Revisional notes on the subgenera *Saturnia (Perisomena)* and *Saturnia (Neoris)* stat. rev. (Lepidoptera: Saturniidae) — Part B: *Neoris*

Wolfgang A. Nässig, Stefan Naumann and Swen Löffler

Dr. Wolfgang A. Nässig[1], Entomologie II, Forschungsinstitut Senckenberg, Senckenberganlage 25, D-60325 Frankfurt am Main, Germany; wolfgang.naessig@senckenberg.de

Dr. Stefan Naumann[2, 3], Hochkirchstrasse 71, D-10829 Berlin, Germany; sn@saturniidae.com

Swen Löffler, Hospitalgasse 7, D-09350 Lichtenstein/Sachsen, Germany; swen.loeffler@t-online.de

Abstract: The subgenus *Saturnia (Neoris)* is revised, based on type studies, imaginal morphology (including genitalia) and COI mtDNA barcode. Three new species are described: *S. (N.)* ***eckweileri*** Nässig, Naumann & Löffler **sp. n.** (holotype male in SMFL, Frankfurt am Main, from Pakistan, Beluchistan); *S. (N.)* ***bergmanni*** Naumann, Löffler & Nässig **sp. n.** (holotype male in ZMHU, Berlin, from Tadjikistan, Darvaz Mts.); and *S. (N.)* ***naumanni*** Naumann, Nässig & Löffler **sp. n.** (holotype male in LNK, Karlsruhe, from Afghanistan, Wakhan valley, Zemestani Baharak). All extant taxa are catalogued, their types are illustrated, and the type localities are discussed. The following five **lectotypes are designated** to avoid potential future identification problems: *Neoris shadulla* Moore, 1872, male (BMNH, London); *Saturnia stoliczkana* C. & R. Felder, 1874, female (BMNH); *Saturnia schencki* Staudinger, 1881, male (ZMHU, Berlin); *Saturnia schencki galeropa* Püngeler, 1900, male (ZMHU); and *Neoris huttoni alatauica* O. Bang-Haas, 1936, male (ZMHU). **Revised synonymies:** *Neoris huttoni alatauica* O. Bang-Haas, 1936 (of *Neoris shadulla* Moore, 1872) and *Neoris haraldi* Schawerda, 1923 (of *Saturnia stoliczkana oliva* A. Bang-Haas, 1910). In total, 12 more or less well-defined species are named. The distribution of safely identified species and inconclusively identified specimens is plotted on a map. Imagines of all taxa are illustrated in colour (including all types), most male genitalia and the preimaginal instars of some of the species are shown. — A short supplement to Part A, *Saturnia (Perisomena),* is added; the species was recently found in the northernmost Zagros Mts. in Iran close to the Iraqi border.

Beitrag zu einer Revision der Untergattungen *Saturnia (Perisomena)* und *Saturnia (Neoris)* stat. rev. (Lepidoptera: Saturniidae) — Teil B: *Neoris*

Zusammenfassung: Die Untergattung *Saturnia (Neoris)* wird revidiert, basierend auf Typenstudien, Imaginalmorphologie (einschließlich männlicher Genitalien) und COI-mtDNA-Barcode. Drei neue Arten werden beschrieben: *S. (N.)* ***eckweileri*** Nässig, Naumann & Löffler **sp. n.** (männlicher Holotypus in SMFL, Frankfurt am Main, aus Pakistan, Beluchistan); *S. (N.)* ***bergmanni*** Naumann, Löffler & Nässig **sp. n.** (männlicher Holotypus in ZMHU, Berlin, von Tadjikistan, Darvaz Mts.); und *S. (N.)* ***naumanni*** Naumann, Nässig & Löffler **sp. n.** (männlicher Holotypus in LNK, Karlsruhe, von Afghanistan, Wakhan-Tal, Zemestani Baharak). Alle bekannten Arten werden in einem Katalog aufgeführt, ihre Typen abgebildet, und die Typuslokalitäten werden diskutiert. Die folgenden fünf **Lectotypen werden festgelegt,** um potentielle zukünftige Identifikationsprobleme zu vermeiden: *Neoris shadulla* Moore, 1872, Männchen (BMNH, London); *Saturnia stoliczkana* C. & R. Felder, 1874, Weibchen (BMNH); *Saturnia schencki* Staudinger, 1881, Männchen (ZMHU, Berlin); *Saturnia schencki galeropa* Püngeler, 1900, Männchen (ZMHU); und *Neoris huttoni alatauica* O. Bang-Haas, 1936, Männchen (ZMHU). Folgende **revidierten Synonymien** werden festgestellt: *Neoris huttoni alatauica* O. Bang-Haas, 1936 (von *Neoris shadulla* Moore, 1872) und *Neoris haraldi* Schawerda, 1923 (von *Saturnia stoliczkana oliva* A. Bang-Haas, 1910). Insgesamt können wir 12 mehr oder weniger klar definierte Arten erkennen und benennen. Die Vorkommen von sicher identifizierten Arten und unsicher erkannten Stücken werden auf einer Karte gezeigt. Imagines aller Taxa werden farbig abgebildet (einschließlich aller Typen), dazu etliche männliche Genitalarmaturen und die Raupen einiger Arten. — Kurzer Nachtrag zu Part A, *Saturnia (Perisomena):* die Art wurde kürzlich auch im nördlichsten Zagrosgebirge in Iran, nahe der irakischen Grenze, gefunden.

Introduction

In contrast to the subgenus *Saturnia (Perisomena),* revised in Part A of the present publication (Nässig et al. 2016), the internal systematic structure of *S. (Neoris)* still is a challenge. The species and populations of *Neoris* are widely distributed especially at high to very high altitudes in the southern and central Asian mountain ranges, resulting in a lot of more or less isolated populations usually confined to different mountain systems and living in parapatric distribution patterns, with obviously only a few cases of area overlapping. Most species look externally very similar to each other, and only in larger series of specimens specific characters can be defined, supported (when available) by details of ♂ genitalia morphology and COI mtDNA barcoding results.

Repeatedly more or less serious attempts on the classification of *Neoris* and its inclusion into or exclusion from *Saturnia* were published (e.g., Cotes & Swinhoe 1887: 226–227, Jordan 1911: 219, Packard 1914 [with additional notes by J. H. Watson and T. Cockerell]: 156, van Bemmelen 1919: 1374–1375, Nässig 1981: 27–33, de Freina 1992, Nässig 1994, Peigler 1996, Pittaway [2000–]2016, Miranda & Peigler 2007, Beeke & Paukstadt 2011: 317, etc.), and several new taxa of the species-group were described, but there never was a convincing hypothesis

[1] 89th contribution to the knowledge of the Saturniidae. (88th contribution: Nässig, W. A., Naumann, S., & Löffler, S. (2016): Revisional notes on the subgenera *Saturnia (Perisomena)* and *Saturnia (Neoris)* stat. rev. (Lepidoptera: Saturniidae); Part A: Introduction and subgenus *Perisomena* [s. str.]. — Nachrichten des Entomologischen Vereins Apollo, Frankfurt am Main, N.F. 37 (1): 47–64.)

[2] 26th contribution to the Saturniidae fauna of China. (25th contribution: Naumann, S., & Löffler, S. (2015): A new species of the genus *Antheraea* Hübner, 1819 ("1816") from Tibet (Lepidoptera: Saturniidae). — The European Entomologist, Orlov, 7 (1): 15–26.)

[3] Research Associate of Museum für Naturkunde Berlin, Germany.

on the status of all the different populations, because external morphology alone did not offer reliable characters for that purpose so far, and besides de Freina (1992), apparently nobody ever looked deeper into genitalia morphology. Most earlier authors interpreted all populations as subspecies or forms or synonyms (often, but not consistently, of *huttoni*) or excluded unconvincingly one or more taxa quite arbitrarily as distinct species. So the problem which population is to be interpreted as a separate species and which is not, was not reliably solved thus far and depends on variations of authors' opinions and interpretations (e.g., Nässig 1981, 1994, de Freina 1992, Peigler 1996). We tried it again here, based on a much broader dataset of specimens, studies of all types, dissections of male genitalia, zoogeographical considerations and also using "barcode" mtDNA data. However, still several questions remain open.

Abbreviations and conventions see Part A; supplementary:

Collections

CASB Institute of Zoology, Chinese Academy of Sciences, Beijing, China.

CRLN Collection †Rudolf E. J. Lampe, formerly Nürnberg (Nuremberg), now deposited in ZSM, München (Munich), Germany; see Hausmann & Nässig (2013).

CSKL Collection Steve Kohll, Luxembourg.

CUPW Collection Ulrich & Laela H. Paukstadt, Wilhelmshaven.

LMKK Landesmuseum Kärnten, Klagenfurt, Austria.

TLMF Tiroler Landesmuseum Ferdinandeum Innsbruck, Austria.

Additional abbreviations for larvae

A1–A10 = Abdominal segments 1–10 of the caterpillars

T1–T3 = Thorax segments 1–3 of the caterpillars

Other conventions

The English spelling of the names of the now independent republics of the former USSR in Central Asia (and also for some other localities) comes from the English Wikipedia pages; last visited: early viii. to 8. xii. 2016. Spellings of citations of labels, especially of type specimens, have usually not been changed.

Results

Barcode analysis

For our present study, 72 specimens of *Saturnia (Neoris)* and, as outgroups, 16 specimens of the subgenus *S. (Perisomena)* and 4 specimens of *S. (Saturnia),* totalling to 92 specimens, were barcoded; the dataset used here for *S. (Perisomena)* and *S. (Saturnia)* is identical to the specimens used in Part A (see Nässig et al. 2016). Further specimens with less than 599 base pairs (bp) successfully analysed or with dubious collecting data were discarded. For details of the specimens studied, refer to Table 1 in Part A of this publication and Table 2 here in this Part B. The NJ (= Neighbor Joining) barcode tree is shown in Text-Fig. A.

The bootstrap values in the NJ barcode tree for the species *shadulla, galeropa, schencki, naessigi* and *bergmanni* sp. n. are high, these species are all at a level of 98–99% separated. For the species *eckweileri* sp. n. and *huttoni,* there was only a single specimen each available for barcoding, so that the statistics are poorer around these two. This may perhaps also explain for the identical Bold BIN code number (Ratnasingham & Hebert 2013) for the species *codyi* and *huttoni,* which have only ca. 1.3% average difference in the bp sequence. The distinction between *eckweileri* sp. n. and *huttoni* is with a bootstrap value of 89% relatively high in spite of only a singleton of *eckweileri* being barcoded.

The differences between the barcode sequences of the specimens which we assigned to the species *shadulla* are on average well below 1%, although the 5 main clusters of this conglomerate have bootstrap values between 79 and 95%. Also other species have below or slightly above 1% within-species differences in their barcode sequence groups.

General notes on male genitalia morphology

De Freina (1992) was the first and so far only author who published a detailed and systematic overview on the genus *Neoris* which was based also on studies of ♂ genitalia morphology; in his work he figured a series of photos of phalli and drawings of the rights valves of most taxa known at the time of his publication. On base of his genitalia studies he could not find specific characters (although he even showed some quite well in his fig. 3). In contrast to de Freina we found among our own dissections stable, species-diagnostic characters, however also in those parts of the genitalia not mentioned and figured by de Freina.

The taxa interpreted by us as different species within the subgenus *Saturnia (Neoris)* clearly and stable differ from each other by a combination of the shape of the uncus (either small or broad-based; length and form of the dorsal tips), of the juxta, and of the general size and of the form of the valves.

Within the juxta of the subgenus *Neoris* there is, aside from the two elongate, pointed dorsolateral processes, another internal process on the ventral side below the phallus, sometimes of a somehow rhomboid or spoon-

Text-Fig. A: Evolutionary relationships of taxa, inferred with the Neighbor-Joining method (Saitou & Nei 1987). The bootstrap consensus tree inferred from 2000 replicates is taken to represent the evolutionary history of the taxa analysed (Felsenstein 1985). The percentage of replicate trees in which the associated taxa clustered together in the bootstrap test are shown next to the branches (only values above 50% shown). The tree is drawn to scale. The evolutionary distances were computed using the Maximum Composite Likelihood method (Tamura et al. 2004) and are in the units of the number of base substitutions per site. The rate variation among sites was modelled with a gamma distribution (shape parameter = 3). The differences in the composition bias among sequences were considered in evolutionary comparison (Tamura & Kumar 2002). The analysis involved 92 nucleotide sequences = individual specimens. Codon positions included were 1st+2nd+3rd+Noncoding. All ambiguous positions were removed for each sequence pair. Evolutionary analyses were conducted in MEGA5 (Tamura et al. 2011). The subgenera *Perisomena* and *Saturnia* are condensed here; they have been shown expanded in Part A of this publication (Nässig et al. 2016). For details of the specimens used for this graph, see Table 1 in Part A and Table 2 here in Part B. — * Probably a contamination, the specimen obviously is a *shadulla* specimen.

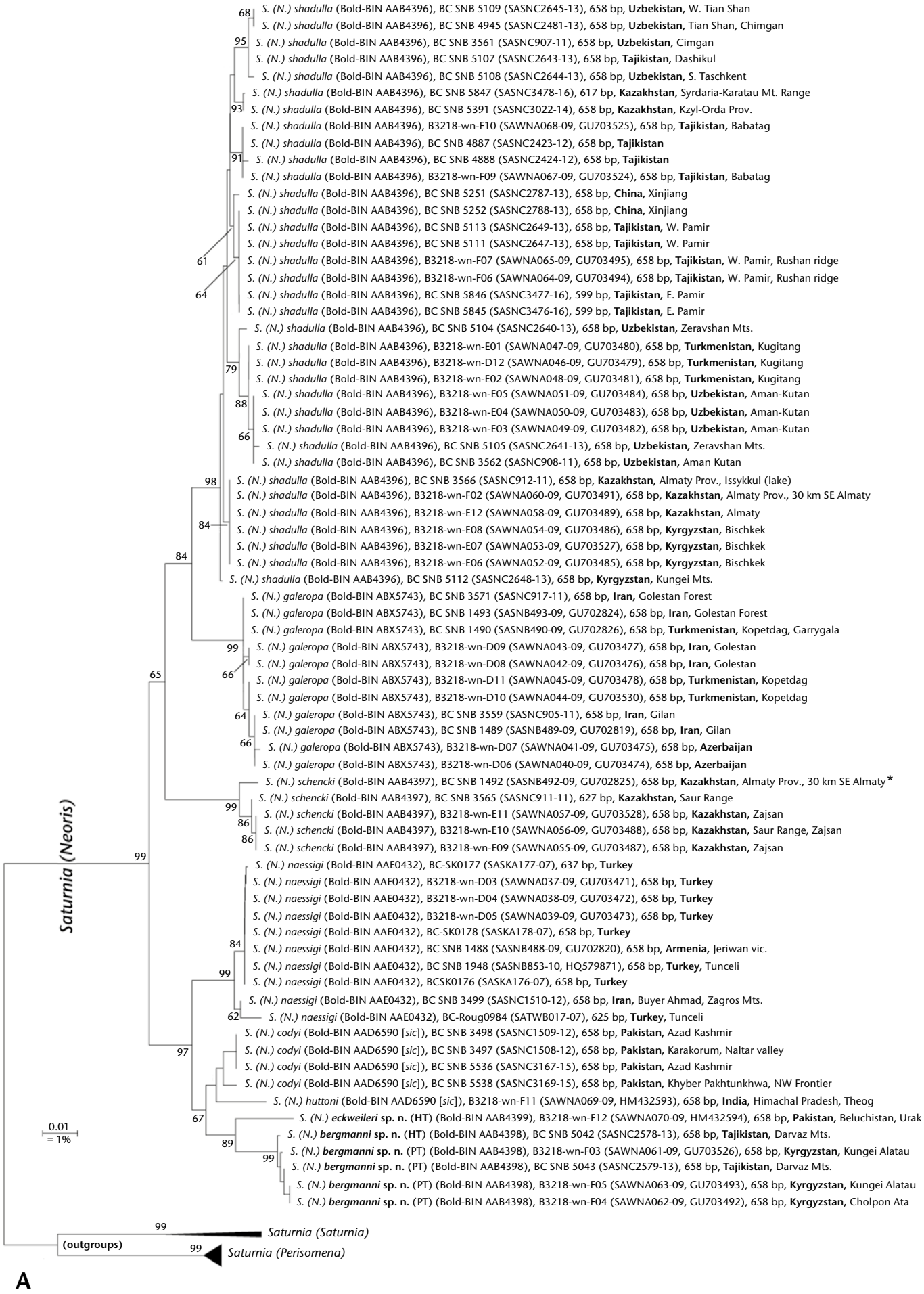
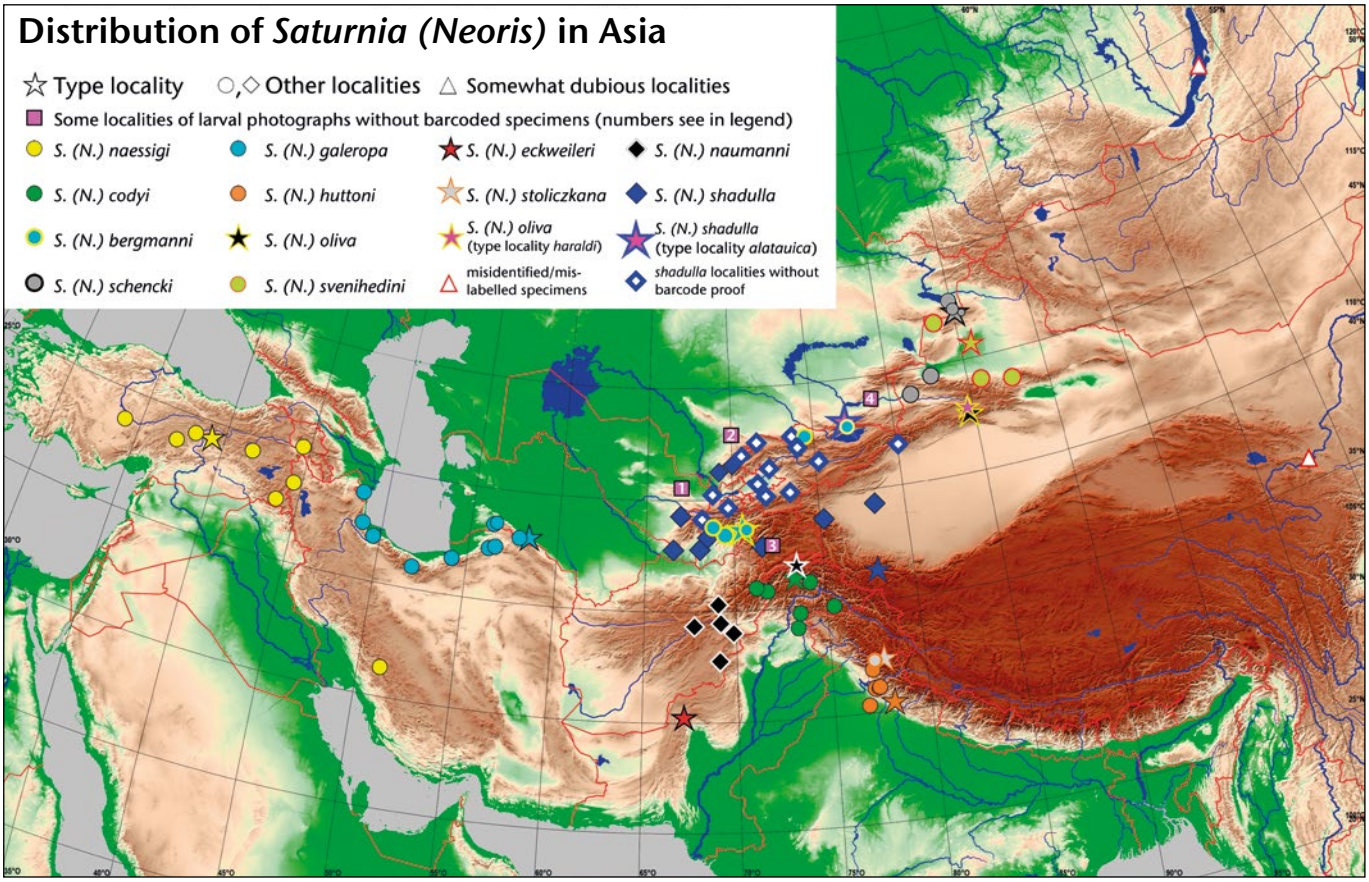


Table 2: Data of the specimens of *Saturnia (Neoris)* (for the specimens of *Saturnia (Perisomena)* and *Saturnia (Saturnia)* as outgroups, see Part A, Table 1; Nässig et al. 2016) used for the mtDNA barcode analyses. Specimens arranged from top to bottom in the order of the NJ-tree graph (Text-Fig. A). — Additional abbreviations: HT = holotype; PT = paratype; SL = Sequence Length (data from Bold); GBAC (= GenBank Access Code) not yet available for all specimens, to follow later. BIN = Barcode Index Number; an automatically assigned identifier for genetic clusters within Bold, see Ratnasingham & Hebert (2013). — * Probably a contamination, the specimen obviously is a *shadulla* specimen.

Sample ID	Process ID	GBAC	Species/Bold BIN-Code	Deposition	SL	Sex	Origin
BC SNB 5109	SASNC2645-13	–	*Sat. (Neoris) shadulla*/AAB4396	CABF	658 bp	♂	**Uzbekistan,** W. Tian Shan
BC SNB 4945	SASNC2481-13	–	*Sat. (Neoris) shadulla*/AAB4396	SMFL (CWAN)	658 bp	♂	**Uzbekistan,** Tian Shan, Chimgan
BC SNB 3561	SASNC907-11	–	*Sat. (Neoris) shadulla*/AAB4396	CSNB	658 bp	♂	**Uzbekistan,** Cimgan
BC SNB 5107	SASNC2643-13	–	*Sat. (Neoris) shadulla*/AAB4396	CABF	658 bp	♂	**Tajikistan,** Dashikul
BC SNB 5108	SASNC2644-13	–	*Sat. (Neoris) shadulla*/AAB4396	CABF	658 bp	♀	**Uzbekistan,** S. Taschkent
BC SNB 5847	SASNC3478-16	–	*Sat. (Neoris) shadulla*/AAB4396	CSNB	617 bp	♂	**Kazakhstan,** Kzyl-Orda Prov., Syrdaria-Karatau Mt. Range
BC SNB 5391	SASNC3022-14	–	*Sat. (Neoris) shadulla*/AAB4396	CSNB	658 bp	♂	**Kazakhstan,** Kzyl-Orda Prov.
B3218-wn-F10	SAWNA068-09	GU703525	*Sat. (Neoris) shadulla*/AAB4396	SMFL (CWAN)	658 bp	♂	**Tajikistan,** Babatag
BC SNB 4887	SASNC2423-12	–	*Sat. (Neoris) shadulla*/AAB4396	CSNB	658 bp	♀	**Uzbekistan** (near Afghanistan borderline)
BC SNB 4888	SASNC2424-12	–	*Sat. (Neoris) shadulla*/AAB4396	CSNB	658 bp	♂	**Uzbekistan** (near Afghanistan borderline)
B3218-wn-F09	SAWNA067-09	GU703524	*Sat. (Neoris) shadulla*/AAB4396	SMFL (CWAN)	658 bp	♂	**Tajikistan,** Babatag
BC SNB 5251	SASNC2787-13	–	*Sat. (Neoris) shadulla*/AAB4396	CSNB	658 bp	♂	**China,** Xinjiang
BC SNB 5252	SASNC2788-13	–	*Sat. (Neoris) shadulla*/AAB4396	CSNB	658 bp	♂	**China,** Xinjiang
BC SNB 5113	SASNC2649-13	–	*Sat. (Neoris) shadulla*/AAB4396	CABF	658 bp	♀	**Tajikistan,** W. Pamir
BC SNB 5111	SASNC2647-13	–	*Sat. (Neoris) shadulla*/AAB4396	CABF	658 bp	♂	**Tajikistan,** W. Pamir
B3218-wn-F07	SAWNA065-09	GU703495	*Sat. (Neoris) shadulla*/AAB4396	SMFL (CWAN)	658 bp	♀	**Tajikistan,** W. Pamir, Rushan ridge
B3218-wn-F06	SAWNA064-09	GU703494	*Sat. (Neoris) shadulla*/AAB4396	SMFL (CWAN)	658 bp	♂	**Tajikistan,** W. Pamir, Rushan ridge
BC SNB 5846	SASNC3477-16	–	*Sat. (Neoris) shadulla*/AAB4396	CSNB	599 bp	♂	**Tajikistan,** E. Pamir
BC SNB 5845	SASNC3476-16	–	*Sat. (Neoris) shadulla*/AAB4396	CSNB	599 bp	♂	**Tajikistan,** E. Pamir
BC SNB 5104	SASNC2640-13	–	*Sat. (Neoris) shadulla*/AAB4396	CABF	658 bp	♂	**Uzbekistan,** Zeravshan Mts.
B3218-wn-E01	SAWNA047-09	GU703480	*Sat. (Neoris) shadulla*/AAB4396	SMFL (CWAN)	658 bp	♂	**Turkmenistan,** Kugitang
B3218-wn-D12	SAWNA046-09	GU703479	*Sat. (Neoris) shadulla*/AAB4396	SMFL (CWAN)	658 bp	♂	**Turkmenistan,** Kugitang
B3218-wn-E02	SAWNA048-09	GU703481	*Sat. (Neoris) shadulla*/AAB4396	SMFL (CWAN)	658 bp	♀	**Turkmenistan,** Kugitang
B3218-wn-E05	SAWNA051-09	GU703484	*Sat. (Neoris) shadulla*/AAB4396	SMFL (CWAN)	658 bp	♀	**Uzbekistan,** Aman-Kutan
B3218-wn-E04	SAWNA050-09	GU703483	*Sat. (Neoris) shadulla*/AAB4396	SMFL (CWAN)	658 bp	♀	**Uzbekistan,** Aman-Kutan
B3218-wn-E03	SAWNA049-09	GU703482	*Sat. (Neoris) shadulla*/AAB4396	SMFL (CWAN)	658 bp	♂	**Uzbekistan,** Aman-Kutan
BC SNB 5105	SASNC2641-13	–	*Sat. (Neoris) shadulla*/AAB4396	CABF	658 bp	♂	**Uzbekistan,** Zeravshan Mts.
BC SNB 3562	SASNC908-11	–	*Sat. (Neoris) shadulla*/AAB4396	CSNB	658 bp	♀	**Uzbekistan,** Aman-Kutan
BC SNB 3566	SASNC912-11	–	*Sat. (Neoris) shadulla*/AAB4396	CSNB	658 bp	♂	**Kazakhstan,** Almaty Prov., Issykkul (lake)
B3218-wn-F02	SAWNA060-09	GU703491	*Sat. (Neoris) shadulla*/AAB4396	SMFL (CWAN)	658 bp	♂	**Kazakhstan,** Almaty
B3218-wn-E12	SAWNA058-09	GU703489	*Sat. (Neoris) shadulla*/AAB4396	SMFL (CWAN)	658 bp	♂	**Kazakhstan,** Almaty
B3218-wn-E08	SAWNA054-09	GU703486	*Sat. (Neoris) shadulla*/AAB4396	SMFL (CWAN)	658 bp	♀	**Kyrgyzstan,** Bischkek
B3218-wn-E07	SAWNA053-09	GU703527	*Sat. (Neoris) shadulla*/AAB4396	SMFL (CWAN)	658 bp	♂	**Kyrgyzstan,** Bischkek
B3218-wn-E06	SAWNA052-09	GU703485	*Sat. (Neoris) shadulla*/AAB4396	SMFL (CWAN)	658 bp	♂	**Kyrgyzstan,** Bischkek
BC SNB 5112	SASNC2648-13	–	*Sat. (Neoris) shadulla*/AAB4396	CABF	658 bp	♂	**Kyrgyzstan,** Kungay Mts.
BC SNB 3571	SASNC917-11	–	*Sat. (Neoris) galeropa*/ABX5743	CSNB	658 bp	♂	**Iran,** Golestan Forest
BC SNB 1493	SASNB493-09	GU702824	*Sat. (Neoris) galeropa*/ABX5743	CSNB	658 bp	♂	**Iran,** Golestan Forest
BC SNB 1490	SASNB490-09	GU702826	*Sat. (Neoris) galeropa*/ABX5743	CSNB	658 bp	♂	**Turkmenistan,** Kopetdag, Garrygala
B3218-wn-D09	SAWNA043-09	GU703477	*Sat. (Neoris) galeropa*/ABX5743	SMFL (CWAN)	658 bp	♂	**Iran,** Golestan
B3218-wn-D08	SAWNA042-09	GU703476	*Sat. (Neoris) galeropa*/ABX5743	SMFL (CWAN)	658 bp	♂	**Iran,** Golestan
B3218-wn-D11	SAWNA045-09	GU703478	*Sat. (Neoris) galeropa*/ABX5743	SMFL (CWAN)	658 bp	♂	**Turkmenistan,** Kopetdag
B3218-wn-D10	SAWNA044-09	GU703530	*Sat. (Neoris) galeropa*/ABX5743	SMFL (CWAN)	658 bp	♂	**Turkmenistan,** Kopetdag
BC SNB 3559	SASNC905-11	–	*Sat. (Neoris) galeropa*/ABX5743	CSNB	658 bp	♂	**Iran,** Gilan
BC SNB 1489	SASNB489-09	GU702819	*Sat. (Neoris) galeropa*/ABX5743	CSNB	658 bp	♂	**Iran,** Gilan
B3218-wn-D07	SAWNA041-09	GU703475	*Sat. (Neoris) galeropa*/ABX5743	SMFL (CWAN)	658 bp	♂	Azerbaijan
B3218-wn-D06	SAWNA040-09	GU703474	*Sat. (Neoris) galeropa*/ABX5743	SMFL (CWAN)	658 bp	♂	Azerbaijan
BC SNB 1492	SASNB492-09	GU702825	*Sat. (Neoris) schencki**/AAB4397	CSNB	658 bp	♂	**Kazakhstan,** Almaty Prov., 30 km SE Almaty
BC SNB 3565	SASNC911-11	–	*Sat. (Neoris) schencki*/AAB4397	CSNB	627 bp	♂	**Kazakhstan,** Saur Range
B3218-wn-E11	SAWNA057-09	GU703528	*Sat. (Neoris) schencki*/AAB4397	SMFL (CWAN)	658 bp	♂	**Kazakhstan,** Zajsan
B3218-wn-E10	SAWNA056-09	GU703488	*Sat. (Neoris) schencki*/AAB4397	SMFL (CWAN)	658 bp	♂	**Kazakhstan,** Saur Range, Zajsan
B3218-wn-E09	SAWNA055-09	GU703487	*Sat. (Neoris) schencki*/AAB4397	SMFL (CWAN)	658 bp	♂	**Kazakhstan,** Zajsan
BC-SK0177	SASKA177-07	–	*Sat. (Neoris) naessigi*/AAE0432	CSKL	637 bp	♂	Turkey
B3218-wn-D03	SAWNA037-09	GU703471	*Sat. (Neoris) naessigi*/AAE0432	SMFL (CWAN)	658 bp	♀	Turkey
B3218-wn-D04	SAWNA038-09	GU703472	*Sat. (Neoris) naessigi*/AAE0432	SMFL (CWAN)	658 bp	♂	Turkey
B3218-wn-D05	SAWNA039-09	GU703473	*Sat. (Neoris) naessigi*/AAE0432	SMFL (CWAN)	658 bp	♂	Turkey
BC-SK0178	SASKA178-07	–	*Sat. (Neoris) naessigi*/AAE0432	CSKL	658 bp	♂	Turkey
BC SNB 1488	SASNB488-09	GU702820	*Sat. (Neoris) naessigi*/AAE0432	CSNB	658 bp	♂	**Armenia,** Jeriwan vic.
BC SNB 1948	SASNB853-10	HQ579871	*Sat. (Neoris) naessigi*/AAE0432	CSNB	658 bp	♂	**Turkey,** Tunceli
BCSK0176	SASKA176-07	–	*Sat. (Neoris) naessigi*/AAE0432	CSKL	658 bp	♂	Turkey
BC SNB 3499	SASNC1510-12	–	*Sat. (Neoris) naessigi*/AAE0432	CSLL	658 bp	♂	**Iran,** Buyer Ahmad, Zagros Mts.
BC-Roug0984	SATWB017-07	–	*Sat. (Neoris) naessigi*/AAE0432	CRRP	625 bp	♀	**Turkey,** Tunceli
BC SNB 3498	SASNC1509-12	–	*Sat. (Neoris) codyi*/AAD6590 [sic]	CSLL	658 bp	♂	**Pakistan,** Azad Kashmir

Sample ID	Process ID	GBAC	Species/BOLD BIN-Code	Deposition	SL	Sex	Origin
BC SNB 3497	SASNC1508-12	–	*Sat. (Neoris) codyi*/AAD6590 [SIC]	CSLL	658 bp	♂	**Pakistan,** Karakorum, Naltar valley
BC SNB 5536	SASNC3167-15	–	*Sat. (Neoris) codyi*/AAD6590 [SIC]	CSLL	658 bp	♂	**Pakistan,** Azad Kashmir
BC SNB 5538	SASNC3169-15	–	*Sat. (Neoris) codyi*/AAD6590 [SIC]	CSLL	658 bp	♀	**Pakistan,** Khyber Pakhtunkhwa, NW Frontier
B3218-wn-F11	SAWNA069-09	HM432593	*Sat. (Neoris) huttoni*/AAD6590 [SIC]	SMFL (CWAN)	658 bp	♂	**India,** Himachal Pradesh, Thaog
B3218-wn-F12	SAWNA070-09	HM432594	*Sat. (Neoris)* ***eckweileri*** **sp. n. (HT)**/ AAB4399	SMFL (CWAN)	658 bp	♂	**Pakistan,** Beluchistan, Urak
BC SNB 5042	SASNC2578-13	–	*Sat. (Neoris)* ***bergmanni*** **sp. n. (HT)**/ AAB4398	CSNB	658 bp	♂	**Tajikistan,** Darvaz Mts.
B3218-wn-F03	SAWNA061-09	GU703526	*Sat. (Neoris)* ***bergmanni*** **sp. n.** (PT)/ AAB4398	SMFL (CWAN)	658 bp	♂	**Kyrgyzstan,** Kungay Alatau
BC SNB 5043	SASNC2579-13	–	*Sat. (Neoris)* ***bergmanni*** **sp. n.** (PT)/ AAB4398	CSNB	658 bp	♀	**Tajikistan,** Darvaz Mts.
B3218-wn-F05	SAWNA063-09	GU703493	*Sat. (Neoris)* ***bergmanni*** **sp. n.** (PT)/ AAB4398	SMFL (CWAN)	658 bp	♂	**Kyrgyzstan,** Kungay Alatau
B3218-wn-F04	SAWNA062-09	GU703492	*Sat. (Neoris)* ***bergmanni*** **sp. n.** (PT)/ AAB4398	SMFL (CWAN)	658 bp	♂	**Kyrgyzstan,** Cholpon Ata



Map: Distribution of the species of *Saturnia (Neoris)* in Asia. One dot may represent more than one locality in close proximity; we have not located every label data on the map. The size of the symbols varies only for graphical reasons to allow better visibility of symbols closely together and does not indicate other information. Colour/symbol legend see in map. — Numbers for some localities of larval photographs without barcoded and identified specimens: 1 = locality of HAAS (2016), "Nuratau foothills ...". 2 = Karatau, NW Tian Shan. 3 = Rushan Range, Pamir. 4 = locality of KORB (2016), Altyn-Emel Nature Reserve. — Map created with Map Creator 2.0 Personal Edition, © 2003–2007 primap software, modified and localities added.

shape, which we interprete as an anchorage for the muscles to move the phallus; this structure is connected (usually sclerotised) with the phallus (GP-Fig. E, separate juxta with still connected phallus). Form and length of that structure are also diagnostic: e.g., in *S. (N.) schencki* and *S. (N.) bergmanni* it is widened and ends in a spoon-like form, whereas it is straight and long in *S. (N.) naessigi* and very short in *S. (N.) oliva*.

