A new subspecies of *Hyles siehei* (Püngeler) from the deserts of Central Asia (Sphingidae)

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Abstract. A new subspecies *Hyles siehei svetlana* **ssp. n.** is described from Central Asia (type locality: Western Kazakhstan, Aktobe Region, the Shagyray Plateau). It inhabits desert biotopes and differs from the nominotypical montane *H. siehei siehei* (Püngeler, 1903) by its smaller size and the presence of a larger postdiscal patch on the forewing. It is also quite distinct in the coloration and body pattern of the mature larvae, which feed on *Eremurus inderiensis* Stev. It is suggested that this desert subspecies originated about 2.5–1.7 million years ago as the result of global and prolonged isolation during repeated transgressions of the Caspian Sea. Data on the life history and morphology of the preimaginal stages are given. The species *H. siehei* is noted here from Kazakhstan, Uzbekistan and Turkmenistan for the first time. The holotype of the new taxon is deposited in the collection of the Zoological Institute of Russian Academy of Sciences, St. Petersburg, Russia.

Резюме. Из Средней Азии (типовая местность – Западный Казахстан, плато Шагырай) описывается новый подвид *Hyles siehei svetlana* **ssp. n.** Он населяет пустынные стации и отличается от номинативного горного *H. s. siehei* (Püngeler, 1903) меньшими размерами, наличием четкого дискального пятна на переднем крыле, а также принципиально иными окраской и рисунком взрослых гусениц, питающихся на пустынном *Eremurus inderiensis* Stev. Предполагается, что данный подвид сформировался при разрыве ареала исходного вида в результате трансгрессий Каспийского моря около 2,5–1,7 миллионов лет назад. Приведены подробные данные по биологии и морфологии его преимагинальных стадий. Вид *H. siehei* впервые отмечается, таким образом, для Казахстана, Узбекистана и Туркменистана. Голотип нового таксона хранится в коллекции Зоологического института Российской Академии Наук (г. Санкт-Петербург).

Introduction

In May 2006, some unknown larvae of a *Hyles* species (Figs 10, 11, 17) feeding on *Eremurus inderiensis* (Stev.) (Fig. 15) were collected by me at Shagyray Plateau, Aktobe Region of Kazakhstan. Their colouration precluded both *Hyles livornica* (Esper, 1780) which is common in this area and *Hyles centralasiae* (Staudinger, 1887) which is known from Turkmenistan, Uzbekistan and Central Kazakhstan. In addition at light we collected some moths very similar to *H. centralasiae* but differing in their smaller size and more olive ground colour of the fore wings. Unfortunately, adults were not successfully reared from those larvae. In 2007 and 2009 new expeditions were organised and similar larvae were collected about 300 km to the south of the previous location, also feeding on *Eremurus inderiensis*. In addition some moths similar to *H. centralasiae* were caught here at light. Five pupae were obtained from the collected larvae. The first imago emerged in July 2007, and the second one year later, in late August 2008, both moths being very similar to *H. centralasiae*.

Shchetkin (1952, 1960, 1975) repeatedly wrote about the biology of *H. centralasiae* (as *Celerio centralasiae*) in Central Asia. He noted the essential distinction between desert and mountain forms of the moths. In 1952 he pointed out that "moths of

C. centralasiae from desert and semi-desert regions (from Bet-Pak-Dala, Mujun-Kum, Repetek) are smaller than those individuals developing in the both foothills and higher altitude regions. Desert specimens have an average wingspan about 57 mm (from 55 to 60 mm), those from other regions average 65 mm (from 60 to 70 mm)". Desert and mountain taxa occur at different altitudes. The typical altitudes for the mountain taxon range between 500 and 2800 m a. s. l. (Shchetkin 1952, 1960, 1975; Danner et al. 1998; Derzhavets 1984; Jordan 1912; Pittaway 1997–2009). The altitudes at which we collected did not exceed 250 m a. s. l., and for coastal areas of the Aral Sea altitudes were minus 28 m. *Eremurus ambigens* Vved. and *E. olgae* Rgl. were specified as hostplants for mountain moths (Shchetkin 1952, 1975), and for the desert moths he states only that larvae feed on *Eremurus* species. It is clear that he had not seen the desert larvae of the hawk moth as he gave only for a description of the mountain form. The larvae found by us differ very strongly from that described, by Shchetkin. It should also be noted that *Eremurus inderiensis*, unlike other congeners, grows not in mountains or along mountain valleys, but only on the semifixed sand of desert and in semidesert biotopes (Fedchenko 1949).

Mitroshina (1989) describes the ecological features of hawk moths inhabiting deserts of Northern Turkmenistan (Southern Ustyurt, chink Burchliburun). The territories that we investigated are very similar, both geographically and climatically, to those described by Mitroshina. Unfortunately Mitroshina did not give a clear description of the larvae she observed. However the similar climatic conditions of the region, the flight period of the imago and the feeding of larvae on *Eremurus inderiensis* led us to suppose that she was dealing with the same species that we had observed.

