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On the systematic position of *Spilosoma caeria* (PÜNGELER, 1906) and *Spilosoma mienshanicum* DANIEL, 1943

(Lepidoptera, Arctiidae)

by

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Abstract: Based on variability within the wing pattern and structure of the ♂ genitalia, *Spilosoma caeria* (PÜNGELER, 1906) and *S. mienshanicum* DANIEL, 1943 are recognized as being conspecific. Based on the structure of the ♂ genitalia, these species are separated into a new genus ***Streltzovia* gen. nov.** Microscopically it differs considerably from the similar *Spilosoma* CURTIS, 1825 by the presence of a keel on the inner side of the valva. Three different subspecies are recognized in *S. caeria* (PÜNG.): western nominotypical, central ssp. *mienshanica* (DANIEL, 1943) and eastern ssp. *streltzovi* (DUBATOLOV, 1996); their distribution is also discussed.

Spilosoma caeria (PÜNGELER, 1906) was originally described from two ♂♂ specimens collected from Kuku-Noor (Lake Qinghai) in late May. Their description was accompanied by a monochrome photograph (fig. 1), which shows a ♂ specimen with large spots on the forewing, with two rows of spots at the antemedial and postdiscal. Several decades later, DANIEL (1943) described a new species *Spilosoma mienshanicum* DANIEL, 1943 (as *S. mienshanica*) from three ♂♂ and four ♀♀ with poorly developed forewing spots from Shaanxi and Shanxi. He noted that his new species varied in the ground colour on the abdomen - two ♀♀ from South Shaanxi had yellow abdomens instead of the red found in other specimens. Later, similar specimens with yellow abdomens were discovered in the Russian Far East, in the vicinity of Blagoveshchensk and from South Primorye, and were described as *Spilosoma streltzovi* DUBATOLOV, 1996. After a comparison of the ♂ genitalia from the topotypical populations near South Shaanxi and Blagoveshchensk, DUBATOLOV (2005) could not find any distinguishing characters of a specific level between these two taxa and so synonymized them. In May, 2007, Dr. A. N. STRELTZOV collected a single ♂ specimen of *S. mienshanicum* DAN. with a yellow abdomen from Blagoveshchensk (the type locality of *streltzovi*) with enlarged dark spots on forewings (colour plate 17: 12-13); that wing pattern is very similar in appearance to *S. caeria* (PÜNG.). So, taking into account the variability of the forewing pattern, ranging from a few spots to the presence of a postdical band on the forewing in the same population of *S. streltzovi* DUB., as well as the identical ♂ genitalia structure, it is established here that all three taxa (*caeria, mienshanicum, streltzovi*) are conspecific with *S. caeria* (PÜNGELER, 1906) = *S. mienshanicum* DANIEL, 1943 **syn. nov**. Nevertheless, the species *S. caeria* (PÜNG.) does involve some geographic variability: Western-most specimens from Qinghai and Gansu always have an enlarged forewing pattern with a continuous postdiscal band, while specimens with just a few spots on forewings are typical for all populations from Shaanxi to Dunbei and the Russian Amur and Primorye Regions. Specimens from the Russian territory in general have yellow abdomens; this is rare in Chinese populations from Qinghai to Heilongjiang as almost all Chinese specimens have a red abdomen.

So, it would be better to isolate three subspecies in *S. caeria* (PÜNG.): the nominotypical, *mienshanicum* DAN., and *streltzovi* DUB.

FANG (2000) recorded two species of this group from China, *S. caeria* (PÜNG.) from Qinghai, Gansu and Nei Mongol, and *S. mienshanicum* DAN. (as *S. mienshanica*) from Hebei, Shanxi, Shaanxi and Nei Mongol. Unfortunately, the distinguishing characteristics of these species were poorly described. *S. caeria* (PÜNG.) was characterized by: "eyes between with the collar with crimson spot, fore wing with a X-shaped black spot in lower angle of cell", while for *S. mienshanicum* DAN. FANG wrote: "not as above". Photographs of ♂ and ♀ *S. caeria* (PÜNG.) sensu FANG (2000) (col. pl. 16: 1-2) show that a narrow continuous postdiscal band on the forewing characterizes all of these specimens, while any crimson spot between eyes is not clear, even if visible. Usually in this group, some hair-like scales on the head have a red or yellow colouration that corresponds to the colour of abdomen. Nevertheless, the structure of the ♂ genitalia seems identical for both *S. caeria* (PÜNG.) and *S. mienshanicum* DAN. (fig. 2-5). Such a structure was found to be clearly dissimilar to that in a set of true *Spilosoma* species, despite great similarity within wing patterns. The establishment of a new genus is therefore judged necessary. A description is given below.

