

A review of the *Aphodius* Illiger, 1798 subgenus *Chilothorax* Motschulsky, 1859 (Coleoptera: Scarabaeidae) of China

Обзор подрода *Chilothorax* Motschulsky, 1859 рода *Aphodius* Illiger, 1798 (Coleoptera: Scarabaeidae) Китая

A.V. Frolov
А. В. Фролов

Zoological Institute, Russian Academy of Sciences, Univesitetskaya nab. 1, St.Petersburg 199034 Russia.

Зоологический институт Российской Академии Наук, Университетская наб. 1, Санкт-Петербург 199034 Россия.

E-mail: avfrolov@mail.ru.

KEY WORDS: Scarabaeidae, *Aphodius*, *Chilothorax*, new species, keys, China.

КЛЮЧЕВЫЕ СЛОВА: Scarabaeidae, *Aphodius*, *Chilothorax*, новые виды, определительная таблица, Китай.

ABSTRACT: Representatives of *Aphodius* Illiger, 1798, subgenus *Chilothorax* Motschulsky, 1859, of China are reviewed and a key to species is presented. One new species, *A. potanini* Frolov, sp.n., is described and *A. kukunorensis* Semenov, 1898 is re-described.

РЕЗЮМЕ: Дан обзор и определительная таблица видов подрода *Chilothorax* Motschulsky, 1859 рода *Aphodius* Illiger, 1798, обитающих в Китае. Дано переописание *A. kukunorensis* Semenov, 1898. Описан новый вид *A. potanini* Frolov, sp.n.

Introduction

Scarab beetles of the genus *Aphodius* Illiger, 1798 occurring in China are difficult to identify because they are very diverse and have been poorly studied. In the present article, the Chinese members of the subgenus *Chilothorax* Motschulsky, 1859 are reviewed, and one new species is described. Because many distinctive characters are missing in the original description of *A. kukunorensis* Semenov, 1898, this species is re-described.

This study is based on material collected during some Central Asian expeditions organized by the Russian Geographical Society at the end of the 19th and beginning of the 20th centuries, and deposited in the collection of Zoological Institute. Additional material loaned from Czech colleagues was also examined.

Abbreviations as follows: DKCP — David Král's collection, Praha, Czechia; MNPC — collection of Museum of Natural History, Praha, Czechia; RCCP — Radek Červenka's collection, Praha, Czechia; ZISP — collection of Zoological Institute, Russian Academy of Sciences, St. Petersburg, Russia.

Localities

In order to define type and collection localities more exactly I compared the label data with the itineraries of

the expeditions [Potanin, 1893; Kozlov, 1902]. Specific collecting localities are listed below and are numbered for easy reference within the following species discussions.

G.N. Potanin's expedition in Gansu (1884–1886).

1. "Kan-ssa, 24.V.1885" — Kadigar (Kadiger) Cloister (35°5'N 103°E), ca. 150 km SSW of Lanzhou.

B.L. Grombcewsky's expedition in south-western area of Central Asia (1889–1890).

2. "Полу, 1.VI.1890" — Pulu (36°10'N 81°30'E), N slope of Kunlun Ridge, Xinjiang Uygur autonomous region.

M.V. Pevtsov's expedition in Tibet (1889–1890).

3. "Карасай, хр. Русский, V.1890" — Karasay (36°50'N 83°50'E), N slope of Kunlun, Xinjiang Uygur autonomous region.

P.K. Kozlov's expedition in Mongolia and Tibet (1899–1901) (Qinghai province).

4. "Предгорья хр. Бурхан-Будда, ущелье Номохун, 17.V.1900" — N slope of Burhan Budai Shan, ca. 20 km S of Barun (36°10'N 97°20'E).