This structure is not known to us for other subgenera of *Saturnia,* nor was it mentioned or figured in some major works on Lepidoptera anatomy and systematics such as MICHENER (1952: 353), LEMAIRE (1978: 26), SCOBLE (1995: 96 *ff.*), or LEMAIRE & MINET (1999: 337). SCOBLE (1996: 98) mentioned that the homology and derivation of the so-called juxta is not entirely clear throughout the Lepidoptera system, and that the ventral sclerotization acts as a support for the phallus. Anyway, a somewhat similar (but not necessarily of identical origin) structure exists, for example, in some species of the Saturniidae genus *Lemaireia* NÄSSIG & HOLLOWAY, 1988 (see, e.g., NÄSSIG & LAMPE 1989: 244, or NÄSSIG & WANG 2006: 24), or in some genera of Mimallonidae, where phallus and juxta are partly connected with each other (e.g., ST. LAURENT & DOMBROSKIE 2015: 59).

Based on the drawings of the genitalia (and in comparison to his text and photos of imagines) of DE FREINA (1992), we interprete his illustrations of the right valves in his fig. 3 as follows:

DE FREINA (1992: fig. 3):

3a: *huttoni* (Punjab) = *huttoni.*

3b: *shadulla* (Tajikistan) = *shadulla.*

3c: *shadulla* (Tajikistan) = *bergmanni.*

3d: *shadulla* (river Ili-area) = *shadulla* (surely not *schencki,* as supposed by DE FREINA 1992: 239).

3e: *stoliczkana* (Afghanistan) = *naumanni.*

3f: *shadulla* (Uzbekistan, Ferghana) = *shadulla.*

3g: *shadulla* (Uzbekistan, Samarkand) = *shadulla.*

3h: *galeropa* (Turkmenistan, Kopet Dagh) = *galeropa.*

3i: [not named] ("Siberia, Baikal"?) = ??? (DE FREINA 1992: 239 supposed this to be *schencki;* likely a mislabelled specimen?).

3j: *naessigi* (East Turkey) = *naessigi.*

The structure termed here "ventral process of the valves" by us was called "clasper" by DE FREINA (1992). This structure apparently is neither fully identical with the vinculum nor the sacculus, and so we remain with our descriptive term.

General notes on preimaginal morphology

In Part A (NÄSSIG et al. 2016: 62) we did not describe the preimaginal instars of *Saturnia (Perisomena) caecigena,* which is now done here (see Figs. 93–100) in direct comparison to early instars of *S. (Neoris)*.

Saturnia (Perisomena) caecigena

Ova (Fig. 93) are more or less flattened ovoid in shape, with a pit on the upper side; the pattern is speckled in brown and whitish tones, more or less covered with the brownish adhesive. They are layed in bent rows in groups of a few to ca. 25 and hibernate on twigs.

There are usually 4 larval instars; only sometimes (especially when the food quality during a rearing is poor?) there may be 5 instars.

L_1 caterpillars (Fig. 94) are black with reddish-orange for the scoli and the subspiracular bulge. They remind the observer a little of L_1 larvae of *Saturnia (Saturnia) pyri* ([DENIS & SCHIFFERMÜLLER], 1775). They are not very hairy, and the short hairs are nearly confined to the typical saturniine scoli.

L_2 (Fig. 95) larvae are nearly entirely black (sometimes with light greyish speckles), with short black bristles on the scoli and longer white hairs on the scoli and also a few secondary hairs in between.

L_3 (Figs. 96–97): Ground colour now green, but with black pattern and usually a black head. There are still short black stinging bristles on the scoli; but much more secondary white hairs on scoli and in between.

Last instar (usually L_4, Figs. 98–99) larvae are entirely bright green (including head), with all scoli yellow without any stiff bristles, only (usually just one or a very few) longer soft white hairs on each scolus and shorter secondary hairs on the body. Spiracles light beige, with a darker brown framing. The subspiracular scoli are embedded into a white or bright yellowish, slightly bulgy lateral line from A1 to A8, which is interrupted at the segment borders. There are yellowish "socks" on the abdominal prolegs, also on the anal legs (there is no prominently coloured lateral sclerotised plate on the anal legs), the clinging apparatus of all legs (and also the arthropod legs of the thorax) in reddish brown tones.

Cocoon (Fig. 100): Elongate ovoid, with a valve-like exit on one tip; ground colour dark reddish or greyish brown (whitish only when there was not sufficient water to soak the silk matrix with the usual secretion). The cocoon is rather thin, usually only 1–2 layers of net-like woven silk.

The **pupa** (Fig. 100) is reddish brown, with a whitish, semi-transparent "window" between and posterior of the eyes.

Species of *Saturnia (Neoris)*

Neoris preimaginals differ from those of *Perisomena* mainly in the following characters (compare Figs. 93–100 with Figs. 75–85, 101–110, 113, 114, 115–119, 120–128):

Ova are slightly larger and a bit more rounded, but else quite similar. This speckled colouration is also found in many other *Saturnia* ova, especially of the subgenus *S. (Rinaca),* but also elsewhere.

There are apparently always 5 larval instars, as far as known.

L_1 larvae are on average less contrasting than those of *S. (P.) caecigena,* with the ground colour brighter (not deep black) and the scoli less intensive reddish, but with very enlarged, prominent dorsal scoli on T2+3.

L_2 caterpillars have their ground colour brighter, the black is much speckled with bright greyish to white, in part also with orange dots. The dorsal scoli on T2+3 are jet black and much enlarged.

L_3: Similar to L_2, the ground colour is becoming more varied, hairs denser and longer.

L_4: This instar is more variable, the ground colour may be dominantly greenish or reddish-dark or of any intermediate form.

L_5: The mature larva of some species appears to be always green; in other species there is obviously a polymorphism, with bright green and dark (blackish, sometimes blackish and reddish) larvae, sometimes also with intermediate forms of these extremes. Whether this is a genetical or a modificatory (induced by temperature, humidity or other parameters) polymorphism is not yet known. The scoli of green larvae are all green, i.e. in the colour of the body, except for the subspiracular scoli which are more or less yellow, i.e. in the colour of the lateral stripe in which they are embedded. Generally the scoli of mature larvae of *S. (Neoris)* are in size and structure even less conspicuously

developed than the (already reduced, in comparison to many other *Saturnia* larvae) scoli of *S. (Perisomena)*. In green larvae, the dorsal scoli on T2+3 usually are also green (in intermediate or darker morphs they tend to be partially or entirely black), and obviously there still are (in contrast to mature larvae of *Perisomena*) some short stinging bristles on these. Except for these dorsal scoli of T2+3, there do not appear to be stinging bristles on other scoli of mature larvae; the hairs are long, soft and white on the scoli (usually more than a single white hair) and short white secondary hairs on the body. Even the green morphs are in general more colourful than the last instars of *Perisomena;* the spiracles are rather conspicuously reddish or orange in the centre with a whitish or yellowish outer ring, sometimes even with an additional external blackish shadow; the lateral longitudinal line through the subspiracular scoli is often slightly more bulgy, broader, usually with a black shadow above the stripe towards the spiracle, often also black below the stripe. The colour of the stripe may be white to yellow, in some of the species and in the dark morphs usually in a deeper yellow to orange to even red. The lateral line may in some larvae (in some species?) be nearly uninterrupted from A1 to A8, often then also encircling the dorsal anal plate (which then usually also is in the colour of the stripe) and in that case running nearly uninterrupted from one side of A1 along the entire abdomen to the anal plate and back to the other side of A1; or the line may be interrupted at every intersegmental border and does not or only weakly encircle the anal plate. The lateral side of the anal prolegs is sclerotised and prominently coloured (usually a triangular patch in yellowish tones) and reminds of similar colourful patches laterally on the anal prolegs found in several members of the subgenus *Saturnia (Rinaca)* (e.g. in *S. (Rinaca) zuleika* Hope, 1843, see Naumann & Nässig 2010b: 137, figs. 27–30, but also in other species).

Cocoon (Figs. 109, 113, 126): Similar in shape to *Perisomena,* with the typical "*Saturnia* valve" for hatching of the imago, often less reddish brown, but brighter; however, the silk is woven usually much denser (meshes smaller, in the innermost layers often lacking; in total more layers of silken walls); the cocoon is of course also larger due to the larger average size of the species.

Pupa (Figs. 110): Similar to *Perisomena,* reddish brown, with the usual whitish, semitransparent "window" between and posterior of the eyes (in fact, this character can be found in many genera of Saturniini and also in a few other groups of Saturniidae). Larger than *Perisomena* and also with larger antennal sheaths.

For additional comparison of the preimaginals of *Perisomena* and *Neoris* (species *naessigi* and *shadulla*) also see the excellent colour plates 318–322 of Lampe (2010).

These obvious similarities between larvae of *Perisomena* and *Neoris* caused the synonymisation of these two subgenera by earlier authors (see discussion in Nässig et al. 2016). However, when looking into other subgenera of *Saturnia,* there are, of course, also some similar traits to be found in some species of *Saturnia (Rinaca)* (compare illustrations in Lampe 2010), which may indicate a plesiomorphic character. Nevertheless, in our opinion there still is a big amount of similarity in caterpillars of *Perisomena* and *Neoris* which not necessarily can be explained in terms of plesiomorphies *alone*.

As usual for larvae of *Saturnia* caterpillars (all subgenera, by far most species), the larvae are polyphagous and feed on a wide variety of deciduous or evergreen woody dicot foodplants (usually small trees, bushes or dwarf shrubs; only rarely in the herbal layer or in tree tops of large trees), always depending on the biotope in which they live and locally sometimes oligo- or even monophageous. This polyphagy comprises an enormous number of plant families and genera, mostly from the plant orders Rosales (e.g., Rosaceae), Fagales (e.g., Fagaceae, Betulaceae), Sapindales (e.g., Anacardiaceae), Lamiales (e.g., Oleaceae) and Malpighiales (e.g., Salicaceae), and surely more.

Additional information and illustrations on preimaginal instars of *Neoris* can here be found under the species *S. (N.) naessigi, galeropa,* in the *shadulla*-complex and also in the chapter "Further published records of doubtful validity or photos of unidentified preimaginals".

Systematic part, taxonomy: Annotated catalogue of the described taxa of the subgenus *Saturnia (Neoris)*

Taxon on genus level

Genus *Saturnia*, subgenus *Neoris* Moore, 1862

Neoris: Moore (1862: 321). — Type species by monotypy: *Neoris huttoni* Moore, 1862 (see also Fletcher & Nye 1982: 108). — No valid subgeneric synonym.

= ‡*Neorina* [*sic*]: Bates (*in* Henderson & Hume 1873: 306), a misspelling evidently not used elsewhere. — Junior homonym of *Neorina* Westwood, 1850 (Genera of diurnal Lepidoptera (1): 369, pl. 65, fig. 2; Nymphalidae).

Present status: Separate subgenus of *Saturnia* von Paula Schrank, 1802 (in contrast to the opinion of Nässig 1994), following Nässig et al. (2016). See discussion in Nässig et al. (2016).

Etymology: Unexplained by Moore and unknown to us.

Note on genus/subgenus level: After Nässig (1994), who united *Perisomena* and *Neoris* in one subgenus *Saturnia (Perisomena),* several authors followed this concept, except, for example, Regier et al. (2002), Pittaway (2016) or Miranda & Peigler (2007), who went on using *Neoris* on genus level, or Beeke & Paukstadt (2011), who used a separate subgenus *Saturnia (Neoris),* but in all of these cases without an explicit formal status change in accordance with the Code (ICZN 1999).

Notes on species names level within *Neoris:* In the late 19th century, when there was not yet a defined Code of Zoological Nomenclature, there was a lot of nomenclatural work published which is plainly incorrect under the ruling of today's ICZN (1999). For example, there have been erroneous type designations and invalid synonymisations (e.g., older taxa becoming "synonyms" of younger taxa). Examples for *Neoris* are:

Kirby (1892: 761) placed *huttoni* and *shadulla* (and, unexplained, as a third species Butler's *jonasi,* largely unrelated and now a member of the subgenus *S. (Rinaca)*!) in *Neoris,* but on pp. 772–

773, again without any explanation, *schenkii* [*sic*] and *stoliczkana* in *Saturnia*. Rothschild (1895: 44, 49) produced a similar arrangement, only with a few differing synonymies and a transfer of *jonasi* to *Saturnia*. In the list between the "genera" *Neoris* and *Saturnia,* we find in both publications a crude and wild mixture of other genera, today even belonging to different ***subfamilies*** of Saturniidae. Further, Rothschild's (1895: 44) "type designation" of *shadulla* Moore for *Neoris* [*sic*!], a species being not included in *Neoris* when the genus was described 10 years before *shadulla,* and Rothschild's synonymisation of the older *huttoni* with the younger *stoliczkana* [*sic*!] are just as unjustified and unsubstantiated as the entire placement of *Neoris* [partim] far off from most of its closest relatives in *Saturnia*. As there was not *any* explanation for this mess in matters of stating differentiating characters and morphological argumentation, we today cannot really reconstruct the train of thought which induced this mayhem of Kirby and Rothschild (and also other contemporary authors).

Similar incorrect synonymies (of older taxa submersed into younger ones) can be found, e.g., in:

Saturnia Stoliczkana var. *Huttoni* [*sic*]: Staudinger & Rebel (1901: 126).

Seitz (1928: 516): *shadulla* as synonym of *Neoris huttoni stoliczkana* [*sic*]).

Annotated catalogue of the existent species-group taxa of *Neoris*

The subgenus *Saturnia (Neoris)* presently comprises 11 valid nominal taxa (infrasubspecific and invalid names not counted separately), listed here in ***chronological*** order of their publication date with arabic numerals (without the three new taxa described below in the chapter "Revisional notes and descriptions of new taxa"); simple misspellings or unjustified emendations (all marked with ‡) are combined under the correct main spelling variant (we have not specifically searched for such misspellings, so there may well be further incorrect spellings in addition to the ones listed here):

1. *huttoni* Moore, 1862

Neoris huttoni: Moore (1862: 321, not illustrated).

Type material: HT ♂ (by monotypy, see below under Etymology, citing Moore's description of the genus *Neoris* in the same publication); deposition not stated by Moore (= in BMNH, specimen in error labelled as "syntype", examined, S.N., see Figs. 23–24). — A second specimen in BMNH, another ♀ from the same locality, is also labelled as "syntype" and comes from the Moore collection. However, this specimen must have been received by Moore after the description was published; this ♀ is in fact no type specimen at all.

Type locality: "Mussooree, N.W. India, 6500 ft." [= Masuri, Garhwal Mts., vicinity of Dehradun, Uttarakhand, India, ca. 2160 m]. — Orange asterisk with thin black frame in Map.

Etymology: See the description of the genus in the same publication: Named after Captain Hutton, who discovered the species and sent "an imperfect specimen" (i.e., a singleton; therefore holotype by monotypy) to F. Moore.

Note: De Freina (1992: 238) describes the type locality as "Province Garhwal, vicinity of Dehradun, Mussorie, N-India, ca. 1500 m". This elevation is not corresponding with Moore's (1862) description, but the circumscribed area of origin should be correct.

Selected literature:

Neoris huttoni: Moore (1862: 321). Cotes & Swinhoe (1887: 226). Rothschild (1895: 44 [in synonymy of *Saturnia stoliczkana, sic*]). Packard (1914: 171). Seitz (1928: 516). Bollow (1932: 131). Aue (1933: 132). Chander (1977: 552). D'Abrera (1998: 44, 45 figs. ♂, ♀).

Neoris Huttoni: Kirby (1892: 761, 935).

Neoris huttoni huttoni: Jordan (1911: 219, fig. 31d ♀). Bouvier (1936: 224, pl. VIII, fig. 3 ♂). De Freina (1992: 233 *ff*., 249). Gorbunov & Kishida (1995: 4).

Saturnia huttoni: Hampson (1893: 24). Peigler (1996: 11 ff., figs. 5, 6 ♂).

Saturnia Huttoni: Sonthonnax (1904: 31, pl. XI, fig. 5 ♀, fig. 6 ♂ [plate legend with wrong gender]).

Saturnia (Neoris) huttoni: Beeke & Paukstadt (2011: 319).

Saturnia Stoliczkana var. *Huttoni* [*sic*]: Staudinger & Rebel (1901: 126).

2. *shadulla* Moore, 1872

Neoris shadulla: Moore (1872: 577, not illustrated).

= ‡*shahidula:* Moore (1879: 8); unjustified emendation. Misspelling not cited too often in literature (e.g. by Jordan 1911: 219, Seitz 1928: 516, de Freina 1992: 249).

= ‡*Neorina* [*sic*] ‡*Shadula* [*sic*]: Bates (*in* Henderson & Hume 1873: 306). Misspelling of both genus and species name, a combination evidently not used elsewhere.

Type material: number of STs not explicitly stated by Moore ("♂ and ♀"); "in coll. F. Moore" (we found 2 ♂♂, 1 ♀ in BMNH, examined, S.N., see Figs. 26–27). — To avoid any potential identification problems, we **herewith designate** the male in BMNH illustrated here in Fig. 26 as **lectotype** of *S. (N.) shadulla*.

Type locality: [PR China, Xizang Autonomous Prov.], or older [SW Tibet, Karakorum], "Shadulla, near Yarkund [river], Eastern Turkestan". — Dark blue asterisk in Map.

Etymology: Evidently named after the type locality.

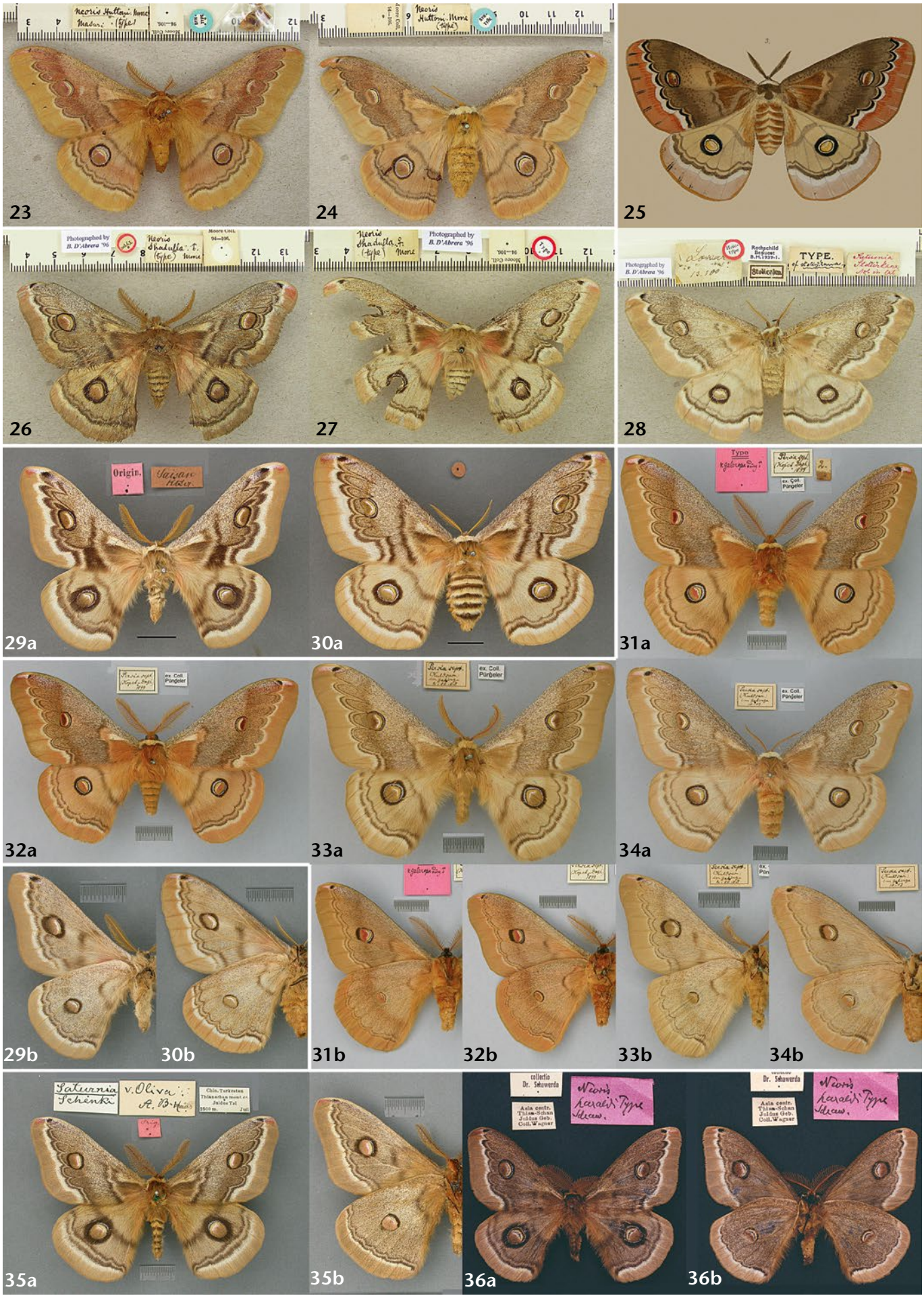
Notes: According to de Freina (1992: 238 [translated]) this locality corresponds to "Shahidulla (= Schahdulla, = Shakhidulla, Chinese: Xaidulla) above the Yarkand River within the northern slopes of the Karakorum range, ca. 100 km NE K2 (= Mt. Goodwin Austen) on at least 3000 m elevation".

This information is also contained in the books by Henderson & Hume (1873) and Forsyth (1875), which in very much detail describe two British expeditions (of 1870 and 1873) from India to the city of Yarkund in the Takla Makan desert. On the map in Henderson & Hume (1873) the place is named "Shahidulla".

Originally we had expected that Moore (1872) meant the city of Yarkund (= Yarkand, = Jarkand) situated at the western edge of the Takla Makan Desert at about 1300 m elevation in the Yarkund (= Yarkand etc.) river valley. This river, in humid times more or less

---

Plate 4: *Saturnia (Neoris),* Imagines. — For all imaginal pictures, where present: **a** = ups., **b** = uns. of the same specimens. Specimens smaller than natural size (scales in photos, where present, in cm/mm or scale bars = 1 cm), not to the same size. Labels not always to the same scale as specimens. — **Figs. 23–36:** Historic types and other material. — **Figs. 23–24:** *Neoris* ***huttoni,*** **23: HT** ♂ by monotypy; **24:** ♀, no type; BMNH. — **Fig. 25:** *Saturnia* ***stoliczkana,*** reproduced from the printed plate in *"Reise der Novara"*. — **Figs. 26–27:** *Neoris* ***shadulla,*** part of the ST series; **26: LT** ♂, designated here; **27:** PLT ♀; BMNH. — **Fig. 28:** *Saturnia* ***stoliczkana,*** **LT** ♀, designated here (no HT as indicated); BMNH. — **Figs. 29–30:** *Saturnia* ***schencki,*** part of the ST series; **29a, b: LT** ♂, designated here; **30a, b:** PLT ♀; ZMHU. — **Figs. 31–34:** *Saturnia* ***galeropa.*** **Figs. 31–32:** part of the ST series; **31a, b: LT** ♂, designated here; **32a, b:** PLT ♂; ZMHU; **Figs. 33–34:** ♂, ♀, no types, "Persia sept., Kuldran, im Gebirge, 10. 03"; ZMHU. — **Fig. 35a, b:** *Saturnia* ***oliva,*** **HT** ♂ by monotypy, ZMHU. — **Fig. 36:** *Neoris* ***haraldi,*** **HT** ♂ by monotypy, NHMW.— BMNH photos © Trustees of the Natural History Museum by kind permission (taken by V. Zolotuhin); Fig. 25: W. A. Nässig; Fig. 36: U. Brosch & S. Naumann [NHMW]; other museum photos by S. Naumann [ZMHU].



permanently, in arid times only temporarily containing water, gave rise to a river plain with natural woody vegetation and agriculture allowed by the presence of water and still today shows the existence of a population of *S. (Neoris) shadulla* (see recent specimen in material list of the species).

Selected literature:

Neoris shadulla: Moore (1872: 577). Cotes & Swinhoe (1887: 226). Rothschild (1895: 44). Packard (1914: 171). Seitz (1928: 516; in synonymy of *S. (N.) stoliczkana* [*sic*]). D'Abrera (1998: 44, 45 fig. ♂ LT, ♀ PLT).

Neoris Shadulla: Kirby (1892: 761).

Neoris huttoni shadulla: de Freina (1992: 249, figs. 11–14 ♂♂, ♀♀; with synonyms *S. (N.) stoliczkana*, *S. (N.) schencki*, *S. (N.) oliva*, & *S. (N.) haraldi*).

Neoris ‡*Shadullæ* [*sic*]: Sonthonnax (1904: 30; in synonymy of *S. stoliczkana* [*sic*]).

Neoris huttoni ‡*shahdulla* [*sic*]: Jordan (1911: 219, in synonymy of *S. (N.) stoliczkana* [*sic*]).

Saturnia shadulla: Peigler (1996: 11, 14, fig. 4 ♂ [with synonyms *stoliczkana, schencki, oliva, haraldi, svenihedini,* and *alatauica*]).

Saturnia (Neoris) shadulla: Beeke & Paukstadt (2011: 318 ff., figs. 1–4 ♂♂. The idea of Beeke & Paukstadt that the illustrated specimens might instead belong to *schencki* cannot be supported; besides external differences, the cited locality Susamyr Mts. [in Google Earth: Suusamyr] is over 1000 km from the type locality of *schencki,* inmidst the distribution area of *shadulla*).

Perisomena huttoni shadulla: Lampe (2010: 361, pl. 322).

3. *stoliczkana* C. & R. Felder, 1874

Saturnia stoliczkana: C. & R. Felder (1874: pl. lxxxvii, fig. 3 [♀]; legend of plate) (reproduction of the colour illustration see here in Fig. 25). — Supplemented by C. & R. Felder (1875: Erklärungen der Tafeln LXXV bis CVII [= tabulated extended explanations of plates], p. 8).

= ‡*stoliczkai:* Moore (1879: 8); probably an [unjustified!] emendation of *stoliczkana*. The Latinisation *stoliczkana* may be a bit unfortunate (the ending "-*ana*" transforms it into an adjective, but this is allowed by the Code, ICZN 1999: Art. 11.9.1.1., 31.1.); however, this form *stoliczkana* is to be preserved as the "correct original spelling" according to the Code (ICZN 1999: Art. 32.2.). This spelling ‡*stoliczkai* is listed as misspelling variant only by a few authors, e.g. by Jordan (1911: 219), Seitz (1928: 516), de Freina (1992: 249).

Type material: sex and number of specimens and deposition of ST[s] not stated by C. & R. Felder. There is one ♀ in BMNH, without published justification labelled as "holotype" (examined, S.N.; see Fig. 28) which erronously was also figured as "holotype" of *S. stoliczkana* by D'Abrera (1998: 45). It bears the following labels: "*Saturnia stoliczkana* nob. in cat." [red letters, handwritten]; "Lossar, 13.500 [ft.]; Stoliczka; type of *stoliczkana*; Rothschild Bequest B.M. 1939-1; Holotype [red, round]; photographed by B. D'Abrera '96". — To avoid any potential identification problems, we **herewith designate** this female in BMNH as **lectotype** of *S. (N.) stoliczkana*. This ♀ fits quite well with the figure in the original colour drawing (see Fig. 25 for a reprint of that figure, and Fig. 28 for the LT specimen in BMNH).

Type locality: In the original description (C. & R. Felder in the legend of the plate), there was only written: "Ladak (Stoliczka)". Formally this should today be somewhere in the huge area of India: Jammu & Kashmir, Ladakh, at higher elevations, and was also interpreted this way by de Freina (1992: 238); he located this place then only about 200 km S of the type locality of *Neoris shadulla*. Stoliczka (*in* Forsyth 1875: 460) himself writes of "Leh (or Ladak)" and "the Indus valley in Ladak", respectively, as the starting point of his travel to "Shahidula on the frontier of Yarkand territory", but does not provide helpful notes about details of the route of travel. — However, on the ***label*** of the LT specimen we find an additional information: "Lossar". We located a village with this name Lossar (spelling on the label; different spelling in Google Earth: Losar) in Travel.India.com (2016) as a locality in the **Spiti valley,** "first village from Kunzum Pass", at ca. 4000 m elevation, which is, according to Google Earth, at 32°26′ N, 77°45′ E, and is shown accordingly as type locality on our Map, bright grey asterisk with broad orange frame.

The collector Ferdinand Stoliczka (*7. vi. 1838, †14. vi. 1874, see Wikipedia.de 2016) worked for the "*British Geological Survey of India*" (his function in the early 1870s is defined as "Naturalist attached to the Yarkand Embassy" by Forsyth 1875) and visited many places also in the Himalaya, while the Spiti valley was not explicitly noted anywhere. The term "Losar" usually describes Tibetian Buddhists' New Year festivals, which are held at many places in the Indian Himalaya where Tibetians live in exile; the only ***village*** with a name "Lossar" (or "Losar") which we could find is the one in the Spiti valley. As the Spiti valley (today part of the Indian state Himachal Pradesh) once (including in the 19th century) was a part of Ladakh, this also fits well with the short locality "Ladakh" in the legend of the Felders' plate. — Summarised: If, first, the label "Lossar" is correctly attributed to the LT of *S. stoliczkana* and if, second, there is no further village with this name in the former Ladakh area which we did not find, we think that we have pinned down the type locality now better than before, where only "Ladakh" was provided. As a result, the type locality of *S. (N.) stoliczkana* is now pretty close to the distribution area of *S. (N.) huttoni,* see in Map.

This locality in the Spiti valley is part of the Himalaya just behind the first mountain chains and on the dry side out of reach of the regular monsoon rains. See the description by V. Weisz (1996 [unpubl.]). She and P. Kautt regrettably did not find any *Neoris* there, because they were using light traps only during the time span June to August.

