

Microlepidoptera of Mongolia collected by the Finnish Lepidopterological Expedition from provinces Selenge and Tuv, Khentii (Kentei) Mountains, July 2024

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Laasonen, E. M., Laasonen, L., Saarenmaa, H., Tokola P. & Englund M. 2026: Microlepidoptera of Mongolia collected by the Finnish Lepidopterological Expedition from provinces Selenge and Tuv, Khentii (Kentei) Mountains, July 2024. — *Sahlbergia* 32(2): 21–28. Helsinki, Finland, ISSN 2342-7582.

A Finnish Lepidopterological Expedition took place in the vicinity of Khentii Mountains, northern Mongolia, in July 2024. The main focus of the expedition was on macrolepidoptera, which were observed and sampled using netting, sugar baits, light and bait traps of various designs. Microlepidoptera materials were gathered as side catches. Here we present from that material a list of 130 microlepidoptera species.

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Introduction

The Finnish Lepidopterological Expedition with participants Dr. Hannu Saarenmaa, Dr. Mikael Englund and MSc Pekka Tokola - as well as prof. Christoph L. Häuser from Berlin, Germany and MSc. Tsetsegbadam Gungaa from The Natural History Museum, Ulaanbaatar - took place in northern Mongolia between 2024-07-15/24. With the expertise of TG, they found suitable study areas in the vicinity of Khentii Mountains not far from Ulaanbaatar, the Capital of Mongolia. Definitely a worthy and traditional advice, as the oldest paper dealing with Lepidoptera we have found, sums up the results of an expedition by

three brethren Durries to just those mountains in the year 1879 – about 150 years ago - with a list of 107 species (Staudinger, 1892). The purpose now was to collect night-flying moths with many different types of traps to get further material for the studies on Palearctic Geometroidae and Noctuidae. ME and HS kindly gave us (EML & LL) the remaining microlepidopteran (micro) side materials to be studied further. Micro- and macrolepidoptera are widely used in literature referring to non-monophyletic groups of Lepidoptera. In this article we regard the superfamilies Papilionoidea, Drepanoidea, Geometroidea, Lasiocampoidea, Bombycoidea, and Noctuoidea as macrolepidoptera. The microlepidoptera comprise all other superfamilies of Lepidoptera. Macrolepidoptera we abbreviate as macro(s) and microlepidoptera as micro(s). We received these side catches with great enthusiasm, but got immediately into some trouble, when we could not find any comprehensive list of the Mongolian microlepidoptera.

Materials and methods

The main focus of the expedition was on macrolepidoptera, which were observed and sampled using netting, sugar baits, and light and bait traps of various designs. As side catches, microlepidoptera from light traps were deposited in envelopes to provide the material for this study.

The materials were collected from 10 localities listed from south to north. (See also the map in Figure 1) To make the list

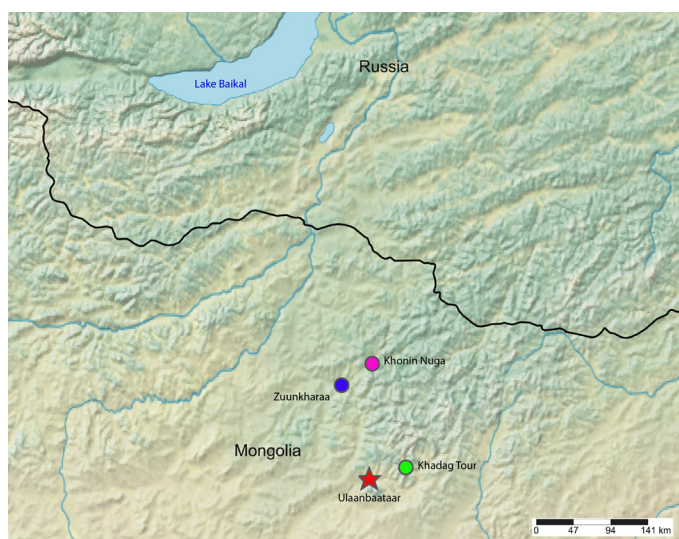


Fig. 1. Map of the collecting localities. Capital City Ulaanbaatar = red star, Khadak Tour = green dot, Zuunkharaa = blue dot and Khonin Nuga = pink dot. In the north, Russian border provinces Burjatija and Tsita. Photo Mikael Englund.

