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A NEW SUBSPECIES OF *PTEROSTICHUS CANCELLATUS* (COLEOPTERA: CARABIDAE) FROM SAKHALIN, RUSSIA

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Summary. A new subspecies of ground beetle, *Pterostichus* (*Lenapterus*) *cancellatus lopatini* **ssp. n.**, is described from the highlands of Mount Lopatin (East Sakhalin Mountains, Central Sakhalin, Russia). The new subspecies differs from the nominative subspecies in the structure of the pronotum, the anal sternite of the abdomen, and the chaetotaxy of the elytra.

Key words: carabid beetles, *Pterostichus*, *Lenapterus*, new subspecies, Russian Far East.

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Резюме. Из высокогорий горы Лопатина (Восточно-Сахалинские горы, Центральный Сахалин, Россия) описывается новый подвид жужелиц *Pterostichus* (*Lenapterus*) *cancellatus lopatini* **ssp. n.** Новый подвид отличается от номинативного строением переднеспинки, анального стернита брюшка и хетотаксией надкрылий.

INTRODUCTION

Pterostichus (*Lenapterus*) *cancellatus* (Motschulsky, 1860) is an eastern Palaearctic species, distributed in the mountain-taiga zone from Lake Baikal in the west to northern Sakhalin in the east and from the Amur River valley in the south to the Stanovoy Highlands and Stanovoy Range in the north (Fig. 1).

Paleontological data and the taxonomic revision of the subgenus *Lenapterus* O. Berlov, 1996 (Sundukov, 2005, 2019a, 2019b) suggest that the cold periods of the Pleistocene (leading to vegetation changes and strong marine regressions connecting the Japanese islands and Sakhalin with the mainland) and the warming periods of the Mindel, Riss, Wurm, and Holocene caused differentiation within *P.* prox. *cancellatus* or *P. cancellatus*, which led to the formation of all modern high-altitude taxa of the "*cancellatus*" group in the coastal mountains of the Sea of Japan (Fig. 1).

A study of the collection of the Federal Scientific Center of the East Asia Terrestrial Biodiversity, Far East Branch of the Russian Academy of Sciences (Vladivostok) made it possible to discover a new high-mountain subspecies of *P. cancellatus*, which is described below.

MATERIAL AND METHODS

The type material was collected in 1977 by the renowned Russian ornithologist Vitaly Andreevich Nechaev on Mount Lopatin, East Sakhalin Mountains, and deposited in the Bioresource Collection of the Federal Scientific Centre of East Asia Terrestrial Biodiversity of the Far East Branch of the Russian Academy of Sciences (reg. number 2797657).

The beetles were examined under an MBS-9 stereoscope. Photographs were taken with a Olympus DP74 camera and SteReo Discovery V.12 stereomicroscope.

The measurements as follows: EW – greatest width of elytra; HW – greatest width of head; M – arithmetic mean; PA – width of pronotal apex; PB – width of pronotal base; PL(m) – length of pronotum, measured along the median line; PL(t) – greatest length of pronotum; PW – greatest width of pronotum.

Collection abbreviations: FEB – Federal Scientific Center of the East Asia Terrestrial Biodiversity, Far East Branch of the Russian Academy of Sciences, Vladivostok, Russia; KSR – State Nature Reserve "Komsomolsky", Komsomolsk-na-Amure, Russia; KTM – Khabarovsk Territorial Museum after N.I. Grodekov, Khabarovsk, Russia; MSPU – Moscow State Pedagogical University, Moscow, Russia; ZISP – Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia.