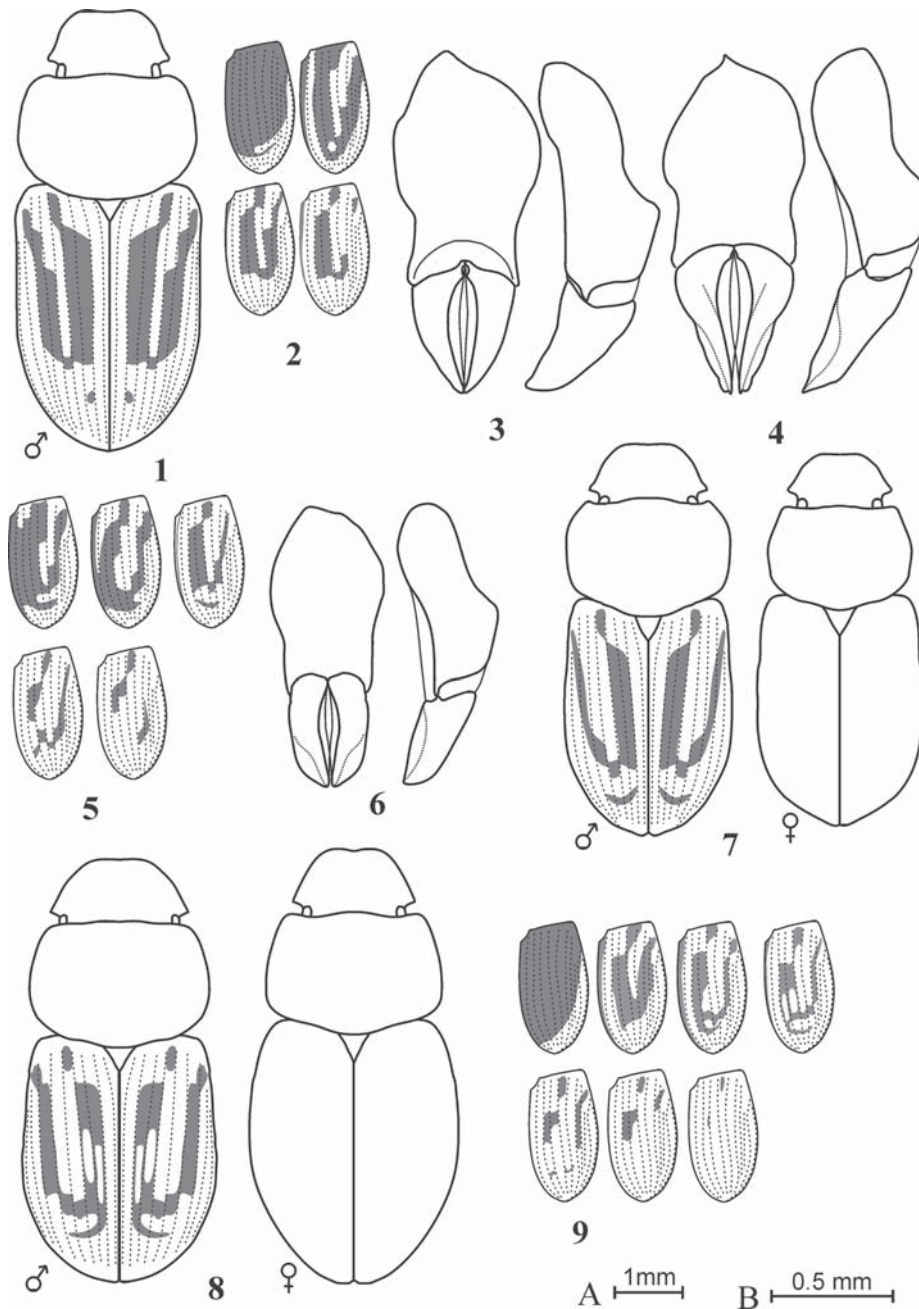
5. "Южный склон хр. Бурхан-Будда, долина оз. Алык-Нор, 30.V.1900" — N slope of Burhan Budai Shan, valley of Alag Hu (Alyk-Nor) [lake] (35°30'N 96°50'E).

6. "Горы Амнэн-кор, 13–14.500', начало VI.1900" — A'nyemaqen Shan Mts., beginning of VI.1900.

7. "Долина озера, верхн. Хуан-хэ, конец VI.1900" — valley of Ngoring Hu (Orin-Nor) [lake] (35°N 98°E), end of VI.1900.

8. "Долина реки Джагын, начало VII.1900" — valley of Dzhagyn River (34°30'N 98°40'E), beginning of VII.1900.

9. "Левый приток р. Бы-чу, 14.000', VII.1900" — left tributary of By-chu River, S slope of Bayan Har Shan (34°N 96°30'E).



Figs. 1–9. 1, 2, 3 — *A. kukunorensis*; 5, 6, 7 — *A. sinicus*; 4, 8, 9 — *A. dzongensis*; 1, 7, 8 — habitus; 2, 5, 9 — elytral pattern; 3, 4, 6 — aedeagus in dorsal and lateral view. A — scale for figs. 1, 7, 8; B — for figs. 3, 4, 6.

