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Review of *Semagystia tsimgana* species group (Lepidoptera, Cossidae: Cossinae) with description of two new species from Central Asia

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Abstract

The article gives a revision of the *Semagystia tsimgana* (Zukowsky, 1936) species group (Lepidoptera, Cossidae, Cossinae). The group comprises seven valid species. Detailed data on the distribution of all the species are provided. Lectotype of *Dyspessa cossoides tsimgana* Zukowsky, 1936 is designated. Two new species are described: *S. muratovi* Yakovlev & Shapoval, sp. n. (Type locality: Tajikistan, Surkhandariya Reg., Babatag Mt. Range, near Zarkomar vill.) and *S. temreshevi* Yakovlev & Shapoval, sp. n. (Type locality: South Kazakhstan, Boraldaiteau Mt. Range, Koshkarata river Valley). The article is illustrated with imagoes of specimens from different localities and male genitalia of all new species.

Key words: biodiversity, fauna, taxonomy, Babatag, Karatau, Tian-Shan, Kugitang, Tarbagatay, Kazakhstan, Tajikistan.

Introduction

The genus *Semagystia* Schorl, 1990 (type species, by original designation: *Endagria agilis* Christoph, 1884) includes 23 species distributed in Turkey, Transcaucasia, Central Asia (including Altai and Tarbagatay Mountains), Iran, Afghanistan, and Northern Pakistan (Schoorl 1990; Yakovlev 2011, 2022; Yakovlev et al. 2015, 2023; Yakovlev & Witt 2016; Rajaei et al. 2023).

Dyspessa cossoides tsimgana Zukowsky, 1936 was briefly described by Zukowsky (1936: 537): “Es liegen drei männliche Exemplare vor, die kleiner als die Type sind, 26–28 mm, während die vom Issykkul

beschriebenen Stücke bis 35 mm messen. Bei den Tieren tritt, besonders bei zwei Stücken, die typische Cossuszeichnung, dunkles Band hinter der Mitte der Vorderflügel, klarer in Erscheinung; der Costalrand ist deutlich dunkel gestrichelt, Fransen hell und dunkel gescheckt. Hinterflügel gleichmäßig dunkelgraubraun wie bei der Stammform. Thianshan occ. Bolshoj Tsimgan, 2000 m. Mitte Juli am Licht von Sheljuzhko gefangen. Typen: Sammlung Bang-Haas und Zukowsky." Daniel (1961: 195) retained the subspecies status of the taxon *tsimana* Zukowsky, however used a new combination: *Catopta cossoides tsimana* (Zukowsky, 1936). As shown later (Yakovlev 2009), the genus *Catopta* Staudinger, 1899 (type species: *Catopta albimacula* Staudinger, 1899, by original designation) belongs to another subfamily Catoptinae Yakovlev, 2009, and the taxa *Endagria cossoides* Graeser, 1892 and *Dyspessa cossoides tsimana* – are typical representatives of the nominate subfamily, which was previously shown by Schoorl (1990: 84), who established a new combination, *Semagystia cossoides* (Graeser, 1892). Schoorl (1990: 86) left the previous subspecies status for *tsimana*.

Yakovlev (2007: 15) established a new status for *tsimana*, considering it as a bona species. Here Yakovlev indicated *Semagystia tsimana* (Zukowsky, 1936) species group, and described three new species: *Semagystia alaica* Yakovlev, 2007 (Type locality: Kirghizia, Alaiskii Range, 70 km S. Kisil-Kiya, Maidantau), *Semagystia dubatolovi* Yakovlev, 2007 (Turkmenistan, Kugitang Mts., Airi-Baba Mt.), and *S. stchetkini* Yakovlev, 2007 (Type locality: Tadzhikistan, Ghissar Mts., 35 km S. Pendzhikent, Magian). Later Yakovlev (2014: 655–657) described *S. tarbagataica* (Type locality: E. Kazakhstan, Tarbagatai distr., Zhagalbaily Mts., 7 km NE Kyzylkezek vill., Bugaz river Valley).

