

A Review of Species of the Subgenus *Lenapterus* (Coleoptera, Carabidae, *Pterostichus*), with Description of a New Species and a New Subspecies from Sikhote-Alin Mountains

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Abstract—Taxonomic review of the subgenus *Lenapterus* O. Berlov includes descriptions of new taxa from Sikhote-Alin Mountains: *P. (L.) gromyko* sp. n. (type locality: Glukhomanka Mt., Dalnii Mt. Range, Sikhote-Alin) and *P. (L.) galae ghankari* ssp. n. (type locality: Lysaya Mt., Partizanskii Mt. Range, southern Sikhote-Alin). A key to species of *Lenapterus* is given. The following new synonymies are established: *Lenapterus* O. Berlov, 1996 = *Galapterus* O. Berlov et Plutenko, 1997, syn. n., and *P. agonus* Horn, 1880 = *P. agonus averenskii* O. Berlov et E. Berlov, 1997, syn. n. Lectotype of *P. saxicola* Tschitschérine, 1899 and paralectotypes of *P. costatus* Ménétrié, 1851 and *P. vermiculosus* Ménétrié, 1851 are designated. The phylogeny of the subgenus *Lenapterus* is hypothesized.

The natural limits of the subgenus *Lenapterus* O. Berlov were determined very recently. Species, included in this subgenus, were described in different subgenera of *Pterostichus* Bonelli, 1810: in *Lypero-pherus* Motschulsky, 1844; *Myosodus* Fischer von Waldheim, 1823; *Platysma* Bonelli, 1810; *Petrophilus* Chaudoir, 1838; *Steropus* Dejean, 1821; *Feronia* Latreille, 1817, and *Paralioae* Ishida, 1958. Subsequently, most of the species were united in the subgenus *Lypero-pherus* (see Csiki, 1930; Jedlička, 1962; Straneo, 1965; Lindroth, 1966; Budarin, 1976; Lafer, 1979; Kirschenhofer, 1985; Kwon and Lee, 1986; Sciaky, 1996; Park and Paik, 2001); some species were included in the subgenera *Petrophilus* (Kryzhanovskij, 1965), *Euryperis* Motschulsky, 1850 (see Kryzhanovskij, 1983), *Metallophilus* Chaudoir, 1838 (Lorenz, 1998), and *Nialoe* Tanaka, 1958 (Lorenz, 1998), or listed without subgeneric attribution (Lafer, 1977). Shilenkov (in Kryzhanovskij *et al.*, 1995, as *Steroperis*) was the first who united all Russian species of this subgenus as currently treated, but the name *Steroperis* was published as nomen nudum and, hence, is invalid. Berlov (1996) described a new subgenus *Lenapterus* for these species and included in it 9 species from the northern Holarctic. Modern authors follow his concept of this subgenus (Bousquet, 1999; Catalogue of Palaearctic Coleoptera, 2003).

The present paper was prepared in relation to the discovery of a new species and a new subspecies of *Lenapterus* in Sikhote-Alin and clarification of the status of some taxa.

The following abbreviations are used for the description of morphological characters and proportions: (HL) length of the head from the anterior margin of the clypeus to posterior margin of the temple; (HW) width of the head with eyes; (PA) width of the pronotum at anterior margin; (PW) maximum width of the pronotum; (PB) width of the pronotum at base; [PL(t)] maximum length of the pronotum; [PL(m)] length of the pronotum along midline; (EW) maximum width of the elytra; (EL) length of elytra from humeri to the apex; [L(s)] = HL + PL(t) + EL; (L) total body length (from apex of mandibles to apex of elytra); (M) mean value. All values are given in mm.

The following acronyms are used for designation of the museums and private collections: (ZIN) Zoological Institute, Russian Academy of Sciences, St. Petersburg; (MSPU) Moscow State Pedagogical University; (NMP) Czech National Museum, Prague; (BSI) Biological and Soil Institute, Far Eastern Division, Russian Academy of Sciences, Vladivostok; (IATE) Institute of Animal Taxonomy and Ecology, Novosibirsk; (cSUND) collection of Yu. Sundukov, Lazo; (cKOCH) collection of D. Kochetkov, Lazo.

Subgenus **LENAPTERUS** O. Berlov

Lenapterus O. Berlov, 1996 : 11–12, fig. 7 (type species *Pterostichus vermiculosus* Ménétrié, 1851).

= *Steroperis* Shilenkov, 1995 : 105 [nomen nudum] (type species *Lypero-pherus cancellatus* Motschulsky, 1859a).

= *Galapterus* O. Berlov et Plutenko, 1997 : 47, 50, fig. 1 (type species *Pterostichus galae* Farkač et Plutenko, 1996), syn. n.

Diagnosis. Metatrochanter with 1 setiferous pore. Hind coxa with 2 setiferous pores. Hind femur with 2 setae along ventral margin. Claw-segment without setae on ventral side. Metepisterna short, not longer than wide. Male anal sternite with secondary sex characters. Posterior angles of pronotum evident. Pronotal disc smooth, impunctate. Sculpture of elytra irregular. Elytral striae impunctate. Third interval with 2–7 discal pores. Humeri without denticle. Scutellar stria present. Aedeagus asymmetrical, with bent apex of lamella.

Description. Beetles of medium or rather large size, body length 9–18 mm.

Coloration black. Elytra black or with weak bronze or violet reflection. Apices of palpi and tarsal claws brown. Occasionally, femora or tarsi reddish brown or dark brown.

Microsculpture. Head lustrous, with weak isodiametric or transverse microsculpture, consisting of very small meshes. Pronotum lustrous, with weak transverse microsculpture, consisting of very small meshes. Elytra lustrous, or, in some species, matte, with distinct (in males, occasionally weak) isodiametric microsculpture, consisting of very small meshes.

Head. Medium-sized, weakly or moderately convex. Eyes rather large, strongly convex or hemispherical. Two supraorbital pores: anterior pore situated before middle of eye, posterior pore, at its posterior margin. Temples short, their length approximately half eye diameter. Frontal furrows narrow, straight, deep, running in parallel or slightly converging anteriorly; their posterior margin reaching anterior supraorbital pore. Frontoclypeal suture deep. Mandibles moderately long or rather short, with apices pointed and bent inwards. Apical segments of labial palpi fusiform in both sexes. Antennae rather short, projecting beyond base of elytra by 0.17–0.20 of their length (only in *P. galae* longer, projecting by 0.33 of length). Scape with one large seta, pedicel with one seta on ventral side, 3rd segment with corolla on apical part. Pubescence on antennae beginning from 4th segment. Dorsal side smooth, impunctate.

Pronotum. Rather large, its shape varying between species from weakly cordate to trapezoid. Anterior margin weakly and more or less uniformly concave.

Anterior angles weakly or moderately projecting, their apices rounded. Base straight (in *P. galae*, very weakly concave). Median line distinct, fine, usually reaching or nearly reaching posterior margin, not reaching anterior margin; disc along this line depressed or not. Anterior transverse depression weak, or more or less distinct. Posterior transverse depression usually indistinct, less frequently present in the form of fine transverse line. Posterior angles always distinct but to varying degree. Two basal foveae present on each side, separated by tubercle or nearly fused. Two lateral setae present: before maximum width and in posterior corners. Base between basal foveae convex, smooth or weakly longitudinally rugose. Disc impunctate.

Elytra. Strongly, moderately, or weakly convex, narrowed toward humeri. Humeral angle distinct, humeri without denticle. Basal margination complete, weakly bent. Scutellum smooth, impunctate. Sides straight or nearly straight in anterior part, rounded in middle and in posterior part; elytra widest at 0.66 of length from base. Striae impunctate. Third interval with 2–7 (usually with 3–5) discal pores. Sculpture usually irregular; striae sinuate, intervals with more or less sharp constrictions or split to rows of tubercles. Scutellar stria present, situated on 1st interval (in *P. costatus* Ménériés, 1851, stria occasionally absent or situated on 2nd interval). Subapical emarginations present, usually weak, small, or obsolete. Series umbilicata consisting of 13–21 setae, usually forming no groups. All species apterous.

Legs. Claw-segment without ventral setae. Tarsi and tibiae without dorsal furrows. Middle and hind coxae with 2 setae on posterior margin. Hind trochanter rounded, with 1 seta.

Underside. Tooth of mentum rather large, 0.33–0.5 times as long as lateral lobes; its apex bifurcate, with 2 basal setae. Submentum with 2 setae on each side, lateral setae short. Suture between submentum and mentum distinct. Ligula with 2 apical setae. Metepisternum short, as wide as, or slightly wider than long. Abdominal sternites III–V with 2 setae (in *P. galae*, frequently 1–4 additional setae present). Anal sternite in male usually with 2 setae and bearing tubercles, folds, or rugose areas. In female, number of setae on anal sternite varying between species from 2 to 9. Underside smooth, impunctate.

Aedeagus. Penis asymmetrical (Fig. 1, 6), with strongly bent apex of lamella. Endophallus without armament, strongly bent downwards; microtrichiate areas weakly pigmented (Fig. 2, 7).

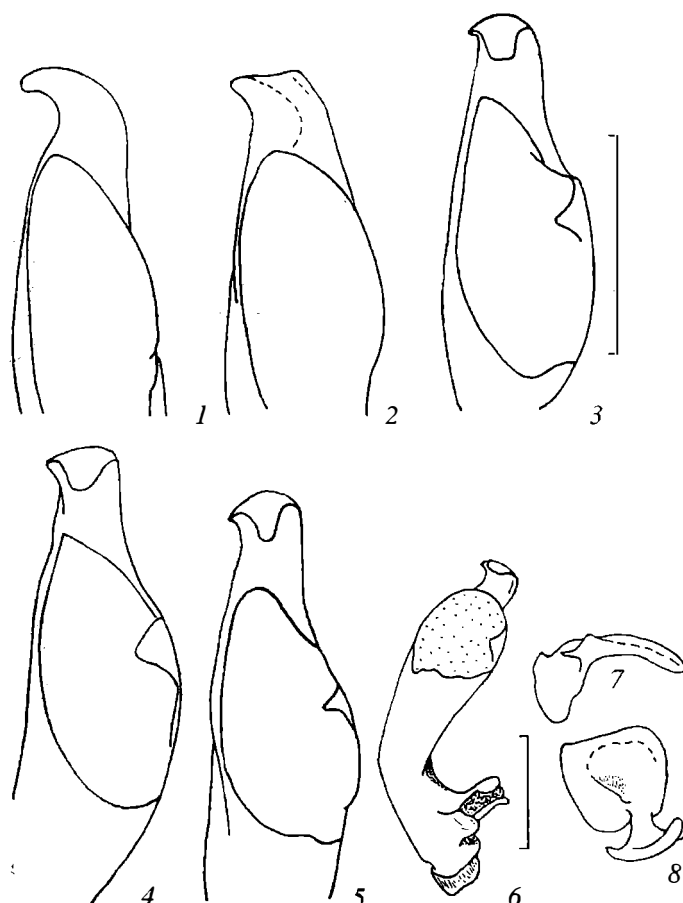


Fig. 1. *Pterostichus (Lenapterus)* spp., apex of penis in dorsal view: (1) *P. (L.) costatus* (Mén., 1851), NW Chukchi Peninsula; (2) *P. (L.) saxicola* (Tschitsch., 1899), Lake Omot, Badzhalskii Range; (3) *P. (L.) agonus* Horn, 1880, Kular, N Yakutia; (4) *P. (L.) galae ghankari* ssp. n., holotype; (5) *P. (L.) vermiculosus* (Mén., 1851), Chara River, Kodar Range; (6–8) general view of aedeagus of *P. (L.) gromykoii* sp. n., holotype [(6) penis; (7) left paramere; (8) right paramere]. Hereinafter, scale 1 mm.

Species included. I include in the subgenus *Lenapterus* 11 species from the northern Holarctic Region: 7 Eastern Asian species (*P. cancellatus* Motschulsky, 1860; *P. galae* Farkač et Plutenko, 1996; *P. gromykoii* sp. n.; *P. rugosipennis* Jedlička, 1932; *P. saxicola* Tschitschérine, 1899; *P. subrugosus* Straneo, 1955, and *P. wellschmiedi* Kirschenhofer, 1985), 1 North American (*P. punctatissimus* Randall, 1838), and 3 northern Holarctic species (*P. agonus* Horn, 1880; *P. costatus* Ménériés, 1851, and *P. vermiculosus* Ménériés, 1851).

Taxonomic notes. I treat *Galapterus* as a junior synonym of *Lenapterus*. In the chaetotaxy, structure of the penis, shape of the body, and other morphological characters, *P. galae* is very closely related to species of *Lenapterus*, especially to *P. rugosipennis* and *P. gromykoii* sp. n. In my opinion, *P. galae* is phyloge-

netically closer to most of *Lenapterus*, than *P. costatus* or *P. saxicola*. Such morphological characters, as the shape of the pronotum and flattened body, reveal only a greater degree of specialization of *P. galae*, living in highlands among stones. Lorenz (1998 : 262) placed *P. galae* in the subgenus *Nialoe* Tanaka, 1958, treating *Galapterus* and *Paralianoe* Ishida, 1958 (where *P. galae* was originally described) as junior synonyms of *Nialoe*. This placement of the species is erroneous, because *Nialoe* and *Lenapterus* belong to different phyletic lineages and represent different groups of subgenera.

***Pterostichus (Lenapterus) costatus* (Ménériés)**

Lyperopherus costatus Ménériés, 1851 : 49. Type locality: Taimyr River, 73°15'N, Taimyr Peninsula, northern Siberia, Russia.