Several museum names are abbreviated:
IZBC: Institute of Zoology, Chinese Academy of Sciences, Beijing, China.
SZMN: Siberian Zoological Museum of the Institute of Animal Systematics and Ecology, Sibarian Branch of the Russian Academy of Sciences, Novosibirsk, Russia.
ZIN: Zoological Institute, Russian Academy of Sciences, St.-Petersburg, Russia.

Streltzovia gen. nov.

Type species: *Spilosoma streltzovi* DUBATOLOV, 1996, now *S. caeria streltzovi* (DUBAT. 1996) **stat. nov.**

Description: In general the external characters are similar or identical to those of true *Spilosoma* CURTIS, 1825; it is difficult to determine if they are of a genus or species group characters. The most visible differences are as follows: head noticeably covered in dense long hairs, while in *Spilosoma* species it is covered with compressed scales, without the lateral dark spots that are present on the abdominal sternites in *Spilosoma* species.

The ♂ genitalia (figs. 3-7) are most important for separation of the genus: the valvae are narrowly triangular, with a short broad process on their ventral edge; the inner side of the valva has a flat contiguous transversal keel; and the aedeagus has a spinulose sclerotized plate at its apex. No noticeable geographical variation in the structure of the ♂ genitalia has been found, all differences in valva shape seeming to be normal variation.

Remarks: Even in its strictest sense, the ♂ genitalia in the genus *Spilosoma* are very polymorphic. The typical species group, *S. lubricipedum* (LINNAEUS, 1758), *S. extrema* DANIEL, 1943, *S. punctarium* (STOLL, [1782]), *S. urticae* (ESPER, 1789), *S. fujianensis* FANG, 1981 and *S. likiangensis* DANIEL, 1943 have elongated rectangular valvae with a single straight apical process, and the aedeagus lacks any apical sclerotization (fig. 2). The ♂ genitalia of *S. rubidium* (LEECH, 1880) resemble this type, but have apical sclerotization on the aedeagus (DUBATOLOV & KISHIDA, 2005b). *S. ningyuenfui* DANIEL, 1943, as well as some North American species like *S. congrua* WALKER, 1855 have ♂ genitalia more similar to the *Spilarctia* BUTLER, 1875 species with three processes on

the valva, including one on its costa. There are more types of *Spilosoma* ♂ genitalia without the costal process, but all *Spilosoma* s. lat. species have no keel on the inside of the valva that is characteristic for the new genus and this is treated here as an autapomorphic character. The presence of such a keel is very unusual in the Arctiinae, a similar structure only being known in the subgenus *Nayaca* MOORE, 1879 of *Alphaea* WALKER, 1855 (DUBATOLOV & KISHIDA, 2005a); but in the latter group it does not cross the entire valva, and is presented on the ventral edge of the valva as a keel-like process. So, these structures in ***Streltzovia* gen. nov.** and *Nayaca* are not homological and show no alliance.

Streltzovia caeria caeria (PÜNGELER, 1906) **comb. nov.** et **stat. rev.** (colour plate 16: 1-2; 17: 14)
Diacrisia (*Spilosoma*) *caeria* PÜNGELER, 1906,D. Ent. Z. Iris **19**: 79, t. 6, fig. 7; type locality: "Kuku-Noor" [China: Qinghai, Kuku-Nor Lake (=Qinghai Lake)].
Spilosoma caeria, FANG (1985): Economic Insect Fauna of China **33**: 38, pl. 2, fig. 31.
FANG (2000): Fauna Sinica. Insecta **19**: 422, pl. XVII, fig. 9.