Examining the specimens, externally similar to *S. tsimana*, we have found two new species from Southern Kazakhstan, Uzbekistan, and Tajikistan. Their description is given below.

Material and methods

Male genitalia were mounted in euparal on slides following Lafontaine and Mikkola (1987). The imagoes were photographed using digital camera of iPhone 7. The genitalia preparations were photographed using an Olympus DP74 camera attached to an Olympus SZX16 stereomicroscope. The morphological terminology used in the description follows Kristensen (2003). The images were processed using Corel Photo-Paint 2017 software. The distribution map was generated using SimpleMappr software (Shorthouse 2010).

List of abbreviation

ISEA Institute of Systematic and Ecology of Animals (Novosibirsk, Russia);
 MNKB Museum für Naturkunde, Leibniz Institut für Evolution und Biodiversitätsforschung (Berlin, Germany);
 MWM Museum of Thomas Witt (Munich, Germany);
 NBCL Naturalis Biodiversity Center (Leiden, The Netherlands);
 RYB collection of Roman Yakovlev (Barnaul, Russia);
 SKO collection of Svyatoslav Knyazev (Omsk, Russia);
 ZIA Zoological Institute of Science Academy of Kazakhstan Republic (Almaty, Kazakhstan);
 ZISP Zoological Institute of Science Academy of Russian Federation (Sankt-Petersburg, Russia).

Taxonomical part

Description of new taxa

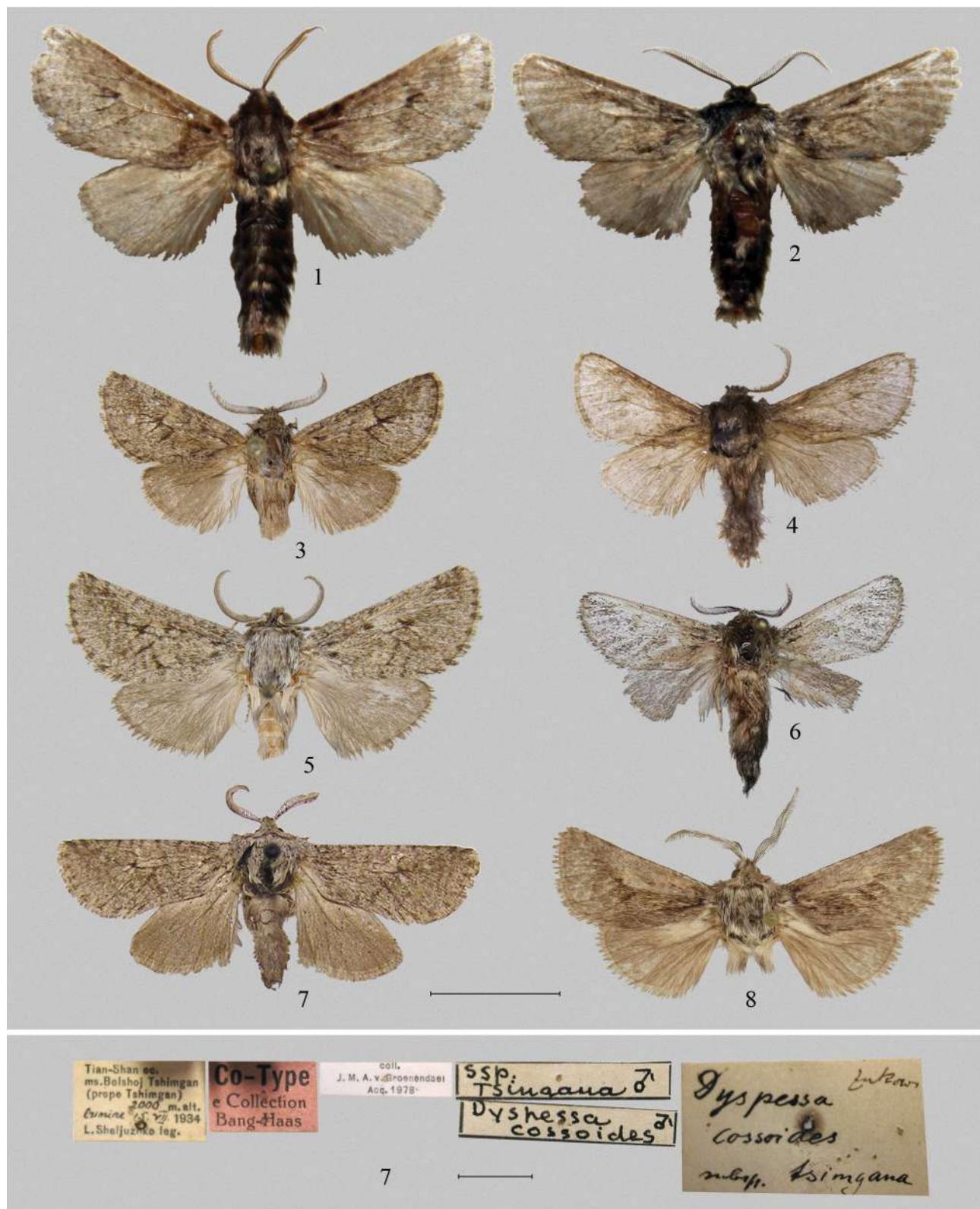
Semagystia muratovi Yakovlev & Shapoval, sp. n.

