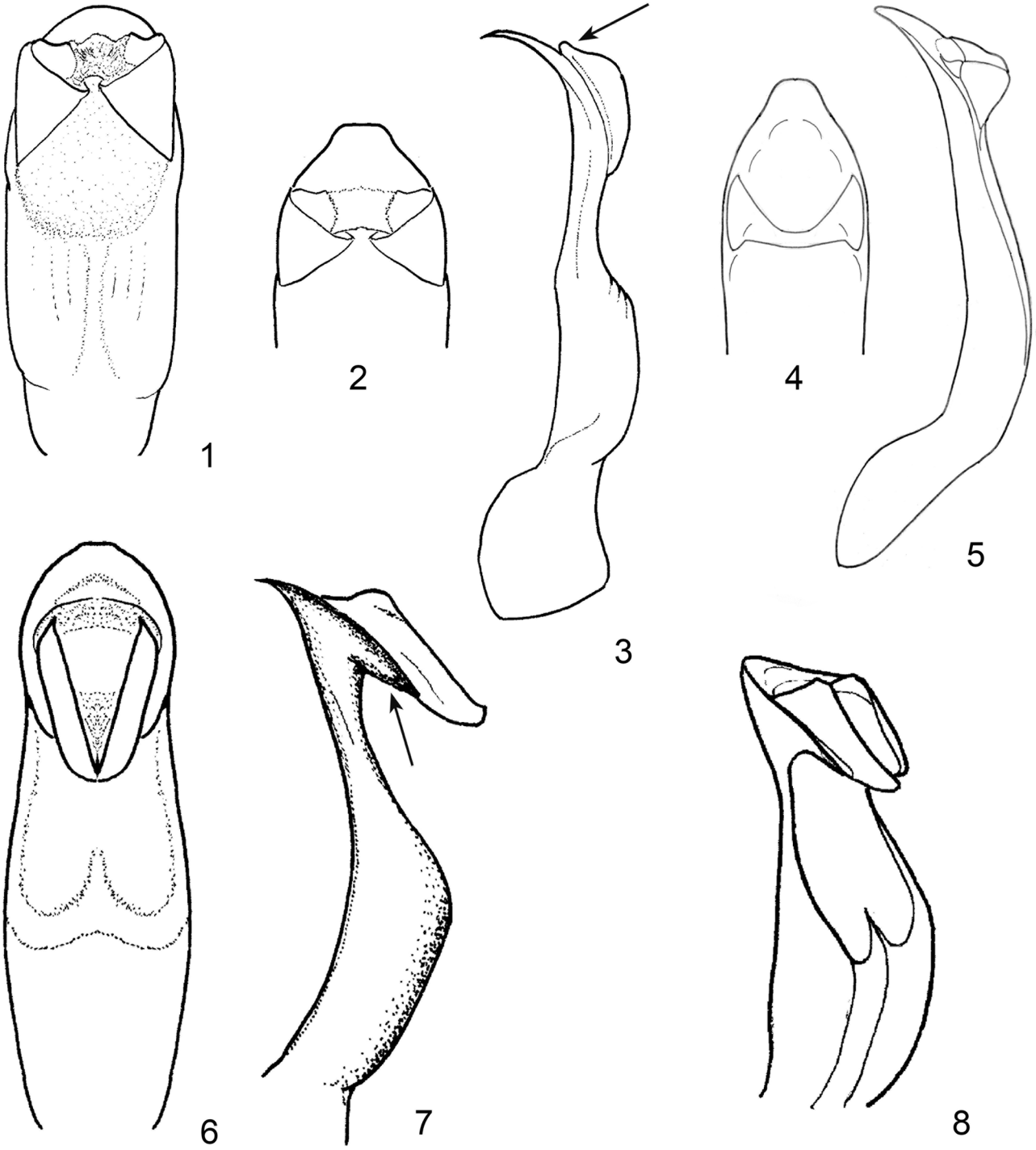
Tarsomeres 1–3 very broad (Fig. 23), with entire sole in all tarsi. First tarsomere as wide as second one and 0.9 times as wide as third one. Claw tarsomere without denticles beneath.