Рис. 1–9. 1, 2, 3 — *A. kukunorensis*; 5, 6, 7 — *A. sinicus*; 4, 8, 9 — *A. dzongensis*; 1, 7, 8 — габитус; 2, 5, 9 — рисунок на надкрыльях; 3, 4, 6 — эдеагус сверху и сбоку. А — масштаб для рис. 1, 7, 8; В — для рис. 3, 4, 6.

10. “Бассейн Голубой реки, долина р. Дза-чю, 12–13.000', V.1901” — Chang Jiang basin, valley of Dza-chu River (32°40'N 98°50'E).

11. “Бассейн Желтой реки, долина р. Сэрг-чю, 13.500', конец V.1901” — Huang He basin, S slope of Bayan Har Shan, valley of Serg-chu River (34°15'N 98°20'E), end of V.1901.

12. “Тибетское нагорье, бассейн Желтой реки, конец V.1901” — same as No. 11.

KEY TO THE *CHILOTHORAX* OF CHINA

1. Elytral intervals shagreened; body smaller (4.0–4.5 mm); elytra with longitudinal brown maculae on intervals 3–8 (Figs. 22, 23); apices of parameres with very long, feebly sclerotized processes (Fig. 24)..... *A. bistriga* Reitter
- Elytral intervals shiny; most of species longer (4.5–7.0 mm); apices of parameres lacking processes, or with short processes..... 2

2. Genae more or less rounded or obtuse; elytra maculate (Figs. 11, 15, 19); disc of metasternum pubescent or glabrous 3
 — Genae acute-angled or right-angled; elytra often dark brown, yellowish apically and laterally, or yellowish brown with dark brown maculae (Figs. 2, 5, 9); disc of metasternum pubescent 5
3. Disc of metasternum glabrous; apices of parameres wider, without processes 4
 — Disc of metasternum pubescent (setae may be abraded in some individuals); apices of parameres narrow, acute, with feebly sclerotized processes (Fig. 12)
 *A. potanini* Frolov, sp.n.
4. Body wider (Fig. 18); fore tibia of ♂ relatively slender and parallel-sided, its inner margin slightly convex, fore tibial spur short (Fig. 21); apices of parameres narrower in lateral aspect (Fig. 20)
 *A. praenubilis* Balthasar
 — Body narrower (Fig. 14); fore tibia of male of typical shape, its inner margin slightly concave, fore tibial spur long (Fig. 17); apices of parameres wider in lateral aspect (Fig. 16) *A. altaicus* Nikolajev (♂)
5. Apices of parameres acute in lateral aspect (Fig. 4)
 *A. dzongensis* Petrovitz (♂)
 — Apices of parameres more or less rounded in lateral aspect 6
6. Parameres nearly parallel-sided in dorsal aspect (Fig. 6)
 *A. sinicus* Červenka (♂)
 — Parameres tapering from base to apex in dorsal aspect (Fig. 3) *A. kukunorensis* Semenov (♂)

Aphodius (Chilothorax) altaicus Nikolajev, 1984
 Figs. 14–17.

Material examined. **Qinghai**: 18 spm. with label No. 5; 1 spm. with label No. 6; 1 spm. with label No. 4; 24 spm. with label No. 12; **Xinjiang Uygur autonomous region**: 1 spm. with label No. 3 (ZISP).

DISTRIBUTION. This species was described from Mongolia (Gov'-Altaj: Ich Bogd mountains); it is recorded from China for the first time.

Aphodius (Chilothorax) praenubilis Balthasar, 1933
 Figs. 18–21.

Material examined. **Xinjiang Uygur autonomous region**: 36 spm. with label No. 2; 29 spm. with label No. 3 (ZISP).

DISTRIBUTION. Tien-Shan, Kunlun mountains.

Aphodius (Chilothorax) huangyuanensis Červenka, 1994

This species was described from northeastern Tibet (Qinghai: 40 km S of Huangyuan). Unfortunately, I had no opportunity to examine the type of the species. According to the characters given in the original description, it cannot be distinguished from *A. praenubilis*, and the two may prove to be conspecific.

Aphodius (Chilothorax) kukunorensis Semenov, 1898
 Figs. 1–3.

Material examined. Holotype ♂ with label No. 1. **Qinghai**: 4 ♂♂ with label No. 12 (ZISP).

