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DESCRIPTIONS OF FIVE NEW SPECIES OF THE GENUS *CHRYSOLINA* MOTSCHULSKY IN JAPAN (Coleoptera: Chrysomelidae)

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According to Kimoto (1964), seven species of the genus *Chrysolina* Motschulsky, 1860, (Type-species: *Chrysomela staphylea* Linné) have been known to occur in Japan. In this paper will be added to the fauna of Japan five new species, of which the types are deposited in the collection of the Entomological Institute, Hokkaido University. Furthermore, having examined the type of *Chrysomela yezoensis* Matsumura, 1911, which has been suppressed as a synonym of *Chrysolina aurichalcea* (Mannerheim, 1825) by Kimoto, I have come to the opinion that *yezoensis* should be treated as a full species of *Chrysolina*.

On this occasion I wish to express my sincere thanks to Prof. C. Watanabe for his kind guidance. Thanks are also due to Dr. S. Kimoto, Dr. T. Nakane and Prof. M. Ohno for their kind help in various ways.

1. **Chrysolina aino** sp. nov.

Body long-oval, the dorsum being entirely cupreous, sometimes with a greenish luster. Pronotum convex dorsally, arcuate at lateral margin, broadest just anteriorly to middle and narrowed toward both ends, the lateral area being convex, bounded inwardly by dense, strong punctures. Elytron with punctures rather small and partly arranged in longitudinal rows. In female last visible sternite of abdomen produced into an ovipositor-like process, covered with long pygidium dorsally; aedeagus as shown in Figs. 6 & 15.

Length. 8-10 mm. (♂♀).

Japan: Hokkaido—Sapporo, 1♂ (holotype), 6♀♀, 17-VIII-68, T. Kocha leg. and 21♂♂, 12♀♀, VI～IX-65～68, H. Takizawa leg.; Nukabira, Tokati, 1♀, 17-VI-66, H. Takizawa leg.

Remarks. This species is very closely related to *Chrysolina angusticollis* (Motschulsky, 1860), but is distinguished from the latter by the colouration of the dorsal surface and by the shape of the aedeagus in the male. It should be noted that the larvae of these two species show marked differences: in the second and following stages the larva of *aino* is densely covered with distinct long setae on the dorsum, while that of *angusticollis* is almost glabrous. These larvae will be discussed in full detail in another paper.

Host plants: *Artemisia* sp., *Aster glehni*, *Cacalia hastata*, *Cirsium* sp., *Eupatorium chinense*, *Petasites japonicus*, *Senecio cannabifolius*, *Solidago Virgaurea* and *Astilbe thunbergii* var. *congesta*.

2. **Chrysolina lamii** sp. nov.

Body long-oval, indigo blue with a metallic luster. Head with frons and clypeus weakly and uniformly punctate; maxillary palpus with last segment distinctly broader than preceding one. Antenna inserted at middle between clypeus and eye, about one-third as long as body, 6th and following segments thickened and closely pubescent; 1st segment a little broader than half of length; 2nd half as long as 1st; 3rd a little shorter than 1st; 4th and 5th equal in size, each of which is shorter than 3rd; 6th as long as 5th, slightly dilated apically; 7th to 10th equal in size, each of which is dilated, shorter than 3rd and broader than half of its own length; 11th longest. Pronotum convex, evenly covered with weak punctures, twice as broad as long, broadest basally and narrowed anteriorly, the basal margin bieng sinuate, the anterior corner acute, the posterior corner rectangular and the lateral area convex dorsally and bounded inwardly by a group of large punctures which are contiguous to each other on the base of the pronotum. Scutellum impunctate apically, triangular and longer than broad. Elytron two and half times as long as broad, broadest at apical one-third, roundly narrowed toward apex and slightly narrowed toward base, evenly and strongly convex, with punctures which are large, deep and confused, the interstices being covered with small punctures; epipleuron ciliate on apical one-third. Hind wing well developed. Tarsi wholly pubescent beneath. Abdomen with last visible sternite truncate at apex; aedeagus broadened toward apex as shown in Figs. 12 & 21.

Length. 7-8 mm. (♂♀).

Japan: Hokkaido—Sapporo, 11♂♂ (one the holotype), 10♀♀, 28-V-65 and 9♂♂, 32♀♀, V～VII-65～68, H. Takizawa leg.; Tenninkyô, Kamikawa, 1♀, 12-VIII-65, H. Takizawa leg.; Toyotomi, Tesio, 1♀, 12-VII-68, H. Takizawa leg.; Kenebetu, Nemuro, 1♂, 4-VII-66, T. Kumata leg. Kurile Is.: Kunasiri I.—Tomari, 1♂, 1-VII-25, K. Doi leg.