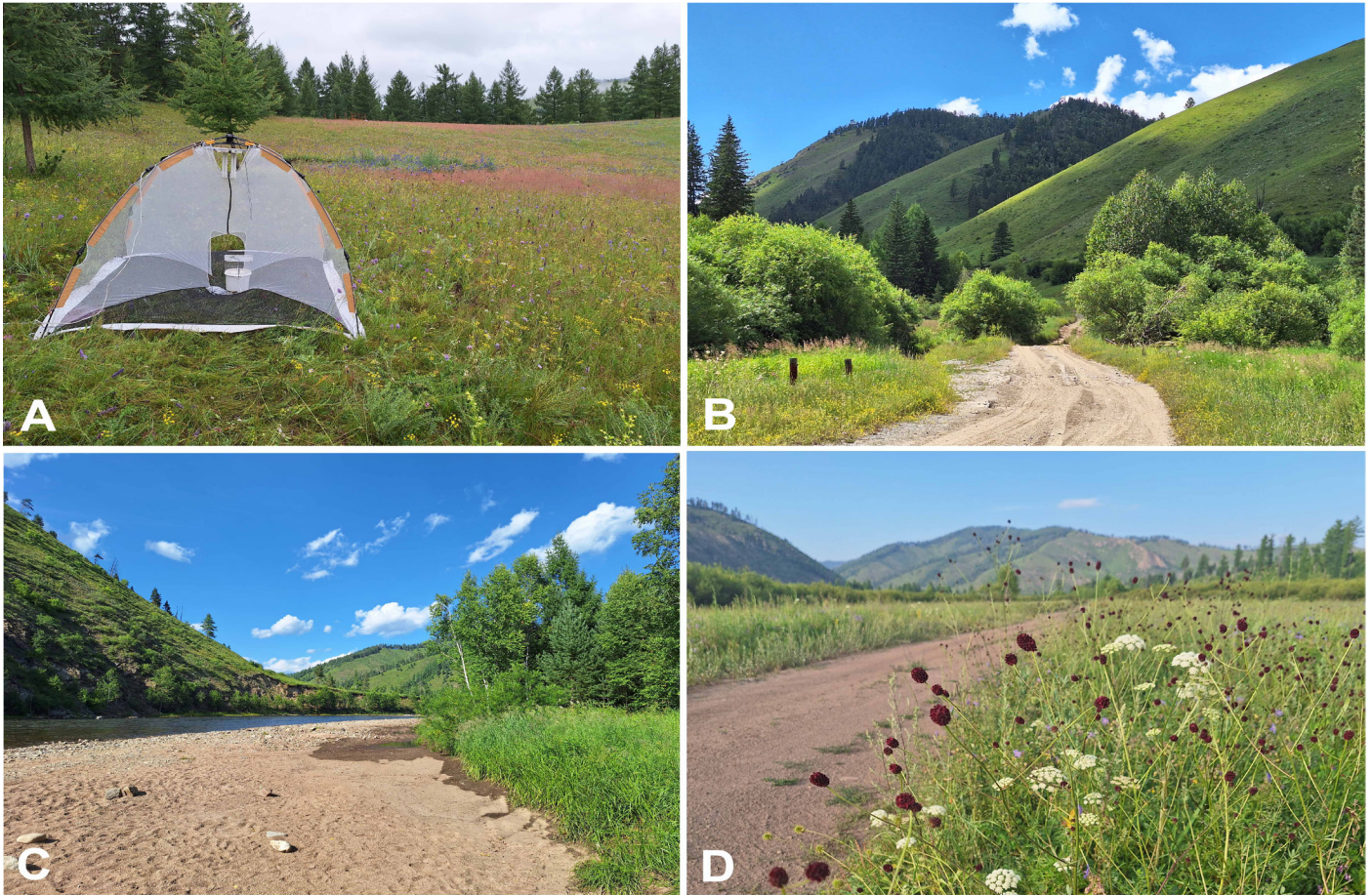


Fig. 2. Collection habitats in Mongolia July 2024. A) Light trap near Khadag Tour "Camp"; B) view from the Khonin Nuga "Road"; C) river bank near Khonin Nuga "Beach"; D) meadow near Khonin Nuga "Camp". Photos Mikael Englund.

in Results more concise, we composed abbreviations out of the province (T or S), a running letter (A – E or A – I), and the collector (E, S or T). Four of the localities (TAT = TBE, SAT = SBE, SDE = SET and SGS = SIS) were visited twice, but at different dates, by different collectors, and/or determined later on by different experts, hence the 14 abbreviations. In Province Tuv at Khadak Tour, some 50 km east from Ulaanbaatar, there were four localities and in the province of Selenge at Zuunkharaa and Khonin Nuga 120 – 150 km north from Ulaanbaatar, six localities. The side catches from these areas contained more than 1100 micros, of which 770 were pinned for further studies. In addition, PT could put on top of that more than 50 fully determined records to this paper. Figure 2 shows some of the study localities above.

Province Tuv

TAT = MONGOLIA: Tuv, Khadag Tour "Alp", N47.9658 E107.8195, alt.1820 m, 2024-07-21/24, Pekka Tokola leg. & det.
 TBE = MONGOLIA: Tuv, Khadag Tour "Alp", N47.9658 E107.8195, alt.1820 m, 2024-07-23, Mikael Englund leg. Erkki M. & Leena Laasonen det.
 TCE = MONGOLIA: Tuv, Khadag Tour "Camp", N48.02816 E107.7301, alt.1530 m, 2024-07-21, Mikael Englund leg. Erkki M. & Leena Laasonen det.
 TDS = MONGOLIA: Tuv, Terelj National Park, N48.028971 E107.716991, alt.1530/1620 m, 2024-07-21/22, Hannu Saarenmaa leg. Erkki M. & Leena Laasonen det. Lush coniferous forest.

TEE = MONGOLIA: Tuv, Khadag Tour "Ridge", N48.0301 E107.7275, alt.1560 m, 2024-07-23, Mikael Englund leg. Erkki M. & Leena Laasonen det. Steep rocky cliff and under it grassy openings.

Province Selenge

SAT = MONGOLIA: Selenge, Zuunkharaa "Mountain", N48.812 E106.551, 2024-07-15, Pekka Tokola leg. & det.
 SBE = MONGOLIA: Selenge, Zuunkharaa "Mountain", N48.8127 E106.5154, alt.980 m, 2024-07-15, Mikael Englund leg. Erkki M. & Leena Laasonen det.
 SCE = MONGOLIA: Selenge, Khonin Nuga "Road", N48.9927 E106.8972, alt.1000 m, 2024-07-20 Mikael Englund leg. & det.
 SDE = MONGOLIA: Selenge, Khonin Nuga "Beach", N49.009 E106.998, alt.930 m, 2024-07-18, Mikael Englund leg. Erkki M. & Leena Laasonen det.
 SET = MONGOLIA: Selenge, Khonin Nuga "Beach", N49.009 E106.998, 2024-07-16/19, Pekka Tokola leg. & det.
 SFE = MONGOLIA: Selenge, Khonin Nuga "Ridge", N49.0816 E107.2887, alt.960 m, 2024-07-18, Mikael Englund leg. Erkki M. & Leena Laasonen det.
 SGS = MONGOLIA: Selenge, Khonin Nuga National Park, N49.08708 E107.29084, alt.924 m, 2024-07-17/18, Hannu Saarenmaa leg. Erkki M. & Leena Laasonen det. Meadows by a river.
 SHE = MONGOLIA: Selenge, Khonin Nuga "Camp", N49.0871 E107.2907, alt.930 m, 2024-07-18, Mikael Englund leg. & det.
 SIS = MONGOLIA: Selenge, Khonin Nuga National Park, N49.093151 E107.306990, alt.924 m, 2024-07-19/20, Hannu Saarenmaa leg. Erkki M. & Leena Laasonen det. Lush coniferous forest.