<https://zoobank.org/urn:lsid:zoobank.org:act:511CC411-2976-4D50-A984-9FA8ED888CF7>

Figs 1, 9, 16

Material. Holotype, male, Uzbekistan, Surkhandariya Reg., Babatag Mt. Range, near Zarkomar vill., 26.v.2003, 1000 m, leg. S. Nikiforov, slide AN 039 (ZISP).

Paratypes. 1 male, Tajikistan, Babatag Mts., Dzhartepa, 30.vi.2003, leg. V. Shablya (RYB).



Figures 1–8. *Semagystia*, adult males: 1. *S. muratovi*, Holotype (ZISP); 2. *S. temreshevi*, Holotype (ZISP); 3. *S. alaica*, Holotype (MWM); 4. *S. dubatolovi*, Paratype (ISEA); 5. *S. stchetkini*, Holotype (MWM); 6. *S. tarbagataica*, Holotype (ZISP); 7. *S. tsimgana*, Lectotype with labels (NBCL); 8. *S. tsimgana*, Chimgan, 18.vii.1990 (MWM). Scale bar = 10 mm.

Description. Male. Length of fore wing 18 mm in holotype, 16–18 mm in paratypes. Thorax and abdomen densely covered with light-brown scales. Antenna about 1/2 of fore wing in length, bipectinate (setae three

times longer than antenna stem in diameter). Fore wing light-grey, with sputtering of brown scales along costal edge and basally, poorly noticeable black stroke at top of discal cell, fringe mottled, brown at veins, light-grey between veins. Hind wing light-grey, without pattern, border thin, light-brown, fringe light-grey.

Male genitalia. Uncus tapered, smoothly narrowing from base to apex; gnathos arms thin, of medium length, gnathos of medium size, poorly structured; valve narrow, distal third membranous, apex lanceolate, costal edge of valve (on border between medium and distal thirds) with small semicircular process; transtilla process short, with very thick basis, sharply narrowing to apex, serrated in distal third, apex curved, acute; juxta tiny, saddle-like, with pair of short, leaf-like lateral processes, diverged at right angle; saccus semicircular, small; phallus relatively short (3/5 of valve in length), thin, slightly curved and narrowing in distal third, vesica aperture about 1/4 of phallus in length, vesica without cornuti.

Female unknown.