Remarks. This species resembles *Chrysolina aurichalcea* (Mannerheim, 1825) in the shape of the body, but is distinguished from the latter by the robust antenna in both sexes, by the aedeagus broadened toward apex in the male and by the last visible abdominal sternite truncate at apex in the female.

Host plants: *Lamium album.*

3. **Chrysolina pirka** sp. nov.

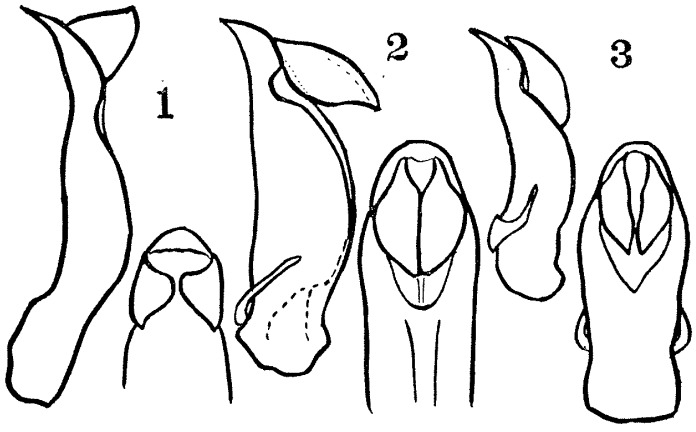
Body long-oval, dilated posteriorly, wholly granulate; colour variable, blackish blue, dark violaceous or dark green, always with dull reflections. Head covered with small punctures, the punctuation being sparser posteriorly, with frons well demarcated; maxillary palpus more robust in male than in female, with last segment distinctly broader and nearly as long as preceding one. Antenna somewhat brownish, about one-third as long as body, closely pubescent except for basal three or four segments, with apical six segments thickened; 1st segment club-shaped, a little shorter than 11th; 2nd globular and smallest; 3rd and 4th subequal in length; 5th a little shorter than 4th; 6th slightly thickened; 7th

to 10th thickened, subequal to each other in length; 11th longest, one and half as long as 10th. Pronotum convex, evenly and densely covered with small punctures, somewhat variable in shape, generally twice as broad as long, nearly parallel-sided on basal three-fifths, narrowed anteriorly, the basal margin being arcuate-sinuate, the anterior corner round, the posterior corner rectangular and the lateral area distinctly convex dorsally and bounded inwardly by a deep furrow on basal half and by a series of larger punctures anteriorly. Scutellum roundly triangular or rather pentagonal. Elytron two to two and half times as long as broad, broadest near middle, roundly narrowed toward apex, weakly but distinctly transversely rugose, with eleven rows of weakly impressed small punctures, the rows becoming indistinct posteriorly and the interstices gently convex with scattered minute punctures; epipleuron ciliate near apex. Hind wing vestigial. Tarsi dilated and wholly pubescent beneath, with three basal segments equal in breadth in male and with third segment broadest and the second narrowest in female. Abdomen with sternites distinctly punctate and rugose laterally; last visible sternite longer than preceding two combined, depressed on both sides and medially convex, with semi-circular impression at apex larger and deeper in male than in female; aedeagus complex, with a pair of large chitinized triangular plates before apical orifice dorsally as shown in Figs. 4 & 13.

Length. 8-10 mm. (♂♀).

Japan: Hokkaido—Mt. Taisetu-san, 1♂, VIII-26, T. Inukai leg.; Mt. Risiridake, 3♂♂, 9♀♀, 3～5-VIII-65, 30-VII-66 (one male the holotype) and 14～15-VII-68, H. Takizawa leg., 31-VII-69, M. Suwa leg.

Remarks. On account of the complex aedeagus and the last visible abdominal sternite which is longer than the preceding two combined and provided with a semi-circular impression, this species is to be referred to the *sylvatica* group



Figs. 1-3. Aedeagus (lateral & dorsal view) of:
1. *Chrysolina cavigera* (after Brown, 1962);
2. *C. sylvatica*; 3. *C. subcostata* (both 2 & 3, after Kontkanen, 1959).

occurring in northernmost Siberia and Alaska. From the three known species of the group, *Chrysolina sylvatica* (Gebler, 1823), *C. subcostata* (Gebler, 1848) and *C. cavigera* (J. Sahlberg, 1887), however, the present species is easily distinguished by the wholly granulate body and by the shape of the aedeagus as shown in Figs. 1-4 & 13.