REDESCRIPTION. Male (Fig. 2). Body length 6.0 mm. Head black, shiny, densely punctate (punctures separated by

0.5 to 1.5 times their diameter), with traces of frontal tubercles; frontoclypeal suture indistinct. Clypeus wide, slightly sinuate in middle, rounded at sides. Genae acute-angled. Distance between eye and gula approximately 1.5 times the width of eye in ventral view.

Pronotum black, shiny, with finely bordered sides and base and unbordered anterior margin, with double punctation on disc (big punctures 2 times larger than small ones; small punctures separated by 1.5 to 2.5 times their diameter). Posterior angles of pronotum obtuse. Fore angles of pronotum pale brown, sides slightly paler than disc.

Scutellum dark brown, shiny, coarsely punctate on base.

Elytra shiny, without humeral denticles, yellowish brown with longitudinal dark brown maculae (Fig. 2). Elytral intervals slightly convex, punctate (punctures separated by 2 to 3 times their diameter on disc, becoming denser towards apices). Sutural intervals pale brown, suture dark brown. Striae fine, punctate (diameter of punctures slightly bigger than width of striae, punctures separated by 3 to 4 times their diameter). Apices and sides of elytra with short, but distinct setae.

Legs brown. Apical spur of anterior tibia acute and slightly curved downward and outward, reaching middle of second tarsal segment. Apical spurs of middle tibia slender and acute; lower spur 1/3 shorter than upper. First segment of hind tarsi equal in length to upper spur of tibia and slightly longer than 2 following segments together. Apical setae of hind and middle tibiae unequal and relatively short.

Disc of metasternum slightly concave, coarsely punctate on the margin, glabrous (setae may be abraded). Apices of parameres more or less rounded in lateral aspect (Fig. 3).

Female unknown.

DIFFERENTIAL DIAGNOSIS. This species is very similar to following two species. It can be reliably separated from *A. dzongensis* by the apices of parameres more or less rounded in lateral aspect. It is more difficult to separate it from *A. sinicus*, and the study of additional material may show that the diagnostic character used to separate the species in the key, is actually within the limits of variation of one species.

DISTRIBUTION. This species, as well as two following, are endemic to Tibet.

Aphodius (Chilothorax) dzongensis Petrovitz, 1976
 Figs. 4, 8–9.

Material examined. **Qinghai**: 9 spm. with label No. 8; 1 spm. with label No. 9; 1 spm. with label No. 6 (ZISP); Qingshuihe (33° 50'N 97°5'E), 4200 m, 1–5.VII.1992, 28 spm. (Z. Molek) (RCCP); Daotanghe (36°25'N 100°55'E), 25–27.VII.1992, 2 spm. (DKCP).