Etymology: Obviosly named after the collector.

Note: See Nässig & Speidel (2007: 70) for the correct authorships of especially "Heft 4" of the "Reise der Novara". Plate LXXXVII was, according to the notes on the plate, drawn ("del.") in vii. 1867 by C. Geyer and "ed." = "edited" (i.e., finally prepared for print or perhaps even printed, but not officially distributed) in 1868; the real publication date for this plate is, however, 1874, compare Nässig & Speidel (2007: 65).

Selected literature:

Saturnia stoliczkana: C. & R. Felder (1874: pl. lxxxvii, fig. 3 ♀). Hampson (1893: 24). Rothschild (1895: 44). Peigler (1996: 11, 14 [in synonymy of *S. (N.) shadulla*]).

Saturnia Stoliczkana: Kirby (1892: 773, 935). Staudinger & Rebel (1901: 126). Sonthonnax (1904: 30, pl. XI, fig. 3 ♂, fig. 4 ♀).

Neoris stoliczkana: Cotes & Swinhoe (1887: 227). Seitz (1928: 516). Bollow (1932: 131). D'Abrera (1998: 44, 45 figs. ♀ LT, ♀).

Neoris huttoni stoliczkana: Jordan (1911: 219, fig. 31c ♀). Bouvier (1936: 224). De Freina (1992: 249; in synonymy of *S. (N.) shadulla*). Gorbunov & Kishida (1995: 4).

Neoris huttoni stolizkana: Packard (1914: 171; synonym of *N. huttoni shadulla*).

4. *schencki* Staudinger, 1881

Saturnia schencki n. sp.: Staudinger (1881: 406[–409], not illustrated).

= ‡*schenki:* Jordan (1911: 219); Packard (1914: 156).

= ‡*schenkii, ‡schenckii:* van Bemmelen (1919: 1374, 1375).

= ‡*schenkii:* Kirby (1892: 772); D'Abrera (1998: 44).

Type material: Number of STs of both sexes not stated by Staudinger ("eine größere Anzahl gezogener Stücke" = "a larger series of reared specimens"). — O. Bang-Haas (1936: 109), who received much of the Staudinger collection, wrote about this taxon: "Saisan (foothills of the Altai Mts.), collected by Haberhauer; original specimens 6 ♂♂ & 6 ♀♀ in coll. Staudinger". Those 12 specimens are still entirely preserved in the Staudinger collection in ZMHU, Berlin (examined, S.N.). In typical Staudinger style the determination label reading "*Schencki* Stgr." is fixed in the box, the first ♂ specimen below this label has the following labels: "Origin" [violet]; "Saisan, Hbhr." [= Haberhauer]; the rest of the type series bears only a small round violet paper label without any letters. To avoiod any potential problems of the identity, we **herewith designate** the ♂ with the locality label **as lectotype** of *Saturnia schencki* (Fig. 29); thereby the rest of the series become paralectotypes (a ♀ PLT see in Fig. 30). To all those specimens type and determination labels will be added accordingly.

In the Püngeler collection kept separately in ZMHU we found one ♀ labelled as "Cotype *schenki* Stgr. ♀" [pink, handwritten, Püngeler] and "Sibiria" [*sic*]. This specimen clearly is no true ST of *S. schenki* as the labelling does not correspond to that of the series from the type locality which is still stored in the Bang-Haas collection in ZMHU. At that time, insect traders (like Staudinger!) were used to label specimens received later (which they believed to belong to a new species, even if not necessarily from the same collecting locality as the "real" types) as "Cotypes" to sell them at better prices. — The provided locality information "Sibiria" is nonsensical with respect to today's geography and does not contain any clear locality data.

Further, in the box of the STs, below those aforementioned 12 ST specimens, there are 1 ♂ and 3 ♀♀ of only faintly similar specimens, of which two bear a label "Margelan, [18]87, Hbhr."; 2 ♀♀ again have only a violet label without letters; however, due to the different locality and year of collection they clearly are no further STs of *schencki*. This locality Margelan (nowadays Marg'ilon: Marg'ilon 2016) is in Uzbekistan, not far from Ferghana (now Farg'ona: Farg'ona 2016), about 1300 km SW of E Kazakhstan, Saissan. These specimens most likely belong to *S. (N.) shadulla*.

Type locality: "Saisan" [= E Kazakhstan, Saissan = Zajsan]. — See the data provided by O. Bang-Haas (1936: 109) about the locality (above). According to de Freina (1992: 238) this locality is in the NE extensions of the Tarbagatai Mts. at ca. 2300 m elevation. Supposedly the specimens have not necessarily been collected in the city of Zajsan, but in the surrounding mountains, especially in the Saur Range, where this species is still rather commonly found today. — Dark grey asterisk with black frame in Map.

Etymology: Explicitely dedicated to Freiherr von Schenck, formerly member of the government (minister of finance) of the Grand-Duchy of Hesse [Großherzogtum Hessen-Darmstadt] (full name: Grand Duchy of Hesse and by Rhine).

Selected literature:

Saturnia schencki: Staudinger (1881: 406). Peigler (1996: 11, 14 [in synonymy of *S. (N.) shadulla*]).

Saturnia Schenckii [*sic*]: Kirby (1892: 772).

Saturnia Schenkii [*sic*]: Sonthonnax (1904: 30; in synonymy of *S. stoliczkana*).

Neoris huttoni schencki: Jordan (1911: 219, fig. 32 a ♂, ♀). Packard (1914: 171; pl. CII, fig. f with misspelling *schenki*); Bouvier (1936: 224). Rougeot (1969: 163). De Freina (1992: 249; cited in synonymy of *S. (N.) shadulla*).

Neoris stoliczkana schencki: Seitz (1928: 516).

Neoris schencki: Bollow (1932: 131).

Neoris huttoni schenki [*sic*]: Gorbunov & Kishida (1995: 4, pl. 2 ♂♂, ♀♀ [these authors show on their map a conglomerate of different species such as *S. (N.) naessigi*, *S. (N.) galeropa* and *S. (N.) shadulla* as distributional area for *S. (N.) schencki*, therefore their determination of the figured specimens for sure is incorrect]).

Neoris schenkii [*sic*]: D'Abrera (1998: 44).

Saturnia Stoliczkana var. *Schenki* [*sic*]: Staudinger & Rebel (1901: 126).

Neoris schenki [*sic*]: "Taxonomy Browser" of Bold (2016 [2. xi.]).

5. *galeropa* Püngeler, 1900

Saturnia schencki Stgr. var. nov. *galeropa:* Püngeler (1900: 116, Taf. IV, fig. 1). — Accepted here as a valid and available name, because described as a geographical "variant" before 1961; according to the regulations of the Code (ICZN 1999: Art. 10.2, 45.6.4) the handling of the name therefore should be on species-group level.

= ‡*galerope:* Jordan ([*in* Seitz] 1911: 219); misspelling, commonly used in later publications (copied from each other without reference to the original description, obviously only based on Jordan's spelling error in the Seitz series). — This error was corrected by hand on the card of the BMNH card index in the meantime, and consequently the spelling is also now correct in Beccaloni et al. (2015) and in Wikispecies (2016). However, in several other species lists in the web (including the "Taxonomy Browser" of Bold 2016 [2. xi.]) we still find the incorrect spelling variant.

Type material: 2 ♂♂ STs, deposition not indicated. The collection of R. Püngeler is stored in ZMHU (see Horn et al. 1990: 314), and there both STs are still deposited (examined, S.N.); to stabilize the identity of the taxon *galeropa,* we **herewith designate** the one ♂ with data as illustrated in Fig. 31 **as lectotype** of *Saturnia schencki galeropa,* the second ST ♂ with data as illustrated in Fig. 32 automatically becomes a PLT; labels will be added accordingly.

Some further contemporary specimens in coll. Püngeler in ZMHU obviously belong to *S. (N.) galeropa,* but are **no** type material: There is a ♀ with data "Persia sept., Kopet-Dagh, 1900; ex coll. Püngeler"; this is not mentioned in Püngeler's description which was published already 15. viii. 1900, and judging from the normal flight period in autumn it is clear that this specimen was collected *after* publication. Two further specimens (♂ and ♀ from "Persia sept., Kuldran, im Gebirge, 10. 03" = "N Persia, Kuldran, in the mountains, x. 1903", collected 3 years later; Figs. 33–34) look slightly different; we have not been able to locate this place "Kuldran".

Type locality: "Kopet-Dagh, bei Aschabad" [= Turkmenistan, Kopet-Dag, near Ashkhabad, close to the present-day border to Iran]. — Light blue asterisk with black frame in Map.

Etymology: Unknown.

Selected literature:

Neoris huttoni galeropa: Jordan (1911: fig. 32a ♂; *sic,* the correct spelling variant in the legend). Bouvier (1936: 224). De Freina (1992: 249, fig. 9 ♂, fig. 10 ♀).

Saturnia galeropa: Peigler (1996: 11, 14).

Saturnia (Neoris) galeropa: Beeke & Paukstadt (2011: 319).

Neoris huttoni ‡galerope [*sic*]: Jordan ([*in* Seitz] 1911: 219). Packard (1914: 171).

Neoris stoliczkana ‡galerope [*sic*]: Seitz (1928: 516).

Neoris ‡galerope [*sic*]: Bollow (1932: 131). D'Abrera (1998: 44). "Taxonomy Browser" of Bold (2016 [2. xi.]).

6. *oliva* A. Bang-Haas, 1910

Saturnia stoliczkana Feld. v. *oliva* n. var.: A. Bang-Haas (1910: 31, not illustrated). — Accepted as valid and available name, because described as a geographical "variant" before 1961; according to the regulations of the Code (ICZN 1999: Art. 10.2, 45.6.4) the handling therefore should be on species-group level.

Type material: ♂ HT by monotypy; deposition not indicated [evidently coll. A. Bang-Haas]. The HT is deposited in the Bang-Haas collection in ZMHU today (examined, S.N.; Fig. 35) and bears the following labels: "Orig. [pink paper]; *Saturnia schenki* [*sic*]; v. *Oliva* A. B.-H. [= A. Bang-Haas]; Chin. Turkestan, Thianschan mont. or., Juldus Tal, 2500 m, Juli".

Type locality: In the original description: "aus dem Juldus-Gebiete" = "from the Juldus area" [of the Tian Shan mountain range, Xinjiang Uygur aut. region, PR China], also according to de Freina (1992: 238). The label of the HT reads, as stated above, "Thianschan mont. or., Juldus Tal, 2500 m". With the help of an old atlas (Andree 1896) containing these old locality names we came to the following coordinates: 42°38′ N, 84°43′ E, at ca. 2500 m, and plotted this on the map. — Black asterisk with yellow frame in Map.

Etymology: Named for the olive colour of the specimen.

Note: O. Bang-Haas (1936: 109) writes: "Thianshan or., Juldus, 1 ♂ type [i.e., the holotype] in coll. B[ang]-Haas". — O. Bang-Haas also states that the wing pattern (antemedian line touching the inner side of the eyespots [on the hindwings ups.] or not) of the specimens illustrated in "Seitz 2" [= Jordan 1911] under the name *schencki* "does not correspond to the [syn-]type series of *schencki* ex coll. Staudinger in coll. Bang-Haas".

Selected literature:

Saturnia stoliczkana oliva: A. Bang-Haas (1910: 31).

Neoris huttoni oliva: Bouvier (1936: 224, cited in synonymy of *S. (N.) stoliczcana*). O. Bang-Haas (1936: 109). De Freina (1992: 249; cited in synonymy of *S. (N.) shadulla*).

Neoris oliva: Bollow (1932: 131).

Saturnia oliva: Peigler (1996: 11, 14 [cited in synonymy of *S. (N.) shadulla*]).

Neoris stoliczkana [partim, for China, Xinjiang]: Zhu & Wang (1996: 133, fig. 100, pl. VII fig. 8), misidentification, this specimen might much more likely be *S. (N.) schencki* or *S. (N.) oliva* (= *haraldi*).

7. *haraldi* Schawerda, 1923

Neoris haraldi species nova: Schawerda (1923: 40, not illustrated). — The specimen was then illustrated (without further notes) on a colour plate by Schawerda (1924: col. pl. fig. 16) in a different journal.

Type material: ♂ HT by monotypy; deposition not indicated [coll. K. Schawerda]. The HT is today stored in the collections of NHMW (examined, S.N.; Fig. 36); it bears the following labels: "*Neoris haraldi* Type Schaw." [violet paper]; "Asia centr., Thian Schan, Juldus Geb., coll. Wagner; collectio Dr. Schawerda".

Type locality: "vom Thian Schan im Juldusgebiete" [Tien Shan Mts., Xinjiang Uygur aut. region, P.R. China] — which is just approximately the same place as for *Saturnia stoliczkana oliva* A. Bang-Haas (de Freina 1992 supports this view: "same locality as for *oliva*"). We placed the asterisk on the Map at 42°55′ N, 84°38′30″ E, just to optically differentiate the *oliva* and *haraldi* type localities. — Pinkish asterisk with yellow frame in Map.

Etymology: Unknown; no dedication in the original description.

Notes: Schawerda (1923) wrote [translated]: "The specimen will soon be illustrated by me in the 'Verhandlungen der zoologisch-botanischen Gesellschaft'", and this picture was printed without any additional text in access to a short legend in Schawerda (1924: col. pl. fig. 16, legend p. (164)).

Schawerda (1923) also wrote that he originally expected the specimen to be identical to *oliva,* but [translated:] "a comparison with the description indicated that this was not correct" [*sic!*] — without providing these alleged differences in any more detail —, and he then produced a short and rather chaotic description of his own from his singleton. Evidently he never had seen the *oliva* type specimen personally and based his description, following A. Bang-Haas' written description of *oliva,* just on the difference in ground colour — which apparently is the result of individual (ecological?) variability.

Selected literature:

Neoris haraldi: Schawerda (1923: 40). Schawerda (1924: col. pl. fig. 16). Bollow (1932: 131).

Neoris huttoni haraldi: Bouvier (1936: 224). De Freina (1992: 249; cited in synonymy of *S. (N.) shadulla*).

Neoris haraldi: D'Abrera (1998: 44).

Saturnia haraldi: Peigler (1996: 11, 14 [cited in synonymy of *S. (N.) shadulla*]).

[*Neoris haraldi:* Zhu & Wang (1983: 412, pl. 134, fig. 2972; 1993: 278, fig. 16; 1996: 133, fig. 99, pl. VII fig. 7), misidentification, see below under *S. (N.) svenihedini.*]

8. *svenihedini* Hering, 1936

Neoris huttoni sveni-hedini [*sic,* incorrect original spelling, corrected according to the ruling of ICZN (1999: Art. 32.5.2.3.) to "*svenihedini*" in the following] subsp. nov.: Hering (1936 [22. i.]: 61, not illustrated).

= ‡*svenhedini* (incorrect emendation): NHRS (2016), Beeke & Paukstadt (2011: 317).

Type material: ♂ HT (by original designation and obviously also by monotypy; Figs. 37–39); deposition not indicated (NHRS, photo examined, no. NHRS-TOBI000001850). — This specimen is also listed and illustrated (another photograph in low resolution on blue background) in the NHRS internet type catalogue (NHRS 2011/2016; search under "H" for "*huttonisvenhedini*" [*sic*]), but with a erroneous publication date "1934". For the correct printing date, see date imprint on p. 7 of the Hering paper. In addition, the taxon is listed on the cited website in error as a type of Notodontidae, and the specific name is spelled "‡*svenhedini*". — The specimen was collected by David Hummel during the "Swedish-Chinese scientific expedition to the northwestern provinces of China 1927–1930".

Type locality: "Manaso [on label: Manass] near Urumchi, late ix. 1928" [= China, Xinjiang, near Ürümqi, salt Lake Manas, which is now largely dry: Manas lake (2016)]. This lake is situated in a desert valley (the Dzungarian Basin; coordinates of the temporary dry Manas River inflow into the lake: 45°41′ N, 85°44′ E; this locality is plotted on our Map) at about 250 m elevation and does not appear to be a typical biotope for *Neoris;* apparently the specimen was collected somewhere in the hills and mountains around the former salt lake. — Light green asterisk with red frame in Map.

Etymology: Dedicated to the leader of the "Swedish-Chinese scientific expedition to the Northwestern Provinces of China, 1927–1930", Sven Hedin.

Note: There is another *Neoris* specimen in NHRS, labelled in error as HT of *S. (N.) svenihedini* by V. Zolotuhin (pers. comm. by T. Malm, NHRS). Judging from the original description it is clear that the specimen figured here in our present work (Figs. 37–39) and with the above mentioned NHRS registration no. is the real HT of Hering. We have not seen this other specimen and do not have any further information about it.

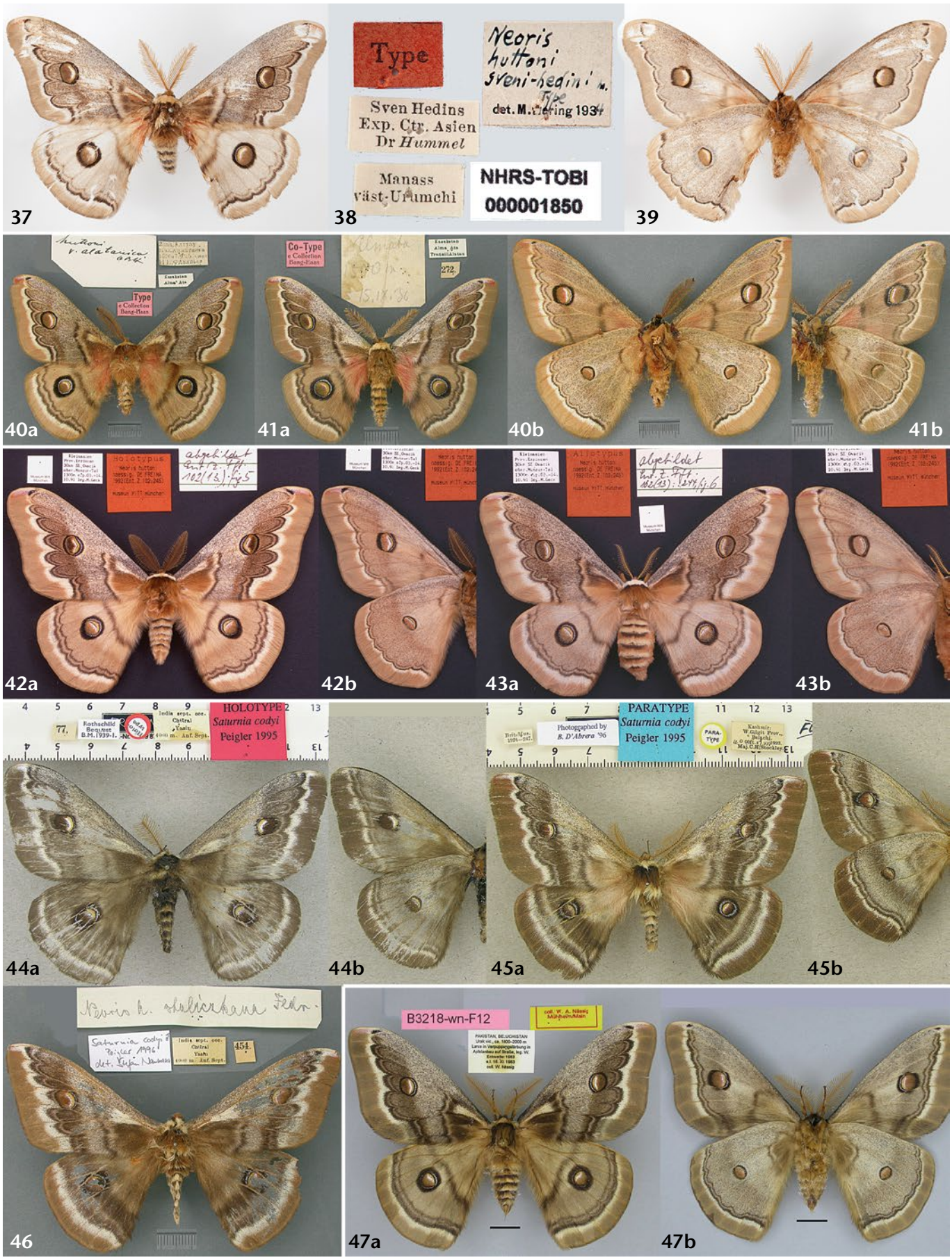


Plate 5: *Saturnia (Neoris),* Imagines. **Figs. 37–47:** Historic and recent type specimens. — **Figs. 37–39:** *Neoris* ***svenihedini,*** **HT** ♂ by original designation, NHRS; **37:** ups., **38:** labels, **39:** uns. — **Figs. 40–41:** *Neoris* ***alatauica,*** part of the ST series; **40a, b: LT** ♂ designated here, ZMHU; **41a, b:** PLT ♂, ZMHU. — **Figs. 42–43:** *Neoris* ***naessigi;*** **42a, b: HT** ♂ by original designation; **43a, b:** PT ♀ ("allotype"); CMWM. — **Figs. 44–46:** *Saturnia* ***codyi;*** **44a, b: HT** ♂ by original designation; **45a, b:** PT ♂; BMNH; **46:** ♂, no type, ZMHU. — **Figs. 47a, b:** *S. (Neoris)* ***eckweileri*** **sp. n., HT** ♂ by original designation; CWAN in SMFL. — NHRS photos © Natural History Museum Stockholm, taken by Tobias Malm; BMNH see in pl. 4; CMWM by U. Brosch & S. Naumann; other museum photos by S. Naumann [ZMHU, SMFL].

Selected literature:

Neoris huttoni sveni-hedini: Hering (1936: 61).

Neoris sveni-hedini: D'Abrera (1998: 44).

Saturnia svenihedini: Peigler (1996: 14 [cited in synonymy of *S. (N.) shadulla*]).

Neoris haraldi: Zhu & Wang (1983: 412, pl. 134, fig. 2972; 1993: 278, fig. 16; 1996: 133, fig. 99, pl. VII fig. 7), misidentification, this specimen is most likely *S. (N.) svenihedini*.

9. *alatauica* O. Bang-Haas, 1936

Neoris huttoni alatauica subsp. nova: O. B[ang]-Haas (1936 [1. vi.]: 109, not illustrated).

= *Neoris ‡atalantica* [*sic!*]: D'Abrera (1998: 44).

Type material: STs ♂♂; number of specimens and deposition of ST series not stated [coll. Bang-Haas?]. In the Bang-Haas collection kept separately in ZMHU we found one ♂ specimen labelled as type, with following data (examined, S.N.; Fig. 40): "Type e collection Bang-Haas" [pink paper]; "*huttoni* v. *alatauica* OBH" [handwritten]; "Kasakstan, Alma Ata; So. Zail. [Zailyiski] Alatau, Mal. [Malenkaja] Almatinka, 1500 m, 7. ix. [19]35 svet. [at light], I. N. Filipjev" [in Cyrillic letters]; "genitalia no. 2511/16 SNB". To avoid possible identification problems in this problematic group, this specimen mentioned to be the "type" is **herewith designated as lectotype** of *Neoris huttoni alatauica*, a LT label will be added accordingly.

A second ♂ in the main collection of ZMHU (Fig. 41) bears the following labels: "Co-Type e collection Bang-Haas [pink paper]; Kasakstan, Alma Ata, Transili Alatau; Almata, 1500 m, 15. ix. [19]36". This second ♂ from a locality rather close to the LT (and other possible STs) thereby automatically becomes PLT and will be labelled accordingly.

Another ♂ (no ST) was found in CRLN and bears the following labels: "Tadzhikistan" [recte Kyrgyzstan, maybe Kazakhstan?], "Co-Type O. Bang-Haas [red paper]; *alatauica* OBH, Khoum Bel Berg, 3000 m, Juli, Alma Ata, Issykul sept."; "*Perisomena huttoni shadulla,* collection R. E. Lampe, Khoum Bel Berg, 3000 m, Issykul, Alma Ata, Sept." [a misinterpretation by Lampe: "September" instead of correct (Latin!) "Issykul septentrionalis" = North of Issykul] [handwritten, Lampe].

Type locality: [Kazakhstan], "Thianschan sept., Alatau occ., Almatinka, 1500 m". Violet-blue asterisk with dark blue frame in Map.

Etymology: Named for the origin of the type series.

Note: In the description only compared with *schencki* Staudinger, although O. Bang-Haas had also at least the HT of *oliva* A. Bang-Haas before him (see above).

Selected literature:

Neoris huttoni alatauica: O. Bang-Haas (1936: 109). Peigler (1996: 14 [new synonym of *S. (N.) shadulla*]).

10. *naessigi* de Freina, 1992

Neoris huttoni naessigi n. ssp.: de Freina (1992: 245, fig. 5 ♂ HT, fig. 6 ♀ AT, fig. 7 ♂ PT, fig. 8 ♀ PT).

Type material: ♂ HT (by original designation), ex coll. de Freina via CMWM in ZSM (examined, W.A.N. & S.N., Fig. 42). The ♂ HT bears following labels: "*Neoris huttoni naessigi* de Freina 1992 (Ent. Z. **102:** 245), Museum Witt München [red cardboard]; Kleinasien, Prov. Erzincan, 30 km SE Ovacik, ober. Munzur-Tal, 1300 m, e.p. 3.–14. x. [19]91, leg. M. Geck; Museum Witt, München; abgebildet Ent. Z. Fft. 102 (13), fig. 5." and has a forewing length of 62 mm; the ♀ "allotype" (= PT) with the same data has a Lfw. of 63 mm (Fig. 43); there are further 7 ♂♂ and 10 ♀♀ PTs with same data and a single ♂ PT with differing data "Kleinasien, Prov. Erzurum, 5 km SE Hinis, 1650 m, 16.–17. x. [19]85, de Freina; GP Nr. 3014 Museum Witt; gen. präp. Nr. 3014.", in CMWM in ZSM. Further 7 ♂♂ and 3 ♀♀ PTs are in CWAN in SMFL. For the complete list of 16 ♂♂ and 14 ♀♀ PTs, see de Freina (1992: 245).

Type locality: "Asia minor [Turkey], Prov. Erzinçan, 30 km SE Ovaçik, upper Munzur valley, 1300 m". Bright yellow asterisk with thin black frame in Map.

Etymology: Named after Wolfgang A. Nässig.

Note: Koçak (1977: 134, fig. 43) was the first published record of a *Neoris* from Asia minor (Turkey). He wrote:

> *A very interesting capture of Saturniid moth was made by my friend Dr. A. Demirsoy from East-Turkey. A single male (fw. ca. 62 mm) has been labelled as "18. x. 1971, Kemaliye" by him. It is closer morphologically to* huttoni *Moore (NW-India) and* stoliczkana *Felder (Ladak, Yarkand) than* galerope *[sic] Püngeler (N-Iran) and* schenki *[sic] Staudinger (Saisan, Ferghana). As a matter of fact, we have insufficient knowledge on the exact taxonomical status of these forms in the genus* Neoris. *For that reason and the lack of more material from Turkey, the problem will keep in an undecided state for a time.*

Then, 15 years later, de Freina (1992) described the species on basis of further material from eastern Turkey (citing Koçak 1977, but not listing this Kemaliye specimen as PT).

Selected literature:

Neoris huttoni naessigi: De Freina (1992: 245).

Neoris naessigi: D'Abrera (1998: 44, 45 fig. ♂). Miranda & Peigler (2007: 437 *ff.*, fig. 1 ♀).

Saturnia naessigi: Peigler & Kendall (1993: 11).

Saturnia (Neoris) naessigi: Beeke & Paukstadt (2011: 319).

Perisomena huttoni naessigi: Lampe (2010: 361, pls. 319–321).

11. *codyi* Peigler, 1996

Saturnia codyi new species: Peigler (1996: 8, figs. 1–3).

Type material: ♂ HT (by original designation, Fig. 44) and 3 ♂♂ PTs, in BMNH (examined, W.A.N. & S.N., Fig. 45).

Type locality: "India sept. occ., Chitral, Yasin, 4000 m, early ix." [= Pakistan, NW Frontier Prov., Ghizar Mts., Yasin, 4000 m]. Bright green asterisk with thin black frame in Map.

Etymology: Named after the painting artist Dr. John Cody, Kansas, USA.

Note: In ZMHU, there is another specimen of *S. (Neoris) codyi* with the same data as the HT, which was not seen and considered as PT by Peigler (1996) (Fig. 46).

Selected literature:

Saturnia codyi: Peigler (1996: 8, figs. 1–3).

Saturnia (Neoris) codyi: Beeke & Paukstadt (2011: 319).

Neoris codyi: D'Abrera (1998: 44, 45; 2 ♂♂ PTs figured [not a pair as mentioned by D'Abrera]).

Revisional notes and descriptions of new taxa

(Species listed basically in ***geographical*** order, approximately from West to East and South to North, counted in roman numerals.)

Subgenus *Saturnia (Neoris)*

Neoris Moore, 1862

Twelve species contained:

I. *Saturnia (Neoris) naessigi* (de Freina, 1992)

(Figs. 42–43, 70, 114, 115–119, GP-Fig. F.)

Neoris huttoni naessigi: de Freina (1992: 245, illustrated).

Bold BIN and status: AAE0432; well-defined species both in morphology and in barcode.

Map: Bright yellow circles and asterisk (type locality) with thin black frame.

Diagnosis: Probably the largest species in the subgenus, with up to 65 mm forewing length in both sexes. De Freina (1992) in his descriptional part mentioned detailed differences to other taxa of the subgenus, such as size (of collected specimens), rounded fw. and hw., more intensively zigzagged in the costal part of the fw. antemedian line, and more intensively bent postmedian lines of fw. and hw. In addition to his description we found as further typical marking the almost rounded, very large fw. ocellus with a maximum diameter of up to 9 mm which is unique for the subgenus.

♂ **genitalia** (2168/10 SNB, 2501/16 SNB [GP-Fig. F]): Uncus with broad base, generally very broad, dorsolateral tips broad, short and acute. Dorsal process of the valves elongated, ventral process obvious, compared to other species, acute and prominent. Saccus broad. Dorsal processes of the juxta long, slender and acute at their tips, internal process straight and slender. In GP SNB 2501/16 the phallus is strongly connected with the juxta and not removable, so that, when manipulating this structure, the dorsal processes of the juxta are bent to the sides. Phallus straight, quite long.

Distribution: Central to eastern Asia minor (Turkey); Armenia; Iran: Zagros Mts., Buyer Ahmad province.

Material examined: Asia minor: type series, see above in catalogue. 1 ♂, 1 ♀, Tunceli Prov., Munzur Valley, 20 km NW Tunceli [ca. 39°20′ N, 39°15′ E], 1100 m, ex ovo ♂ 12. x. 1994, ♀ 7. ix. 1995, cult. H. Speidel; GP 2501/16 SNB; BC SNB 1948 (CSNB). 2 ♂♂, 1 ♀, same locality, 1200 m, 24.–25. viii. 1991, leg. F. Geck (CSLL). 1 ♂, 1 ♀, same locality, 1200 m, 24. viii. 1991, leg. Geck (CRLN). 3 ♂♂, 1 ♀, same locality, ex ovo x. 1993 on *Malus hillieri*, ova via W. A. Nässig (CRLN). 3 ♂♂, 2 ♀♀, Erzincan Prov., Munzur Valley, 30 km SE Ovacık, e.o. x. 1992 on *Malus hillieri*, via Geck (CRLN). 1 ♂, 40 km NE Elazığ [ca. 38°44′ N, 39°15′ E], 1400 m, ex larva x. 1991, larvae on *Salix, Carpinus,* leg. F. Geck (CSNB). 1 ♂, 1 ♀, Elazığ, ♀ 1. xi. 1994, ♂ 16. x. 1996 (CSLL). 2 ♂♂, 2 ♀♀, Elazığ env., e.o. 19. & 25. x. 1995, 29. x. 1996 (CABF). A few more specimens ex Asia minor, all reared material, in part obviously hybrids with probably *shadulla,* and no or incomplete locality data, in CWAN in SMFL. — **Armenia:** 3 ♂♂, 1 ♀, Jerivan env. [40°8′ N, 44°31′ E], ex wild collected ova, ♂♂ x. 1995, 23. x. 1995, 3. ix. 1997 [ex twice overwintered pupa], ♀ 26. x. 1995 on *Ligustrum japonicum,* cult. S. Naumann; GP ♂ 2168/10 SNB; BC SNB 1488 [♂, see Fig. 70], 3560 [♂] (CSNB). — **Iran:** 1 ♂, Buyer Ahmad Prov., Zagros Mts., Vazag [31°19′ N, 51°11′ E], 2450 m, 16.–19. x. 2009, leg. Hacz-Sum; BC SNB 3499 (CSLL).

Preimaginal instars: The preimaginals of this species were already figured for three populations from Turkey and Armenia by Lampe (2010); those from Armenia obviously did not result in imagines in Lampe's rearing, but fortunately some ova of this material were kept by one of the authors (S.N.) and gave a few imagines. We figure here again the larvae (Figs. 115–119) for direct comparison with other taxa. In addition, we show a picture of a mature larva from eastern Turkey reared and photographed by Toni Pittaway in our Fig. 113.