Host plants: *Pedicularis* sp.

4. **Chrysolina porosirensis** sp. nov.

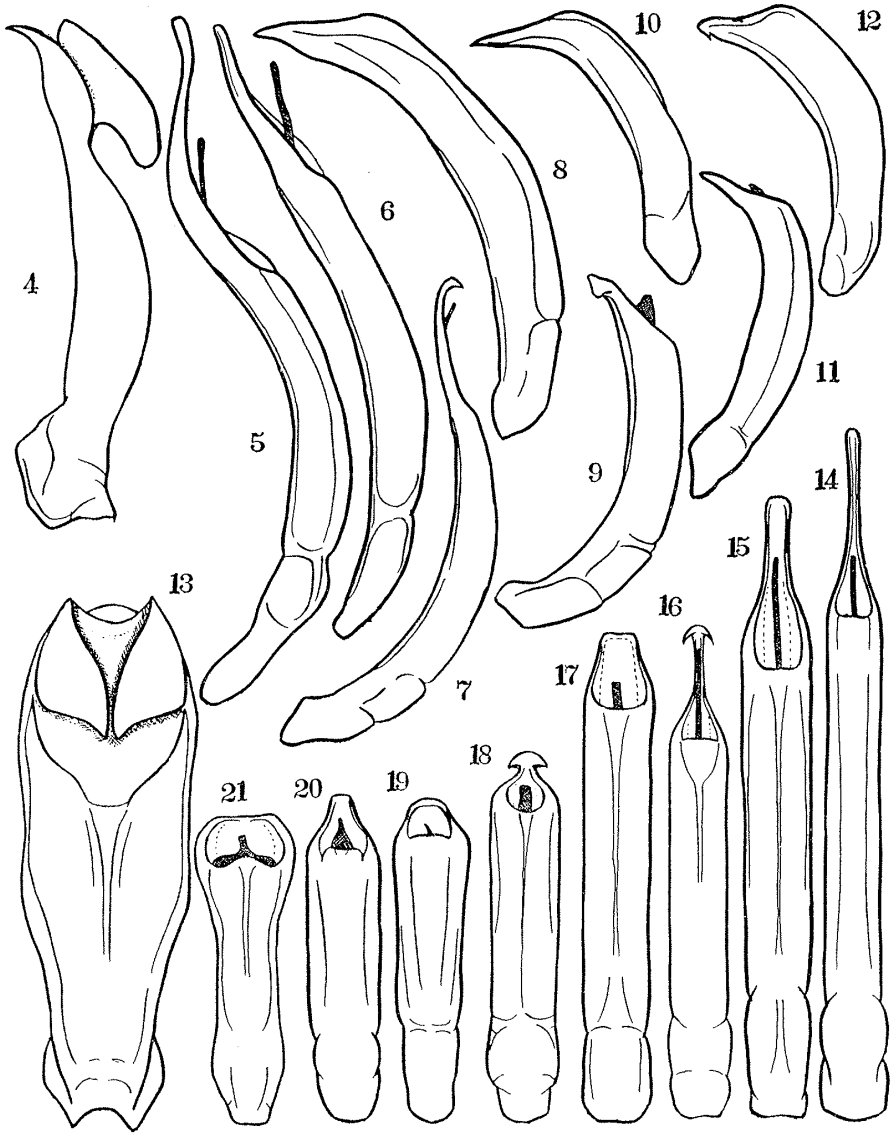
Body long-oval, entirely cupreous; head and pronotum sometimes dark bluish and elytra purplish blue. Head punctate and finely granulate. Antenna longer than one-third of body, reddish brown with first five segments rather dark and with apical six segments closely pubescent; 1st segment about half as broad as long; 2nd shortest, about half as long as 1st; 3rd as long as 1st: 4th and 5th equal in size, each of which is shorter than 3rd and half as broad as long; 6th to 10th equal in size, each of which is shorter than 3rd, half as broad as long in male and distinctly broader than preceding one in female; 11th longest, about one and half as long as 10th. Pronotum convex, arcuate at lateral margin, about twice as broad as long, broadest at middle and narrowed toward both ends, the anterior margin being arcuate-emarginate, the basal margin arcuate-produced, weakly sinuate near corners, the posterior corner almost rectangular and the lateral area moderately convex dorsally, bounded inwardly by a group of large punctures, which are contiguous to each other on the base of the pronotum; disc of pronotum finely granulate and covered with large or small punctures. Scutellum smooth, a little longer than broad. Elytron about one-third as broad as long, broadest at middle, moderately convex with strong, dense punctures which are entirely confused, with two smooth longitudinal lines which are sometimes raised; epipleuren with inner margin ciliate near apex. Hind wing vestigial. Tarsi slightly brownish. Abdomen with last visible sternite having a median shallow transverse depression in male, while in female it produced into an ovipositor-like process, which is brownish and covered with long pygidium dorsally; aedeagus anchor-shaped at apex as shown in Figs. 7 & 16.