As a primary reference for determining the micro species, we used two book series: Insects of Mongolia, Yearbook, Vols 1 - 11, years 1972 - 1990 (= IOM) and Microlepidoptera Palearctica, Vols 1 - 11, years 1965 - 2002 (= MP). Of these books, we referred to those papers which were relevant for this work. However, the books did not cover all microlepidopteran families of interest. As a secondary reference, we used the “Catalogue of the Lepidoptera of Russia” from all the republics or provinces at the northern border of Mongolia: Republic of Altai, Republic of Tuva, Province (Oblast) of Irkutsk, Republic of Buryatia and province of Tsita (Sinev, 2019). Similarly, we surveyed the relatively few Chinese papers, if they eventually contained micros from the regions at the southern border of Mongolia: Xinjiang Uygur autonomous region, Gansu province and Inner Mongolia autonomous region. Finally, we checked from the “Catalogue of Lepidoptera from Russian Far East” (Leleja, 2016), if some eastern micros should be noted, and went through its really long 65-page reference list!

Results

We present a list of 130 microlepidopteran species with comments. Micros were determined according to the habitus. Genital preparates (GP) were also used, but determination by DNA only indirectly. The micros were arranged according to the book “The Lepidoptera of Europe”, using its running number (Karsholt & Razowski, 1996). An “a” after the number in the list (XXXXa) means a species is not included in “The Lepidoptera of Europe” but placed (about) here in the book. For the abbreviations of investigation localities, please see Material and Methods. The notation “3/2” means 3 males and 2 females, and “D” that at least some specimens were discarded. After these notes, we present in brackets the paper with which we have determined the species and after that without brackets the papers which report the species from Mongolia: IOM = Insects of Mongolia 1972 - 1990 and MP = Microlepidoptera Palearctica 1965 - 2002. Twelve interesting micros presented in Figures 3 (and 4) were digitalized at the Finnish Museum of Natural History Luomus (ZMUH) and the codes are presented here. The micros are deposited either in ZMUH, in research collection Laasonen, in research collection Tokola or in research collection Englund.

Tineidae

702 *Monopis spilotella* (Tengström, 1848): TDS 0/1, TEE 1/0, SGS 0/1, SIS 1/1. D. Mongolia: Zaguljajev, 1972. IOM 1.

Gracillariidae

1147 *Calybites phasianipennella* (Hübner, 1813): TDS 0/1. D.

Yponomeutoidea

1343 *Scythropia crategella* (Linnaeus, 1767): TDS 0/1.

1352 *Yponomeuta rorrella* (Hübner, 1813): SAT 1 ex.

1453 *Argyresthia brockeella* (Hübner, 1813): TDS 1/0. D.

1488 *Ypsolopha horridella* (Treitschke, 1835): TEE 0/1. GP 3919/25LL.

1504 *Ypsolopha leuconotella* (Snellen, 1884): TDS 2/1, SFE 1/0. Mongolia: Leleja, 2016. <http://id.luomus.fi/GL.10612>

1525 *Plutella xylostella* (Linnaeus, 1758): TEE 1/0. D.

Depressariidae

1662a *Ethmia mongolica* (Rebel, 1901): SGS 1/0. Mongolia: Sattler, 1967. MP 2

1676 *Exaeretia (Levipalpus) hepatariella* (Lienig & Zeller, 1846): TCE 1/0, TDS 1/0, SIS 2/0. The ground color of forewings slightly darker than in Finnish exx. <http://id.luomus.fi/GL.10613>

1688 *Exaeretia mongolicella* (Christoph, 1882): TDS 2/0, TEE 2/0, SIS 2/0 (Buchner & Sumpich, 2020). Mongolia: Leleja, 2016.

1740a *Agonopterix abditella* Hannemann, 1959: TAT 3 exx., TDS 1/0. GP 3886/25LL (Buchner & Sumpich, 2020).

3078 *Hypercallia citrinalis* (Scopoli, 1783): SDE 1/0. Mongolia: Tokar et al. 2005.

Elachistinae

1831 *Elachista (Cosmiotes) stabilella* (Stainton, 1858): TEE 3/0. GP 3909/25LL.

Momphidae

2887a *Mompha jurassicella* (Frey, 1881): TEE 1/0 (Koster & Sinev, 2003): GP did not succeed.

2891 *Mompha subbistrigella* (Haworth, 1828): SGS 0/1.

Gelechiidae

3232 *Aristotelia subericinella* (Duponchel, 1843): TBE 1/0, SIS 0/1. Mongolia: Emelyanov & Piskunov, 1982, IOM 8 and Piskunov, 1990, IOM 11.

3321 *Monochroa elongella* (Heinemann, 1870): TDS 0/1. D.

3338 *Oxypteryx (Eulamprotes) wilkella* (Linnaeus, 1758): TEE 6/2.

3341a *Oxypteryx (Eulamprotes) altaicella* Huemer & Karsholt, 2013: TDS 1/0, TEE 1/0. (Huemer et al., 2013).

3373 *Bryotropha terrella* (Denis & Schiffermüller, 1775): TDS 2/0, TEE 1/0, SGS 4/0, SIS 2/0. D.

3386 *Bryotropha similis* (Stainton, 1854). TEE 1/0.

3448a *Teleiopsis kyraensis* Bidzilya, 2018: TEE 3/0. GP 3917/25LL. (Bidzilya & Nupponen, 2018).

3458 *Xenolechia aethiops* (Humphrey & Westwood, 1845): TBE 2/0.

3507 *Mirificarma mulinella* (Zeller, 1839): TEE 3/0. GP 3920/25LL & GP 3921/25LL.

