

A new species of *Saturnia* (Saturniidae) from northern Pakistan

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Abstract. *Saturnia codyi* n. sp. is described and figured in color and compared to related species. It has been collected at altitudes around 4000 m in the western Himalayas of northern Pakistan. The species belongs to the species-group commonly classified in the genus *Neoris*, of which several known species range in Siberia, western China, northern India, and westward to eastern Turkey. The new species has the darkest wing coloration in this group. The female and immature stages are unknown.

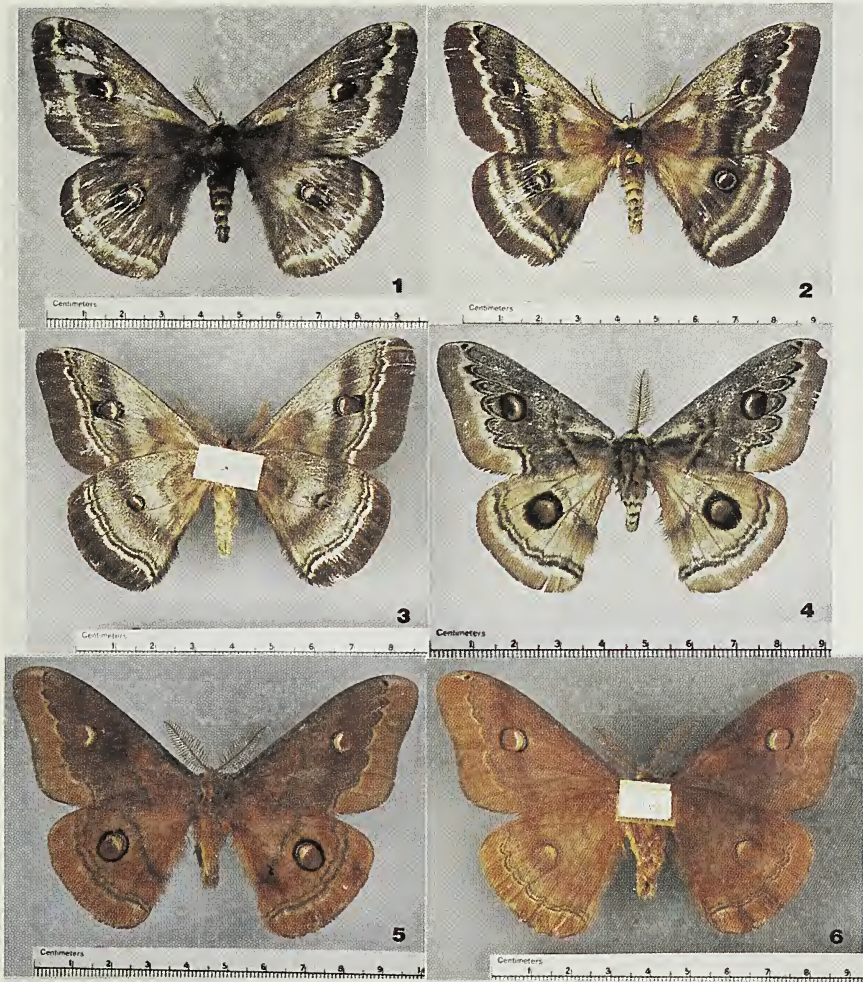
The genus *Saturnia* Schrank (Saturniidae) ranges widely in the Northern Hemisphere, with about 30 known species. They mainly occur in Palaearctic Eurasia, but a few are known from California and tropical southeastern Asia. One group of species has been classified by some authors as belonging to the genus (or subgenus) *Neoris* Moore. The only significant review of this group since that of Jordan (1911: 219) was a detailed and excellent one published recently by de Freina (1992). In March 1995 I found four male specimens of an undescribed species in the collection of The Natural History Museum in London. Specimens of most other taxa in this group were arranged alongside, leaving little doubt that the new species was different. In addition to examining type specimens, I checked descriptions and/or specimens of all other taxa in the *Neoris* group. The new species is described below, and a diagnosis comparing and contrasting it to other species is provided.

The representatives of this species-group live in central Asia, in montane habitats usually at high elevations (Figs. 8-9). The moths fly in late summer or fall, the eggs overwinter, and the larvae feed in spring and summer on broad-leaved trees such as ash (*Fraxinus*, Oleaceae), birch (*Betula*, Betulaceae), *Pistacia chinense* Bunge (Anacardiaceae), various Rosaceae (e.g., *Pyrus*, *Malus*, *Prunus*, *Spiraea*), etc. The larvae are green with soft hairs and minimal armature (i.e., scoli very reduced). The cocoons are brown, pyriform, with very minute reticulations. Pinned specimens are rare or absent in most collections, because populations occur in remote, inaccessible regions.