Length. 7-8 mm. (♂♀).

Japan: Hokkaido—Porosiri-dake, Mts. Hidaka, 1♂ (holotype), 1♀, 10-VII-65, S. Umezawa leg.; Porosiri-dake, 9♂♂, 4♀♀, 20~22-VII-67, T. Kumata et al.; Hakuun-dake, Mt. Taisetu-san, 27-VII-65, T. Kocha leg.; Nukabira, Tokati, 1♂, 17-VI-66, on *Petasites japonicus*, H. Takizawa leg.

Remarks. This is closely related to *Chrysolina angusticollis* (Motschulsky, 1860) and *Chrysolina aino* (sp. nov.), but it is distinguished from those species by the smaller size and by the shape of the aedeagus of which the apex is anchor-shaped.

Host plants: *Petasites japonicus*.



Figs. 4-12. Aedeagus (lateral view) of: 4. *Chrysolina pirka*; 5. *C. angusticollis*; 6. *C. aino*; 7. *C. porosirensis*; 8. *C. watanabei*; 9. *C. aurichalcea*; 10. *C. nikkoensis*; 11. *C. yezoensis*; 12. *C. lamii*. Figs. 13-21, Aedeagus (dorsal view) of: 13. *C. pirka*; 14. *C. angusticollis*; 15. *C. aino*; 16. *C. porosirensis*; 17. *C. watanabei*; 18. *C. aurichalcea*; 19. *C. nikkoensis*; 20. *C. yezoensis*; 21. *C. lamii*

5. **Chrysolina watanabei** sp. nov.

Body long-oval, dark blue; pronotum and elytra reddish cupreous with metallic luster. Maxillary palpus with last segment broader than preceding one. Antenna

inserted nearer to clypeus than to eye, indigo blue, one-third as long as body, 6th and following segments thickened and closely pubescent; 1st segment about half as broad as long; 2nd shortest, about half as long as 1st; 3rd slender, as long as 1st; 4th and 5th equal in size, each of which is distinctly shorter than 3rd; 6th a little shorter than 5th; 7th to 9th equal in size, each of which is as long as 5th; 10th a little longer than 9th; 11th longest, one and half as long as 10th. Pronotum convex dorsally, arcuate at lateral margin, sparsely punctate medially, about twice as broad as long, broadest near middle and narrowed toward both ends, the basal margin being arcuate-produced, weakly sinuate near corners, the anterior corner round, the posterior corner almost rectangular and the lateral area moderately convex, bounded inwardly by a group of large punctures, which are sparser anteriorly and contiguous to each other on the base of the pronotum. Scutellum impunctate, roundly narrowed toward apex, with a metallic bluish luster. Elytron two-fifths as broad as long, broadest at middle, roundly narrowed toward both ends, strongly and evently convex, with punctures dense and partly arranged in longitudinal rows, with two or three longitudinal lines distinct, the interstices being scattered with small punctures; epipleuron ciliate near apex. Hind wing vestigial. Tarsi wholly pubescent beneath. Abdomen with last visible sternite strongly convex downward in female; aedeagus as shown in Figs. 8 & 17.

Length. 7.5-8.0 mm. (♂♀).

Japan: Hokkaido—Moiwa-yama, Sapporo, 9♂♂ (one the holotype), 2♀♀, 10-VIII-66, H. Takizawa leg.; Sapporo, 8♂♂, 18♀♀, V～VIII-66～67, H. Takizawa leg.; Mt. Taisetu-san, 1♂, 27-VII-65, T. Kocha leg.; Risiri-dake, 1♂, 1♀, 3-VIII-65, H. Takizawa leg. Sakhalin: Itinosawa, 1♀, 10-VII-24, S. Takano & K. Tamanuki leg.

