

A review of the genus *Agdistis* Hübner, [1825] (Lepidoptera: Pterophoridae) from Middle Asia

Обзор видов рода *Agdistis* Hübner, [1825] (Lepidoptera: Pterophoridae) Средней Азии

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KEY WORDS: biodiversity, Pterophoridae, Middle Asia, *Agdistis*, new synonyms, new data, distribution.

КЛЮЧЕВЫЕ СЛОВА: биоразнообразие, пальцекрылки, Средняя Азия, *Agdistis*, новые синонимы, новые данные, распространение.

ABSTRACT. The paper considers species of the genus *Agdistis* Hübner, [1825] from Middle Asia (former republics of the Soviet Union: Kazakhstan, Uzbekistan, Turkmenistan, Kyrgyzstan, and Tajikistan). Synonymy has been established for 3 species: *Agdistis incisa* Arenberger et Buchsbaum, 2000 = *Agdistis balchashensis* Zagulajev, 1997 **syn.n.**; *Agdistis tigrovaja* Arenberger, 2001 = *Agdistis gerasimovi* Zagulajev et Blumental, 1994 **syn.n.**; *Agdistis turkestanica* Zagulajev, 1990 = *Agdistis mevlaniella* Arenberger, 1972 **syn.n.** New records have been reported for the Middle Asian republics: *A. frankeniae* and *A. rubasiensis* for Uzbekistan, *A. intermedia* for Turkmenistan. An image of the female *A. flavissima* Caradja, 1920 is presented for the first time. Detailed distribution data for the species throughout their range is provided.

РЕЗЮМЕ. Рассматриваются виды рода *Agdistis*, обитающие на территории Средней Азии (бывшие союзные республики СССР: Казахстан, Узбекистан, Туркменистан, Киргизстан и Таджикистан). Установлена синонимия для трёх видов: *Agdistis incisa* Arenberger et Buchsbaum, 2000 = *Agdistis balchashensis* Zagulajev, 1997 **syn.n.**; *Agdistis tigrovaja* Arenberger, 2001 = *Agdistis gerasimovi* Zagulajev et Blumental, 1994 **syn.n.**; *Agdistis turkestanica* Zagulajev, 1990 = *Agdistis mevlaniella* Arenberger, 1972 **syn.n.** Отмечены новые находения видов для республик Средней Азии: *A. frankeniae* и *A. rubasiensis* для Узбекистана, *A. intermedia* для Туркменистана. Впервые дано изображение самки

A. flavissima Caradja, 1920. Приводится полное распространение видов по всей территории ареала.

Introduction

The genus *Agdistis* is widespread in Eurasia and Africa. It includes about 160 species. The genus displays several centers of biodiversity (Fig. 1). The South Africa (Cape zoogeographic subregion) is the most significant center, being home to 54 species known to date, i.e. 34% of the total species composition. Another center is the Mediterranean subregion with 39 species or 24% of the total species of the genus, and the third centre is the Irano-Turanian subregion with 33 species or 20% of the world fauna of the genus *Agdistis*. The center in the Cape Province, with the most pronounced locus of speciation, is not yet fully explored. In recent years, particularly in the last two or three decades, more than 50 species have been described [Arenberger, 1986, 1988, 1996, 2001a, 2008, 2009, 2010; Gielis 1986, 1990; Kovtunovich, Ustjuzhanin, 2009a, b; 2010a, b, c; 2015a, b; 2024 in press]. The Mediterranean subregion is the best studied, with the species composition almost fully identified. In the Irano-Turanian subregion, the fauna of Pterophoridae, in particular representatives of the genus *Agdistis*, is not yet studied completely. The Middle Asian geographical region belongs to the Irano-Turanian zoogeographical subregion, which includes the following republics: Kazakhstan, Turkmenistan, Uzbekistan, Tajikistan, and Kyrgyzstan. Most of the species described from Middle