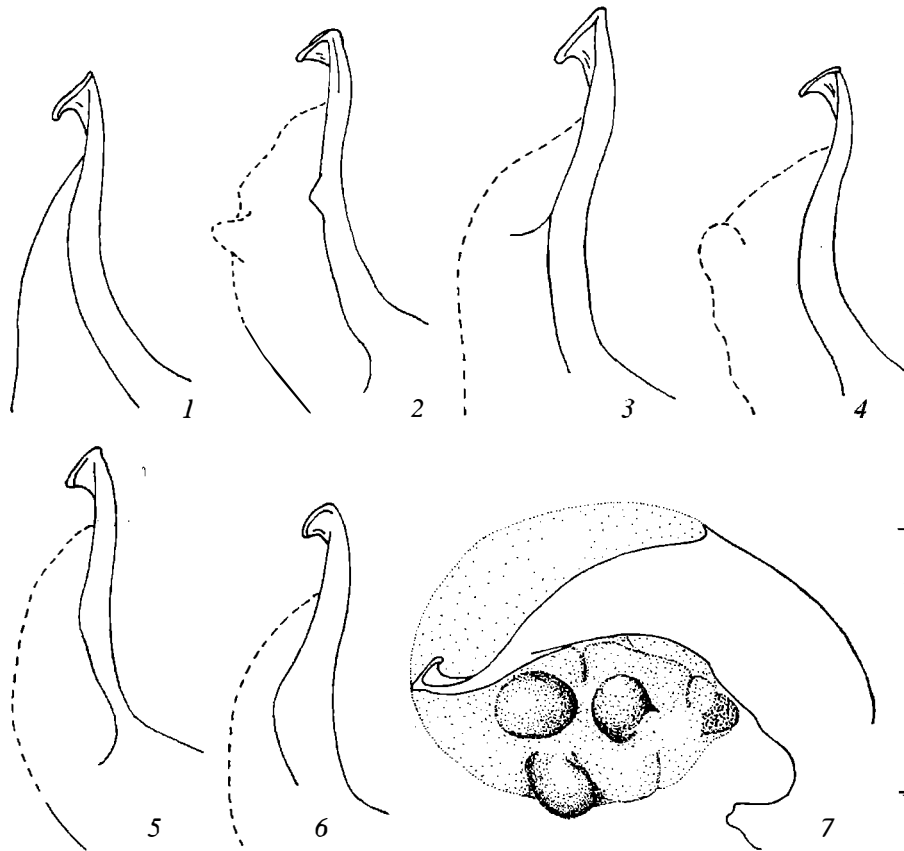


Fig. 2. *Pterostichus* (*Lenapterus*) spp., apex of penis in lateral (right) view: (1) *P. (L.) cancellatus* (Motsch., 1860), Omot-Makit River, Badzhalskii Range; (2) *P. (L.) wellschmiedi* Kirschenhofer, 1985, Chekhov Mt., southern Sakhalin; (3) *P. (L.) punctatissimus* (Rand., 1838), Canada; (4) *P. (L.) gromyko* sp. n., holotype; (5) *P. (L.)* sp., Komandnaya Mt., Bolshoi Yan Range, northern Sikhote-Alin; (6) *P. (L.) rugosipennis* Jedl., 1932, type from "Ompo, Korea", North Korea; (7) endophallus of *P. (L.) cancellatus* Motsch., 1860, Omot-Makit River, Badzhalskii Range.

= *Myosodus femoratus* Motschulsky, 1845 : 22 [junior homonym of *Pterostichus femoratus* Dejean, 1828 : 345]. Type locality: Sitka, Alexander Archipelago, southern Alaska, USA; a syntype labeled "Am. b. occ."

= *Platysma cruralis* Tschitschérine, 1902 : 105 (replacement name for *Myosodus femoratus* Motschulsky, 1845).

Material. Paralectotype (designated here). ♂, "Chauta v.," "*costatus* Mén. Type Ménétriés det.," [red square], [red rectangle] (ZIN); 1 ♀, "Gydanskii Peninsula, NO shore of Lake Khassein-To, 24.VI.1927, Naumov" (ZIN); 1 ♀, "Gydanskii Peninsula, NW shore of Lake Khassein-To, 24.VI.1927, Naumov" (ZIN); 1 ♀, "Gydanskii Peninsula, Yuribei River mouth, 30.VII.1927, Naumov" (ZIN); 1 ♀, "Pyasina River, shrub tundra, 3.07.1960, Panin" (ZIN); 1 ♂, "South of Yamal Peninsula, Priuralskii District, environs of Shchyuch'e trading station, 21.VII.1980,

T.R. Andreeva" (ZIN); 1 ♂, 2 ♀, "N Yamal, lower Sabetayakha River, 71°18'N, 71°58'E, 1-20.VII.1993, Yu. Shevnin" (MSPU); 1 ♂, "Gulf of Ob Coast, 5-7.VIII.1897, Kalachev" (ZIN); 1 ♂, "Krasnoyarsk Territory, southern Taimyr, Nizhnyaya Agapa River sources, Lake Ladannakh, *Drias* association, 71°03'42"N, 87°22'36"E, 5.VII.1999, D. Osipov" (MSPU); 1 ♀, "Taimyr, Agapa River, polygonal sedge and moss dominated tussock tundra, 13.VIII.1960, Chernov" (MSPU); 1 ♂, "Taimyr, Tareya, polygonal tundra, 14.VII.1971, Yu. Chernov" (ZIN); 1 ♀, "Taimyr, Tareya, marsh, 9.VIII.1967" (MSPU); 1 ♂, 1 ♀, "N of Krasnoyarsk Territory, Taimyr Peninsula, Khatanga Vill., 22.VII.1987, Yu. Karbainov" (cSUND); 1 ♂, 2 ♀, "Yenisei, Shmidt 1866" (ZIN); 1 ♀, "N of Yenisei Province, beginning of Gyda-yam Bay, 20.VII.1927, Naumov" (ZIN); 1 ♂, "Yakutia, 68°40'N, near Cherskii Vill., meadow-steppe slope, 10 km upstream of Panteleikha River mouth, 29.VI-18.VII.1999, D. Berman" (ZIN); 10 ♂, 5 ♀, "Yakutia,

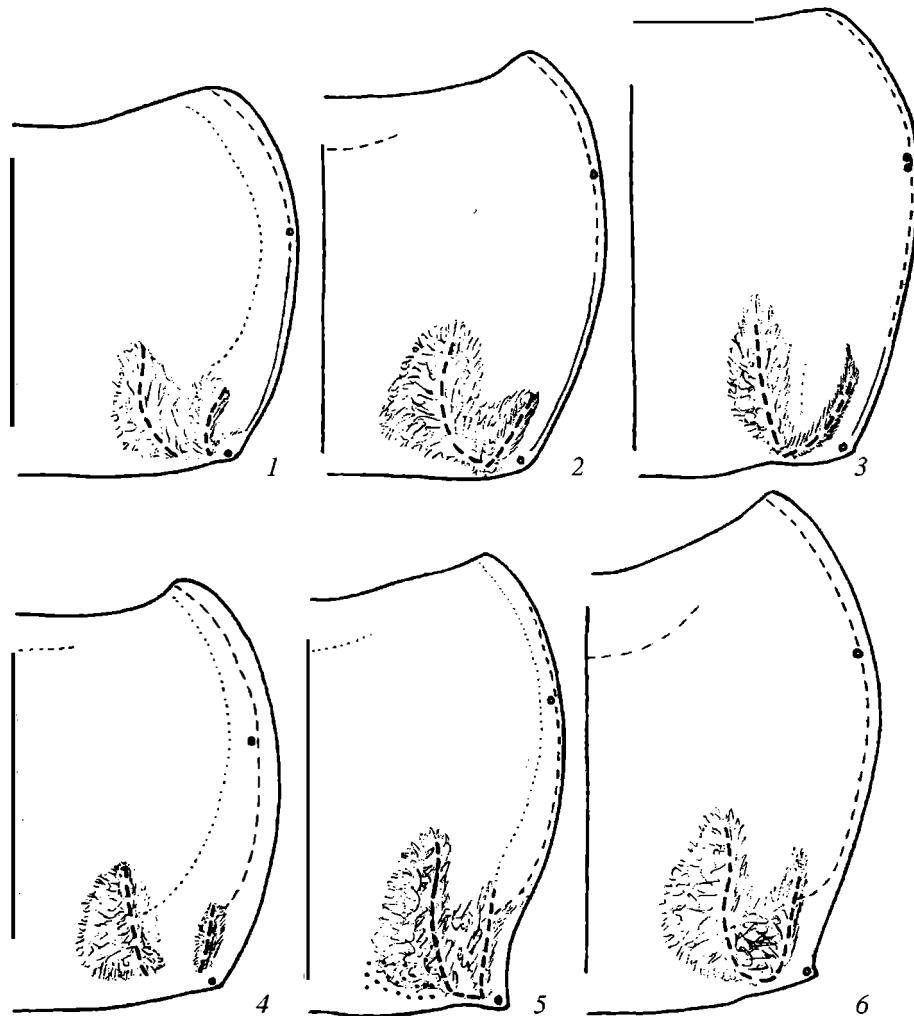


Fig. 3. *Pterostichus (Lenapterus)* spp., right half of pronotum: (1) *P. (L.) costatus* (Mén., 1851), paralectotype from "Chauta v."; (2) *P. (L.) costatus* (Mén., 1851), Ipun' River, Gulf of Chaun, Chukchi Peninsula; (3) *P. (L.) saxicola* (Tschitsch., 1899), lectotype from "Siberia"; (4) *P. (L.) agonus* Horn, 1880, Kular, N Yakutia; (5) *P. (L.) galae ghankari* ssp. n., holotype; (6) *P. (L.) gromykoii* sp. n., holotype.

Lena River Delta, Samojlova [= Samoilovskii] Island, 1–2.IX.2002, S. Kuzmina" (ZIN); 1 ♀, "lower Lena River, Sakhtani River, 45 versts [versta = 1.067 km—Ed.] N of Bulun, 11–12.VI.1908, Pfitzenmeier" (ZIN); 2 ♂, 1 ♀, "Tiksi Harbor, Lena River Delta, in shelters, 29.VII.1972, Vereshchagin" (ZIN); 1 ♂, 2 ♀, "tundra between Ust-Yansk and Svyatoi Nos, 9–24.VI.1893, Tol'" (ZIN); 3 ♂, 2 ♀, "Magadan Province, Shmidt District, Mys Shmidta Vill., 2–4.VIII.1985, V. Zykov" (cSUND); 1 ♂, 1 ♀, "NE Siberia, Indigirka River Delta, Russkaya Ust'ichnaya Anabranche, sedge and moss shrub tundra, 14–15.VII.1994, A. Babenko" (MSPU); 1 ♀, "Yana River Delta, Shirokoston Peninsula, Lake Ledyanoe, 72°25'N, 141°00'E, 5–6.VIII.1994, A. Babenko" (MSPU); 1 ♂, 1 ♀, "Chukchi Na-

tional Territory, extreme NW, Medvezhka River, estuary, under logs, 15.VIII.1972, V. Shilov" (ZIN); 1 ♀, "Anadyr firth, 18.VI.1904, N. Sokolnikov" (ZIN); 2 ♀, "Anadyr, [18]90, Gr.-Gr. [Grum-Grshimailo]," "1907 c. Tschitscherin" (ZIN); 1 ♂, "Chukchi Peninsula, Red-Kuchi (= Rytkuchi) Vill., VII.1972, A. Stepanov" (ZIN); 2 ♂, "Chukchi Peninsula, Ust'-Chaun, IBPS (Institute of Biological Problems of the North) Station, left bank, wetland, 7.IX.1972" (ZIN); 2 ♂, 1 ♀, "Chukchi Peninsula, Gulf of Chaun, Ipun' River, 14.06.1940, Semenov" (ZIN); 1 ♂, "Ju. T.," "1907. c. Tschitscherin" (ZIN); 1 ♀, "Ju. T.," "1907. c. Tschitscherin" (ZIN); 1 ♂, "86799" (ZIN); 1 ♀, "86804" (ZIN); 1 ♀, "86805" (ZIN); 1 ♀, "86807" (ZIN); 1 ♀, "86809" (ZIN); 1 ♂, "86823" (ZIN).

Description. Coloration. Body black; apices of palpi and mandibles, base of antennal segments, tarsal claws, and femora reddish brown.

Standard measurements [hereinafter mean value (M) is given in parentheses]. HW = 2.23–2.50 (2.37); HL = 1.47–1.58 (1.51); PA = 2.30–2.55 (2.36); PW = 3.27–3.73 (3.47); PB = 2.53–2.95 (2.74); PL(t) = 2.47–2.78 (2.60); PL(m) = 2.16–2.45 (2.34); EW = 4.20–4.70 (4.41); EL = 6.00–6.75 (6.36); L(s) = 10.02–11.05 (10.47); L = 10.8–12.0

Head. Weakly convex, width with eyes 1.52–1.64 times length.

Pronotum (Fig. 3, 1, 2). Large, strongly transverse [PW/PL(t) = 1.29–1.39 (1.34), PW/PL(m) = 1.40–1.57 (1.48)], significantly wider than head [PW/HW = 1.40–1.52 (1.46)], wider at base than at anterior margin [PB/PA = 1.10–1.23 (1.16)]. Anterior margin without edging or with very narrow edging near anterior angles. Sides moderately convex, uniformly rounded from anterior to posterior angles. Lateral bead narrow, sides of disc not flattened or widely flattened. Lateral grooves distinct, usually reaching middle of basal foveae, not merging with them. Base without edging. Posterior angles obtuse-angular, distinct, with apices widely rounded. Basal foveae with bottom not engraved dash-like, short; inner fovea longer. Tubercle between foveae distinct or obsolete. Outer basal fovea separated from lateral margin by low carina. Anterior setiferous pore situated in lateral groove, distance between pore and lateral margin approximately equal to its diameter. Disc weakly convex, impunctate.

Elytra. Weakly or moderately convex, long [EL/EW = 1.30–1.61 (1.45); EL/PL = 2.38–2.51 (2.45); EW/PW = 1.20–1.38 (1.27)]. Striae deep. Intervals strongly or moderately convex. Third interval with 4–6 (usually with 4) discal pores; anterior pore situated near 3rd stria; rest pores, near 2nd stria. Striae almost straight. Odd-numbered intervals usually significantly wider than even-numbered ones, occasionally constricted in several places. Basal pores absent. Scutellar stria short, situated in 2nd interval, occasionally absent. Series *umblicata* consisting of 13–17 setae.

Underside. Tooth of mentum 0.33 times as long as lateral lobes. Abdominal sternites III–V with 2 setae. Anal sternite with 2 apical setae in male and 4 apical setae in female. In male, anal sternite with 2 low tubercles before setae; area with setae rugose. In female, anal sternite with microsculpture coarser than on rest of abdomen.

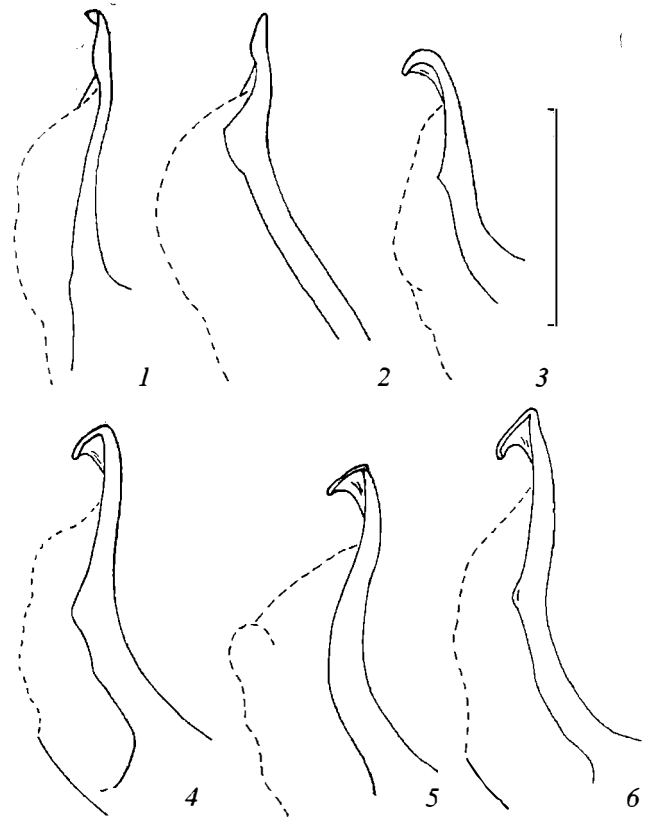


Fig. 4. *Pterostichus* (*Lenapterus*) spp., apex of penis in lateral (right) view: (1) *P. (L.) costatus* (Mén., 1851), Svyatoi Nos, Chukchi Peninsula; (2) *P. (L.) saxicola* (Tschitsch., 1899), Lake Omot, Badzhalskii Range; (3) *P. (L.) agonus* Horn, 1880, Rodgers Harbor, Wrangel Island; (4) *P. (L.) agonus* Horn, 1880, Chara River, Kodar Range; (5) *P. (L.) galae ghankari* ssp. n., holotype; (6) *P. (L.) vermiculosus* (Mén., 1851), Chara River, Kodar Range.