Phenologically both taxa are quite distinct. As Shchetkin (1952, 1975), Danner et al. (1998), Derzhavets (1984), Jordan (1912) and Pittaway (1997–2008) remarked, the flight period for *H. centralasiae* falls in the first half of June and it is linked to the beginning of the flowering period for *Eremurus*. Larvae have to complete their feeding before the maturing of fruits of *Eremurus*, and their development therefore lasts on average 20–25 days. Similar situations were noted for *E. inderiensis* and the *Hyles* species trophically connected with it. Based on our data, the flight period of imago in deserts is the first weeks of May, which coincides with active vegetation growth and the beginning of flowering of *E. inderiensis*.

The life circle of *E. inderiensis* is much shorter in desert biotopes, and by late May all parts of the plant above ground level are completely dessicated. Development of larvae on this plant is accelerated, and from egg to a pupa lasts only about 9–11 days (pers. observ.).

It is reasonable to assume that *H. centralasiae* partially migrates in desert territories as during dry periods no hostplant can be found there. Thus it is possible to conclude that the differing life cycles produce a temporal isolation which preserves the desert pheno- and genotypes, separating these taxa from those in mountain regions.

Based on author's conclusion from the biological and morphological evidence, the taxon inhabiting the Western Kazakhstan differs from typical *H. centralasiae*. To test this assumption our material was subjected to the analysis of mitochondrial DNA. Results of this analysis (Hundsdörfer et al. 2009) confirmed the assumption that the samples differ from typical *H. centralasiae*, but surprisingly are close to *H. siehei* (Püngeler, 1903). Such a close relationship was unexpected, as these taxa differ strongly both morphologically (Figs 2, 4) and ecologically. The montane *H. siehei* prefers the sunny, moderately humid hills of Turkey (Danner et al. 1998; Pittaway, 1997–2009; Derzhavets 1984; Pelzer, 1982, 1991) (Fig. 19), and our taxon is a typical member of desert and semidesert fauna of the Central Asia. Thus, on the one hand ecological and morphological differences are enough to separate the taxon from the Western Kazakhstan to the rank of a species; on the other hand the analysis of mtDNA shows that the new taxon is very similar to *H. siehei*.

Basing on the facts given above I am of the opinion that the new taxon most likely has the rank of a new species, but at present there is insufficient unequivocal evidence to support this conclusion. I am therefore describing here the taxon from the Western Kazakhstan as a new subspecies of *H. siehei*.

Abbreviations

BMNH	Natural History Museum, London, United Kingdom
LSSU	Laboratory of Animal Systematics and Faunistics, Samara State University, Samara, Russia
MWM	Entomological Museum Thomas J. Witt, Munich, Germany
WCA	Working collection of the author
ZISP	Zoological Institute of Russian Academy of Sciences, St. Petersburg, Russia

Hyles siehei svetlana ssp. n. (Figs 1–2, 5, 10–11, 16–18)

Material. Holotype ♂, '15.05.2006 Kazakhstan, | Aktobe Region, Plateau Shagyray, | N 46°52'35" EO 58°02'05" | leg. Trofimova T.A. & Shovkoon D.F.' <white rectangle, printed in black ink>, 'HOLOTYPUS. | P *Hyles siehei svetlana* | Shovkoon | design. Shovkoon D. F. 2009' <red rectangle, printed in black ink> (in coll. ZISP). – Paratypes: 6♂, 1♀ same data as holotype (1♂, 1♀ in coll. ZISP, 2♂ in coll. WCA, will be transferred in coll. BMNH, 1♂ in coll. WCA, will be transferred in coll. MWM, 2♂ in coll. LSSU); 1♂ 13.05.2006 Kazakhstan, Aqtobe Region, N 46°58'08" E 59°13'35", leg. Trofimova T.A. & Shovkoon D.F. (in coll. WCA); 3♂ 25.05.2006 Kazakhstan, Aqtobe Region, Plateau Shagyray. N 46°45'36" E 57°31'20", leg. Trofimova T.A. & Shovkoon D.F. (1♂ in coll. WCA, will be transferred in coll. BMNH, 2♂ in coll. LSSU); 1♂ 11.05.2004 Kazakhstan, Aqtobe Region, Plateau Shagyray. leg. Trofimova T.A. (in coll. LSSU); 1♂, 1♀ 27.05.2006 Kazakhstan, Qyzylorda Region, coast of Aral Sea N 46°20'09" E 59°43'21", leg. Trofimova T.A. & Shovkoon D.F. (in coll. WCA); 3♂ 16.05.2007 Kazakhstan, Mangistau Region, N 43°44'53" EO 53°38'14", leg. Trofimova T.A. & Shovkoon D.F. (1♂ in coll. WCA, will be transferred in coll. BMNH, 1♂ in coll. WCA, will be transferred in coll. MWM, 1♂ in coll. LSSU); 1♂ 16.05.2007 Kazakhstan, Mangistau Region, N 43°44'53" EO 53°38'14" – larva, 27.05.2007 – pupa, 18.07.2007 – imago (in coll. WCA); 1♂ 16.05.2007 Kazakhstan, Mangistau Region, N 43°44'53" E 53°38'14" – larva, 27.05.2007 – pupa, 29.08.2008 – imago (in coll. WCA). – Additional material. 1♂ sands Sary-Tau-Kum, 150 km NNE Alma Ata, on light, leg. Reznik 1.v.1981 (ZISP); 1♂ Kazakhstan, sands Sary-Tau-Kum in Lower Ili, near Aydayrly, leg. Seitova 11.05.1967 (ZISP); 1♂ Uzbekistan, Kyzyl-Kum desert leg. Falkovich 29.iv.1974 (ZISP); 1♂ Uzbekistan, Kyzyl-Kum desert, Ayakgujumdy, leg. Falkovich 18.iv.1986 (ZISP); 1 walking larva 29.05.2009 Kazakhstan, Mangistau Region, N 43°44'53" E 53°38'14" (WCA).