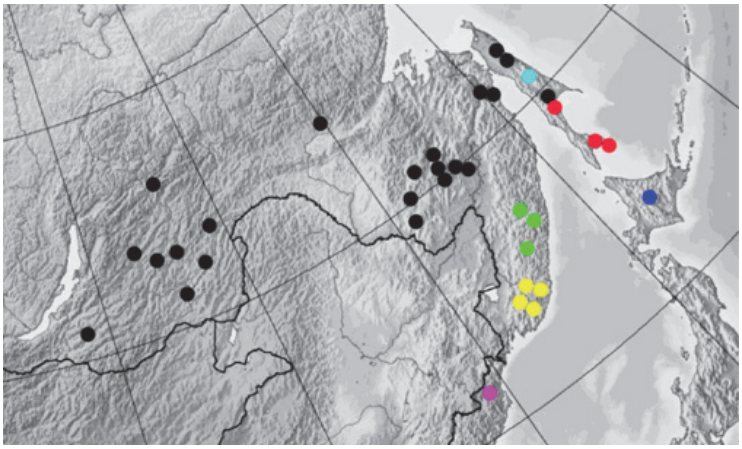


Fig. 1. Distribution of *Pterostichus* species of the "*cancellatus*" group based on the studied materials: black circles – *P. cancellatus cancellatus* (Motschulsky, 1860); light blue circle – P. *cancellatus lopatini* ssp. n.; green circles – *P. gromykoi* Sundukov, 2005; yellow circles – *P. galae* Farkač & Plutenko, 1996 (two northern ones – *P. galae galae*, two southern ones – *P. galae ghankari* Sundukov, 2005); pink circle – *P. rugosipennis* Jedlička, 1932; red circles – *P. marginatus marginatus* Matsumura, 1911; blue circle – *P. marginatus subrugosus* Straneo, 1955.

TAXONOMY

***Pterostichus* (*Lenapterus*) *cancellatus lopatini* Sundukov, ssp. n.**

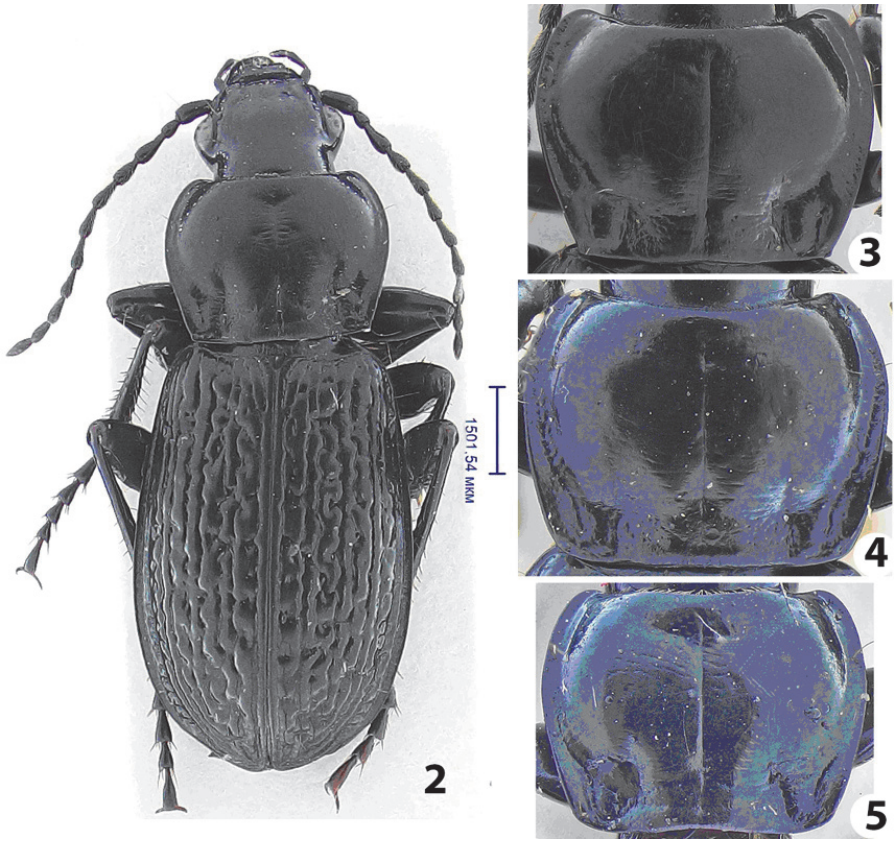
https://zoobank.org/NomenclaturalActs/16C7551D-BC35-40C3-B328-1F823AD25B94

Figs 2, 3

TYPE MATERIAL. Holotype – ♂, **Russia**: Central Sakhalin, East Sakhalin Mountains, Mount Lopatin, 50.851292 N, 143.140152 E, h=1500–1600 m, alpine, 16–18.VII 1977, leg. V.A. Nechaev (FEB). Paratypes: the same label as the holotype, 4 ♂, 5 ♀ (FEB).