Remarks. On account of the shape of the last abdominal sternite in the female, this species is closely related to *Chrysolina aurichalcea* (Mannerheim, 1825), from which it is distinguished by the absence of the hind wing and by the absence of the apical process of the aedeagus. It is variable in colour: dorsum entirely indigo blue to reddish cupreous; each abdominal sternite sometimes orange yellow at posterior margin.

Host plants: *Aster glehni*.

5. **Chrysolina yezoensis** (Matsumura)

Chrysomela yezoensis Matsumura, Jour. Coll. Agr., Tohoku Imp. Univ. 4: 149, 1911.
Chrysolina yessoensis [sic]: Chen, Notes Ent. chin., Mus. Heude, 3(5): 73, 1936.
Chrysolina shikokensis Nakane, Fragm. Coleopterol. Kyoto, 5: 19, 1960. **Syn. nov.**

Body long-oval, violaceous to blackish blue, the dorsum being covered with punctures. Pronotum with lateral area bounded inwardly by a group of large punctures anteriorly and by a deep groove posteriorly, the disk being evenly punctate. Elytron with punctures arranged in regular geminate rows, which become indistinct posteriorly on account of dense punctuation of interstices.

Aedegaus subquadrate at apex as shown in Figs. 11 & 20.

Length. 7.0-8.5 mm. (♂♀).

Sakhalin: Galkinowraskö, 2♂♂ (syntypes of *Chrysomela yezoensis*), 29-VII-11, K. Oguma leg.; Konuma, 1♀, 23-VII-30, C. Watanabe & T. Inoue leg.; Ohtani, 2♂♂, 1♀, 22-VIII-30, Adachi & Issik ileg. Japan: Hokkaido—Sapporo, 1♂, (syntype of *yezoensis*), no date, S. Matsumura leg. and 1♂, 5♀♀, VI～VII-66～68, H. Takizawa leg.; Toyotomi, Tesio, 1♂, 2♀♀, 12-VII-68, H. Takizawa leg.

Remarks. Having compared the type of *Chrysolina shikokensis* with that of *Chrysomela yezoensis* I have been convinced that *shikokensis* should be suppessed as a synonym of *yezoensis*. Although Kimoto (1964) has suppressed *yezoensis* as a synonym of *Chrysolina aurichalcea* (Mannerheim), *yezoensis* is closely related to *Chrysolina nikkoensis* (Jacoby, 1885) rather than *aurichalcea*. This species is, however, distinguished from *nikkoensis* by the punctures on the disc of the pronotum dense and distinct, by the punctures in the elytral interstices larger and denser, and by the shape of the aedeagus.

Host plants: *Hypericum* sp.

List of the Japanese species of *Chrysolina*

In the course of the present study the following thirteen species of *Chrysolina* have been known to occur in Japan.

1. *Chrysolina aeruginosa* (Faldermann)
   Acad. St. Petersburg, Mem. 2: 440, 1835 (*Chrysomela*).
   Distribution: Japan (Hokkaido, Honshu), E. Siberia, Mongolia, Tibet and N. China.
2. *Chrysolina aino* sp. nov.
   Distribution: Japan (Hokkaido).
3. *Chrysolina angusticollis* (Motschulsky)
   Etud. Ent. 9: 23, 1860 (*Apterosoma*).
   Distribution: Japan (Hokkaldo; Honsyu?), E. Siberia and Manchuria.
4. *Chrysolina aurichalcea* (Mannerheim)
   Humel's Essais Ent. 4: 39, 1825 (*Chrysomela*).
   Distribution: Japan (Hokkaido; Honsyu; Sikoku; Kyusyu), Ryukyu Is., Siberia, Mongolia, China, Tonkin, Burma, Taiwan, Korea, Manchuria and Sakhalin.
5. *Chrysolina exanthematica* (Wiedemann)
   Germar's Mag. Ent. 4: 178, 1821 (*Chrysomela*).
   Distribution: Japan (Hokkaido; Honsyu; Sikoku; Kyushu), Siberia, Manchuria, China, Korea and India.
6. *Chrysolina lamii* sp. nov.
   Distribution: Japan (Hokkaido) and Kurile Is. (Kunasiri I.).
7. *Chrysolina* nikkoensis (Jacoby)
   Zool. Soc. Lond., Proc. 1885: 207, 1855 (*Chrysomela*).
   Distribution: Japan (Honsyu).
8. *Chrysolina nikolski* (Jacobson)

Mus. Petersburg, Ann. 2: 200, 1898 (*Chrysomela*).
Distribution: Japan (Hokkaido), E. Siberia, Kuriles and Sakhalin.

9. *Chrysolina pirka* sp. nov.
Distribution: Japan (Hokkaido).

