

Does *Hyles chivilini* EITSCHBERGER, DANNER & SURHOLT, 1998 present a taxonomic problem?

(Lepidoptera, Sphingidae)

by

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Abstract: The present article is devoted to clarifying the relationship of *Hyles chivilini* EITSCHBERGER, DANNER & SURHOLT, 1998 to the subspecies of *Hyles costata* (NORDMANN, 1851), already described by DERZHAVETS (1979) and kept in the collection of the Zoological Institute of the Russian Academy of Sciences in St. Petersburg (Russia). Based on the types examination (all primary types are figured here), it was stated that *Hyles costata exilis* DERZHAVETS, 1979 **stat. rev.**, and *H. chivilini* EITSCHBERGER, DANNER & SURHOLT, 1998, are doubtless conspecific leading to establish a new synonymy and a new specific combination: *Hyles exilis* DERZHAVETS, 1979 **stat. rev. et stat. nov.** as bona species. The stronger curvature of medial fascia in the fore wing and distinct coloration of the medial field allow us to consider *H. chivilini* EITSCHBERGER, DANNER & SURHOLT, 1998 in the rank of a separate northern subspecies, establishing the new combination and status *Hyles exilis chivilini* EITSCHBERGER, DANNER & SURHOLT, 1998 **comb. et stat. nov.** Distribution maps are given for both species, and larvae of both are also illustrated for the first time. The speckled larva of *H. costata* (NORDM.) feeds on different Polygonaceae: *Rumex*, *Polygonum*, *Aconogonon*, whereas the larva of *H. exilis* DERZH. **stat. rev. et stat. nov.** strongly resembles that of *H. euphorbiae* (L.) and was found on *Euphorbia*. It is suggested that both species belong to different phylogenetic branches within *Hyles* HÜBNER, [1819] and the unusual external similarity of both species seems to be a result of their convergent evolution in arid biotopes of Central Asia.

Zusammenfassung: Der vorliegende Artikel beinhaltet eine Richtigstellung der Verwandtschaft zwischen *Hyles chivilini* EITSCHBERGER, DANNER & SURHOLT, 1998 und einer Unterart von *Hyles costata* (NORDMANN, 1851), die von DERZHAVETS (1979) beschrieben wurde und sich in der Sammlung des Zoologischen Instituts der Russischen Akademie der Wissenschaft in St. Petersburg befindet. Nach der Typenprüfung (alle primären Typen werden hier abgebildet), wird festgelegt, daß *Hyles costata exilis* DERZHAVETS, 1979 **stat. rev.** und *H. chivilini* EITSCHBERGER, DANNER & SURHOLT, 1998 zweifellos konspezifisch sind. Somit kann eine neue Synonymie und eine neue Art-Kombination festgestellt werden: *Hyles exilis* DERZHAVETS, 1979 **stat. rev. et stat. nov.** Die kräftige Biegung des Medianbandes im Vorderflügel und die andere Färbung des Medianfeldes erlauben uns, *H. chivilini* EITSCHBERGER, DANNER & SURHOLT, 1998 als eine nördliche Unterart zu betrachten: *Hyles exilis chivilini* EITSCHBERGER, DANNER & SURHOLT, 1998 **comb. et stat. nov.** Verbreitungskarten und Raupenphotos werden für beide Arten abgebildet. Die kleinfleckige Raupe von *H. costata* (NORDM.) frißt an verschiedenen Polygonaceae: *Rumex*, *Polygonum*, *Aconogonon*, während die von *H. exilis* DERZH. **stat. rev. et stat. nov.** stark an die von *H. euphorbiae* (L.) erinnert und von *Euphorbia* gemeldet ist. Vermutlich gehören die beiden Arten zu verschiedenen phylogenetischen Linien innerhalb *Hyles* HÜBNER, [1819] und deren ungewöhnliche äußerliche Ähnlichkeit kann als Koevolution in ariden Biotopen Zentralasiens erklärt werden.

The present article is devoted to the further clarification of the taxonomic status of *Hyles chivilini* EITSCHBERGER, DANNER & SURHOLT, 1998. We have not suspected its independence as a separate species, and clear diagnostic features are given in its original description. These features appear reliably in series as well as single specimens and can be easily proved by genitalic characteristics. The taxon is considered as a good species in the recent list of the Hawkmoths of the World (KITCHING & CADIOU, 2000: 49). Surprisingly, in spite of the presence of clear diagnostic characters the identification of the taxon is still problematic for most collectors and frequently results in confusion. For example on the well known site of PITTAWAY & KITCHING (<http://tpittaway.tripod.com/china/china.htm>) it is stated: "DANNER et al. (1998) separated *H. chivilini* from *Hyles costata* (VON NORDMANN) based on minor differences of colour pattern and male genitalia. In view of known morphological variation within other desertic species of *Hyles*, the strong possibility remains that these two taxa are conspecific. We were unable to examine sufficient specimens to resolve this issue or to separate the below records, although most would probably be referable to *H. chivilini*". Moreover, the specimens figured on the site as *H. chivilini* EITSCHBERGER, DANNER & SURHOLT are doubtless *H. costata* (NORDM.) introducing further confusion in distinguishing these species.

