

Sphingidae of the Mongolian Altai (Lepidoptera: Sphingidae)

R. V. Yakovlev, E. V. Gus'kova, V. V. Doroshkin & S. V. Titov

Abstract

The annotated list of Sphingidae of the Mongolian Altai which includes 21 species of 9 genera is presented. Two species *Hyles livornica* (Esper, 1780) and *Agrius convolvuli* (Linnaeus, 1758) are reported as new for the Mongolian Fauna. Larva and pupa of *Hyles chamyla* (Denso, 1913) are described.

KEY WORDS: Lepidoptera, Sphingidae, fauna, *Hyles livornica*, *Agrius convolvuli*, *Hyles chamyla*, Mongolia.

Sphingidae del Altai mongol (Lepidoptera: Sphingidae)

Resumen

Se presenta una lista de los Sphingidae del Altai mongol, que incluye 21 especies de 9 géneros. Dos especies, *Hyles livornica* (Esper, 1780) y *Agrius convolvuli* (Linnaeus, 1758) se indican como nuevas para la fauna mongola. Se describe la larva y pupa de *Hyles chamyla* (Denso, 1913).

PALABRAS CLAVE: Lepidoptera, Sphingidae, fauna, *Hyles livornica*, *Agrius convolvuli*, *Hyles chamyla*, Mongolia.

Introduction

The Mongolian Altai is a mountain system in Mongolia and China. It stretches approximately 1000 km from the northwest to the southeast and its width varies from 300 km in the northwest to 150 km in the southeast. It reaches an altitude of 4362 m (Mt. Munkh-Khajrkhan-Ula) and consists of several parallel ridges, separated by longitudinal tectonic valleys. The summits are mostly plateau-like, with cirque and cornice glaciers (the largest being Potanin Glacier) on their crests. The Mongolian Altai is made up of Paleozoic schists, porphyries, and granites. Southwestern slopes receive more precipitation than northeastern ones, and they consist of richer forest-meadow landscapes (with spruce and larch prevailing in forests), changing into steppes in lowlands and alpine meadows. Steppes and semi-deserts dominate on northeastern slopes, while semi-deserts prevail between the mountains. The mountain system of the Mongolian Altai reaches uplands of the Altai Republic (Russia) in the north, borders with deserts and semi-deserts of Dzhungaria and Gobi towards the south and west, and semi-deserts of the Great Lakes Depression in the northeastern area of the system. The Alag-Nuur Depression in the east of the Mongolian Altai separates it from the lower Gobi Altai (KAMELIN, 2005).

Entomofauna of the southwestern (Dzungarian) slopes of Mongolian Altai is very different from those of the northeastern slopes. This has been documented in several publications (SERGEEV, 1986; KRYZHANOVSKIJ, 2002; YAKOVLEV, 2012). The main ridge of the Mongolian Altai divides the biota of the Altai mountain region into two biological provinces: Altai-Dzhungarian (western) and Western Mongolian (eastern).

The history of studies on Sphingidae of the Mongolian Altai is very limited. DANIEL (1969) in a range of papers on moths of Mongolia mentioned *Hyles hippophaes* for Hovd (Kobdo) aimak. There were no new data on the fauna of Mongolian Altai in the paper on hawkmoths of Mongolia (DERZHAVETS, 1977) but just a repeated mention by F. Daniel. Later (GROSSER, 1982; PITTAWAY & KITCHING, 2000) *Smerinthus ocellata* (Linnaeus, 1758) and *Marumba gaschkewitschii* (Bremer & Grey, 1853) were reported for Hovd (Kobdo) aimak, 10 km east of Jarantai. Common information on the distribution of the Palaearctic Sphingidae including data on the territory of the Mongolian Altai was introduced in (DANNER *et al.*, 1998; PITTAWAY & KITCHING, 2013). Two papers published in the last decade (SALDAITIS & IVINSKIS 2006; ZOLOTUHIN & SALDAITIS, 2011) were devoted to Mongolian species of genus *Hyles* Hübner, [1818]. These papers include faunistic finds, description of the new species *Hyles churkini* Saldaitis & Ivinskis, 2006 and a new synonymy establishing that *Hyles chivilini* Eischberger, Danner & Surholt, 1998 is a synonym of *Hyles exilis* Derzhavets, 1979. Also a brief analysis of the history of study and trophic connections of Sphingidae of Mongolia was performed (ZAGORINSKIY *et al.*, 2010).

During our expeditions to Western Mongolia abundant material on Sphingidae was collected. As a result six species were reported for the territory of Mongolia for the first time (*Smerinthus kindermannii* Lederer, 1853, *Hemaris ducalis* (Staudinger, 1887), *Hemaris alaiana* (Rothschild & Jordan, 1903), *Neopterodonta kuldjaensis* (Graeser, 1892), *Hyles nicaea* (Prunner, 1798), *H. centralasiae* (Staudinger, 1887) and data on the distribution of some already known species was specified (YAKOVLEV *et al.*, 2005; 2013; YAKOVLEV & DOROSHKIN, 2005; GUS'KOVA & YAKOVLEV, 2011; YAKOVLEV, 2011). In the present paper we summarize all known data on Sphingidae of the Mongolian Altai.

Material and methods

Material mentioned in the current work was collected by the authors using light sources (light trap (light source-tube Philips TL 8W/05), poison-chloroform), bulbs, Philips-250 a Subaru-750 generator) during ten expeditions to Western Mongolia; all published data are cited.

Abbreviations: MČK - collection of Matjaz Černila (Kamnik, Slovenia); PSU - Research Centre for Environmental «Monitoring», Pavlodar State University (Pavlodar, Kazakhstan); RYB - collection of Roman V. Yakovlev (Barnaul, Russia); VDC - collection of Vyacheslav Doroshkin (Chelyabinsk, Russia).

List of collecting localities (Fig. 1):

1. Bayan-Ulegej aimak, middle stream of Elt-Gol river (Kara-Irtys basin), 48° 05' N; 89° 10' E;
2. Bayan-Ulegej aimak, Kobdo-gol Valley, 20 km SW Tsengel, 48° 49' N; 88° 59' E (Fig. 2);
3. Bayan-Ulegej aimak, Khuraj-Modny-am place, 48° 15' N; 88° 54' E;
4. Hovd aimak, 30 km NNW Bulgan, rivers Bulgan-Gol and Bayan-Gol;
5. Hovd aimak, 30 km S Altai somon, Bodonchijn-Gol river valley (under stream), Elkhony-Ekhen-Tal place, 45° 43' N; 92° 05' E;
6. Hovd aimak, Bodonchijn-Gol basin, Hundijn-Gol riv. valley, 46° 06' N; 92° 30' E;
7. Hovd aimak, Bulgan-gol basin, Dod-Naryjn-Gol Valley;
8. Hovd aimak, Arshantyn-Nuruu Mts., Bulgan-gol basin, Bayan-gol basin, middle stream of Ulyastain-Sala river, 46° 21' N; 91° 08' E;
9. Hovd Aimak, Sutay Uul Mts, NW slopes;
10. Hovd Aimak, Mongolian Altay Mts, NW slopes, 25 km S from Tsetseg;
11. Hovd aimak, near Erdene-Buren-Somon, Shurag-Gol Valley;
12. Hovd aimak, near Mankhan;
13. Hovd aimak, Bulgan-Gol Valley, 45 km N of Bulgan;
14. Hovd aimak, Dzhungarian Gobi, 45 km SW Bulgan, Uvhod-Ula Mt.;
15. Hovd aimak, Dzhungarian Gobi, 15 km S Bulgan, Barangijn-Shara-Nuruu Mts.;