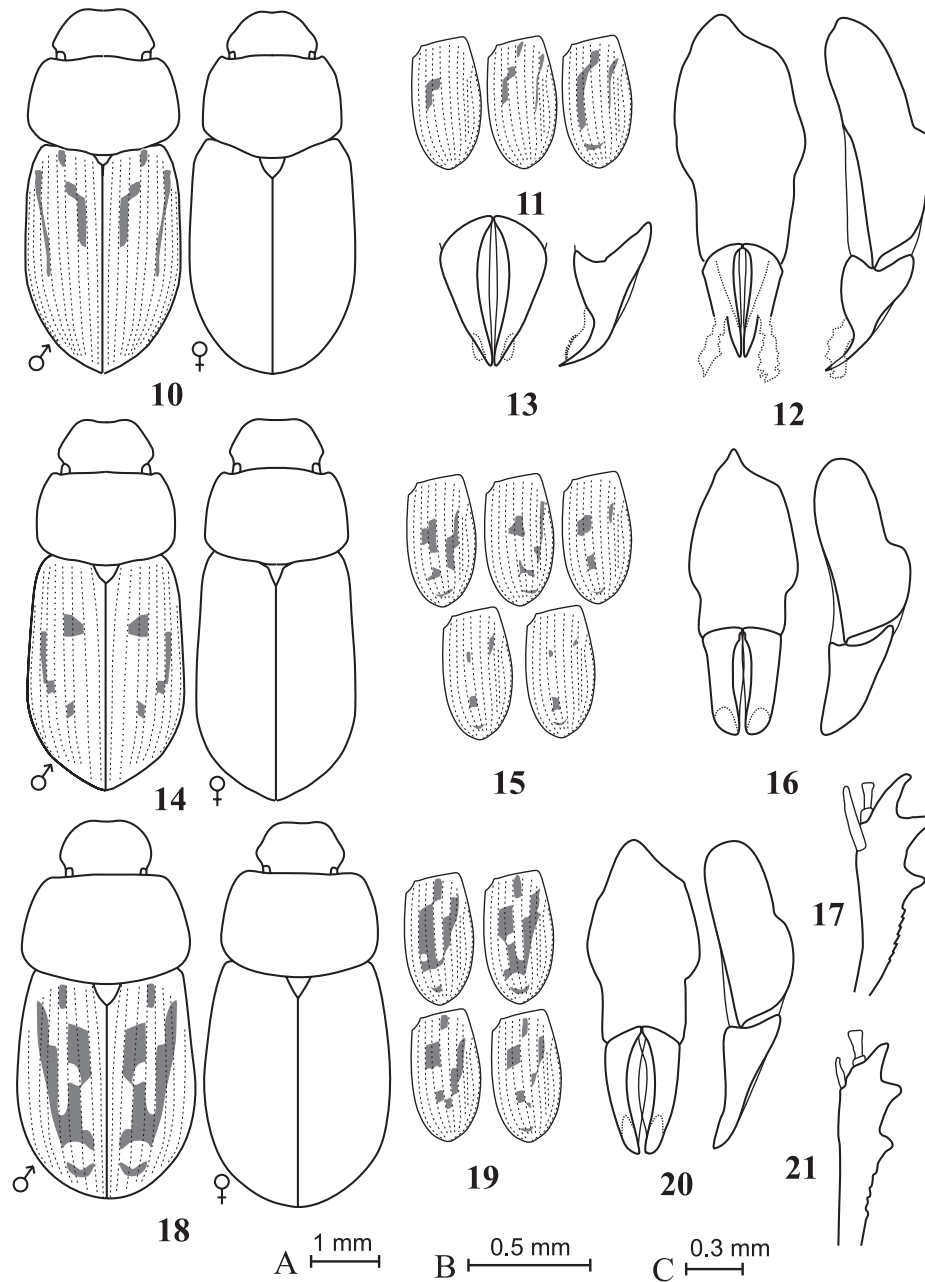
Aphodius (Chilothorax) sinicus Červenka, 1994
 Figs. 5–7.

Material examined. **Qinghai**: 5 paratypes (2 ♂♂ and 3 ♀♀), 120 km W of Qinghai Hu [lake], Tianjun (37°10'N 99°E), 3500 m, 3–4.VII.1990, (Nikodym) (RCCP); 6 spm. with label No. 7; 1 spm. with label No. 12 (ZISP); Chaxalung (34°5'N 97°45'E), 4000 m, 19.VII.1992, 4 spm. (DKCP); eastern Qilian Shan (Nan Shan) mts., 4200 m., 29.VII–1.VIII.1992, 1 spm., (J. Kalab) (DKCP).

Specimens examined differ slightly from *A. kukunorensis* in being smaller, having the pronotum relatively wider and having the apices of the parameres wider in dorsal aspect.

Aphodius (Chilothorax) bistriga Reitter, 1900
 Figs. 22–24.

Material examined. **Qinghai**: Qilian Shan, Tenkor, 10.V.1951, 1 spm. (P. Eichinger) (MNPC); **Gansu**: Xiahe, 3000–3900 m,



Figs. 10–21. 10, 11, 12 — *A. potanini* sp.n.; 13 — *A. tanbensis*, parameres in dorsal and lateral view; 14, 15, 16, 17 — *A. altaicus*; 18, 19, 20, 21 — *A. praenubilis*; 10, 14, 18 — habitus; 11, 15, 19 — elytral pattern; 12, 16, 20 — aedeagus in dorsal and lateral view; 17, 21 — fore tibia of ♂. A — scale for figs. 10, 14, 18; B — for figs. 12, 13, 16, 20; C — for figs. 17, 21.

Рис. 10–21. 10, 11, 12 — *A. potanini* sp.n.; 13 — *A. tanbensis*, парамеры сверху и сбоку; 14, 15, 16, 17 — *A. altaicus*; 18, 19, 20, 21 — *A. praenubilis*; 10, 14, 18 — габитус; 11, 15, 19 — рисунок на надкрыльях; 12, 16, 20 — эдеагус сверху и сбоку; 17, 21 — передняя голень самца. А — масштаб для рис. 10, 14, 18; В — для рис. 12, 13, 16, 20; С — для рис. 17, 21.

20.V.1991, 1 spm. (Paulus) (DKCP); 25 km E of Xiahe, 2805–2925 m, 3.VIII.1994, 2 spm. (Smetana) (ZISP).

