

## New or little known elfin lycaenids from Shaanxi, China

(Lepidoptera: Lycaenidae)

by

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**Abstract:** *Ahlbergia luoliangi spec.nov.* is described from Shaanxi, China. It is strongly characterized in both sexes by a very whitish suffusion on the underside of both wings which extends from the outer margin to the postdiscal area. *Ahlbergia hsui* JOHNSON, 2000 from Gansu, based upon two ♀♀, was rediscovered and the ♂ is described and illustrated here. *Ahlbergia lei* JOHNSON, 1992 is recorded from Shaanxi for the first time, with both ♂ and ♀ illustrated. Based upon a single ♂, *Novosatsuma collosa* JOHNSON, 1992 has also been rediscovered, with the ♀ described and illustrated here.

**Zusammenfassung:** *Ahlbergia luoliangi spec.nov.* wird aus Shaanxi, China beschrieben. Die neue Art wird in beiden Geschlechtern durch die dichte, ausgedehnte weißliche Beschuppung der Flügelunterseiten, die vom Außenrand bis zur postdikal Zone reicht, gut charakterisiert. *Ahlbergia hsui* JOHNSON, 2000 aus Gansu, die nach zwei ♀♀ beschrieben wurde, konnte wiederentdeckt werden und wird hier, zusammen mit dem ♂, abgebildet. *Ahlbergia lei* JOHNSON, 1992 wird erstmals aus Shaanxi gemeldet, wobei das ♂ und das ♀ abgebildet werden. *Novosatsuma collosa* JOHNSON, 1992, nach einem einzigen ♂ beschrieben, wurde erneut entdeckt, wobei das ♀ erstmals beschrieben und abgebildet wird.

**Introduction:** The junior author made a collecting trip to Chang-an, Shaanxi in early spring of 2004, and the results included three species of "elfin butterflies" which were presented to the senior author for identification. Two of these butterflies were very interesting but a careful examination of the external features and genital structures of the third insect proved that it was new to science and is described here. Mr. J.-B. TIAN also rediscovered *Ahlbergia hsui* JOHNSON in S.Gansu and, from three ♀♀ sent to the senior author, these are studied in this work.

### *Ahlbergia luoliangi spec.nov.*

**Description ♂:** Upperside of forewing: ground color blackish, with a rather reflecting bluish tint; scent brand black and very long, about half as long as the forewing discocellular cell. Upperside of hindwing: ground color with bluish grey tint, as on forewing; outer margin of hindwing lined with sparse whitish scales in spaces 1a and 2; anal lobe of hindwing weakly developed, marked with whitish scales.

Underside of forewing: ground color brownish grey above vein 2, paler below vein 2, well clad with dense whitish scales in marginal and submarginal areas; discocellular bar obscure; postdiscal line blackish, margined by white scales on its outer side; submarginal markings sagittate, obscure and merged into the whitish suffusion in marginal and submarginal areas.

Underside of hindwing: ground color brownish grey as on forewing, darker near the base, very sparsely powdered with some whitish scales everywhere except for marginal and submarginal areas which are very densely clad; subbasal lines nearly absent; discocellular bar blackish; discal line blackish and rather clear in appearance, very sparsely margined with whitish scales on its outer side throughout; submarginal markings blackish, sagittate and well separated by veins; marginal line black and thin.

♂ genitalia: as illustrated, valvae similar to those of *A. leei* JOHNSON, *A. frivaldszkyi* (LED.) and *A. hsui* JOHNSON in ventral view, but conspicuously more sharply pointed at tip.

Description ♀: Upperside of forewing: ground color blackish, with a bluish grey tint, and clearly powdered by bright blue scales in the basal half; no sex brand. Upperside of hindwing: ground color blackish with bluish grey tint as on the forewing, clearly powdered by bright scales in discocellular cell and anal area; outer margin of hindwing clearly lined with whitish scales in spaces 1a and 2; anal lobe of hindwing well developed and suffused with brown.

Underside of forewing: ground color brown above vein 2, grey below vein 2, broadly and densely clad with whitish scales in the marginal and submarginal areas as in the ♂; discocellular bar darker and very obscure; postdiscal line blackish, margined by white scales on its outer side, interrupted by veins 2,3 and 4; submarginal markings sagittate, obscure and merged into the whitish suffusion in marginal and submarginal areas.

Underside of hindwing: ground color brown as on forewing, very sparsely powdered with some whitish scales in the basal disc, more densely powdered by whitish scales in postdiscal area. broadly and densely suffused with whitish scales in the marginal and submarginal areas; subbasal lines nearly absent; discocellular bar blackish brown and visible; discal line blackish brown and rather clear in appearance, apparently margined with whitish scales on its outer side throughout; submarginal markings brown, sagittate and merged into the whitish suffusion; marginal line blackish brown and thin.

♀ genitalia: As illustrated, ductus bursae expands gradually to terminal lamellae, lamella postvaginalis somewhat semi-circular in shape, lamella postvaginalis ventrum without any convolutions.