3514 *Chionodes holosericea* (Herrich-Schäffer, 1854): TEE 2/0.

3517 *Chionodes continuella* (Zeller, 1839): TDS 2/0, SIS 6/0. D. Mongolia: Emelyanov & Piskunov, 1982, IOM 8.

3527 *Chionodes fumatella* (Douglas, 1850): TEE 6/1. D. Males by GP 3922/25LL & GP 3927/25LL. Mongolia: Piskunov, 1979, IOM 6, Lvovsky & Piskunov, 1989, IOM 10 and Piskunov, 1990, IOM 11.

3530a *Aroga controvalva* Li & Zheng, 1998: TDS 1/0. GP 3891/25LL. (Li & Zheng, 1998). <http://id.luomus.fi/GL.10614>

3659 *Ephysteris insulella* (Heinemann, 1870): TDS 1/0. GP 3890/25LL. Mongolia: https://en.wikipedia.org/wiki/Ephysteris_insulella. <http://id.luomus.fi/GL.10615>

3686a *Caryocolum mongolense* Povolny, 1963: TEE 1/0. GP 3928/25LL. Mongolia: Sumpich et al., 2020. The male genitalia fit well, but the forewings are more reddish. <http://id.luomus.fi/GL.10616>

3721 *Caryocolum cassella* (Walker, 1864): TDS 1/0, SGS 5/0, SIS 1/0. D.

3723 *Caryocolum petrophila* (Priessecker, 1914): SGS 6/0. D.

3798 *Aproaerema anthyllidella* (Hübner, 1813): TEE 0/1.

- 3834a *Neofaculta taigana* Ponomarenko, 1998: TEE 4/1. (Gregersen & Karsholt, 2022).
 3851 *Dichomeris derasella* (Denis&Schifferrmuller, 1775): TDS 1/0, SDE 1/0, SFE 1/0, SGS 2/0, SIS 1/0, D.
 3854 *Dichomeris (Uliaria) rasilella* (Herrich-Schäffer, 1853): TDS 1/0. Mongolia: Piskunov, 1979, IOM 6.
 3874 *Acompsia cinerella* (Clerck, 1759): TAT 1 ex., TDS 1/0, D.
 3883 *Acompsia schmidtii* Heyden, 1848: TDS 1/0.

Zygaenidae

- 3925 *Rhagades pruni* (Denis&Schifferrmuller, 1775): TAT 1 ex., SET 1 ex.
 3992 *Zygaena viciae* (Denis&Schifferrmuller, 1775): SET 1 ex. Mongolia: Sukhareva, 1978 (as *meliloti* Esper, 1789).

Tortricidae

- 4187 *Phtheochroa (Hysterosia) inopiana* (Haworth, 1811): TDS 1/0. D. Mongolia: Razowski, 1966, Razowski, 1970, MP 3 and Kuznetsov, 1975, IOM 3.
 4287 *Eupoecilia angustana* (Hübner, 1799): TDS 1/0. D. (Razowski, 1970, MP 3).
 4309 *Aethes smeathmanniana* (Fabricius, 1781): TDS 1/0, SGS 5/2, SIS 3/0. D. Including f. *ochromata* SCS 0/1, SDS 1/0. D. (Razowski, 1970, MP 3).
 4326 *Aethes cnicana* (Westwood, 1854): SIS 1/0. D. (Razowski, 1970, MP 3). Mongolia: Staudinger, 1892 and Leleja, 2016.
 4335 *Cochylidia subroseana* (Haworth, 1811): TDS 6/0, SIS 1/0. D. (Razowski, 1970, MP 3).
 4339 *Cochylidia implicitana* (Wocke, 1856): TDS 1/0. D. (Razowski, 1970, MP 3).
 4365 *Falseuncaria ruficiliana* (Haworth, 1811): TAT 1 ex, TBE 1/0, TEE 8/0. D. (Razowski, 1970, MP 3).
 4376 *Acleris (Croesia) bergmanniana* (Linnaeus, 1758): SGS 1/0. D. Mongolia?: Razowski, 1984, MP 6.
 4444 *Eana argentana* (Clerck, 1759): TDS 1/0, TEE 1/0. Mongolia: Razowski, 1966 and Kuznetsov, 1975, IOM 3.
 4556 *Archips betulanus* (Hübner, 1787): TDS 2/1, SIS 1/0, D. Mongolia: Kuznetsov, 1978.
 4577 *Pandemis cinnamomeana* (Treitschke, 1830): TEE 0/1. Mongolia: Kuznetsov, 1975, IOM 3.
 4612 *Clepsis aerosana* (Lederer, 1853): SIS 0/1. Mongolia: Staudinger, 1892 and Kuznetsov 1975, IOM 3. <http://id.luomus.fi/GL.10611>
 4618 *Clepsis rurinana* (Linnaeus, 1758): SGS 1/0, SIS 3/0. D. Mongolia: Kuznetsov, 1975, IOM 3.
 4657 *Bactra lacteana* (Caradja, 1916): TDS 1/0, SGS 1/1, SIS 1/0, D. Mongolia: Razowski, 1966 and Kuznetsov, 1975, IOM 3.
 4667 *Endothenia marginana* (Haworth, 1811): TEE 2/0. In northern Scandinavia we have ssp. *tarandina* (Laasonen & Laasonen 1995). These two exx. resemble more the nominate form ssp. *marginana*. Mongolia: Razowski, 1966 and Kuznetsov, 1975, IOM 3.
 4673 *Endothenia quadrimaculana* (Haworth, 1811): TAT 1 ex., TDS 2/0, SIS 1/0. D. Mongolia: Kuznetsov, 1975, IOM 3.
 4700 *Apotomis turbidana* Hübner, 1825: SGS 1/0, SIS 3/1. D. Male GP3987/25LL (Nedoshivina, 2016).
 4711 *Orthotaenia undulana* (Denis&Schifferrmüller, 1775): TBE 2/0. D.
 4728 *Celypha cespitana* (Hübner, 1817): TEE 12/0. D. Mongolia: Razowski, 1966, and Kuznetsov, 1975, IOM 3.
 4733 *Celypha (Syricoris) rivulana* (Scopoli, 1763): SGS 21/0, SIS 10/0. D. GP3892/25LL. Mongolia: Kuznetsov, 1975, IOM 3.
 4755 *Phiaris bipunctana* (Fabricius, 1794): SGS 5/0, SIS 3/0. D. GP 3893/25LL. Mongolia: Kuznetsov, 1975, IOM.
 4814 *Thiodia torridana* (Lederer, 1859): SDE 0/1, SGS 2/0. (Zhang & Li, 2005).
 4825a *Semasia (Asketria, Biuncaria) kenteana* (Staudinger, 1892):