Pygidium with shallow but distinct median longitudinal impression along entire length. Last abdominal sternite with distinct semicircular impression in apical half (Fig. 20).

Aedeagus (Figs 1–3, 21, 22) flattened dorsoventrally, curved in lateral view; dorsal side with shallow impression before alae, laterobasal border of membranous part slightly visible in lateral view, "step" present but weak; alae in shape of equilateral triangle, slightly pressed to dorsal side of aedeagus; apex of aedeagus bent down in arc by 90°; flagellum absent.

Variability. Paratypes: 7.4 mm long, 4.0 mm wide (males), 7.5 mm long, 5.1 mm wide (female). Female (Fig. 24): head and pronotum shining, mostly violet, with lateral sides of head, pronotal lateral impressions and base blue, scutellum shining, violet, elytra sericeous, green; elytron with sutural interval flat, intervals 1, 3, 5, 7 and 9 convex, intervals 2, 4, 6 and 8 keel-shaped; tarsomeres 1–3 narrow, with entire sole in all tarsi.

Comparison. A combination of such features as slightly convex, depressed body, bluish green coloration of the dorsal side, regular puncture rows of the elytra, and mostly flat elytral intervals clearly distinguish the new species from the most members of the subgenus *Pleurosticha* except *Ch. shapkini* (Figs 4, 5, 10–16) described from the Mongolian Altai. The new species differs from *Ch. shapkini* in the following characters: (1) dorsal colour: bluish green in the new species (Figs 17, 18, 24) *vs.* olivaceous green in *Ch. shapkini* (Figs 10, 11), (2) prosternal intercoxal process convex anteriorly and slightly impressed posteriorly in the new species *vs.* impressed along the entire length in *Ch. shapkini,* (3) elytral base as wide as pronotal base in the new species (Figs 17, 24) *vs.* elytral base wider than pronotal base in *Ch. shapkini* (Fig. 10), (4) male tarsomeres 1–3 very broad in the new species (Fig. 23) *vs.* weakly broadened in *Ch. shapkini* (Fig. 13), (5) width ratio of male tarsomeres 1 and 2: the first tarsomere as wide as the second in the new species, *vs.* the first tarsomere 1.2 times as wide as the second one in *Ch. shapkini*, (6) median longitudinal impression of the pygidium developed along its entire length in the new species *vs.* developed only near the base of the pygidium in *Ch. shapkini*, (7) the last abdominal sternite of male with a semicircular impression in the new species (Fig. 20) *vs.* without impression in *Ch. shapkini* (Fig. 12), (8) the apex of the aedeagus bent down in arc: by 90° in the new species (Figs 3, 21, 22) *vs.* 30–45° in *Ch. shapkini* (Figs 5, 15),



Figs 1–8. *Chrysolina* spp. Aedeagus. **1–3**, *Chrysolina reshetnikovi* **sp. nov.** (paratype); **4–5**, *Ch. shapkini* Mikhailov et Gus'kova, 2013 (holotype); **6–8**, *Ch. borisi* **sp. nov.** (holotype). 1, 4, 6, dorsal view; 2, dorsal view of apical part; 3, lateral view (arrow indicates the direction from which an aspect illustrated in Fig. 2 is visible); 5, lateral view; 7, lateral view (arrow indicates the protrusion); 8, dorsolateral view.