In the present work we would like to define a relationship of *H. chivilini* EITSCHBERGER, DANNER & SURHOLT to the subspecies of *H. costata* (NORDM.) previously described by the late Prof. Dr. YURI A. DERZHAVETS¹ (13.XI.1931-21.III.2005) (Abb. 9, 10), and now kept in the collection of the Zoological Institute of Russian Academy of Sciences in St. Petersburg (Russia). Besides that, we would like to specify geographical areas of both species and a zone of their sympatry. Also, larval characteristics and bionomics data were searched for both species. We obtained rare photos of caterpillars of both species from SERGEY GORGEV (Chita, Russia), and some of them are here published with his kind permission. The results are given below.

The following abbreviations are used in the text for Museums, Institutions and private collections examined:

CASV: Collection of AIDAS SALDAITIS, Vilnius (Lithuania);
 CSGC: Collection of SERGEY GORGEV, Chita (Russia);
 CVGM: Collection of VLADIMIR A. GANSON, Moscow (Russia);
 EIHU: Entomological Institute of Hokkaido University, Sapporo (Japan);
 EMEM: Entomologisches Museum EITSCHBERGER, Marktleuthen (Germany);
 MHUB: Zoologisches Museum der HUMBOLDT-Universität zu Berlin (Germany);
 MWM: Entomologisches Museum WITT, München (Germany);
 SMND: Staatliches Museum für Naturkunde zu Dresden (Germany);
 ZFMK: Zoologisches Forschungsinstitut und Museum ALEXANDER KOENIG, Bonn (Germany);
 ZISP: Zoological Institute of the Russian Academy of Sciences, St. Petersburg (Russia);
 ZMGU: Zoological Museum of Moscow State University (Russia).

¹YURI ADOLFOVICH DERZHAVETS (Figs 9, 10) was not a professional entomologist. He worked for a long time as a vice-rector in the State Technological University of St. Petersburg and was a specialist in planetary gear. Sphingidae were his hobby during most of his life and he was admitted person in the group in the Soviet Union and in the post-Soviet area.

In the article, the original spelling is retained in the listing of the data of the labels, if not in Russian.

The senior author of the article studied the primary types of all four taxa of the *H. costata* (NORDM.) - group. Their external features as well as genitalic characters allow our stating the following conclusions.

As it is already known, two distinct species shall be separated in the complex of the *H. costata* (NORDM.) - group. One of them is the proper *H. costata* (NORDM.), and the second species is known now as *H. chivilini* EITSCHBERGER, DANNER & SURHOLT. Based on the types examination it was stated that *H. costata exilis* DERZHAVETS, 1979 **stat. rev.**, and *H. chivilini* EITSCHBERGER, DANNER & SURHOLT, 1998, are surely conspecific that led to a new synonymy and new specific combinations as given below. Subspecific division for both species now appears a bit anticipatory but not without any logic.

***Hyles costata* (NORDMANN, 1851) (col. pl. 1: 1-3)**

Sphinx (*Deilephila*) *costata* NORDMANN, 1851, Bull. Soc. Nat. Mosc. **24**: 444, pl. 11: 3, 4. Type locality: [Russia, Transbaicalia] "aus der Umgegend von Kjachta". Holotype ♂, by monotypy (ZISP) [examined].

= *Celerio costata* NORDMANN f. *confusa* GEHLEN, 1928, Intern. Ent. Z. **22** (2): 16, fig. 4. Type locality: [Russia, Transbaicalia] Kiachta. Holotype ♂ (by monotypy) (coll. GEHLEN in Zoologische Staatssammlung, München)

***Hyles costata solida* DERZHAVETS, 1979 stat. rev.**, Nasekomye Mongolii **6**: 408, figs 1b, 2b. Type locality: Far East of Russia, Blagovestchensk. Holotype ♂, by original designation (ZISP) [examined].

Diagnosis: The moths with straight and smooth inner border of the postmedian band which strongly tapers the light median field to dorsal margin of the wing; sacculus process in the male genitalia is short here.

Larva (col. pl. 1: 6-12): In speckled patterning and lacking large white lateral eyed spots, they are basically distinct from those of the euphorbiae-complex and more close to the zygophylli-complex. Two colour forms are known. More typical is one with pinkish-red dorsal pattern, horn and head; a yellow-coloured form (but with red horn) is very rare. The species feeds on Polygonaceae, and was found in Buryatia on *Rumex*, *Polygonum*, *Aconogonon* (both *angustifolium* and *divaricatum*). The larvae illustrated were found in Buryatia, loc. Onokhoj, 23.-24.VII.2007 by SERGEY GORDEEV (CSGC) on *Aconogonon*.