Etymology. The subspecies was named after my sister and Dr. Svetlana Kozlova, my dear friend, for her continuous valuable help in my scientific work.

Figs 1–4. Adults of *Hyles* spp. **1.** *H. siehei svetlana* ssp. n., ♀, paratype. **2.** *H. siehei svetlana* ssp. n., ♂, holotype from Kazakhstan, Aktobe Region, Plateau Shagyray (ZISP). **3.** *H. centralasiae*, ♂, Uzbekistan, Samarkand 20/22 IV, O. Herz 1892 (ZISP). **4.** *H. siehei siehei*, ♂, Turkey, Taurus (MWM).

Description. I m a g o : Wingspan: ♂ 55–60 mm (holotype 57 mm), ♀ 65 mm. Forewings with a large discal spot in the pale median stripe. Central gap in the oblique median stripe more reduced, or completely absent. The pink area of the hindwing can be intense or faint. Black or dark-olive post-discal band on the hindwing narrower and separated from the black basal area along the costa. Rarely with a distinct rosy hue on both wings and body. Antenna distally incrassate in both sexes and, in female, more clavate. Pilifer with long setae medially, and shorter ones laterally. Labial palpus smoothly scaled, concealing base of proboscis; scaling at apex of the first segment not arranged in a regular border on inner surface; second segment without apical tuft on inner side. Abdomen conically pointed, with strong dorsal spines usually arranged in two transversal rows. First segment of foretarsus short, with six strong spines.
M a l e g e n i t a l i a (Fig. 5): Similar to all other species of *Hyles*. Uncus and gnathos beak-shaped, narrow. Valva broadly pear-shaped. Sacculus terminates in a thin simple, tapering process. Phallus tubular with apex bearing well-expressed dentate curved spur.
O v u m (Fig. 16): Small, 1.2 mm in diameter, almost spherical, pale green. Laid directly on flower buds or on a stalk of the hostplant nearby the ground.
L a r v a : The newly-hatched larva is 2.5 mm long, pale rosy with blackish brown head, legs, prothoracal shield and horn (the latest is short and vertical): the body bears rows of setae of the same colour. The head and thoracal segments are rose-tinted. In the second instar (Fig. 17) the primary body colour is pale rosy matching flowers of

the host, with whitish dorso-lateral line bearing rudimentary eye-spots. There is a hint of an orange dorsal line. The third instar is similarly patterned and colored, primary colour can vary to greenish olive. The dorso-lateral line is more prominent, the eye-spots pure white, and a pinkish-white ventro-lateral line presented. The head, anal clasper and horn are black, dorsal line pale orange. In the fourth instar the primary body colour is greenish olive with scattered white, frequently darkly-ringed speckles. The head, legs, horn and prothoracal shield are black. Fully grown larva is 65–70 mm long (Figs 10, 11), greenish olive with scattered white, frequently dark-ringed speckles, with a bright yellow dorsal line. Each side with a dorso-lateral line having large, white or yellow, black-ringed eye-spots. Horn, head, legs and anal shield are black. Spiracles yellow, black-ringed.

Newly hatched larvae prefer feeding on the pollen-sacs and often sit on the flowers. As they grow, all parts of the flower are eaten, including the immature ovaries. Larvae of later instars feed openly on the tall, columnar inflorescence.