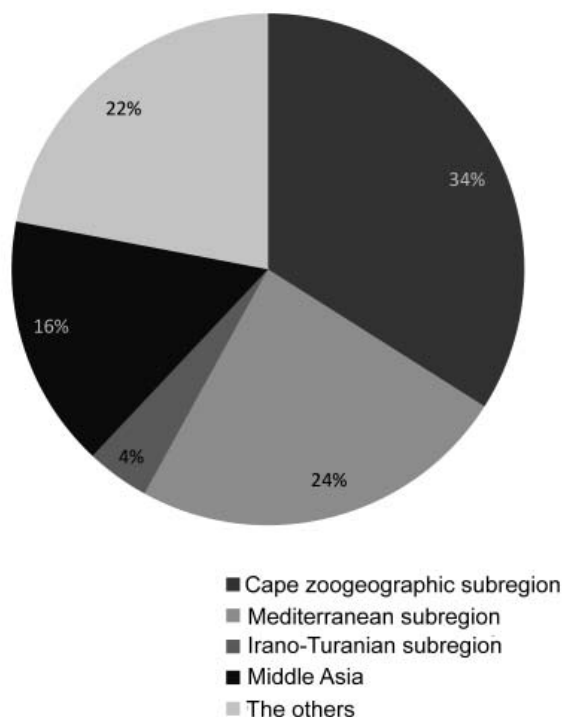


Fig. 1. Centers of species diversity of the genus *Agdistis*.
Рис. 1. Центры видовой разнообразия рода *Agdistis*.

Asia are restricted to dry, arid and desert landscapes [Altermatt, 2008; Arenberger, 1975, 1997, 1999, 2001b; Arenberger, Buchsbaum, 2000; Caradja, 1920; Christoph, 1887; Gibeaux, 1997; Ustjuzhanin, Kovtunovich, 2011, 2014, 2016, 2018; Zagulajev, 1986a, 1990, 1997; Zagulajev, Filippova, 1976; Zagulajev, Blumental, 1994]. For forage, species of the genus *Agdistis* most often prefer plants of the families Plumbaginaceae, Tamaricaceae, Frankeniaceae, etc. [Zagulajev, 1986b].

Taxonomical part

1. *Agdistis adactyla* (Hübner, [1819])

Alucita adactyla Hübner, [1819]: t. 7, figs. 32–34. (Type locality: Austria).

DISTRIBUTION. Western Europe, Russia (European part, Caucasus, Siberia, Yakutia, Far East), Turkey, Georgia, Azerbaijan, Armenia, Iran, Turkmenistan, Kazakhstan, Kyrgyzstan, Tadzhikistan, Afghanistan, China (Beijing, Tianjin, Hebei, Inner Mongolia, Shaanxi, Gansu, Ningxia, Xinjiang), Mongolia [Gielis, 2003; Li *et al.*, 2003; Hobern, 2024].

2. *Agdistis asthenes* Bigot, 1970

Agdistis asthenes Bigot, 1970: 283. (Type locality: Somon Bajan-leg, Mongolia).

DISTRIBUTION. Mongolia, Kazakhstan, Kyrgyzstan.

3. *Agdistis balchashensis* Zagulajev, 1997

Agdistis balchashensis Zagulajev, 1997: 791. (Type locality: Balkhash, Kazakhstan).

Agdistis incisa Arenberger et Buchsbaum, 2000: 276. (Type locality: Tschardam, Kazakhstan). **syn.n.**

DISTRIBUTION. Kazakhstan.

REMARKS: Comparison of the holotype of *Agdistis balchashensis* Zagulajev, 1997 with *Agdistis incisa* Arenberger et Buchsbaum, 2000 showed their complete conspecificity. The type material of *A. balchashensis* is deposited in the collection of Zoological Institute, St. Petersburg, Russia (ZISP). Holotype, female, gen. praep. 16626.

4. *Agdistis caradjai* Arenberger, 1975

Agdistis caradjai Arenberger, 1975: 205. (Type locality: Kagizman, Turkey).

Agdistis dagestanica Zagulajev et Filippova, 1976: 38. (Type locality: Achty, Dagestan, Russia).

Agdistis karabachica Zagulajev, 1990: 112. (Type locality: Khanlara, Azerbaijan).