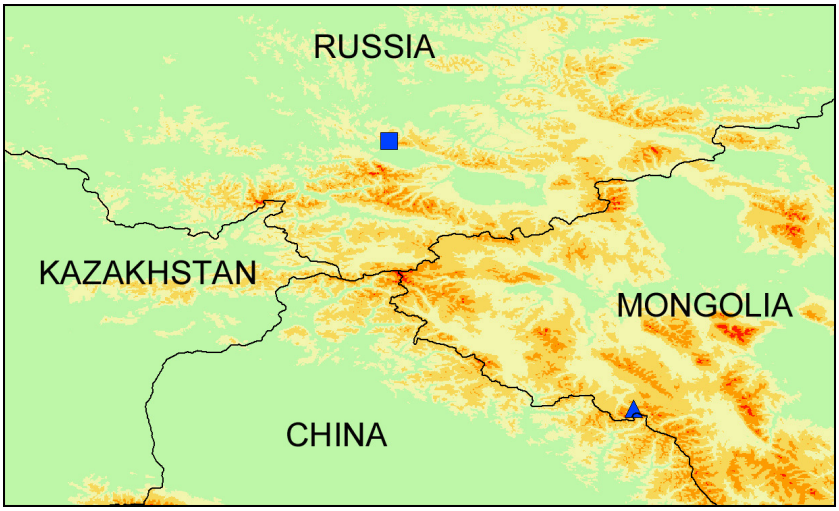


Fig. 9. Type localities of *Chrysolina* spp. on the map. Square, *Ch. reshetnikovi* **sp. nov.**; triangle, *Ch. shapkini* Mikhailov et Gus'kova, 2013.

(9) in the aedeagus, laterobasal border of membranous part slightly visible in the lateral view, "step" is present but weak in the new species (Figs 3, 22), *vs.* this border not visible in the lateral view, "step" is absent in *Ch. shapkini* (Figs 5, 15).

Etymology. The new species is named after Andrey N. Reshetnikov (A.N. Severtsov Institute of Ecology and Evolution, Moscow), a well-known Russian ecologist and expert on biological invasions, who collected the holotype during his expedition to the Altai Mountains.

Distribution. Russia, Altai: Kuray Range.

Habitat. According to the personal communication by A.N. Reshetnikov, the type locality is a rocky area with extremely sparse cereal vegetation (Electronic supplementary material; see Addenda). The holotype was found under a small flat stone.

Comments. Among the species of the subgenus *Pleurosticha*, the new species is morphologically closest to *Ch. shapkini*; both species form a natural group, which is well distinguished from other species of the subgenus by an elongate flattened body. They are also similar to each other by mostly flat elytral intervals (in males, for the new species), the shape of the aedeagus (Figs 1–5, 15, 16, 21, 22), and green coloration of the upper side of the body. These two species are known each from a single locality, 500 km from one another (Fig. 9). The type locality of *Ch. shapkini* lies in the belt of mountain steppes at an altitude of 2200 m, and the localities of the new species lie in the belt of alpine tundra at altitudes of 2100–3000 m. Such localities are well isolated from similar places by deep gorges and a mountainous forest belt, apparently serving as strong geographical barriers for such flightless species.

Chrysolina (*Pleurosticha*) *borisi* sp. nov.
(Figs 6–8, 25–30)