16. Hovd aimak, Bodonch Gol river, 50 km NE Uench;
17. Hovd aimak, Uenchin-Gol Valley, 50 km N. of Uench (Fig 3);
18. Hovd aimak, Barlagijn-Gol Valley (under stream), 25 km NW of Altan-Soembo, 45° 53' N; 93° 05' E;
19. Hovd (Kobdo) aimak, 10 km east of Jarantai;
20. Gobi-Altai aimak, Alag-Nuur lake (near Ajlyn-Tsagan-Khuduk), 45° 09' N; 94° 30' E (Fig. 4);
21. Gobi-Altai aimak, 15–20 km N of Alag-Nuur lake, Takhajchin-Gol river Valley;
22. Gobi-Altai aimak, Gobi-Altai aimak, Adzh-Bogdo Mt.(S.sl.), Il-Gol Valley;
23. Gobi-Altai aimak, Adzh-Bogdo Mts. (NE slope), near Khalba-Khairkhan Mt., 45° 03' N; 94° 59' E;
24. Gobi-Altai aimak, Mongolian Altai Mts., S. slope, Mogojin-Gol Valley, 45° 39' N; 93° 47' E;
25. Gobi Altay aimak, S of Mongolian Altay, Alag Kharkhan Mts;
26. Gobi-Altai aimak, Mongolian Altai Mts., Hara-Adzragyn-Nuru Mts., Najtvaryn-Sajr river Valley (under stream), 45° 52' N; 95° 30' E;
27. Gobi-Altai aimak, Mongolian Altai Mts., Khasgt-Khairkhan Mts., 17 km SSW Zhargalan, 46° 48' N; 95° 49' E.

Results

ANNOTATED LIST OF SPECIES

Agrius convolvuli (Linnaeus, 1758) (Fig. 5)

Material examined: 1 ♂, SW Mongolia, Gobi-Altai aimak, Dzhungarian Gobi, Alag-Nuur lake (near Ajlyn-Tsagan-Khuduk), 1300 m, 45° 09' N; 94° 30' E; 9-10-VII-2010, leg. V. Doroshkin (VDC). **New for Mongolian Fauna.** In the Mongolia - ssp. *convolvuli* (Linnaeus, 1758).

Smerinthus kindermanni Lederer, 1853 (Fig. 6)

Material examined: 1 ♂, Hovd aimak, 30 km NNW Bulgan, rivers Bulgan-Gol and Bayan-Gol, H-1500 m, 13-VII-2003, leg. V. Doroshkin (VDC). In the Mongolia - ssp. *kindermanni* Lederer, 1853.

Smerinthus ocellata (Linnaeus, 1758) (Fig. 7)

Material examined: 1 ♂, SW Mongolia, Hovd aimak, middle stream of Uenchin-Gol river, 50 km N of Uench, 1-2-VI-2004, leg. V. Doroshkin (VDC); 12 ♂♂, SW Mongolia, Hovd aimak, 30 km S Altai somon, Bodonchijn-Gol river valley (under stream), Elkhony-Ekhen-Tal place, 1200 m, 45° 43' N; 92° 05' E; 7-VI-2011, leg. R. Yakovlev (RYB); 1 ♂, same locality, 10-V-2012, leg. M. Černila (MČK). In the Mongolia - ssp. ? *ocellata* (Linnaeus, 1758).

Sphinx ligustri Linnaeus, 1758 (Fig. 8)

Material examined: 1 ♂, SW Mongolia, Hovd aimak, Bodonchijn-Gol basin, Hundijn-Gol riv. valley, 1600 m, 46° 06' N; 92° 30' E; 6-VI-2011, leg. R. Yakovlev (RYB); 1 male, W. Mongolia, Hovd aimak, Bulgan-gol basin, Dod-Naryjn-Gol Valley, 1500-1700 m, 14-VII-2007, E. V. Gus'kova & R.V. Yakovlev leg. (RYB); 1 ♂, SW Mongolia, Gobi-Altai aimak, Mongolian Altai Mts., S. slope, Mogojin-Gol Valley, 11-VII-2009, 1800 m, R. Yakovlev & E. Gus'kova (RYB); 1 ♂, SW Mongolia, Gobi-Altai aimak, Adzh-Bogdo Mt.(S. sl.), Il-Gol Valley, 2500 m, 15-VII-2009, R. Yakovlev & E. Gus'kova (RYB). In the Mongolia - ssp. *amurensis* Oberthür, 1886.

Host plant in Mongolia: *Spiraea* sp. (Rosaceae) (ZAGORINSKIY *et al.*, 2010).

Hemaris ducalis (Staudinger, 1887) (Fig. 9)

Material examined: 1 ♂, W. Mongolia, Hovd aimak, Bulgan-gol basin, Dod-Naryjn-Gol Valley, 1500-1700 m, 14-VII-2007, E. V. Gus'kova & R. V. Yakovlev leg. (RYB); 1 ♂, W. Mongolia, Hovd aimak, Bulgan-gol basin, Bayan-gol basin, middle stream of Ulyastain-Sala river, 2100 m, 21-23-VI-2004, R. Yakovlev & D. Ryzhkov leg. (EMEM). In the Mongolia - ssp. *ducalis* (Staudinger, 1887).

Hemaris alaiana (Rothschild & Jordan, 1903) (Fig. 10)

Material examined: 1 ♂, W Mongolia, Khovd aimak, Bulgan-gol basin, Bayan-gol basin, 2000 m, 13-V-2002, R. Yakovlev leg. (RYB). In the Mongolia - ssp. *alaiana* (Rothschild & Jordan, 1903).

Neopterodonta kuldjaensis (Graeser, 1892) (Fig. 11)

Material examined: 1 ♂, SW Mongolia, Hovd aimak, Bodonchijn-Gol basin, Hundijn-Gol riv. valley, 1600 m, 46° 06' N; 92° 30' E; 28-V-2011, leg. R. Yakovlev (RYB). In the Mongolia - ssp. *kuldjaensis* (Graeser, 1892).