II. *Saturnia (Neoris) galeropa* Püngeler, 1900

(Figs. 31–34, 84–92, GP-Fig. G.)

Saturnia schencki galeropa: Püngeler (1900: 116, Taf. IV, fig. 1). = ‡*galerope:* Jordan (1911: 219); common misspelling.

Bold BIN and status: ABX5743; well-defined species both in morphology and in barcode.

Map: Bright blue circles and asterisk (type locality) with thin black frame.

Diagnosis: As mentioned in the original description, also a large species, in fact the second largest in the subgenus, with up to 58 mm Lfw. (Püngeler noted up to 52 mm). It is of reddish brown ground colour, the double postmedian line similarly to *S. (N.) naessigi* very undulate, intensively bent, but the basal black line of this marking thinner. Hw. ocellus round and large, the fw. ocellus more ovoid, small, with dark reddish brown center. Püngeler compared *S. (N.) galeropa* to specimens of the much smaller and more greyish *S. (N.) schencki,* thereby he could easily find differences.

S. (N.) galeropa is a very variable species, following the West-East gradients of average annual and monthly rainfall along the mountains from the very humid Talysh with summer rains in Azerbaijan and NW Iran along the Elburs mountains of N Iran to the semiarid Kopet Dagh in S Turkmenistan with dry summers, and as well *within* these Caspian mountain ranges from the humid and foggy northern slopes facing the Caspian Sea to the dry southern slopes facing the inland deserts (see Figs. 87–92). The specimens from humid places in mesophilous deciduous forest are more colourful, with warm tones of red (even pink on the margin) to brown and with colourful eyespots, while the specimens from dry areas in semiarid open slopes with hard-leaved and coniferous bushes and at best riverine deciduous forests are much less colourful dull greyish-brown and have less colourful eyespots. It is not yet clear whether this is a modificatory effect of ecological factors during the individual life of a specimen or whether this is a genetically determined polymorphism.

♂ **genitalia** (2170/10 SNB, 2500/16 SNB [GP-Fig. G]): Uncus with broad base, the dorsolateral tips broad and rounded, relatively short. Dorsal process of the valves almost rectangular, ventral process only slightly indicated as a round projection, sacculus very small. Saccus short and relatively slender. Dorsal processes of the juxta short, slender and very acute, internal process short, slender, and almost straight. Phallus straight and short, only about 1.8 mm, vesica without any projections.

Distribution: Through the mountain chains along the southern coastlines of the Caspian Sea from Azerbaijan (Talysh Mts., south of the river plains of the Kura river) across N Iran through Talysh, Elburs and Kopet Dagh Mts. (provinces Ardabil, Gilan, Mazandaran, Golestan, Northern Khorasan, Razavi-Khorasan) to Turkmenistan (Kopet Dagh Mts.) at more or less high altitudes. *S. (N.) galeropa* comes in its western range limits geographically rather close to *S. (N.) naessigi,* and in its eastern range it is found in southwestern Turkmenistan in the Kopet Dagh, while in the Kugitang Mts. in the southeastern edge of Turkmenistan already *S. (N.) shadulla* is found, in disjunct parapatric distribution, isolated by dry lowlands. — Interestingly, in the barcode NJ tree *galeropa* is found as direct sister-group to *shadulla,* while *naessigi* is placed quite distinct in the other main part of the subgenus *Neoris;* see the placement of these species in Text-Fig. A.

Material examined: Azerbaijan: 4 ♂♂, Talysh District, Masally, x. 1988 (CRLN). 1 ♂, same data (ex CRLN in CWAN in SMFL). 2 ♂♂, USSR, Talysh, Masally, 23.–26. x. 1988, leg. P. Kazarian (via CUPW in CWAN in SMFL). 1 ♀, [label in Kyrillic letters, transcription:] Talysh, Lerik, [leg.] R. Zffenli[?], "1971.11.10"[?] (CWAN in SMFL). — **Iran:** 1 ♂, Gilan Prov., 15 km SW Rast. Disku [37°1′ N, 49°35′ E], 200 m, 17.–18. xi. 2000, leg. B. Benedek & Gy. Fábián; GP 2500/16 SNB; BC SNB 3559 (CSNB). 2 ♂♂, same data (CSLL). 2 ♂♂, Mazanderan, Golestan, Golestan-NP, Tange-Gol, 700 m, 37°22′16.3″ N, 55°56′22.8″ E [GPS], trockene Eichenmischwälder am Ostrand des Elburs, semiarid, LF 28. x. 2003, leg. Chr. Wieser, Klagenfurt (SMFL); BC CWAN B3218-wn-D08 + -D09. 4 ♂♂, Golestan Forest, Almeh [37°19′ N, 56°7′ E], 12. ix. 1994, leg. Ali Reza Naderi; GP 2170/10 SNB; BC SNB 1493, 3571 (CSNB). 2 ♂♂, Gorgan, Golestan Forest, Almeh, 1650 m, viii.

1992, via L. Racheli (CSNB). 1 ♂, same data (ex CSNB in CWAN in SMFL). – **Turkmenistan:** 2 ♂♂ [LT and PLT], Persia sept. [close to present Iran borderline], Kopet-Dagh [near Ashkhabad], 1899, coll. Püngeler (ZMHU). 1 ♀, same data (no type), but 1900 (ZMHU). 2 ♂♂, (SW) Kopetdag, Garrygala [38°25′ N; 56°17′ E], 20. x.–10. xi. 1994, leg. Miatleuskij; BC SNB 1490 (CSNB). 1 ♂, same data (CABF). 1 ♂, same data (CWAN in SMFL). 3 ♂♂, Kopetdag Mts., Sumber River Valley, Gosch-Demir vill. [ca. 37°56′ N, 57°48′ E], 21.–22. x. 1995, leg. J. Miatleuskij (CSLL). 16 ♂♂, 4 ♀♀, W. Kopet-Dagh, NSG Sunt-Charzadagh, Abhänge des Berges Sunt ["slopes of Mt. Sunt"], ca. 850 m, 13. x. 1996, leg. O. Targonia, via Z. Kljutschko (in CWAN in SMFL); BC CWAN B3218-wn-D10. 1 ♂, same data, but 800–900 m, LF 5.–15. x. 1988, via Z. Kljutschko (in CWAN in SMFL); BC CWAN B3218-wn-D11. – Further: 10 reared old specimens "Kopet Dagh", no details (i.e., Iran or Turkmenistan?).

Preimaginal instars: The first (and so far only) picture of a caterpillar of *Saturnia (Neoris) galeropa* which we received was from an expedition by Robert Trusch and others of the LNK to the cloud forest areas of the eastern Elburs (mainly Prov. Golestan, Figs. 84–85) in Iran in April 2008, where the larva was found crawling around on the ground looking for a place for cocoon construction. The caterpillar pupated and hatched in Germany in Karlsruhe in autumn/winter 2008/09 (all *Neoris* are autumn fliers), and it was overlooked because it was erroneously expected that the pupa would hibernate. So the male flew in the pupal cage, got severely damaged, died and then received some fungal infection in the abdomen (Fig. 86), and was only discovered later. Under the natural climate in humid areas of the Elburs, the ground colour of the mature larva was entirely green.

Notes: Wieser & Stanglmeier (2005) in their report of nocturnal Lepidoptera found in the Elburs mountains in northern Iran (Mazandaran, Golestan, Khorasan) during an expedition in 2003 quote several localities where they found *S. (N.) galeropa,* most of which we have plotted in our map (in part overlapping with other localities closeby, so separate dots are omitted for these). Further general information on some of the localities were already published by Gutleb & Wieser (2002), with details on humidity and plant ecology. See also Figs. 87–92.

III. *Saturnia (Neoris) eckweileri* Nässig, Naumann & Löffler sp. n.

(Figs. 47, 113, GP-Fig. H.)

Holotype ♂ (Fig. 47): "**Pakistan:** Beluchistan, Urak vic., ca. 1800–2000 m, Larva in Verpuppungsfärbung in Apfelanbau auf Straße, leg. W. Eckweiler 1983, e.l. 16. xi. 1983, in coll. W. A. Nässig". Barcode: B3218-wn-F12, number in type catalogue of SMFL: SMFL 4698. A red HT label will be added accordingly. – No paratypes.

Etymology: Dedicated to its finder, Dr. Wolfgang Eckweiler, Frankfurt am Main, Germany (presently Chairman of Entomologischer Verein Apollo e.V. in Frankfurt).

Bold BIN and status: AAB4399; well-defined species both in morphology and in barcode.

Map: Red asterisk with black frame (only type locality known).

Diagnosis: Another large species within the genus. It is of dark greyish brown ground colour, markings such as fw. antemedian area, antemedian and postmedian lines even darker, the postmedian followed with white portion, and the outer margin of dark grey colour. Fw. and hw. ocellus rounded, medium-sized, that of the hw. with broad outer black circle. As only a singleton is known so far, nothing can be said about variability.

Description: ♂ (HT, a specimen hatched in Europe, not in the natural biotope under natural conditions): Lfw. 56 mm. The single known specimen is of dark greyish brown ground colour on dorsal side. Antennae quadripectinate, as usual for the genus, and with 36 segments, 18.5 mm long, longest rami around 4 mm. Head, thorax and abdomen in ground colour, the head with broad white collum, the abdomen with intersegmental white stripes. Fw. antemedian area of homogenous dark brown colour, with costal white portion, antemedian and double postmedian line of same colour, median area in the basal half light grey, in the marginal half dark grey. The postmedian lines are followed by a wide white submarginal line, the marginal area of dark olive brown colour. Fw. ocellus little ovoid, almost round, 6.5 mm maximum diameter. Hw. with same dark ground colour, with contrasting dark ante- and double postmedian lines. The almost round ocellus with 8 mm diameter has a broad outer black circle and olive center. Submarginal and marginal area as in fw. Ventral side of dark greyish colour, lighter than dorsal side, and, as usual in the subgenus, with less markings. Ante- and double postmedian line of same colour as dorsal, but postmedian less undulate. Hw. ocellus without the broad black outer circle. – ♀ unknown.

♂ genitalia (GP 2498/16 CWAN [*fec.* SNB], HT; GP-Fig. H): Uncus with narrow base, very long and ending with acute, pointed distal tips, easily to separate from, e.g., that of *S. (N.) naumanni* n. sp. or *S. (N.). codyi* (both with broad base and short tips). Apex of the valves rounded, ventral process only slightly indicated as a rounded extension, no real process. The internal dorsobasal process of the valves quite well developed. The juxta with two long and acute processes, internal process of the juxta with broad, spoon-like end. Phallus straight, ending with a bent, rounded margin, vesica with two processes in dorsal projection.

Notes: Similar to an observation published by Chander (1977) for *S. (N.) huttoni* somewhere in Himachal Pradesh (no details of locality provided by Chander, probably around Shimla), the larva of *S. (N.) eckweileri* apparently is also feeding on apple (*Malus domesticus,* Rosaceae) in plantations.

This singleton was in the hands of the senior author of the present publication since winter 1983/84. For over 30 years we tried to get hold of further specimens, but have not been successful. So, after we got a complete sequence analysis of the 658 bp of the barcode in 2009 showing sufficient distance to other species (see Text-Fig. A, NJ-tree), we finally decided to describe this species now within the revision of *Neoris* and dedicate it to its collector, who found a caterpillar walking along a driving way within an apple plantation in Pakistanian Beluchistan, vicinity of Urak, during one of his earlier butterfly collecting trips. The larva soon pupated (the cocoon is illustrated in Fig. 112) and the male hatched in November 1983 in Germany.

Preimaginal instars: Regrettably there is no picture of the larva.

IV. *Saturnia (Neoris) naumanni* Naumann, Nässig & Löffler sp. n.

(Figs. 48–50, GP-Fig. I.)

Holotype ♂: Afghanistan (NE), Wakhan valley, Zemestani Baharak, 3300 m, 23. vii. 1971 UV-Li., leg. Ebert & Naumann, coll. Nr. 261; genitalia no. 2515/16 SNB; BC SNB 3294 [no result] (LNK) (Fig. 48). – A red HT label will be added accordingly.

Paratypes (in total 31 ♂♂, 2 ♀♀), all from **Afghanistan:** 2 ♂♂, same locality as HT, but 24. & 25. vii. 1971, UV-Li., leg. Ebert & Naumann, BC SNB 3293 [no result]. 6 ♂♂, Wakhan valley, Darrah e-Shaur, 3450 m, 25. vii. 1971, leg. Ebert & Naumann. 2 ♂♂, (E), Sarobi [32°46′ N, 69°5′ E], 1150 m, x. [19]63, leg. Hammer, *Neoris huttoni schencki* Stgr., P.-C. Rougeot det. (1 ♂: Fig. 50); 1 ♂ with genitalia no. 2509/16 SNB; BC SNB 3132 [no result]. 1 ♂, (E), Djebel-Seratsch, Kohdaman, 1650 m, 13. x. 1952, leg. J. Klapperich; *Neoris huttoni schencki* Stgr., P.-C. Rougeot det. 1966. 1 ♂, (SE), Safed Koh, Kotkai, 2350 m, 29. ix. 1967, leg. M. Müller. 6 ♂♂, 1 ♀ (Fig.

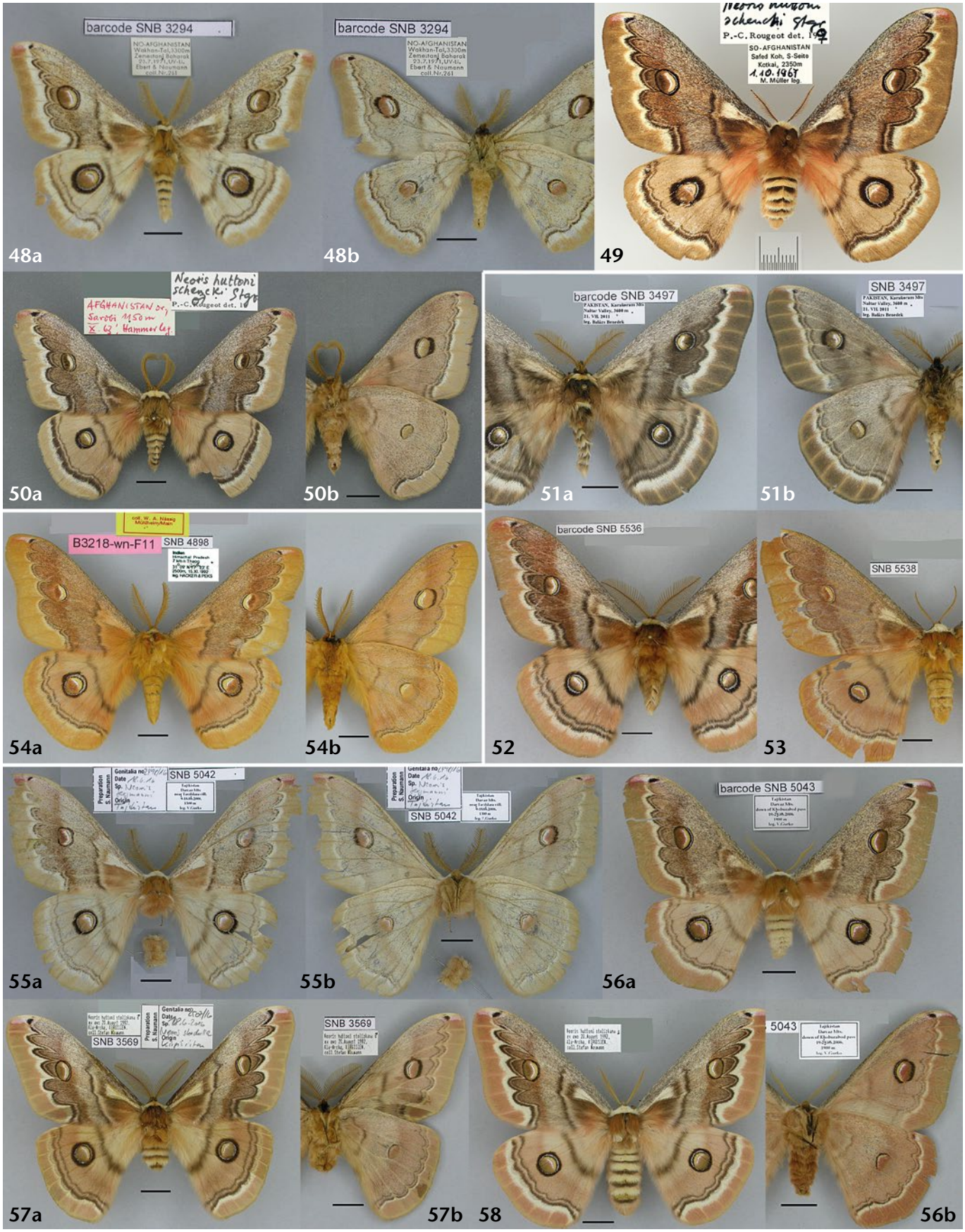


Plate 6: *Saturnia (Neoris),* Imagines. **Figs. 48–58:** Recent specimens and types. — **Figs. 48–50:** *S. (N.)* ***naumanni*** **sp. n.; 48a, b: HT** ♂ by original designation; **49:** PT ♀; **50a, b:** PT ♂; LNK. — **Figs. 51–53:** *S. (N.)* ***codyi,*** recent material from Pakistan (in CSLL) exhibiting wide variability, but with nearly identical BC [BC no. in pictures, compare Tab. 2]; **51a, b:** ♂, Karakorum, Naltar valley; **52:** ♂, Azad Kashmir; **53:** ♀, NW Frontier, Khyber Pakhtunkhwa. — **Fig. 54:** *S. (N.)* ***huttoni,*** ♂, India,Himachal Pradesh; CWAN in SMFL. — **Figs. 55–58:** *S. (N.)* ***bergmanni*** **sp. n.; 55a, b: HT** ♂ by original designation, Tajikistan (CSNB in ZMHU); **56a, b:** PT ♀, Tajikistan; **57a, b:** PT ♂, Kyrgyzstan [BC SNB 3569: only 407 bp, discarded]; **58a:** PT ♀, Kyrgyzstan (all in CSNB). — LNK photos in Figs. 50a, b by Robert Trusch; other museum photos by S. Naumann [LNK, CSNB, ZMHU, CSLL, SMFL].

49), same locality, 1. x. 1967, leg. M. Müller. 5 ♂♂, same locality, 3. x. 1967, leg. M. Müller. 1 ♂, same locality, 5. x. 1967, leg. M. Müller. 4 ♂♂, 1 ♀, same locality, no date, leg. M. Müller. – All these in LNK. – 1 ♂, same locality (Safed Koh, Kotkai, 2350 m), 3. x. 1967, leg. M. Müller; *Neoris huttoni schencki* Stgr., P.-C. Rougeot det. 1968 (ex LNK in MNHN). – 1 ♂, Kotale, Salang, ca. 3100 m, 17. ix. 1972, leg. Dr. Reshöft; BC B3218-wn-G01 and SNB 4943 [both without full result] (CWAN in SMFL). – Blue paratype labels will be added accordingly. One of the ♂ specimens from Safed Koh will be deposited in the collection of S.N., to be deposited within the Rainer Seegers Foundation in the collections of ZMHU lateron.

Etymology: Dedicated to the late Prof. Dr. Clas M. Naumann [zu Königsbrück], formerly professor at Bielefeld University and director at ZFMK (for further biographic details, see, e.g., Häuser 2004), collector of some of the specimens of the type series (including the HT), in recognition of his field work in difficultly accessible areas in Afghanistan as well as on the family Zygaenidae. The coauthor S.N. is not related to C. M. Naumann.

Bold BIN and status: So far, we did not receive any full barcode sequence data from these specimens from Afghanistan (probably due to age: most of the museum specimens from Afghanistan were collected in the 1970s or before, i.e., they are now 40 or more years old and have been softened at least once for setting, and for the problems with the actual "fast DNA analysis" protocols of Bold, in contrast to former "forensical" methods, compare Nässig et al. 2016: 52). These populations are presently in areas more or less inaccessible due to civil unrest, and it is unlikely that fresh material for successful barcode analyses will presently be obtained. – See also below under "Notes".

Map: Black asterisk (type locality) and rhombi with white frames.

Diagnosis: A species which shows some variability both in size and colour. Generally small to medium-sized representative of the subgenus, with vivid greyish-brown colour and intense markings. We chose a smaller ♂ as HT which shows all typical elements such as contrasting pattern, greyish-brown pattern elements, quite rounded fw. and hw. ocelli, broad white portion in the submarginal area, and somewhat elongate forewings. Specific status is supported by unique ♂ genitalia structures. No similar forms are found around the distribution of *S. (N.) naumanni* in Pakistan, Uzbekistan, other bordering countries or further west, thereby the species easily can be separated from its geographically neighbouring species *S. (N.) shadulla*, *S. (N.) codyi* and *S. (N.) eckweileri* sp. n.

Description: ♂: Lfw. 42–48 mm, thereby rather small for the subgenus. All known specimens show a reddish brown to vivid reddish ground colour. Antennae quadripectinate, with about 36 segments, 14–16 mm long (HT 14.0 mm), longest rami about 3.5 mm. Head, thorax, and abdomen in ground colour, the head with broad white collum, the abdomen with broad white intersegmental stripes. Fw. antemedian area reddish, with small white costal portion, antemedian line dark and almost straight. Median area of homogenous greyish brown colour, suffused with lots of white scales, only some specimens with darker shade to the two black tiny postmedian lines. Fw. ocellus almost rounded, about 7 mm maximum diameter, relatively large for the subgenus. Fw. postmedians are followed by a wide white portion and a marginal area in ground colour. Hw. of same colour as fw. marginal area, with large rounded ocellus of about 7.5–8.5 mm maximum diameter (HT 8 mm) with broad outer black circle. White submarginal portion again broad, marginal area as in fw. Ventral side lighter, but pattern as in all other species.

♀: Aside from typical sexually dimorphic characters there are no fundamental differences in pattern and colour (see Fig. 49).

♂ genitalia (GP 2509/16 SNB, 2515/16 SNB HT [GP-Fig. I]): Uncus elongate with broad base, with two relatively short and acute dorsolateral processes, thereby resembling somewhat those of *S. (N.) codyi* and *S. (N.) eckweileri* sp. n., but which bear even more acute processes. Apex of the valves rounded, slender, ventral process triangular, considerably prominent. Dorsal processes of the juxta of medium length, slender and acute, internal process short, straight, and at its internal end widened, spoonlike. Phallus straight, vesica rounded with small processes.

Distribution: Specimens were collected at different places in eastern Afghanistan (see Map), including the Wakhan valley between the Pamir and the Hindu Kush mountain systems in the narrow "panhandle" in the NE, where they come rather close to the area of *S. (N.) codyi*. However, in spite of the distances between the localities and the lack of supporting barcode data, we believe that the populations from E and SE Afghanistan (the species is obviously widespread in the Hindu Kush and Koh-i-Baba mountain systems of Afghanistan) represent the same species as the topotypical population from the far NE in the Wakhan valley, based mainly on ♂ genitalia. – Although mentioned on some labels in the type series to be from "SE Afghanistan", this locality in the Safed Koh mountains is in fact somewhere southeast of Kabul in *eastern* Afghanistan, Paktia Province, near to the Pakistan borderline, at around 33°58′ N, 69°50′ E. The locality is also shown on a map figured by Ebert (2010: 193).

Preimaginal instars: A green, apparently mature larva was illustrated by C. M. Naumann (1978: fig. 38, an imago see in the centre bottom of his fig. 39); some short words on behaviour and ecology see C. M. Naumann (1978: 211). The larva apparently fed on dwarf shrubs of *Salix* in high mountains in some sort of "Alpine tundra" just at the ground.

Notes: *S. (N.) naumanni* n. sp. was provisionally classified with *N. huttoni schencki* by Rougeot (1969: 163), and differentiated only from *N. galeropa*. He mentioned some of the records hold in LNK, and obviously from this work one specimen remained in the collections of MNHN. C. M. Naumann (1978: 211) mentioned the species as *Neoris huttoni* ssp. *stoliczkana*. Koçak & Kemal (2012: 126) classified it as *Saturnia (Neoris) shadulla* and provided a list of over 30 [unexplained!] locality codes for the entire complex (either of *Neoris* [all species] or of a very wide concept of *shadulla*? Not stated).

When using the only existing short and incomplete mtDNA sequence of only 248 bp of a *Neoris* specimen from Afghanistan, which resulted for sample SNB 4943, in the calculation of a NJ barcode tree (Mega5), this sequence comes out closest to *S. (N.) eckweileri*. However, as this sequence is so short, we discarded it from our tree published here to have a better data quality and clearer statistics. In fact, it may or may not indicate a closer relationship of the Afghanistan *Neoris* to *eckweileri* from Beluchistan.

There was found some unusual variability in size in this species, although all specimens are (according to their labels) collected in the wild and not reared. We interprete this as result of partially small choice of larval food in the often very dry mountain habitats.

V. *Saturnia (Neoris) codyi* Peigler, 1996

(Figs. 44–46, 51–53, GP-Fig. J.)

Saturnia codyi: Peigler (1996: 8, figs. 1–3).

Bold BIN and status: AAD6590 [*sic*, compare *huttoni*]; rather well-defined species in morphology (but with a high pattern and colour variability, perhaps the highest variability for a taxon of *Neoris* so far observed); however, only weakly separated in Bold's barcode from *huttoni* (which may be caused by only one single barcode sequence of *huttoni* being available presently).

Map: Bright green asterisk (type locality) and circles with thin black frame.

Diagnosis: Very variable species, the type series consists of dark greyish to chocolate brown specimens (see type series, Figs. 44–46) with peculiar marking which look very distinct to everything else known in the subgenus, but recent collecting around the type locality and in other high altitude places in northern Pakistan and at the border to India in currently unclear assigned Kashmir area resulted in small series of very variable specimens, partly in the colour of the type series (Fig. 51), but also more greyish-brown (not illustrated) or just warm brown colourful ones (Figs. 52, 53), which turned out to be conspecific, based on male genitalia morphology and DNA barcoding results. The causes for this polymorphism are presently unknown; it may depend on elevation and ecological effects of climate or weather at these elevations or similar.

♂ **genitalia** (GP 2169/10 SNB, 2499/16 SNB [GP-Fig. J], 2510/16 SNB ZMHU topotype): Uncus with relatively narrow base, quite long and with two short, very acute processes with deep furcation in between; the general form overall is shared with genitalia of *S. (N.) bergmanni* sp. n., but the tips of the processes are much more acute in *S. (N.) codyi*. Apex of the valves elongated, rounded, ventral process visible as short round protuberance. Juxta with relatively long and slender dorsal processes, which are rounded at their tips, the internal process is almost straight and short, corresponding with a short, only around 1.7 mm long phallus. The saccus is broad-based and short. By the generally smaller size of the *S. (N.) codyi* ♂ genitalia plus the form of the uncus and juxta both *S. (N.) codyi* and *S. (N.) huttoni* can easily be separated from each other, although Bold calculated the same BIN code number for both.

Distribution: Higher elevations of the Chitral Himalaya and surrounding in Pakistan.

Material examined: Pakistan: 1 ♂ HT (Fig. 44), NW Frontier Prov. [Chitral], Ghizar Mts., Yasin, 4000 m, early IX. (BMNH) [ca. 36°23′ 13.18″ N, 73°17′59.04″ E]. 2 ♂♂ PTs, same data (BMNH). 1 ♂ [Fig. 46], same data [no type]; *Saturnia codyi* ♂, Peigler 1996, det. S. Naumann; GP 2510/16 SNB (ZMHU). 1 ♂ PT [Fig. 45], Azad Jammu & Kashmir, W. Gilgit Prov., Bulachi [Belachi], 12000 ft., 17. VIII. 1923, [leg.] Maj. C. H. Stockley (BMNH) [ca. 36°0′ N, 71°10′ E]. 1 ♂, NW Frontier Prov., Chitral ["Chatral"; ca. 35° 50′ N, 71°46′ E], VII. 2007, leg. Abdul Rehman Azeemi, received I. 2008; GP 2169/10 SNB; BC SNB 1491 (CSNB). 1 ♀, NW Frontier Prov., Abatabad Distr., Khairi Gali, rd. Muree–Nathia Gali [34°8′ N, 73°22′ E], 8. XI. 2008, leg. Liquat Ali; BC SNB 5538 [Fig. 53] (CSLL). 1 ♂, Karakorum Mts., Naltar Valley [ca. 36° 10′ N, 74°9′ E], 3600 m, 21. VII. 2011, leg. B. Benedek; GP 2499/16 SNB, BC SNB 3497 [Fig. 51] & 5535 (CSLL). 1 ♂, Kashmir, Deosai Mts., Bubin village [34°58′ N, 75°23′ E], 3150 m, 13. & 17. VII. 2001, leg. B. Benedek & G. Ronkay; BC SNB 1223 (CSLL). 1 ♂, Kaghan Valley, Saiful Muluk [34°46′ N, 73°31′ E], 3100 m, 24. VIII. 1997, leg. Gy. Fábián & G. Ronkay; BC SNB 5537 (CSLL). 1 ♂, Nazhar Valley, 1. IX. 1931, no. 580, coll. D. H. Eckerlein (MNHG). — **[India/Pakistan borderline:]** 1 ♂, 1 ♀, Kashmir, Deosai N.P., Chilam Sherkuli, 3600 m, 2. VIII. 2011, leg. B. Benedek; BC SNB 3498 & 5536 [♀, Fig. 53] (CSLL).

Preimaginal instars: unknown.

Note: Very variable species, compare Figs. 44–46 and 51–53. See also the Notes for *huttoni* and *stoliczkana*.

VI. *Saturnia (Neoris) huttoni* (Moore, 1862)

(Figs. 23–24, 54, GP-Figs. E [detail juxta/phallus], K.)

Neoris huttoni: Moore (1862: 321, not illustrated).

Bold BIN and status: AAD6590 [*sic,* compare *codyi*]; well-defined species in morphology, but only weakly separated in Bold's barcode. See comment above.

Map: Orange asterisk (type locality) and circles with thin black frames.

Diagnosis: Easily determinable by its reddish to orange brown ground colour in combination with medium to large size and little elongate fw. This typical faunal element of lower, humid slopes of northwestern parts of the Himalaya shows a prominent median line or shadow in the median area, the otherwise double post-median line is reduced to a very tiny first and little larger outer second line, less prominent than in all other species. The following white submarginal line is narrow, the marginal area very broad, of ochreous orange colour. Hw. in the same vivid colour, double post-median line here clearly visible.

♂ **genitalia** (GP 2499/16 CWAN [*fec.* SNB, GP-Fig. K], 2513/16 SNB, 2514/16 SNB [GP-Fig. E]): Uncus broad-based, long, with indention half-way, and two spread, bent dorsal processes with sharp tips. Valve apices broad and rounded, ventral process prominent as rounded triangle, sacculus existent. The internal dorsobasal process at the base of the valves well developed. Dorsal juxta processes long, slender and acute, internal process short with spoon-like end. In preparation 2514/16 SNB juxta and phallus were strongly connate and thereby removed in total; in lateral view of this structure the position of the internal juxta process and its connection with the phallus as a conduction for that part can easily been seen (see GP-Fig. E). Corresponding with the relatively large size of the genitalia the phallus is also longer than in nearby occurring taxa such as *S. (N.) naumanni* sp. n., *S. (N.) eckweileri* sp. n., or *S. (N.) codyi*. As mentioned already under the genitalia description of the latter, both taxa can easily be separated by their different ♂ genitalia structures, in spite of the identical Bold BIN code.

Distribution: India, Himalaya: state of Uttarakhand, also in the neighbouring state of Himachal Pradesh (specimens in BMNH, ZMHU, ZSM, and SMFL; see also Peigler 1996: 9); possibly also Punjab (de Freina 1992, but see also below).

Material examined: India: 1 ♂ HT (Fig. 23), Uttarakhand, Masuri, Garhwal Mts., vicinity of Dehradun, ca. 2160 m (BMNH). 1 ♀ (Fig. 24), [Uttarakhand], Masuri (BMNH). 1 ♂, 1 ♀, Mussoori, coll. Atkinson > coll. Staudinger; ♂ GP 2514/16 SNB (ZMHU). 1 ♂, Punjab [now Himachal Pradesh], Simla, Kufri Mt.; ♂ GP 2513/16 SNB (ZMHU). 1 ♂, same data (BMNH). 2 ♂♂, Punjab [now Himachal Pradesh], Simla, Kufri Mt., 2500 m, coll. Stgr. 1942, ex coll. Kager (CRLN). 1 ♂, Umballa [now Chandigarh], leg. Kramer (NHMW). 1 ♂, Kullu [now Himachal Pradesh] (ZSM). 1 ♂ (Fig. 54), Himachal Pradesh, 7 km N Theog, 31°9′ N, 77°23′ E, 2500 m, 16. XI. 1992, leg. Hacker & Peks, c/o P. Kautt in CWAN 1995; GP 2499/16 CWAN [*fec.* SNB], BC CWAN B3218-wn-F11 = SNB 4898 (CWAN in SMFL). — 1 ♂, "Silhet" [this would be in today's Bangla Desh; but it is surely mislabelled, i.e. no reliable locality data available and not shown in Map. Compare Naumann et al. (2010b: 130–131) for similar cases; Silhet was probably just the shipping port for the material], coll. Maassen, no. 75136 (ZMHU).