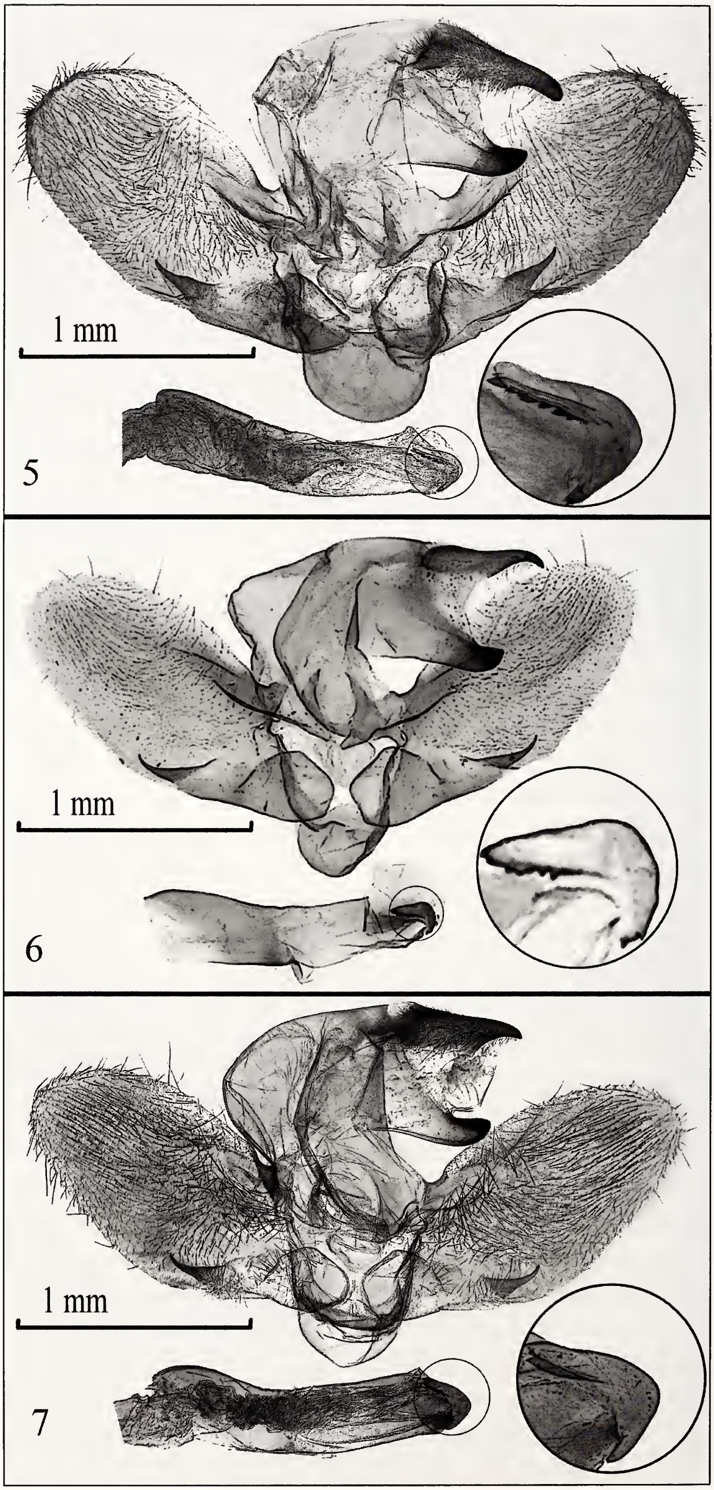
Pupa (Fig. 18): 37–42 mm. Pale greenish-brown with semitransparent cuticule, in a loosely spun, net-like cocoon among debris on the ground. Proboscis fused with body, not projecting anteriorly. Cremaster large, bent ventrally. Many pupae have a diapause of several years.

Diagnosis. From the nominate *H. s. siehei* (Fig. 4) moths of the new subspecies differ by (1) the smaller size, (2) the forewing has a clearly defined postdiscal patch and (3) lighter background oblique median stripe is always clearly defined and does not merge with a dark field at wing edge as is often seen in *H. siehei siehei*, and (4) the hindwing has a more clearly defined and wider black band than in *H. siehei siehei*.

From *H. centralasiae* (Fig. 3), moths of *H. s. svetlana* also differ in their smaller size (from 58 to 75 mm in *H. centralasiae*), though there is some overlap. The coloration of *H. s. svetlana* has a prevalence of olive tones and in *H. centralasiae* the colour is lighter, with a predominance of beige tones. Hindwing of *H. s. svetlana* has a more clearly defined, wide, black band. Underside of wings and abdomen in *H. s. svetlana* are rose (Fig. 1), in *H. centralasiae* cream coloured (Fig. 3), or, rarely, faintly rose.

The lectotype of *H. centralasiae* from Samarkand has a wingspan of only 58 mm (as measured from the illustration in Danner et al, 1998) and so falls within the range of the new taxon rather than montane *H. centralasiae*. However, the lectotype is also quite pale, rather beige, which would suggest that it is *centralasiae* sensu auctorum. Samarkand is located at 700 m above sea level, which correspond to the altitude at which *centralasiae* sensu auctorum occurs. But the question remains, whether the type locality of *H. centralasiae* is appropriate for the desert taxon or the montane taxon. There is a possibility that the desert taxon could be the true *centralasiae*, and then the name *transcaspica* Bang-Haas, 1936 (type locality: Achal tekke, Uzbekistan) would have to be reinstated for the montane taxon.