- TCE 1/0, SDE 1/0, SIS 2/0. (Kuz- netsov et al., 1998). Mongolia: Staudinger, 1892 and Razovski, 1966 and Kuznetsov, 1975, IOM 3.
 4829 *Rhopobota naevana* (Hübner, 1817): SIS 0/2. D. Mongolia: Kuznetsov, 1975, IOM 3.
 4882 *Zeiraphera griseana* (Hübner, 1799): SIS 1/0. D. Mongolia: Kuznetsov, 1975, IOM 3.
 4901 *Pelochrista apheliana* (Kennel, 1901): SGS 1/0, SIS 2/0. (Zhang & Li 2005). Mongolia: Razowski, 2003.
 4901a *Pelochrista muhabbet* Kocak 2006 != *chanana* (Kennel, 1901) /: TEE 4/0. GP3929/25LL. (Gilligan & Wright, 2012). Mongolia: Razowski, 1966 and Kostjuk, 1975, IOM 3 (both as *chanana*). <http://id.luomus.fi/GL.10618>
 4909 *Pelochrista latericana* (Rebel, 1919): TEE 1/0. GP3930/25LL. <http://id.luomus.fi/GL.10619>
 4919 *Pelochrista arabescana* (Eversmann, 1844): TBE 1/0, TEE 14/2, SIS 1/0. D. Mongolia: Kostjuk, 1975, IOM 3.
 4959 *Eucosma tundrana* (Kennel, 1900): TAT 1 ex. TEE 1/0. Mongolia: Kuznetsov, 1975, IOM 3. <http://id.luomus.fi/GL.10617>
 4985 *Gypsonoma dealbana* (Frölich, 1828): SIS 0/1. D. (Zhang & Li, 2005).
 5019 *Notocelia cynosbatella* (Linnaeus, 1758): TDS 1/0. D. (Zhang & Li, 2005). Mongolia: Kuznetsov, 1978.
 5055 *Enarmonia formosana* (Scopoli, 1763): SIS 1/0. D.
 5073 *Ancylis badiana* (Denis&Schifferrmuller, 1775): TDS 0/1. D. Mongolia: Kuznetsov, 1975, IOM 3.
 5114 *Cydia leucogrammana* (O.Hoffman, 1898): TDS 1/0.
 5230a *Dichrorampha altaica* Danilevsky, 1968: SGS 2/0, SIS 2/0. <http://id.luomus.fi/GL.10620>

Choreutidae

- 5273 *Prochoreutis ultimana* (Krulikovsky, 1909): TDS 1/0, TEE 1/0, SIS 5/0. D.

Epermeniidea

- 5302 *Epermenia aequentella* (E.Hofmann, 1867): TEE 8/1. Male GP3915/25LL. Mongolia: Falkovitsch 1981.

Pterophoridae

- 5381 *Amblytilia acanthadactyla* (Hübner, 1813): SIS 1/0. GP3895/25LL.
 5385+ *Paraplatyptilia sibirica* (Zaguljajev, 1983): TAT 1 ex., TDS 0/1, SGS 1/0. (Kullberg et al., 2013).
 5394 *Stenoptilia veronicae* Karvonen, 1932: SIS 1/0. GP3894/25LL. (Arenberger, 2005, MP 12).
 5441 *Oxyptilus pilosellae* (Zeller, 1841): SGS 0/1, SIS 1/0. D. (Arenberger, 2002, MP 11).
 5474a *Procapperia kuldschaensis* (Rebel, 1914): TEE 1/1. Mongolia: Arenberger, 2002, MP 11.
 5501 *Merrifieldia leucodactyla* (Denis&Schifferrmüller, 1775): TEE 1/0, TCE 11/1. Mongolia: Arenberger, 1995, MP 9.
 5501a *Merrifieldia caspius* (Lederer, 1870): TCE 0/1. (Arenberger, 1995, MP 9).
 5535 *Euleioptilus (Hellinsia) didactylites* (Ström, 1783): TDS 0/1. D. (Arenberger, 1995, MP 9).
 5548a *Hellinsia mongolica* (Zaguljajev & Pentschukovskaja, 1972): TDS 1/0. Mongolia: Arenberger, 1995 MP 9.

Pyralidea

- 5625a *Pyralis cardinalis* Kaila, Huemer, Mutanen, Tyllinen & Wickström 2020: TDS 1/0, SCE 1/0. (Wikström et al., 2020).
 5686 *Pempeliella ornatella* (Denis&Schifferrmüller, 1775): SBT 1 ex, SFE 1/0.