Preimaginal instars unknown. Chander (1977) reported larvae from a single observation as a "pest" on apple (*Malus domesticus,* Rosaceae) in apple orchards, probably somewhere near Shimla, Himachal Pradesh.

Notes: There is a pair stored in the type collection of OUM, both specimens originating from "E. India, Captn. Hutton", labelled with "A" and "1162". The female bears a handwritten label "*Saturnia stoliczkana* Felder Plate 57, f. 3". Both specimens clearly can be identified externally as *S. (N.) huttoni,* and for sure are not illustrated in Felder's type picture of *S. (N.) stoliczkana*. There is no locality given for the origin of this pair.

Similarly, there is a ♂ in ZMHU, labelled as "*stoliczkana* Felder, coll. Weymer" (very bleached and worn), without any locality data. This specimen is clearly not *stoliczkana,* but apparently a wreck of *S. (N.) huttoni*.

VII. *Saturnia (Neoris) stoliczkana* C. & R. Felder, 1874

(Figs. 25, 28.)

Saturnia stoliczkana: C. & R. Felder (1874, illustrated; faksmile copy see in our Fig. 25).

Bold BIN and status: No Bold BIN available; this is a somewhat "provisional species" due to the lack of recent material. There was no recently collected material (neither from the Spiti valley nor from anywhere else in the area of Ladakh *s.l.,* compare discussion above) available so far for obtaining a barcode.

Map: Bright grey asterisk (type locality) and circle (Rohtang specimen, see below) with broad orange frames.

Diagnosis: The species is known only from two very old ♀ specimens which we separate from *S. (N.) huttoni* and *S. (N.) codyi* by their different colour and pattern and from their distribution at higher altitudes in the northwestern parts of the Indian Himalaya on the "dry side" behind the wet monsoonal southern ranges. The ground colour is greyish white, the fw. median line is missing, proximal and marginal part are separated more by their different shade of grey. The outer postmedian line is more prominent, the white submarginal line intense, and the marginal area smaller than in *S. (N.) huttoni*. So far only 2 ♀♀ are known, and due to the age of the material no DNA sequencing with actual "quick modern" methods seemed to be promising, and no attempts of a "forensic" sequencing were undertaken yet.

As no ♂ is known, external and genitalia morphology of ♂♂ have not been studied and compared to other species so far.

Distribution: India, Himalaya: Uttarakhand, Kashmir; only known from the type locality "Lossar" in the Spiti valley and in Kashmir from the Rohtang pass (which is much closer to the regular monsoon rains than the Spiti valley, see Notes below).

Material examined: ♀ LT (Fig. 28), [**India**, Uttarakhand, Kashmir], Ladakh, Lossar, 13,500 ft. (BMNH). 1 ♀ (no type), [Uttarakhand], Kashmir, 12,000 ft., "top of highest Birch forests east of the Rhotang on side of Dourni Peak" (BMNH).

Preimaginal instars: unknown.

Notes: In the legends to the "Reise der Novara" plates, the locality of the single type specimen is listed only as "Ladak (Stoliczka)", see above. However, the type specimen (illustrated in our Fig. 28) shows a label with data "Lossar, 13,500 [ft.]", which we found to be in the Spiti valley, much closer to the known area of *S. (N.) huttoni* (see above in the systematic catalogue), and plotted it accordingly on our Map. The second specimen in BMNH from the Rohtang pass (figure see D'Abrera 1998: 44–45) comes from a place even closer to the habitats of *S. (N.) huttoni* on the monsoonal side, although apparently already just behind the first southern chain of the Himalaya. This Rohtang specimen is also much more colourful than the type of *stoliczkana* (see the pictures in D'Abrera).

The type locality of *S. (N.) stoliczkana* is quite close to the distribution area of *S. (N.) huttoni,* so one may speculate about conspecifity, but the LT looks externally clearly different from *huttoni* and appears to represent a well-defined species in morphology. However, it could also be a case similar to *S. (N.) galeropa,* with colourful specimens in the rainy southern slopes of the Himalaya (= *huttoni*) and much less colourful specimens in the dry valleys behind the high peaks of the first mountain chains (= *stoliczkana*), especially so when looking at this Rohtang specimen in BMNH, which is apparently somehow intermediate in its colouration between the two taxa. — Also, *S. (N.) codyi,* which is externally a very variable species and has received the same Bold BIN as *S. (N.) huttoni,* for some of its variants (see Figs. 52–53) appears to be externally comparatively similar to *S. (N.) stoliczkana* and *huttoni.*

There is a photo on Flickr (Nanda 2006, no download permitted) which shows a specimen from the Spiti valley (i.e., = *stoliczkana?*) which apparently exhibits a dark colour form similar to *codyi.*

It appears to be necessary to get more recent material for barcode analyses and other studies, both from the areas between the presently known localities of *codyi* and *huttoni* as well as of *stoliczkana* from the dry inner Himalaya valleys behind the first mountain chains as well as from geographically and ecologically "intermediate" biotopes in between. If also *codyi* would join in (on basis of longer series of specimens and barcodes, in spite of the observed genitalia differences), their dark habitus might be interpreted as a form of extreme elevations (caused by low temperatures or other ecological effects?) in the highest zones of the distribution.

VIII. *Saturnia (Neoris) bergmanni* Naumann, Löffler & Nässig sp. n.

(Figs. 55–58, GP-Fig. L.)

Holotype ♂: Tadjikistan, Darvaz Mts., near Tavildara vill. [ca. 38°41′ N, 70°29′ E], 1300 m, 9.–18. viii. 2006, leg. V. Gurko; (received in CSNB from V. Gurko Prag iii. 2013); GP 2498/16 SNB, BC SNB 5042 (CSNB) (Fig. 55). — A red HT label will be added accordingly. The HT will be deposited within the Rainer Seegers Foundation in the collections of ZMHU.

Paratypes (in total 12 ♂♂, 5 ♀♀): **Tadjikistan:** 1 ♀, Darvaz Mts., below Khoburabod Pass [ca. 38°39′ N, 70°44′ E], 1900 m, 19.–29. viii. 2006, leg. V. Gurko; BC SNB 5043 (CSNB) (Fig. 56). 1 ♂, same data (CABF). 1 ♂, 1 ♀, USSR, Vakhan Ridge, Nurek, 38°25′ N, 69°30′ E, ex larva x. 1981, leg. J. A. Vaněk; BC SNB 3567, 3568 (CSNB). 1 ♂, Pamir, Kon-Dara river [ca. 38°47′ N, 68°49′ E], 16. x. 1965 (CABF). 1 ♀, Kondara Gorge, Kondara, garden no. 37 [ca. 38°47′ N, 68° 49′ E], 1100 m, e.l. 2. x. 1954 [with handwritten notes: larva spun cocoon 18. v. 1954, wing venation visible 24. ix. 1954], leg. J. Tshotkin [in Cyrillic letters] (CABF). 4 ♂♂, Hissar Mts., Kondara Gorge [ca. 38°47′ N, 68°49′ E], 1800 m, 10., 12., 17., 20. ix. 1955 [in Cyrillic letters] (CABF). — **Kyrgyzstan:** 2 ♂♂, 2 ♀♀ [1 ♂, 1 ♀ see Figs. 57–58], Kirgisien, Ala-Archa [42°38′ N, 74°28′ E], ex ovo 20. viii. 1992; ♂ GP 2507/16 SNB; BC SNB 3569, 3570 [both resulted only in 407 bp, therefore discarded; determination via external morphology and ♂ GP] (CSNB). 3 ♂♂, Kirgisia, Kungei Alatau, Cholpon Ata, ex larva, c/o W. Eckweiler von russischem Züchter 1993; 1 ♂ GP 2496/16 CWAN, 1 ♂ GP 2500/16 CWAN [*fec.* SNB], BC (CWAN) 3218-wn-F03, -F04, -F05 (CWAN in SMFL).

Etymology: Named after Andreas Bergmann, Forst/Lausitz (Brandenburg, Germany), because he noticed independently from us what he thought to be a separate, undescribed species of *Neoris* in Tadjikistan. It was not exactly this species which now carries his name, but this was only due to misidentified names and name-locality associations in literature. When he noticed that his identification was problematic, he came to the authors of the present paper and showed us all his results.

Bold BIN and status: AAB4398; well-defined species in barcode, slightly less clearly in morphology.

Map: Bright turquoise blue asterisk (type locality) and circles with yellow frames.

Diagnosis: *S. (N.) bergmanni* is a medium sized species with relatively elongated both fw. and hw.; it is of light reddish to ochreous brown colour. It differs from *S. (N.) shadulla* by ist different fw. and hw. form, the lighter overall colour, less black outer portions of both fw. and hw. ocelli, details in the markings and ♂ genitalia morphology.

Our first attention on that species was drawn by the results of the Bold barcoding results when some of the specimens earlier identified under *S. (N.) shadulla* resulted in distinct barcodes. Sorting all those specimens out made the *shadulla* series in our hands more consistent in its characters, and the resulting pool of spe-

Plate 7: *Saturnia (Neoris),* imagines. — **Figs. 59–67:** *S. (N.)* ***shadulla;*** **59a, b:** ♂ Xinjiang; **60a, b:** ♂ Xinjiang; **61a, b:** ♀ Xinjiang (same data as Fig. 59, so the BC SNB 5252 may also represent this ♀); **62a, b:** ♂, Uzbekistan, close to border triangle with Tajikistan and Afghanistan (all these CSNB); **63a, b–64a, b:** Tajikistan, West Pamir, NW Rushan Chain; **63:** ♀, **64:** ♂ (all CABF); **65:** ♂, Uzbekistan, Tien Shan, Chimgan; BC SNB 4945; **66:** ♂, "Kazakhstan, Almaty, Kizil Zsar", BC CWAN B3218-wn-F02 [= *shadulla*] (all CWAN in SMFL); **67:** ♂, "Kazakhstan, Almaty, Kizil Zsar", BC SNB 1492 [= *schencki*] (CSNB); for the last two specimens see discussion in text under *S. (N.) shadulla* and *schencki.* — **Figs. 68–69:** *S. (N.)* ***schencki;*** **68:** ♂, [PR China, Xinjiang Uygur aut. region], Kuldja = Gulja = now Xining (coll. A. Seitz in SMFL); **69:** ♂, Kazakhstan, Saur Range, Zaisan, reared (ex CRLN in CSNB). — **Fig. 70:** *S. (N.)* ***naessigi,*** ♂, Armenia, vic. Jeriwan, reared (cult. S.N., in CSNB). — All photos by S. Naumann [CSNB, CABF, (partim ex CWAN in) SMFL].

cimens from Tadzhikistan and Kirgistan showed some astonishingly consisent characters as well, so we decided to describe that species as new. We do not yet have a plausible explanation for the fact that representatives of *S. (N.) bergmanni* were found at two widely separated places so far, but this may be explained either by gaps of collecting in between, relicts of formerly connected populations, or, less plausible, that one population was transported by chance by man on e.g. carried fruit trees or other traded goods and founded a population at another place. – From the surroundings of Bishkek there are also several records of *shadulla* (see material list of *shadulla*), which we could not enter into the map because of overlapping symbols.

Description: ♂: Lfw. 50–51 mm (no reared specimens measured), the fw. elongate, outer margin a little convex rounded (*shadulla:* concave). Ground colour light reddish to ochreous brown. Antennae quadripectinate, with about 37–38 segments, ca. 18–20 mm long (HT with some segments missing, existent part of the antenna 18.0 mm), longest rami 3.8 mm. Head, thorax, and abdomen in ground colour, the head with broad white collum, the abdomen with broad white intersegmental stripes. FW antemedian area reddish brown, even if general appearence of a specimen more ochreous. Antemedian line thin, almost straight, and only one costal indention. Median area wide, with ovoid, medium sized ocellus of 6 mm maximum diameter (HT), with tiny outer black ring. Fw. postmedian lines very tiny, stongly undulate, white submarginal band relatively prominent, and outer margin very light, ochreous beige. Hw. also of a typical elongated form, very light in ground colour. The hw. ocellus relatively small, round, of consistently 8 mm diameter. White submarginal portion very broad, marginal area coloured as in fw. Ventral side lighter, but from pattern as in all other species.

♀: Aside from typical sexually dimorphic characters there are no differences in pattern and colour to the ♂♂. A wild collected specimen has a Lfw. of 49 mm, the fw. ocellus a maximum diameter of 6 mm, the round hw. ocellus of 8 mm.

♂ genitalia (2498/16 SNB HT, 2507/16 SNB PT, 2500/16 CWAN [*fec.* SNB] PT [GP-Fig. L]): Uncus short, broad-based, with two relatively short dorsal tips which are directed laterally to both sides; from its size it is comparable to the uncus of *S. (N.) codyi,* but the tips are less acute and more bent than there. Apex of the valves elongate and rounded, ventral process relatively small and unremarkable, sacculus small. The internal dorsobasal process at the base of the valves concisely short in dorso-ventral direction. Dorsal processes of the juxta medium-sized, internal process short with broad spoon-like extension. Saccus relatively prominent, phallus relatively long, around 2 mm. Genitalia of *S. (N.) bergmanni* sp. n. can be separated from those of the partly syntopic *S. (N.) shadulla* by their larger size and base of the uncus, the bent dorsal processes of that structure, the spoon-like internal juxta process, and the longer size of the phallus.

Distribution: Tadjikistan (Gissar Range of the Pamir-Alay mountain system) and Kyrgyzstan (Kungay Alatau [north of the Issyk-Kul] and Kyrgyz Alatau [south of Bishkek, Ala Archa NP] Ranges of the northern Tian Shan mountain system); see note.

Preimaginal instars: unknown.

Note: This species was found so far in two disjunct areas, at the type locality and a few additional places in Tadjikistan, and about 700 km away from there in Kyrgyzstan at two localities in the Kungay and Kyrgyz Alatau (see on Map). The barcode data available clearly indicates that these disjunct populations are identical (see NJ tree in Text-Fig. A) and different from *S. (N.) shadulla* and its synonym *alatauica*. All material of *bergmanni* from the Kungay Alatau area appears to be reared, and so far it is not clear whether this rearing stock might have been mislabelled, or whether it really is a species with a rather disjunct distribution, or perhaps just with data lacking from in between.

IX. *Saturnia (Neoris) shadulla* (Moore, 1872)

(Figs. 26–27, 40–41, 59–67, 101–111, 120–128, GP-Fig. M.)

Neoris shadulla: Moore (1872: 577, not illustrated).

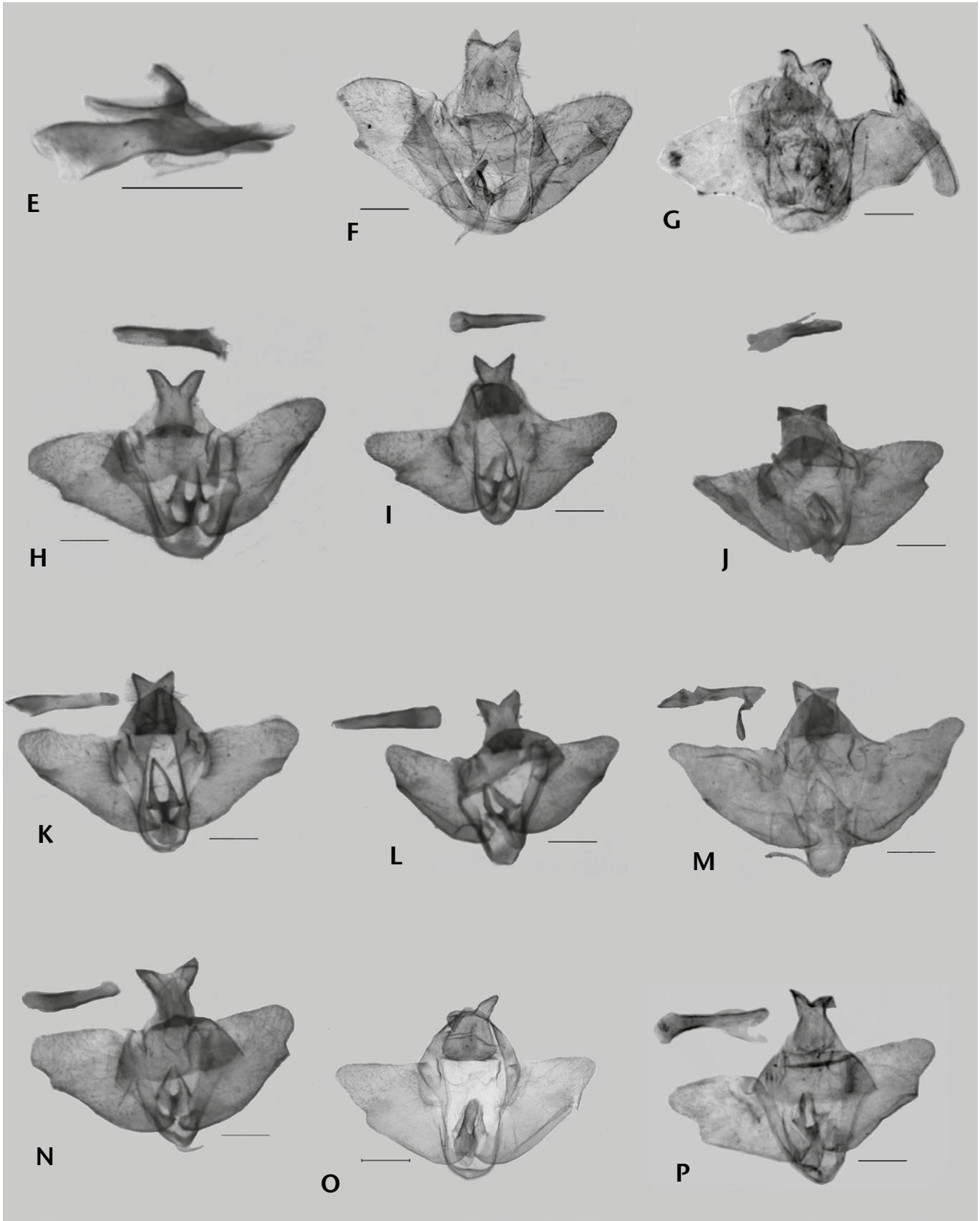
= *Saturnia alatauica* O. Bang-Haas, 1936 (Figs. 40–41), **syn. rev.**

Bold BIN and status: AAB4396; specific delimitation in morphology slightly vage and in barcode comprising a large, relatively heterogeneous group. This name is here used for a large conglomerate of populations especially in the western parts of the central Asian mountains (in spite of the type locality, see Map). The barcode sequences of recent material from relatively close proximity of the type locality of *alatauica* O. Bang-Haas, 1936 is not significantly different (less than 1%) to other populations of *shadulla* (closest are specimens from near Bishkek, which are not shown in the Map due to overlapping with a *bergmanni* locality) and, therefore, *alatauica* is here included as synonym of *shadulla* at its supposed north-eastern outpost. The different populations subsumed here under *shadulla* do not only share the same BIN code, but are all externally and in ♂ genitalia quite similar. However, there appear to be several different clusters in the barcode with usually much less than 1% difference between them (one of which appears to be *alatauica*). There is also some geographical variability in pattern and colouration, but *shadulla* also overlaps with *bergmanni* and thus allows a rather clear differentiation. A more detailed study of this complex, based on other DNA than only the COI barcode, would perhaps be helpful to clear the situation.

Map: Dark blue asterisk (type locality of *shadulla;* barcode not analysed); dark blue rhombi (barcode analysed) and dark blue rhombi with white centre (barcode not analysed); violet-blue asterisk with dark blue frame (type locality for the synonym *alatauica;* barcode not analysed).

Diagnosis: As to be expected from the wide range of the species, there is considerable variation between specimens, but, nevertheless, there are consistent elements found in larger series to describe apparently specific characters and to distinguish *shadulla* from other taxa. *S. (N.) shadulla* is a medium-sized species of greyish-olive brown ground colour with a touch of pink or reddish brown with relatively vivid, contrasting markings. ♂♂ (and even some ♀♀) have a little elongated fw. apex, in eastern specimens (Xinjiang populations) sometimes even triangular forewings with a nearly pointed apex (Figs. 59, 60, ♀ Fig. 61). The fw. antemedian line is concave, the double postmedian line undulate, but less incurved than in most other species. The hw. antemedian area with broad tuft of pinkish white hair. Both fw. and hw. submarginal lines are broad white, the marginal area in ground colour. Obviously no specific character is the size of the wing ocelli, even in series of wild collected specimens from one single locality there is much variation in form and size; generally fw. ocelli have a tiny black outer ring, and the larger hw. ocelli show a broader blue and black outer ring system. In addition to this, there are relatively consistent ♂ genitalia structures, as described below.

♂ genitalia (*shadulla:* GP 2171/10 SNB, 2502/16 SNB, 2503/16 SNB, 2504/16 SNB, 2505/16 SNB, 2506/16 SNB [GP-Fig. M]; 2511/16 SNB HT *alatauica*): Uncus relatively long, with small base and slender form, with short dorsolateral processes and small incurvation in between. The form and size is somewhat near *S. (N.) codyi* but with less acute dorsal tips. *S. (N.) bergmanni,* which partially is occurring syntopically with *S. (N.) shadulla,* has a much broader base of the uncus and broader dorsal processes which are directed more to the sides. The dorsal process of the valves with rounded, prolongate tip, the ventral process prominent, with rounded tip, sacculus absent. The juxta with medium-sized dorsolateral processes which are widely separated at their base, the internal process short and straight. Phallus relatively short, the sclerotized



Genitalia plate: *Saturnia (Neoris),* male genitalia. — **Fig. E:** *S. (N.)* ***huttoni,*** India, Mussoori (ZMHU), GP 2514/16 SNB; separate juxta with still connected phallus. — Scale bar = 1 mm; more enlarged than other genitalia photos. — **Fig. F:** *S. (N.)* ***naessigi,*** Turkey, Tunceli Prov., Munzur Valley (CSNB), GP 2501/16 SNB; phallus in situ. — **Fig. G:** *S. (N.)* ***galeropa,*** Iran, Gilan Prov. (CSNB), GP 2500/16 SNB; phallus separate. — **Fig. H:** *S. (N.)* ***eckweileri,*** Pakistan, Beluchistan, Urak vic. (CWAN *in* SMFL), 2498/16 CWAN [*fec.* SNB], **HT;** phallus separate. — **Fig. I:** *S. (N.)* ***naumanni,*** Afghanistan (NE), Wakhan valley, Zemestani Baharak (LNK), 2515/16 SNB, **HT;** phallus separate. — **Fig. J:** *S. (N.)* ***codyi,*** Pakistan, Karakorum Mts., Naltar Valley (CSLL), 2499/16 SNB; phallus separate.. — **Fig. K:** *S. (N.)* ***huttoni,*** India, Himachal Pradesh, N Theog (CWAN *in* SMFL), 2499/16 CWAN [*fec*. SNB]; phallus separate. — **Fig. L:** *S. (N.)* ***bergmanni,*** Kirgisia, Kungei Alatau, Cholpon Ata (CWAN *in* SMFL), 2500/16 CWAN [*fec*. SNB]; phallus separate. — **Fig. M:** *S. (N.)* ***shadulla,*** Tadzhikistan, Eastern Pamir Mts. (CSNB), 2506/16 SNB; phallus separate. — **Fig. N:** *S. (N.)* ***oliva,*** China, Xinjiang Uygur A.R. (ZMHU), 2516/16 SNB, **HT;** phallus separate. — **Fig. O:** *S. (N.)* ***svenihedini,*** China, Xinjiang (CASB), GP photo from Xue Dayong (CASB); phallus in situ. — **Fig. P:** *S. (N.)* ***schencki,*** Kazakhstan (E), Saur Range (CSNB), 2508/16 SNB, **HT;** phallus separate. — Scale bars = 1 mm; GPs approx. to the same size.

part only about 1.8 mm length. Generally there is some more variability found in the genitalia of *S. (N.) shadulla* compared to other taxa which may result from the huge distributional area which that taxon inhabits, but in general criteria are consistent.

Distribution: Rather widely distributed in central Asian mountains, known from the far Southeast of Turkmenistan in the Kugitang Mts. of the Pamir-Alai mountain range and the Pamir foothills in Tajikistan just north of the river Darya in the Southwest to Lake Yssykköl and the Kungej-Alatau (of the Tian Shan Mts.) in Kyrgyzstan and Kazakhstan in the Northeast, but also in the northern Himalaya (China: Xizang Autonomous Prov. [= Tibet]), and in China: Xinjiang Prov., Yarkand River plains in the Takla Makan.

Pittaway (2016) did not accept separate species (except *codyi*) within his notes on the genus *Neoris*. He used only 4 subspecies under *huttoni,* with other taxa being listed as synonyms, and also united *schencki* under *"huttoni shadulla"*. He gives as distribution for his subspecies *"huttoni shadulla"* the following huge area (without providing citations as sources for this information): "*A subspecies of the mountain chains which separate the western and eastern Palaearctic regions, from Ladakh to Krasnoyarsk and the eastern Sajan near Lake Baikal. This encompasses Jammu and Kashmir (India), eastern Afghanistan, western Xinjiang Province (China), Tajikistan, eastern Uzbekistan, Kyrgyzstan, eastern Kazakhstan, the Altai Mountains of China, Russia and Mongolia, central Siberia as far north as Krasnoyarsk, and the Tuva ASSR, Russia, where it meets the eastern palaearctic* Caligula boisduvalii *Eversmann*". He also lists without critical discussion these dubious localities in Gansu and Shaanxi (see below under "Further published records of doubtful validity or photos of unidentified preimaginals"), without citing Zhu & Wang as source. We have not seen any actual and proven data (neither reliably labelled recent specimens of independent origin nor detailed and illustrated literature records) for such Russian-Siberian localities so far. See also below under "Further published records of doubtful validity ...".

Material examined:

PR China: ♂ LT, ♂ and ♀ PLT of *shadulla,* [PR China, Xizang Autonomous Prov.], "Shadulla, near Yarkund [river], Eastern Turkestan" (BMNH, Figs. 26–27). 3 ♂♂, 1 ♀, Xinjiang Prov., SW Kashi [formerly Kashgar], Keng Tau Mts., Oytac loc., 38°54.363′ N, 75°13.788′ E, 2650 m, 29.–30. ix. & 1. x. 2013, leg. Floriani, via A. Saldaitis xi. 2013; BC SNB 5252 (Fig. 59; ♀ Fig. 61) (CSNB); larvae from there see in Figs. 120–128. 1 ♂, Xinjiang Prov., W Taklimakan Desert, Yarkan He river valley, tugay forest [in a temporary river valley with vegetation and agriculture within the desert], 39°21.233′ N, 78° 13.367′ E, 1130 m, 3. x. 2013, leg. Floriani; via A. Saldaitis xi. 2013; GP 2502/16 SNB; BC SNB 5251 (Fig. 60) (CSNB).

Kazakhstan: 4 ♂♂, (S), Kzyl-Orda Prov., Shieli Distr., Syrdaryia Karatau Mt. Range, 12 km NW Aksumbe aul., 44°31′ N, 67°25′ E, 450 m, 30. ix. 2013, leg. P. Gorbunov, iii. 2014 via V. Gurko; GP 2504/16 SNB; BC SNB 5391, 5847 (CSNB). 7 ♂♂, Almaty Prov., Lake Issyk [43°17′ N, 77°23′ E], 1710 m, 23. ix. 2002, leg. B. Benedek & T. Csovari, coll. Gy. Fábián; GP 2505/16 SNB; BC SNB 3566 (CSNB). 1 ♂, sama data, ex CSNB (CSLL). – 1 ♂, 1 ♀, "Turkestan, Alexandergebirge" (today probably in the Kazakhian part of the Kyrgyz Alatau?), ex coll. J. Zukunft (see Näßig 1998a, b) in SMFL. (These 2 specimens are reared dwarfs without details of locality and date [probably have been reared before WW2, latest ca. 1965] and most likely belong to *S. (N.) shadulla,* but we have not yet checked ♂ genitalia or "forensic" barcode to rule out that it is *S. (N.) bergmanni;* they are in the Map with the tentative coordinates 42°30′ N, 71°30′ E as "*shadulla* without barcode".)

Note regarding Kazakhstan: With respect to a series of specimens in the collections CSNB, CSLL and CWAN, the locality label "Kazakhstan, Almaty Prov., Kizil Zsar (Red valley), 30 km SE Almaty, 1100 m, 1. x. 2002, leg. B. Benedek & T. Csovari, coll. G. Fabian" requires some caution; see also the discussion of this in the "Notes" under XII. *Saturnia (Neoris) schencki* Staudinger, 1881. We think that this series (in spite of the barcode SNB 1492 [Fig. 67] for one specimen which keyed out as "*schencki*" and another BC 3218-wn-F02 [Fig. 66] of the same series, which keyed out as *shadulla,* while the specimens are absolutely identical in their morphological characters and clearly ***not*** typical for *schencki*) entirely belongs to *S. (N.) shadulla;* the exceptional barcode result may be a contamination earlier overlooked or perhaps some case of female hybrid introgression.

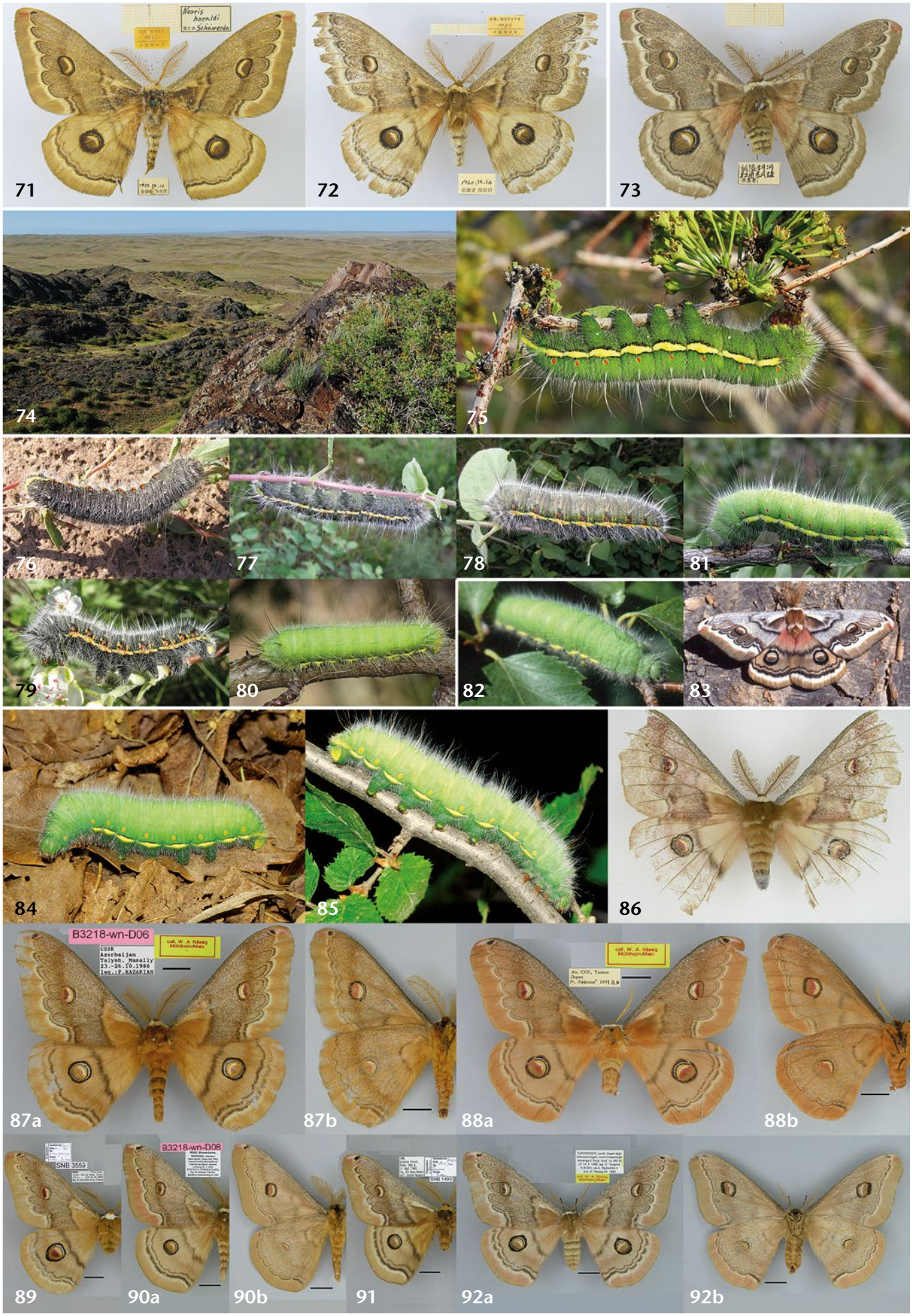
Tadzhikistan: 3 ♂♂, Eastern Pamir Mts., Zulumart Mt. Range, 3700 m, 1.–10. viii. 2014, leg. V. Gurko; GP 2506/16 SNB; BC SNB 5845, 5846 (CSNB). 4 ♂♂, Varzob Valley [38°46′ N, 68°49′ E], 20. viii. 2003, leg. R. Yakovlev (CSLL). 1 ♂, West Pamir, NW part of Rushan Range, 60 km from Chorog to Rushan, up, mouth of river Bartang into Pjandsh [37°48′ N, 71°34′ E], 3200–3400 m, 27. vii.–28. viii. 1997, leg. V. Gurko (CSLL). 10 ♂♂, 1 ♀, same data, BC SNB 5111 (♂, Fig. 64), 5113 (♀, Fig. 63) (CABF). 2 ♂♂, Dushanbe [38°29′ N, 68°49′ E], 14. x. 1981, leg. R. Yakovlev (CSLL). 2 ♂♂, Tigrawaja Batka Reserve, Dshilkul, 15. vii.–25. viii. 2000, leg. O. Legecin; BC SNB 5107 (CABF). 2 ♂♂, Fan Mts., Akman [39°9′ N, 68°112′ E] (CABF). 1 ♂, Turkestan Range, Kusawlisaj Gorge [39°39′ N, 68°42′ E], 2400 m, 1. ix. 1961 (CABF). 1 ♂, 1 ♀, Babatea Ridge, 38°20′ N, 68°30′ E, ex ovo ix. 1981, Z. Weidenhoffer (CRLN).