Diagnosis. All the species of this group are very similar externally; in the male genital structure the new species is close to *S. stchetkini*, from which it differs in a series of characters:

- the lighter color (*S. stchetkini* is colored slightly darker);
- the almost complete reduction of the wing pattern (*S. stchetkini*, has a developed thin black reticulated pattern on the fore wing);
- the more narrow uncus (in *S. stchetkini*, the uncus is thicker, apex trapezoidal);
- the thin arms of the gnathos (in *S. stchetkini*, the gnathos arms are thicker);
- the almost straight phallus, slightly curved in distal third (in *S. stchetkini*, the phallus is curved in medium third).

Distribution. Tajikistan and Uzbekistan (Babatag Mt. Range).

Etymology. The new species is named after the well-known ornithologist Dr. Rustam Sh. Muratov (Dushanbe), who provided important assistance in organizing field work in Tajikistan.

Semagystia temreshevi Yakovlev & Shapoval, sp. n.

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Figs 2, 10, 17–18

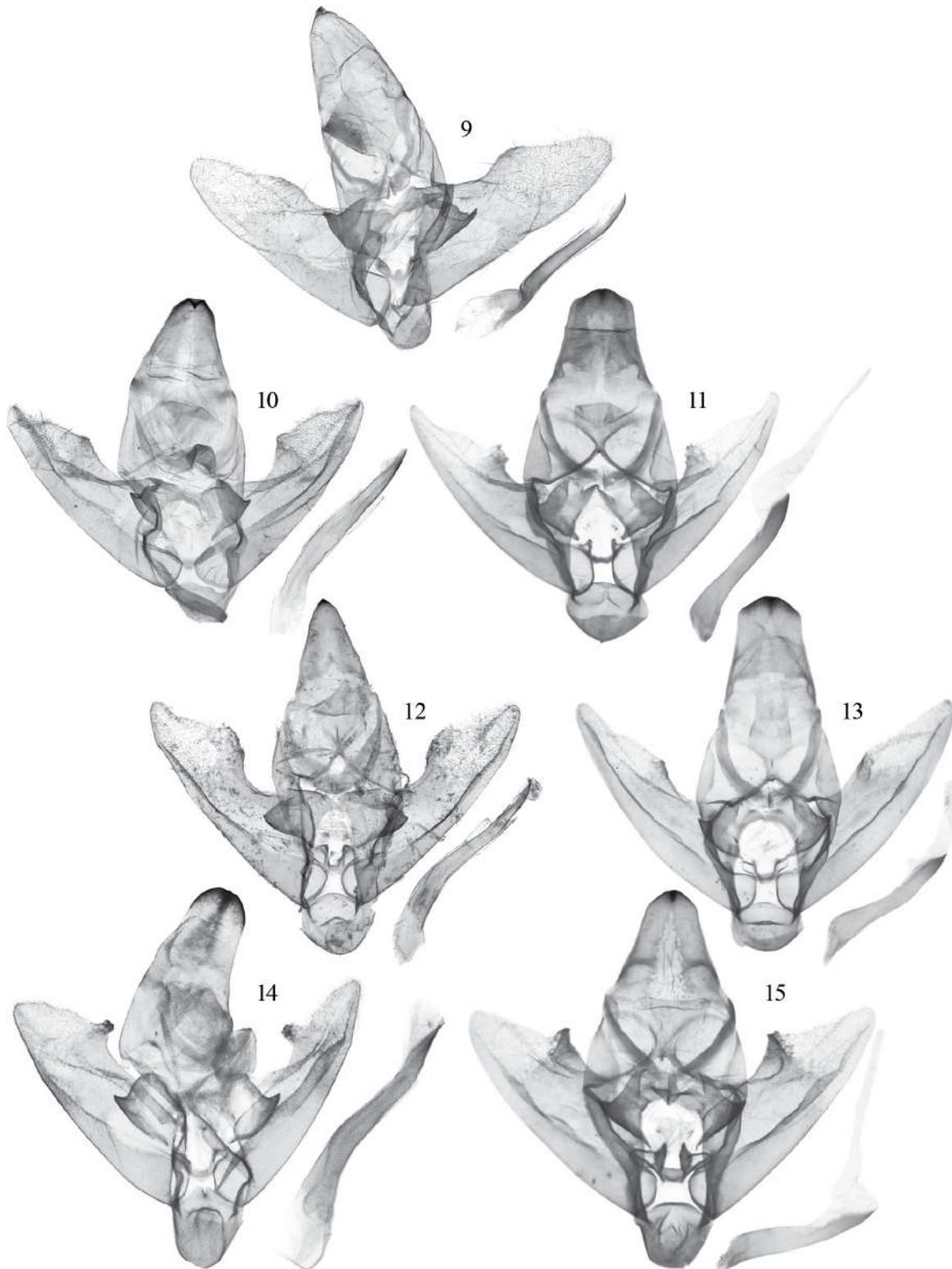
Material. Holotype, male, South Kazakhstan, Boraldaitau Mt. Range, Koshkarata river Valley, 775 m, 42°54'N / 70°13'E, 20.vi.2019, leg. P. Gorbunov, slide AN 055 (ZISP).