DESCRIPTION

Saturnia codyi Peigler, **new species**

Holotype. Male (Fig. 1). Pakistan, Northwest Frontier Province, Ghizar Mountains, Yasin, 4000 m, early September. The labels read as follows: 77.; India sept. occ., Chitral, Yasin, 4000 m, Anf. [Anfang] September; Rothschild Bequest B.M. 1939-1. Pakistan was formerly part of India. I added a red label



Figures 1-6. 1. *Saturnia codyi* n. sp., holotype male, Yasin, Pakistan. 2. *S. codyi*, paratype male, Bulachi, Pakistan. 3. Underside of same specimen. 4. *Saturnia shadulla* (Moore), male, Right Talgar Transili, Ala Tau Mts., Tian Shan Range, Kazakhstan, 20 August 1970, D. S. Lastochkin. 5. *Saturnia huttoni* (Moore), male, Simla, Himachal Pradesh, India. 6. Underside of same specimen. Specimen in Fig. 4 in Denver Museum of Natural History, others in The Natural History Museum, London.

which reads: Holotype *Saturnia codyi* Peigler 1995. Forewing length 50 mm; hindwing length 40 mm.

Paratypes. Two males, same labels as holotype, except numbers 76 and 78, instead of 77. One male, Pakistan, presumably Northwest Frontier Province, Bulachi, 4000 m, 17 August 1923, C. H. Stockley collector. Labels read as follows: Emperor moth, Bulachi 12000', 17/8/23 [handwritten]; Bulachi, W. Gilgit Prov., Kashmir, 12 000 ft., 17 VIII 1923, Maj. C. H. Stockley, Brit. Mus. 1924-247 [typeset]. I added blue paratype labels.

All type specimens are in The Natural History Museum, London. Although the male from Bulachi (Figs. 2-3) is in the best condition, a specimen from Yasin was selected to make that the type-locality, as I have been unable to locate Bulachi on any of several detailed maps.

Male. Antennae stramineous, 17 mm long, 8 mm wide. Frons light or dark brown. Thoracic collar whitish. Thorax and abdomen brown, with white bands on abdominal segments. Legs unicolorous brown. Forewing 50-54 mm in length; antemedian area dark brown or pinkish, antemedian line faint, brown, median area sprinkled with white scales, brown distally; ocellus 7-8 mm long, oval, mostly brown, with yellow, white, and blue scales proximally; postmedian line scalloped with light brown, black, and broad white components; postmedian area dark brown; trace of red in apex. Hindwing 40-42 mm in length; antemedian area and line indistinct, brown or pinkish; median area brown; ocellus as in forewing but larger, and with more black edging; postmedian line whitish, double, smoothly rounded (the inner portion almost straight); postmedian area as in forewing. Underside with markings more distinct; ocelli in forewing may or may not contact postmedian line; hindwing ocelli much smaller than on upperside.

Female and Immature Stages. Unknown.

Diagnosis. The new species is much darker chocolate brown than all other known taxa in the group, giving the illusion that the postmedian line has a much stronger white component in both forewing and hindwing. The postmedian line is much smoother in the hindwing than in other species. In the forewing, the postmedian line is not drawn inwards as far at the anal margin than in other species. The antemedian line is weakly defined, even more so than in *huttoni*. The ocelli are smaller and have darker components than other species. One paratype from Yasin was dissected. Comparison of the male genitalia from this specimen to the series of valves shown by de Freina (1992: fig. 3) reveals that the valve of the new species has an even more reduced median notch than all other taxa.

Etymology. This new saturniid is named in honor of Dr. John Cody (Hays, Kansas, U.S.A.) in recognition of his work through art, writings, and lectures to bring awareness to the public of the need to preserve habitats of Saturniidae.

DISCUSSION

Although the group of species discussed in this paper form a compact and obviously monophyletic assemblage for which the generic name *Neoris* (type species: *Neoris huttoni* Moore 1862) is available, the broader concept of

Saturnia appears to me to be more useful as it demonstrates relationships with many more species, thus fulfilling the original concept of predictability intended by C. Linnaeus when he established the category of genus. Usage of subgenera adds a layer of complexity to nomenclature with minimal benefit. I therefore use the concept of species-groups within larger genera such as this one. Lemaire (1978) followed the same plan in his treatment of large genera such as *Rothschildia* and *Copaxa*, by defining species-groups to indicate relationships, without proposing formal subgeneric names. *Saturnia caecigena* Kupido, a species from southeastern Europe usually classified in the monotypic genus *Perisomena* Walker, is probably the sister-group to the *Neoris* complex, as suggested by Jordan (1911: 219). The wing pattern in the various *Saturnia* was discussed by van Bemmelen (1919), including a species in the *huttoni*-group.