Distribution (fig. 6): Steppes and mixed forests of southern Siberia and Far East of Russia; there the species inhabits open rather mesophytic biotopes - meadows, forest glades, grass steppes. In its Transbaical range it is known from steppes along wide river valleys. It is known from Mongolia also in similar biotopes, but occurs there also from steppes of a different kind. In China it is very local and it was recorded only from a very few locations so far.

Material examined: Type specimens: Holotype ♂ of *Sphinx* (*Deilephila*) *costata* NORDMANN, 1851, Kjachta (ZISP); Holotype ♂ of *Hyles costata solida* DERZHAVETS, 1979, Blagovestchensk, 20.VI.1972, leg. SHABLIOVSKY (ZISP); Paratype ♂ of *Hyles costata solida* DERZHAVETS, Raddefka [Radde], leg. GRUM-GRZHIMAILO (ZISP).

Russia: 17 ♂♂, Tuva, 950 m, Tere-Khol Lake, 50°01'N, 95°03'E, 8.-12.VII.1996, A. SALDAITIS leg. (EMEM); 6 ♂♂, S. Tuva, N.W. Tere-Khol lake, 1100 m, 11.-14.VII. 2000, leg. KRÜGER, Saldaitis (EMEM); 10 larvae, Burjatia, Onokhoj, 23.-24.VII.2007, S. GORGEEV leg. (CSGC); 1 ♂, Transbaical, Burjatia, Balejsk Distr., outsk. vill. Undino-Poselie, valley of Unda river, 22.VI.2008, S. GORGEEV leg. (CSGC); 1 ♂, 3 ♀♀, russische Transbaikalien, Chita-Gebiet, Nizhnij Tsassutschej, 11-23.VI.1990, leg. Z. KLJUTSCHKO (MWM); 1 ♂, Tchita Distr., outsk. vill. Undino-Poselie, lower flow of Unda river, 21.VI.2008, S. NEDOSHIVINA leg. (coll. A. HUNSDOERFER, Dresden); 1 ♂, 3 ♀♀, Russia, Dahurische steppe, Westufer des Barun-Torej-Sees, vic. Bulum, am Licht, 30.VI.1990, leg. M. GOLOVUSHKIN (EMEM); 6 specimens, Amur Region, Konstantonovka Distr., 16 km E Konstantinovka, env. Vojkovo vill., eastern bank of Osinovoe Lake, 49°36'07"N, 128°12'44"E, 110 m, leg. et coll E. BELYAEV; 2 ♂♂, 1 ♀, Amur Region, 17 km NEN Blagovestchensk, railway station „91 kilometr“, field stationar of Blagovestchensk pedagogical University, 50°24'01"N, 127°40'20"E, 150 m, leg. et coll E. BELYAEV; 1 ♀, Transbaical, Dahuria, Dahurian Reserve, outsk. vill. Utochi, 21.VIII.2002, O. V. KORSUN (CSGC).

Mongolia: 26 ♂♂, 2 ♀♀, Mongolia, Central aimak, 25 km W from Erdennesant, 14.-15.VI. 2003, 1260 m, N 47°22' / E 104°13', leg. A. SALDAITIS (EMEM); 4 ♂♂, 2 ♀♀, Mongolia, Bajan Hongor aimak, 60 km S from Bajanhongor, 27.-30.VI.2003, 1640 m, N 45°40' / E 100°41', leg. A.SALDAITIS (EMEM); 1 ♀, S. Mongolia, Omnogov aimak, Gurvan-Saikhan Mts., 12 km NW Tzokhor v. 2300 m, 22.VI.2002, 43°24'N, 104°02'E, leg. S. CHURKIN (EMEM); 1 ♂, Mongolia, Bayanhongor aimak, Mts Ih Bogd Uul, 1850 m, valley of Pitut river, 100°13'E, 45°00'N, 24-26.VII.1987, leg. L. PEREGOVITS, M. HREBLAY & T. STEGER (MWM); 2 ♂♂, Mongolia, Arhangaj, 10 km W from Rashaant, Elsen Tasarhay sands, 16.VI.2003, 1250 m, N 47°19' / E 103°41', leg. A. SALDAITIS (EMEM); 3 ♂♂, Mongolia, Arkhangai aimak, Onei somon, 47°47'08"N, 102°44'17"E, 1330 m, 14.VI.2005, ODBAYARTZ leg. (CAS).

China: 1 ♂, 1 ♀, China sept[entrionalis], Tsingtau, 1910 (MHUB); 1 ♂, Ko-syu-rei, 4.VIII.1937 (EIHU).