Aedeagus. Figs. 1, 1; 4, 1.

Distribution. A Holarctic polar species; the tundra zone from Gydanski Peninsula in the north of Eurasia to Hudson Bay in North America.

Ecology. The beetles usually occur in grassy spots in more or less humid places.

Taxonomic notes. Lindroth (1966 : 529) designated a female from the Zoological Museum, University of Helsinki, Finland, labeled “Ménétr.” and “Middendorff, Sibiria bor.” as lectotype of *Lyperoherus costatus*. Probably, this specimen was sent to Finnish entomologists for examination from ZIN. I designate as a paralectotype a male from the same series, labeled “Chauta v.,” “*costatus* Mén. Typ. Ménétriés det.,” [red square], [red rectangle], in the Zoological Institute, St. Petersburg.

It is noteworthy that Lindroth (1966 : 530), comparing North American specimens with those from northern Siberia, found that posterior angles of the pronotum in Siberian specimens (including the lectotype) are more distinct than in the American ones. Examination of the material available demonstrates that the structure of the pronotum in *P. costatus* strongly varies in the entire Asian part of its range. In the examined material, both specimens with absolutely not flattened sides of the disc and distinct apices of posterior angles and specimens with widely flattened sides of disc and widely rounded apices of posterior angles are present (the latter specimens also include the paralectotype). In some specimens, sides of the disc are moderately flattened. The male labeled "tundra between Ust'-Yansk and Svyatoi Nos" very clearly differs from other specimens in the absolutely flat intervals and shallow striae on elytra. Nevertheless, the presence of such important and, in my opinion, species-specific characters, as the structure of posterior angles of the pronotum, localization of the anterior seta of the pronotum at a distance of one diameter from the margin, structure of anal sternite and aedeagus, and also the distribution allow us to attribute all the specimens examined to one species.

Pterostichus (Lenapterus) saxicola (Tschitschérine)

Platysma (Petrophilus) saxicola (Tschitschérine), 1899 : 279. Type locality: "Siberie, sans indication de localite plus precise" (Eastern Siberia, Russia).

Material. Lectotype (designated here): ♂, "Sibiria," "*Plat. (Petroph.) saxicola* Typ. m. Tschitscherin det.," [red rectangle] (ZIN); 1 ♂, "Olekmo Aldan, 1.VII.1899, Podyakonov" (ZIN); 1 ♂, "Chita Province, Chara Depression, Sulumatskii Rapids, 5.VII.1975, E. Bessolitsyna" (MSPU); 1 ♂, 1 ♀, "Amur Province, Listvyanaya River, tributary of Khingan River, 1-2.VIII.1909" (ZIN); 1 ♂, "Khabarovsk Territory, Enda River mouth (basin of Tyrma River), spruce and *Abies* forest, 28-29.VIII.2000, E. Ignatenko" (cSUND); 1 ♂, 1 ♀, "Khabarovsk Territory, Grigor'evskii Island, Bureya River near Urgal River mouth, spruce and *Abies* forest, 7.VII.2000, E. Ignatenko" (cSUND); 6 ♂, 6 ♀, "Khabarovsk Territory, Badzhalskii Mt. Range, Lake Omot (Gerbi River basin), floodland "dark coniferous" (dominated by trees other than *Pinus silvestris* and *Larix* spp.—Ed.) forest, 1170 m, 9-15.VII.1997, Yu. Sundukov" (cSUND); 2 ♀, "Khabarovsk Territory, Badzhalskii Mt. Range, Omot-Makit River, 3 km upstream of mouth (Gerbi River

basin), 900-1000 m, valley dark coniferous forest, 5.VII.1997, Yu. Sundukov" (cSUND); 2 ♂, "Khabarovsk Territory, Badzhalskii Mt. Range, sources of Omot-Makit River, 1400-1500 m, dark coniferous forest, 7-15.VII.1997, Yu. Sundukov" (cSUND); 1 ♀, "Khabarovsk Territory, Badzhalskii Mt. Range, valley of Gerbi River, 700-800 m, 3.VII.1997, Yu. Sundukov" (cSUND); 1 ♀, "Khabarovsk Territory, Solnechnyi Distr., near Gornyi Vill., 13-27.VI.1991, N. Ivanchenko" (MSPU).

Description. Coloration. Body black, apices of palpi and tarsal claws reddish brown, elytra black or with slight bronze reflection.

Standard measurements. HW = 2.37-2.70 (2.56); HL = 1.52-1.80 (1.56); PA = 2.35-2.63 (2.49); PW = 3.20-3.70 (3.45); PB = 2.58-2.85 (2.70); PL(t) = 2.58-3.00 (2.76); PL(m) = 2.48-2.75 (2.59); EW = 4.00-4.60 (4.42); EL = 6.00-6.70 (6.30); L(s) = 10.22-11.35 (10.71); L = 11.1-12.2.

Head. Rather large, convex, width with eyes 1.49-1.61 times length.

Pronotum (Fig. 3, 3). Weakly cordate, transverse, PW/PL(t) = 1.20-1.33 (1.25), PW/PL(m) = 1.28-1.41 (1.33), wider than head [PW/HW = 1.30-1.41 (1.35)], slightly wider at base than at anterior margin [PB/PA = 1.02-1.12 (1.09)]. Anterior edging present only at anterior angles. Sides moderately convex, uniformly rounded from anterior to posterior angles. Lateral bead narrow, sides of disc not flattened. Lateral grooves distinct, usually reaching posterior angles, not merging with basal foveae. Base not edged, or edging present only near basal foveae. Posterior angles obtuse-angular, distinct, with apices obsoletely rounded or slightly pointed. Two pairs of basal foveae dash-like, deep, narrow, nearly parallel-sided; inner fovea longer. Foveae separated by swollen interval, but connected via deep groove at base. Anterior setiferous pore situated near lateral groove, distance between pore and lateral margin slightly exceeding pore diameter. Disc strongly or moderately uniformly convex as far as lateral grooves, impunctate.

Elytra. Strongly convex, short [EL/EW = 1.38-1.50 (1.43); EL/PL = 2.22-2.47 (2.29); EW/PW = 1.23-1.38 (1.28)]. Striae deep. Intervals moderately convex. Third interval usually with 3 (occasionally up to 6) discal pores; anterior pore situated near 3rd stria; middle pore, near 2nd stria; posterior pore, near 2nd stria or in the middle of interval. Striae straight. Intervals

usually of uniform width (less frequently, even-numbered intervals wider than odd-numbered ones), not interrupted. Two basal pores always present. Series umbilicata consisting of 14–17 setae.

Underside. Tooth of mentum 0.33 times as long as lateral lobes. Abdominal sternites III–V with 2 setae. Anal sternite with 2 apical setae in male and 4 apical setae in female. In male, anal sternite with 2 low tubercles before setae; area with setae weakly rugose. In female, anal sternite rugose in area with setae, with microsculpture coarser than on rest of abdomen.

Aedeagus. Figs. 1, 2; 4, 2.

Distribution. An Eastern Asian species. Russia: Amur Province, Khabarovsk Territory (south of Stanovoi Mt. Range), northern Primorskii Territory [Samarga River, after Lafer (1997)]; China: northern Bolshoi Khingan Mt. Range.

Ecology. The species occurs in the mountain taiga under forest canopy, does not live in highlands, preferring valleys of rivers and brooks.

Taxonomic notes. I designate a male labeled “Siberia,” “*Plat. (Petroph.) saxicola* Typ. m. Tschitscherin det.,” [red rectangle] in the Zoological Institute, St. Petersburg, as lectotype of *P. saxicola*. This specimen and its geographical label fit the original description of the species by Tschitschérine (1899 : 279).

Pterostichus (Lenapterus) agonus Horn

Pterostichus agonus Horn, 1880 : 140. Type locality: Yukon River, Alaska, USA.

= *Feronia (Petrophilus) tschuchtschorum* J. Sahlberg, 1887 : 12. Type locality: “Rirajtinop near Pitlekaj,” Chukotka Peninsula, NE Siberia, Russia.

= *Pterostichus corallipes* Jedlička, 1937 : 44. Type locality: “Mandschurei: Chingan-Mont Buchalu,” Bolshoi Khingan Mt. Range, NE China.

= *Pterostichus (Lenapterus) agonus averenskii* O. Berlov et E. Berlov, 1997 : 50. Type locality: upper Kele River, Kokchin River mouth, Verkhoyanskii Mt. Range, Yakutia, Russia. **Syn. n.**

Material. 1 ♀, “Gydanskii Peninsula, NW shore of Lake Khassein-To, 24.VI.27, Naumov” (ZIN); 1 ♂, 1 ♀, “Taimyr, Tareya Vill., polygonal tundra, 14.VII.1971, Yu. Chernov” (ZIN); 1 ♀, “NE Taimyr, Amu-Tarida River, 7.VII.1928, Tolmachev” (ZIN);

1 ♀, S shore of Lake Taimyrskoe, Cape Blizhnii, S slope of a range, 74°36'N, 101°44'E, 25.VII–18.VIII.1994, O. Makarova” (MSPU); 1 ♀, “Taimyr, Daksatis, 28.VII.1967, Yu. Chernov” (MSPU); 1 ♂, “N of Krasnoyarsk Territory, Taimyr Peninsula, Khatanga Vill., 22–25.VII.1987, Yu. Karbainov” (cSUND); 1 ♀, “confluence of Yambu-se and Gyda Rivers, N of Yenisei Province, 6.VII.1927, Naumov” (ZIN); 1 ♂, 2 ♀, Chita Province, Kodar Mt. Range, Chara River, gol'tsy [upper forestless zone of mountains in Siberia and Russian Far East.—Ed.], 15–25.VII.1996, A. Brinev” (cSUND, MSPU); 1 ♂, 1 ♀, “Stanovoe Highland, S part of Kodar Mt. Range, upper Chara River, 50 km WSW of Novaya Chara Vill., 1700–2000 m, 27.VII.1995, A. and R. Dudko, D. Lomakin” (cSUND); 2 ♂, “Yakutia, Kular Vill., 9.VII.1996, Nogovitsyn” (cSUND); 1 ♂, “Gulf of Anabar, Cape Khorgo, 11.VII.1959, Chernov” (ZIN); 1 ♂, “Wrangel Island, middle flow of Mamontovaya River, (17), 20–30.VI.1992, O. Khruleva” (MSPU); 3 ♂, 1 ♀, “Magadan Province, Shmidt District, Mys Shmidta Vill., 2–4.VIII.1985, V. Zykov” (cSUND); 1 ♂, 1 ♀, “NE Siberia, Kolyma River mouth, Prokhodnaya Edoma, 18–19.VII.1994, A. Babenko” (MSPU); 1 ♂, 1 ♀, “NE Siberia, Kolyma River Delta, right bank, western spurs of Rauchanskii Range, Vysokaya Mt., 18–19.VII.1994, M. Berezin (MSPU); 1 ♀, “Chayachya zaimka, N part of Kolyma River valley, 23.VI.05, Buturlin” (ZIN); 1 ♂, “NE Siberia, Indigirka River Delta, sedge and moss shrub tundra, 14–15.VII.1994, A. Babenko” (MSPU); 1 ♂, 1 ♀, “Kolyuchinskaya Bay, N of Chukchi Peninsula, 2–15.VII.1914, Starokadomskii,” “*agonus* Horn (*tschuchtschorum* J. Sahlb.), det. Lindroth 63” (ZIN); 2 ♀, “Chukchi Peninsula, N coast of Mechigmen Bay, 40 km W of Lavrentii Vill., 65°32'N, 171°48'E, VI–VII.2000, V. Babenko” (MSPU); 1 ♂, “Yana River Delta, Shirokoston Peninsula, Lake Ledyanoe, 72°25'N, 141°00'E, 5–6.VIII.1994, A. Babenko” (MSPU); 1 ♀, “Chukchi Peninsula, Gulf of Chaun, Uchun River, 14.VI.1940, Semenov” (ZIN); 1 ♀, “Chukchi Peninsula, Gulf of Chaun, Cape Turyryv, bank of brook, 21.VI.1940, Semenov” (ZIN); 2 ♂, 1 ♀, “Chukchi Peninsula, Ust'-Chaun, right bank of river, IBPS (Institute of Biological Problems of the North) Station, 3.IX.1972” (ZIN); 1 ♀, “Anadyr, fish factory, 2.VI.1938, Alanov” (ZIN); 1 ♀, “Bulun,” “1907. c. Tschitscherin” (ZIN); 2 ♂, 4 ♀, “Alaska, Yukon-Kuskokwim Delta, 61°26'N, 165°27'W, 10–25.VII.1994, E.A. Kretschmar” (ZIN); 1 ♀, “Cruallaukk,” “1907. c. Tschitscherin” (ZIN).

Description. Coloration. Body black; tarsal claws brownish red, femora reddish brown, elytra black or with weak bronze or violet reflection.

Standard measurements. HW = 1.95–2.32 (2.18); HL = 1.30–1.55 (1.47); PA = 1.97–2.45 (2.22); PW = 3.00–3.57 (3.33); PB = 2.30–2.95 (2.72); PL(t) = 2.35–2.72 (2.56); PL(m) = 2.13–2.50 (2.36); EW = 3.80–4.50 (4.20); EL = 5.55–6.20 (5.88); L(s) = 9.36–10.40 (9.90); L = 9.7–11.2.

Head. Small, convex, width with eyes 1.44–1.54 times length.

Pronotum (Fig. 3, 4). Very weakly trapezoid, moderately convex, transverse [PW/PL(t) = 1.26–1.37 (1.30), PW/PL(m) = 1.35–1.52 (1.41)], significantly wider than head [PW/HW = 1.46–1.61 (1.53)], at base significantly wider than at anterior margin [PB/PA = 1.15–1.37 (1.23)]. Anterior margin without edging. Sides rather strongly convex, uniformly rounded from anterior to posterior angles. Lateral bead wide, sides of disc very strongly flattened, especially near basal foveae. Lateral groove indistinct, usually connected with basal foveae. Base without edging. Posterior angles obtuse-angular, with apices very widely rounded. Basal foveae small, dash-shaped at bottom, moderately deep, frequently running in parallel; inner fovea longer. Foveae separated by large, strongly convex tubercle, limited by depressions at all sides. Lateral bead convex at posterior angles. Distance between anterior setiferous pore and lateral margin constituting approximately 2.5–3 pore diameters. Disc moderately and more or less uniformly convex. Pronotum impunctate, or variably distinct punctures present only on flattened lateral part (basal foveae devoid of punctation).