DISTRIBUTION. Russia (Dagestan), Turkmenistan, Turkey, Azerbaijan [Ustjuzhanin, Kovtunovich, 2018].

REMARKS: The synonym *Agdistis karabachica* Zagulajev, 1990 is given in Ustjuzhanin *et al.*, [in press].

5. *Agdistis chardzhouna* Arenberger, 1997

Agdistis chardzhouna Arenberger, 1997: 81. (Type locality: Kugitangtau, Turkmenistan).

DISTRIBUTION. Turkmenistan, Tadzhikistan.

6. *Agdistis falkovitshi* Zagulajev, 1986

Agdistis falkovitshi Zagulajev, 1986: 77. (Type locality: Ayakguzumdy, Uzbekistan).

DISTRIBUTION. Kazakhstan, Turkmenistan, Uzbekistan, Tajikistan, Mongolia [Ustjuzhanin, Kovtunovich, 2016]; Dagestan [Kovtunovich, 2007], Iran [Alipanah, 2014].

7. *Agdistis flavissima* Caradja, 1920

Agdistis ingens var. *flavissima* Caradja, 1920: 87. (Type locality: Chami, China).

MATERIAL: 1 ♀, Tajikistan, Tigrovaya Balka, 6–9.VIII.1991, V. Zolotuhin leg.

DESCRIPTION. **Female genitalia** (Fig. 2). Anal papillae triangular, slightly elongated. Posterior apophyses straight, twice as long as anal papillae. Lobes of vaginal plate rectangular. Antrum sclerotized, slightly elongate, horizontal, plate-shaped, with small bump in the middle and hook-like outgrowths along the margins. Ductus broad near antrum, then slightly narrowed. Copulatory pouch elongated, oval.

REMARKS: Female genitalia of *A. flavissima* are very similar to those of *A. ingens*, we did not find clear characters distinguishing both species by female genitalia.

DISTRIBUTION. China, Turkmenistan, Tajikistan, Uzbekistan, Kazakhstan, European Russia (Astrakhan district) [Nupponen, 2022].

8. *Agdistis frankeniae* (Zeller, 1847)

Adactyla frankeniae Zeller, 1847: 900. (Type locality: Messina, Sicily, Italy).

Agdistis rjabovi Zagulajev et Filippova, 1976: 36. (Type locality: Derbent, Dagestan).

Agdistis urmijensis Zagulajev, 1996: 130. (Type locality: Heydarabad, Iran).

MATERIAL: 3 ♂♂, 1 ♀, Uzbekistan, Bukhara Prov., Ecological Centre Geiron, 39°33' N, 64°42' E, 220 m, 31.III.2023, R. Yakovlev leg.

DISTRIBUTION. South Europe, Morocco, Algeria, Tunisia, Libya, Egypt, European part of Russia, Dagestan, Azerbaijan, Turkey, Israel, Jordan, Saudi Arabia, Iran, Kazakhstan [Gielis, 2003; Ustjuzhanin, Kovtunovich, 2018]; Uzbekistan.

REMARKS: New for Uzbekistan.



Fig. 2. *Agdistis flavissima* Caradja, 1920. Female genitalia. Tajikistan, Tigrovaya Balka, 6–9.VIII.1991, V. Zolotuhin leg.

Рис. 2. *Agdistis flavissima* Caradja, 1920. Гениталии самки. Таджикистан, Тигровая балка, 6–9.VIII.1991, В. Золотухин leg.

9. *Agdistis gerasimovi* Zagulajev et Blumental, 1994
Agdistis gerasimovi Zagulajev et Blumental, 1994: 128. (Type locality: Bukhara, Uzbekistan).

Agdistis detruncatum Zagulajev et Blumental, 1994: 133. (Type locality: Bukhara, Uzbekistan).

Agdistis tigrovaja Arenberger, 2001: 38. (Type locality: Tigrovaja Balka, Tadjhikistan). **syn.n.**

DISTRIBUTION. Turkmenistan, Uzbekistan, Tadjhikistan.