Material: China: Nei Mongol: 1 ♂, Urad Qianqi [Huang He valley], 7.VI.1975 (IZBC); 1 ♂, Baotou, 8.V.1981 (IZBC); Gansu: 1 ♂, 1 ♀, Yongdeng County, 21.V.1988 (IZBC).

Distribution (fig. 9): China: Qinghai, south-western part of Nei Mongol (the Huang He River valley), central part of Gansu north from the Huang He valley. Dr. KAREL CERNY stated in a letter to me on 6.II.1985 that he collected one ♂ of *S. caeria* (PÜNG.) in Mongolia, Chentei Aimak, Tsenhermandal, Modoto, 1600-1800 m, 109° 04' E 47° 48' N, 9-14.VII.1984. Nevertheless the subspecific position of the Mongolian population is still uncertain.

Bionomy: The moths were collected in late May and early June.

Remarks. The main remarkable character of the subspecies is the presence of a narrow dark postmedian band on the forewings, which is sometimes broken into spots by light-coloured veins. The abdomen is crimson.

Streltzovia caeria mienshanica (DANIEL, 1943) **comb. nov.** et **stat. rev.** (colour plate 16: 3-8)
Spilosoma caeria mienshanica DANIEL, 1943, Mitt. Münch. Ent. Ges. **33** (2/3): 732, t. 20, figs. 20-21; type locality: "Mien Schan (Shansi), 1500-2000 m [111,5° ö.L., 37,1°n.Br.]. Tapaishan im Tsiling (Süd-Shensi), ca. 1700 m" [China: Shanxi: Mien Shan [37.1° N 111.5° E] and Shaanxi: Tapai Shan in Qin Ling Mts.].
Spilosoma mienshanica, FANG (1985): Economic Insect Fauna of China **33**: 39, pl. 2, fig. 34; Fang (2000): Fauna Sinica. Insecta 19: 420, pl. XVII, fig. 7.
Spilosoma mienshanicum, DUBATOLOV & DOLGIKH (2007): Animal World of the Far East **6**: 124 [Great Khekhtsyr Nature Reserve].

Material. China: Gansu: 2♀♀, S. Gansu, Wangziguan, E. Wudu, 2000 m, 26.-30.V.1997, S. MURZIN leg. (SZMN); Nei Mongol: 1 ♂, without exact locality, 9.V.1991 (IZBC); 1 ♀, a valley downstream to village Si-kou-myn, S from Tui-khua-chen [SE from Hohhot], 5.VII.1884, POTANIN leg. (ZIN); 1 ♀, Xilin Hot, 22.VI.1971 (IZBC); Shaanxi: 1 ♂, Tai Bai Shan Mts., 1600 m, 33°35'N 107°43'E, 20.VIII-5.IX.1998, V. MURZIN & SINIAEV leg. (coll. V. MURZIN, Moscow); Shanxi: 1 ♂, Datong City, VII.1980 (IZBC); Hebei: 1 ♂, 1 ♀, Weixian, 6.VI.1980 (IZBC); 1 ♂, Xiaowutaishan [Small Wutaishan], 1991 (IZBC); 1 ♀, Wulingshan (=Mt. Wuling in Xinglong County), 4.VI.1981 (IZBC);1 ♂, Chengde, 10.VI.1980 (IZBC); 1 ♂, 1 ♀, Bashang (a mountain ridge in North Hebei),

21.VI.1980 (IZBC); Beijing Shi: 1 ♂, 100 km W of Beijing, Taihang Mts., 1100 m, Xiao Longmeng Nat. Forest Park, Beijing City, Mentougou Dist., 6-8.VII.2006, KRIVOKHATSKY leg. (ZIN); 1 ♀, Beijing, Yanqing County, 3.VI.1982 (IZBC); Liaoning: 1 ♂, Beipiao, 1984 (IZBC); Heilongjiang: 1 ♂, Ertsendyantsy [probably, the modern name is Yuquan, ~70-80 km SE from Kharbin], Manchzhuria, 5.VI.1911, EMELYANOV leg. (ZIN). Russia: Khabarovsk District: 1 ♂, Great Khekhtsyr Nature Reserve, Bychikha, 18-19.VI.2007, DOLGIKH leg. (SZMN); 1 ♂, Primorskii Krai, Oktyabr'skii Raion (District of Pokrovka), 18 km W from Pokrovka, Orlikha river, 18.V.2004, BELJAEV leg. (SZMN).

