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TWO NEW SPECIES OF THE GENUS *BISTON* (LEPIDOPTERA, GEOMETRIDAE, ENNOMINAE) FROM CENTRAL ASIA

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Two New Species of the Genus *Biston* (Lepidoptera, Geometridae, Ennominae) from Central Asia. Viidalepp J. R. — *Biston pljushtschi* Viidalepp sp. n. from the Hissar Mountain Range (Tadjikistan) is described. The species is relatively isolated in the *B. stratarius* (Hufnagel, 1767) group of species of the genus *Biston* Leach, 1815. *Biston stuningi* Viidalepp sp. n. from the West Pamirs and Western Tian-Shan in Tadjikistan, Uzbekistan and Kyrghyzstan belongs to the *B. betularius* (Linnaeus, 1758) species group of the genus, differing in its wing pattern, male genitalia and hindlegs armature. Types of *Biston huberaria* (Ballion, 1866) and *B. tienschana* Wehrli, 1940 are compared. Holotypes of the both new species are deposited in the collection of the Institute of Zoology and Botany (Tartu) (ZBI), paratypes in various collections.

Key words: Geometridae, Ennominae, *Biston*, new species, Tadjikistan, Usbekistan, Kyrghyzstan.

Два новых вида рода *Biston* (Lepidoptera, Geometridae, Ennominae) из Центральной Азии. Вийдалепп Я. Р. — Описан *Biston pljushtschi* sp. n. из Гиссарского хребта, Таджикистан; вид относительно изолирован в группе видов *B. stratarius* (Hufnagel, 1767) рода *Biston* Leach, 1815. *Biston stuningi* Viidalepp sp. n. из Западного Памира и Западного Тянь-Шаня в Таджикистане, Узбекистане и Кыргызстане относится к группе *B. betularius* (Linnaeus, 1758), отличаясь рисунком крыльев, строением гениталий самца и задних ног. Проведено сравнение с типами *Biston huberaria* (Ballion, 1866) и *B. tienschana* Wehrli, 1940. Голотипы обоих новых видов хранятся в коллекции Института зоологии и ботаники (Тарту, Эстония), паратипы — в различных коллекциях.

Ключевые слова: Geometridae, Ennominae, *Biston*, новые виды, Таджикистан, Узбекистан, Кыргызстан.

Introduction

Two unnamed *Biston* sp. are listed in the last checklist of the Geometridae of the former USSR (Viidalepp, 1996), their publication was postponed due search for types of possibly related taxa, as well as for additional material and distribution data.

Altogether about 50 species are currently placed in the genus *Biston* Leach, 1815 (Scoble, 1999), a half of the bulk concentrated in faunas of Southern Asia (26 spp.). Not less than six of them were described within last 20 years, thereunder two taxa from Nepal (Inoue, 1982). *Biston pljushtschi*, sp. n. is distantly related to *B. stratarius* (Hufnagel, 1767) according to build of its male antennae (pectinate to tip). *B. stratarius* is characterized further by its amphi-palearctic distribution area (*B. s. stratarius* in Europe, represented by B. stratarius laetus Moltrecht, 1927 in Primorye Territory, by *B. s. hasegawai* Inoue, 1955 in Hokkaido and Honshu). *B. achyra* Wehrli, 1936 inhabits mountainous areas from Dagestan via the Caucasus up to northern Syria (Wehrli, 1936) and northern Jordan (Hausmann, 1991).

The distribution of the *Biston betularius* species group is Holarctic but extends southwards to Nepal and Western China (Inoue, 1982). While working through A. A. Bundel's large collection of moths from Central Asia now deposited in Zoological Institute of the Russian Academy of Sciences, St.-Petersburg, two allopatric and morphologically different species of the *B. betularius* group were found and preliminarily included as *B. betularius* L. and *B. alexandrinus* (Wehrli, 1940) (Viidalepp, 1988). Later, after a careful study of a large series of specimens from the Zailiiskii Alatau Mts., North Tian-Shan in Zoological Museum of University Helsinki (ZMUH) et al. collections it became apparent that the boreal species *B. betularius* (= cognatarius Guenйe, [1858]) is represented by a dark subspecies *B. betularius* alexandrinus Wehrli in mountains of South-eastern Kazakhstan (Kaila et al., 1996).