Elytra. Rather strongly convex, short [EL/EW = 1.32–1.47 (1.40); EL/PL = 2.19–2.38 (2.30); EW/PW = 1.21–1.32 (1.26)]. Striae moderately deep or superficial. Intervals moderately convex or nearly flat. Third interval usually with 4 discal pores; anterior pore situated near 3rd stria; other pores, usually near 2nd one. Striae more or less regular, rather weakly sinuate. Odd-numbered intervals frequently interrupted and connected; in some specimens, nearly without interruptions. Basal pores absent. Series umbilicata consisting of 14–18 setae.

Underside. Tooth of mentum half as long as lateral lobes. Abdominal sternites III–V with 2 setae. Anal sternite with 2 apical setae in both sexes. In male, anal sternite either entirely smooth, or with transverse rugae (microsculpture in rugose area very coarse, nearly

isodiametric). In female, anal sternite also nearly smooth, with coarse microsculpture.

Aedeagus. Figs. 1, 3; 4, 3, 4.

Distribution. A Holarctic species, inhabiting the tundra zone from Taimyr Peninsula in the north of Eurasia to Hudson Bay in North America. In Siberia, along mountain tundra, it reaches Stanovoi Highland (Kodar Range). According to Bousquet (1999), it occurs in Bolshoi Khingan in northeastern China.

Ecology. The beetles usually occur in humid grasslands.

Taxonomic notes. *P. agonus averenskii* was described from single female (Berlov and Berlov, 1997) with straight elytral striae. I place it to synonymy with *P. agonus agonus* because many specimens of this species from different parts of the range have nearly straight or weakly sinuate striae.

Pterostichus (Lenapterus) galae Farkač et Plutenko

Pterostichus (Paralioanoe) galae Farkač et Plutenko, 1996 : 11–13. Type locality: Oblachnaya Mt., southern Sikhote-Alin, Russian Far East.

Description. Coloration. Body black. Tarsal claws and apices of palpi dark brown. Femora, tarsi, and mandibles frequently dark brown.

Standard measurements. HW = 2.30–2.70 (2.49); HL = 1.70–2.20 (1.85); PA = 2.10–2.70 (2.46); PW = 3.00–3.50 (3.29); PB = 2.20–2.70 (2.46); PL(t) = 2.50–3.05 (2.73); PL(m) = 2.35–2.80 (2.63); EW = 4.20–4.80 (4.49); EL = 6.35–7.40 (6.87); L(s) = 10.70–12.45 (11.75); L = 11.5–13.0.

Head. Rather large, weakly convex, width with eyes 1.30–1.45 times length.

Pronotum (Fig. 3, 5). Weakly cordate, weakly transverse [PW/PL(t) = 1.07–1.29 (1.18), PW/PL(m) = 1.18–1.40 (1.26)], wider than head [PW/HW = 1.23–1.33 (1.28)], as wide at base as at anterior margin [PB/PA = 0.94–1.19 (1.00)]. Anterior margin without edging. Sides weakly convex, rounded from anterior to posterior angles. Lateral bead narrow, sides of disc narrowly flattened, slightly widening before basal foveae. Lateral groove indistinct, connected with basal foveae. Base weakly concave, without edging. Posterior angles rectangular or acute, with apices not rounded. Basal foveae dash-shaped at bottom, nearly fused; inner fovea longer and deeper. Lateral bead at basal foveae rather strongly reflexed. Anterior setiferous

pore situated near lateral groove at distance subequal to pore diameter. Disc weakly convex, flattened medially. Punctuation present only in basal foveae, punctures small, but rather dense.

Elytra. Moderately or weakly convex, wide and long [EL/EW = 1.41–1.65 (1.55); EL/PL = 2.23–2.76 (2.49); EW/PW = 1.26–1.47 (1.37)]. Striae moderately deep or superficial. Intervals moderately convex or flattened. Third interval with 2–5 (usually with 3 or 4) discal pores; anterior pore usually situated near 3rd stria; other pores, usually near 2nd one. Striae weakly sinuate or straight. Intervals nearly not interrupted, odd-numbered intervals always without interruptions. Number of basal pores varying: two, one (on left or right elytron), or pore absent. Series *umbilicata* consisting of 13–19 setae.

Underside. Tooth of mentum half as long as lateral lobes. Abdominal sternites III–V usually with 2 setae, but frequently 1–2 (up to 4) additional setae present. Anal sternite usually with 2 apical setae in male (occasionally up to 4 setae) and 4 setae in female (occasionally up to 7 setae). In male, anal sternite with carina bordering area with rugose surface and setae. Anterior margin of carina with matte area in middle. In female, anal sternite smooth.

Aedeagus. Figs. 1, 4; 4, 5.

Distribution. An Eastern Asian species known only from highlands of southern Sikhote-Alin: Oblachnaya, Snezhnaya, Sestra, Kamen'-Brat, Gorelaya Sopka, Lysaya, Ol'khovaya, and Golets Mts.

Ecology. The species occurs in the mountain tundra at altitudes of 1200–1800 m above sea level. The beetles were found exclusively in stony areas under stones.

Pterostichus (Lenapterus) galae galae Farkač et Plutenko

Pterostichus (Paralianoe) galae Farkač et Plutenko, 1996 : 11–13. Type locality: Oblachnaya Mt., southern Sikhote-Alin, Russian Far East.

Material. Paratypes: 1 ♂, 1 ♀, "Oblachnaya Mt., tundra, kurum [boulder scree—Ed.], 25.VI.1992, A.V. Plutenko," "Paratypus, *Pt. (Paralianoe) galae* Farkač et Plutenko, 1996, A. Plutenko det." (BSI); 1 ♂, "Primor'e [Primorskii Territory—Ed.], S Sikhote-Alin, Oblachnaya Mt., 1700 m, near thickets of *Pinus pumila* in stones, 16.VIII.1992, G. Lafer" (BSI); 7 ♂,

9 ♀, same locality, 1600–1800 m, rocky slopes, 4–7.VII.2002, Yu. Sundukov (cSUND); 1 ♂, "Primor'e, Sikhote-Alin, Snezhnaya Mt., 1550–1650 m, stony tundra, 4.VI.2000, Yu. Sundukov" (cSUND); 1 ♂, 1 ♀, same locality, 30.VI.2002, Yu. Sundukov (cSUND); 2 ♂, 2 ♀, "Primor'e, S Sikhote-Alin, Lazo Distr., Sestra Mt., 1200 m, stony tundra, 10.VIII.1996, Yu. Sundukov" (cSUND); 1 ♂, "Primor'e, Lazo Distr., Kamen'-Brat Mt. (massif of Sestra Mt.), 1500–1540 m, alpine meadow, 3.VII.2003, Yu. Sundukov, V. Shokhrin" (cSUND); 13 ♂, 2 ♀, "Primor'e, S Sikhote-Alin, Lazo Distr., Gorelaya Sopka Mt., 1450 m, stony tundra, 10–11.VIII.1996, Yu. Sundukov" (cSUND); 2 ♂, same locality, 18–20.VI.1999, Yu. Sundukov (cSUND).

Description. See the description of the species.

Pronotum at anterior margin narrower [PL/PA = 1.15–1.32 (1.24); PB/PA = 1.00–1.19 (1.07)].

Elytra weakly convex. Intervals nearly flat. Striae superficial, nearly straight, at apices of elytra merging in pairs, nearly always regularly (1st stria connected with 2nd, 3rd with 4th, and 5th with 6th). Basal pores always present.

Legs entirely, or only femora and tarsi, or, occasionally, only tarsi, brown.

Distribution. Highlands of southern Sikhote-Alin: Oblachnaya, Snezhnaya, Sestra, Kamen'-Brat, and Gorelaya Sopka Mts.

Taxonomic notes. In the original description, no basal pores are depicted on elytra of the holotype (Farkač et Plutenko, 1996 : 12, fig. 1). We examined 44 specimens of this subspecies (including 2 paratypes and 17 topotypes); all of them possess basal pores: 95% of specimens, 2 pores, and 5%, a single pore (on left or right elytron).

Pterostichus (Lenapterus) galae ghankari Sundukov, ssp. n.

Type locality: Lysaya Mt., Partizanskii Mt. Range, southern Sikhote-Alin, Russian Far East.

Material. Holotype ♂, "Primor'e [Primorskii Territory], S Sikhote-Alin, Lysaya Mt., 1540–1560 m, stony tundra, 15–18.VII.1995, Yu. Sundukov" (ZIN). Paratypes: 7 ♂, 2 ♀, collected together with holotype (ZIN and cSUND); 4 ♂, 1 ♀, "Primor'e, S Sikhote-Alin, Alekseevskii Mt. Range, Ol'khovaya Mt., 1650–1660 m, stony tundra, 4.VIII.1995, Yu. Sundukov"

(cSUND); 1 ♂, "Primor'e, Alekseevskii Mt. Range, Ol'khovaya Mt., 1600–1669 m, alpine vegetation, 7–9.VII.2003, Yu. Sundukov" (cSUND). Additionally, the following specimens were examined: 3 ♂, 3 ♀, "Primor'e, S Sikhote-Alin, Partizanskii Mt. Range, Lysaya Mt., 1400–1560 m, stony tundra, 16–21.VI.1994, Yu. Sundukov" (cSUND); 19 ♂, 12 ♀, same locality, 1540–1560 m, stony tundra, 15–18.VII.1995, Yu. Sundukov (cSUND); 1 ♂, "Primor'e, S Sikhote-Alin, Alekseevskii Mt. Range, Ol'khovaya Mt., 1650 m, stony tundra, 22.VI.1994, Yu. Sundukov" (cSUND); 6 ♂, 8 ♀, same locality, 1650–1660 m, stony tundra, 4.VIII.1995, Yu. Sundukov (cSUND).

Description. See the description of the species.

Pronotum at anterior margin wider [PL/PA = 1.00–1.17 (1.08); PB/PA = 0.94–1.04 (0.99)].

Elytra moderately convex. Intervals moderately convex. Striae moderately deep, moderately sinuate; at apices of elytra strongly sinuate, never merging in pairs; variants of their connections very diverse, frequently striae forming irregular pattern. Basal pores usually absent.

Legs nearly always entirely black; rarely, tarsi dark brown.

Distribution. Highlands of southern Sikhote-Alin: Lysaya Mt. in Partizanskii Mt. Range and Ol'khovaya Mt. in Alekseevskii Range.

Taxonomic notes. Out of the 68 examined specimens of the new subspecies, 8% possessed 2 basal pores; 21%, a single pore (on right or left elytron); 71% of specimens had no pores.

Pterostichus (Lenapterus) cancellatus
(Motschulsky)

Lyperopherus cancellatus Motschulsky, 1860 : 93. Type locality: "de Djai sur le fleuve Amour," Kalinovka Vill., 12 km SW of Sofiisk-na-Amure, Khabarovsk Territory, Russia.

= *Lyperopherus cancellatus* Motschulsky, 1859a : 488 [nomen nudum]. Type locality: "Daur. mer.," probably mountains in Chita Province, Transbaikalia, Russia.

= *Lyperopherus rufipes* Motschulsky, 1859b : 222 [junior homonym of *Pterostichus rufipes* Dejean, 1828 : 345]. Type locality: Yakutsk, Eastern Siberia, Russia.

= *Pterostichus (Steropus) schrenkii* A. Morawitz, 1862 : 216. Type locality: "Amur bei Dshai," Kali-

novka Vill., 12 km SW of Sofiisk-na-Amure, Khabarovsk Territory, Russia.

Material. Holotype ♀, "176," "176–192, Dzai, 2 august 55," "*Schrenki* Mor. Typ. A. Morawitz det.," "*cancellatus* Motsch. Tschitscherin det.," [red rectangle] (ZIN); 1 ♂, 1 ♀, "Malyi Okonon River, Yablonovyi Mt. Range, 30.VI.1914, Dorogostaiskii" (ZIN); 1 ♂, "Jablonovoj (Gebirge), Jakutsk Geb., Koshantschikow" (ZIN); 2 ♀, "Yakutsk Province, Yablonovyi Range, VI.1915, Koshantschikow" (ZIN); 2 ♂, 2 ♀, "Kiran," "1907 c. Tschitscherin"; 1 ♂, 1 ♀, "NE of Chita Province, Kodar District, environs of Leprindo station, 1500–2300 m, 22–23.VII.1997, A. Petrov" (MSPU); 1 ♂, "N Transbaikalia, Verkhneangarskii Range, mountain tundra, 2000 m, 1–5.VII.1998, Reshetnikov" (MSPU); 1 ♀, "Buryatia, Vitim Highland, upper Bolshoi Amalat River, 18.VI.1967, O.N. Kabakov" (MSPU); 1 ♂, "Amur Province, Radde station, 10.VI.1900, G. Suvorov" (ZIN); 3 ♂, 2 ♀, "Amur Province, Listvyanaya River, tributary of Khingan River, 21–22.VIII.1909, Radkevich" (ZIN); 1 ♂, 1 ♀, "Listvennoe, Malyi Khingan, Amur Province, 1–2.VIII.1909, K. Glazunov" (ZIN); 1 ♀, NE part of Amur Province, S spur of Stanovoi Range, 1000–1200 m, 24–25.VII.1962, Kabakov" (ZIN); 1 ♂, "SW part of Stanovoi Range, 12 km S of Nagomyi Vill., 1100 m, 20.VII.1995, A. and R. Dudko, D. Lomakin" (cSUND); 1 ♀, "Khabarovsk Territory, mouth of Enda River (Tyrma River basin), *Abies* forest on slope, 28–29.VIII.2000, E. Ignatenko" (cSUND); 1 ♂, "Khabarovsk Territory, Badzhalskii Range, Omot-Makit River sources, 1800–2100 m, mountain tundra, 7–19.VII.1997, Yu. Sundukov" (cSUND); 25 ♂, 24 ♀, "Khabarovsk Territory, Badzhalskii Range, Lake Omot (Gerbi River basin), floodland dark coniferous forest, 1100–1200 m, 7–21.VII.1997, Yu. Sundukov" (cSUND); 1 ♂, 1 ♀, "Khabarovsk Territory, lower Gerbi River, 2–4.VII.1997, Yu. Sundukov" (cSUND); 1 ♂, "Khabarovsk Territory, W part of Badzhalskii Range, 30 km S of Mogdy station, 500 m, *Abies* and birch forest, 10–20.VII.1997, A. Brinev" (MSPU); 2 ♂, "Amur Region, Badzhalskii Range, Darya River, 7.IX.1965, O. Kabakov" (ZIN); 1 ♂, "De Kastri, 1885, Grinevetskii" (ZIN); 1 ♀, "Tikhmenevsk, 23–24.VII.1901, P. Schmidt" (ZIN); 1 ♂, "Prmzsk," "1907 c. Tschitscherin" (ZIN).