Distribution (fig. 9): China: Gansu (south from the Huang He valley), Nei Mongol (eastern districts, including Gobi desert), Shaanxi, Shanxi, Hebei, Beijing, Liaoning, Heilongjiang (southern districts). Russia: Khabarovsk District, SW part of Primorskii Krai: Oktyabrskii Region (District of Pokrovka), west from Razdolnaya (=Suifun) river.

Bionomy: The moths fly in at least in two generations: from late May to early July, and from late August to early September.

Remarks. Specimens of this subspecies have a more or less reducedblack patterning on the forewing; as a minimum, the continuous postdiscal band is absent. Abdomen red; a yellow abdomen is a rare aberration.

Streltzovia caeria streltzovi (DUBATOLOV, 1996) **comb. nov.** et **stat. rev.** (colour plate 17: 9-13) Neue Ent. Nachr. **36**: 58, 71, fig. 2j; type locality: "Amurskaya region, near Blagovestshensk" [Russia].

Material. Russia: Amurskaya Oblast, Blagoveshchensk Region: 2 ♂♂, Mukhinka tourist camp, 29.VI.1993, STRELTZOV leg. (SZMN); 1 ♂, Natalino, by light, 1.-10.VII.1996, STRELTZOV leg. (SZMN); 4 ♂♂, 1 ♀ Blagoveshchensk, 15.III, 27.V, 5.VII, 9.VII.1994, 12.V.2007, STRELTZOV leg. (SZMN); 3 ♂♂ (including the holotype!), 1 ♀, Blagoveshchensk suburbs, by light, 31.V, 6.VI, 8.VI.1990, STRELTZOV leg. (SZMN); 3 ♂♂, Verkhneblagoveshchenskoe, agrobiostation, by light, 2.VI.1996, 29.V, 29.VI.1999, STRELTZOV & DUBATOLOV leg. (SZMN); Primorskii Krai: 2 ♂♂, 18 km SE from Ussuriisk, Gornotayozhnoe, dendrarium, by light, 15.-18.VI.1985, BELJAEV leg. (SZMN).

Distribution (fig. 9): Russia: Amur Province [Amurskaya oblast'], southern part of Primorye Region [Primorskii Krai], east from the Razdolnaya (=Suifun) River. This subspecies should occur in northern districts of Heilongjiang Province in China, but specimens from this region are absent in collections.

Bionomy: The moths fly from May until early July.

Remarks: Judging by the wing pattern alone, this subspecies is identical to the previous one - but the abdomen is always yellow, not red. Occasionally the forewing pattern includes a postdiscal band, as in the nominotypical subspecies.

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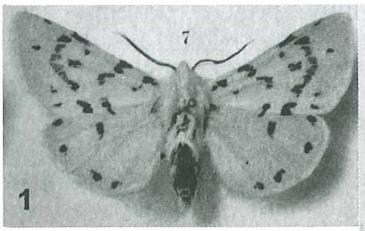


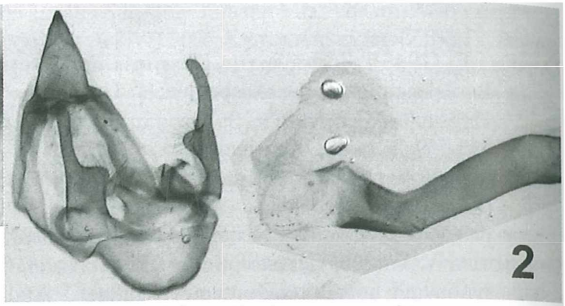


Fig. 1: *Streltzovia caeria* (PÜNGELER, 1906), figure from the original description.
Fig. 2: ♂ genitalia of *Spilosoma lubricipedum* (LINNAEUS, 1758), Russia, West Caucasus, Cochi, Khosta, 12.VI 1967, KOROLEVSKAYA leg.
Fig. 3: ♂ genitalia of *Streltzovia caeria* (PÜNGELER, 1906), China, Nei Mongol, Urad Qianqi [Huang He valley], 7.VI.1975, anonymous leg.
Fig. 4: ♂ genitalia of *Streltzovia caeria mienshanica* (DANIEL, 1943) from the original description.