DANNER & al. (1998) recorded the species from [the Far East of Russia] Radde and Khabarovsk, and DERZHAVETS (1979) listed it from [Russia] Tuva: Kyzyl, Kaa-Hem and Mongolia: Ubsu-Noor Aimak, Ubsu-Noor Lake, 50 km E Ulangom. The species was recorded in Burjatia (SHODOTOVA et al., 2007) from Beloozersk. We have also seen photos of the specimens collected from Altai, Chermal (CVGM and ZISP), and from Altai, Kosh-Agach Distr., env. Chagan-Uzun, 2200 m (OGUDOV, 2007).

***Hyles exilis* DERZHAVETS, 1979 stat. rev. et stat. nov.** (col. pl. 1: 4-5)

Hyles costata exilis DERZHAVETS, 1979, Nasekomye Mongolii **6**: 408. Type locality: Northern China, Tjan-Tszin, Chzhili. Holotype ♂, by original designation (ZISP) [examined].

Hyles (*Surholtia*) *chivilini* EITSCHBERGER, DANNER & SURHOLT, 1998 **syn. nov.**, Herbiopoliana **4**: 275, pl. 34: 5-8; pls 366-374. Type locality: Russia, Khakassia, Abakan, Red Lake. Holotype ♂, by original designation (EMEM) [examined].

Diagnosis: The second species of the *costata*-group, known previously as *H. chivilini* EITSCHBERGER, DANNER & SURHOLT is characterized by distinctly curved, sometimes strongly, inner border of the postmedian band that expands the light medial field to the dorsal margin of the wing (forming some kind of a trapezium-like patterning); sacculus process in the male genitalia is slender and elongated here. As was already pointed out above, based on the types examination, *H. costata exilis* DERZHAVETS, 1979, and *H. chivilini* EITSCHBERGER, DANNER & SURHOLT, 1998, are doubtless conspecific leading to a new synonymy and a new specific combination. The stronger curvature of medial fascia of the fore wing and distinct coloration of medial field allow us to consider the taxon *chivilini* in a rank of a separate northern subspecies with the establishing of a new combination *Hyles exilis chivilini* EITSCHBERGER, DANNER & SURHOLT, 1998 **stat. et comb. nov.** The range of both taxa hence needs special careful investigation.

Larva: The caterpillars of the types of *H. chuvilini* EITSCHBERGER, DANNER & SURHOLT were collected by A. V. CHUVILIN shortly before pupation on an *Euphorbia* sp. They were not photographed because they were not distinguished at first sight from those of *H. euphorbiae* (LINNAEUS, 1758). A description of caterpillars of the species was also given by GEHLEN as for *H. costata* (NORDM.) collected by Pe-tai-ho, Shantung; the moths reared from the locality are kept in SMND and NHUB [examined] that proved their identification as *H. exilis* DERZHAVETS. According to GEHLEN (1933: 152), these *Euphorbia*-eating caterpillars have the pronotum black, only medially red, sometimes completely black; 2 lateral rows of eyed spots fused to one; the stigmal zone is light coloured; only 2/5 to 3/5 of the horn is red. The caterpillar from Transbaikalia, Dahuria (col. pl. 1: 13) collected in a walking phase completely corresponds to that description and it is the only member of the *euphorbia*-complex in the region, thus we consider it as the larva of *H. exilis* DERZH. In 2009, the caterpillar of the same species was found on *Euphorbia fischeri* STEUDEL (= *pallasii* TURCZ.) in Chita Region (S. GORGEV, pers. comm. - col. pl. 1: 14, 15). Other species of euphorbias were rejected as hosts during subsequent rearing.

Nomenclatorial remarks: A type series of *Hyles costata exilis* DERZHAVETS, 1979, is somewhat heterogeneous, and not sufficiently labelled. Here in 'Material examined' only reliably labelled specimens of the taxon are included; others, without geographic labels but with red hand-written labels "Type", shall be attributed surprisingly also to *H. deserticola* STAUDINGER, 1901 or similar species from Mediterranean Region. The specimen genitalia of which were investigated by YU. DERZHAVETS and described by him in the original description, was not clearly determined by us but the genitalia of the holotype was specially examined; its genitalia is for the first time figured here (figs 1-5).

Distribution (fig. 7): Steppes and meadow biotopes of southern Siberia, Mongolia and central and eastern China. The species inhabits open arid biotopes and is typical for more xerophytic biotopes than *H. costata* (NORDM.). In China it is widely distributed and is running extends very far southwards.