Paratypes. 48 males, 9 females, same locality and data (RYB); 9 males, 4 females, South Kazakhstan, Zhambyl Province, 14 km E of Khantau railway station, mt. steppe, 44°11'N / 73°58'E, 3.vi.2015, leg. P. Gorbunov, slide AN 056 (ZISP, RYB); 1 male, 1 female, South Kazakhstan, Syrdariya Karatau Mt. Range, 13 km S of Karakur vill., 890 m, 44°01'N / 68°05'E, 7.vi.2015, leg. P. Gorbunov (RYB); 1 male, South Kazakhstan Province, near Terekty vill., Boralday river, 535 m, 42°52'20.6"N / 69°52'59.1"E, 25–28.05.2018, leg. D. Shovkoon (RYB).

Description. Male. Length of fore wing 16 mm in holotype, 15–17 mm in paratypes. Thorax and abdomen densely covered with light-brown scales. Antenna about 1/2 of fore wing in length, bipectinate (setae three times longer than antenna stem in diameter). Fore wing brown, with slight sputtering of ocher scales on all wing, poorly noticeable black stroke in discal cell, border very thin, light-brown, fringe grey. Hind wing brown, without pattern, border thin, light-brown, fringe grey.

Male genitalia. Uncus tapered, smoothly narrowing from base to apex, apically acute; gnathos arms thick, of medium length, gnathos of medium size, poorly structured; valve narrow, distal third membranous, apex lanceolate, costal edge of valve (on border between medium and distal thirds) with small process of irregular shape with tiny teeth on edge; transtilla process very short, with very thick basis, sharply narrowing to apex, apex sharply curved, acute; juxta tiny, saddle-like, with pair of short leaf-like processes

diverged at obtuse angle; saccus semicircular, small; phallus slightly shorter than valve (4/5 of valve in length), of medium thickness, slightly curved in basal third, slightly narrowing in distal third, vesica aperture about 1/3 of phallus in length, vesica without cornuti.



Figures 9–15. Male genitalia of *Semagystia*: 9. *S. muratovi*, Holotype slide AN 039 (ZISP); 10. *S. temreshevi*, Holotype slide AN 055 (ZISP); 11. *S. alaica*, Paratype, slide Genitalpräparat Heterocera Nr. 28.223 (MWM); 12. *S. dubatolovi*, Paratype slide AN 051 (ISEA); 13. *S. stchekini*, Paratype, slide Genitalpräparat Heterocera Nr. 28.222 (MWM); 14. *S. tarbagataica*, Holotype (ZISP); 15. *S. tsimgana*, Chimgan, 18.vii.1990 slide Genitalpräparat Heterocera Nr. 28.221 (MWM).

Female. Larger than male, length of fore wing 15–21 mm. Wing pattern not modified, all wings uniformly brown, with thin light-brown border and brown fringe. Ovipositor very long. Female genitalia not studied.