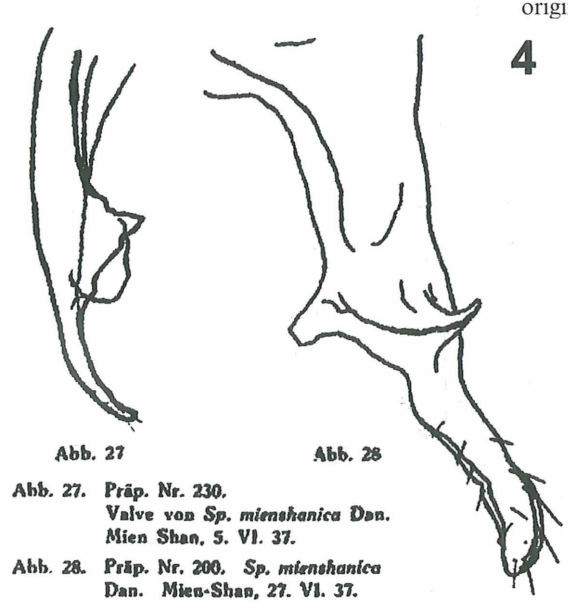
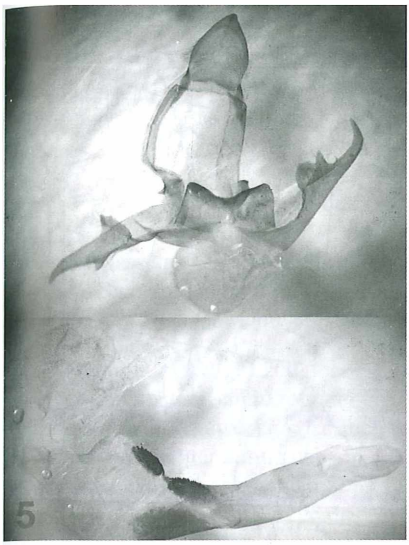
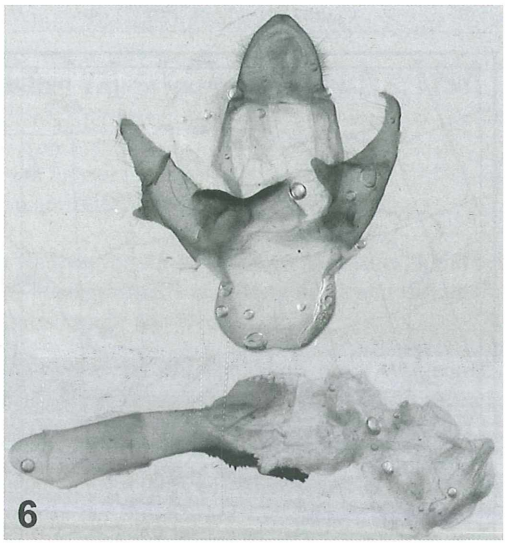


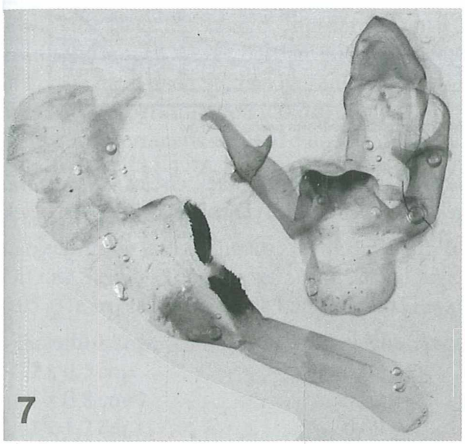
Abb. 27 Abb. 28

Abb. 27. Präp. Nr. 230. Valve von *Sp. mienshanica* Dan. Mien Shan, 5. VI. 37.