Turkmenistan: 2 ♂♂, 2 ♀♀, Kugitang Mts. [37°47′ N, 66°30′ E], 1300 m, leg. V. Tuzov; ♂ GP 2171/10 SNB; BC SNB 3564 (CSNB). 3 ♂♂, 3 ♀♀, Kugitang Mts., 1100 m, ex larva 1991 (CRLN).

Uzbekistan: 1 ♀, Aman Kutan village [39°18′ N, 66°57′ E], e.l. found v. 1992 on *Prunus,* emerged x. 1993, leg. Ladislav, coll. Nardelli; BC SNB 3562 (CSNB). 1 ♂, 1 ♀, same locality, e.l. 6. v. 1988 [not the date of hatching of the moth!], cult. L. Miško (CABF). 2 ♂♂, 3 ♀♀, Babalug Mts., 2000 m, e.o. x. 1991 on *Malus,* cult. V. Siniaev; BC SNB 3563 (CSNB). 1 ♂, Čimgan [41°32′ N, 70°2′ E], 1600–2000 m, e.l. 3.–14. vi. 1991 [not the date of hatching of the moth!], leg. L. Miško; BC SNB 3561 (CSNB). 3 ♂♂, Zeravshan Mts., Kitab geology research station [39°6′ N, 66°53′ E], 16.–20. x. 1997, leg. V. Gurko (CSLL). 23 ♂♂, same data, BC SNB 5104, 5105, GP 01/1999 Bergmann (CABF). 1 ♂, 2 ♀♀, same locality, e.o. 2. x. 1993, 30. ix. & 5. x. 1994 on *Malus hillieri* (CRLN). 4 ♀♀, Rd. Tashkent–Dushanbe, 100 km S Tashkent [ca. 40°15′ N, 68°49′ E], 10.–15. x. 1997, leg. V. Gurko; BC SNB 5108 (CABF). 1 ♂, Tian Shan (W), Tshatkal-

---

Plate 8: *Saturnia (Neoris),* specimens and preimaginals. — **Figs. 71–72:** *S. (N.)* ***svenihedini,*** China, Xinjiang; **71:** ♂, Urümqi, 980 m, 10. ix. 1959, coll. Li Changqing (this specimen was illustrated by Zhu & Wang 1983: 412, pl. 134; 1996: 133, fig. 99, pl. VII fig. 7), 43°49′30″ N, 87°36′0″ E; **72:** ♂, Emin county (= Dorbijin county), Kelumusu, 550 m, 16. ix. 1960, coll. Zhang Facai, ca. 46°43′ N, 83°31′ E; (both CASB). — **Fig. 73:** *S. (N.)* ***schencki*** (or possibly ***oliva***?), China, Xinjiang, Liaohe, Jinghe county, Liangfan Station, [Dzungarian Alatau, 44°34′ N, 82°47′ E], CASB, only tentatively identifed as *schencki,* see text. — Photos of specimens in CASB by Xue Dayong, CASB. — Photos of unidentified larvae, details see text: **Figs. 74–75: 74:** Kazakhstan, Chu-Ili Mts., N of Almaty, with **75:** *Neoris* caterpillar in penultimate or ultimate instar (likely either *S. (N.) shadulla* or *bergmanni*?) feeding on *Spiraea hypericifolia;* photos Oleg Belyalov. — **Figs. 76–78:** Kazakhstan, Karatau Mts. (larval locality "no. 2" in Map); **Figs. 79–80:** Boraldy Mts.; **Fig. 81:** Altyn-Emel. Photos Sergey Titov. — **Figs. 82–83:** Tadjikistan, Rushan Range, Pamir (larval locality "no. 3" in Map); **82:** larva on *Betula* (probably *B. pamirica*?); **83:** imago (♂) on dark bark of *Betula* tree; photos Vladimir Gurko. — All these conveyed by A. Bergmann; all these depict likely *S. (N.) shadulla* or other species. — **Figs. 84–92:** *S. (N.)* ***galeropa***. **84–86:** Iran, eastern Elbrus, cloud forest; caterpillar found in April 2008 and hatched ♂ (worn); photos R. Trusch. **87–92:** specimens from humid to drier areas of the distribution; **87–88:** ♂ and ♀, Azerbaijan, Talysh, very humid; **89:** ♂, Iran, Gilan, still humid; **90:** Iran, Golestan, Tange Gol, still humid; **91:** Iran, Golestan Forest, Almeh, drier; **92:** Turkmenistan, Kopet Dagh, dry; specimen photos S. Naumann. Several of the collecting localities in Iran were described in more detail (including ecological and climatical parameters) and figured by Gutleb & Wieser (2002) and Wieser & Stanglmeier (2005).



Kette, Masar Saly [ca. 41°56′ N, 70°33′ E], 1000[?] m, 30. VIII.–1. IX. 1997, leg. A. LEGEZIN; GP 02/1999 BERGMANN; BC SNB 5109 (CABF). 3 ♂♂, Tian Shan (W), Großer Tschingan, Gukan Dag [ca. 40°40′ N, 71°30′ E], 1400 m, 10. XI. 1997, leg. O. LEGEZIN (CABF). 1 ♂, or., Thian-Shan, Chatkalski, nr. Chimgan, 1700 m, 1.–5. VI. 1983, BC SNB 4945 (Fig. 65) (CWAN in SMFL). 8 ♂♂, 1 ♀, Uzbekistan-Tadzhikistan-Afghanistan border triangle, W Kafirnigan river, 50 km N Afghanistan border [ca. 37°47′ N, 68°3′ E], 1200 m, end x.–end XI. 2007, leg. V. GURKO; ♂ GP 2503/16 SNB; BC SNB 4887 (♀, Fig. 62), 4888 (CSNB).

Kyrgyzstan: 1 ♂, LT of *S. (N.) alatauica*, Alma Ata; So. Zail. [= Zailyiski] Alatau, Mal. [Malenkaja] Almatinka, 1500 m, 7. IX. [19]35, svet. [at light], I. N. FILIPJEV" [in Cyrillic letters]; GP 2511/16 SNB (ZMHU). 1 ♂, PLT of *S. (N.) alatauica*, Alma Ata, Transili Alatau; Almata, 1500 m, 15. IX. [19]36 (ZMHU). 2 ♂♂, [Chuy Prov.], Suusamyr Range [ca. 42°10′ N, 73°58′ E], 2400 m (BEEKE & PAUKSTADT 2011: 320, illustrated, not personally seen). 1 ♂, Kungei Mt., Tashkoro gorge [40°13′ N, 73°22′ E], 1800 m, 20. x. 2002. leg. S. TOROPOV (CSLL). 1 ♂, same data; BC SNB 5112 (CABF). 3 ♂♂, 4 ♀♀, Alexander Mts., Aksu [Ak-Suu] gorge [41° 29′ N, 75°12′ E], 1800 m, 10. x. 2002, leg. S. TOROPOV (CSLL). 1 ♂, same data (CABF). 1 ♂, Kirgizskij Mts., Chveok Kayndy [W Bischkek, ca. 42°41′ N, 73°39′ E], 13. x. 1993 (CSLL). 6 ♂♂, 3 ♀♀, Tian Shan (W), Chatkalsky Mts., Mt. B. Chimgan [near Tashkent, ca. 41°30′ N, 70°45′ E], 2600–3100 m, 22. IX.–15. x. 1998, leg. D. SOBANIN (CSLL). 1 ♂, Tashkumyr Distr., Naryn river [41°20′ N, 72°13′ E], 2000 m, 17. IX. 1998, leg. V. GURKO; BC SNB 5106 (CABF). 2 ♂♂, 1 ♀, Kirgiz mountain ridge, Frunze city env., IX. 1984 (CRLN). – 1 ♂, "Tadzhikistan" [recte Kyrgyzstan, maybe Kazakhstan?], "Alma Ata, Issykul sept., Khoum Bel Mt., 3000 m; *alatauica* B.-H. Co-Type" [i.e., no type material!] "O. BANG-HAAS" [red] (CRLN). 12 ♂♂, Chatkal Reserve, 60 km ESE Tashkent [40°6′ N, 71°56′ E], 1250 m, 3.–19. x. 1992, leg. V. ZOLOTHUHIN (CSLL).

Preimaginal instars: A complete life cycle of material from Uzbekistan, which evidently belongs to *S. (N.) shadulla,* was figured by LAMPE (2010: pl. 322, p. 327).

We illustrate here, in our Figs. 101–111, a rearing by Toni PITTAWAY from Kyrgyzstan, vic. Bishkek, and in Figs. 120–128, a rearing by V. VISINSKAS from China, Xinjiang, Kunlun Shan. – Many (all?) of the larvae without barcoded identification illustrated in our Figs. 74–83 will probably also belong to *S. (N.) shadulla.*

X. *Saturnia (Neoris) oliva* A. BANG-HAAS, 1910

(Figs. 35, 36, GP-Fig. N.)

Saturnia stoliczkana oliva: A. BANG-HAAS (1910: 31, not illustrated).

= *haraldi* SCHAWERDA, 1923 (Fig. 36), **syn. rev.**

BOLD BIN and status: No barcode available for either of the two synonyms. – This is a somewhat provisional species requiring further study. The synonymy is based on nearly identical type locality and generally external similarity of the two types.

Map: Two asterisks: type locality of *oliva* = black with yellow frame; type locality of *haraldi* = pinkish with yellow frame (placed on the respective coordinates listed above in the catalogue).

Diagnosis: As the name *oliva* suggests, this small species (Lfw. of HT *oliva* 43 mm, HT *haraldi* 44 mm) is of a dark greyish-brown, somewhat olive ground colour. So far no reliably identified specimens aside from the type material were in our hands, so there cannot much be said about variability. *S. (N.) oliva* has relatively short fw. with rounded apex (responsible for a somewhat "square-like" look of the set specimens), both fw. ante- and postmedian lines are prominent, dark grey to black, followed by broad white submarginal band and relatively narrow marginal area (in comparison with other taxa) of olive colour. The fw. ocellus is almost round, just a little ovoid, of 6 mm maximum diameter in both HTs. Hw. with very broad antemedian line which is situated far away from the wing base, the hw. ocellus round, quite large, of 11 mm diameter, with broad black outer portion. It is, aside from some specimens of *S. (N.) schencki,* the only species where the ocellus touches the antemedian line and the prominent double postmedian line as well.

♂ genitalia (GP 2516/16 SNB HT *oliva;* GP-Fig. N): For our studies we could only dissect the HT of *S. (N.) oliva,* but not the HT of *haraldi,* and no further specimen was available for dissection. Therefore this is only a description of a singleton, and we cannot give notes about variability. Uncus with very narrow base, narrow in the basal two thirds, with two broad dorsolateral processes directed laterally. Dorsal apex of the valves rounded, the ventral process situated near to the apex, with only a short projection. Internal process at the base of the valves rounded and prominent. Dorsal juxta processes short and acute with strong basal sclerotisation in between, the interal process very short, almost absent. Saccus short. The phallus of average size, about 1.9 mm long. The structure resembles somewhat that of *S. (N.) schencki* from size and form of the uncus processes, but can be separated from that by the smaller base and a completely different internal juxta process which is broad and spoon-like in *S. (N.) schencki.*

Distribution: So far safely known only from the type localities in the Juldus area of the Tian Shan mountains in China, Xinjiang Uygur autonomous region.

Material examined: [All **PR China,** Xinjiang Uygur autonomous region]: ♂ HT of. *S. (N.) oliva*, "Chin. Turkestan, Thianshan mont. Or., Juldus-Tal, 2500 m, VII."; GP 2516/16 SNB (ZMHU), plotted on the map for 42°38′ N, 84°43′ E, according an old atlas (ANDREE 1896). – ♂ HT of. *S. (N.) haraldi*, [PR China, Xinjiang Uygur aut. reg.], "vom Thian Schan im Juldusgebiete" (NHMW); this is just about the same place as for *Saturnia stoliczkana oliva*. For details see above in the catalogue for the type localities.

Preimaginal instars: unknown.

Note: The specimen illustrated by ZHU & WANG (1996: 133, fig. 100, pl. VII fig. 8) from Xinjiang, Liaohe, Jinghe county, Liangfan Station (locality details from Dr. XUE Dayong of CASB, Beijing), [Dzungarian Alatau] (our Fig. 73), as "*Neoris stoliczkana*" might possibly represent *S. (N.) oliva,* but the illustration is not reliably conclusive, and for the time being we decided to include it tentatively in the Map as *S. (N.) schencki.* Of course, this specimen does not belong to the true Indian *S. (N.) stoliczkana.*

XI. *Saturnia (Neoris) svenihedini* (HERING, 1936)

(Figs. 37–39, 71–72, GP-Fig. O.)

Neoris huttoni sveni-hedini [*SIC,* incorrect original spelling]: HERING (1936: 61, not illustrated).

BOLD BIN and status: No barcode available. Besides the HT specimen there are a few specimens in CASB known today (see under Notes), and these specimens apparently share a common external morphology as described below. – This is again a somewhat provisional species requiring further study.

Map: Type locality of *svenihedini:* green asterisk with dark red frame; green circles with red frame (see under Notes).

Diagnosis: Besides the HT (Figs. 37–39), there are, to our information, no further specimens known from European museums. However, XUE Dayong from CASB kindly sent us photos of *Neoris* specimens from China (including the specimens illustrated by ZHU & WANG 1983, 1993, 1996). 3 or 4 of these moths evidently (from external morphology) belong to *S. (N.) svenihedini* and are here used in comparison, in addition to its geographically nearest neighbour species, *S. (N.) oliva* and *S. (N.) schencki.*

The HT is of very light greyish brown colour, with less prominent pattern elements compared to the other two mentioned species. The wing base of both fw. and hw. is covered with pinkish and

white hair, the fw. antemedian line slender, but bordered by a unique broad white basal portion. The inner fw. postmedian line very slender, almost touching the far marginally situated ocellus, the marginal postmedian line prominent, and of the same width all over its length. The fw. apex a little tapering, outer margin a little concave as described already by Hering. With 56 mm Lfw. the HT is much larger than specimens of *S. (N.) oliva* and *S. (N.) schencki.* Hw. very light, bright ochre, the antemedian line near the wing base. The hw. ocellus rather small, round, 8 mm in diameter.

Photos of some specimens from PR China, Xinjiang, sent by Xue Dayong from the collections of CASB show similar characters as the HT and were identified by us as *S. (N.) svenihedini* (see Figs. 71, 72). Due to lack of longer series we cannot say much about variability of this species; however, the few specimens known to us from photos can easily and consistently be separated from the two aforementioned species by their larger size, light colour, inconspicuous pattern, elongated fw. and smaller hw. ocellus.

♂ **genitalia** of the HT have not yet been studied. We tentatively believe that the genitalia illustrated by Zhu & Wang (1993: 278, fig. 16; 1996: 134, fig. 99a, each under the name "*haraldi*") and reproduced here in our GP-Fig. O from the photo of the original slide (photo kindly sent to us by Xue Dayong, CASB) most likely represent the ♂ genitalia of *S. (N.) svenihedini.* No further genitalia were available to us, and therefore we cannot say anything about variability. Uncus with broad base, getting more slender to the medial part, with two dorsolateral processes, rounded at their tips. Valve apex triangular, rounded, the ventral process slightly indicated, much more ventrally than in *S. (N.) oliva,* sacculus present. Internal process at valve base prominent, rounded. Dorsal juxta processes short with broad base, internal process very short, rounded at its end, phallus short as well. Saccus broad. The phallus was not removed in this dissection, but Zhu & Wang (1996) show a small peculiar hook at the distal end of the sclerotized part.

Distribution: Known from the type locality in the Dzungarian basin near the Manas River; see details in the catalogue. Further locality data (see Map) from China, Beijing, CASB, from the photos and collecting data sent to us by Xue Dayong: China, Xinjiang Prov., Urümqi, 980 m, 10. ix. 1959, Fig. 71; Emin county, (= Dorbijin county), Kelumusu, 550 m, 16. ix. 1960, Fig. 72; Shawan county, about 170 km west Urümqi, 19. ix. 1979, native collector, specimen not figured by us.

Material examined: We examined photos of the HT (high resolution photos sent from NHRS; there are also low-resolution pictures in the Web under "huttonisvenhedini" on NHRS 2005–2016). In addition photos of 3 specimens (one more specimen is possibly not *S. (N.) svenihedini,* but another species, which cannot safely be determined from the photo only, so we omitted this specimen here) from the localities listed above.

Preimaginal instars: unknown.

Notes: This taxon neither appears to be identical to *S. (N.) oliva* nor to *S. (N.) shadulla* nor to *S. (N.) schencki,* all living around the type locality. Therefore, we provisionally interprete it as a separate species, requiring further studies.

The specimen from Xinjiang illustrated as "2972. *Neoris haraldi* Schawerda" by Zhu & Wang (1983: 412, pl. 134, fig. 2972) and for which these authors (Zhu & Wang 1993: 278, fig. 16) also showed a line drawing of the ♂ genitalia and again by Zhu & Wang (1996: 133, fig. 99 [again the genitalia of 1993], pl. VII fig. 7) most likely show a specimen of *S. (N.) svenihedini.* This is based on the light ground colour (especially on the hw.) with little marking, small fw. ocelli and pinkish basal field on the fw. (compare Zhu's & Wang's figures with our Figs. 37 & 39 and 70 & 71). This specimen illustrated by Zhu & Wang (1983, 1996) is illustrated again here in our Fig. 70. The ♂ genitalia shown by Zhu & Wang (1993: 278, fig. 16), illustrated here again in our GP-Fig. O, may therefore be interpreted as putative genitalia of *svenihedini* and are described above as such.

XII. *Saturnia (Neoris) schencki* Staudinger, 1881

(Figs. 29–30, 68–69, GP-Fig. P.)

Saturnia schencki: Staudinger (1881: 406[–409], not illustrated).

Bold BIN and status: AAB4397; well-defined species in barcode and less clearly in morphology.

Map: Dark grey asterisk (type locality) and circles with black frames.

Diagnosis: A relatively small to medium sized species of typical dark brown to greyish-brown ground colour. Wild collected specimens have a Lfw. of 35 to 49 mm (LT 39 mm). The fw. costa is somewhat curved, and the fw. margin a little concave in most specimens as well, giving male specimens a somewhat elongate fw. (those of the females is more rounded, as usual in the subgenus). All lines such as ante- and postmedian are very prominent, of black colour. The fw. ocellus of ovoid form, with broad black outer circle, the submarginal white portion prominent as well, followed by an olive marginal area. Hw. with round, medium to large sized ocellus, outer ring broad black. Also the hw. markings quite intensive and less zig-zagged, the antemedian band always bent.

♂ **genitalia** (2508/16 SNB, 2512/16 SNB PLT; GP-Fig. P): Uncus broad-based, longish, getting more slender to dorsal side, with two short dorsolateral acute processes with acute tips. Valves generally small and short, valve apex slender, rounded, the ventral process only a small triangular projection, sacculus missing. Dorsal juxta processes short and slender, internal process broad, ending spoon-like, saccus triangular and medium-sized. The phallus with a small lateral projection to the right at its sclerotized end. From size and uncus form the structure resembles somewhat the genitalia of *S. (N.) shadulla,* but can be separated easily from these by the spoon-like internal process.

Distribution: "Saisan" [= E Kazakhstan, Saissan = Zajsan, South of Altai Mts.], Saur Range; obviously also further south in the Dzungarian Alatau and maybe Tian Shan.

Material examined (in total 14 ♂♂, 11 ♀♀): **Kazakhstan,** 6 ♂♂, 6 ♀♀, type series (= ♂ LT, Fig. 29, + 11 PLTs, a PLT ♂ see Fig. 30, see above), Saisan [Zajsan], Hbhr. [= Haberhauer]; 1 ♂ PLT with GP 2512/16 SNB (ZMHU). 1 ♂, Kazakhstan (E), Saur Range, Zaisan village, ex larva ix. 1990, GP 2508/16 SNB, BC SNB 3565 (Fig. 69) (CSNB). 3 ♂♂, 3 ♀♀, same locality, ix. & x. 1990 (CRLN). 2 ♂♂, same locality, 1991, reared by R. Lampe, ex CRLN (CWAN in SMFL). 1 ♂, 1 ♀, Zajsan, 47°28′ N, 84°55′ E, e.l. 1992, ex coll. A. Schintlmeister (CWAN in SMFL). — **China, Xinjiang:** 1 ♂, Liaohe, Jinghe county, Liangfan Station, [Dzungarian Alatau, 44°34′ N, 82°47′ E], CASB, here only tentatively identified [no barcode] as *S. (N.) schencki,* see Notes below. — 1 ♂, 1 ♀, Kuldscha [= Gulja, = Xining, in the valley between Tien Shan and Dzungarian Alatau, 43°56′ N, 81°31′ E] (ex coll. A. Seitz in SMFL); illustrated in black and white by Nässig (1981: 28, figs. 24a, b), the ♂ illustrated here again in Fig. 68 in colour; also included tentatively [no barcode, no GP] here under *S. (N.) schencki.*

Preimaginal instars: unknown (the species was evidently reared in Europe, but there was no published documentation and description with photos).

Notes. The specimen illustrated by Zhu & Wang (1996: 133, fig. 100, pl. VII fig. 8) from Xinjiang, Liaohe, Jinghe county, Liangfan Station, [Dzungarian Alatau, 44°34′ N, 82°47′ E] (locality details xi. 2016 from Xue Dayong of CASB), as "*Neoris stoliczkana*" might possibly instead of *schencki* represent *S. (N.) oliva,* but the illustration is not reliably conclusive, and the identification via the GP illustrated by Zhu & Wang (1993), which is severely broken and incomplete, is as well not possible. For the time being we decided to include it tentatively in the Map under the grey circles of *S. (N.) schencki.*

We have a series of specimens in the collections CSNB, CSLL and CWAN (possibly also in other collections?) with the locality

label "Kazakhstan, Almaty Prov., Kizil Zsar (Red valley), 30 km SE Almaty, 1100 m, 1. x. 2002, leg. B. Benedek & T. Csovari, coll. G. Fabian"; see two of them on Plate 7 in the Figs. 66 (CWAN, BC B3218-wn-F02) and 67 (BC SNB-1492). In our barcode NJ-Tree in Text-Fig. A, the barcode B3218-wn-F02 keys out under *S. (N.) shadulla* (with Bold-BIN AAB4396), while BC SNB-1492 is to be found under *S. (N.) schencki* (Bold-BIN AAB4397). We think that this series entirely belongs to *S. (N.) shadulla;* the exceptional barcode result may be an earlier overlooked contamination or other error or some case of female hybrid introgression. The specimens are absolutely identical in their morphological characters and not typical for *schencki.* Whether there is also a mislabelling involved cannot be decided presently.

Further published records of doubtful validity or photos of unidentified preimaginals

For the identity of the specimens identified as "*haraldi*" and "*stoliczkana*" by Zhu & Wang (1983: 412; 1996: 111 [map], 113, 133) from **Xinjiang,** China, see above under *S. (N.) svenihedini* (= "*haraldi*" *sensu* Zhu & Wang) and *S. (N.) schencki* [or *oliva*?] (= "*stoliczkana*" *sensu* Zhu & Wang).

The following locality data are for one or another cause doubtful and cannot be interpreted on basis of the above accepted 12 species; they most likely represent misidentifications or mislabelled specimens.

- "*haraldi*" *sensu* Zhu & Wang (1983: 412; 1996: 111 [map], 113, 133) from **Gansu and Shaanxi** in China.

(White triangle with red frame in the Map in Gansu in China; also recorded for Shaanxi [outside of our Map, not shown].)

There are no members of the subgenus *Saturnia (Neoris)* known from any of these southern, eastern and north-eastern provinces of China presently. These are apparently misidentifications. Xue Dayong (CASB) explicitly supports this view [in litt.] as misidentification by non-specialist collectors.

- "*Neoris* sp.": **Lake Baikal area** in Russia: Siberia *sensu* de Freina (2002: 241).

(White triangle with red frame in the Map inmidst Lake Baikal [in lack of any detailed locality] in Siberia, Russia.)

This is possibly based on a label of a specimen in coll. ZSM published by de Freina (1992), which the senior author has also seen personally some years ago. It cannot be totally ruled out that *Neoris* may reach further North in the Central Asian mountain ranges, but besides a somewhat dubious listing of "the eastern Sayan [Mts.] near Lake Baikal" [the E Sayan Mts. are about 1000 km NE of the Saur Range and Zajsan] for his "*Neoris huttoni shadulla*" without any documentation cited for this record by Pittaway (2016) we have not found any detailed further records of *Neoris* from Siberia: Lake Baikal area. Therefore this is an implausible locality and most likely a case of one or more mislabelled collection specimen[s].

- Pittaway (2016) also lists for his "*Neoris huttoni*" in a broad sense (without accepting separate species and lumping all together) "Krasnoyarsk and the Tuva area" in Russia. As discussed above we have not found any reliable source for these places so far.
- A further pair of *Saturnia (Neoris)* [probably *shadulla?*] (not plotted on the Map) in CRLN in ZSM has labels listing the locality data "Amur" in Far East Russia [Primorye]. This is an extremely implausible locality and surely also a case of mislabelled collection specimens.

There will surely be further mislabelled specimens in other collections, especially in private collections (which later may have been donated to museums).

A few further records of (predominantly) caterpillars in publications are undocumented (except by photos) and usually did evidently not result in any specimens available for external comparison, genitalia dissection and/or barcode analysis. Two recent examples:

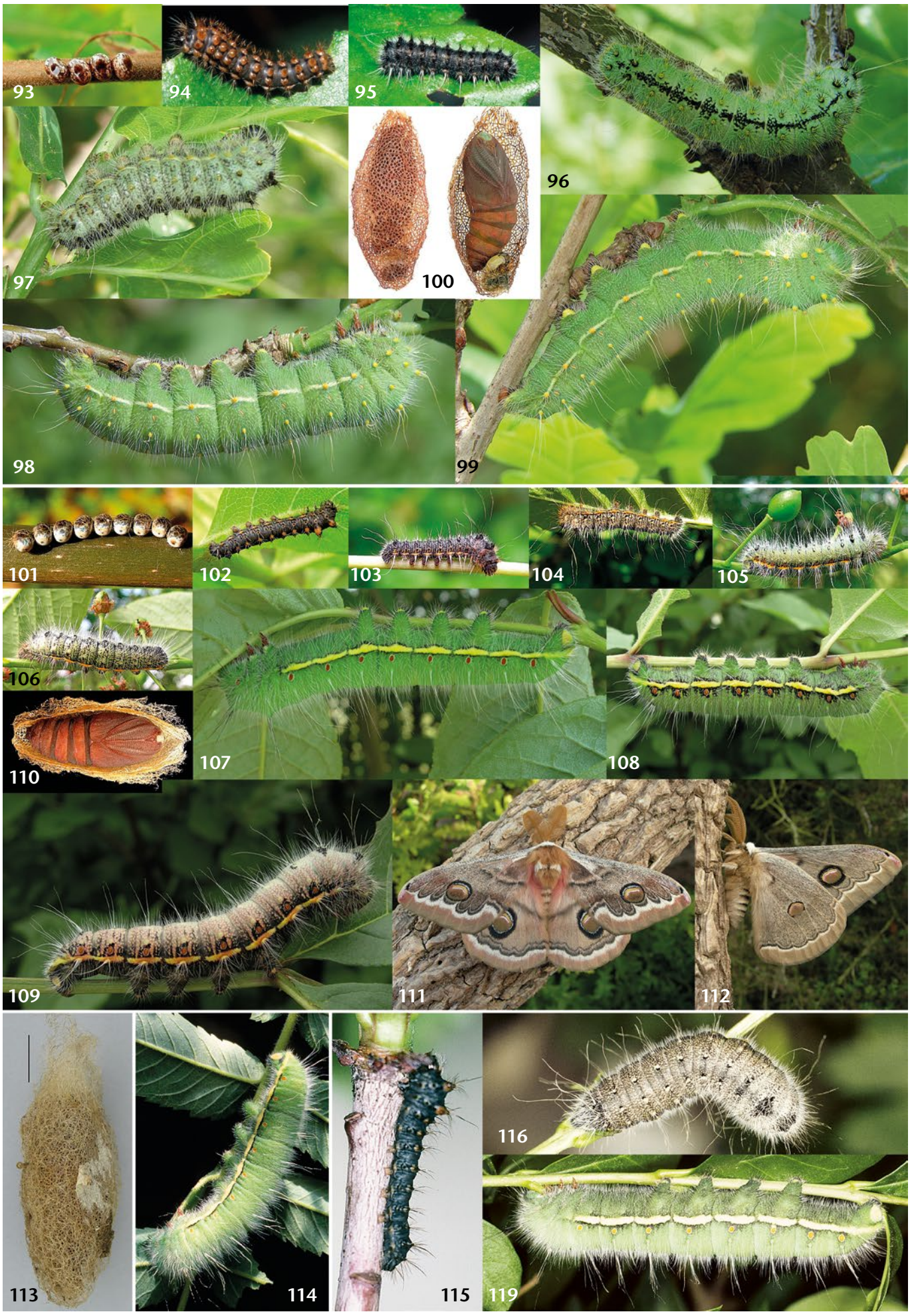
- Korb (2016: 19, fig. 5) illustrates a caterpillar of a *Neoris* (under the misidentification "*Neoris huttoni* Moore, 1862") from the Altyn-Emel Nature Reserve in **Kazakhstan** (approx. 44° N, 78°48′ E, see Map, larval photograph square no. 4). It is said that the larva fed on "wild cherry", but without providing an identification (scientific name) of the foodplant. This caterpillar may most likely have been either of *S. (N.) shadulla* or *S. (N.) bergmanni,* but this cannot be identified from just a single caterpillar photo without barcode analysis.
- Another picture of a *Neoris* caterpillar was shown by Haas (2016) from [translated] the "Nuratau foothills, part of the Kyzylkum desert, N, between Hayat and Djizak, S Aydarkul", in **Uzbekistan;** see Map, larval photograph square no. 1 [approx. 40°37′ N, 67° E]). This area is quite distant in the NW of the localities which we have marked in our Map, and we have no idea which *Neoris* species may be illustrated by Haas (possibly again *shadulla?*), because here is again no specimen available for external comparison, genitalia dissection and/or barcode analysis. The foodplant of the caterpillar was determined as *Amygdalus spinosissimus;* the present placement of *Amygdalus* is as a subgenus in the genus *Prunus* (Rosaceae) (Prunus – Wikipedia 2016).

Considering the general polyphagy of *Saturnia* caterpillars, Rosacae are not in the least surprising records.