Material examined: Type specimens: Holotype ♂ of *H. costata exilis* DERZH., 1979, Northern China, Tjan-Tszin, Chzhili [Тяньцзинь, Чжили], VI.1913, leg. VASILIEV (ZISP); Paratype ♂ of *H. costata exilis* DERZH., Pekin [Beijing], 1907, leg. VASILIEV (ZISP); paratype ♀ of *H. costata exilis* DERZH., Northern China, Tsao-Shan-Sy [Цзяо-Шань-Сы], 23.VI.1916, leg. VASILIEV (ZISP); Paratype ♀ of *H. costata exilis* DERZH., Northern China, Syn-Dao-Guan [Сынь-Дао-Гуань], 6.VII.1916, leg. VASILIEV (ZISP); holotype ♂ of *H. chuvilini* EITSCHBERGER, DANNER & SURHOLT, Russia, Khakasia, Abakan, Red Lake, [ex l., larva 20.VII.1993] leg. A. V. CHUVILIN (EMEM); paratype ♀ of *H. chuvilini* EITSCHBERGER, DANNER & SURHOLT, Russia, Khakasia, Abakan, Red Lake, [ex l., larva 20.VII.1993] leg. A. V. CHUVILIN (EMEM); 1 ♂, 1 ♀, paratypes of *H. chuvilini* EITSCHBERGER, DANNER & SURHOLT, [China, Shandong] Tsingtau (EMEM).

Russia: 1 ♂, Russia, Altaj, Tschichatscheva Mts, Talduir, 2200 m, 22.VI.1999, leg. V. LUKHTANOV (EMEM); 19 ♂♂, Siberia, West Tuva, Ak-Sug river valley, 900 m, 1.-4.VIII.2000, N 51°25', E 090°52', leg. KRÜGER, SALDAITIS (EMEM); 1 ♂, Russia, S-Tuva, Erzin Distr., Ubsunur State Reserve, south bank of Lake Tore-Kholj, 21.-22.VI.2002, R. YAKOVLEV leg. (EMEM); 1 ♂, Siberia, Tuva, Cagan-Schibetu mtr, 1900 m, Barlik riv. Valley, 27.-30.VII.2000, N 50°28', E 090°43', leg. KRÜGER, SALDAITIS (MWM); 1 ♂, Transbaikalien (Chita Gebiet), Kyra, 900 m, 14.VII.1997, leg. I. KOSTJUK, O. KOSTJUK, A. BIDZILJA (MWM); Caterpillar, Transbaikalia, Chita Region, Baley, VIII.2009, on *Euphorbia fischeri* (CSGC).

Mongolia: 5 ♂♂, 1 ♀, Domod Aimag, Khalhiin r., 22 km E from Sumber sum, 15.VI.2004, 700 m (EMEM); 4 ♂♂, 1 ♀, Mongolia, Bajan Hongor aimak, 60 km S from Bajanhongor, 27.-30.VI.2003, 1640 m, N 45°40' / E 100°41', leg. A. SALDAITIS (EMEM); 6 ♂♂, Mongolia, Bajanhongor aimak, 50 km SW from Bajanhongor, 4.VI.2004, 1780 m, N 45°40' / E 100°41', leg. A. SALDAITIS (EMEM); 1 ♂, Gobi Altay aimak, S of Mongolian Altay, Alag Kharkhan Mts, 2500 m, 5.-7.VII.2004, leg. A. SALDAITIS (EMEM); 3 ♂♂, Mongolia, Hovd Aimak, Sutay Uul Mts, NW slopes, 1900 m, 10.VII.2004, leg. A. SALDAITIS (EMEM); 2 ♂♂, Mongolia, Hovd Aimak, Mongolian Altay Mts, NW slopes, 25 km S from Tsetseg, 2600 m, 20.VI.2004, leg. A. SALDAITIS (EMEM); 1 ♂, Mongolia, Central aimak, 25 km W from Erdennesant, 14.-15.VI.2003, 1260 m, N 47°22' / E 104°13', leg. A. SALDAITIS (EMEM); 1 ♀, Mongolia, Belgerhan obo 90 km North from Öndörhan, 2.VIII.1986, Ligh-Trap (MWM); 1 ♂, Mongolia, Övörhangay aimak, 110 km SE of Arvayheer, 1400 m, 101°40'E, 45°48'N, 23.VII.1987, leg. L. PEREGOVITS, M. HREBLAY & T. STEGER (MWM); 1 ♂, Mongolia, Arkhangai Aimak, Hanhay Mts., 20 km S from Bulgan somon, Urd Tamy, riv. valley, 2100 m, 20.-21.VII.2004, leg. A. SALDAITIS (EMEM); 4 ♂♂, Mongolia, Arkhangai aimak, Onei somoh, 1330 m, 102°44'17"E, 47°47'08"N, 14.VI.2005, leg. ODBAYAR Tz. (CAS).