The *huttoni*-group is in need of taxonomic revision, although de Freina (1992) provided a firm foundation toward that end. He apparently had specimens from several regions of central Asia available, and dissected male genitalia from distant populations. The genitalic differences are not strong, which probably resulted in his treatment of all taxa in this group as subspecies of *huttoni* (Fig. 5). In my opinion, the differences in adult facies are too distinctive to reconcile these taxa under a single species. De Freina synonymized the following names under *shadulla* (Moore 1872), an arrangement with which I concur: *stoliczkana* (C. Felder & R. Felder 1874), *schencki* (Staudinger 1881), *oliva* A. Bang-Haas 1910, and *haraldi* Schawerda 1923. De Freina retained the taxon *galeropa* (Püngeler 1900) as a separate western subspecies (from Iran) allied to *naessigi*, which he described from eastern Turkey as new. Norbert Keil provided material of *naessigi* to me for study. Peigler and Kendall (1993: 11) elevated *naessigi* to full species rank, which differs from all other taxa in this group by the moths being twice as large. In their paper on saturniids of China, Zhu and Wang (1993: 278-279) cited *haraldi* from Shaanxi, Gansu, and Xinjiang provinces, and *stoliczkana* from Xinjiang and India, and figured the male genitalia of both. Gorbunov and Kishida (1995) reported parthenogenetic reproduction in a taxon they called *Neoris huttoni schencki*.

Moths in collections or figured in publications labelled under the names *shadulla*, *schencki*, *stoliczkana*, and *galeropa* all appear to be very similar in appearance (tan or light brown colored). Colored figures of some of these can be seen in Jordan (1911: pls. 31-32), and black & white photographs were given by de Freina (1992: figs. 9-14). *Saturnia huttoni* stands apart from these with its brownish orange ground color and more elongated wings. Likewise, *S. codyi* is unique with its dark brown coloration, shortened wing shape, and certain other features of the wing pattern, as given in the diagnosis above. *Saturnia naessigi* is figured here in color for the first time (Fig. 7), in addition to the underside of *S. huttoni* (Fig. 6).

I examined the following type specimens in The Natural History Museum (London): four syntypes of *huttoni* of both sexes (type-locality Mussoorie, Uttar Pradesh, India); holotype (or syntype?) female of *stoliczkana* (type-



Figure 7. *Saturnia naessigi* de Freina, male in living repose, Tunçeli Province, Turkey. Transparent watercolor painting by John Cody.



Figure 8. Darkot Valley 20 km north of Yasin, Pakistan. 2800 m. July 1981.
Figure 9. Gilgit Valley 5 km from confluence with the Darkot River. 2650 m. July 1981. Figures 8 and 9 courtesy of R. Mattoni.

locality Lossar, 13,500 feet, Ladakh Mountains, Kashmir, India); pair of syntypes of *shadulla* (type-locality: Xaidulla, southern Xinjiang Province, China). I examined the specimens from Afghanistan and Tajikistan (=Tadzhikistan) in the Muséum National d'Histoire naturelle in Paris that Rougeot (1969) referred to under the name *schencki*. They are clearly of the *shadulla/galeropa* subgroup. In the latter museum I also examined four males of *galeropa* from the vicinity of Tehran, Iran.

Two additional names have been proposed that were not considered by de Freina (1992). *Neoris huttoni svenihedini* Hering (1936) was described from a single male from Manas, near Ürümqi, northern Xinjiang Province, China, in the Tian (=Tien) Shan Mountain Range. *Neoris huttoni alatauica* O. Bang-Haas (1937) was described from an unspecified number of males from Almatinka, 1500 m, western Ala Tau Mountains, northern Tian Shan Range, Kazakhstan. Based on the brief descriptions and type-localities of *svenihedini* **syn. nov.** and *alatauica* **syn. nov.**, I consider them to be synonyms of the widely-ranging *shadulla*. No figures were given by Hering or Bang-Haas. Three male specimens (see Fig. 4) from the Ala Tau Mts. sent to me by Dale Pforr in 1971 agree with the types of *shadulla*.

Based on a small sample of pinned specimens available to me for study, I believe that there are at least four species in the *Neoris* group: *huttoni*, *shadulla*, *codyi*, and *naessigi*. However, considering the vast distances and high altitudes of the distributions of these moths, I expect that up to a dozen species will ultimately be found to exist. Isolation by high mountains resulting in speciation is a well-known phenomenon in Saturniidae. Some of the other names already proposed that were considered to be synonyms by de Freina (1992) may prove to be valid species. Political unrest will continue to hinder collecting, both in the new republics of the southern parts of the former Soviet Union (Azerbaijan, Uzbekistan, Turkmenistan, Kazakhstan, Tajikistan, Kyrgyzstan), and in the Kashmir region where vast tracts of territory remain in dispute between India, China, and Pakistan.

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