As the lectotype of *H. centralasiae* from Samarkand does not unequivocally answer this question, I studied the collection of ZISP where I found the moth illustrated in Fig. 3. This moth originates from the type locality of *H. centralasiae* and was reared from a larva. Remnants of larval and pupal exuviae are available for that specimen together with additional dried larvae. All larvae have the typical colouration and eye-spot pattern



Figs 5–7. Male genitalia of *Hyles* spp. **5.** *H. siehei svetlana* ssp. n. (ZISP), paratype. **6.** *H. siehei siehei*, Turkey (MWM). **7.** *H. centralasiae*, Uzbekistan, Samarkand (ZISP).

of the mountain taxon, which strongly suggests that the lectotype of *H. centralasiae* is congruent with *H. centralasiae* sensu auctorum and that the name *transcaspica* is a synonym.

Male genitalia are very variable and similar to those of other *Hyles* species, and do not seem to be suitable for diagnostic purposes. Differences in shape of the valva and uncus are constant. In *H. siehei svetlana* the valva is pear-shaped (Fig. 5), in *H. siehei siehei* (Fig. 6) and *H. centralasiae*. (Fig. 7) ovate. The uncus of *H. siehei svetlana* is smoother and less pointed, of *H. siehei siehei* coiled with beak-shaped apex, of *H. centralasiae* short and massive, sharply pointed at apex.

Differences in the larvae are more marked (Tab. 1).

Distribution (Fig. 19). *H. siehei svetlana* is strongly linked to the range of its hostplant. From our data, the moths inhabit desert and semi desert stations of the Western Kazakhstan where *E. inderiensis* grows – the Shagyray Plateau (Fig. 19, points 2–4), sands Bolshye Barsuki (point 5), part of the northern coast of Aral Sea (point 6) and Southern Ustyurt (point 1).

Besides that, material stored in the collection of ZISP and data from the literature indicates that the same subspecies is probably native to Northern Turkmenistan – part of Burchliburun (Mitroshina, 1989; point 10), the Kyzyl-Kum desert, Repetek (Shchetkin, 1952; point 12); in the Central Kazakhstan sands Sary-Tau-Kum in Lower Ili (Danner et al. 1998: pl. 35 fig. 7, moth with data: ♂, Kazakhstan, Kolshengel, 350 m, 13.v.1996, M. Danilevsky; point 8); 1♂ sands Sary-Tau-Kum, 150 km NNE Alma Ata, on light, leg. Reznik 1.v.1981 (ZISP), point 7; 1♂ Kazakhstan, sands Sary-Tau-Kum in Lower Ili, near Aydayrly, leg. Seitova 11.05.1967 (ZISP), point 9. In Uzbekistan – also the Kyzyl-Kum desert (Falkovich 1986; point 14); 1♂ Uzbekistan, Kyzyl-Kum desert leg. Falkovich 29.iv.1974 (ZISP) point 11; 1♂ Uzbekistan, Kyzyl-Kum desert, Ayakgujumdy, leg. Falkovich 18.iv.1986 (ZISP) point 13.

Nominotypical *H. siehei siehei* (Fig. 19, triangular marker) is distributed from the eastern Toros and Bolkar Mountains of southern Turkey (Danner et al. 1998), eastern Turkey, Armenia (Danner et al. 1998), northern Syria, northern Iraq and northern Iran. Thence probably south along the Zagros Mountains of Iran to Kerman Province, from where one specimen has been recorded (Pittaway 1997–2009).

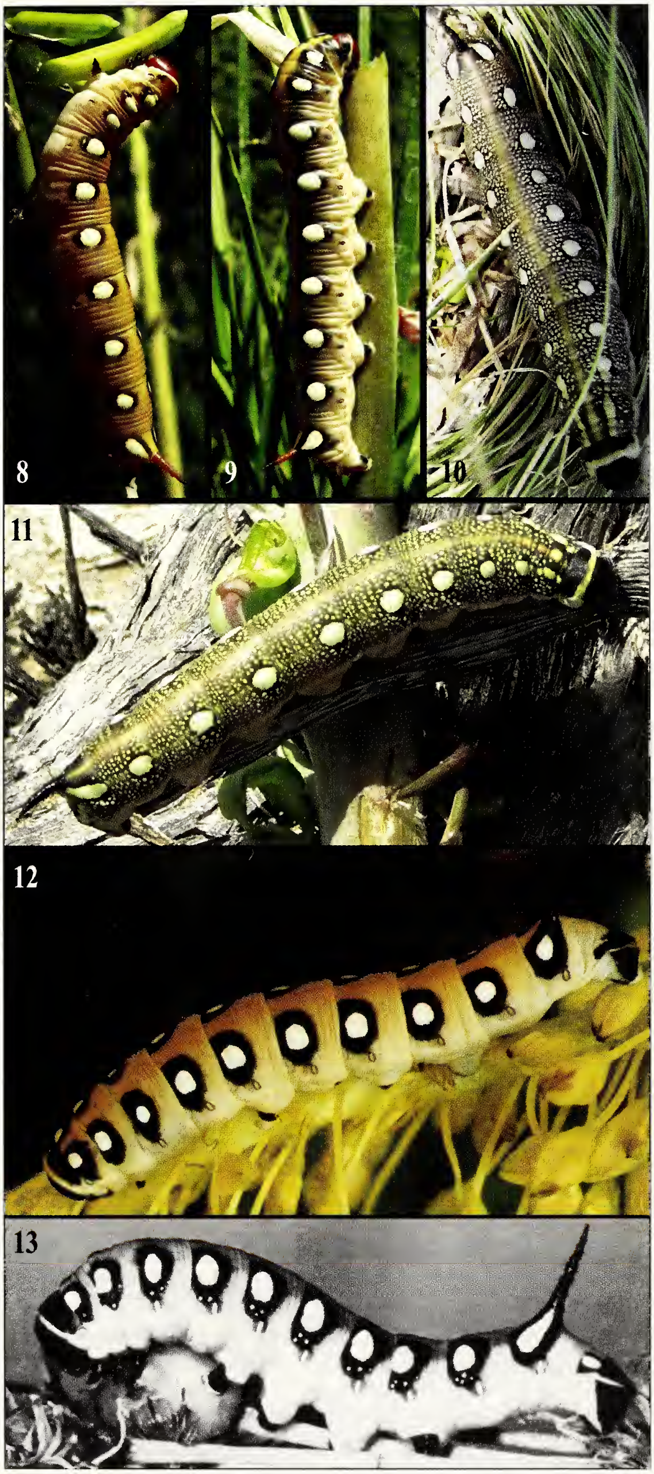
H. centralasiae (Fig. 19, square marker) is distributed from northeastern Iran (Danner et al. 1998), southern Turkmenistan (Derzhavets 1984), southern Uzbekistan (Bang-Haas 1936), southern Kazakhstan (Danner et al. 1998), Tajikistan (Grum-Grshimailo 1890; Bang-Haas 1936) Kyrgyzstan (Pittaway 1997–2009) to northern and eastern Afghanistan (Pittaway 1997–2009) and northern Xinjiang Province, China (Pittaway 1997–2009).