COMPARATIVE MATERIAL. ***Pterostichus* (*Lenapterus*) *cancellatus cancellatus* (Motschulsky, 1860)**. **Russia**: Holotype – ♀: "176", "176-192 Dzaï, 2 august 55", "*Schrencki* Mor. Typ. A. Morawitz det.", "*cancellatus* Motsch. Tschitscherin det." (ZISP). *Buryatia*: 1 ♂, 1 ♀, Vitim Plateau, forest, 12.IX 1970, leg. Alekseev (ZISP); 1 ♀, Vitim Plateau, upper reaches of the Bolshoy Amalat River, 18.VI 1967, leg. O.N. Kabakov (MSPU); 5 ♂, 2 ♀, Kiran, 1907. Tschitscherine collection (ZISP); 1 ♀, Nuhu-Daban, 11.VI 1915, leg. S. Rodionoff (ZISP). *Zabaykalsky Krai*: 1 ♂, 1 ♀, Kodar Ridge, vicinity of Leprindo, 1500–2300 m, 22–23.VII 1997, leg. A. Petrov (MSPU); 1 ♂, 1 ♀, Maly Okonon River, Yablonovy Ridge, 30.VI 1914, leg. Dorogostaysky (ZISP); 1 ♂, 2 ♀, Yablonovy Ridge, VI 1915, leg. Koshantschikow (ZISP). *Amurskaya Oblast*: 2 ♂, southwestern part of the Stanovoy Range, 12 km south of Nagorny, 1100 m, 20.VII 1995, leg. D. Lomakin & A. Dudko (FEB); 2 ♀, southern part of the Stanovoy Range, 1000–1200 m, 24-25.VII 1961, leg. O.N. Kabakov (ZISP, FEB); 2 ♂, 1 ♀, Listvyanaya River, 14-1-Khingana, 21–22.VIII 1909, leg. Radkevich (ZISP); 1 ♂, 1 ♀, ibid, 1–2.IX 1909, leg. Radkevich (ZISP); 1 ♂, ibid, VIII 1910, leg. Radkevich (ZISP); 1 ♂, 1 ♀, ibid, VI 1911, leg. Gadkeva (ZISP). *Jewish Autonomous Region*: 1 ♂, Radde, 10.VI 1900, leg. G. Suvorov (ZISP). *Khabarovsky Krai*: 1♀, mouth of Enda River (Tyrma River basin), larch forest on the slope, 28–29.VIII 2000, leg. E. Ignatenko (FEB); 3 ♂, Badzhal Ridge, Daria River, 7.IX 1975, leg. O. Kabakov (ZISP); 1 ♂, 1 ♀, Badzhal Ridge, Gerbi River Valley, 2–4.VII 1997, leg. Yu. Sundukov (FEB); 2 ♂, 2 ♀, Badzhal Ridge, Omot-Makit River, 2 km below Lake Omot, floodplain dark coniferous forest, 1100 m, 15–21.07.1997, leg. Yu. Sundukov (FEB); 9 ♂, 7 ♀, Badzhal Ridge, Lake Omot, 1150–1170 m, dark coniferous forest, 8–13.VII 1997, leg. Yu. Sundukov (FEB); 4 ♂, 6 ♀, ibid, 9–15.VII 1997, leg. Yu. Sundukov (FEB); 10 ♂, 8 ♀, ibid, 13–20.VII 1997, leg. Yu. Sundukov (FEB); 1 ♀, Badzhal Ridge, upper reaches of Omot-Makit River, 1200–1400 m, 9.VII 1997, leg. Yu. Sundukov (FEB); 