- 5690a *Delplanqueia (Pempeliella) inscriptella* (Duponchel,1836): TEE 6/9, SIS 2/1. D. (Bengtsson, 2016).
- 5718 *Sciota fumella* (Eversmann,1844): TDS 0/1, SDE 1/0, SGS 1/2, SIS 3/1, D. Mongolia: Leleja, 2016.
- 5732 *Selagia argyrella* (Denis&Schifferrmuller,1775): TAT 1 ex., TBE 1/0, TCE 21/1, TDS 1/1. D. Mongolia: Staudinger, 1892 and Leleja, 2016.
- 5735 *Selagia spadicella* (Hübner,1796): TCE 1/0, TEE 13/4, SCE 0/1. D. Mongolia: Leleja, 2016.
- 5740 *Pima boisduvaliella* (Guenée 1845): TEE 4/1. Mongolia: Ivinskis 1990, IOM 11.
- 5740a *Pima tabulella* Ragonot 1901: TEE 1/0. Opinions differ, if tabulella is just a ssp. of *boisduvaliella*. <http://id.luomus.fi/GL.10621>
- 5751 *Oncocera semirubella* (Scopoli.1763) f. *Icterella* Ragonot,1888: TDS 0/2. Mongolia: Leleja, 2016.
- 5869a *Acrobasis curvella* (Ragonot,1893): TDS 0/1. <http://id.luomus.fi/GL.10622>
- 5902 *Cremnophila sedakovella* (Eversmann,1851): TEE 4/0, SBT 1 ex, SBE 0/1. Mongolia: Staudinger, 1892 and Leleja, 2016.
- 5930 *Megasia rippertella* (Zeller,1839): TDS 1/0, SIS 1/0. (Roesler, 1993, MP 8).
- 6066a *Staudingeria (Ancylosis) psammicola* Roesler 1970: TEE 1/0. Mongolia: Roesler, 1973, MP 4 and Ivinskis, 1990, IOM 11. Up till now, only from Mongolia.
- Crambidae**
- 6176 *Gesneria centuriella* (Denis&Schifferrmuller,1775): TCE 1/0, TDS 1/0, SET 1 ex., SGS 0/2, SIS 1/1. Mongolia: Staudinger, 1892 and Leleja, 2016.
- 6182 *Eudonia murana* (Curtis,1827): TDS 2/0, SIS 1/1. D.
- 6193 *Eudonia truncicolella* (Stainton,1849): TDS 2/0, TEE ca.120 exx., SIS 0/1. DD.
- 6244 *Crambus silvellus* (Hübner,1813): TDS 1/1. (Blezynski, 1965, MP 1). Mongolia: Leleja, 2016.
- 6250a *Crambus sibiricus* Alpheraky,1897: SGS 2/0, SIS 1/0. (Blezynski, 1965, MP 1). Mongolia: Leleja, 2016.
- 6253 *Crambus perlellus* (Scopoli,1763): TAT 2 exx., TEE 0/1, SET 1 ex., SGS 2/0, SIS 3/0. D. (Blezynski,1965, MP 1). Mongolia: Staudinger, 1892 and Leleja, 2016.
- 6258 *Agriphila tristella* (Denis&Schifferrmuller,1775): TAT 2 exx. (Blezynski, 1965, MP 1).
- 6265 *Agriphila aeneociliella* (Eversmann,1844): TBE 1/0, TDS 2/0. (Blezynski, 1965, MP 1). Mongolia: Leleja,2016.
- 6303 *Catoptria permiaca* (W.Petersen, 1924): TAT 1 ex., TDS 1/0, SDE 0/1, SGS 1/0. (Blezynski, 1965, MP 1).
- 6303a *Catoptria furciferalis* (Hampson,1909): SGS 2/0, SIS 1/0. (Blezynski, 1965, MP 1).
- 6341 *Xanthocrambus argentarius* (Staudinger,1867): TEE 5/0. (Blezynski, 1965, MP 1). Mongolia: Staudinger, 1892.
- 6348 *Chrysocramboides (Chrysocrambus) craterella* (Scopoli,1763): TBE 1/0, TEE 2/0. (Blezynski, 1965, MP 1).
- 6350 *Thisanotia chrysonuchella* (Scopoli,1763): TDS 1/0. Mongolia: Blezynski,1965, MP 1.
- 6355 *Pediasia luteella* (Denis&Schifferrmüller,1775): TEE 23/3, SIS 1/0. D. Mongolia: Blezynski, 1965, MP 1.
- 6364a *Pediasia radicivitta* (Filipjev,1927): TEE 1/0. GP3918/25LL. Mongolia: Blezynski,1965, MP 1.
- 6377a *Platytes ornatella* (Leech,1889): TDS 1/0, SHS 1/0, SIS 1/2. (Blezynski, 1965, MP 1).
- 6386a *Talis menetriesii* Hampson,1900: TAT 4 exx., TDS 2/2, TEE 9/0, SFE 1/0. Mongolia: Blezynski,1965, MP 1.
- 6492+ *Evergestis pechi* (Bethune-Baker,1885): TAT 1 ex.
- 6396+ *Scirpophaga xanthopygata* Schawerda,1922: SAT 1/0.
- 6499 *Evergestis extimalis* (Scopoli,1783). TDS 1/0, SIS 0/1. D. Mongolia: Staudinger, 1892 and Leleja 2016.
- 6532 *Udea costalis* (Eversmann,1852): TAT 1 ex., TDS 2/0. SDE 1/0, SGS 1/1, Mongolia: Kirpichnikova, 1990, IOM 11.
- 6543 *Udea inquinatalis* (Lienig&Zeller,1846): TDS 1/0, SIS 2/0.
- 6544 *Udea cyanalis* (deLaHarpe,1855): SIS 1/0. GP3896/25LL.
- 6563 *Anania (Opsitotys) fuscalis* (Denis & Schifferrmuller, 1775): TAT 1 ex., TDS 4/0, SGS 1/0, SHE 1/0, SIS 0/1. D. Mongolia: Kirpichnikova, 1990, IOM 11
- 6595 *Haematia (Pyrausta) cingulata* (Linnaeus,1767): TAT 1 ex., TEE 2/0, SCE 1/0. Mongolia: Leleja, 2016.
- 6601 *Pyrausta despicata* (Scopoli,1763): TAT 1 ex. Mongolia: Staudinger, 1892 (as *cespitalis* (Denis&Schifferrmuller,1775)) and Leleja, 2016.
- 6606 *Pyrausta ostrinalis* (Hübner,1796): TAT 1 ex, TBE 1/0, SBE 1/0. Mongolia?: Staudinger, 1892 (as *purpuralis* var. *kentealis* Staudinger, 1892)
- 6623 *Sitochroa palealis* (Denis&Schifferrmuller,1775): SAT 1 ex. Mongolia: Leleja, 2016.
- 6624 *Sitochroa verticalis* (Linnaeus,1758): TAT 1 ex., TDS 1/0, SHE 1/0. Mongolia: Staudinger, 1892 and Leleja, 2016.