China: 1 ♀, [China, Hebei, Beidaihehaibin] Pei-tai-ho, coll. GEHLEN (MHUB); 3 ♂♂, China, Inner Mongolia, 80 km NE from Xin Barag Zuoqi, 2.VII.2008, 900 m, FLORIANI, SALDAITIS leg. (MWM); 1 ♂, China, Kiautschou, 10.IX.1913 (ZFMK); 1 ♀, Tapaischan im Tsinling, Sued-Shensi, ca 1000 m, 31.V.1935, leg. H. HÖNE (ZFMK).

DANNER et al. (1998) recorded the species from: 1 ♂, Mongolia, Toodumi/Boyan, 1990, coll. F. KARRER (Zofingen); 1 ♀, China, Petaiho, Küste des Gelbes Meeres, coll. F. KARRER (Zofingen).

Later EITSCHBERGER (1999: 167) also wrote: „Diese Art scheint in China weit verbreitet zu sein... Die meisten Falter stamen aus den Counties Dingbian, Heyang, Liquan Wugong und Xi'an in der Provinz Shaanxi. Ein Falter wurde in der Provinz Henan bei Anyang City erbeutet“ and gave a map of additional locations of the species in China.

The zone of sympatry of both species is shown on the map (fig. 8). It is a large area covering most of southern Siberia, Mongolia and north-eastern China. At the same time, although both species can be collected in the same traps because of high flight activity, caterpillars are separated under microclimatic conditions of a site. It was pointed out that *H. costata* (NORDM.) develops in more mesophytic biotopes and *H. exilis* DERZH. can be found in very hot and dry places on xerophytous *Euphorbia*. In the sites with jagged relief (as in many Mongolian locations) both species develop side-by-side geographically but not ecologically and coming in mixed series to light. It was suggested by EITSCHBERGER & ZOLOTUHN (1998, in DANNER et al., 1998), that it is a complex of two sister species joined in the common phylogenetic branch. But recently, very interesting results were obtained by a composite author studied mitochondrial DNA (HUNSDOERFER, KITCHING & WINK, 2005). They postulated that the species *H. costata* (NORDM.) should be included into a clade of the *deserticola-tithymali*-lineage, considered by EITSCHBERGER & ZOLOTUHN (1998, in DANNER et al., 1998) as a subgenus *Rommeliana* within *Hyles* HÜBNER, [1819]. These data are of special interest, in spite of the fact that only one species from the *costata*-group was investigated. An alliance of *H. costata* (NORDM.) to the *deserticola-tithymali*-lineage is supported by a speckled pattern of a caterpillar as well. But caterpillars of *H. exilis* DERZH. belong surely (because of special pattern of another kind and

the use of Euphorbiaceae as hosts) to the *euphorbiae*-lineage. In that case, the unusual external similarity of both species seems to be a result of their convergent evolution in arid biotopes of Central Asia. Also, we can suppose that the striate wing pattern which is typical for the members of *Dammeria* EITSCHBERGER & ZOLOTUHIN, 1998 and *Surholtia* EITSCHBERGER & ZOLOTUHIN, 1998 is of adaptive meaning and of limited diagnostic significance. Further, detailed investigations are needed to clarify the problem. We hope this article will help to shed some light on the taxonomic position of both species.

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References

- DANNER, F., EITSCHBERGER, U. & B. SURHOLT (1998): Die Schwärmer der westlichen Palaearktis. Bausteine zu einer Revision (Lepidoptera: Sphingidae). - *Herbipoliana* **4** (1, Textband): 1-368, **4** (2, Tafelband): 1-720, Verlag EITSCHBERGER, Marktleuthen.
- DERZHAVETS, YU. A. (1979): Taxonomic studies of *Hyles costata* NORDMANN (Lepidoptera, Sphingidae). - *Nasekomye Mongolii* [Insects of Mongolia] **6**: 404-412, Leningrad (in Russian).
- EITSCHBERGER, U. (1999): Zur Verbreitung einiger *Hyles*-Arten in China. 3. Ergänzung zu „Die Schwärmer der westlichen Palaearktis“ (DANNER, EITSCHBERGER & SURHOLT, 1998) (Lepidoptera, Sphingidae). - *Atalanta* **30** (1/4): 162-168, 1 Farbt., Würzburg.
- GEHLEN, B. (1933): Sphingidae. In SEITZ, A. (ed.), Die palaearktischen Spinner und Schwärmer. Die Groß-Schmetterlinge der Erde. Suppl. **2**: 137-166, Dresden.
- HUNDSDOERFER, A.K., KITCHING, I. J. & M. WINK (2005): A molecular phylogeny of the hawkmoth genus *Hyles* (Lepidoptera: Sphingidae, Macroglossinae). - *Molecular phylogenetics and evolution* **35**: 442-458, Amsterdam.
- KITCHING, I. J. & J.-M. CADIOU (2000): Hawkmoths of the World. An annotated and illustrated revisionary checklist (Lepidoptera: Sphingidae). - The Natural History Museum, London and Cornell University Press, Ithaca and London.
- OGUDOV, S. A. (2007): New record of *Hyles costata* (NORDMANN, 1851) (Lepidoptera, Sphingidae) on the territory of Russian Altai. - *Altai zoological Journal* **1**: 56, Barnaul (in Russian).
- SHODOTOVA, A. A. (2007): Lepidoptera of Burjatia. In UBUGUNOV, U & V. DUBATOLOV (eds.). - Novosibirsk (in Russian).
- Internet resources
- PITTAWAY, A. R. & I. J. KITCHING: Sphingidae of the Eastern Palaearctic (including Siberia, the Russian Far East, Mongolia, China, Taiwan, the Korean Peninsula and Japan) (in association with FELIX LIN) - <http://tpittaway.tripod.com/china/china.htm>