Diagnosis. The new species differs in the very poorly developed pattern on the fore wing, in the male genital structure it is close to *S. alaica*, from which it differs in a series of characters:

- the apically acute uncus, smoothly narrowing from base to apex (in *S. alaica*, the uncus is more obtuse, apically trapezoidal);
- the very short transtilla process (in *S. alaica*, the transtilla process is more robust and long);
- the poorly serrated crest on the costal edge of the valve (in *S. alaica*, the crest on the costal edge of valve has big teeth).

Distribution. South Kazakhstan (Karatau Mt. Range).

Habitat. Slope with bushes from *Atraphaxis* L. (Polygonaceae), *Lepidolopha* C. Winkl. (Asteraceae), *Ephedra* L. (Ephedraceae), *Spiraea* L. (Rosaceae) etc.

Etymology. The new species is named after the good friend of first author, well-known entomologist Dr. Izbasar I. Temreshev (Almaty), carrying out a huge work on the study of pest and quarantine species in Kazakhstan.

Catalogue of *Semagystia tsimgana* species group

Semagystia alaica Yakovlev, 2007

Figs 3, 11

Yakovlev, 2007: 14–15.

Type locality: Kirghizia, Alaiskii Range, 70 km S. Kisil-Kiya, Maidantau.

Type material (Holotype, male) in MWM, examined.

Material examined. Male (Holotype), Kirghizia, Alaiskii Range, 70 km S. Kisil-Kiya, Maidantau, 2000 m, 13.vii.1997, leg. I. Pljusctch (GPrMWM 11092) (MWM); 4 males (paratypes), same locality and data (GPrMWM 11099); 1 male (paratype), the same locality, 11.vii.97, V. Dolin leg. (MWM); 5 males, 1 female, Souther Kyrgyzstan, Alai Mt. Range, Isfraim-Say, 1700 m, 3.vii.1998, leg. I. Plyustch (RYB); 1 male, Kyrgyzstan, Alai Mt. Range, 7 km W of Kara-Teiit vill., Ok-Suu, 2950 m, 39°31'N 71°41'E, 28.vi.2019, leg. P. Gorbunov (RYB); 1 male, Kyrgyzstan, Alai Mts., 9.6 km SW Kichi-Karakol, 39°50.370'N 73°19.503' E, 2667 m, 15.vii.2015, leg. S. Korb (RYB); 1 male, Kyrgyzstan, Alai, Batken prov., Kichik-Aslai, 2050 m, 10.vii.1995, leg. E. Rutjan (RYB).

Distribution: Kyrgyzstan (Alai Mts)

Semagystia dubatolovi Yakovlev, 2007

Figs 4, 12

Yakovlev, 2007: 6–7.

Type locality: Turkmenistan, Kugitang Mts., Airi-Baba Mt.

Type material (Holotype, male) in ISEA, examined.

Material examined. Male (Holotype), Turkmenistan, Kugitang Mts., Airi-Baba Mt., 2150 m, 14.vii.1991, V. Dubatolov legit. (ISEA), 33 males (paratypes), same data (ISEA, RYB, MWM).

Distribution: Turkmenistan (Kugitang Mts. Range).



Figure 16. Type locality of *S. muratovi* (photo by R. Yakovlev).



Figure 17. Type locality of *S. temreshevi* (photo by P. Gorbunov).

***Semagystia muratovi* Yakovlev & Shapoval, sp. n.**

Type locality: Uzbekistan, Surkhandariya Reg., Babatag Mt. Range, near Zarkomar vill.

Type material (Holotype, male) in ZISP, examined.

Distribution: Uzbekistan, Tajikistan (Babatag Mts. Range).

***Semagystia stchetkini* Yakovlev, 2007**

Figs 5, 13

Yakovlev, 2007: 15–16.

Type locality: Tadzhikistan, Ghissar Mts., 35 km S Pendzhikent, Magian.

Type material (Holotype, male) in MWM, examined.