Macroglossum stellatarum (Linnaeus, 1758) (Fig. 12)

Material examined: 1 ♂, W. Mongolia, Hovd aimak, Bulgan-gol basin, Bayan-Gol river valley, Arshantyn-Nuruu Mts., Ulyastajin-Sala river, 1900 m, 46° 21' N; 91° 08' E; 9-10-VI-2011, R. Yakovlev leg. (RYB); 1 male, SW Mongolia, Gobi-Altai aimak, Mongolian Altai Mts., S. slope, Mogoijn-Gol Valley, 11-VII-2009, 1800 m, R. Yakovlev & E. Gus'kova (RYB). In the Mongolia - ssp. *stellatarum* (Linnaeus, 1758).

Hyles chamyla (Denso, 1913) (Figs 13, 27-30)

Material examined: 4 ♂♂, SW Mongolia, Gobi-Altai aimak, Alag-Nuur lake (near Ajlyn-Tsagan-Khuduk), 1300 m, 45° 09' N; 94° 30' E; 1-2-VI-2011, R. Yakovlev (RYB); 1 ♂, Hovd aimak, Dzhungarian Gobi, 45 km SW Bulgan, Uvhod-Ula Mt., H-1350 m, 8-10-VII-2003, leg. Doroshkin, Ustjuzhanin and Yakovlev (RYB). Caterpillar was photographed on 11-VII-2007 by V. Anikin on *Poacinum pictum* (Apocinaceae). (Hovd aimak, Dzhungarian Gobi desert, Uvhod-Ula Mts., 15 km S of Bulgan somon) (Figs 27, 30). In the Mongolia - ssp. *chamyla* (Denso, 1913).

Notes: Besides the imago collected at light, several caterpillars were collected near Alag-Nuur lake (9-10-VII-2010) on *Poacinum pictum* (Apocinaceae) and were fed till pupation happened (Fig. 28). Due to continuing of the expedition at the further itinerary it was impossible to continue supplying the caterpillars with their host plants. Instead they were supplied by finely cut fresh carrot and cabbage. For a week they fed on this, then pupation happened on 20-25-VII-2013, and on 1-VIII, 3-6-IX-2013 the imagos appeared. Larva of the last instar: length of 55-60 mm, light-green. Dorsal line yellowish, subdorsal, suprastigmal and stigmal strips represented by rows of white, slightly prominent spots. Spiracles white, oval, surrounded by black line. Pupa (Fig. 29) fusiform, light-brown, abdominal part slightly darker than thoracic. Cremaster thin, pointed to apex.

Hyles exilis (Derzhavets, 1979) (Figs 14, 31)

Material examined: 2 ♂♂, SW Mongolia, Hovd aimak, Bodonchijn-Gol basin, Hundijn-Gol riv. valley, 1600 m, 46° 06' N; 92° 30' E; 28-V-2011, leg. R. Yakovlev (RYB); 1 ♂, W. Mongolia, Hovd aimak, 25 km NW Mankhan, 3-VII-2003, leg. V. Doroshkin (VDC). Caterpillar (Fig. 31) was collected and photographed on *Poacinum pictum* (Apocinaceae) (Gobi-Altai aimak, Alag-Nuur lake (near Ajlyn-Tsagan-Khuduk), 45° 09' N; 94° 30' E). However we were unable to feed it till pupation. In the Mongolia - ssp. *chuvilini* Eitschberger, Danner & Surholt, 1998.

Host plant in Mongolia: *Euphorbia* sp. (Euphorbiaceae) (ZAGORINSKIY *et al.*, 2010).

Reported for Gobi Altai aimak, S of Mongolian Altay, Alag Kharkhan Mts.; Hovd Aimak, Sutay Uul Mts, NW slopes; Hovd Aimak, Mongolian Altay Mts, NW slopes, 25 km S from Tsetseg (ZOLOTUHIN & SALDAITIS, 2011).

Hyles costata (Nordmann, 1851) (Fig. 15)

Material examined: 2 ♂♂, W. Mongolia, Hovd aimak, near Erdene-Buren-Somon, Shurag-Gol Valley, 1400 m, 13-VI-2011, leg. R. Yakovlev (RYB); 1 ♂, W. Mongolia, Hovd aimak, near Mankhan, 1400 m, 5-VII-2007, E. V. Gus'kova & R.V. Yakovlev leg. (RYB). In the Mongolia - ssp. *costata* (Nordmann, 1851).

Host plant in Mongolia: *Aconogonon chaneyi* (Polygonaceae) (ZAGORINSKIY *et al.*, 2010).

Hyles euphorbiae (Linnaeus, 1758) (Fig. 16)

Material examined: 3 ♂♂, 1 ♀, SW Mongolia, Hovd aimak, 30 km S Altai somon, Bodonchijn-Gol river valley (under stream), Elkhony-Ekhen-Tal place, 1200 m, 45° 43' N; 92° 05' E; 7-VI-2011, leg. R. Yakovlev (RYB); 1 ♂, SW Mongolia, Hovd aimak, Bodonchijn-Gol basin, Hundijn-Gol riv. valley, 1600 m, 46° 06' N; 92° 30' E; 11-VI-2011, leg. R. Yakovlev (RYB); 1 male, W. Mongolia, Hovd aimak, Bulgan-Gol Valley, 45 km N of Bulgan, 1500 m, 19-VII-2009, R. Yakovlev, E. Gus'kova (RYB). In the Mongolia - ssp. *euphorbiae* (Linnaeus, 1758).

Hyles gallii (Rottemburg, 1775) (Figs 17, 32)

Material examined: 1 ♂, W. Mongolia, Bayan-Ulegei aimak, middle stream of Elt-Gol river (Kara-Irtys basin), 2100-2300 m, 1-8-VII-2005, R. Yakovlev and D. Ryzhkov leg. (RYB); 5 ♂♂, Bayan-Ulegei aimak, Khuraj-Modny-am place, 48° 15' N; 88° 54' E, 2300 m, 15-18-VII-2010, leg. S. Titov (PSU); 1 ♂, W. Mongolia, Hovd aimak, Bulgan-gol basin, Dod-Naryjn-Gol Valley, 1500-1700 m, 14-VII-2007, E. V. Gus'kova and R. V. Yakovlev leg. (RYB); 1 ♂, 1 ♀, W. Mongolia, Bayan-Ulegei aimak, Kobdo-gol Valley, 20 km SW Tsengel, 48° 49' N; 88° 59' E, 1800 m, 21-VII-2007, E. V. Gus'kova and R. V. Yakovlev leg. (RYB); 1 ♂, SW Mongolia, Gobi-Altai aimak, Mongolian Altai Mts., Hara-Adzragyn-Nuru Mts., Najtvaryn-Sajr river Valley (under stream) 15-16-VII-2010, 1700-2000 m, 45° 52' N; 95° 30' E; R. Yakovlev and E. Gus'kova (RYB); 2 ♂♂, SW Mongolia, Gobi-Altai aimak, Mongolian Altai Mts., Khasgt-Khairkhan Mts., 17 km SSW Zhargalan, 19-21-VII-2010, 2500-2900 m, 46° 48' N; 95° 49' E; R. Yakovlev and E. Gus'kova (RYB); 1 ♂, W. Mongolia, Hovd aimak, Bulgan-gol basin, Bayan-Gol river valley, Arshantyn-Nuruu Mts., Ulyastajn-Sala river, 1900 m, 46° 21' N; 91° 08' E; 9-10-VI-2011, R. Yakovlev leg. (RYB); 1 ♂, Hovd aimak, near Erdene-Buren-Somon, Shurag-Gol Valley; 21-22-VII-2003, leg. V. Doroshkin (VDC). Caterpillar was shot and collected on 27-VII-2010 by V. Anikin on *Galium* sp. (Bayan-Ulegei aimak, Kobdo-gol Valley, 20 km SW Tsengel) (Fig. 32). Pupation happened on 2-VIII-2010, imago (♂) appeared at 4-XI-2010. In the Mongolia - ssp. *gallii* (Rottemburg, 1775).