Table 1. Origin of the earlier barcodings of the micros at our list this far: A) The 111 micros with a Palearctic or Holarctic zoogeographical distribution. B) The remaining 19 micros with an eastern Palearctic distribution.

Origin of the micros barcoded	A	B
	% (n)	% (n)
Mongolia*	2 (2)	-
Bordering provinces to Mongolia**	26 (29)	16 (3)
Eastern Palearctic further away	24 (27)	-
Nearest in Europe	41 (45)	-
No barcoding	7 (8)	84 (16)

* A) 1688 *Exaeretia mongolicella*, 5740 *Pima boisduvaliella*

** A) 27 from Russian Altai and 2 from Chinese provinces; B) 3381a *Oxypteryx altaicella*, 5230a *Dichrorampha altaica*, both from Russian Altai, and 5548a *Hellinsia mongolica* from Russian Burjatija. See also text.

Of the listed species 111/130 (85 %) have a Palearctic or even Holarctic zoogeographical distribution, and the remaining 19 an eastern Palearctic distribution. Five of these, *Ethmia mongolica*, *Aroga controvalva*, *Hellinsia mongolica*, *Acrobasis curvella* and *Catoptria furciferalis* only occur in Mongolia and further eastwards as well as *Staudingeria (Ancylosis) psammicola* only from Mongolia. Here we had a problem, as virtually nothing could be found in the literature about the biology of the latter "far east" group of six species, or about five of the remaining 13 species of the eastern Palearctic group. Therefore, we are able to suggest only three species with steppe or semidesert living habitat: *Pelochrista muhabbet* (= *chanana*) and *Pelochrista arabescana* (Kuznetsov et al. 1998), as well as *Agonopterix abditella*, and only one mountain species, *Merifieldia caspius*. Our highest collecting locality was at Tuv: Khadag Tour "Alp" at a height of 1820 m, perhaps not high enough to catch the species residing in the highest mountain elevations.