There will surely be more publications of such type, based on unidentified or misidentified observations,

---

Plate 9: *Saturnia (Perisomena)* and *S. (Neoris),* preimaginal instars. — **Figs. 93–100:** *S. **(Perisomena) caecigena,*** Croatia, Krk Island [cult. Pittaway] resp. Bitola, Greek Macedonia [Wenczel]; **93:** ova; **94:** L_1 larva; **95:** L_2 larva; **96–97:** ca. L_3 larva (penultimate), usually there are only 4 larval instars in *S. (P.) caecigena,* rarely 5; **98–99:** last instar (usually L_4); **100:** cocoon and pupa. — **Figs. 101–112:** *S. **(Neoris) shadulla,*** Kyrgyzstan, vic. Bishkek [Pittaway]; **101:** ova; **102:** L_1; **103:** L_2; **104:** ca. L_3; **105–106:** L_4 (two forms); **107–109:** L_5 (green, intermediat and dark form); **110:** Pupa in cocoon cut open; **111–112:** hatched specimen, dorsal/ventral. — **Fig. 113:** *S. **(Neoris) eckweileri,*** cocoon of HT [Naumann]. — **Figs. 114:** *S. **(Neoris) naessigi,*** L_5, Eastern Turkey [Pittaway]. — **Figs. 115–119:** *S. **(Neoris) naessigi,*** Armenia; **115:** L_1; **116:** L_4; **117–118** see next plate; **119:** last instar (L_5) [Naumann]. — Photos 93–95, 100, 101–112, 114 © Tony Pittaway by kind permission (from Pittaway 2016); 96–99 B. Wenczel, Bubikon; 113, 115–119 S. Naumann (115–119 scanned from old photographic slides).



which do not deliver reliable and trustworthy information and often are not backed by any moth specimens which could be available for any studies in more detail.

For our part, we have received, mainly from lepidopterists from the states of the former USSR, usually kindly conveyed by A. Bergmann, several sets of photos taken in the wild during collecting expeditions in Central Asia. Of these photographed caterpillars, however, we often did not receive moth specimens for GP and barcode analyses to reliably find out to which species these caterpillars belonged. We show here, nevertheless, some of the photos.

- **Kazakhstan,** Chu-Ili Mts., N of Almaty (not separately shown on Map, because a symbol would overlap with the symbols for the type locality of *alatauica* [i.e., the synonym of *shadulla*] and a locality for *bergmanni*): From there we received a photo of the landscape (Fig. 74) and two photos of ca. penultimate to ultimate caterpillars (one see in Fig. 75), feeding upon *Spiraea hypericifolia* (Rosaceae), taken by Oleg Belyalov, conveyed by A. Bergmann.
- **Kazakhstan,** Karatau, NW Tian Shan: From there (see Map, larval photograph square no. 2 [approx. 42°53′ N, 69°59′ E], northern part of the Mts. and surroundings of Lake Biikikul [not located] (Figs. 76–78), of mid-May 2010) and another locality closer to Almaty (Boralday Mts. near village Tirekty [not located], Figs. 79–80, of early May 2011 and Altyn-Emel, Chulak Mts., Taigak cove [not located], Fig. 81) we received larval photos (half to full grown larvae) apparently feeding on wild apple (*Malus* sp.) or quince (*Cydonia* sp., both Rosaceae) or something similar (perhaps *Prunus* sp.?). Photos were taken by Sergey Titov, Pawlodar on Irtysh in N Kazakhstan, conveyed by A. Bergmann.
- **Tadjikistan,** Rushan Range, Pamir (see Map, larval photograph square no. 3 [approx. 37°54′ N, 71°10′ E]): From there we show in Fig. 82 a mature caterpillar found on *Betula* cf. *pamirica* (Betulaceae) and in Fig. 83 a ♂ specimen on a *Betula* tree bark. Photos Vladimir Gurko, Chernovtsy, Ukraine, conveyed by A. Bergmann.

Details on photos of further, doubtlessly identified caterpillars (of *S. (N.) naessigi, galeropa, shadulla*) are to be found under the respective species.

General discussion

Most of the old material (i.e., dating back before world war II) from museum (and private) collections is usually not very helpful for critical studies, in spite of the fact that it sometimes exists in surprisingly large numbers, but usually of very inhomogenous origin:

1. Old material usually has only very insufficient, incomplete or even evidently misleading to wrong locality labels.
2. Many old specimens apparently have been reared, but usually without any documentation of this on the labels, and no preimaginal descriptions and illustrations are available.
3. Further, if the reared specimens are "dwarfs" (which appears to be the rule!), genitalia dissections may be useless, because sheer size-depending characters and allometric growth may be involved.
4. Identifications (if present at all) are usually just misleading and/or incorrect, in accordance with the chaotic interpretations of the systematic arrangement in literature during time.
5. From such old specimens it is usually only possible to get DNA data under often extravagant costs, caused by the necessity to use "forensic" methods.

Therefore, many such old specimens in private and, especially, museum collections, if not belonging to a clearly identifiable type series, have been more or less ignored for the present study; we studied mainly the old types (only by morphological methods) and then relatively modern material with more detailed and more reliable locality data, including better chances for barcoding success. Modern reared material was analysed with regard to barcode data, and when genitalia were dissected, then only for "normal sized" specimens. Much of the old collection material is not safely identifiable without major effort and, therefore, is not of much help in a revision.

The 12 species (plus 2 synonyms) listed here are quite heterogeneously studied due to lacking availablity of (especially recent) material for some of them, and therefore their validity is different from taxon to taxon. Some taxa are known from their single types or small series only (e.g., *S. (N.) stoliczkana, oliva, haraldi, svenihedini, eckweileri*), while others have more or less recently been collected in often much larger numbers, resulting in more detailed knowledge, both for the characters defining the taxa and the variability. When the variability appears to be especially large, like, e.g., for *S. (N.) codyi,* the externally "defining characters" may sometimes be obscured. In any case, more recent material, provided with reliable and exact collecting data and accessibility for GP dissection and barcode analyses, is urgently required for further studies.

It is quite interesting that the prediction by Peigler (1996: 14) that he expects "up to a dozen species will ultimately be found to exist" [in *Neoris*] was met in our paper. We were not aware of this prediction until we eventually just had reached this number (under inclusion of our 3 new species).

For some species (namely *S. (N.) stoliczkana, oliva* including *haraldi, svenihedini, naumanni*) there is no complete barcode at all available so far (usually because there were too few and/or too old specimens which require expensive special "forensic" treatment to successfully obtain any DNA sequences). For one or two of these (*S. (N.) stoliczkana* and, to some degree, also *svenihedini,* as the specimen of the illustrated genitalia is only provisionally associated with the taxon), there are in addition

no ♂ genitalia dissections available, and the larval instars of all of these remain unknown (or at least undocumented and unpublished) so far.

Further, there are, especially from more recent times, including sources in the WWW, some photographic records of *Neoris* specimens (usually larvae) from places where we do not have any imagines for dissection or mtDNA analyses at our hands (see, e.g., the notes on the caterpillar from the "Nuratau foothills" by Haas 2016 cited above, etc.).

On the other side, other species have been bred regularly (e.g., *S. (N.) naessigi,* from Asia minor and Armenia) and are well defined in barcode and morphology.

Some other species may appear to be rather well-defined, but still offer a lot of questions: Specimens of *S. (N.) codyi,* for example, from various places are a bit heterogeneous in their barcode (however, not clearly suggesting a split into different species), but extremely variable in external morphology (colour, pattern). The externally well-distinct *S. (N.) huttoni* shows (based on the single analysed specimen so far) the same BIN code as *codyi.* From *S. (N.) stoliczkana,* we do not know the barcode nor the ♂ genitalia, but its type locality is just behind the first chains of the Himalaya reached by monsoonal rain in the dry Spiti valley quite close to the area of *huttoni,* and it may be speculated about the relations between these three taxa.

However, we think that we have summarised the presently available information on the different populations and species of *Saturnia (Neoris)* sufficiently to have a rather reliable basis for further research; we studied and illustrated all types and many recently collected specimens. The closing of "character gaps" (based on present gaps in documented distribution), based on new material and different populations, or the identification of new characters may lead to new results.

Checklist of the revised subgenera

With synonyms and (where existing) Bold's BIN codes, but without misspellings and other invalid and infrasubspecific names. First sorted by subgenera, then in chronological order of names.

1. Subgenus *Saturnia (Perisomena)*

One species with three subspecies.

***Saturnia (Perisomena) caecigena* Kupido, 1825**
Bold-BIN AAC6908.

***S. (Perisomena) caecigena caecigena* Kupido, 1825**
= *parviocellata* Friedel, 1968

***S. (Perisomena) caecigena transcaucasica* (O. Bang-Haas, 1927)**

***S. (Perisomena) caecigena stroehlei* Nässig, 2002**

2. Subgenus *Saturnia (Neoris)*

Twelve species including a few tentative taxa lacking clear barcode identification.

***Saturnia (Neoris) huttoni* (Moore, 1862)**
Bold-BIN AAD6590 (but see also *S. (N.) codyi*!).

***Saturnia (Neoris) shadulla* (Moore, 1872)**
= *alatauica* O. Bang-Haas, 1936 **syn. rev.**
Bold-BIN AAB4396.

***Saturnia (Neoris) stoliczkana* C. & R. Felder, 1874**
[Not yet barcoded, therefore no BIN.]

***Saturnia (Neoris) schencki* Staudinger, 1881**
Bold-BIN AAB4397.

***Saturnia (Neoris) galeropa* Püngeler, 1900**
Bold-BIN ABX5743.

***Saturnia (Neoris) oliva* A. Bang-Haas, 1910**
= *haraldi* Schawerda, 1923 **syn. rev.**
[Not yet barcoded, therefore no BIN.]

***Saturnia (Neoris) svenihedini* (Hering, 1936)**
[Not yet barcoded, therefore no BIN.]

***Saturnia (Neoris) naessigi* (de Freina, 1992)**
Bold-BIN AAE0432.

***Saturnia (Neoris) codyi* Peigler, 1996**
Bold-BIN AAD6590 (but see also *S. (N.) huttoni*!).

***Saturnia (Neoris) naumanni* Naumann, Nässig & Löffler, sp. n.**
[No Bold-BIN available, no or incomplete barcode result.]

***Saturnia (Neoris) bergmanni* Naumann, Löffler & Nässig, sp. n.**
Bold-BIN AAB4398.

***Saturnia (Neoris) eckweileri* Nässig, Naumann & Löffler, sp. n.**
Bold-BIN AAB4399.

Supplementary information to Part A, *Saturnia (Perisomena)*

A kind note by Alireza Naderi (Tehran) in xi. 2016 informed us that the distribution area of *Saturnia (Perisomena) caecigena* evidently also comprises Iran: Hasan Ghaderi, who works for the department of Environment in Kordestan, found in a house garden in the village Darreh Tefi between the Zeribar Lake and the Iraqi border in the most northwestern part of the Zagros range (see Fig. 129, green dot) a few specimens, probably lured by nocturnal illumination (photos seen). Thanks also to Hiwa Feizi who informed A. Naderi about this interesting record. There was no specimen available for barcode or any other studies so far.

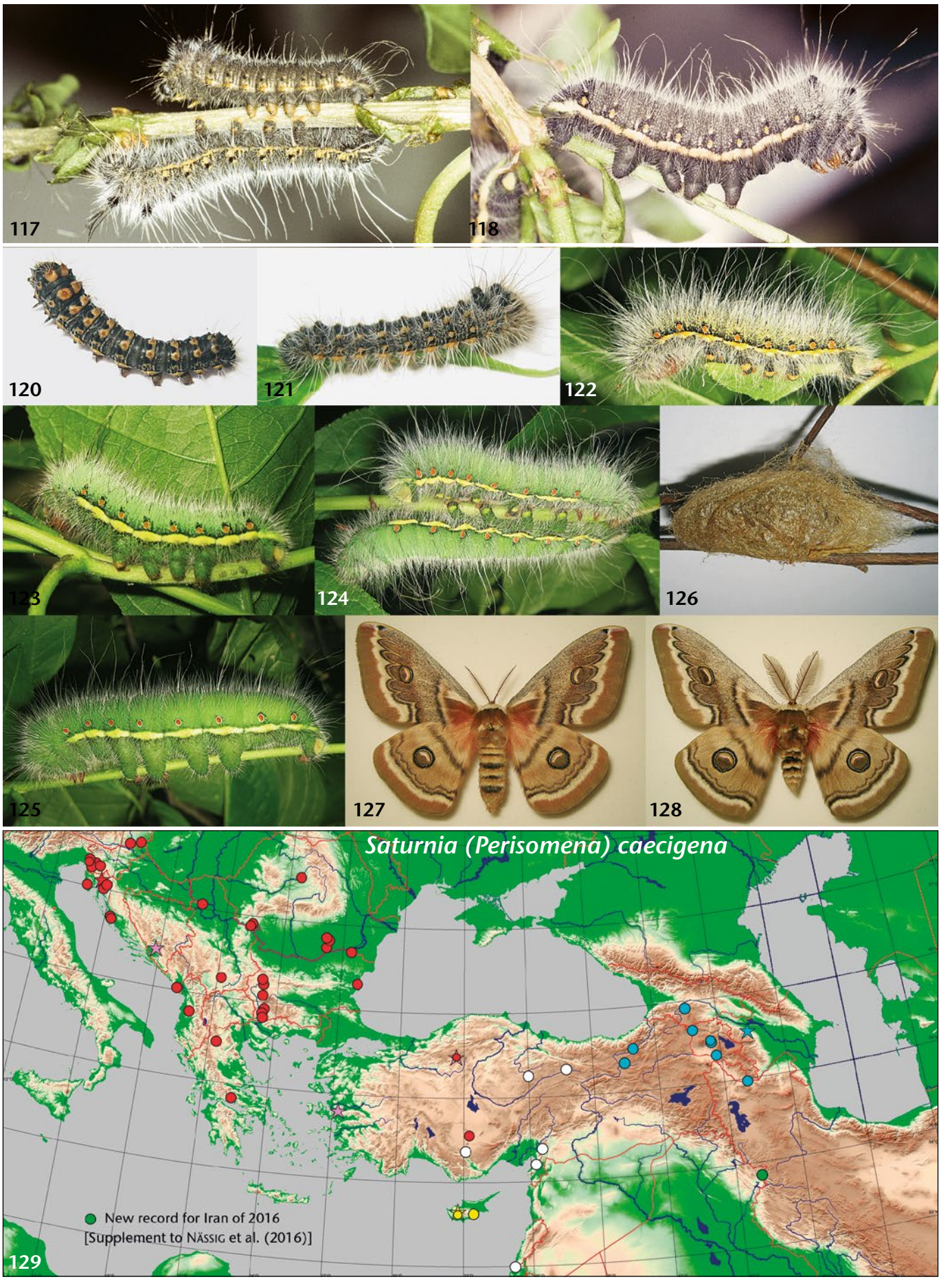


Plate 10: *Saturnia (Neoris),* preimaginals. — **Figs. 117–118:** *S. **(Neoris) naessigi,*** Armenia; **117:** L_2 (top)/L_3 (bottom); **118:** L_4 [Naumann]. — **Figs. 120–128:** *S. **(Neoris) shadulla,*** China, Xinjiang, Kunlun Shan Mts. (Keng Tau Mt.), Oytag ("very dry slopes with sparse bushes and *Juniperus*"), F_1 ex ♀ leg. Floriani & Saldaitis, cult. V. Visinskas [one Barcode SNB 5252, see Table]; **120:** L_1 larva; **121:** L_2; **122:** L_3; **123:** L_4; **124–125:** L_5; **126:** cocoon, **127:** ♀, **128:** ♂. — Photos V. Visinskas. — **Fig. 129:** Supplementary map for *S. **(Perisomena) caecigena,*** additional locality in Iran close to Iraqi border; see text.

Acknowledgements (for parts A and B)

During our studies for this project we were kindly welcomed in different museum collections and found much support by the custodial people there. We would like to thank the following museum staff: Alessandro Giusti, Ian Kitching (BMNH); Xue Dayong (CASB); Harald Sulak, Thomas Witt (CMWM); Christian Wieser (LMKK); Günter Ebert, Robert Trusch (LNK); Bernhard Merz (MNHG); Joël Minet, Rodolphe Rougerie (MNHN); Vitya Kuban (MMBC); Sabine Gaal-Haszler, Martin Lödl (NHMW); Bert Gustafsson, Tobias Malm (NHRS); Darren Mann (OUM); Matthias Nuss (SMTD); Gerhard Tarmann, Peter Huemer (TLMF); Marek Wanat (WMNH); Wolfram Mey (ZMHU); Hans Strümpel (ZMUH); Ulf Buchsbaum, Axel Hausmann, Wolfgang Speidel (ZSM).

The following persons kindly gave either access to their collections, or supported us with notes, information, photos, data, material and/or discussion about the results of our study and the manuscript: Abdul Rehman Azeemi (Mirpurkhas Sindh, Pakistan), Oleg Belyalov (Almaty, Kazakhstan), Balázs Benedek (Törökbálint, Hungary), Ulrich Brosch (Hille, Germany), Josef J. de Freina (München, Germany), Konstantin A. Efetov (Simferopol, Crimean State Medical University), György Fábián (Budapest, Hungary), Alessandro Floriani (Milano, Italy), Martin Geck (Augsburg, Germany), Dmitriy Goshko (Moskow, Russia), Vladimir Gurko (Chernovtsy, Ukraine), Zoja Kluychko (Kiev, Ukraine), Steve Kohll (Kayl, Luxembourg), Günter Müller (Haifa, Israel), Alireza Naderi (Tehran, Iran), Uberto Nardelli (Trento [Vela], Italia), Richard "Ric" Peigler (San Antonio, Texas, USA), Tony Pittaway (Wallingford, Oxon, UK), Luigi Racheli (Roma, Italia), Aidas Saldaitis (Vilnius, Lithuania), Alexander Schintlmeister (Dresden, Germany), Martin Schroth (Hanau, Germany), Ryan St. Laurent (Gainesville, Florida, USA), Sergey Titov (Pawlodar/Irtysh, Kazakhstan), Vytautas Visinskas (Vilnius, Lithuania), Bernhard Wenczel (Bubikon, Switzerland), Alberto Zilli (then Roma, now London, BMNH), Vadim Zolotuhin (Ulyanovsk, Russia).

We would like to give special thanks to Andreas Bergmann (Forst/Lausitz, Germany) and Wolfgang Eckweiler (Frankfurt am Main, Germany) for their valuable support of this study with contacts abroad and own expeditions; they kindly presented us material which we could describe in this work.

The earlier molecular work (COI barcoding) was funded by NSERC and Genome Canada through grants to Paul D. N. Hebert at the Canadian Centre for DNA Barcoding based at the Biodiversity Institute of Ontario at the University of Guelph, Ontario, Canada, until ca. mid-2012; more recent barcode analyses were at least in part payed privately by the authors. Again Rodolphe Rougerie (Paris) helped with access and interpretation of some results.

References (for parts A and B)

Abafi-Aigner, L. (1907): Magyarország Lepkéi Tekintettel Európa többi országainak lepke-faunájára. A berge-féle lepkekönyv képeivel. [Reprint 2006 by Müszaki Könyvkiadó]. — Budapest (Kiadja a K. M. Természettudományi Társulat), xxxii + 139 + 38 pp., 51 col. pls.

Andree, R. (1896): Andrees allgemeiner Handatlas in 99 Haupt- und 82 Nebenkarten, nebst vollständigem alphabetischem Namenverzeichnis. 3. Auflage, 2. revidierter und vermehrter Abdruck. — Bielefeld, Leipzig (Geographische Anstalt und Verlag von Velhagen & Klasing), [ii] + 188 pp., 140 pp. maps + legends.

Aue, A. U. E. (1933): Handbuch für den praktischen Entomologen. 1. Abteilung: Lepidoptera. IV. Band. Thaumatopoeidae, Lasiocampidae, Lemoniidae, Bombycidae, Endromididae, Drepanidae, Saturniidae. — Frankfurt am Main (Internationaler Entomologischer Verein e.V.), iv + 180 pp.

Bang-Haas, A. (1910): Neue oder wenig bekannte palaearctische Macrolepidopteren. — Deutsche Entomologische Zeitschrift Iris, Dresden, **24** (3): 27–51, pls. III–IV.

Bang-Haas, O. (1927): Horae macrolepidopterologicae regionis palaearcticae, editus ab Otto Bang-Haas. — Dresden-Blasewitz (Verlag Staudinger & A. Bang-Haas), xxviii + 128 pp., plates (part. col.).

—— (1936 [1. vi.]): Neubeschreibungen und Berichtigungen der palaearktischen Macrolepidopterenfauna XXII. — Entomologische Zeitschrift, Frankfurt am Main, **50** (9): 108–109.

Barcode of life [*or* Bold *or* Boldsystems] (2016): Advancing species identification and discovery by providing an integrated environment for the assembly and application of DNA barcodes. Barcode of life data systems. — URL: www. barcodinglife.org *or* www.boldsystems.org. — Last accessed: 18. iv. 2016.

Beccaloni, G., Scoble, M., Kitching, I. J., Simonsen, J., Robinson, G., Pitkin, B., Hine, A., & Lyal, C. (2005): The Global Lepidoptera Names Index (database, last update 2005). — URL: www. nhm. ac. uk/ our-science/ data/ lepindex/ (last accessed: 9. iv. 2017).

Beeke, M., & Paukstadt, U. (2011): Eine interessante Ocellenvariation bei *Saturnia (Neoris) shadulla* Moore, 1872 von Kirgistan (Lepidoptera: Saturniidae). — Beiträge zur Kenntnis der wilden Seidenspinner, Wilhelmshaven, **9** (7): 316–322.

Bertaccini, E., Fiumi, G. & Provera, P. (1994): Bombici e sfingi d'Italia (Lepidoptera Heterocera), Volume **1.** — Monterenzio (Natura-Giuliano Russo Editore), 248 S.

Bold (2016): Bold [or Barcode of life or Boldsystems]. — URL: www.boldsystems.org (last accessed: 23. vi. 2016).

Bollow, C. (1932): 13. Familie: Saturnidae [*sic*]. — Pp. 129–135, pls. 11, 14 *in:* Seitz, A. (ed.) (1930–1934), Die Gross-Schmetterlinge der Erde, I. Abteilung, Die Gross-Schmetterlinge des Palaearktischen Faunengebietes, Supplement zu Band **2.** Band, Die Palaearktischen Spinner & Schwärmer [incl. Nachträge]. — Stuttgart (A. Kernen), vii + 315 + 1 pp., pls. 1–16.

Bouvier, E.-L. (1936): Étude des Saturnioïdes normaux. Famille des Saturniidés. — Mémoires du Muséum national d'Histoire naturelle, Paris, n.s., **3:** 1–354, pls. I–XII.

——, & Riel, P. (1931): Catalogue des papillons sériciginènes Saturnioïdes. — Rapport présenté a la Chambre de Commerce de Lyon par la commission administrative 1924–1931, Lyon, **17:** 1–90, 3 pls.

Bouyer, T. (1993): *Maltagorea* n. gen., un nouveau genre de Saturniidae malgache (Lepidoptera: Saturniidae, Saturniinae, Pseudapheliini). — Lambillionea, Bruxelles, **93** (1): 97–102.

CCDB (Canadian Centre for DNA Barcoding) (2016): Advancing species identification and discovery. — URL: www. dnabarcoding.ca [see there also under technical protocols] (last accessed: 23. vi. 2016).

Chander, R. (1977): *Neoris huttoni* Moore, a new pest on apple. — Science and Culture, Kolkata, **43:** 552.

Cotes, E. C., & Swinhoe, C. (1887): A catalogue of the moths of India, part **II,** Bombyces. — Calcutta (Trustees of the Indian Museum), pp. 41–255.

D'Abrera, B. (1998): Saturniidae mundi. Saturniid moths of the world. Part **III**. — Keltern (Goecke & Evers), 171 pp., 87 col. pls.

Daniel, F. (1959): Ein weiterer Beitrag zur Lepidopterenfauna der Steiermark. — Nachrichtenblatt der Bayerischen Entomologen, München (Munich), **8** (11): 105–107.

—— (1968): Die Makrolepidopteren-Fauna des Sausalgebirges in der Südsteiermark. Mit Zuträgen einiger Fundlisten aus anderen Insektengruppen. — Mitteilungen der Abteilung für Zoologie und Botanik am Landesmuseum „Joanneum", Graz, **30:** 84–260 (separatum with separate pagination 1–176) + 10 b&w pls. + legend.

Dayrat, B. (2005): Towards integrative taxonomy. — Biological Journal of the Linnean Society, London, **85:** 407–415.

Decaëns, T., & Rougerie, R. (2008): Descriptions of two new species of Hemileucinae (Lepidoptera: Saturniidae) from the region of Muzo in Colombia: evidence from morphology and DNA barcodes. — Zootaxa, Auckland, **1944:** 34–52.

de Freina, J. J. (1992): Beitrag zur Kenntnis der Gattung *Neoris* Moore 1862 mit Neubeschreibung ihrer kleinasiatischen Vertreter (Lepidoptera: Saturniidae). — Entomologische Zeitschrift, Essen, **102** (13): 233–251.

—— (1994): 9. Beitrag zur systematischen Erfassung der Bombyces- und Sphinges-Fauna Kleinasiens. Weitere Kenntnisse über Artenspektrum, Systematik und Verbreitung von Cossidae, Psychidae, Cochlididae, Syntomidae, Saturniidae, Brahmaeidae, Drepanidae, Axiidae, Hepialidae, Dilobidae und Nolidae. — Atalanta, Marktleuthen, **25** (1/2): 317–349, col. pls. xiv + xv.

——, & Witt, T. J. (1987): Die Bombyces und Sphinges der Westpaläarktis (Insecta, Lepidoptera). Ein umfassendes, reich illustriertes Bestimmungsbuch europäischer und nordwestafrikanischer Nachtfalter. — München (Ed. Forschung & Wissenschaft), 708 pp.

Ebert, G. (2010): Auf Expedition in Afghanistan. Ein Insektenforscher erzählt von seinen Reisen (1957–1971). — Karlsruhe (Naturwissenschaftlicher Verein Karlsruhe e.V.), 342 pp.

Efetov, K. A., & Budashkin, Y. I. (1990): Lepidoptera of the Crimea. — Simferopol (Tavria), 112 pp. [in Cyrillic letters].

Fajčík, J. (2003): Motýle strednej a severnej Európy. Určovanie, rozšírenie, stanovište, bionómia. — Die Schmetterlinge Mittel- und Nordeuropas. Bestimmung, Verbreitung, Flugstandort, Bionomie. [Bilingual book.] — Bratislava (the author), 173 pp., 22 b.&w. drawing pls., 38 col. pls.

Farg'ona (2016): [Historical and geological data about Ferghana]. — URL: de.wikipedia.org/ wiki/ Farg'ona (last accessed: 17. vi. 2016).

Fauna europaea (2016): [Search for the species *caecigena,* displayed on a map]; map downloaded (PDF) on 4. ii. 2016. — URL: www.faunaeur.org/ full_results.php? id=443615 (last accessed: 4. ii. 2016).

Felder, C., & Felder, R. (1874): "Heft 4" [*partim*], "Heterocera. Bombyces & Sphinges". — Plates 75–107 *in:* Felder, C., Felder, R., & Rogenhofer, A. F. (eds.) (["1864"] 1865–1875), Reise der österreichischen Fregatte Novara um die Erde in den Jahren 1857, 1858, 1859 unter den Befehlen des Commodore B. von Wüllerstorf-Urbair, Zoologischer Theil, Zweiter Band, Zweite Abtheilung: Lepidoptera. Atlas [= butterfly plates + Hefte 4 + 5 with all legends and explanations]. — Vienna (K.-k. Hof- und Staatsdruckerei), pp. 1–9, 1–10, 1–20, pls. 1–140.

——, & —— (1875): ["Heft 5" [*partim*], "Heterocera"], Erklärungen der Tafeln LXXV bis CVII. — *In:* Felder, C., Felder, R., & Rogenhofer, A. F. (eds.) (["1864"] 1865–1875), Reise der österreichischen Fregatte Novara um die Erde in den Jahren 1857, 1858, 1859 unter den Befehlen des Commodore B. von Wüllerstorf-Urbair, Zoologischer Theil, Zweiter Band, Zweite Abtheilung: Lepidoptera. Atlas [= butterfly plates + Hefte 4 + 5 with all legends and explanations]. — Vienna (K.-k. Hof- und Staatsdruckerei), pp. 1–9, 1–10, 1–20, pls. 1–140.

Felsenstein J. (1985): Confidence limits on phylogenies: An approach using the bootstrap. — Evolution, New York, **39** (4): 783–791.

Ferguson, D. C. (1971/72): Bombycoidea, Saturniidae. — *In:* Ferguson, D. C., Franclemont, J. G., Hodges, R. W., Munroe, E. G., Dominick, R. B., & Edwards, C. R. (eds.), The moths of America north of Mexico, Fascicle 20.2 (2 parts, 1971/72). — London (E. W. Classey & R.B.D. Publ.), 275 + xxi pp., 22 pls.

Fischer, H., & Lewandowski, S. (2003): Zweiter Beitrag zur Schwärmer- und Spinnerfauna Zyperns (Lepidoptera). — Entomologische Zeitschrift, Stuttgart, **113** (10): 295–301.

Fletcher, D. S., & Nye, I. W. B. (1982): Bombycoidea, Castnioidea, Cossoidea, Mimallonoidea, Sesioidea, Sphingoidea, Zygaenoidea. — *In:* Nye, I. W. B. (ed.), The generic names of moths of the world, vol. **4.** — London (Trustees of the BMNH), 1 pl., xiv + 192 pp.

Forster, W., & Wohlfahrt, T. A. (1960): Die Schmetterlinge Mitteleuropas, Band **3:** Spinner und Schwärmer (Bombyces und Sphinges). — Stuttgart (Franckh), vii + 239 pp., 28 col. pls.

Forsyth, T. D. (1875): Report of a mission to Yarkund in 1873, under command of Sir T. D. Forsyth, K.C.S.I., C.B., Bengal Civil Service, with historical and geographical information, regarding the possessions of the Ameer of Yarkund. [*Forsyth as commanding officer may be interpreted as some sort of an editor and author, and more detailed reports on many subjects and 45 b&w photographic illustrations were added by other participants, in alphabetic order: Bellow, Biddulph, Chapman, Gordon, Stoliczka, Trotter and others.*] — Calcutta (Foreign Dept. Press), [1] + 573 pp. [Download from ia600507. us.archive.org/ 21/ items/ lahoretoyarkandi1873hend/ lahoretoyarkandi1873hend. pdf on 21. x. 2016.]

Friedel, G. (1968): *Perisomena caecigena* ssp. n. *parviocellata* Friedel (Lepid., Saturniidae). — Zeitschrift der Wiener Entomologischen Gesellschaft, Vienna, **53:** 18–19.

Gorbunov, O. G., & Kishida, Y. (1995): A virgin reproduction of *Neoris huttoni schenki* [*sic*] (Staudinger) from Central Asia [in Japanese]. — Gekkan-Mushi, a monthly journal of entomology, Tokyo, **296:** 3–5.

Gutleb, B., & Wieser, C. (2002): Ergebnisse einer zoologischen Exkursion in den Nordiran, 2001. Arthropoda (Lepidoptera, Trichoptera, Neuroptera, Heteroptera, Coleoptera, Opiliones, Araneae, Decapoda) und Vertebrata (Amphibia, Reptilia, Aves, Mammalia). — Carinthia II, Klagenfurt, **192/112:** 33–140.

Haas, H. (2016): Zur Raupe aus Usbekistan, Anfrage v. 7.10.16 *Foto* [and following contributions]. — Lepiforum 1, Bestimmung von Schmetterlingen und ihren Praeimaginalstadien. — URL: www.lepiforum.de/ 1_forum_2016.pl? page =1; md= read; id= 23523 (last accessed: 12. x. 2016).

Habeler, H. (2014): Lepidopterologische Nachrichten aus der Steiermark, 21 (Lepidoptera). — Joannea Zoologie, Graz, **13:** 165–179.

Hafner, J. (1910): Verzeichnis der bisher in Krain beobachteten Großschmetterlinge. — Carniola, Laibach, Heft **I:** 109–128.

Hampson, G. F. (1893): The fauna of British India, including Ceylon and Burma, moths, vol. **I.** — London (Taylor & Francis), xxiii + 527 pp.

Häuser, C. (2004): Clas Michael Naumann zu Königsbrück. 26. 06. 1939–15. 02. 2004. — Nota lepidopterologica, Dresden, **27** (1): 3–10.

Hausmann, A., & Nässig, W. A. (2013): Über den Verbleib der Schmetterlingssammlung und des wissenschaftlichen Nachlasses des verstorbenen Rudolf E. J. Lampe. — Nachrichten des Entomologischen Vereins Apollo, Frankfurt am Main, N.F. **33** (4): 158.

Henderson, G., & Hume, A. O. (1873): Lahore to Yarkand. Incidents of the route and natural history of the countries transversed by the expedition of 1870, under T. D. Forsyth [*with "Chapter II. Insects. Order Lepidoptera", authored by H. W. Bates, and with a contemporary map of the city of Yarkand and many geographical details*]. — London (L. Reeve & Co.), xviii + 370 pp. [Download from www.biodiversitylibrary.org/ bibliography/ 101652#/summary on 21. x. 2016.]