Host plant in Mongolia: *Chenopodium album* (Chenopodiaceae) (ZAGORINSKIY *et al.*, 2010) and *Galium* sp. (Rubiaceae).

Hyles hippophaes (Esper, 1789) (Fig. 18)

Material examined: 1 ♂, SW Mongolia, Hovd aimak, 30 km S Altai somon, Bodonchijn-Gol river valley (under stream), Elkhony-Ekhen-Tal place, 1200 m, 45° 43' N; 92° 05' E; 7-VI-2011, leg. R. Yakovlev (RYB); 2 ♂♂, W. Mongolia, Hovd aimak, Bulgan-gol basin, Bayan-Gol river valley, Arshantyn-Nuruu Mts., Ulyastajn-Sala river, 1900 m, 46° 21' N; 91° 08' E; 9-10-VI-2011, R. Yakovlev leg. (RYB); 1 ♂, 1 ♀, W. Mongolia, Hovd aimak, Bulgan-Gol Valley, 45 km N of Bulgan, 1500 m, 19-VII-2009, R. Yakovlev, E. Gus'kova (RYB); 3 ♂♂, 2 ♀♀, Hovd aimak, Dzhungarian Gobi, 45 km SW Bulgan, Uvhod-Ula Mt., H-1350 m, 18-19-VI-2004, leg. Doroshkin (VDC). In the Mongolia - ssp. *bieneri* (Staudinger, 1874).

Hyles livornica (Esper, 1780) (Fig. 19)

Material examined: 2 ♂♂, SW Mongolia, Hovd aimak, Bodonchijn-Gol basin, Hundijn-Gol riv. valley, 1600 m, 46° 06' N; 92° 30' E; 11-VI-2011, leg. R. Yakovlev (RYB); 2 ♂♂, SW Mongolia, Gobi-Altai aimak, Adzh-Bogdo Mts. (NE slope), near Khalba-Khairkhan Mt., 1700 m, 45° 03' N; 94° 59' E; 3-4-VI-2011, R. Yakovlev (RYB). **New for Mongolian Fauna.** In the Mongolia - ssp. *livornica* (Esper, 1780).

Hyles nicaea (Prunner, 1798) (Fig. 20)

Material examined: 2 ♂♂, 2 ♀♀, Hovd aimak, Dzhungarian Gobi, 45 km SW Bulgan, Uvhod-Ula Mt., H-1350 m, 8-10-VII-2003, leg. Doroshkin, Ustjuzhanin and Yakovlev (VDC, RYB); 2 ♂♂, 2 ♀♀, Hovd aimak, Dzhungarian Gobi, 15 km S Bulgan, Barangijn-Shara-Nuruu Mts., H-1500 m, 7-VII-2003, leg. Doroshkin, Ustjuzhanin and Yakovlev (VDC, RYB); 4 ♂♂, Hovd aimak, Bodonchijn-Gol river, 50 km NE Uench, H-2000 m, 5-6-VII-2003, leg. Doroshkin, Ustjuzhanin and Yakovlev (VDC, RYB); 1 ♂, SW Mongolia, Hovd aimak, Bodonchijn-Gol basin, Hundijn-Gol riv. valley, 1600 m, 46° 06' N; 92° 30' E; 28-V-2011, leg. R. Yakovlev (RYB). In the Mongolia - ssp. *sheljukoi* (Dublitzky, 1928).

Hyles zygophylli (Ochsenheimer, 1808) (Fig. 21)

Material examined: 2 ♂♂, 1 ♀, Hovd aimak, Dzhungarian Gobi, 45 km SW Bulgan, Uvhod-Ula Mt., H-1350 m, 8-10-VII-2003, leg. Doroshkin, Ustjuzhanin and Yakovlev (VDC, RYB); 4 ♂♂, 2 ♀♀, SW Mongolia, Hovd aimak, 30 km S Altai somon, Bodonchijn-Gol river valley (under stream), Elkhony-Ekhen-Tal place, 1200 m, 45° 43' N; 92° 05' E; 7-VI-2011, leg. R. Yakovlev; 1 ♂, SW Mongolia, Hovd aimak, Bodonchijn-Gol basin, Hundijn-Gol riv. valley, 1600 m, 46° 06' N; 92° 30' E; 28-V-2011, leg. R. Yakovlev (RYB); 1 ♂, 1 ♀, SW Mongolia, Gobi-Altai aimak, Dzhungarian Gobi, 15-20 km N of Alag-Nuur lake, Takhajchin-Gol river Valley, 11-VII-2010, 1300 m, 45° 19' N; 94° 28' E; R. Yakovlev, E. Gus'kova (RYB, VDC); 2 ♂♂, SW Mongolia, Gobi-Altai aimak, Dzhungarian Gobi, Alag-Nuur lake, 9-10-VII-2010, 1300 m, 45° 09' N; 94° 30' E; R. Yakovlev, E. Gus'kova (RYB); 2 ♂♂, W. Mongolia, Hovd aimak, Bulgan-gol basin, Bayan-Gol river valley, Arshantyn-Nuruu Mts., Ulyastajn-Sala river, 1900 m, 46° 21' N; 91° 08' E; 9-10-VI-2011, R. Yakovlev leg. (RYB). In the Mongolia - ssp. *xanthoxyli* (Derzhavets, 1977).

Host plant in Mongolia: *Zygophyllum xanthoxylon* (Zygophyllaceae) (ZAGORINSKIY *et al.*, 2010).

Hyles churkini Saldaitis & Ivinskis, 2006 (Figs 22-23)

Material examined: 5 ♂♂, 2 ♀♀, SW Mongolia, Hovd aimak, 30 km S Altai somon, Bodonchijn-Gol river valley (lower stream), Elkhony-Ekhen-Tal place, 1200 m, 45° 43' N; 92° 05' E; 7-VI-2011, leg. R. Yakovlev (RYB). In the Mongolia - ssp. *churkini* Saldaitis & Ivinskis, 2006.