1 ♂, Badzhal Ridge, source of Omot-Makit River, 1800–2100 m, mountain tundra, 7–19.VII 1997, leg. Yu. Sundukov (FEB); 1 ♂, western part of Badzhal Ridge, 30 km south of Mogdy Station, 500 m, larch-birch forest, 10–20.VII 1997, leg. A. Brinev (MSPU); 4 ♂, 1 ♀, Badzhal Ridge, Lake Omot, 24–26.VI 2001, leg. E. Novomodnyi (KTM); 1 ♂, Myao-Chan Ridge, spruce forest near Chalba Mt., 25.VI–2.VII.2025, leg. O. Kuberskaya (KSR); 1 ♂, De-Castri, 1885, leg. Gvinevsky (ZISP). *Sakhalin*: 3 ♀, near Dagi, 26.VI 2011, leg. V. Zykov (FEB); 1 ♂, 1 ♀, near Nabil, 16.VI 2011, leg. V. Zykov (FEB); 1 ♀, Tikhmenevsk (= Poronaysk), 23–24.VII 1901, leg. P. Schmidt (ZISP). ***P.* (*L.*) *marginatus marginatus* Matsumura, 1911**. **Russia**: *Sakhalin*: 1 ♂, Chekhov Mt., dwarf cedar, 4.VII 1967, leg. L. Molodova (ZISP); 1 ♂, 2 ♀, ibid, dwarf cedar, 18.VI 1968, leg. L. Molodova (ZISP); 2 ♂, 1 ♀, ibid, dwarf cedar, 1.VII 1968, leg. L. Molodova (ZISP); 2 ♂, 1 ♀, ibid, 500 m, fir forest, 21.VII 1968, leg. L. Molodova (ZISP); 1 ♂, ibid, 6.VIII 1968, leg. L. Molodova (ZISP); 2 ♂, ibid, dwarf cedar, 15.VIII 1968, leg. L. Molodova (ZISP); 4 ♂, 3 ♀, ibid, dwarf cedar, VI 1970, leg. L. Molodova (ZISP); 15 ♂, 11 ♀, ibid, VII 1970, leg. L. Molodova (ZISP); 8 ♂, 8 ♀, ibid, dwarf cedar, VIII 1970, leg. L. Molodova (ZISP); 1 ♀, ibid, blueberry, 18.V 1971, leg. L. Molodova (ZISP); 2 ♂, 1 ♀, ibid, dwarf cedar, 18.VIII 1971, leg. L. Molodova (ZISP); 1 ♂, ibid, 300 m, 1.VII 1988, leg. E. Nesterov (MSPU); 2 ♂, ibid, 19.VII 1990, leg. E. Tarasov (MSPU); 3 ♂, 3 ♀, ibid, 700–1000 m, 18.VI 1998, leg. V. Zykov (FEB); 2 ♂, 1 ♀, ibid, 700–1000 m, 5.VII 1999, leg. V. Zykov (FEB); 2 ♂, Mereya River, Ca 3 km from mouth, 28.VII 2001, leg. Yu. Marusik (ZISP); 1 ♂, 2 ♀, Korsakovsky district, 14 km SO Novikovo, 8–9.VI 1990, leg. K. Makarov (MSPU); 1 ♂, 1 ♀, Korsakovsky district, Utyosnoye, 6–8.VII 1992, leg. A. Basarukin (FEB). ***P.* (*L.*) *marginatus subrugosus* Straneo, 1955**. **Japan**: 1 ♂, (Koizumidake) Mts. Daisetsuzan, Hokkaido, Japan, 14.VII 1989, leg. N. Yasuda (FEB); 1 ♀, Mt. Daisetsu, Koijumidake, 16.VIII 1926, leg. Y. Kono, (ZISP).