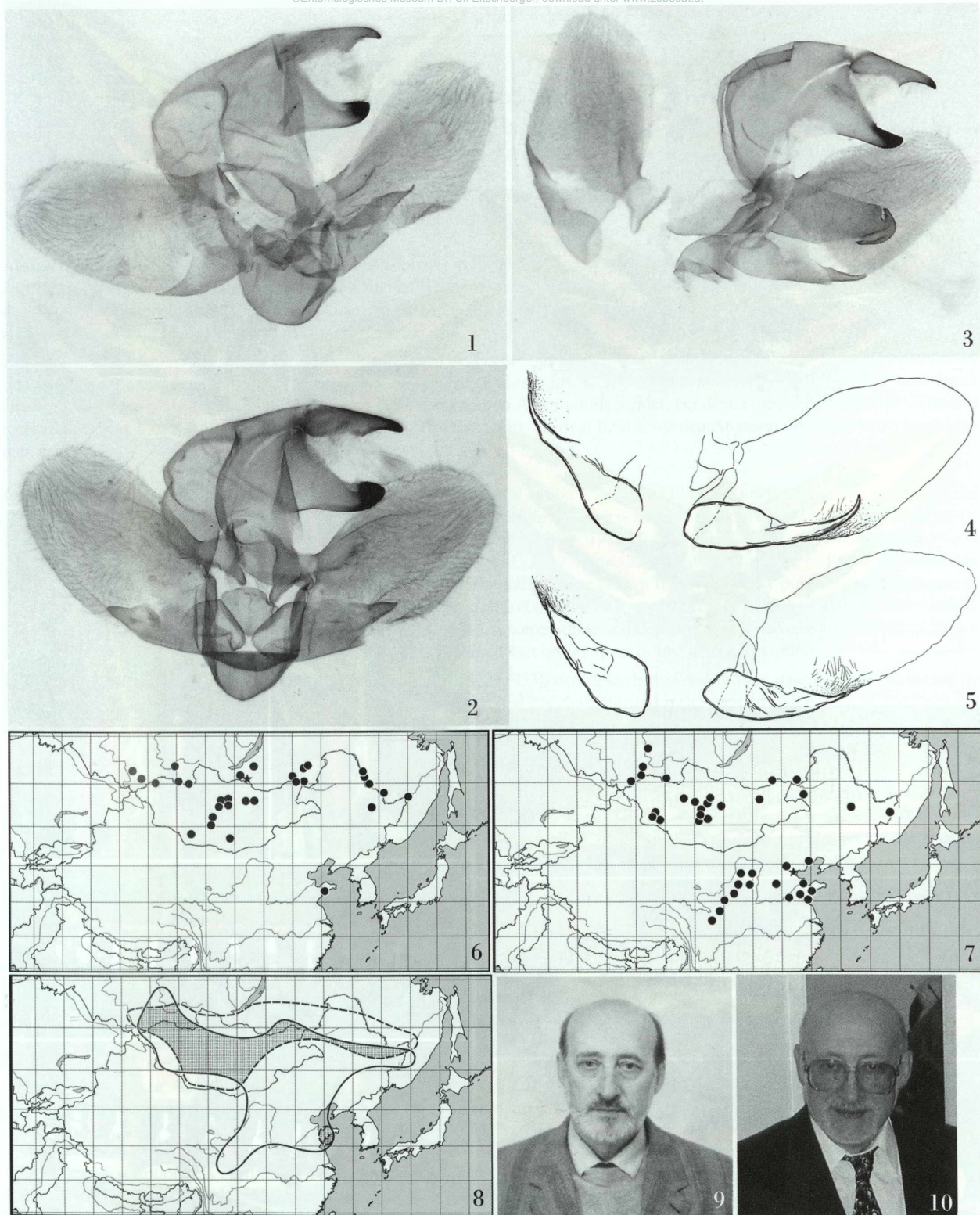
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Legend to colour plate 1