Abb. 28. Präp. Nr. 200. *Sp. mienshanica* Dan. Mien-Shan, 27. VI. 37. Valve aufgeklappt.







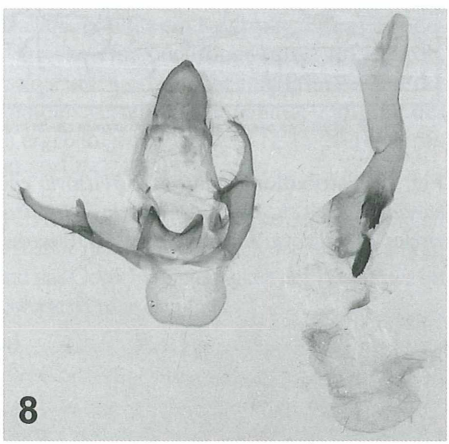


Fig. 5: ♂ genitalia of *Streltzovia caeria mienshanica* (DANIEL, 1943), China, Shaanxi, Tai Bai Shan Mts., 1600 m, 33°35'N 107°43'E, 20.VIII-5.IX.1998, V. MURZIN & SINIAEV leg.
Fig. 6: ♂ genitalia of *Streltzovia caeria mienshanica* (DANIEL, 1943), China, Heilongjiang, Ertsendyantsy [probably, the modern name is Yuquan, ~ 70-80 km SE from Kharbin], Manchzhuria, 5.VI.1911, EMELYANOV leg.
Fig. 7: ♂ genitalia of *Streltzovia caeria streltzovi* (DUBATOLOV, 1996), Russia, Amur Province, Blagoveshchensk vic., 6 km N from Belogore settlement, tourist camp "Mukhinka", by light, 29.VI 1993, A. N. STRELTZOV leg.
Fig. 8: ♂ genitalia of *Streltzovia caeria streltzovi* (DUBATOLOV, 1996), Russia, Primorskii Krai, 18 km SE from Ussuriisk, Gornotayozhnoe, dendrarium, by light, 15-18.VI.1985, BELJAEV leg.

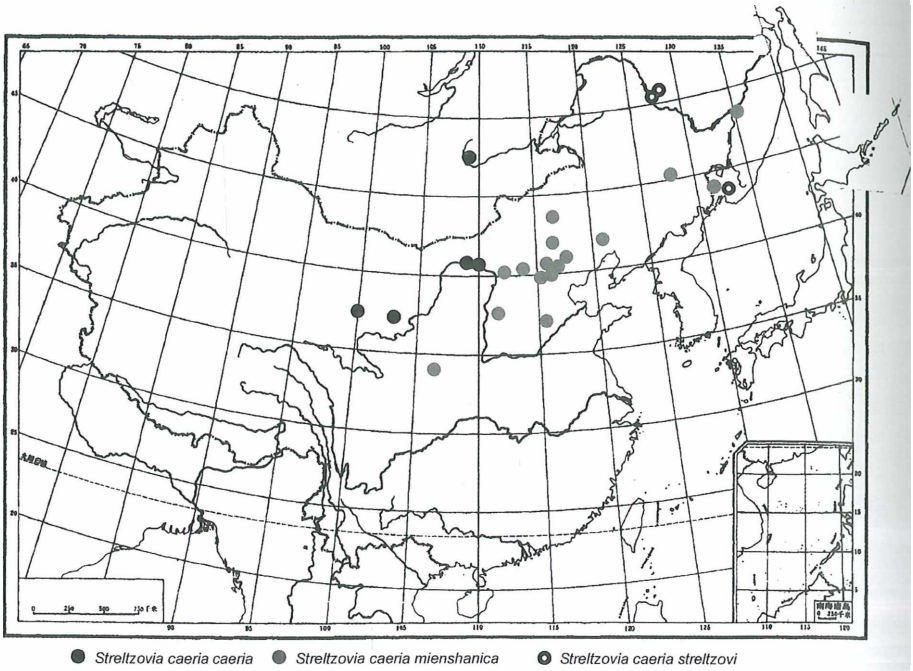
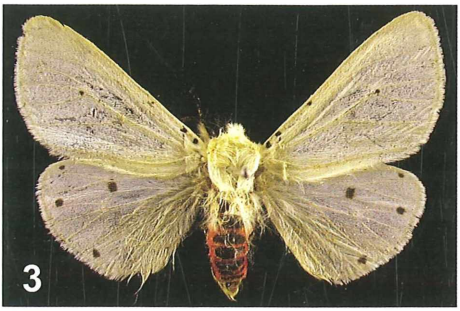
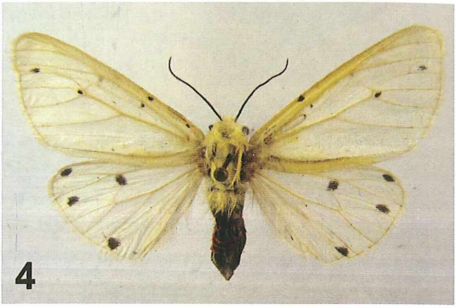
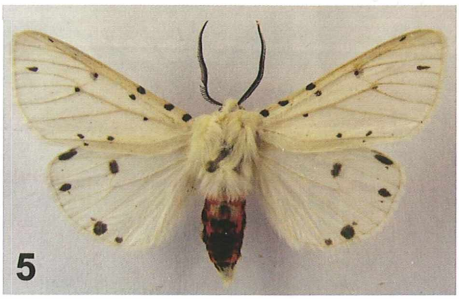