Notes: Described from Mogoin-Gol Valley (SALDAITIS & IVINSKIS, 2006)

Hyles centralasiae (Staudinger, 1887) (Fig. 24)

Material examined: 1 ♂, SW Mongolia, Gobi-Altai aimak, Dzhungarian Gobi, Alag-Nuur lake (near Ajlyn-Tsagan-Khuduk), 1300 m, 45° 09' N; 94° 30' E; 1-2-VI-2011, R. Yakovlev (RYB). In the Mongolia - ssp. *centralasiae* (Staudinger, 1887).

Deilephila porcellus (Linnaeus, 1758) (Figs 25-26)

Material examined: 25 ♂♂, SW Mongolia, Gobi-Altai aimak, Mongolian Altai Mts. (S. slope), Mogojin-Gol Valley, 1800 m, 45° 39' N; 93° 47' E; 30-31-V-2011, R. Yakovlev (RYB); 45 ♂♂, 3 ♀♀, SW Mongolia, Hovd aimak, Bodonchijn-Gol basin, Hundijn-Gol riv. valley, 1600 m, 46° 06' N; 92° 30' E; 28-V-2011, leg. R. Yakovlev (RYB); 2 ♂♂, W. Mongolia, Hovd aimak, Uenchin-Gol Valley, 50 km N. of Uench vill., 1500 m, 22-VII-2009, E. V. Gus'kova and R. V. Yakovlev leg. (RYB); 2 ♂♂, W. Mongolia, Hovd aimak, Barlagijn-Gol Valley (under stream), 25 km NW of Altan-Soembo, 1700 m, 45° 53' N; 93° 05' E; 5-VII-2010, leg. R. Yakovlev and E. Gus'kova (RYB); 2 ♂♂, SW Mongolia, Gobi-Altai aimak, Adzh-Bogdo Mts. (NE slope), near Khalba-Khairkhan Mt., 1700 m, 45° 03' N; 94° 59' E; 3-4-VI-2011, R. Yakovlev (RYB); 1 ♂, W. Mongolia, Bayan-Ulegei aimak, middle stream of Elt-Gol river (Kara-Irtys basin), 2100-2300 m, 1-8-VII-2005, R. Yakovlev and D. Ryzhkov leg. (RYB); 2 ♂♂, W. Mongolia, Bayan-Ulegei aimak, Kobdo-gol Valley, 20 km SW Tsengel, 1800 m, 21-VII-2007, E. V. Gus'kova and R. V. Yakovlev leg. (RYB); 4 ♂♂, 2 ♀♀, W. Mongolia, Hovd aimak, Bulgan-gol basin, Bayan-Gol river valley, Arshantyn-Nuruu Mts., Ulyastajn-Sala river, 1900 m, 46° 21' N; 91° 08' E; 9-10-VI-2011, R. Yakovlev leg. (RYB).

Notes: There are two morphs of the species: normal and “*suellus*”, and we have not found these two morphs in sympatry. Pale-coloured “*suellus*” was found in valleys of rivers of southern slope of Mongolian Altai: Mogojin-Gol, Barlagijn-Gol, Bodonchijn-Gol, Uenchin-Gol, while common bright reddish morph was found - in dorsal part of Mongolian Altai (valleys of Elt-Gol and Kobdo-Gol). It is noteworthy that typical morphs were found in Arshantyn-Nuruu Ridge situated in extreme south-west of Mongolian Altai. Probably it's a consequence of intense moisture of these habitats.

Marumba gaschkewitschii (Bremer & Grey, 1853)

Reported for Western Mongolia, Hovd (Kobdo) aimak, 10 km east of Jarantai (GROSSER, 1982;

PITTAWAY & KITCHING, 2000). Not found by us. In the Mongolia - ssp. *gordeevorum* Eitschberger & Saldaitis, 2012.

Discussion

Thus, there are 20 species of hawkmoths in the fauna of Mongolian Altai, 5 of which (*Sphinx ligustri* Linnaeus, 1758, *Hyles exilis* (Derzhavets, 1979), *Hyles costata* (Nordmann, 1851), *Hyles gallii* (Rottemburg, 1775), *Deilephila porcellus* (Linnaeus, 1758)) are known from the north-eastern macroslope of the ridge. In the case of four species (*Hyles exilis*, *H. costata*, *Sphinx ligustri* and *Deilephila porcellus*) the Mongolian Altai is not unsurmountable and they are known from both the northern and southern slopes, although they are rarer there. One species (*Marumba gaschkewitschii*) is distributed only in extreme east of Mongolian Altai. Fifteen species were found only in river valleys and semi-desert slopes with a southern exposure.

By type of hawkmoths areals of the Mongolian Altai they are distributed as follows: endemic (*Hyles churkini*); palaearctic-panpalaeotropic (*A. convolvuli*); Eurasian-African species (*Macroglossum stellatarum*, *Hyles livornica*); transpalaearctic boreal-subtropical species (*Sphinx ligustri*, *Deilephila porcellus*, *Hyles euphorbiae*, *H. gallii*); South-Siberian-Mongolian species (*Hyles exilis*, *H. costata*); Western-Palaearctic boreal-subtropical species (*Smerinthus ocellata*); Southwest-Asian - Middle-Asian-Turanian (*Smerinthus kindermannii*, *Hyles nicaea*, *H. zygophylli*, *H. hippophaes.*); Turanian (*Hemaris ducalis*, *H. alaiana*, *Neoptero-donta kuldjaensis*, *H. centralasiae*); Gobyian (*Hyles chamyla*), eastern-palaearctic (*Marumba gaschkewitschii*). Thus, the leading group of fauna area transpalaearctic boreal-subtropical, Southwestern-Turanian and Turanian species (19% each). Overall the percentage of species with areas lying inside the boundaries of the Ancient Mediterranean Region is 52.3%. This index is very large and significantly differs that found in other groups of Lepidoptera, for example, Papilionoidea (not more than 25%) (YAKOVLEV, 2012).

Acknowledgements

We are indebted to Vasilij Anikin (Saratov), Petr Ustyuzhanin (Novosibirsk), Alexandr Shmakov, Sergej Smirnov, Alexei Kechaikin, Dmitrij German, Sergej Djachenko, Petr Kosachev, Alexandr Shalimov, Dmitrij Ryzhkov, Ilya Sherin (Barnaul), Beket Ulugvanuly (Bayan-Ulegei), Colonel Grigorij Khabiev (Gorno-Altai) and to our drivers M. Sidorov and V. Yevdoshenko (Barnaul) for helping us reach the most inaccessible parts of Western Mongolia.