REMARKS: Comparison of the type material of *A. gerasimovi* Zagulajev et Blumental, 1994 with *A. tigrovaja* Arenberger, 2001 showed that the latter is a junior synonym to *A. gerasimovi*. The type material of *A. gerasimovi* is deposited in the collection of Zoological Institute, St. Petersburg, Russia (ZISP). Holotype, male, gen. praep.13051, paratype, male, gen. praep. 13052.

10. *Agdistis huemeri* Arenberger, 2002

Agdistis huemeri Arenberger, 2002: 608. (Type locality: Golestan, Iran).

DISTRIBUTION. Iran, Turkmenistan.

11. *Agdistis ingens* Christoph, 1887

Agdistis ingens Christoph, 1887: 124. (Type locality: Ashgabat, Turkmenistan).

DISTRIBUTION. The south-east of the European part of Russia, Georgia, Azerbaijan, Turkmenistan, Kazakhstan, Uzbekistan, Kyrgyzstan, Tajikistan, Afghanistan, China (Gansu), Mongolia [Li *et al.*, 2003; Ustjuzhanin, Kovtunovich, 2016].

12. *Agdistis intermedia* Caradja, 1920

Agdistis benneti var. *intermedia* Caradja, 1920: 88. (Type locality: Uralsk, Kazakhstan).

Agdistis hungarica Amsel, 1955: 53. (Type locality: Hungary).

MATERIAL: 1 ♂, 1 ♀, Turkmenistan, Amu-Darya river, Lambe vill., 9.V.1978, M. Daricheva leg.

DISTRIBUTION. Central Europe (Hungary), Azerbaijan, Russia (European part, Dagestan, south of Western Siberia), Kazakhstan [Ustjuzhanin *et al.*, 2016; Nupponen, 2022]; Turkmenistan.

REMARKS: New for Turkmenistan.

13. *Agdistis karakalensis* Zagulajev, 1990

Agdistis karakalensis Zagulajev, 1990: 110. (Type locality: Karakala, Turkmenistan).

DISTRIBUTION. Turkmenistan.

14. *Agdistis kazakhstanicus* Ustjuzhanin et Kovtunovich, 2014

Agdistis kazakhstanicus Ustjuzhanin, Kovtunovich, 2014: 242. (Type locality: Mynbulak, South Kazakhstan).

DISTRIBUTION. South Kazakhstan.

15. *Agdistis manas* Ustjuzhanin et Kovtunovich, 2011

Agdistis manas Ustjuzhanin, Kovtunovich, 2011: 269. (Type locality: Sary Jaz, Kyrgyzstan).

DISTRIBUTION. Kyrgyzstan.

16. *Agdistis manicata* Staudinger, 1859

Agdistis manicata Staudinger, 1859: 258. (Type locality: Chiclana, Spain).

DISTRIBUTION. France, Spain, Portugal, Morocco, Tunisia, Libya, Kazakhstan [Bigot, Picard, 1996], Azerbaijan [Nupponen, 2022], Russia (?).

REMARKS: The record for the Saratov region of Russia [Anikin *et al.*, 2003] is erroneous. The record of this species for Kazakhstan is also subject to scrutiny.