A detailed description of *P. cancellatus* is given in the revision of the subgenus *Lenapterus* (Sundukov, 2005: 490–492). Detailed morphological characteristics of all valid species and subspecies of the subgenus can be found in the works of Sundukov (2005) and Sasakawa *et al.* (2020). Undescribed forms from northern Sikhote-Alin are described in detail in the publications of Budilov (2018, 2019) and Sundukov (2005). Therefore, in describing *P. cancellatus lopatini* **ssp. n.**, we limit ourselves to a comparative diagnosis.



Figs 2–5. *Pterostichus* (*Lenapterus*) spp., details: 2 – *P. cancellatus lopatini* ssp. n., holotype, male, dorsal view; 3 – pronotum of *P. cancellatus lopatini* ssp. n., paratype, female; 4– pronotum of *P. cancellatus cancellatus* (Motschulsky, 1860), Badzhal Ridge, Khabarovsky Krai; 5 – pronotum of *P. marginatus marginatus* Matsumura, 1911, Chekhov Mt., South Sakhalin.

COMPARATIVE DIAGNOSIS. Two species of the subgenus *Lenapterus* inhabit Sakhalin: *P. cancellatus* and *P. marginatus* Matsumura, 1911. Based on size, coloration, structure of the head, pronotum, elytra and genitals, *P. cancellatus lopatini* **ssp. n.** is undoubtedly *P. cancellatus* (Fig. 2), but differs from the nominative subspecies in the following characters: pronotum is narrower (PW/PL(t) = 1.18–1.27 (M 1.23); EW/PW = 1.26–1.40 (M 1.31) *vs*. PW/PL(t) = 1.24–1.34 (M 1.28); EW/PW = 1.21–1.30 (M 1.24) in *P. cancellatus cancellatus*);

posterior angles of pronotum are usually pointed at apex (Fig. 3), in the nominative subspecies they are broadly rounded (Fig. 4); lateral flattened edge of pronotum is almost not punctate (in the nominative subspecies punctation is usually present along the entire flattened edge); 3rd elytral interval with 3–5 (usually 4) dorsal pores (nominotypical subspecies with 5–7 (usually 5) pores); anal sternite of female abdomen has 4 (in one female 5) setae at apex, this area is moderately rugose (in *P. cancellatus cancellatus* with 5–9 setae, this area is strongly rugose).

Inhabiting the mountain taiga forests and thickets of dwarf pine of southern Sakhalin, *P. marginatus marginatus* differs from *P. cancellatus lopatini* **ssp. n.**: larger head (PW/HW = 1.32–1.37 (M 1.35) *vs*. PW/HW = 1.39–1.48 (M 1.43) in *P. cancellatus lopatini* **ssp. n.**); narrower pronotum (PW/PL(t) = 1.25–1.30 (M 1.27); EW/PW = 1.21–1.28 (M 1.25)); narrow pronotum base (PW/PA = 1.01–1.13 (M 1.06) vs. PW/PA = 1.07–1.21 (M 1.15) in the new subspecies); distinct, but always rounded at apex, posterior angles of pronotum (Fig. 5); the location of pronotal anterior seta, which is removed from lateral edge by 1.0–1.5 of its diameter (in *P. cancellatus lopatini* **ssp. n.** it is removed by approximately two seta diameters); the presence of punctation only in basal foveae of the pronotum; almost smooth apex of anal sternite of male abdomen (in *P. cancellatus* it is strongly or moderately rugulose).

DISTRIBUTION AND HABITAT. The new subspecies is known only from its type locality, Mount Lopatin in central Sakhalin. According to geographic labels, the beetles inhabit the alpine zone, likely in mountain tundra, dwarf pine thickets, or rocky habitats.

ETYMOLOGY. The new subspecies is named in honor of the famous Russian geologist and geographer Innokenty Alexandrovich Lopatin, after whom Mount Lopatin is named.

NOTE. It is worth noting that another endemic subspecies of the genus *Pterostichus* Bonelli, 1810 is known from the highlands of Mount Lopatin – *P.* (*Cryobius*) *ventricosus nechaevi* Lafer et Kuznetsov, 1996 (Lafer & Kuznetsov, 1996).

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