BIBLIOGRAPHY

- DANIEL, F., 1969.– Bombyces et Sphinges III. Ergebnisse der zoologischen Forschungen von Dr. Z. Kaszab in der Mongolei (Lepidoptera).– *Reichenbachia*, **11** (25): 265–277.
- DANNER, F., EITSCHBERGER, U. & SURHOLT, B., 1998.– *Die Schwärmer der westlichen Palaearktis (Lepidoptera: Sphingidae)*: 368 pp. Dr. Ulf Eitschberger, Markthleuthen.
- DERZHAVETS, Y. A., 1977.– Hawkmoths (Lepidoptera, Sphingidae) of Mongolia.– *Nasekomye Mongolii*, **5**: 642–648. (in Russian)
- GROSSER, N., 1982.– Zur Fauna der Bombyces und Sphinges der Mongolei (Insecta, Lepidoptera).– *Faunistische Abhandlungen Staatlichen Museum für Tierkunde in Dresden*, **9**(13): 137–140.
- GUS'KOVA, E. V. & YAKOVLEV, R. V., 2011.– Kara-Irtysh biogeographically region of Altai. Opinion of entomologist (provisory results).– *Amurian Zoological Journal*, **3**(2): 196–198. (in Russian)
- KAMELIN, R. V., 2005.– New Flora of Altai (aims and conception of new floristic revision); pp. 5597.– In R. V. KAMELIN, M. G. KUZEV, D. V. TIKHONOV, D. N. SHAULO, A. I. SHMAKOV & R. L. L. VIANE. *Flora Altaica*, **1**: Barnaul: Azbuka. (in Russian)
- KRYZHANOVSKI, O. L., 2002.– *Structure and distribution of entomofaunas of World*: 237 pp. KMK-Press, Moskow. (in Russian)

- PITTAWAY, A. R. & KITCHING, I. J., 2000.– Notes on selected species of hawkmoths (Lepidoptera: Sphingidae) from China, Mongolia and the Korean Peninsula.– *Tinea*, **16**(3): 170-211.
- PITTAWAY, A. R. & KITCHING, I. J., 2013.– *Sphingidae of the Eastern Palaearctic (including Siberia, the Russian Far East, Mongolia, China, Taiwan, the Korean Peninsula and Japan)*. Available from http://tpittaway.tripod.com/china/a_tob (accessed 25 October 2013).
- SALDAITIS, A. & IVINSKIS, P., 2006.– A new species of *Hyles* (Lepidoptera, Sphingidae) from Mongolia with distributional notes on the other members of the genus.– *Acta Zoologica Lituanica*, **16**(4): 317-322.
- SERGEEV, M. G., 1986.– *Laws of distribution of Orthoptera insects of Northern Asia*: 238 pp. Nauka, Novosibirsk. (in Russian)
- YAKOVLEV, R. V., 2011.– *Eupterodon kuldjaensis* (Graeser, 1892) - a new species for Mongolian fauna.– *Amurian Zoological Journal*, **3**(3): 287-288. (in Russian)
- YAKOVLEV, R. V., 2012.– Checklist of Butterflies (Papilionoidea) of the Mongolian Altai Mountains, including descriptions of new taxa.– *Nota lepidopterologica*, **35**(1): 51-96.
- YAKOVLEV, R. V. & DOROSHKIN, V. V., 2004.– New data of Macrolepidoptera for the fauna of Mongolia. II (Insecta, Lepidoptera).– *Atalanta*, **35**(3/4): 390-398.
- YAKOVLEV, R. V., DUBATOLOV, V. V. & TITOV, S. V., 2013.– New data about distribution of hawk-moths of the Genus *Hyles* Hübner, [1819] (Lepidoptera: Sphingidae).– *Amurian Zoological Journal*, **5**(3): 306-307. (in Russian)
- YAKOVLEV, R. V., USTYUZHANIN, P. YA. & DOROSHKIN, V. V., 2005. New records of Macrolepidoptera from Mongolia.– *Euroasian Entomological Journal*, **4**(1): 55-56. (in Russian)
- ZAGORINSKIY, A. V., GORBUNOV, O. G. & PUNTSAGDULAM, JU., 2010.– A new contribution to the fauna of Hawk moths (Lepidoptera, Sphingidae) of Mongolia. *Ecological consequences of biosphere processes in the ecotone zone of Southern Siberia and Central Asia*.– *Proceedings of the international conference 2* (Poster reports): 178-180. (in Russian)
- ZOLOTUHIN, V. & SALDAITIS, A., 2011.– Does *Hyles chuivilini* Eischberger, Danner & Surholt, 1998 present a taxonomic problem?– *Neue Entomologische Nachrichten*, **67**: 73-78.

*R. V. Y.
Altai State University
Lenina, 61
RF-656049 Barnaul
RUSIA / RUSSIA
E-mail: yakovlev_asu@mail.ru

E. V. G.
Altai State University
Lenina, 61
RF-656049 Barnaul
RUSIA / RUSSIA
E-mail: guskovael@mail.ru

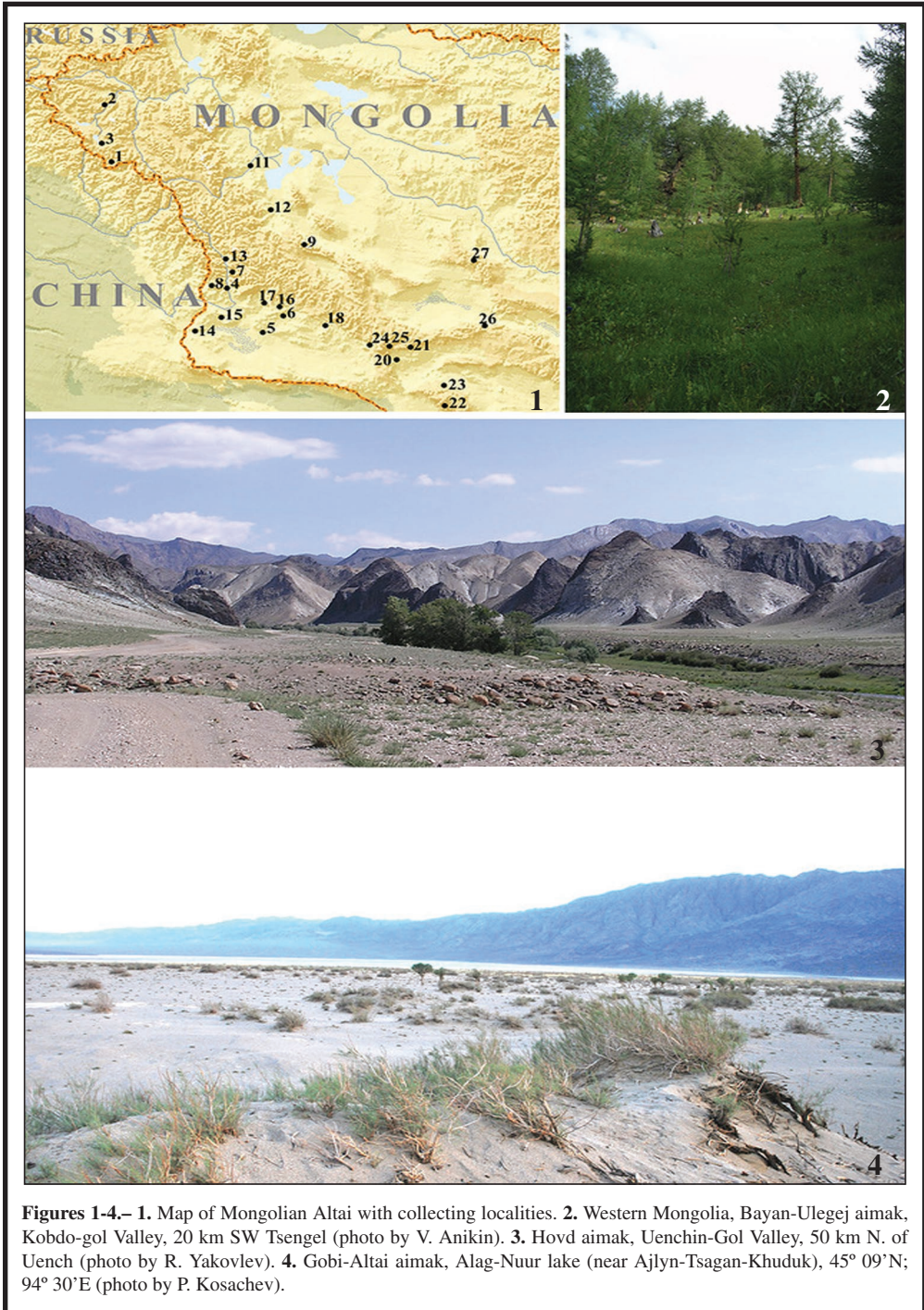
y / and
National Research
Tomsk State University
Laboratory of Biodiversity and Ecology
Lenina pr., 26
RF-634050 Tomsk
RUSIA / RUSSIA