10. *Chrysolina porosirensis* sp. nov.
Distribution: Japan (Hokkaido).

11. *Chrysolina virgata* (Motschulsky)
Schrenck's Reisen Amurl, 2: 224, pl. 11, fig. 8, 1860 (*Dlochrysa*).
Distribution: Japan (Honsyu), E. Siberia, Manchuria, N. China and Korea.

12. *Chrysolina watanabei* sp. nov.
Distribution: Japan (Hokkaido) and Sakhalin.

13. *Chrysolina yezoensis* (Matsumura)
Jour. Coll. Agr., Tohoku Imp. Univ. 4: 149, 1911 (*Chrysomela*).
Distribution: Japan (Hokkaido; Sikoku) and Sakhalin.

In conclusion, the above-listed species occuring in Japan may be distinguished by the following key:-

Key to the Japanese species of *Chrysolina*

1. Hind wings well developed. 2
- Hind wings lacking or vestigial. 8
2. Elytra punctate throughout. 3
- Elytra with shiny, impunctate patches in regular longitudinal rows. ..... 5. *exanthematica* (Wiedemann)
3. Punctures in elytra arranged in more or less geminate rows. 4
- Punctures in elytra entirely confused or partly arranged in longitudinal rows. 6
4. Antenna inserted at middle between eye and clypeus; body above blue with violaceous, indigo or blackish tinge; aedeagus narrow, quadrate or round at apex without apical groove 5
- Antennal insertion close to clypeus; body above bronzy with bluish luster; aedeagus rather broadly truncate at apex, with a transverse groove on ventral side apically. ..... 1. *aeruginosa* (Faldermann)
5. Elytral punctures in geminate rows posteriorly somewhat indistinct, with punctures in interstices larger; punctures on disc of pronotum small, dense and distinct; body above indigo blue; aedeagus as shown in Figs. 11 & 20. ..... 13. *yezoensis* (Matsumura)
- Punctures in elytral interstices smaller; punctures on disc of pronotum small, weak and indistinct; body above blackish blue with metallic luster; aedeagus as shown in Figs. 10 & 19 ..... 7. *nikkoensis* (Jacoby)
6. Larger species, 11-15 mm. in length; body purplish blue or golden striped with green ground colour dorsally ..... 11. *virgata* (Motschulsky)
- Smaller species, 7-10 mm. in length; body cupreous or bluish dorsally. 7
7. Antennae slender; last abdominal sternite of female strongly convex downward; aedeagus with lateral processes as shown in Figs. 9 & 18; body above cupreous or blackish blue. ..... 4. *aurichalcea* (Mannerheim)

- Antennae rather robust abdominal sternite in both sexes flat; aedeagus broadened to apex, without lateral processes as shown in Figs. 12 & 21; body indigo blue dorsally. ..... 6. *lamii* sp. nov.

8. Punctures in elytra small and weak, arranged in longitudinal rows; body wholly granulate, dark green, dark violaceous or blackish blue always with dull reflections; last abdominal sternite longer than the preceding two combined, with semi-circular impression at apex. ..... 9. *pirka* sp. nov.
- Punctures in elytra entirely confused or partly arranged in longitudinal rows. 9

9. Pronotum convex with a longitudinal furrow laterally, the inside of which is irregularly punctate. 10
- Pronotum evenly convex without furrow; body wholly granulate, violaceous blue or greyish green dorsally. ..... 8. *nikolskyi* (Jacobson)

10. Last abdominal sternite of female with a long ovipositor-like process, which is wholly covered with long pygidium dorsally; aedeagus produced at apex. 11
- Last abdominal sternite of female strongly convex downward; aedeagus as shown in Figs. 8 & 17. ..... 12. *watanabei* sp. nov.

11. Larger species, 8-12 mm. in length; body cupreous or dark blue dorsally; aedeagus slender. 12
- Smaller species, 7-8 mm. in length; body entirely cupreous dorsally; head and pronotum sometimes dark bluish and elytra purplish blue; aedeagus anchor-shaped at apex as shown in Figs. 7 & 16. ..... 10. *porosirensis* sp. nov.

12. Body entirely cupreous dorsally; aedeagus rather robust at apex as shown in Figs. 6 & 15. ..... 2. *aino* sp. nov.
- Body entirely dark blue dorsally, with dark violaceous tinge; elytra weakly shagreened posteriorly in female; aedeagus slender at apex as shown in Figs. 5 & 14. ..... 3. *angusticollis* (Motschulsky)

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