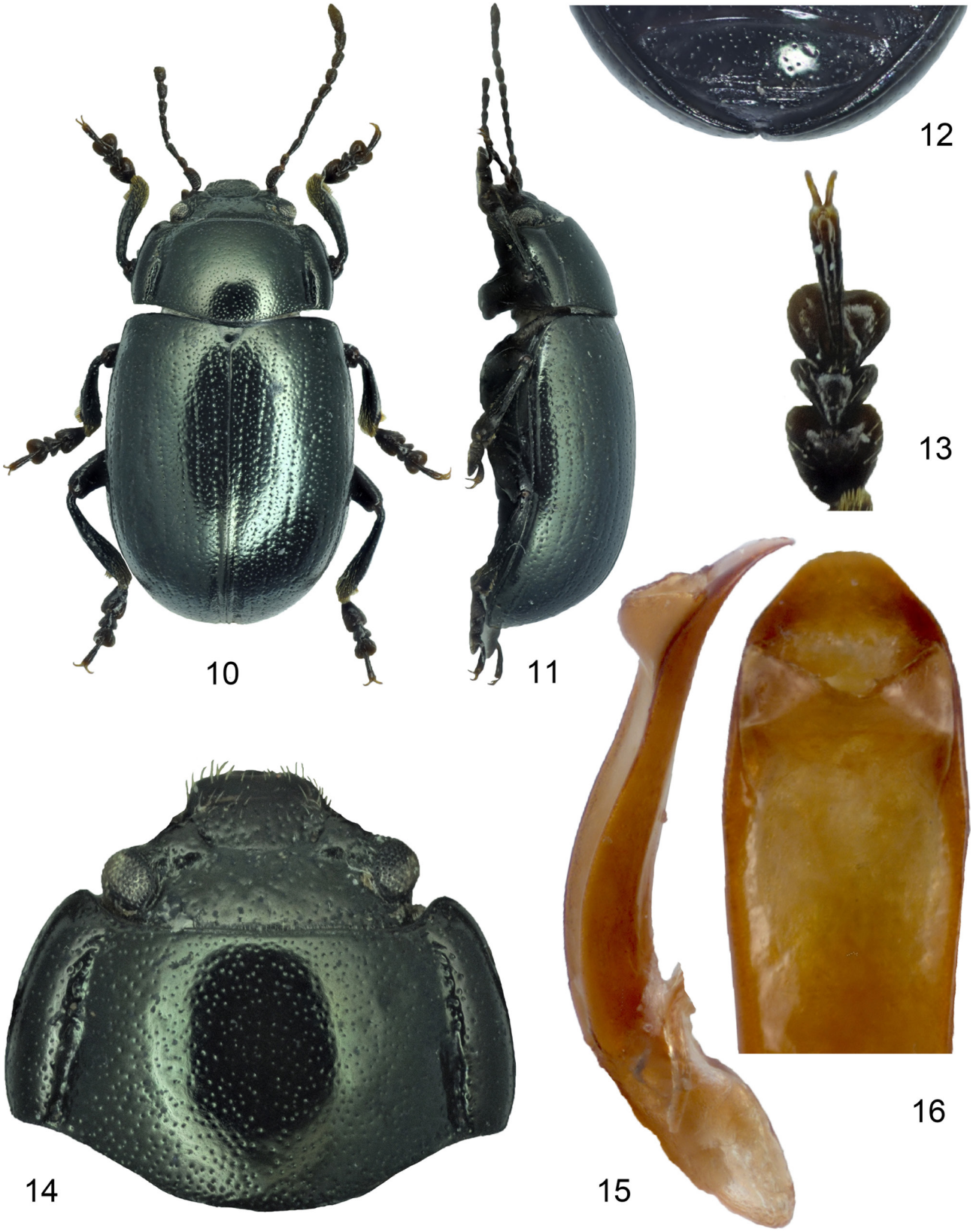
Holotype. Male, **Russia**, *Republic of Tyva*, Western Tannu-Ola Ridge, upper reaches of Kady River, mountain tundra, 2.VIII.1979, B.A. Korotyaev leg. (ZIN).

Paratype. Female, with same labels (ZIN).