Wehrli (1940) has described two new taxa of the *B. betularius* group: *B. cognataria* (Guenйe, [1858]) ssp. alexandrina, and *Biston hueberaria* ssp. tienschana Wehrli, 1940. A single male specimen fitting with the

description of *B. tienschana* was detected in collection of ZMUH labelled Thian-Shan Aksu (ex coll. Winter). At the authors request, Dr. D. Stьning kindly has investigated the characters of type specimens (2 ♂, 2 ♀) of the last taxon in coll. E. Wehrli (ZFMK). Later, as a Deutscher Academischer Austauschdienst stipendiate, the author was able to study these types anew. Indeed, *B. tienschana* is closely related to *Biston hypoleucos* Kuznetsov, 1901 from Ussuri Territory (as mentioned in the original description), especially by its wings shape and wings pattern delicate sandy brown above and ground colour creamy white, without any dark pattern underneath. *B. tienschana* is supposedly confined to East Tian-Shan in NW China. The type specimen of the third little known *Biston* taxon, *Biston huberaria* Ballion, 1866, has been studied in ZISP collection. It represents an infrasubspecific form of B. betularius sibiricus Fuchs, 1899, confined to white-trunk birch forests in south-western Siberia and characterized by poor but typical wing pattern of this species on a pretty white ground. Accordingly, *B. tienschana* (as *B. tianschanicus*, an incorrect subsequent spelling) has been considered as valid species in Viidalepp (1996).

Paratypes of described taxa are deposited in museums as follows (abbreviations in brackets): Institute of Zoology and Botany at Estonian Agricultural University, Tartu (ZBI); Zoological Museum of Kyiv University, Ukraine (ZMKU); Zoological Institute of Russian Academy of Sciences, St. Petersburg (ZISP); Zoological Museum of University Helsinki, Finland (ZMUH); Zoologisches Forschungsinstitut und Museum A. Koenig, Bonn, Germany (ZFMK); Zoologisches Staatssammlung Mьnchen, Germany (ZSM).

Biston pljushtschi Viidalepp, **sp. n.** (fig. 1, 3)

Material. Holotype ♂, Tadjikistan, Hissar Mts., Kondara, 1100 m, 19.04.1980 (Pljushtch) (ZBI). Paratypes: ♂, same locality (Murzin) (Coll. S. V. Murzin, Moscow); ♂, Tadjikistan, Hissar Mts., Romit, 22–25.04.1991 (Jьrivete) (ZMKU).

Description. Wingspan 47.0–48.0 mm (3 ♂). Male antennal pectinations yellow and reaching the tip of antenna like in *B. stratarius*. The length of external and inner pectinations 0.8 and 0.75 mm, correspondingly. Frons thickly scaled, light grey, brownish laterally; vertex and collar light grey, bordered whitish. Vestiture of thorax brownish grey, that of patagiae silvery grey. Hindwings with veins Rs and M_1 diverging from one point, M_2 reduced and represented by a fold. Hindlegs hairy, with distal pair of spurs present and proximal spurs absent (both pairs present in *B. stratarius*).

Ground colour of forewings whitish brown, densely suffused dark grey (fig. 1). Postmedial line less contrasting than in *B. stratarius* and *B. achyra*, enlarged into a grey blotch between origins of veins Cu_1 and Cu_2. A median shadow from a greyish patch at costa approximates to the postmedial line and parallels it from vein M_3 to the anal margin of wing. Antemedial line marqueed by two grey blotches in discal cell and at anal vein. Hindwings whitish, irrorated brown; two transverse lines grey, straight, approximating towards the anal margin of wing. Forewings underneath with a shadowy postdiscal wish grey; the distal part of both wings suffused darker. Fringe concolorous, brownish grey (spotted light grey and darker brownish grey in both *B. stratarius* and *B. achyra*).

Male genitalia (fig. 3): slightly smaller than in Estonian *B. s. stratarius* of the same wing length, less robust; apical projections of uncus more slender and more closely approximated than in *B. stratarius*. Male genitalia are relatively uniform within the genus *Biston* (compare e. g. Inoue (1982), fig. 41 A, B).

Etymology. The species is named for Ukrainian lepidopterist Igor Pljushtch, who succeeded to collect the first studied specimen of the new species.

Differential diagnosis. Male antennae pectinated to tip; hind legs with proximal spur pair absent; forewings heavily suffused dark grey, with fringe concolorous.

Biston stuningi Viidalepp, **sp. n.** (fig. 2, 4)

Biston alexandrinus Viidalepp, 1988: 166 (misidentification).