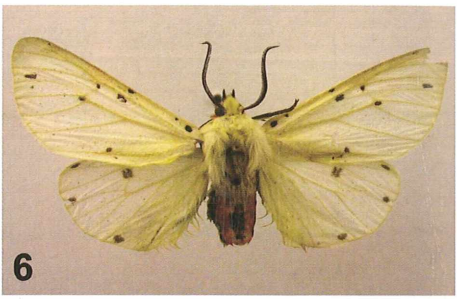
Fig. 9: Distributional map of *Streltzovia caeria* (PÜNGELER, 1906); black circles - *Streltzovia caeria* (PÜNGELER, 1906), gray circles - *Streltzovia caeria mienshanica* (DANIEL, 1943), open black circles - *Streltzovia caeria streltzovi* (DUBATOLOV, 1996).

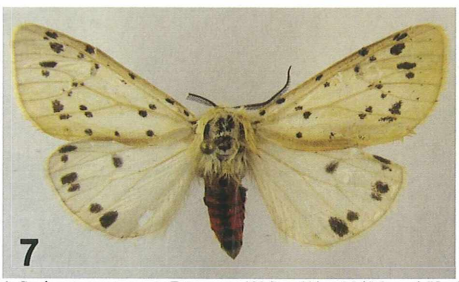
Colour plate 16/ Farbtafel 16

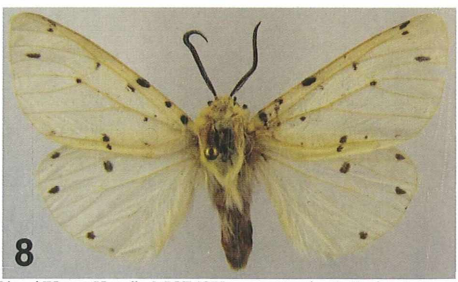






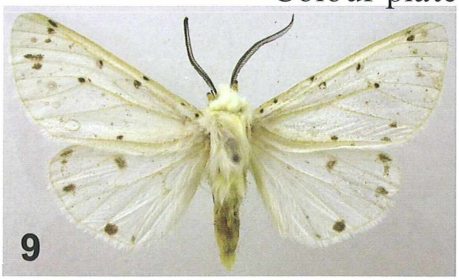


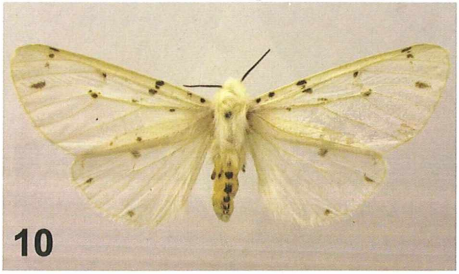


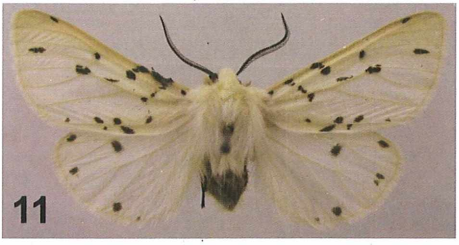


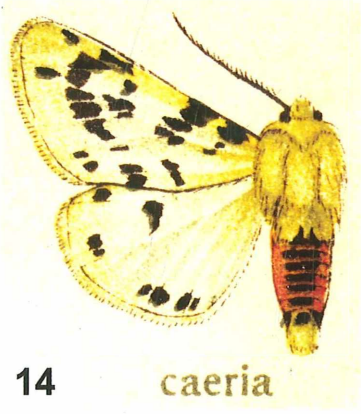
1: *Streltzovia caeria caeria* (Püngeler, 1906) ♂, China, Nei Mongol, Urad Qianqi [Huang He valley], 7.VI.1975, anonymous leg. **2**: *Streltzovia caeria caeria* (Püngeler, 1906) ♀, China, North Gansu, Yongdeng County, 21.V.1988, anonymous leg. **3**: *Streltzovia caeria mienshanica* (Daniel, 1943) ♂, China, Shaanxi, Tai Bai Shan Mts., 1600 m, 33°35'N 107°43'E, 20.VIII-5.IX.1998, V. Murzin & Siniaev leg. **4**: *Streltzovia caeria mienshanica* (Daniel, 1943) ♀, China, S. Gansu, Wangziguan, E. Wudu, 2000 m, 26.-30.V.1997, S. Murzin leg. **5**: *Streltzovia caeria mienshanica* (Daniel, 1943) ♂, China, Beijing Shi, 100 km W of Beijing, Taihang Mts., 1100 m, Xiao Longmeng Nat. Forest Park, Beijing City, Mentougou Dist., 6-8.VII.2006, Krivokhatsky leg. **6**: *Streltzovia caeria mienshanica* (Daniel, 