Unfortunately, some data attributed in the literature to *H. centralasiae* was not verified (Fig. 19, square marker with sign "?") and it is likely that these records should be attributed to the described subspecies. Amongst them – specimens from deserts of the Western and Central Turkmenistan (Shchetkin, 1952), and Central Kazakhstan – Middle and Lower Syr Darya (Danner et al. 1998).

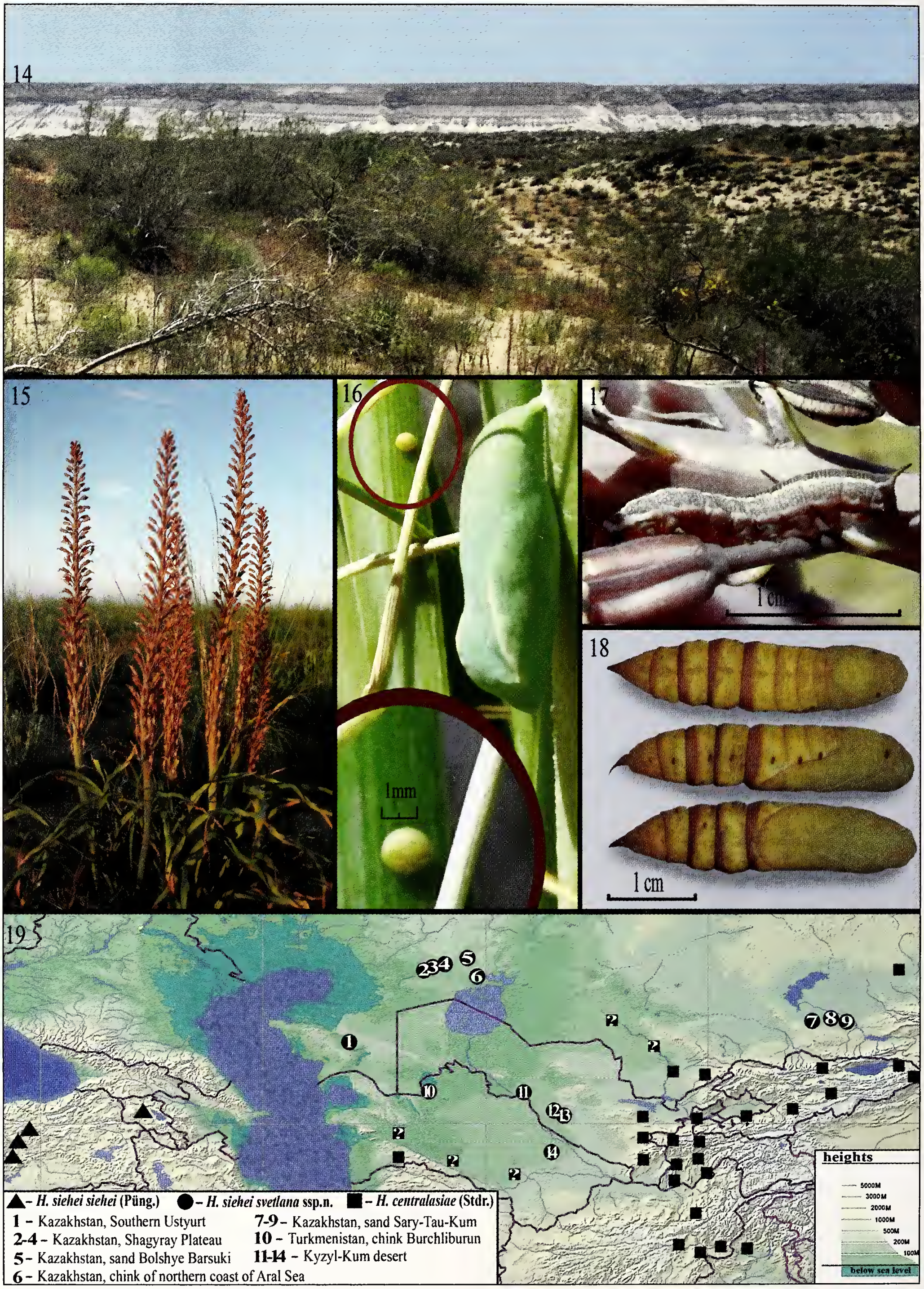
Type locality. The Shagyray Plateau (Figs 14, 19 – point 3) is a continuation of Ustyurt and Donyztau and winds in a northeast direction for 130 *km*. The width of a plateau