Material. Holotype ♂, Tadjikistan, West Pamirs, Chorog, Botanical Garden, 19.07.1985 (Nekrasov). Paratypes: 22 ♂, 2 ♀, same locality, 22.05–23.07 1961–1975 (Bundel, Zaprjagaev) (ZISP); 3 ♂, ♀, same locality, 26.06–1.07.1981 (Kljutchko) (ZMKU); same locality, 22.07.1985 (Gorodinski) (ZMKU); 2 ♂, Chorog 1910 (Pamir or.) (Murashkin, ex coll. Sheljuzhko, ZMKU); 2 ♂, Tadjikistan, SW Pamirs, Shachdara Mts., 3000 m, tugai at Sendiv, 18.07.1957 (Bundel) (ZISP); 3 ♂, Tadjikistan, W Pamirs, Vantsh basin, Gutshevast, 7–10.06.1978 (Viidalepp, Metsaviir) (ZBI); ♂, Tadjikistan, western flange of Peter I Range, at Obi-Hingou River, 1600 m, 28.07.1988 (Jьrivete) (ZBI); 2 ♂, Tadjikistan, Hissar Mts., Takob Valley, 12.08.1953 (Poto-

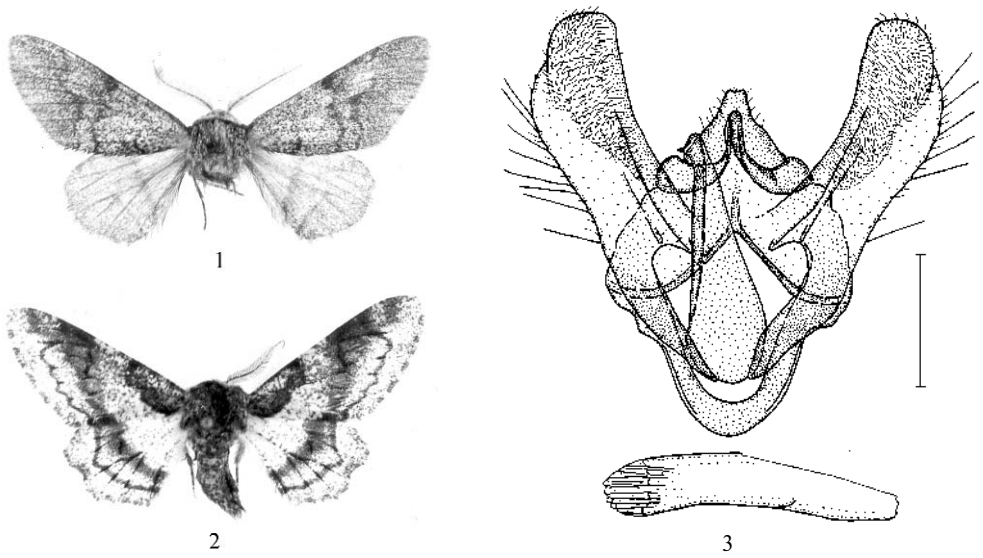

Fig. 1–3. 1 — *Biston pliushtshi*. Holotype, ♂, gen. prep. ZBI 3311. 2 — *Biston stuningi*. Paratype, ♂. Wingspan, 48 mm (1), 49.5 mm (2). 3 — Male genitalian armature and aedeagus of *Biston pliushtshi*. Holotype: scale bar 1 mm.

Рис. 1–3. 1 — *Biston pliushtshi*. Голотип, ♂, ген. преп. ZBI 3311. 2 — *Biston stuningi*. Паратип, ♂. Размах крыльев: 48 мм (1), 49,5 мм (2). 3 — Генитальная арматура самца и эдеагус *Biston pliushtshi*. Голотип: масштабная линейка 1 мм.

polski) (ZISP); ♀, Tadjikistan, Hissar Mts., Pakrut, 18.07.1977 (Solianikov) (ZBI); ♂, Tadjikistan, Hissar Mts., 1150 m, Romit, 25.07.1990 (R. Lindt) (ZMUH); ♂, Tadzhikistan, Vantsh, 2500 m, 10–27.07.1992 (R. Lindt) (ZMUH); 26 ♂, 4 ♀, Uzbekistan, W Tian-Shan Mts., Tshimgan, 800–2000 m, 69°58'E, 41°32' N, 18–25.07.1990 (Gyulai, Hreblay) (ZSM); 2 ♂, Uzbekistan, Yangi-Kurgan, 71°43'E, 41°12' N, 26.06.1986 (R. Lindt) (ZMUH); ♂, ♀, Uzbekistan, Tshimgan Mt., 26.06.–1.07.1981 (Jurivete, A. Lindt) (ZBI); 2 ♂, Kyrghyzstan, Naryn Valley, 2000 m, 4–10.06.1993 (ex coll. Schintlmeister) (ZFMK); ♂, Kyrghyzstan, Alamyshik Mts. 15 km W Naryn, 2300 m, 23.06.1995 (Lukhtanov) (ZSM).