Material examined. **Tajikistan:** Male (Holotype), Tadzhikistan, Ghissar Mts., 35 km S. Pendzhikent, Magian, 1800–3000 m, 09–11.vii.1994, leg. V. Lukhtanov (GPrMWM 11091) (MWM); 5 males (paratypes), same locality and data (GPrMWM 11099); 1 male (paratype), Tadzhikistan, Gissarskii Range, Iskander-Kul' lake, 2200 m, 20.vii.1994, leg. V. Lukhtanov (MWM); 4 males, 2 females (paratypes), Tadzhikistan, Ghissar Mts., Kondara, 1100 m, 38°50'N; 68°50'E, July 1998 (MWM); 9 males, 4 females (paratypes), Tadzhikistan, Ghissar Mts., 20 km NW Tursunsade, Farob, 1000–1200 m, 1–2.vii.1994, leg. V. Lukhtanov (MWM); 3 males (paratypes), Tadzhikistan, Pendzhikent reg., Seravsan-Tal, Magien, 1800 m, 10.vii.1994, leg. V. Lukhtanov (MWM); 1 female (paratype), Seravshan Mts., 45 SSE Aini, Dasht, 18–20.vii.1994 (MWM); 1 male, Tajikistan, Gissar Mt. Range, 30 km N Dushanbe, Kondara vill., light, 16.ix.1991, leg. P. Ustjuzhanin (RYB). **Uzbekistan:** 1 male, 2 females (paratypes), Uzbekistan, Ghissar Range, 60 km E Shakhrisabz, 20–27.vii.1994, leg. A. Karpov (MWM); 1 male (paratype), Uzbekistan, S. of Samarkand, Aman-Kutan, 15.vi.1994, leg. V. Lukhtanov (MWM); 1 male (paratype), Uzbekistan, Ghissarskij Range, Jurgy, 1000 m, 1.vii.1994, leg. V. Lukhtanov (MWM); 1 male (paratype), Uzbekistan, Samarkand Gebiet, Seravshan Gebirge, Aman-Kutan, 1600 m, 15.vi.1994, leg. V. Lukhtanov (MWM); 1 female, Uzbekistan, Zeravshan Mt. Range, Kitab Reserve, 1500 m, 6–10.vi.2001, leg. S. Nikiforov (RYB). **Kyrgyzstan:** 6 males, 6 females, Kyrgyzstan, Turkestanskyi Mt. Range, 11 km SE of Katran vill., Buldzhuma river, 1800 m, 39°44'N 70°05'E, 4.07.2019, leg. P. Gorbunov (RYB).

Distribution: Kyrgyzstan, Tajikistan and Uzbekistan (Gissar Mts., including Turkestanskii Mt. Range).

***Semagystia tarbagataica* Yakovlev, 2014**

Figs 6, 14

Yakovlev, 2014: 655.

Type locality: E. Kazakhstan, Tarbagatai distr., Zhagalbaily Mts., 7 km NE Kyzylkezek vill., Bugaz river Valley, 47°55'N; 82°04'E.

Type material (Holotype, male) in ZISP, examined.

Material examined. Holotype, male, E. Kazakhstan, Tarbagatai distr., Zhagalbaily Mts., 7 km NE Kyzylkezek village, Bugaz river Valley, 700 m, 47°55'N / 82°04'E, 23.07.2011, leg. R. Yakovlev (ZISP); paratypes, 6 males, 11 females, same locality (ZISP, MWM, RYB); 1 male, 1 female, E. Kazakhstan, W Tarbagatai Mts, Urdzhar district, 7 km NE of Altynshoky (Predgornoe) village, 920 m. 47°11'37"N / 81°09'46"E, 24.06.2014, Volynkin A.V. & Titov S.V. leg. (RYB); 1 female, Eastern Kazakhstan, Bukombaj Mts., 35 km SW Alexeevka (Terekty) Village, 48°16'N / 85°26', 650 m, 28.06.2018, R. Yakovlev, V. Doroshkin, V. Rudoj & A. Naydenov leg. (RYB); 7 females, Karaganda Province, Takrau River, Saryterek aul, 700 m, 48°05'N / 75°18'E, 29.05.2015, leg. P. Gorbunov (RYB); 1 male, Karaganda Reg., Zhana-Arka distr, 23–24.06.1959, leg. Aibasov (ZIA); 2 males, 3 females, Kazakhstan, Karagandy Reg., Bektau-Ata Mts., 70 km. N of Balkhash, 47°26'52.20"N / 74°41'5.92"E, 7.07.2018, at light, S.A. Knyazev leg. (SKO).