17. ***Agdistis mevlaniella*** Arenberger, 1972
Agdistis mevlaniella Arenberger, 1972: 151. (Type locality: Salzsteppe Konya, Turkey)
Agdistis turkestanica Zagulajev, 1990: 113. (Type locality: Chiment Region, S. Kazakhstan). **syn.n.**
Agdistis pseudomevlaniella Gibeaux, 1997: 418. (Type locality: 130 km W of Alma-Ata, Kazakhstan).
 DISTRIBUTION. Turkey, Kazakhstan, Turkmenistan, Kyrgyzstan [Gielis, 2002], Tadjikistan [Nupponen, 2022], Russian Caucasus.
 REMARKS: Comparison of *Agdistis mevlaniella* Arenberger, 1972 with *Agdistis turkestanica* Zagulajev, 1990 showed their complete conspecificity. The type material of *A. turkestanica* is deposited in the collection of Zoological Institute, St. Petersburg, Russia (ZISP). Holotype, female, gen. praep. 12793.
18. ***Agdistis murgabica*** Zagulajev et Blumental, 1994
Agdistis murgabica Zagulajev, Blumental, 1994: 130. (Type locality: Murgab, Turkmenistan).
 DISTRIBUTION. Turkmenistan.
19. ***Agdistis paki*** Ustjuzhanin et Kovtunovich, 2020
Agdistis paki Ustjuzhanin, Kovtunovich, 2020: 245. (Type locality: 8 km ESE Shuroabad, Tadjikistan).
 DISTRIBUTION. Tadjikistan.
20. ***Agdistis paralia*** Zeller, 1847
Adactyla paralia Zeller, 1847: 899. (Type locality: Sicily: Siracuse, Italy).
 DISTRIBUTION. France, Spain, Morocco, Algeria, Tunisia, Sardinia, Sicily, Malta, Greece, Israel, Turkmenistan [Gielis, 2003].
21. ***Agdistis protecta*** Arenberger, 1999
Agdistis protecta Arenberger, 1999: 225. (Type locality: Seidi, Turkmenistan).
 DISTRIBUTION. Turkmenistan [Gielis, 2003], Iran [Alipanah, Ustjuzhanin, 2007].
22. ***Agdistis rubasiensis*** Zagulajev, 1985
Agdistis rubasiensis Zagulajev, 1985: 785. (Type locality: Rubas, Dagestan, Russia).
 MATERIAL: 1 ♂, Uzbekistan, Surxondaryo Region, 4 km NW Termez, Khakim-at-Termezi Mausoleum, 37°16'548" N, 67°11'775" E, 300 m, 28–29.IV.2022, R. Yakovlev leg.
 DISTRIBUTION. Russia (Dagestan); Turkey, Armenia, Azerbaijan, Georgia, Turkmenistan, Georgia. Azerbaijan [Nupponen, 2022]; Uzbekistan.
 REMARKS: New for Uzbekistan.
23. ***Agdistis rutjani*** Ustjuzhanin et Kovtunovich, 2011
Agdistis rutjani Ustjuzhanin, Kovtunovich, 2011: 269. (Type locality: Dzhalal-Abad, Kyrgyzstan).
 DISTRIBUTION. Kyrgyzstan.
24. ***Agdistis sissia*** Arenberger, 1987
Agdistis sissia Arenberger, 1987: 103. (Type locality: Alanya, Turkey)
 DISTRIBUTION. Turkey, Armenia, Azerbaijan, Georgia, Turkmenistan [Nupponen, 2022].
25. ***Agdistis tamaricis*** Zeller, 1847
Agdistis tamaricis Zeller, 1847: 899. (Type locality: Strasbourg, France).
 DISTRIBUTION. Europe, Turkmenistan, Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan, Iran, Afghanistan,

Pakistan, Mongolia, China (Tianjin, Hebei, Inner Mongolia, Shanghai, Shandong, Shaanxi, Gansu, Ningxia, Taiwan) [Li *et al.*, 2003].

26. ***Agdistis tugai*** Altermatt, 2008
Agdistis tugai Altermatt, 2008: 65. (Type locality: Tigrovaya Balka, Tajikistan).
 DISTRIBUTION. Tajikistan.

Conclusion

To date, 26 species of the genus *Agdistis* are known from this region, which is 78% of all species inhabiting the Irano-Turanian subregion or 15.6% of the world fauna of this genus. Undoubtedly, in future the number of species may be increased for the region with such a variety of natural landscapes.

Competing interests. The authors declare no competing interests.

Acknowledgements. The authors are grateful to Sergey Sinev and Alexandr Lvovsky (Zoological Institute of the Russian Academy of Sciences, St. Petersburg) for providing the possibility to examine the Pterophoridae collection. The study of the first author is supported by state assignment of the Ministry of Science and Higher Education of the Russian Federation (project FZMW-2023-0006 “Endemic, local and invasive arthropods (Arthropoda) from the mountains of South Siberia and Central Asia: a unique gene pool of a biodiversity hotspot”).

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