Description. Coloration. Body black, tarsal claws and apices of palpi reddish brown, femora black or reddish brown, elytra black or with weak bronze reflection.

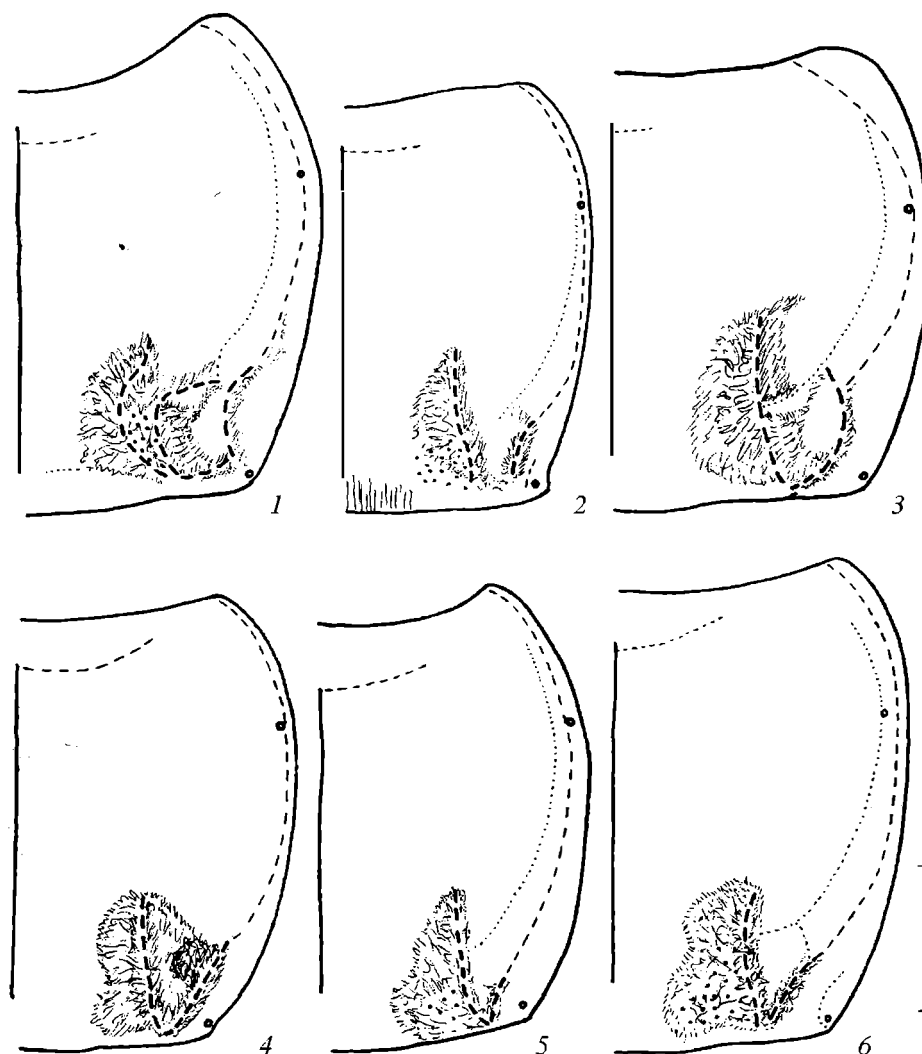


Fig. 5. *Pterostichus (Lenapterus)* spp., right half of pronotum: (1) *P. (L.) cancellatus* (Motsch., 1860), holotype from "Dzai"; (2) *P. (L.) rugosipennis* Jedl., 1932, type from "Ompo, Korea", North Korea; (3) *P. (L.) vermiculosus* (Mén., 1851), paralectotype from "Indiga b."; (4) *P. (L.) subrugosus* Straneo, 1955, from Daisetsuzan Mts., Hokkaido; (5) *P. (L.) wellschmiedi* Kirschenhofer, 1985, Chekhov Mt., southern Sakhalin; (6) *P. (L.) punctatissimus* (Rand., 1838), Canada.

Standard measurements. HW = 2.60–3.13 (2.88); HL = 1.85–2.28 (2.00); PA = 2.40–3.00 (2.78); PW = 3.70–4.40 (4.04); PB = 2.75–3.45 (3.16); PL(t) = 2.70–3.45 (3.15); PL(m) = 2.60–3.35 (2.94); EW = 4.44–5.55 (5.06); EL = 6.45–7.80 (7.26); L(s) = 11–13.53 (12.41); L = 12.2–15.3.

Head. Weakly convex, width with eyes 1.36–1.60 times length.

Pronotum (Fig. 5, 1). Nearly rectangular, strongly transverse [PW/PL(t) = 1.24–1.34 (1.28), PW/PL(m) = 1.30–1.44 (1.37)], significantly wider than head [PW/HW = 1.35–1.47 (1.41)], at base wider than at anterior margin [PB/PA = 1.08–1.19 (1.13)]. Anterior margin without edging. Sides moderately convex and uniformly rounded from anterior to posterior an-

gles. Lateral bead wide, edging of disc moderately flattened, widening posteriorly. Inner basal fovea large, longer and wider than outer fovea. Outer basal fovea distinctly dash-like. Foveae separated by small or rather large convex tubercle, limited by depressions at all sides. Lateral bead noticeably convex or reflexed at posterior angles. Anterior setiferous pore situated near lateral groove; distance between this pore and lateral margin constituting approximately 2 pore diameters. Disc moderately convex. Rather dense punctation present in basal foveae; punctation rare on flattened sides.

Elytra. Moderately or strongly convex, short (EL/EW = 1.29–1.49 (1.42); EL/PL = 2.09–2.34 (2.25); EW/PW = 1.21–1.30 (1.24)]. Striae deep. In-

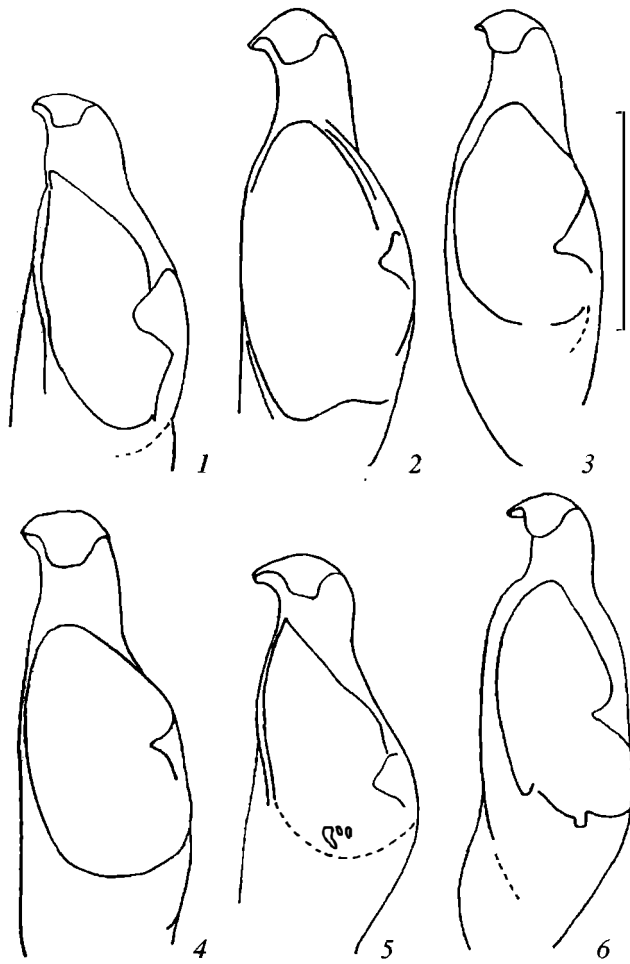


Fig. 6. *Pterostichus (Lenapterus)* spp., apex of penis in dorsal view: (1) *P. (L.) cancellatus* (Motsch., 1860), Lake Omot, Badzhalskii Range; (2) *P. (L.) cancellatus*, Nagomyi Vill., Stanovoi Range; (3) *P. (L.) wellschmiedi* Kirschenhofer, 1985, Utesnoe, Korsakov District, southern Sakhalin; (4) *P. (L.) punctatissimus* (Rand., 1838), Canada; (5) *P. (L.) gromykoii* sp. n., holotype; (6) *P. (L.)* sp., Komandnaya Mt., Bolshoi Yan Range, northern Sikhote-Alin.

tervals strongly or moderately convex. Third interval with 5–7 (usually with 5) discal pores; anterior pore situated near 3rd stria; other pores, usually near 2nd one or in middle of interval. Striae strongly sinuate. Intervals frequently interrupted (odd-numbered intervals interrupted significantly less frequently or stay continuous). Two basal pores present. Series umbilicata consisting of 15–19 setae.

Underside. Tooth of mentum half as long as lateral lobes. Abdominal sternites III–V with 2 setae. Anal sternite with 2 apical setae in males and 5–9 setae in females. In male, anal sternite with carina, bordering rugose area with setae. In female, anal sternite strongly rugose in area of apical setae.

Aedeagus. Figs. 4, 6; 6, 1, 2.

Distribution. An Eastern Asian species, spread from northern Baikal area in the west to the mouth of the Amur River in the east, and from valley of the Amur River in the south to Stanovoe Highland and Stanovoi Range in the north.

Ecology. *P. cancellatus* inhabits the mountain taiga, occasionally occurs in the mountain tundra. The species is not hygrophilous.

Taxonomic notes. The binomen *P. cancellatus* was first attributed by Motschulsky (1859a : 488) to specimens from Dauria. As no description was given in the cited paper, the name, according to the International Code of Zoological Nomenclature (ICZN, 2000), the name is a nomen nudum. The description of *P. cancellatus* was published in the subsequent year (Motschulsky, 1860 : 93) after examination of material collected by Schrenk's expedition in Amur in 1855. The species was described from a female labeled "Djai" (Motschulsky, 1860 : 93). Later, Morawitz (1862 : 262) described from the same female as a new species, *P. (Steropus) schrenkii* A. Mor., 1862; probably, he compared this female with specimens of *P. cancellatus* from Dauria and considered that Motschulsky's identification was erroneous. Thus, the female with labels "176," "176–192, Dzai, 2 august 55," is the holotype of 2 species, *Lyperopherus cancellatus* Motschulsky, 1860 and *Pterostichus (Steropus) schrenkii* A. Morawitz, 1862. The older name *Lyperopherus rufipes* Motschulsky, 1859 cannot be used because it is a junior homonym of *P. rufipes* Dejean, 1828.

***Pterostichus (Lenapterus) gromykoii* Sundukov, sp. n.**

Type locality: Glukhomanka Mt., Dalnii Range, Sikhote-Alin, Russian Far East.

Material. Holotype ♂, "Primor'e, Sikhote-Alin, Sikhote-Alin Reserve, Glukhomanka Mt., 1350–1450 m, alpine zone, 13.VII.1998, Yu. Sundukov" (ZIN). Paratypes: 5 ♂, 5 ♀, collected together with holotype (cSUND); 24 ♂, 12 ♀, "Primor'e, Sikhote-Alin, Sikhote-Alin Reserve, Glukhomanka Mt., 1500–1550 m, alpine zone, 5–6.VII.1999, Yu. Sundukov" (cSUND, ZIN). In addition, the following specimens were examined: 2 ♂, 2 ♀, "Primor'e, Sikhote-Alin, Sikhote-Alin Reserve, Glukhomanka Mt., 1500–1550 m, alpine zone, 5–6.VII.1999, Yu. Sundukov" (cSUND).

Description. Coloration. Body black, tarsal claws and apices of palpi brown, femora occasionally dark brown.

Standard measurements. HW = 2.50–2.83 (2.68); HL = 1.85–2.00 (1.94); PA = 2.35–2.80 (2.58); PW = 3.35–4.00 (3.70); PB = 2.40–2.98 (2.72); PL(t) = 2.75–3.25 (3.03); PL(m) = 2.55–2.95 (2.78); EW = 4.50–5.15 (4.88); EL = 6.50–7.65 (7.23); L(s) = 11.00–12.75 (12.19); L = 12.5–14.0.

Head. Rather large, convex, width with eyes 1.34–1.42 times length.

Pronotum (Fig. 3, 6). Weakly cordate, moderately transverse [PW/PL(t) = 1.16–1.26 (1.22), PW/PL(m) = 1.24–1.38 (1.33)], wider than head [PW/HW = 1.33–1.45 (1.38)], at base as wide as, or slightly narrower than at anterior margin [PB/PA = 0.98–1.13 (1.05)]. Anterior margin without edging. Sides moderately convex, usually rounded from anterior angles to anterior margin of basal foveae and weakly emarginated or straight (less frequently rounded) from basal foveae to posterior angles. Lateral bead narrow or very narrow, sides of disc narrowly flattened, weakly widening posteriorly. Lateral groove indistinct, connected with outer basal fovea. Base without edging. Posterior angles obtuse-angular or nearly rectangular, distinct, with small denticle, less frequently narrowly rounded. Basal foveae dash-shaped at bottom, deep, running in parallel; inner fovea significantly longer. Tubercle between foveae narrow, weakly raised, but distinct. Sides at basal foveae rather strongly reflexed. Anterior setiferous pore situated in lateral groove, distance between pore and lateral margin approximately 1.5 times pore diameter. Disc moderately or weakly convex, occasionally slightly flattened in center. Sparse punctation usually present in basal foveae and along lateral margin.

Elytra. Moderately convex, rather wide and moderately long (EL/EW = 1.41–1.52 (1.48); EL/PL = 2.31–2.53 (2.39); EW/PW = 1.28–1.37 (1.32)). Striae moderately deep. Intervals moderately convex. Third interval with 4–5 (usually with 5) discal pores; anterior pore usually situated near middle of interval; other pores, near 2nd stria or in middle of interval. Striae strongly sinuate. Even-numbered intervals frequently interrupted, odd-numbered intervals very rarely interrupted, usually not interrupted. Number of basal pores varying from zero to two. Series umbilicata consisting of 16–18 setae.

Underside. Tooth of mentum half as long as lateral lobes. Abdominal sternites III–V usually with 2 setae, but occasionally with 1 additional seta on any of sternite. Anal sternite usually with 2 apical setae in male

and 4 setae in female (in one female, with 6 setae). In male, anal sternite very similar to that in *P. cancellatus*, with carina bordering rugose setiferous area (in some specimens coarsely rugose, in others nearly smooth). In female, setiferous apical area of anal sternite coarsely rugose.

Aedeagus. Figs. 1, 6–8; 2, 4; 6, 5.

Distribution. An Eastern Asian species known only from Glukhomanka Mt. in the middle part of Sikhote-Alin.

Ecology. The species occurs in mountain tundra at altitudes of 1350–1600 m above sea level. All beetles were collected in stony area under stones.