- 1: *Hyles costata* (NORDMANN, 1851), holotype ♂ (ZISP).
 - 2: *Hyles costata solida* DERZHAVETS, 1979, paratype ♂, Blagovestchensk (ZISP).
 - 3: *Hyles costata solida* DERZHAVETS, 1979, paratype ♂, Raddefka (ZISP).
 - 4: *Hyles exilis chivilini* EITSCHBERGER, DANNER & SURHOLT, 1998 **comb. et stat. nov.**, holotype ♂ of *Hyles chivilini* EITSCHBERGER, DANNER & SURHOLT, 1998, Abakan, Red Lake (EMEM).
 - 5: *Hyles exilis* DERZHAVETS 1979 **stat. rev. et stat. nov.**, holotype ♂ of *Hyles costata exilis* DERZHAVETS, 1979, Northern China, Tjan-Tsin, Chzhili (ZISP).
 - 6-10: Typical (red) form of caterpillars of *Hyles costata* (NORDMANN, 1851) and details, Burjatia, Onokhoj, 23.-24.VII.2007, S. GORDEEV leg. et photo.
 - 11-12: Rare yellow form of caterpillars of *Hyles costata* (NORDMANN, 1851), the same locality (photo S. GORDEEV).
 - 13: Walking phase of caterpillar of *H. exilis* DERZHAVETS, 1979, Dahurian Reserve (photo T. TACHUK).
 - 14: Mature larva of *Hyles exilis* DERZHAVETS 1979 **stat. rev. et stat. nov.**, Chita Region, env. Baley, 7.VII.2009 (photo S. GORDEEV).
 - 15: The same larva of *Hyles exilis* DERZHAVETS 1979 **stat. rev. et stat. nov.**, in penultimate instar, 3.VII.2009 (photo S. GORDEEV).
 - 16-17: Pupa of *Hyles exilis* DERZHAVETS 1979 **stat. rev. et stat. nov.**, Chita Region, env. Baley (photo S. GORDEEV).
- Scale bar for the moths: 1 cm.



- 1: *Hyles costata* (NORDMANN, 1851), genitalia holotype ♂, Kjachta (ZISP, Nr D350).
- 2: *Hyles costata solida* DERZHAVETS, 1979, genitalia paratype ♂, Raddefka (ZISP, Nr D364).
- 3: *Hyles exilis chuvilini* EISCHBERGER, DANNER & SURHOLT, 1998 **comb. et stat. nov.**, genitalia holotype ♂ of *Hyles chuvilini* EISCHBERGER, DANNER & SURHOLT, 1998, Abakan, Red Lake (EMEM).
- 4: *Hyles exilis* DERZHAVETS 1979 **stat. rev. et stat. nov.**, genitalia holotype ♂ of *Hyles costata exilis* DERZHAVETS, 1979, Northern China, Tjan-Tszin, Chzhili (ZISP, Nr D283) [orig. drawing by S. NEDOSHIVINA].
- 5: *Hyles costata solida* DERZHAVETS, 1979, genitalia holotype ♂, Blagovestchensk (ZISP, Nr D246) [orig. drawing by S. NEDOSHIVINA].
- 6: Distribution of *Hyles costata* (NORDMANN, 1851), a star means the type locality.
- 7: Distribution of *Hyles exilis* DERZHAVETS 1979 **stat. rev. et stat. nov.**, a star means the type locality;
- 8: Sympatry zone in distribution of both species (prep. by A. SOLOVYEV): distribution of *Hyles costata* (NORDMANN, 1851) is marked with a dotted line.
- 9, 10: YURY A. DERZHAVETS, (9) ca. 1980, (10) in 2004.

Colour plate 1



1: *Hyles costata* (NORDMANN, 1851), holotype ♂ (ZISP). 2: *Hyles costata solida* DERZHAVETS, 1979, paratype ♂ (ZISP). 3: *Hyles costata solida* DERZHAVETS, 1979, paratype ♂ (ZISP). 4: *Hyles exilis chivilini* EISCHBERGER, DANNER & SURHOLT, 1998 **comb. et stat. nov.**, holotype ♂ (EMEM). 5: *Hyles exilis* DERZHAVETS 1979 **stat. rev. et stat. nov.**, holotype ♂ (ZISP). 6-10: Typical (red) form of caterpillars of *Hyles costata* (NORDMANN, 1851). 11-12: Rare yellow form of caterpillars of *Hyles costata* (NORDMANN, 1851). 13: Walking phase of caterpillar of *H. exilis* DERZHAVETS, 1979. 14: Mature larva of *Hyles exilis* DERZHAVETS 1979 **stat. rev. et stat. nov.** 15: The same larva of *Hyles exilis* DERZHAVETS 1979 **stat. rev. et stat. nov.**, in penultimate instar. 16-17: Pupa of *Hyles exilis* DERZHAVETS 1979 **stat. rev. et stat. nov.** More details see p. ???

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