1943) ♂, China, Heilongjiang, Ertsendyan'tsy [probably, the modern name is Yuquan, ~70-80 km SE from Kharbin], Manchzhuria, 5.VI.1911, Emelyanov leg. **7**: *Streltzovia caeria mienshanica* (Daniel, 1943) ♂, Russia, Khabarovsk District, Great Khekhtsyr Nature Reserve, Bychikha, 18-19.VI.2007, Dolgikh leg. **8**: *Streltzovia caeria mienshanica* (Daniel, 1943) ♂, Russia, Primorskii Krai, Oktyabrskii Raion (District of Pokrovka), 18 km W from Pokrovka, Orlikha river, 18.V.2004, Beljaev leg.

Colour plate 17/ Farbtafel 17









9: *Streltzovia caeria streltzovi* (Dubatolov, 1996) ♂, holotype, Russia, Amurskaya Oblast, Blagoveshchensk, 31.V.1990, Streltzov leg. **10**: *Streltzovia caeria streltzovi* (Dubatolov, 1996) ♀, paratype, Russia, Amurskaya Oblast, Blagoveshchensk, 8.VI.1990, Streltzov leg. **11**: *Streltzovia caeria streltzovi* (Dubatolov, 1996) ♂, Russia, Amurskaya Oblast, Blagoveshchensk vic., Verkhneblagoveshchenskoe, agrobiostation, by light, 29.V.1999, Dubatolov leg. **12**: *Streltzovia caeria streltzovi* (Dubatolov, 1996) ♂, Russia, Amurskaya Oblast, Blagoveshchensk, 12.V.2007, Streltzov leg. **13**: *Streltzovia caeria streltzovi* (Dubatolov, 1996) ♂, Russia, Amurskaya Oblast, Blagoveshchensk, 12.V.2007, the same specimen (fig. 12), sitting on a wall, photo by A. Streltzov. ***14***: *Streltzovia caeria caeria* (Püngeler, 1906) ♂, figure from: Seitz (1910: fig. 17a).