Description. Wingspan 41.5–49.0 mm in males, 52.0–61.0 mm in females. The straight course of the waved or saw-toothed postmedial fascia between veins M_2 and An, as well as the reduction of proximal spurs in hindlegs (less than ¾ length of distal spurs) are diagnostic for the new species *B. stuningi* (fig. 2). Strong angling of the forewing postmedial fascia distal to the discal cell and curving inward between the cell and subsidiary angle at vein Cu_2 is characteristic for *B. betularius* and *B. tienschana*. Hindwings distal margin is straight between veins M_1 and M_3 in *B. betularius* and *B. tienschana*, concave in *B. stuningi*. Male genitalia: Cornuti bundles in everted vesicas, and vesica shapes are different in *B. stuningi* (fig. 4) and *B. betularius* (fig. 5). Juxta is much longer (1.75 mm) in *B. stuningi* than in *B. betularius* (1.25 mm), cochlear (central projection of gnathos) and uncus ampler.

Female genitalia have not been studied as these are relatively uninformative within the genus *Biston* (Inoue, 1982).

Etymology. The new species is dedicated to Dr. D. Stuning (ZMFK, Bonn). Gender: masculine.

Discussion. An interesting peculiarity of the Chorog population of the new species, *B. stuningi* is to be mentioned: the yellowish white ground colour of wings dominating (ca 90% of specimens studied), combined with the median line contrastingly blackish, broad, suffused. The populations of Vantsh valley (NW Pamirs), Peter I Range, Hissar Mts. and Tshimgan Mt. differ in wings above suffused grey.

Another pure white taxon, *Biston huberaria* Ballion, 1866 (type in coll. ZISP, examined) possess a typical but reduced "*betularius*"-like wing pattern (discussed in Introduction).

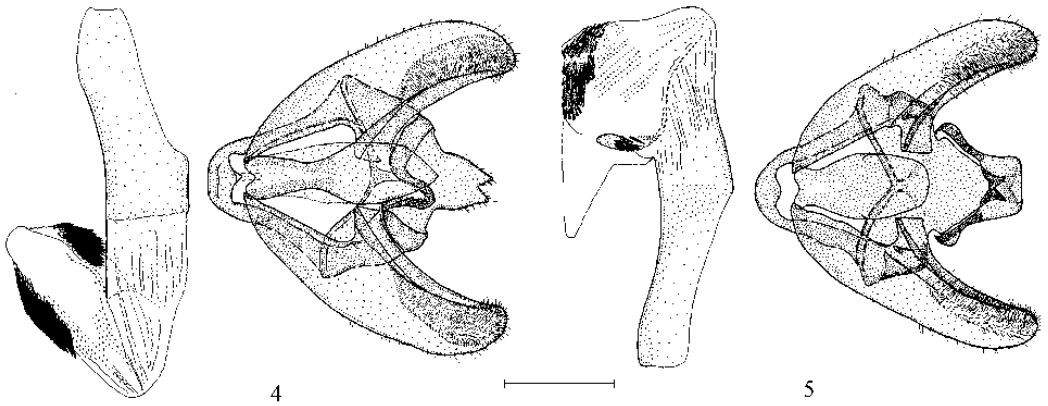

Fig. 4—5. 4 — *Biston stuningi*. Paratype, ♂, gen. prep. ZBI 4013. 5 — *B. betularius*, gen. prep. ZBI 4012. Scale bar 1 mm.

Рис. 4—5. 4 — *Biston stuningi*. Паратип, ♂, ген. преп. ZBI 4013. 5 — *B. betularius*, ген. преп. ZBI 4012. Масштабная линейка 1 mm.

Differential diagnosis. Similar to *Biston betularius* in facies but postmedial fascia of forewings straight between veins M_2 and An (instead of being produced outwards at discal vein and Cu_2, and strongly concave between).

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