Taxonomic notes. In addition to the listed material from Glukhomanka Mt., I examined a single specimen from the northern Sikhote-Alin, labeled “Khabarovsk Territory, Sikhote-Alin, central part of Bolshoi Yan Range, Komandnaya Mt., gol'tsy, 1500–1600 m, 26.VII.1997, D. Lomakin” (IATE). This specimen possesses an intermediate set of morphological characters: the structure of the pronotum is more similar to that in *P. cancellatus*, whereas the absence of basal pores on the elytra relates the specimen to *P. gromyko* sp. n. Its standard measurements are as following: HW = 2.78; HL = 1.88; PA = 2.65; PW = 3.80; PB = 2.95; PL(t) = 2.95; PL(m) = 2.78; EW = 4.95; EL = 6.50; L(s) = 11.33; L = 12.9 mm. The shape of the penis as in Figs. 2, 5 and 6, 6. To identify this specimen with certainty, examination of an additional material is necessary.

Etymology. The new species was named for Mikhail Gromyko, a researcher in the Sikhote-Alin Reserve. It was his help in organization of the excursions to Glukhomanka Mt. which enabled collecting of the new species.

Pterostichus (Lenapterus) rugosipennis Jedlička

Pterostichus (Lyperopherus) rugosipennis Jedlička, 1932 : 73. Type locality: “Ompo,” 50 km S of Chkhonchzhin, North Korea.

Material. Type ♂, “Ompo, Korea,” “8000 Fuss,” “Type,” “*rugosipennis* sp. n. mihi, det. Ing. Jedlička,” “Mus. Nat. Pragae, Inv. 24633” (NMP).

Description. Coloration. Body black, tarsal claws reddish brown, mandibles and antennae tar-brown.

Standard measurements. HW = 2.60; HL = 1.93; PA = 2.48; PW = 3.55; PB = 2.84; PL(t) = 2.98;

PL(m) = 2.82; EW = 4.85; EL = 6.85; L(s) = 11.76; L = 13.1.

Head. Medium-sized, convex, width with eyes 1.35 times length.

Pronotum (Fig. 5, 2). Weakly cordate [PW/PL(t) = 1.19, PW/PL(m) = 1.2; PW/HW = 1.37; PB/PA = 1.15]. Anterior margin with very narrow edging, present only at angles. Sides weakly convex, uniformly rounded nearly as far as posterior angles; very shortly concave before posterior angles. Lateral bead very narrow, sides of disc nearly not flattened, weakly explanate posteriorly. Lateral groove indistinct, connected with outer basal fovea. Base without edging. Posterior angles nearly rectangular, distinct, with apices slightly pointed. Basal foveae without dash-like depression at bottom, moderately deep; inner fovea longer. Tubercle between foveae narrow, weak, but distinct. Lateral margin at basal foveae moderately reflexed. Anterior setiferous pore situated in lateral groove, distance between pore and lateral margin approximately equal to pore diameter. Disc weakly convex, flattened in center. Sparse and weak punctation present only in basal foveae.

Elytra. Weakly convex, short, much wider than pronotum (EL/EW = 1.41; EL/PL = 2.30; EW/PW = 1.37). Striae deep. Intervals moderately convex. Third interval with 5 discal pores; all pores situated along middle of interval. Striae strongly sinuate. Even-numbered intervals frequently interrupted, odd-numbered ones nearly not interrupted. Basal pores absent. Series umbilicata consisting of 13–14 setae.

Underside. Tooth of mentum half as long as lateral lobes. Abdominal sternites III–V usually with 2 setae. Anal sternite usually with 2 apical setae in male; area with setae more or less smooth, with only several transverse rugae, and bordered by carina.

Aedeagus. Fig. 2, 6.

Distribution. An Eastern Asian species known only from mountains of North Korea.

Ecology. The species probably occurs in the mountain tundra. The label on the type specimen says that it was collected at an altitude of 8000 feet (“8000 Fuss”); in North Korea, altitudes above 2000 m are occupied by the mountain tundra.

Taxonomic notes. “Ompo,” given in the label of the type specimen, was known in North Korea in the first half of the 20th century as a name of thermal

springs 50 km S of Chkhonchzhin. In 1928–1946, this territory belonged to a well-known Russian naturalist and insect collector Yu. M. Yankovskii (Yankovskii, 1990). As *P. rugosipennis* occurs supposedly in mountain tundra, the type specimen probably originates from the southern part of the Khamen Ridge in Kwanmo-bong Mts. and Kvesan-bo Mts. as the nearest to Ompo springs.

***Pterostichus (Lenapterus) vermiculosus* (Ménétriés)**

Lyperopherus vermiculosus Ménétriés, 1851 : 48.
Type locality: Indiga Bay, 175 km N of Naryan-Mar, northern Russia.

= *Lyperopherus intricatus* Ménétriés, 1851 : 49 [junior homonym of *Myosodus intricatus* Motschulsky, 1845]. Type locality: Boganida River, 125 km W of Khatanga Vill., Taimyr Peninsula, northern Siberia, Russia.

= *Lyperopherus innuitorum* Brown, 1949 : 231.
Type locality: Kidluit Bay, Richard Island, mouth of Mackenzie River, Northwestern Territories, Canada.

Material. Paralectotype (designated here) ♀, “Indiga b.,” “Vermiculosus Mén., Typ. Ménétriés det.,” [golden square], [red rectangle] (ZIN); 2 ♀, “Lakes Vasiutkiny, Bolshezemelskaya tundra, 28–29.VII.1904, Zhuravskii” (ZIN); 1 ♀, “Bolvanskaya tundra, Bolshezemelskii Archipelago, beginning of VI.1903, Zhuravskii” (ZIN); 1 ♂, 3 ♀, “Bolshezemelskaya tundra, 16.06–27.VII.1908, V. Kertselli” (ZIN); 1 ♀, “Peak 8–10 km N of Savaibei, Bolshezemelskaya tundra, 10.VII.1908, V. Kertselli” (ZIN); 1 ♂, 1 ♀, “Chorny River Delta, Adz’va anabranche, Arkhangelsk Province, 1.VIII.1909, Kulik” (ZIN); 1 ♀, “Arkhangelsk Province, Cape Chernyi, 24.VII.1912, P.I. Oppokov” (ZIN); 1 ♂, “Komi-Nenets Autonomous Territory, Ortina River, spruce forest with green moss and cowberry, 30.VI.1999, A.A. Kozhevnikova” (MSPU); 1 ♂, “Komi ASSR, Polar Urals, 25.VI.1964, Sedykh” (ZIN); 1 ♂, “Pym-va-yu Creek, 140 versts downstream of Adz’va mouth, Zhuravskii” (ZIN); 1 ♂, “Polar Urals, N of Tobolsk Province, 28.VI.1909, F. Zaitsev” (ZIN); 1 ♀, “Voikar River basin, N Urals, Obdorsk, 19–20.VIII.1925, Makarkin” (ZIN); 1 ♂, “Sob’ River basin, Bolshoi Ural, Obdorsk, 14.VII.1925, Gorodkov” (ZIN); 1 ♀, “Sob’ River between Malyi and Bolshoi Urals, Obdorsk, 3.VII.1925, Fridolin” (ZIN); 1 ♂, 1 ♀, “Bolshaya Khanema River, Obdorsk, 1.VII.1925, Fridolin” (ZIN); 1 ♀, “Sob’ River and Bolshoi Urals, after it Obdorsk, 4.VII.1925,

Fridolin" (ZIN); 1 ♂, 1 ♀, "Malyi Urals at Sob' River, Obdorsk, Tobolsk Province, along pass, 2.VII.1925, Fridolin" (ZIN); 1 ♂, 1 ♀, "Polar Urals, Neroika Mt., meadow under forestless hill, 16–20.VI.1989" (MSPU); 2 ♂, 1 ♀, "Yuribei River mouth, Gydanskii Peninsula, 27–31.VII.1927, Naumov" (ZIN); 2 ♀, "beginning of Gydy-yam Bay, N of Yenisei Province, 11–20.VII.1927, Naumov" (ZIN); 1 ♂, "NW shore of Lake Khassein-to, Gydanskii Peninsula, 25.VI.1927, Naumov" (ZIN); 4 ♂, 2 ♀, "NO shore of Lake Khassein-to, Gydanskii Peninsula, 24.VI.1927, Naumov" (ZIN); 2 ♂, "Yamal, in moss tussocks, 06.1961, Chernov" (MSPU); 1 ♂, 1 ♀, "S Yamal, Sabettayakha River, 140 km of Salekhard, 67°00'N, 69°31'E, 22.08–10.IX.1986, Yu. Shevnin" (MSPU); 2 ♂, 1 ♀, "S Yamal, lower Sabettayakha River, 71°18'N, 71°58'E, 1–20.VII.1993, Yu. Shevnin" (MSPU); 1 ♀, "South of Yamal Peninsula, Priuralskii District, environs of Shchyuch'e trading station, 21.VII–11.VIII.1980, E.M. Veselova" (cSUND); 1 ♂, "Yamal, Middle Shchyuchya River, Sopkeu, 24.VI.1990, A. Belyakov" (MSPU); 1 ♀, "Karpov fish factory on Shchyuchya River, Tobolsk Province, 22.VI.1913, Shukhov" (ZIN); 1 ♂, "Shchyuchya River, left bank, Tobolsk Province, 16.VI.1913, Shukhov" (ZIN); 1 ♀, "Ins. Nikandr.," "J. Sahlb." (ZIN); 1 ♂, "Dickson Island, dry stony tundra, 13.VII.1961, Chernov" (MSPU); 1 ♂, "S Taimyr, Khatanga, forest tundra, under logs, 23.VIII.1994, O. Makarova" (MSPU); 1 ♂, "system of Moner, tributary of Khatanga, 67°N, 1874, Czekanovskii," "73509" (ZIN); 1 ♂, same locality, "73106" (ZIN); 2 ♂, 1 ♀, same locality, "73518" (ZIN); 1 ♂, same locality, "73188" (ZIN); 1 ♀, same locality, "73395" (ZIN); 1 ♀, "Kotui, right bank, 14 versts from Khatanga River Delta, 22.VIII.1933, O. Yakovlev" (ZIN); 2 ♂, "73900," "System of Olenek River, 1874, Czekanovskii" (ZIN); 1 ♂, 1 ♀, "N of Krasnoyarsk Territory, Taimyr Peninsula, Khatanga Vill., 22–25.VII.1987, Yu. Karbainov" (cSUND); 1 ♀, "Taimyr, Agapa River, in peat area, 15.VIII.1960, Chernov" (ZIN); 2 ♂, "Krasnoyarsk Territory, Taimyr National Territory, Vorontsovo Vill., 25.07–1.VIII.1995, L. Rybalov" (MSPU); 1 ♂, "Lake Essei, upper Khatanga River basin, 26.V.1905, I. Tolmachev" (ZIN); 1 ♂, 2 ♀, "Confluence of Yambu-se and Gyda Rivers, North of Yenisei Province, 2.VII.1927, Naumov" (ZIN); 2 ♂, "Yenisei, Schmidt 1866" (ZIN); 2 ♂, "Yenisei Province, 1–17.VI.1908, Rychkov" (ZIN); 1 ♀, "Yenisei Province, 1–31.05.1908, Rychkov" (ZIN); 1 ♀, "Nukhu-Daban, 10.VI.1915, S. Rodionoff" (ZIN); 1 ♂, "N Transbaikalia, Verkhneangarskii Range, mountain

tundra, 2000 m, 1–5.VII.1998, Reshetnikov" (MSPU); 2 ♂, 1 ♀, "Stanovoe Highland, S part of Kodar Range, upper Chara River, 50 km WSW of Novaya Chara Vill., 1700–2000 m, 27.VII.1995, A. and R. Dudko, D. Lomakin" (cSUND); 1 ♂, "Amur Province, Mogot Vill., 12.VII.1975, L. Voronova" (MSPU); 1 ♂, "Sobol' River, 280 versts N of Bulun, lower Lena River, 19.VI.1908, Pfitzenmeier" (ZIN); 1 ♀, "Alazeya River, NE of Yakut Province, 10.VI.1905, Rozhnovskii" (ZIN); 1 ♂, "Yakutia, Kolyma, 69°15'N, 120 km downstream of Cherskii Vill., 25.VI–12.VII.1999, D. Berman" (ZIN); 1 ♂, 1 ♀, "NE Siberia, right bank of Kolyma River Delta, western spurs of Rauchanskii Range, Vysokaya Mt., 18–19.VII.1994, M. Berezin" (MSPU); 1 ♂, "Chayachya zaimka, NW of Kolyma River Delta, 23.VI.1905, Buturlin" (ZIN); 1 ♂, 2 ♀, "Magadan Prov., Shmidt Distr., Mys Shmidta Vill., 2–4.VIII.1985, V. Zykov" (cSUND); "Wrangel I., bank of brook with spots of graminean + moss + *Drias* vegetation, 8.VI.19912, O. Khruleva" (MSPU); "Wrangel I., upper Neizvestnaya River, (2), 10–19.VI.1991, O. Khruleva" (MSPU); 1 ♂, 1 ♀, "Wrangel I., spurs of Pervaya Mt., 7–25.VII.1992, O. Khruleva" (MSPU); 1 ♀, "Chukchi National Terr., Bilibino, flood-land of Kepegvesnyia River, VII.1992, V. Sinyaev" (MSPU); 1 ♀, "Chukchi National Territory, extreme NW, Medvezhka River, estuary, 12.VII.1972, V. Shilov" (ZIN); 1 ♂, "Chukchi Peninsula, N coast of Mechigmen Bay, 40 km W of Lavrentii Vill., 65°32'N, 171°48'E, 06–07.2000, V. Babenko" (MSPU); 2 ♂, 1 ♀, "Magadan Province, Chukotka Peninsula, Anadyr Vill., 12.VII.1993, Yu. Artyukhin" (cSUND); 1 ♂, "SE Chukchi Peninsula, Shakhtersk Vill., 18.VII.1971, A. Tikhomi-rova" (ZIN); 2 ♂, "Chukchi Peninsula, Ust'-Chaun, IBPS Station, 7–31.VIII.1978" (ZIN); 1 ♀, "J.T.," "1907. c. Tschitscherin" (ZIN); 1 ♂, "USA, W Alaska, 66°23.363'N, 163°15.868'W, 31.VII.2001, N.E. Doku-chaev" (LATE).

Description. Coloration. Body black, tarsal claws reddish brown; femora black, occasionally brownish red or reddish brown.

Standard measurements. HW = 2.30–2.80 (2.64); HL = 1.55–1.88 (1.77); PA = 2.58–2.90 (2.73); PW = 3.60–4.41 (4.05); PB = 3.05–3.50 (3.33); PL(t) = 2.90–3.23 (3.10); PL(m) = 2.60–3.00 (2.82); EW = 4.80–5.40 (5.12); EL = 6.00–7.50 (7.14); L(s) = 11.38–12.61 (12.01); L = 12.1–13.8.