V. V. D.
Chelyabinsk
RUSIA / RUSSIA
E-mail: ural@kros-china.ru

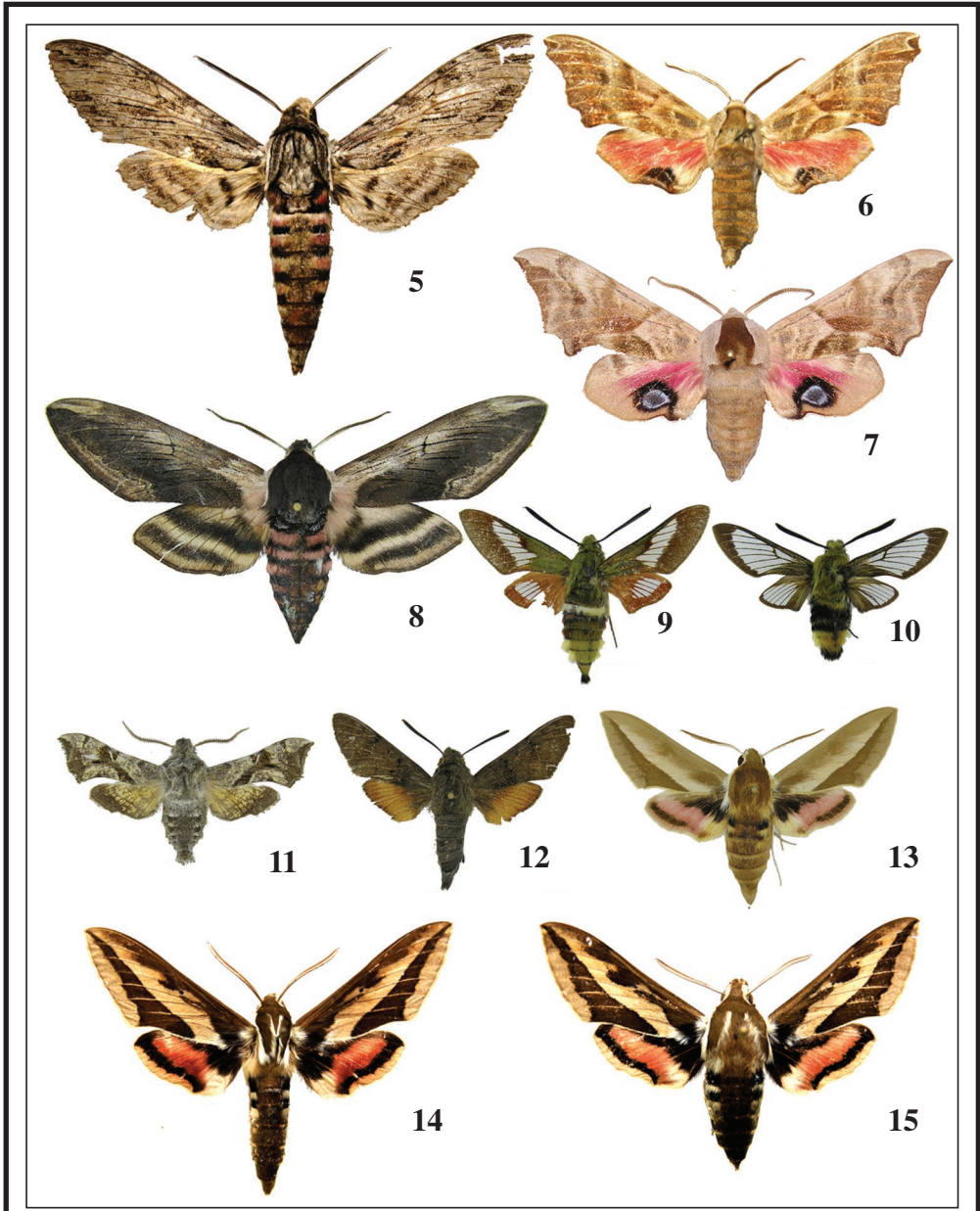
S. V. T.
The Research Centre for Environmental «Monitoring»
Pavlodar State University
Lomova street, 64
KZ-140008 Pavlodar
KAZAHISTAN / KAZAKHSTAN
E-mail: titovs80@mail.ru