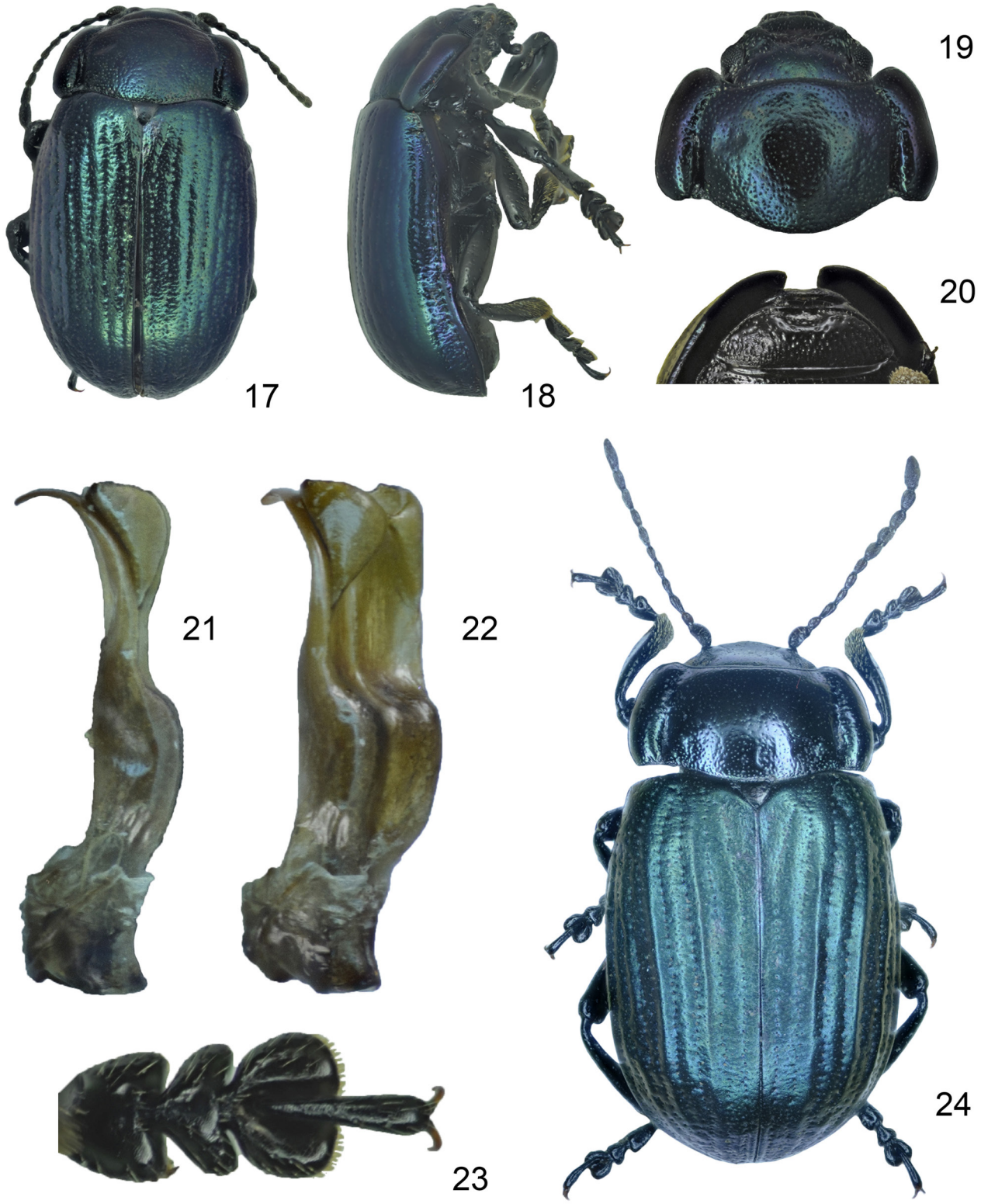
Description. *Holotype* (male). Body 6.3 mm long, 3.7 mm wide, elongate oval, 1.7 times as long as wide, convex; elytron 2.5 times as long as high. Body dorsally sericeous shining because of distinct microreticulation, black with bronze reflection (Figs 25, 26), antennae piceous with antennomeres 1 and 2 rufous ventrally, mouth parts, femora, tibiae, and underside black with bronze reflection, tarsi piceous.

Last maxillary palpomere broadly oval, obliquely truncate, 1.3 times as long as wide, 1.2 times as wide as previous palpomere and 1.5 times as long as latter. Antenna inserted 2.0 times as close to clypeus as to eye.

Pronotum (Fig. 28) 1.9 times as wide as long (length measured from anterior to posterior border along middle), with maximum width just before base, roundly narrowed anteriorly, with anterior and posterior angles more than 90°, slightly rounded. Pronotal lateral calli convex, narrow, 0.1 times as wide as pronotal width (in dorsal view), separated from disc by deep narrow furrow



Figs 10–16. *Chrysolina shapkini* Mikhailov et Gus'kova, 2013 (holotype, male). **10**, habitus, dorsal view; **11**, habitus, lateral view; **12**, last abdominal sternite; **13**, fore tarsus, dorsal view; **14**, head and pronotum, dorsal view; **15**, aedeagus, lateral view; **16**, aedeagus, dorsal view.