Head. Weakly convex, width with eyes 1.44–1.68 times length.

Pronotum (Fig. 5, 3). Nearly rectangular, strongly transverse [PW/PL(t) = 1.16–1.37 (1.31), PW/PL(m) = 1.29–1.51 (1.43)], significantly wider than head [PW/HW = 1.41–1.63 (1.53)], at base significantly wider than at anterior margin [PB/PA = 1.11–1.29 (1.22)]. Anterior margin without edging. Sides moderately convex, uniformly rounded from anterior to posterior angles. Lateral bead wide, sides of disc widely flattened, strongly explanate posteriorly. Lateral groove indistinct, connected with outer basal fovea. Base without edging. Posterior angles wide obtuse-angular, more or less distinct, with apices widely rounded. Basal foveae dash-shaped at bottom, narrow; inner fovea slightly longer than outer one. Tubercle between foveae large and swollen, usually bordered by depressions at all sides. Outer basal fovea separated from lateral margin by swollen carina. Anterior setiferous pore situated in lateral groove, distance between pore and lateral margin more than twice pore diameter. Disc moderately convex, impunctate; occasionally several punctures present in depressions of basal foveae.

Elytra. Moderately or strongly convex, short [EL/EW = 1.35–1.44 (1.40); EL/PL = 2.26–2.39 (2.31); EW/PW = 1.22–1.36 (1.27)]. Striae moderately deep. Intervals moderately or strongly convex. Third interval with 4 discal pores; anterior pore situated near 3rd stria; other pores, near 2nd stria. Striae very strongly sinuate. All intervals frequently interrupted, forming irregular pattern. Basal pores absent. Series umbilicata consisting of 14–19 setae.

Underside. Tooth of mentum half as long as lateral lobes. Abdominal sternites III–V with 2 setae. Anal sternite with 2 apical setae in male and 4 setae in female. In male, anal sternite with small carina between apical setae separating rugose area with setae. In female, anal sternite strongly rugose around apical setae.

Aedeagus. Figs. 1, 5; 4, 6.

Distribution. A northern Holarctic species, inhabits the tundra zone from Bolshezemelskaya tundra in the north of Eurasia to Hudson Bay in North America, reaches Stanovoe Highland (Verkhneangarskii and Kodar Ranges) southwards along the mountain tundra of Siberia.

Ecology. The species occurs in the tundra and, probably, is not hygrophilous.

Taxonomic notes. Lindroth (1966 : 528) designated a female from the Zoological Museum, University of Helsinki, Finland, labeled “Ménétr., Middendorff,

Siberia bor., Indega Bay,” as lectotype. Probably, this specimen was sent to Finnish entomologists from ZIN. I designate a female from the same series as a paralectotype. This specimen in the ZIN collection is labeled “Indiga b., *Vermiculosus* Mén., Typ. Ménétriés det.,” [golden square], [red rectangle]. Silfverberg (1987 : 26) mentioned Taimyr as the provenance of the lectotype (“Taimyr aut. okr.”), but the type specimens were collected actually on the Indiga Bay shore in Nenets National Territory.

Examination of specimens from different localities within the range revealed a high fraction of intermediate forms between *P. vermiculosus* and *P. cancellatus* with a mixed set of morphological characters in the mountains of northern Transbaikalia. Rather high fraction of “hybrid” specimens at the border between the ranges of the two forms gives us all reason to consider them subspecies of one species. In the western part of the range (tundra of European Russia, Polar Urals, and southern Yamal Peninsula), specimens, which, in some characters, could be treated as transitional between these two species, are also found rather frequently, although *P. cancellatus* was not recorded from this region. In the present paper, I leave the question on the taxonomic status of these species open, because I have no sufficient material from zones of contact between closely related species in other pairs, e. g., *P. cancellatus*–*P. gromyko* sp. n. in the northern Sikhote-Alin, and *P. vermiculosus*–*P. punctatissimus* in America. For the time being, I suggest to accept the traditional point of view on the taxonomic status of species, closely related to *P. vermiculosus*, and to consider this phenomenon as a secondary intergradation between two closely related allopatric species.

Pterostichus (Lenapterus) subrugosus Straneo

Pterostichus (Lyperopherus) subrugosus Straneo, 1955 : 88. Type locality: Daisetsuzan Mts., Hokkaido, Japan.

Material. 1 ♂, “(Koizumidake) Mts. Daisetsuzan, Hokkaido, Japan, 14.VII.1989, N. Yasuda,” “*P. subrugosus*” (cSUND); 1 ♀, “Mt. Daisetsu, Y. Kono,” “*Lyperopheres eurillatus* Motschulsky,” “Kojumidake, 16.VIII.1926” (ZIN).

Description. Coloration. Body black, tarsal claws and apices of palpi reddish brown, antenna tar-brown.

Standard measurements. HW = 2.80–2.85 (2.83); HL = 1.93–1.98 (1.96); PA = 2.60–2.72 (2.66); PW = 3.25–3.50 (3.38); PB = 2.70–2.75 (2.73);

PL(t) = 2.90–3.23 (3.10); PL(m) = 2.90–2.95 (2.93); EW = 5.00–5.10 (5.05); EL = 7.15–7.20 (7.18); L(s) = 12.1–12.26 (12.19); L = 13.2–13.4.

Head. Large, moderately convex, width with eyes 1.44–1.45 times length.

Pronotum (Fig. 5, 4). Weakly cordate, strongly convex, very weakly transverse [PW/PL(t) = 1.07–1.14 (1.10), PW/PL(m) = 1.10–1.19 (1.14)], wider than head [PW/HW = 1.16–1.23 (1.19)], slightly wider at base than at anterior margin [PB/PA = 1.01–1.04 (1.02)]. Anterior margin without edging. Sides moderately convex, uniformly rounded from anterior to posterior angles. Lateral bead narrow, sides of disc narrowly flattened, explanate posteriorly. Lateral groove indistinct, connected with outer basal fovea. Base without edging. Posterior angles obtuse-angular, distinct, with apices narrowly rounded. Outer and inner basal foveae nearly fused, deep, dash-shaped at bottom; inner fovea slightly longer than outer one. Tubercle between foveae large and flattened, bordered by depressions from all sides. Lateral margin swollen and strongly reflexed at basal foveae. Anterior setiferous pore situated in lateral groove, distance between pore and lateral margin 1.5 times pore diameter. Disc uniformly and strongly convex, impunctate; inner basal fovea with obliquely folded bottom.

Elytra. Moderately convex, rather long, significantly longer than pronotum [EL/EW = 1.41–1.43 (1.42); EL/PL = 2.34–2.36 (2.35); EW/PW = 1.46–1.54 (1.50)]. Striae moderately deep. Intervals moderately convex. Third interval with 4 discal pores; all pores situated near middle of interval. Striae strongly sinuate. Even-numbered intervals frequently interrupted, odd-numbered intervals nearly not interrupted. Both specimens examined possess 1 pair of basal pores. Series umbilicata consisting of 15–16 setae.

Underside. Tooth of mentum half as long as lateral lobes. Abdominal sternites III–V with 2 setae. Anal sternite with 2 apical setae in male and 4 setae in female. In male, anal sternite with carina, bordering setose area; this area not rugose. In female, anal sternite weakly rugose around apical setae.

Aedeagus. Not examined.

Distribution. An Eastern Asian species known only from mountains in central Hokkaido.

Ecology. The species occurs in the mountain forests; it is not hygrophilous.

Taxonomic notes. I failed to examine the aedeagus of this species, because it was lost in the male specimen in my possession.

Pterostichus (Lenapterus) wellschmiedi
Kirschenhofer

Pterostichus (Lyperopherus) wellschmiedi Kirschenhofer, 1985 : 224. Type locality: Chekhov Mt., southern Sakhalin, Russian Far East.

Material. 1 ♂, “S Sakhalin, Chekhov Mt., *Pinus pumila* forest, 4.VII.1967, L. Molodova” (ZIN); 1 ♂, 2 ♀, same locality, 18.VI.1968, L. Molodova (ZIN); 2 ♂, 1 ♀, same locality, 1.VII.1968, L. Molodova (ZIN); 1 ♀, same locality, 500 m, VII.1968, L. Molodova (ZIN); 1 ♂, same locality, 6.VIII.1968, L. Molodova (ZIN); 2 ♂, same locality, 15.VIII.1968, L. Molodova (ZIN); 4 ♂, 3 ♀, same locality, VI.1970, L. Molodova (ZIN); 8 ♂, 8 ♀, same locality, VIII.1970, L. Molodova (ZIN); 2 ♂, 1 ♀, same locality, 18.VIII.1971, L. Molodova (ZIN); 14 ♂, 10 ♀, “S Sakhalin, Chekhov Mt., *Abies* forest, VII.1970, L. Molodova” (ZIN); 2 ♀, “S Sakhalin, Mt Chekhov, 19.VII.1990, E. Tarasov” (MSPU); 3 ♂, 3 ♀, same locality, 700–1000 m, 18.VI.1999, V. Zykov (cSUND); 2 ♂, 1 ♀, same locality, 700–1000 m, 5.VII.1999, V. Zykov (cSUND); 5 ♂, 7 ♀, “S Sakhalin, Susunai Range, Chekhov Mt., *Betula platyphylla* belt, 10.VIII–13.IX.2003, D. Kochetkov” (cSUND, cKOCH); 1 ♂, “S Sakhalin, Anivskii Distr., Mt Chekhov, 300 m, 1.VII.1988, E. Nesterov” (MSPU); 1 ♂, 1 ♀, “S Sakhalin, Korsakov Distr., 14 km SE of Novikovo Vill., 9.VI.1990, K. Makarov” (MSPU); same locality, 8.VI.1990, K. Makarov (MSPU); 1 ♂, 1 ♀, “Sakhalin, Korsakov Distr., Utesnoe Vill., 6–8.VII.1992, A. Basarukin” (cSUND); 2 ♂, “Sakhalin, SE part, Mereya River, ca 3 km from mouth, 28.VII.2001, Yu. Marusik” (ZIN).

Description. Coloration. Body black, tarsal claws brown; femora and tarsi usually black, less frequently, dark brown; elytra black or with weak bronze reflection.

Standard measurements. HW = 2.75–3.02 (2.89); HL = 1.80–2.05 (1.91); PA = 2.65–2.90 (2.75); PW = 3.76–4.10 (3.89); PB = 2.85–3.08 (2.98); PL(t) = 2.95–3.20 (3.06); PL(m) = 2.55–2.90 (2.81); EW = 4.60–5.10 (4.86); EL = 6.60–7.10 (6.90); L(s) = 11.35–12.30 (11.87); L = 12.9–13.4.

Head. Large, weakly convex, width with eyes 1.44–1.60 times length.

Pronotum (Fig. 5, 5). Reverse trapezoid, moderately transverse [PW/PL(t) = 1.25–1.30 (1.27), PW/PL(m) = 1.30–1.51 (1.39)], wider than head [PW/HW = 1.32–1.37 (1.35)], at base wider than at anterior margin [PB/PA = 1.03–1.13 (1.08)]. Anterior margin without edging. Sides moderately or weakly convex, uniformly rounded from anterior to posterior angles. Lateral bead wide, sides of disc widely flattened, strongly explanate posteriorly. Lateral groove indistinct, connected with outer basal fovea. Base without edging. Posterior angles obtuse-angular, distinct, with apices slightly rounded. Basal foveae narrow; inner fovea slightly longer than outer one. Tubercle between foveae rather large and moderately convex, bordered by depressions from all sides. Lateral bead flat or slightly reflexed at basal foveae. Anterior setiferous pore situated in lateral groove, distance between pore and lateral margin 1.0–1.5 times pore diameter. Disc uniformly and moderately convex. Punctuation present only in depressions of basal foveae.

Elytra. Moderately convex, short [EL/EW = 1.39–1.43 (1.42); EL/PL = 2.20–2.33 (2.25); EW/PW = 1.21–1.28 (1.25)]. Striae deep. Intervals strongly or moderately convex. Third interval usually with 4–5 discal pores; anterior pore situated near 3rd stria; other pores, usually near 2nd stria. Striae strongly sinuate. Even-numbered intervals frequently interrupted, odd-numbered intervals interrupted significantly less frequently; 7th interval always entire. Two basal pores present. Series umbilicata consisting of 17–21 setae.

Underside. Tooth of mentum half as long as lateral lobes. Abdominal sternites III–V with 2 setae. Anal sternite with 2 apical setae in male and 4 setae in female. In male, anal sternite with carina, bordering setiferous area; the latter smooth, only with several transverse rugulae. In female, anal sternite weakly rugose around apical setae.

Aedeagus. Figs. 2, 2; 6, 3.

Distribution. An Eastern Asian species known only from mountains of southern Sakhalin.

Ecology. The species occurs in the mountain forests at altitudes of 300–1000 m above sea level; is not hygrophilous.

Taxonomic notes. Sciaky (1996 : 433), after examination of long series from Sakhalin and Hokkaido, came to a conclusion that *P. wellschmiedi* is a junior synonym of *P. subrugosus*. Although I have examined only 2 specimens of *P. subrugosus* from Japan, I pre-

fer to follow the traditional concept of these species. In my opinion, morphological differences of the two Japan specimens from *P. wellschmiedi* from Sakhalin are sufficient for separation of *P. subrugosus* as a distinct species.

***Pterostichus (Lenapterus) punctatissimus* (Randall)**

Feronia punctatissima Randall, 1838 : 3. Type locality: Blue Mountains, Maine, USA.

Material. 1 ♂, "Hudson Bay," "1907 c. Tschitscherin" (ZIN); 1 ♂, "B. de Hudson," "*Feronia* sp. *Lyperopherus*," "1907 c. Tschitscherin" (ZIN); 1 ♂, "B. de Hudson," "6," "1907 c. Tschitscherin" (ZIN); 1 ♀, "Hudson Bay" (ZIN); 1 ♀, "Wt. Mts., N. H., Woods," "*Feronia punctatissima* Randall" (ZIN); 1 ♂, Mt Wn., N. H., "1907 c. Tschitscherin" (ZIN); 1 ♀, "Canada," "1907 c. Tschitscherin" (ZIN); 1 ♂, "Canada," "1907 c. Tschitscherin," "*punctatissima*" (ZIN); 1 ♀, "U. States," "*punctatissima* Rand.," "Ex Musaeo H.W. Bates 1892," "1907 c. Tschitscherin" (ZIN); 1 ♀, "1907 c. Tschitscherin" (ZIN); 1 ♀, "19941" (ZIN).

Description. Coloration. Black; tarsal claws reddish brown.

Standard measurements. HW = 3.00–3.20 (3.10); HL = 2.10–2.12 (2.11); PA = 3.00–3.15 (3.08); PW = 4.15–4.45 (4.30); PB = 3.25–3.65 (3.45); PL(t) = 3.35–3.80 (3.58); PL(m) = 3.15–3.32 (3.24); EW = 5.30–5.80 (5.55); EL = 7.75–8.35 (8.05); L(s) = 13.20–14.27 (13.74); L = 14.2–15.4.