*Autor para la correspondencia / *Corresponding author*

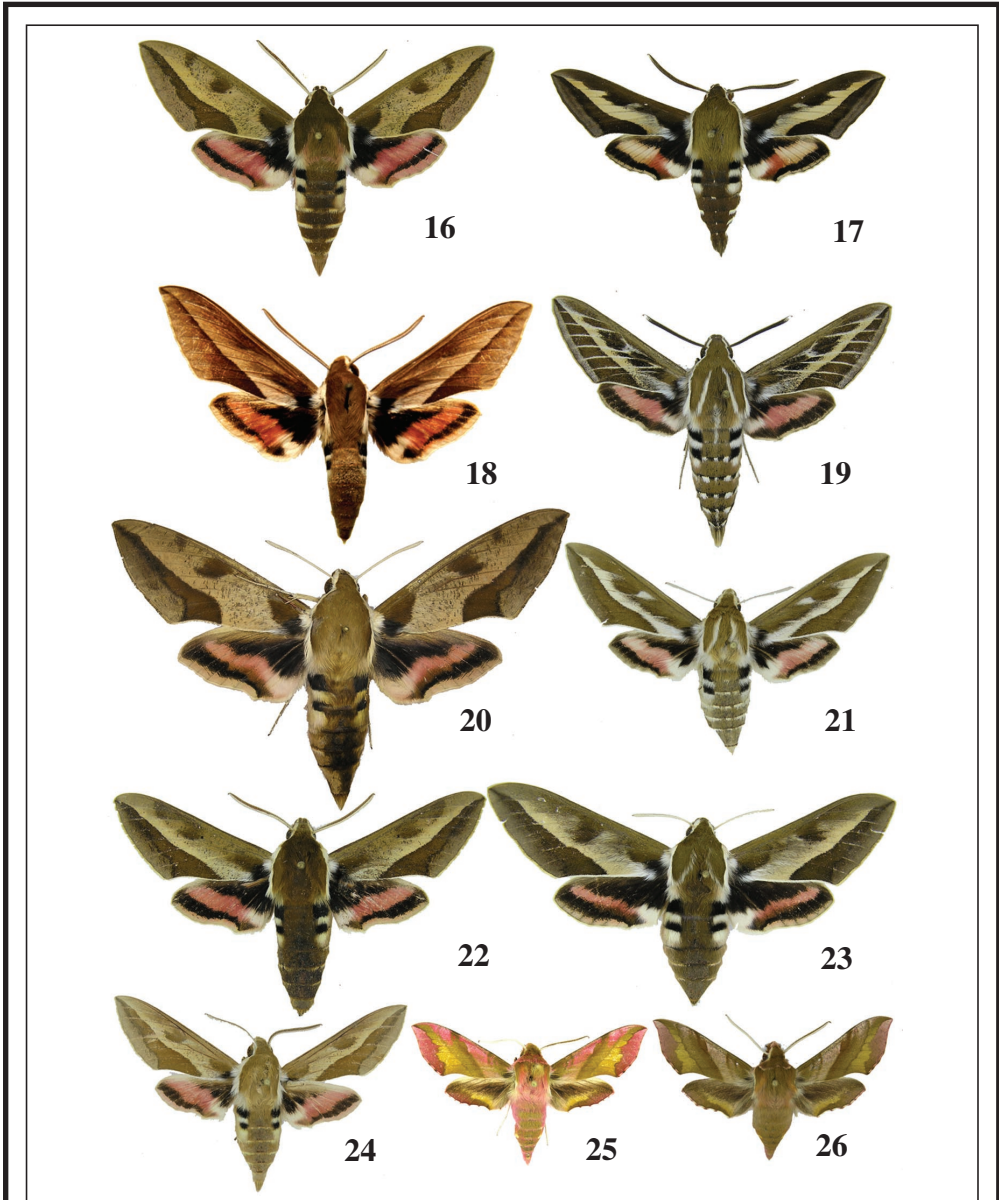
(Recibido para publicación / *Received for publication* 27-VII-2014)
(Revisado y aceptado / *Revised and accepted* 28-VIII-2014)
(Publicado / *Published* 30-IX-2015)



Figures 1-4.— 1. Map of Mongolian Altai with collecting localities. 2. Western Mongolia, Bayan-Ulegej aimak, Kobdo-gol Valley, 20 km SW Tsengel (photo by V. Anikin). 3. Hovd aimak, Uenchin-Gol Valley, 50 km N. of Uench (photo by R. Yakovlev). 4. Gobi-Altai aimak, Alag-Nuur lake (near Ajlyn-Tsagan-Khuduk), 45° 09'N; 94° 30'E (photo by P. Kosachev).



Figures 5-15.– 5. *Agrius convolvuli* (Linnaeus, 1758), adult, ♂, Mongolia. 6. *Smerinthus kindermannii* Lederer, 1853, adult, ♂, Mongolia. 7. *Smerinthus ocellata* (Linnaeus, 1758), adult, ♂, Mongolia. 8. *Sphinx ligustri* Linnaeus, 1758, adult, ♂, Mongolia. 9. *Hemaris ducalis* (Staudinger, 1887), adult, ♂, Mongolia. 10. *Hemaris alaiana* (Rothschild & Jordan, 1903), adult, ♂, Mongolia. 11. *Neopterodonta kuldjaensis* (Graeser, 1892), adult, ♂, Mongolia. 12. *Macroglossum stellatarum* (Linnaeus, 1758), adult, ♂, Mongolia. 13. *Hyles chamyla* (Denso, 1913), adult, ♂, Mongolia. 14. *Hyles exilis* (Derzhavets, 1979), adult, ♂, Mongolia. 15. *Hyles costata* (Nordmann, 1851), adult, ♂, Mongolia.



Figures 16-26. 16. *Hyles euphorbiae* (Linnaeus, 1758), adult, ♂, Mongolia. 17. *Hyles gallii* (Rottemburg, 1775), adult, ♂, Mongolia. 18. *Hyles hippophaes* (Esper, 1789), adult, ♂, Mongolia. 19. *Hyles livornica* (Esper, 1780), adult, ♂, Mongolia. 20. *Hyles nicaea* (Prunner, 1798), adult, ♂, Mongolia. 21. *Hyles zygophylli* (Ochsenheimer, 1808), adult, ♂, Mongolia. 22. *Hyles churkini* Saldaitis & Ivinskis, 2006, adult, ♂, Mongolia. 23. *Hyles churkini* Saldaitis & Ivinskis, 2006, adult, ♀, Mongolia. 24. *Hyles centralasiae* (Staudinger, 1887), adult, ♂, Mongolia. 25. *Deilephila porcellus* (Linnaeus, 1758), adult, ♂, typical form (Western Mongolia, Hovd aimak, Arshantyn-Nuruu Mts.) 26. *Deilephila porcellus* (Linnaeus, 1758), adult, ♂, "suellus" form (Western Mongolia, Gobi-Altai aimak, Mogoin-Gol river Valley).



Figures 27-32.— 27. *Hyles chamyla* (Denso, 1913), larva (Mongolia, Hovd aimak, Uvkhod-Ula Mt.) (photo by V. Anikin). 28. *Hyles chamyla* (Denso, 1913), larva before pupation (photo by A. Kechaikin). 29. *Hyles chamyla* (Denso, 1913), pupa (photo by A. Kechaikin). 30. *Poacynum pictum* (Schrenk) Baill. (Apocynaceae), Mongolia, Hovd aimak, Uvkhod-Ula Mt. (photo by V. Anikin). 31. *Hyles exilis* (Derzhavets, 1979), larva (photo by A. Kechaikin). 32. *Hyles gallii* (Rottemburg, 1775), larva, W. Mongolia, near Tsengel (photo by V. Anikin).