Tab. 1. Differential characters of final instar larva of Hyles siehei svetlana ssp. n., H. siehei siehei and H. centralasiae.

Character \ taxon	*H. centralasiae*	*H. siehei siehei*	*H. siehei svetlana* ssp. n.
Length of fully grown larvae, mm	75–90	70–80	65–70
Ground colour of mature larvae	pale grey, sometimes with a pale rose dorsal suffusion	pale brownish grey with rose dorsal suffusion	greenish olive with scattered white, frequently darkly-ringed speckles
Coloration of subspiracular field	strongly bright- to pinkish-cream or pinkish-white and passes to abdominal legs and all ventral surface.	strongly bright to cream-white or pale grayish and passes to abdominal legs and all ventral surface.	strongly bright to pinkish-white or pale grayish and passes to abdominal legs and all ventral surface.
Dorso-lateral line	with large, brilliant white, black-ringed eye-spots.	with very large brilliant white eye-spots and heavily ringed with black. In dark colored larvae, the eye-spots may be reduced or absent.	with large, little bit horizontally extended brilliant white or yellowish, black-ringed eye-spots.
Coloration of thoracic segments	At the majority of larvae spots of second and third segments double – merged of back and smaller forward. On first segment eye-spot is not present, but on their place two black spot, corresponding black-ringed of eye-spots.	At the majority of larvae on second and third segments, on one white eye-spots heavily ringed with black. On the first segment eye-spots stains are not present.	At all found larvae spots of second and third segments double – merged of back and smaller forward, merge full and spots are perceived as longitudinal short strips. On first segment eye-spots are not present, black-ringed is indiscernible merge with a dark background of a larva.
Dorsal line	not broken by any longitudinal strips. In many larvae black bordering of eye-spots of the next segments incorporate among themselves a blackish indistinct shade, and at the blacked out larvae on a back remains more or less narrow dorsal line of the basic pinkish tone.	clearly distinguishable and usually of pinkish colour.	clearly distinguishable and usually has the same coloring as eye-spots.
Horn	blood-red with a black tip, in dark larvae an be completely black	completely black	completely black, very rare orange with a black tip
Head, legs and anal shield	brown-red, in dark larvae can be completely black	black	black, very rare orange



Figs 8–13. Final instar larva of *Hyles* spp. **8.** *H. centralasiae*. **9.** *H. centralasiae*. **10.** Walking-phase of *H. siehei svetlana* ssp.n. **11.** *H. siehei svetlana* ssp.n. **12.** *H. siehei siehei* (from Danner et al. 1998). **13.** *H. siehei siehei* (from Pelzer, 1991).



Figs 14–19. On the lif-history of *Hyles siehei svetlana* ssp. n. **14.** The Shagyray Plateau in Kazakhstan, the type-locality of *H. s. svetlana*. **15.** *Eremurus inderiensis*, the hostplant of *H. s. svetlana*. **16.** Egg of *H. s. svetlana* (near pupa of *Hyponephele* sp.). **17.** Pupa of *H. s. svetlana*. **18.** Second instar larva of *H. s. svetlana*. **19.** Distribution map of *H. siehei svetlana* ssp. n., *H. siehei siehei*, and *H. centralasiae*.