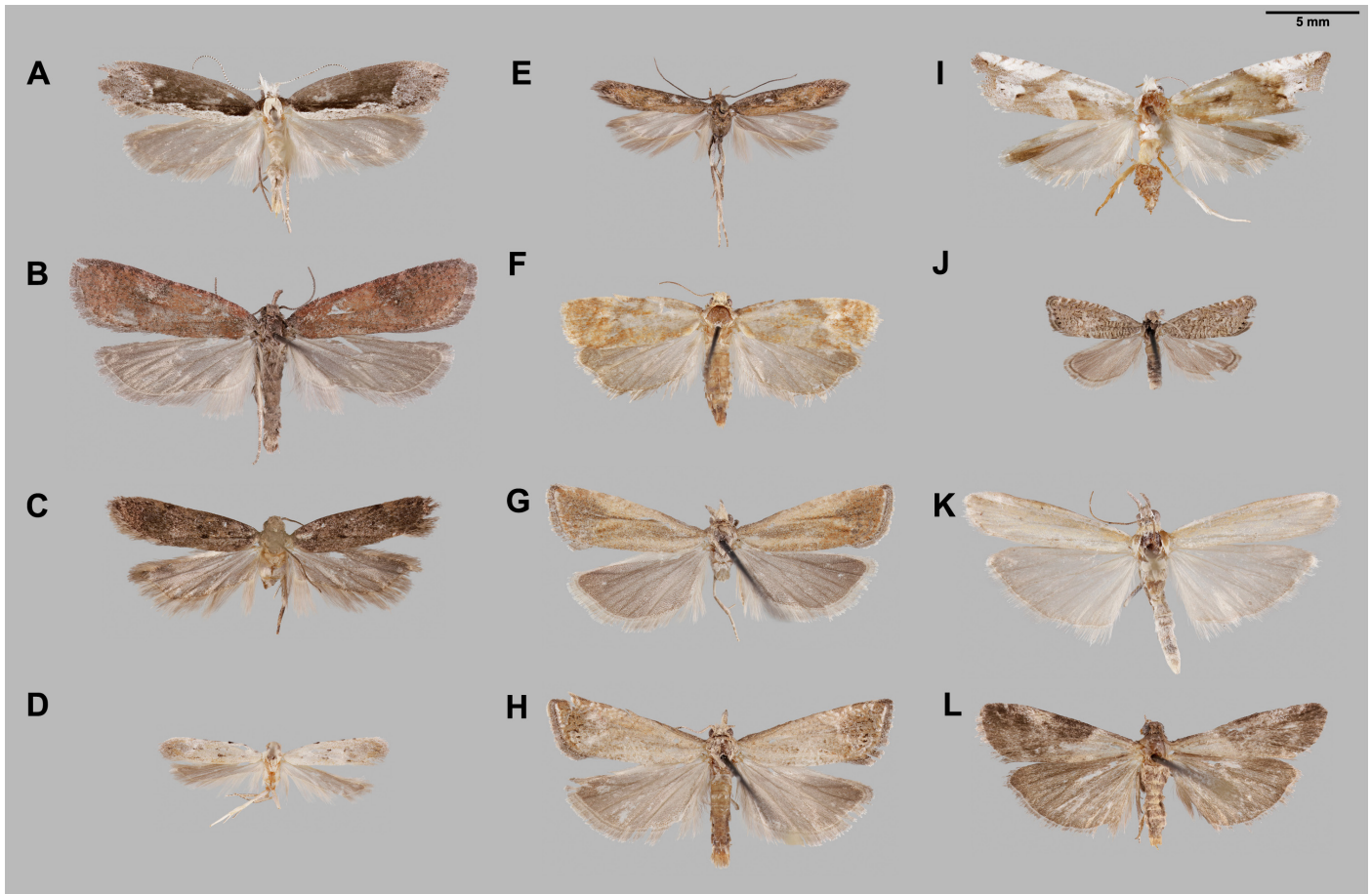


Fig. 3. Twelve Mongolian micros (digitalization codes see the list of species). A) *Ypsolopha leuconotella*; B) *Exaeretia hepatoriella*; C) *Aroga controvalva*; D) *Ephysteris insulella*; E) *Caryocolum mongolense*; F) *Clepsis aerosana*; G) *Pelochrista muhabbet*; H) *Pelochrista latericana*; I) *Eucosma tundrana*; J) *Dichrorampha altaica*; K) *Pima tabulella* and L) *Acrobasis curvella*. Photos Pekka Malinen.

We also screened the distribution of earlier barcoded material of our 130 micros from the BOLD v4 (<https://v4.boldsystems.org/index.php/PublicBarcodeIndexNumber> Home). The results are in Table 1: A) for the 111 micros with Palearctic or Holarctic zoogeographical distribution and B) for the remaining 19 micros with eastern Palearctic distribution. Especially we wish to point out the frequent use of barcoding in materials from Russian Republic of Altai near the north-westernmost tip of Mongolia. This "hot spot" accentuated especially among our 20 Palearctic Gelechiid micros, of which 10 were barcoded there (see eg. Huemer et al. 2013). Very little barcoding exists anywhere from the 19 eastern Palearctic micros.

Finally, we have dozens of partly determined micros in groups Gracillarioidea, Elachistinae, Scythrididae, Coleophoridae, Gnorimoschemini and Phycitini. We will return, if we eventually find the correct species names for them.

Discussion

This paper certainly has a European touch. We have been trained with European micro materials, our bookshelves are 90 % full of European books, and even the Lepidopteran material in internet has quite often a European source. Therefore, we devoted much work to secure that the additional northern (Sinev,

2019) and eastern micros (Leleja, 2016) should not avoid our attention. The main problem here was that many new species and their descriptions by Russian or Soviet authors were unavailable. Information from southern micros of the border between Mongolia and China was quite sparse and often unreadable. Maybe these southern species, and perhaps also endemic Mongolian species, are underrepresented in our paper. So, we did not try to make a comprehensive list of Mongolian micros. However, a list of 130 Mongolian micros is the most extensive we have found from the literature thus far. There are many reasons for this. Earlier, the authors concentrated on macrolepidoptera and micros were just an appendix. Later, they took a Family, e.g. Tortricidae, and made very good job on them, or even worked with the "giant" genera such as *Elachista*, *Coleophora*, *Scythris*, *Scrobipalpa* or *Homoeosoma*, again with respectable results. But the more primitive a micro family is or the smaller the species are in it, the thinner and more uneven the literature is. Virtually nobody has tried to cover all the micro families. But we did our best.

We would have liked to use more GPs and determination by DNA, but for such an extensive material it was a question of resources. However, we have a dream. Mongolia is almost an empty box in using barcodes. It would be very interesting to start from scratch and sort the Mongolian micros from fresh

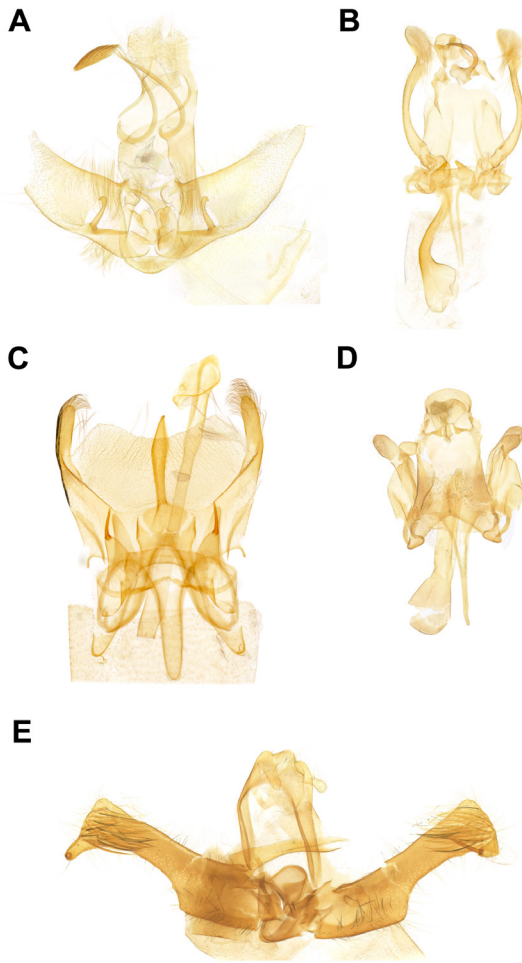


Fig. 4. Five pictures of male genitalia. (A) *Agonopterix abditea*; (B) *Ephysteris insulella*; (C) *Aroga controvalva*; (D) *Caryocolum mongolense* and (E) *Pelochrista muhabbet*. Photos Pekka Malinen.

materials primarily via barcoding into phylogenetic clusters, and then, as a kind of reversed approach, test if the human eye can find morphological differences between those isolated molecular clusters. The challenge for such an effort is to find the required resources.

Acknowledgements

We wish to thank all the participants of the expedition for an excellent cooperation and detailed information of all local and other aspects. We thank Dir., Dr. Ishgen Budbayar from the Natural History Museum in Ulaanbaatar for his help and wise advice to the expedition. Our sincere thanks go to Jaakko Kullberg for determining of many Pekka Tokolas micros. Juho Paukkunen and Pekka Malinen from the Zoological Museum Luomus deserve our warmest thanks for their help in the literature and photos. Finally, we thank Pekka Alestalo for the loan of his micro books from the Far East.

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