Figs 17–24. *Chrysolina reshetnikovi* **sp. nov.** (17–23, holotype, male; 24, paratype, female). **17**, habitus, dorsal view; **18**, habitus, lateral view; **19**, head and pronotum, dorsal view; **20**, last abdominal sternite; **21**, aedeagus, lateral view; **22**, aedeagus, dorsolateral view; **23**, fore tarsus, dorsal view; **24**, habitus, dorsal view.

Figs 25–30. *Chrysolina borisi* **sp. nov.** (holotype, male). **25**, habitus, dorsal view; **26**, habitus, lateral view; **27**, last abdominal sternite; **28**, head and pronotum, dorsal view; **29**, aedeagus, dorsolateral view; **30**, aedeagus, lateral view.

in basal half and by narrow, shallow, gently sloping impression with wrinkled punctures in anterior half. Pronotal disc and lateral calli covered by distinct microreticulation (cells rounded) and micropunctules (diameter about 0.02 mm). Pronotum entirely marginated and ciliate anteriorly. Anterior setiferous pore of pronotum absent.

Prothoracic hypomeron weakly convex, with irregular wrinkles laterally; basal fold wide and deep. Prosternal intercoxal process convex, wrinkled. Metasternum entirely marginated anteriorly.

Two elytra combined 1.3 times as long as wide; elytral base as wide as pronotal base. Elytron with obsolete humeral callus, without scutellar puncture row, with ten rows of dense, moderately large punctures (diameter 0.05 mm); rows distinct up to apex. Puncture rows regular, slightly wavy here and there. Sutural interval as wide as second interval. Intervals slightly convex, covered by numerous punctures as large as those on pronotal disc. Elytral microreticulation and micropuncturation similar to those on pronotum. Elytral epipleuron inclined outside, visible along entire length in lateral view, densely ciliate apically. Hind wings strongly reduced, as long as metathorax.

Tarsomeres 1–3 very broad, with entire sole. In fore tarsi, first tarsomere as wide as third and 1.2 times as wide as second. Claw tarsomere without denticles beneath.

Pygidium without distinct longitudinal median impression. Last abdominal sternite with high transverse tubercle in basal third and with distinct impression in apical third (Fig. 27).

Aedeagus (Figs 6–8, 29, 30) flattened dorsoventrally, curved in lateral view, constricted laterally at level of alae; dorsal side with shallow impression before alae, laterobasal border of membranous part not visible in lateral view; lateral side of aedeagus at attachment place of alae drawn towards base and forming a narrow long protrusion; alae narrow, directed basally; apex of aedeagus slightly bent ventrally; flagellum absent.

Variability. *Paratype* (female) 7.2 mm long, 4.4 mm wide. Elytral rows 6 and 7 irregular in basal half. Tarsomeres 1–3 narrow, with entire sole beneath. Last abdominal sternite evenly convex.

Comparison. A combination of such features as a convex body and its small size, black coloration of the dorsal side, femora and tibiae, regular puncture rows of the elytra, with slightly convex intervals, clearly distinguishes the new species from other members of the subgenus *Pleurosticha*. The unique feature of the new species is the shape of the lateral side of the aedeagus at the place of attachment of the alae: it is drawn towards base and forms a narrow long protrusion (Figs 7, 8, 29, 30). No other known species of the subgenus *Pleurosticha* has such a protrusion.

Etymology. The new species is named after Boris A. Korotyaev (ZIN, St Petersburg), a well-known Russian entomologist who collected the type specimens of the new species during an expedition to Tyva.

Distribution. Russia, Tyva: Western Tannu-Ola Ridge.

Habitat. According to the personal communication by B.A. Korotyaev, the type locality is a steep grassy slope at about 2500 m a.s.l., a mountain meadow steppe with a dense cover of cereal grasses and possibly sedges.

Addenda

Electronic supplementary material. Type locality of *Chrysolina reshetnikovi* **sp. nov.** (red circle indicates the collection place of the holotype). File format: JPG. Available from: https://doi.org/10.31610/zsr/2023.32.1.75

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