Hering, M. (1936 [22. i.]): Schwedisch-chinesische wissenschaftliche Expedition nach den nordwestlichen Provinzen Chinas, unter Leitung von Dr. Sven Hedin und Prof. Sü Ping-chang. Insekten, gesammelt vom schwedischen Arzt der Expedition Dr. David Hummel 1927–1930. 40. Lepidoptera. 4. Bombyces. — Arkiv för Zoologi, Stockholm, **27A** (32): 1–7.

Hofmann, E. (1894): Die Gross-Schmetterlinge Europas. 2. Auflage [2 parts]. — Stuttgart (C. Hoffmann'sche Verlagsbuchhandlung), text part xxxxi + 240 pp.; plate part 71 col. pls.

Horn, W., Kahle, I., Friese, G., & Gaedike, R. (1990): Collectiones entomologicae. Ein Kompendium über den Verbleib entomologischer Sammlungen der Welt bis 1960. Teil I: A bis K; Teil II: L bis X. — Berlin (Akademie der Landwirtschaftswissenschaften der DDR), pp. 1–220 + 221–573.

Huemer, P. (2013): Die Schmetterlinge Österreichs (Lepidoptera). Systematische und faunistische Checkliste. — Innsbruck (Tiroler Landesmuseum Ferdinandeum, Studiohefte **12**), 304 pp.

——, & Tarmann, G. (1993): Die Schmetterlinge Österreichs. Systematisches Verzeichnis mit Verbreitungsangaben für die einzelnen Bundesländer. — Veröffentlichungen des Tiroler Landesmuseums Ferdinandeum, Innsbruck, **Supplement 5:** 1–224.

Hundsdörfer, A., & Kitching, I. J. (2010): A method for improving DNA yield from century-plus old specimens of large Lepidoptera while minimizing damage to external and internal abdominal characters. — Arthropod Systematics and Phylogeny, Dresden, **68** (1): 151–155.

ICZN [International Commission on Zoological Nomenclature, ed.] (1999): International Code of Zoological Nomenclature, fourth edition, adopted by the International Union of Biological Sciences. — London (International Trust for Zoological Nomenclature, BMNH), xxix + 306 pp. — *The Code can also be found in the WWW under iczn.org, including actual amendments.*

Jordan, K. (1911): 13. Familie, Saturnidae [*sic*]. — Pp. 209–226, pls. 31–34 *in:* Seitz, A. (ed.) (1907–1913), Die Gross-Schmetterlinge der Erde, I. Abteilung, Die Gross-Schmetterlinge des Palaearktischen Faunengebietes, **2.** Band, Die Palaearktischen Spinner & Schwärmer. — Stuttgart (A. Kernen), vii + 479 + 3 pp., pls. 1–56.

Karsholt, O., & Razowski, J. (ed.) (1996): The Lepidoptera of Europe. A distributional checklist. — Stenstrup (Apollo), 380 S. + CD.

Kirby, W. F. (1892): A synonymic catalogue of Lepidoptera Heterocera (moths), vol. **I,** Sphinges and Bombyces. — London (Gurney & Jackson), Berlin (R. Friedländer & Son), xii + 951 pp.

Knölke, S., Erlacher, S., Hausmann, A., Miller, M. A., & Segerer, A. H. (2005): A procedure for combined genitalia dissection and DNA extraction in Lepidoptera. — Insect Systematics and Evolution, Copenhagen, **35:** 401–409.

Koçak, A. Ö. (1977): New Lepidoptera from Turkey V. — Atalanta, Münnerstadt, **8** (2): 126–147.

——, & Kemal, M. (2012): Lepidoptera of Afghanistan. Annotated bibliography and synonymical checklist of the known species. — Priamus, Serial Publication of the Centre for Entomological Studies Ankara, **Supplement 26:** 1–134.

Korb, S. K. (2016): Lepidoptera of Central Asia: collecting experience. — SEL News, The Newsletter of the Societas Europaea Lepidopterologica, Dresden, **57:** 18–25.

Kupido, F. J. (1825): Neuentdecktes europäisches Nacht-Pfauen-Auge. *Saturnia Cœcigena* Nro. 4. (*Phalaea Attacus* Linn.) (*Saturnia* Schrank.) *[sic]*. — Brünn [Brno] (J. G. Trassler), 12 pp., 1 pl. (hand-col.).

Lampe, R. E. J. (2010): Saturniidae of the world, their lifestages from the eggs to the adults — Pfauenspinner der Erde, ihre Entwicklungsstadien vom Ei zum Falter. — München (F. Pfeil), 368 pp. incl. 336 col. pls.

Lederer, G. (1951): Ein Beitrag zur Lebensweise von *Perisomena caecigena caecigena* (Kupido, 1825) (Lep. Saturnidae) *[sic]*. — Entomologische Zeitschrift, Stuttgart, **61** (17): 131–136, (18): 142–144.

Lederer, J. (1855): Beitrag zur Schmetterlings-Fauna von Cypern, Beirut und einem Theile Klein-Asiens. — Verhandlungen des zoologisch-botanischen Vereins in Wien, Vienna, **5:** 177–254.

Lemaire, C. (1978): Les Attacidae Américains — The Attacidae of America (= Saturniidae); part 1, Attacinae [= Saturniinae]. — Neuilly-sur-Seine (the author), 238 pp., 49 pls.

——, & Minet, J. (1999): 18. The Bombycoidea and their relatives. — Pp. 321–353 *in:* Kristensen, N. P. (volume ed.): Part **35.** Lepidoptera, moths and butterflies. Vol. **1:** Evolution, systematics, and biogeography. *In:* M. Fischer (series ed.): Handbuch der Zoologie. Handbook of Zoology. Vol. IV, Arthropoda: Insecta. — Berlin, New York (Walter de Gruyter), x + 491 pp.

Leraut, P. (2006): Moths of Europe, vol. **I,** saturnids, lasiocampids, hawkmoths, tiger moths ... — Verrières le Buisson (N.A.P Ed.), [394] pp.

Levente, S. (2010): Moths of Romania 1. Fluturide noapte din România 1. — Săcele-Braşov (Disz Tipo), 264 pp., 10 col. pls. [in English and Romanian].

Mabille, J. P. (1879): Recensement des Lépidoptères hétérocères observés jusqu'à ce jour à Madagascar. — Annales de la Société entomologique de France, Paris, 5e série, tome IX, trimestre de 18: [291]–348.

Manas Lake (2016): [Historical and geological data about Lake Manas]. — URL: en.wikipedia.org/wiki/Manas_Lake (last accessed: 17. vi. 2016).

Marg'ilon (2016): [Historical and geological data about Margelan]. — URL: de.wikipedia.org/wiki/Marg'ilon (last accessed: 17. vi. 2016).

Mariani, M. (1941): Fauna Lepidopterorum Italiae, Parte 1, Catalogo ragionato dei Lepidotteri d'Italia. — Giornale di Scienze Naturali ed Economiche, Palermo, **42** (3): 1–80 ["1940/41"].

Michener, C. D. (1952): The Saturniidae (Lepidoptera) of the western hemisphere: morphology, phylogeny, and classification. — Bulletin of the American Museum of Natural History, New York, **98:** 335–502, pl. 5.

Minà-Palumbo, A. (1883/1884): Lepidotteri druofagi. — Il Naturalista Siciliano, Palermo, (1883) **2** (12): 298–302; **3** (1): 31–32, (2): 54–56, (3): 92–96; (1884) (4): 120–124, (6): 184–186, (8): 247–248, (10): 298–300, (11): 323–324, (12): 347–348; **4** (1–2): 16–20. — [*Cited after Parenzan & Porcelli (2006), not personally seen.*]

Miranda, R. A., & Peigler, R. S. (2007): Phylogenetic analysis of the *Saturnia*-group (Saturniidae) of genera based on scolus structure of mature larvae. — Transactions of the Lepidopterological Society of Japan, Tokyo, **58** (4): 433–441.

Moore, F. (1862): XXIV. On the Asiatic silk-producing moths. — The Transactions of the Entomological Society of London, London, (3) **1** (4): 313–322.

—— (1872): 5. Descriptions of new Indian Lepidoptera. — Proceedings of the Scientific Meetings of the Zoological Society of London, London, **1872:** 555–583, pls. xxxii–xxxiv.

—— (1879): Scientific results of the second Yarkand Mission, based upon the collections and notes of the late Ferdinand Stoliczka, PhD. Lepidoptera. — Calcutta (Office of the Superintendent of Government Printing), 1–18, 1 col. pl.

Nanda, S. (2006): [*Photo of a darkened* Neoris *on a plastered house wall in the Spiti valley, India. There is no download of the photo allowed. According to the few text accompanying the photo, it was taken in the Spiti valley, and the photographer obviously lives in Kullu.*] sn066867x.jpg. — www.flickr.com/ photos/ talk2space/ 310005340/ in/ photolist-toRMEoy4nUR-wpKh3m (last accessed: 25. xi. 2016).

Nässig, W. A. (1981): Ein Beitrag zur Kenntnis der Saturniidae und der Brahmaeidae des Iran und der Türkei, Teil 2: Saturniidae. — Nachrichten des Entomologischen Vereins Apollo, Frankfurt am Main, N.F. **2** (1): 1–39.

—— (1994): Vorschlag für ein neues Konzept der Gattung *Saturnia* Schrank 1802 (Lepidoptera: Saturniidae). — Nachrichten des Entomologischen Vereins Apollo, Frankfurt am Main, N.F. **15** (3): 253–266.

—— (1998a): Die Sammlung des 1983 verstorbenen Johann Zukunft, Maintal-Dörnigheim, jetzt im Senckenberg-Museum. — Nachrichten des Entomologischen Vereins Apollo, Frankfurt am Main, N.F. **19** (1): 22.

—— (1998b): Sammlung von Johann Zukunft jetzt im Senckenberg-Museum. — Natur und Museum, Frankfurt am Main, **128** (7): 227.

—— (2002): Anmerkungen über *Saturnia (Perisomena) caecigena* mit Beschreibung einer neuen Unterart von Zypern (Lepidoptera: Saturniidae, Saturniinae). — Nachrichten des Entomologischen Vereins Apollo, Frankfurt am Main, N.F. **23** (1/2): 43–48.

——, & Lampe, R. E. J. (1989): Neue Erkenntnisse über die Gattung *Lemaireia:* 2. Eine neue Art der Gattung *Lemaireia* von Mindanao (Philippinen). — Nachrichten des Entomologischen Vereins Apollo, Frankfurt am Main, N.F. **10** (3): 239–250.

——, Naumann, S., & Löffler, S. (2016): Revisional notes on the subgenera *Saturnia (Perisomena)* and *Saturnia (Neoris)* stat. rev. (Lepidoptera: Saturniidae); Part A: *Perisomena* [*s. str.*]. — Nachrichten des Entomologischen Vereins Apollo, Frankfurt am Main, **37** (1): 47–64.

——, & Speidel, W. (2007): On the authorships of the Lepidoptera atlas of the "Reise der Novara", with a list of the Bombycoidea [s.l.] therein described (Insecta, Lepidoptera, Bombycoidea). — Senckenbergiana biologica, Frankfurt am Main, **87** (1): 63–74.

——, & Wang M. (2006): First record of the saturniid genus *Lemaireia* Nässig & Holloway, 1987 from Hainan island (PR China) with the description of a new species (Lepidoptera: Saturniidae). — Nachrichten des Entomologischen Vereins Apollo, Frankfurt am Main, N.F. **27** (1/2): 23–25.

Naumann, C. M. (1978): Zur Tierwelt des „Großen Pamir" (unter Mitarbeit von H. Huss und M. K. Nauroz). — Pp. 202–213, figs. 33–42 *in:* Senarclens de Grancy, R., & Kostka, R. (Hrsg.), Großer Pamir; Österreichisches Forschungsunternehmen 1975 in den Wakhan-Pamir, Afghanistan. — Graz (Akadem. Druck- u. Verlagsanstalt), x + 399 pp., 86 col. figs., 5 col. maps.

Naumann, S., Löffler, S., & Nässig, W. A. (2012a): Revisional notes on the species-group of *Saturnia cachara,* with description of a new subgenus and a new species (Lepidoptera: Saturniidae). — Nachrichten des Entomologischen Vereins Apollo, Frankfurt am Main, N.F. **33** (2/3): 107–128.

——, ——, & —— (2012b): Taxonomic notes on the group of *Loepa miranda,* 2: The subgroup of *Loepa damartis* (Lepidoptera: Saturniidae). — Nachrichten des Entomologischen Vereins Apollo, Frankfurt am Main, **33** (2/3): 87–106.

——, & Nässig, W. A. (2010a): Revisional notes on the species-group of *Saturnia grotei* Moore, 1859 of the genus *Saturnia* Schrank, 1802 (Lepidoptera: Saturniidae). — Nachrichten des Entomologischen Vereins Apollo, Frankfurt am Main, **31** (1/2): 31–62.

——, & —— (2010b): Two species in *Saturnia (Rinaca) zuleika* Hope, 1843 (Lepidoptera: Saturniidae). — Nachrichten des Entomologischen Vereins Apollo, Frankfurt am Main, N.F. **31** (3): 127–143.

Nei, M., & Kumar, S. (2000): Molecular evolution and phylogenetics. — New York (Oxford Univ. Pr.), 348 pp.

NHRS (Naturhistoriska Riksmuseet, Stockholm) (2005–2016): A checklist of the Lepidoptera in the Swedish Museum of Natural History. — URL: www2. nrm. se/ en/ lep_nrm/ h/ leph.html (last accessed 23. vi. 2016).

Niepelt, W. (ed.) (1914 ["1913"]): Lepidoptera Niepeltiana, [Part 1], Abbildungen und Beschreibungen neuer und wenig bekannter Lepidopteren aus der Sammlung W. Niepelt [edited by W. Niepelt, authored by E. Strand and other authors including the editor]. — Leipzig (Urban & Co.), 65 pp., col. pls. I.–IV., b. & w. pls. V–XII.

Packard, A. S. [posthumously edited by T. Cockerell, with notes by J. H. Watson] (1914): Monograph of the bombycine moths of North America, including their transformations and origin of the larval markings and armature. Part III, Families Ceratocampidae (exclusive of Ceratocampinae), Saturniidae, Hemileucidae, and Brahmaeidae. — Memoirs of the National Academy of Sciences, Washington, **12** (I, 1): [ix] + 516 pp. [incl. CXIII pls.].

Parenzan, P., & Porcelli, F. (2006): I macrolepidotteri italiani. Fauna Lepidopterorum Italiae (Macrolepidoptera). — Phytophaga, Palermo, **15** ["2005–2006"]: 1–1051.

Peigler, R. S. (1996): A new species of *Saturnia* (Saturniidae) from northern Pakistan. — Journal of Research on the Lepidoptera, Arcadia (Calif.), **32:** 8–15 ["1993"].

——, & Kendall, R. O. (1993): A review of the genus *Agapema* (Lepidoptera: Saturniidae). — Proceedings of the Denver Museum of Natural History, Denver, **3** (3): 1–22.

Pittaway, A. R. ([2000–]2016): Saturniidae of the Western Palaearctic (including Europe, North Africa, the Middle East, western Siberia and western Central Asia). Systematic list [then internal links to *Perisomena* or to *Neoris*]. — URL: tpittaway. tripod. com/silk/satlist.htm (last accessed: 16. xi. 2016).

Prola, C., Provera, P., Racheli, T., & Sbordoni, V. (1978): I Macrolepidotteri dell'Appennino centrale, Parte I, Diurna, Bombyces e Sphinges. — Fragmenta Entomologica, Roma, **14:** 1–217.

Provera P. (1992): Tabelle faunistiche sui Bombici e Sfingi italiani e delle regioni limitrofe (Lepidoptera). — Bollettino dell' Associazione romana di Entomologia, Rome, **46** ["1991"]: 1–35.

Prunus — Wikipedia (2016): URL: de.wikipedia.org/wiki/Prunus (last accessed: 1. xi. 2016).

Püngeler, R. (1900): Neue Macrolepidopteren aus Centralasien. Fortsetzung. — Deutsche Entomologische Zeitschrift Iris, Dresden, **13:** 115–123, pl. IV.

Raineri, V., Zangheri, S., & Zilli, A. (1995): 88. Lepidoptera Thyridoidea, Lasiocampoidea, Bombycoidea. — Pp. 1–6 *in:* Minelli, A., Ruffo, S., & La Posta, S. (eds.), Checklist delle specie della fauna italiana. — Bologna (Calderini), [5] + 6 + 11 + 23 + 43 pp.

Rambur, P.[-J.] (1866 [1867?]): Catalogue systématique des Lépidoptères de l'Andalousie, livr. (2). — Paris (J. B. Baillière), ix + 414 pp., XXII col. pls.

Ratnasingham, S., & Hebert, P. D. N. (2007): Barcoding. BOLD: The barcode of life data system (www.barcodinglife.org). — Molecular Ecology Notes, Hoboken, **7** (3): 355–364.

——, & —— (2013): A DNA-based registry for all animal species: The Barcode Index Number (BIN) system. — PLoS ONE **8** (8): e66213; doi: 10.1371/journal.pone.0066213.

Regier, J. C., Mitter, C., Peigler, R. S., & Friedlander, T. P. (2002): Monophyly, composition, and relationships within Saturniinae (Lepidoptera: Saturniidae): Evidence from two nuclear genes. — Insect Systematics and Evolution, Copenhagen, **33:** 9–21.

Rothschild, W. (1895): Notes on Saturnidae [*sic*]; with a preliminary revision of the family down to the genus *Automeris* and description of some new species. — Novitates Zoologicae, Tring, **2** (1): 35–51.

Rougeot, P.-C. (1969): Contribution á l'études des Lépidoptères Attacides d'Afghanistan. Déscription d'une sous-espéce nouvelle. — Entomops, Nizza, **13:** 165–168.

—— (1971): Faune de l'Europe de du Bassin Méditerranéen, **5,** Les Bombycoides (Lepidoptera–Bombycoidea) de l'Europe de du Bassin Méditerranéen, Tom. I, Lemoniidae, Bombycidae, Brahmaeidae, Attacidae, Endromididae. — Paris (Masson et Cie. Éd.), [6] + 159 pp.

——, & Viette, P. (1983): Die Nachtfalter Europas und Nordafrikas. I. Schwärmer und Spinner (I. Teil). — Keltern (Erich Bauer), 281 pp., 40 col. pls.

Rzhetsky, A., & Nei, M. (1992): A simple method for estimating and testing minimum evolution trees. — Molecular Biology and Evolution, Oxford, **9** (5): 945–967.

Saitou, N., & Nei, M. (1987): The neighbor-joining method: A new method for reconstructing phylogenetic trees. — Molecular Biology and Evolution, Oxford, **4** (4): 406–425.

Schawerda, K. (1914): Achter Nachtrag zur Lepidopterenfauna Bosniens und der Herzegowina. — Verhandlungen der kaiserlich-königlichen zoologisch-botanischen Gesellschaft in Wien, Vienna, **64** (9/10): 349–378.

—— (1923): *Neoris haraldi* species nova. — Mitteilungen der Münchner Entomologischen Gesellschaft, München, **13** (6–10): 40.

—— (1924): [*No accompanying text, only illustration of the type of* Neoris haraldi *within a plate showing other new Lepidoptera described in the cited paper within the proceedings of the society*]. — [Fig. 16 on plate, legend on p. (164).] — Verhandlungen der Zoologisch-Botanischen Gesellschaft. Versammlung der Sektion Lepidopterologie am 6. April 1923, Wien, **73** (1923): (87)–(90), (164) + plate.

Schlick-Steiner, B. C., Steiner, F. M., Seifert, B., Stauffer, C., Christian, E., & Crozier, R. H. (2010): Integrative taxonomy: A multisource approach to exploring biodiversity. — Annual Review of Entomology, Palo Alto (Calif.), **55:** 421–438.

Schultz, O. (1910): Ueber drei aberrative und drei gynandromorphe Saturniden-Formen. — Entomologische Zeitschrift, Stuttgart, **24** (13): 64–65.

Schüssler, H. (1933): Saturnioidea II: Saturniidae: 2. Subfam. Saturniinae. — Pp. 85–324 *in*: Strand, E. (ed.), Lepidopterorum Catalogus, pars **56.** — Berlin (W. Junk).

—— (1935): Saturniidae: 3. Subfam. Ludiinae II. — Pp. 485–769 *in*: Strand, E. (ed.), Lepidopterorum Catalogus, pars **65.** — Berlin (W. Junk).

Scoble, M. J. (1995): The Lepidoptera. Form, function and diversity (reprint with corrections). — New York (Oxford Univ. Pr.), xi + 404 pp.

Seitz, A. (1926–1928): 14. Familie: Saturniidae, Nachtpfauenaugen. — Pp. 497–520, pls. 52–56A, *in* Seitz, A. (1911–1933) (ed.), Die Gross-Schmetterlinge der Erde. Eine systematische Bearbeitung der bis jetzt bekannten Gross-Schmetterlinge. Band **10.** Die Indo-Australischen Spinner und Schwärmer. — Stuttgart (A. Kernen), ix + ii + 909 pp., pls. 1–100.

Sneath, P. H., & Sokal, R. R. (1973): Numerical taxonomy: the principles and practice of numerical classification. — San Francisco (Freeman Books), xv + 573 pp.

Sokal, R. R., & Sneath, P. H. (1963): Principles of numerical taxonomy. — San Francisco (Freeman Books), xvi + 359 pp.

Sonthonnax, L. (1904): Essai de classification des lépidoptères producteurs de soie (4e fascicule). — Extrait des Annales du Laboratoire d'Études de la Soie, vol. **11,** 1901–1902. — Lyon (A. Rey & Cie), 86 pp., XXVIII pls.

Speidel, W., Hausmann, A., Müller, G. C., Kravchenko, V., Mooser, J., Witt, T. J., Khallaayoun, K., Prosser, S., & Hebert, P. D. N. (2015): Taxonomy 2.0: Sequencing of old type specimens supports the description of two new species of the *Lasiocampa decolorata* group from Morocco (Lepidoptera, Lasiocampidae). — Zootaxa, Auckland, **3999** (3): 401–412.

Spuler, A. ([1901–]1908): Die Schmetterlinge Europas, **I.** Band, Allgemeiner Teil; Spezieller Teil. — Stuttgart (E. Schweizerbart), pp. A–D + IX–CXXVIII + I–VIII + 1–385 [pls. and rest of text bound separately in 2 vols.].

Staudinger, O. (1881): Beitrag zur Lepidopteren-Fauna Central-Asiens. — Entomologische Zeitung, herausgegeben von dem Entomologischen Vereine zu Stettin, Stettin, **42** (7–9): 253–300, (10–12): 393–424.

——, & Rebel, H. (1901): Catalog der Lepidopteren des palaearktischen Faunengebietes. 3. Auflage. — Berlin (R. Friedländer & Sohn), xxx + 411 pp. [part 1] + 368 pp. [part 2].

Sthetkin, J. L. (1960): The higher lepidoptera of the Wakch valley (Tadjikistan). Part 1. Lepidoptera, Rhopalocera and Heterocera (without Noctuidae and Geometridae). — Stalinabad (Academy of Sciences of the Tadjikistan SSR), 303 pp. [*in Cyrillic letters*].

St. Laurent, R. A., & Dombroskie, J. J. (2015): Revision of the genus *Eadmuna* Schaus, 1928 (Lepidoptera, Mimallonidae) with a description of a new species from French Guiana. – Zookeys, Sofia, **494:** 51–68. Doi: 10.3897/zookeys.494.9208; zookeys. pensoft. net.

Strutzenberger, P., Brehm, G., & Fiedler, K. (2012): DNA barcode sequencing from old type specimens as a tool in taxonomy: A case study in the diverse genus *Eois* (Lepidoptera: Geometridae). – PLoS ONE, San Francisco, **7** (11): e49710 [doi: 10.1371/ journal.pone.0049710].

Tamura, K., & Kumar, S. (2002): Evolutionary distance estimation under heterogeneous substitution pattern among lineages. – Molecular Biology and Evolution, Oxford, **19** (10): 1727–1736.

——, Nei, M., & Kumar, S. (2004): Prospects for inferring very large phylogenies by using the neighbor-joining method. – Proceedings of the National Academy of Sciences (USA) [PNAS], Washington, **101** (30): 11030–11035.

——, Peterson, D., Peterson, N., Stecher, G., Nei, M., & Kumar, S. (2011): MEGA5: Molecular evolutionary genetics analysis using maximum likelihood, evolutionary distance, and maximum parsimony methods. – Molecular Biology & Evolution, Oxford, **28** (10): 2731–2739.

——, Stecher, G., Peterson, D., Filipski, A., & Kumar, S. (2013): MEGA6: Molecular evolutionary genetics analysis, version 6.0. – Molecular Biology & Evolution, Oxford, **30** (12): 2725–2729.

Taxonomy Browser of Bold (2016): [searching for *galeropa* and *galerope,* variants of *schencki*].-– URL: www. boldsystems. org/ index. php/ Taxbrowser_ Taxonpage? taxid=744145 (last accessed: 2. xi. 2016).

Travel.India.com (2016): Search for "Lossar". – URL: Travel.india. com (last accessed: 17. vi. 2016).

Turati, E. (1909): Nuove forme dei Lepidotteri e note critiche III. – Il Naturalista Siciliano, Palermo, **21, N.S. 1** (1–8): 1–133.

Vaglia, T., Haxaire, J., Kitching, I. J., Meusnier, I., & Rougerie, R. (2008): Morphology and DNA barcoding reveal three cryptic species within the *Xylophanes neoptolemus* and *loelia* species-groups (Lepidoptera: Sphingidae). – Zootaxa, Auckland, **1923:** 18–36.

van Bemmelen, J. F. (1919): De onderlinge verhouding der soorten van het geslacht *Saturnia,* beoordeeld naar de kleurenteekening harer vleugels. – Verslag van de gewone vergaderingen der wis- en natuurkundige afdeeling – van 25 Mei 1918 tot 30 November 1918. – Koninklijke Akademie van wetenschappen te Amsterdam, Amsterdam, **27** (1): 1368–1377.

von Paula Schrank, F. (1802): Fauna Boica. Durchgedachte Geschichte der in Baiern einheimischen und zahmen Thiere. Zweyter Band, zweyte Abtheilung. – Ingolstadt (J. W. Krüll), 412 pp.

Walker, F. (1855a [10. xi.]): List of the specimens of lepidopterous insects in the collection of the British Museum. Part **V.** – Lepidoptera Heterocera. – London (Trustees of the BM), [3] + pp. 977–1257.

—— (1855b [8. xii.]): List of the specimens of lepidopterous insects in the collection of the British Museum. Part **VI.** – Lepidoptera Heterocera. – London (Trustees of the BM), [3] + pp. 1259–1507.

Weisz, V. (1996 [unpubl.]): Faunistische und ökologische Untersuchungen an ausgesuchten Lepidopterenfamilien in den westhimalayanischen Trockentälern Spiti, Ladakh und Lahoul unter besonderer Berücksichtigung des Oberen Spiti-Valleys. – Zulassungsarbeit zur Wissenschaftlichen Priifung für das Lehramt an Gymnasien, Eberhard-Karls-Univ. Tübingen [unpublished thesis], [4] + 102 pp., ill.

Wieser, C., & Stangelmaier, G. (2005): Zwischenergebnisse einer lepidopterologischen Forschungsreise in den Nordiran, Oktober 2003 (Insecta: Lepidoptera). – Carinthia II, Klagenfurt, **195/115:** 659–674.

Wikipedia (2013): Franz Josef Kupido. – URL: en.wikipedia.org/ wiki/ Franz_Josef_Kupido (last visited: 13. xi. 2013).

Wikipedia.de (2016): Ferdinand Stoliczka. – URL: de.wikipedia. org/ wiki/Ferdinand_Stoliczka (last visited: 17. vi. 2016).

Wikispecies (2016): *Neoris huttoni galeropa*. – URL: species.wikimedia. org/wiki/Neoris_huttoni_galeropa (last visited: 23. vi. 2016).

Will, K. W., Mishler, B. D., & Wheeler, Q. D. (2005): The perils of DNA barcoding and the need for integrative taxonomy. – Systematic Biology, Washington, London, New York etc., **54** (5): 844–851.

Wilson, J. J. (2010): Assessing the value of DNA barcodes and other priority gene regions for molecular phylogenetics of Lepidoptera. – PLoS ONE, San Francisco, **5** (5): e10525 [doi: 10.1371/ journal.pone.0010525].

Zhu H.-F. & Wang L. (1983): Saturniidae. Pp. 408–414, col. pls. 130–135, *in*: Zhu H.-F., Wang L., Hou T. & Zhang B. (eds.), Iconographia Heterocerorum Sinicorum, **IV.** – Beijing (Science Pr.), pp. i–ii, 391–484, col. pls. 119–152 [in Chinese].

—— & —— (1993): The Saturniidae of China (Lepidoptera). – Sinozoologia, Beijing, **10:** 251–296 [in Chinese with English abstract].

—— & —— (1996): Fauna Sinica, Insecta, **5,** Lepidoptera: Bombycidae, Saturniidae, Thyrididae. – Beijing (Science Pr.), X + 302 pp., 18 pls. [in Chinese].

Zwick, A. (2009): The principal structure of male genital sclerites and muscles of bombycoid moths, with special reference to Anthelidae (Lepidoptera: Bombycoidea). – Arthropod Structure & Development, Amsterdam, **38:** 147–161.

 ISSN 0723-9912

Entomologische Notiz

Correcting a homonymy in *Saturnia: Saturnia (Neoris) clasnaumanni* Naumann, Nässig & Löffler, nom. nov. *pro S. (Neoris) naumanni* Naumann, Nässig & Löffler, 2017 *nec S. (Rinaca) naumanni* Brechlin, 2001 (Lepidoptera: Saturniidae)

Dr. Stefan Naumann, Hochkirchstrasse 71, D-10829 Berlin, Germany; sn@saturniidae.com

Dr. Wolfgang A. Nässig, Entomologie II, Forschungsinstitut Senckenberg, Senckenberganlage 25, D-60325 Frankfurt am Main, Germany; wolfgang.naessig@senckenberg.de

Swen Löffler, Hospitalgasse 7, D-09350 Lichtenstein/Sachsen, Germany; swen.loeffler@t-online.de

Rodolphe Rougerie kindly informed us that we somehow managed to produce a homonym while describing three new species of the subgenus *Saturnia (Neoris):*

The new species *Saturnia (Neoris) naumanni* Naumann, Nässig & Löffler, 2017 (dedicated to the late Clas M. Naumann) is regrettably a primary homonym (Art. 57.2 and 57.4 of ICZN 1999) of *Saturnia (Rinaca) naumanni* Brechlin, 2001 (dedicated to Stefan Naumann, published in Nachrichten des Entomologischen Vereins Apollo, N.F. 22 (2): 90; see Brechlin 2001).

We here erect a substitute (replacement) name to correct this homonymy (Art. 60.3, ICZN 1999):

***Saturnia (Neoris) clasnaumanni* Naumann, Nässig & Löffler, nom. nov.**

> ***pro:*** *Saturnia (Neoris) naumanni* Naumann, Nässig & Löffler, 2017 (*in* Nässig, Naumann & Löffler 2017)

Saturnia (Neoris) clasnaumanni nom. nov. is, in accordance with Art. 72.7 ICZN, an ***objective*** synonym of the substituted name and has the same type specimen as the replaced homonymic name. For the description and all other presently available information on the species, refer to Nässig et al. (2017).

Thanks to Rodolphe Rougerie to draw our attention on this error.

References

Brechlin, R. (2001): Einige Anmerkungen zur Gattung *Saturnia* Schrank, 1802 mit Beschreibung von zwei neuen Arten (Lepidoptera: Saturniidae). – Nachrichten des Entomologischen Vereins Apollo, Frankfurt am Main, N.F. 22 (2): 89–100.

ICZN [International Commission on Zoological Nomenclature, ed.] (1999): International Code of Zoological Nomenclature, fourth edition, adopted by the International Union of Biological Sciences. – London (International Trust for Zoological Nomenclature, BMNH), xxix + 306 pp. – *The Code can also be found in the WWW under iczn.org, including actual amendments.*

Nässig, W. A., Naumann, S., & Löffler, S. (2017): Revisional notes on the subgenera *Saturnia (Perisomena)* and *Saturnia (Neoris)* stat. rev. (Lepidoptera: Saturniidae). Part B: *Neoris*. – Nachrichten des Entomologischen Vereins Apollo, Frankfurt am Main, N.F. 37 (4): 179–216.

 ISSN 0723-9912

Zeitschrift/Journal: Nachrichten des Entomologischen Vereins Apollo

Jahr/Year: 2016

Band/Volume: 37

Autor(en)/Author(s): Nässig Wolfgang A., Naumann Stefan, Löffler Swen

Artikel/Article: Revisional notes on the subgenera Saturnia (Perisomena) and Saturnia (Neoris) stat. rev. (Lepidoptera: Saturniidae) — Part B: Neoris 179-216