DISTRIBUTION. Known only from Tibet.

Aphodius (Chilothorax) potanini Frolov, sp.n.

Figs. 10–12.

Material. Holotype ♂ with label No. 10; 3 paratypes: ♂ with label No. 11), ♂ and ♀ with label No. 7 (ZISP). Type specimens

supplied with red labels "Holotypus [Paratypus] *Aphodius potanini* A. Frolov det. 2000".

DESCRIPTION. Holotype ♂. Body length 5.2 mm. Head dark brown, shiny, punctate (punctures separated by 0.5 to 1.5 times their diameter), without frontal tubercles. Clypeus wide, indistinctly sinuate in middle, rounded at sides. Frontoclypeal suture indistinct. Genae obtuse, slightly protruding past eyes. Minimum distance between eye and gula approximately the same as the width of eye in ventral view.

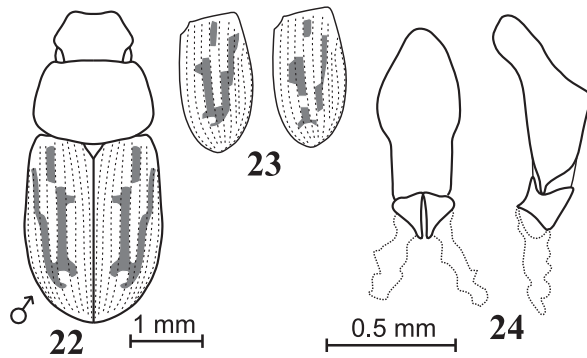


Fig. 22–24. *A. bistriga*. 22 — habitus; 23 — elytral pattern; 24 — aedeagus in dorsal and lateral view.

Рис. 22–24. *A. bistriga*. 22 — габитус; 23 — рисунок на надкрыльях; 24 — эдеагус сверху и сбоку.

Pronotum shiny, dark brown on disc, with yellowish brown sides, with double, dense puncturation on disc (big punctures 2 times larger than small ones in diameter; small punctures separated by 1 to 3 times their diameter). Anterior margin unborded, lateral margins and base finely bordered. Posterior angles of pronotum obtusely rounded.

Scutellum wide triangular, shiny, dark brown, punctate on base.

Elytra shiny, yellowish brown with longitudinal dark brown maculae on intervals 3, 5, and 7, without humeral denticles. Striae fine, densely punctate (diameter of punctures slightly bigger than width of striae, punctures separated by 1 to 1.5 times their diameter).

Elytral intervals flat, densely punctate (punctures separated by 1.5 to 2 times their diameter). Sutural intervals pale

brown, suture dark brown. Apices and sides of elytra with short, pale setae.

Apical spur of anterior tibia acute and curved downward, reaching middle of second tarsal segment. Apical spurs of middle tibia slender and acute; lower spur 1/3 shorter than upper. First segment of hind tarsi equal in length to upper spur of tibia and slightly longer than 2 following segments together. Apical setae of hind and middle tibiae relatively short and unequal.

Disc of metasternum slightly concave, punctate, pubescent with short, pale setae.

Apices of parameres slender and acute, with relatively long processes.

Female differs from ♂ in narrower pronotum and more densely punctate pronotum and head.

Paratypes. Body length 5.3–4.8 mm.

DIFFERENTIAL DIAGNOSIS. This species is closely related to *A. grafi* Reitter, 1901 and, especially, to *A. tanhensis* Frolov, 2001. It can be best distinguished from the both species by the more slender apices of parameres, which have feebly sclerotized lateral processes.

ETYMOLOGY. The species is named in honor of G.N. Potanin, noted Russian researcher of Central Asia.

ACKNOWLEDGEMENTS. I would like to thank Dr. David Král, Mr. Radek Červenka, and Dr. Josef Jelinek (Praha) for loan of material, and Dr. Paul Lago (University of Mississippi) for linguistic review of the manuscript and valuable suggestions.

References

- Kozlov P.K. 1902. [Itinerary of Tibetan expedition of Imperial Russian Geographical Society under the direction of P.K. Kozlov in 1899–1901] // Annu. Mus. zool. Acad. imp. Sci. Vol.7. P.XX–XXXVIII [in Russian].
- Potanin G.N. 1893. [Tangut-Tibetan area of China and Central Mongolia]. Vol.1. St.-Petersburg. 568 pp. [in Russian].