does not exceed 30 *km* (average 15). East and southeast slopes are flat; the western has a more broken character – steep and penetrated by a system of deep ravines. Absolute altitudes here do not exceed 330 *m* a. s. l. but typically range between 100 and 150 m. The vegetation of this rugged terrain varies considerably with altitude. It is mostly composed of *Aristida karelini* Trin. et Rupr. Roshev., *Aeluropus littoralis* (Gouan) Parl., *Stipa lessingiana* Trin. et Rupr., *S. sareptana* A. Beck., *Bromus squarrosus* L. (all Poaceae), *Salsola chiwensis* M. Pop., *S. dendroides* Pall., *S. verrucosa* M. B., *S. rigida* Pall., *Atriplex patula* L., *Haloxylon aphyllum* (Minkw.) Iljin, *Halocnemum strobilaceum* (Pall.) Bieb., *Camphorosma monspeliaca* L. (all Chenopodiaceae), *Calligonum aphyllum* (Pall.) Guerke, *Atraphaxis spinosa* L. (all Polygonaceae), *Astragalus varius* S. G. Gmel., *Caragana frutex* (L.) C. Koch, *Alhagi pseudalhagi* (Bieb.) Fisch. (all Fabaceae), *Clematis glauca* Willd. (Ranunculaceae), *Euphorbia sclerocyathium* Korov. et M. Pop. (Euphorbiaceae), *Artemisia dracunculus* L., *A. austriaca* Jacq., *A. frigida* Willd. (all Asteraceae), *Ephedra equisetina* Bunge (Ephedraceae), *Tamarix gracilis* Willd. (Tamaricaceae), *Elaeagnus angustifol*

Discussion

This new subspecies from the deserts of Central Asia is a good example of the process of speciation when taxa that are already ecologically and biologically divided become geographically isolated. But in this case, the process of speciation probably started comparatively recently and changes are not yet reflected in the mitochondrial DNA.

The defining factors of speciation were most likely repeated isolations during the various transgressions of the Caspian Sea. At present it is known that there were at least five significant transgressions – Akchagylian (2.7–2.3 million years ago), Apsheronian (2 million years ago), Bakuvian (1.7 million years ago), the Early Khazarian (400 thousand years ago) and the Early Khvalynian (100 thousand years ago) (Aladin et al. 1998). The strongest isolating influence was most probably the Akchagylian and Apsheronian transgressions of the Caspian Sea (Fig. 20). The waters of Akchagyl Lake penetrated into the Aral depression forming islands corresponding to the modern Plateau Ustyurt. Extensive lowland stretches of Trans-Caspian, Azerbaijan, Dagestan and Volga were flooded. The Akchagyl Lake existed for a slightly less than 1 million years. The Apsheron reservoir emerged approximately 2 million years ago.

The lake was smaller than Akchagyl, but its waters also penetrated into the Aral basin and drained into the Black Sea. The Caspian lowland was completely flooded and the Kura lowland and Karakum were partially inundated. The Apsheron Lake existed for more than 1 million years.

Thus the flora and fauna of these territories (where our taxon is found) have been isolated from the Pamiro Alay of modern Uzbekistan and hills of modern Turkey twice for a long period of time (more than 0,5 million years).

It is likely these global and prolonged isolations facilitated the emergence of the desert taxon. The range of the new subspecies is separated geographically from the range of the nominated subspecies by water of the Caspian Sea supporting the contention that isolation and speciation are linked.

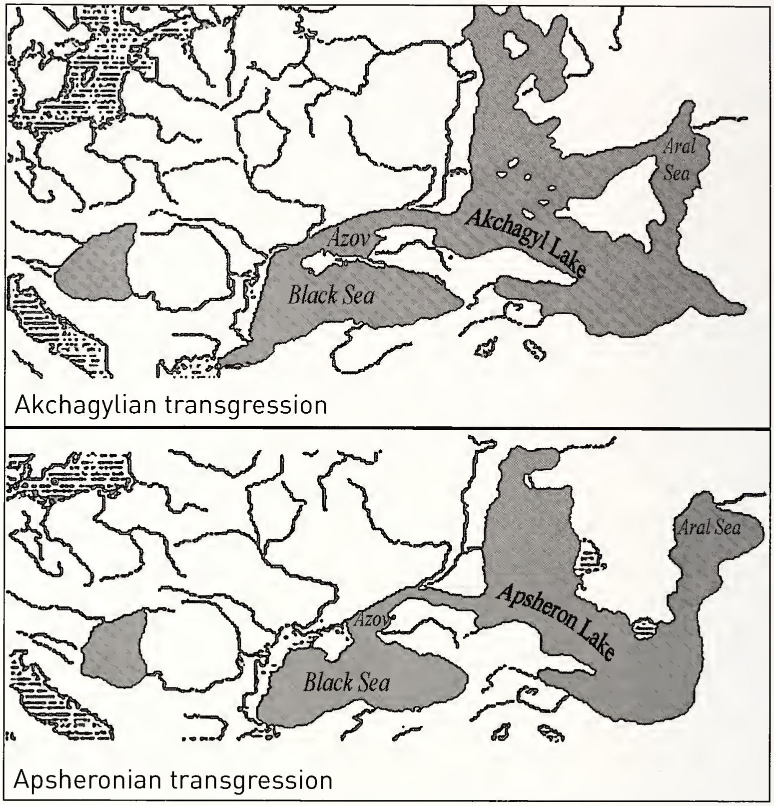


Fig. 20. Water bodies of the Akchagylian and Apsheronian transgressions of the Caspian Sea (from Aladin et al. 1998).

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