Head. Large, convex, width with eyes 1.43–1.51 times length.

Pronotum (Fig. 5, 6). Trapezoid, narrow, moderately transverse [PW/PL(t) = 1.17–1.24 (1.21), PW/PL(m) = 1.32–1.34 (1.33)], wider than head [PW/HW = 1.38–1.39 (1.39)], at base slightly wider than at anterior margin [PB/PA = 1.08–1.16 (1.12)]. Anterior margin without edging. Sides weakly convex and weakly rounded, nearly straight to posterior angles in posterior half. Lateral bead narrow, sides of disc narrowly or moderately flattened, slightly explanate posteriorly. Lateral groove distinct, connected with outer basal fovea. Base without edging. Posterior angles obtuse-angular, distinct, with apices widely rounded. Basal foveae deep and wide, but short; inner fovea only slightly longer than outer one. Tubercle between foveae very small or absent. Outer basal fovea separated from lateral margin by keel. Anterior setiferous pore situated near lateral groove, distance

between pore and lateral margin 2.5–3.0 times pore diameter. Disc uniformly and moderately convex. Punctuation very weak and sparse, present in basal foveae or on flattened part of sides.

Elytra. Moderately convex, short [EL/EW = 1.44–1.46 (1.45); EL/PL = 2.20–2.31 (2.25); EW/PW = 1.28–1.30 (1.29)]. Striae moderately deep. Third interval with 4 discal pores; anterior pore situated near 3rd stria; other pores, usually near 2nd stria. Striae strongly sinuate. Even-numbered intervals frequently interrupted, odd-numbered intervals usually not interrupted. Two basal pores present. Series umbilicata consisting of 13–17 setae.

Underside. Tooth of mentum half as long as lateral lobes. Abdominal sternites III–V with 2 setae. Anal sternite with 2 apical setae in male and 4 setae in female. In male, anal sternite without carina; area around setae slightly depressed and more coarsely microreticulate, with meshes wider than those on rest of abdomen. In female, anal sternite around setae sculptured as rest of abdomen, with weak rugosity only close to setae.

Aedeagus. Figs. 2, 3; 6, 4.

Distribution. A North American species, distributed in taiga eastwards from the Rocky Mountains to New England in the south (Lindroth, 1966).

Ecology. The species occurs in dark coniferous and mixed forests, the beetles usually are found under bark and moss on stubs. In Labrador, *P. punctatissimus* occurs only on exposed soil. The distribution of this species is not limited by altitude (Lindroth, 1966).

Key to Species of the Subgenus Lenapterus

The following characters are most important for determination of species of the subgenus: the shape and structure of the pronotum; sculpture of elytra; and structure of the anal sternite of the abdomen. The shape of the aedeagus is rather uniform and could be used reliably only for determination of species-groups within the subgenus.

- 1(8). Striae of elytra straight or weakly sinuate; intervals not interrupted or partly interrupted and never split into high tubercles.
- 2(5). Lateral groove of pronotum distinct, separated from basal foveae by carina (occasionally keel-shaped) (Fig. 3, 3). Tooth of mentum shorter than in other species, 0.33 times as long as lateral lobes. In male, anal sternite of abdomen

with 2 median tubercles. Lamella of penis not hooked apically (Fig. 4, 1, 2).

- 3(4). Pronotum more transverse (PW/PLm = 1.40–1.57), much wider than head (PW/HW = 1.40–1.52), at base significantly wider than at anterior margin (PB/PA = 1.10–1.23). Posterior angles of pronotum very widely rounded apically (Fig. 3, 1, 2). Odd-numbered intervals of elytra noticeably or significantly wider than even-numbered ones. Elytra without basal pores. Microsculpture of elytra consisting of distinct isodiametric meshes. Femora reddish brown. Body length 10.8–12.0 mm *P. costatus* Mén.
- 4(3). Pronotum less transverse (PW/PLm = 1.28–1.41), wider than head (PW/HW = 1.30–1.41), at base narrower (PB/PA = 1.01–1.12). Posterior angles of pronotum not rounded and slightly blunted apically (Fig. 3, 3). All intervals of elytra usually of similar length. Elytra always with 2 basal pores. Microsculpture of elytra very fine, consisting of transverse meshes. Femora black. Body length 11.1–12.2 mm *P. saxicola* Tschitsch.
- 5(2). Lateral groove of pronotum indistinct, connected with outer basal fovea (Fig. 5, 1). Tooth of mentum longer, half as long as lateral lobes. In male, anal sternite without median tubercles. Lamella of penis hooked apically (Figs. 1, 3, 4; 5, 3–5).
- 6(7). Pronotum (Fig. 3, 4) much wider than head (PW/HW = 1.46–1.61), with sides uniformly convex from anterior to posterior angles, at base significantly wider than at anterior margin (PB/PA = 1.15–1.37). Lateral bead of pronotum very wide, sides of disc strongly flattened, posterior angles widely rounded apically. Distance between anterior setiferous pore and lateral margin 2.5–3.0 times pore diameter. Elytra frequently with weak bronze or violet reflection. Body length 9.7–11.2 mm *P. agonus* Horn.
- 7(6). Pronotum (Fig. 3, 5) weakly cordate, narrower (PW/HW = 1.23–1.33), at base approximately as wide as at anterior margin (PB/PA = 0.94–1.19). Lateral bead of pronotum narrow, sides of disc narrowly flattened, posterior angles rectangular or acute, not rounded, nearly pointed apically. Distance between anterior setiferous pore and lateral margin equal to pore diameter. Elytra always black. Body length 11.5–13.0 mm *P. galae* Farkač et Plutenko.

- 8(1). Striae of elytra strongly sinuate; most of elytral intervals interrupted along entire length, forming numerous and strongly convex tubercles.
- 9(14). Lateral bead of pronotum wide; sides of pronotum widely or very widely flattened, uniformly rounded from anterior to posterior angles (Fig. 5, 1, 3, 5).
- 10(11). Elytra without basal pores. Base of pronotum wider (PB/PA = 1.11–1.29). All intervals of elytra frequently interrupted, forming complicated irregular pattern. Body length 12.1–13.8 mm *P. vermiculosus* Mén.
- 11(10). Elytra with basal pores. Base of pronotum narrower (PB/PA = 1.03–1.19). Intervals on elytra less interrupted, odd-numbered intervals usually not interrupted.
- 12(13). Posterior angles of pronotum widely rounded apically. In female, apex of anal sternite usually with 5–9 setae. Distance between anterior setiferous pore of pronotum and lateral margin twice pore diameter. Eastern Siberian continental species. Body length 12.2–15.3 mm
..... *P. cancellatus* Motsch.
- 13(12). Posterior angles of pronotum weakly rounded apically. In female, apex of anal sternite usually with 4 setae. Distance between anterior setiferous pore of pronotum and lateral margin 1.0–1.5 times pore diameter. Southern Sakhalin. Body length 12.9–13.4 mm
..... *P. wellschmiedi* Kirschenh.
- 14(9). Lateral bead of pronotum narrow or very narrow; sides of pronotum narrowly flattened, uniformly rounded from anterior to posterior angles (Fig. 5, 4), or sinuate or straight before posterior angles (Figs. 3, 6; 5, 2, 6).
- 15(18). Sides of pronotum uniformly rounded from anterior to posterior angles (Fig. 5, 4), or straight in posterior half (Fig. 5, 6), not sinuate before posterior angles. Posterior angles of pronotum obtuse, narrowly rounded apically.
- 16(17). Sides of pronotum uniformly rounded from anterior to posterior angles (Fig. 5, 4). Pronotum weakly transverse (PW/PLm = 1.10–1.19), narrower (PW/HW = 1.16–1.23), at base slightly wider than at anterior margin (PB/PA = 1.01–1.04). Distance between anterior setiferous pore and lateral margin 1.5 times pore diameter. Elytra wide (EW/PW = 1.46–1.54). Japan. Body length 13.2 mm *P. subrugosus* Straneo.
- 17(16). Sides of pronotum straight in posterior part (Fig. 5, 6). Pronotum more transverse (PW/PLm = 1.32–1.34), wider (PW/HW = 1.38–1.39), at base noticeably wider than at anterior margin (PB/PA = 1.08–1.16). Distance between anterior setiferous pore and lateral margin 2.5–3.0 times pore diameter. Elytra narrow (EW/PW = 1.28–1.30). North America. Body length 14.2–15.4 mm *P. punctatissimus* Rand.
- 18(15). Pronotum weakly cordate, with sides usually sinuate before posterior angles. Posterior angles of pronotum usually rectangular, with apices pointed or finely denticulate (Fig. 3, 5; 5, 2).
- 19(20). Pronotum weakly cordate (sides moderately convex as far as basal foveae, then weakly sinuate or straight) (Fig. 3, 6); at base as wide as, or slightly wider than at anterior margin (PB/PA = 0.98–1.13). Distance between anterior setiferous pore and lateral margin 1.5 times pore diameter. Elytra longer (EL/PL = 2.31–2.53); series umbilicata consisting of 16–18 setae. Mandibles short and thick. Head with weakly, pronotum with strongly transverse microsculpture. Sikhotealin. Body length 12.5–14.0 mm
..... *P. gromyko* sp. n.
- 20(19). Pronotum nearly rectangular (sides weakly convex close to posterior angles and very shortly sinuate before latter) (Fig. 5, 2), wider at base than at anterior margin (PB/PA = 1.15). Distance between anterior setiferous pore and lateral margin equal to pore diameter. Elytra shorter (EL/PL = 2.30); series umbilicata consisting of 13–14 setae. Mandibles long and slender. Head with isodiametric, pronotum with weakly transverse microsculpture. North Korea. Body length 13.1 mm
..... *P. rugosipennis* Jedl.

Phylogenetic Analysis of the Subgenus Lenapterus

In my opinion, formation of the subgenus *Lenapterus* was geographically associated with Beringia and timed with the Miocene. It was in the Miocene that boreal vegetation of the taiga and tundra types was formed in northern Beringia, and the ancestral group of *Pterostichus* differentiated into the subgenera *Lenapterus* and *Eosteropus* Tschitschérine. Probably,

evolution of species of the subgenus *Eosteropus* was associated with the zone of “southern” deciduous forests [as shown in the analysis of the subgeneric range by Bousquet (1984)], while the evolution of *Lenapterus* was associated with the boreal vegetation. Close relationships between these two subgenera were noted by Nemoto (1989) and Berlov (1996) based on the similar chaetotaxy and the structure of the genitalia; I agree with these authors.

Analysis of the most important morphological characters (the structure of the pronotum, aedeagus, and anal sternite) makes it possible to distinguish two main phyletic lineages within the subgenus *Lenapterus*, formed not later than in the middle Miocene: the “*costatus*” group (*P. costatus* and *P. saxicola*) and the “*punctatissimus*” group, comprising all other species of the subgenus.

Speciation in the “*costatus*” group was associated with exploitation of different zones.

P. costatus was formed as a polar [actually hypoarctic—Ed.] tundra dweller (in the upper Miocene, these landscapes occupied vast territories in the northern Holarctic) and settled in the northern Eurasia and North America in the Pliocene (in the period of repeated appearance of a land bridge across the Bering Strait. *P. costatus* was found by Kiselev (1974, 1976) in the Kolyma Lowland in the sediments of the upper Pliocene.

P. saxicola was formed in the Eastern Asian taiga and was unable to colonize North America because of the complete separation of the taiga complexes of the Asian and American parts of Beringia in the Pliocene (Buks, 1976).

The second species group is more heterogeneous. In this group, *P. agonus* and *P. galae* are distinctly separated, whereas all the other species are very similar, forming a complex, which could be treated as the “*P. punctatissimus*” superspecies.

In this group, speciation also began not later than in middle Miocene: boreal species, closely related to *P. punctatissimus* and *P. agonus*, were described from the upper Miocene sediments in the Canadian Archipelago (Matthews, 1974). This fact presumes the separation of the “*P. punctatissimus*” complex from *P. agonus* 9–10 million years ago. Matthews (1979) also found *P. cf. vermiculosus* in the Lava Cape Mine, Alaska (Pliocene sediments), and Kiselev (1974, 1976) found *P. vermiculosus* of modern appearance in the

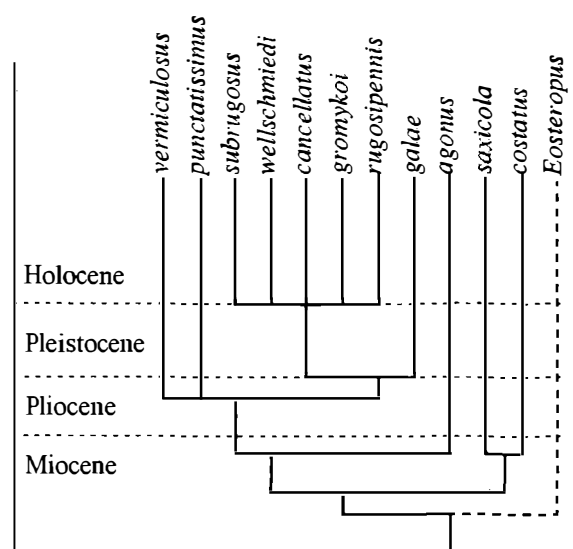


Fig. 7. Scheme of phylogeny of the subgenus *Lenapterus* O. Berlov, 1996.

lower and middle Anthropogene of the Kolyma Lowland. In that period, forests of temperate zone gradually disappeared from Beringia, being replaced first by dark coniferous forests and later, by the forest-tundra and tundra of the modern type. By the end of the Pliocene, when dark coniferous forests of North America and Eurasia completely separated, at least 3 species of the “*P. punctatissimus*” complex existed, namely, *P. cf. vermiculosus*, *P. cf. punctatissimus*, and *P. cf. cancellatus*. The subsequent evolution of species of the superspecies “*P. punctatissimus*” included only differentiation within *P. cf. cancellatus*. By the end of the Pleistocene, this species could occupy vast territories in Eastern Asia, because in this period taiga was spread over the entire territory of the Amur basin, Manchuria, Korea, Sakhalin, and Japan; Japan Islands and Sakhalin were connected with the continent. In the Holocene, the climate became warmer and sea regressions ceased. The range of dark coniferous forests significantly diminishes, and Japan and Sakhalin become isolated from the mainland. Some populations of *P. cf. cancellatus* become isolated from each other, which have resulted in the formation of extant species.

I associate the evolution of *P. galae* with the first half of the Pleistocene, when the climate became colder and the first wave of glaciation occurred. At this stage, representatives of the alpine Eastern Siberian fauna intensely spread southwards (Kurentsov, 1965). Repeated alterations of the warmer and colder climates resulted in the following restrictions and ex-

tentions of the range of boreal vegetation (Buks, 1976), which led to a complete isolation of the population of *P. galae* from the ancestral form and its adaptation to life in the stony mountain tundra habitats and change of the habitus.

A scheme of the phylogeny of the subgenus *Lenapterus* is given in Fig. 7.

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