Distribution: Eastern and Central Kazakhstan (Tarbagataj Mountains and Kazakh Uplands).

Semagystia temreshevi Yakovlev & Shapoval, sp. n.

Type locality: South Kazakhstan, Boraldaite Mt. Range, Koshkarata river Valley.

Type material (Holotype, male) in ZISP, examined.

Distribution: Southern Kazakhstan (Karatau Mts. Range).



Figure 18. *S. temreshevi*, male in nature, Khantau (photo by P. Gorbunov).

Semagystia tsimgana (Zukowsky, 1936)

Figs 7–8, 15

Dyspessa cossoides tsimgana Zukowsky, 1936: 537.

Type locality: Thian-Shan, Bolshoi Tshimgan [Uzbekistan, W. Tian-Shan, near Tashkent, Bol'shoi Chimgan].

Type material. Lectotype in NBCL, designated there.

Material examined. **Uzbekistan:** 1 male, Uzbekistan, W. Thian-Shan, Chatkal Reserve, 1200 m (MWM); 14 males, Chimgan, 18.vii.1990, leg. Gyulai & Hreblay (MWM); 1 male, Uzbekistan, Chimgan, 22.vii.1987, leg. Spatenka (MWM); 1 female, Chimgan, 17.vii.1979, leg. L. & K. Krušek (MWM); 13 males, 1 female, Uzbekistan, NW Tian-Shan, Pskemskii Mt. Range, 2000 m, 21.vi.2004, leg. S. Nikiforov (RYB); 8 males, 7 females, Uzbekistan, Chimgan, 26.vii.2002, leg. O. Legezin (RYB); 1 female, Uzbekistan, Tashkent Reg., Gulkamsay, 10.vii.1999, leg. V. Shablya (RYB); 1 male, 2 females, Uzbekistan, Tashkent Reg., West Tian-Shan, Karzhantau Mts., Aktash, 10–13.vii.2009, leg. Kreuzberg (RYB), 1 female, Uzbekistan, West Tian-Shan, Ugamsky Mt. Range, Nanay vill., 1300 m, 26.vii.2001, S. Nikiforov leg. (RYB). **Kyrgyzstan:** 7 males, Kyrgyzstan, Chatkal Mt. Range, Vrabat-Sai river, near Chap-Chima pass, 1870 m, 41°33'N 70°43' E, 9–10.07.2022, leg. P. Gorbunov (RYB).

Distribution: Uzbekistan and Kyrgyzstan (Western Tian-Shan).

Discussion

Thus, *Semagystia tsimgana* (Zukowsky, 1936) species group includes seven species, widespread in mountainous and semidesert areas from Tarbagatai and Kazakh Uplands to Gissar, Kugitang and Babatag Mts. (Fig. 19). The species discussed here are endemic to certain mountain systems of Central Asia. If we consider the distribution of the group from north to south, then the endemic of Tarbagatai and Kazakh Uplands is *S. tabagataica*; of the Karatau – *S. temreshevi*; Western Tian-Shan – *S. tsimgana*; Alai – *S. alaica*; Gissar – *S. stchetkini*; Babatag – *S. muratovi*, and Kugitang – *S. dubatolovi*. Further molecular genetic research of this group representatives is of great interest; the DNA sequences have already been obtained for most taxa, which will be analyzed in our subsequent works.



Figure 19. Distribution of *Semagystia tsimgana* species group.

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