Diagnosis: This new species undoubtedly belongs to the *Ahlbergia frivaldszkyi* group [sensu HUANG & ZHAN, in press, including *A. frivaldszkyi* (LEDERER, 1855), *A. leei* JOHNSON, *A. ferrea* (BUTLER, 1866) (= *A. korea* JOHNSON, 1992), *A. arquata* JOHNSON, 1992, *A. hsui* JOHNSON and two more new species described in other papers by the senior author], because the ♂ upperside ground color has a bluish tint. However, it seems to have no close relatives and is strongly characterized by the whitish suffusion, which is very dense and extends from the outer margin to the postdiscal area on the underside of both wings. Such extensive and dense whitish marginal suffusion on the underside of both wings is unique within the *Ahlbergia*, thus this new species, *A. luoliangi* **spec. nov.** cannot be confused with any known

species of the genus. A key to all known species of the *Ahlbergia frivaldszkyi* group and a systematic account can be found in HUANG, CHEN & LI (in press).

Type data: holotype ♂, LF 12mm. Chang-an, Shaanxi, April 12<sup>th</sup> 2004, leg. K. SONG. Paratypes: 3 ♂♂ and 2 ♀♀, same data as holotype. Holotype ♂ and one paratype ♀ are deposited in the Biological Laboratory of Qingdao Vocational and Technical College, Qingdao, China. All remaining type specimens deposited in the private collection of the junior author.

Etymology: This new species is named after the son of the junior author.

***Ahlbergia hsui* JOHNSON, 2000**

Type locality: Kangxian, S.Gansu.

Specimens examined: holotype ♀, deposited in IZAS, [Longnan Dist.], Kang xian, S.Gansu, July 7<sup>th</sup> 1999, leg. Y-F Hsu; 3 ♂♂, Xing-long-shan, Yu-zhong, S.Gansu, May 2004, leg. J.-B. TIAN.

Notes: The newly added specimens were taken from the same area in S. Gansu, though not from exactly the same locality. They agree with the holotype ♀ in nearly all features on the underside of the wings. As in *A. frivaldszkyi* (LED.) all the three ♂♂ of *A. hsui* JOHNSON examined show no brand on the upperside of the forewing. In addition, *A. hsui* JOHNSON is also characterized by the following external features and genital structures: upperside ground color with a bluish tint as in *A. leei leei* JOHNSON and *A. frivaldszkyi* (LED.), but more brownish; hindwing upperside pale marginal line prominent; forewing underside submarginal area without whitish scales; both wings underside ground color rather uniform, more yellowish than in other species of the *A. frivaldszkyi* group; hindwing underside subbasal lines and discal line more clearly defined; male valvae short, obtusely pointed at tip; ductus bursae longer, lamella postvaginalis ventrum without convolution.

***Ahlbergia leei* JOHNSON, 1992**

Type locality: China (no detailed collecting data for holotype; only the locality for holotype is employed here, as the allotype from “Amorland” may not belong to this taxon). Type preservation: Natural History Museum, London.

Specimens examined: 4 ♂♂ and 3 ♀♀, Chang-an, Shaanxi, April 12<sup>th</sup> 2004, leg. K. SONG.

Notes. The holotype was labeled from China but without any detailed data whereas the paratypes were labeled from various areas (“Amorland”, “N W Islafrontiere”, “Regional Baikal d’Irkoutsk”, “Siberia” “Sayan Mts.”, “Greater Chingan Mountains”) in Russia and NE China. Since JOHNSON himself made mistakes in identifying *A. frivaldszkyi* (LED.), no localities of the paratypes can be listed for the type locality of *A. leei* JOHNSON. It is very interesting that the specimens recently collected from Shaanxi, China agree well with the holotype of *A. leei* JOHNSON in all diagnostic characters. Thus Shaanxi can be regarded as a reliable locality for the nominotypical *A. leei leei* JOHNSON. Here, both sexes from the same locality in Shaanxi, N. China and their genitalia are illustrated. A detailed discussion on this species can be found in HUANG, CHEN & LI (in press).

*Novosatsuma collosa* JOHNSON, 1992

Type locality: Saio-Hou, Kansu.

Specimens examined: 1 ♂ and 2 ♀♀, Chang-an, Shaanxi, April 12<sup>th</sup> 2004, leg. K.SONG.

Notes. *The description of N. collosa* JOHNSON was based upon a single ♂. In the same paper JOHNSON also described the very similar *N. plumbagina* JOHNSON, 1992 based upon a single ♀ from “Chia-kou-ho” [according to WAGENER (1959) Chia-kou-ho = Chinkouho is situated to the east of Washan, W. Sichuan, not in northern Hupeh and southern Shensi provinces, as JOHNSON stated]. Both, *N. collosa* JOHNSON and *N. plumbagina* JOHNSON were only compared with *N. pratti* LEECH, 1889 in their original descriptions. However, according to the original figures, it is apparent that *N. collosa* JOHNSON is most allied to *N. plumbagina* JOHNSON and not to *N. pratti* LEECH. The newly added specimens included both sexes and were identified as *N. collosa* JOHNSON instead of *N. plumbagina* JOHNSON because the locality where they were collected at N. Shaanxi is much closer to Gansu than to W. Sichuan. The butterfly fauna of N. Shaanxi is identical with that of S. Gansu but shows remarkable differences with that of W. Sichuan. The ♀ genitalia of *N. collosa* JOHNSON from Shaanxi shows significant differences with those of *N. plumbagina* JOHNSON in that the ductus bursae is much narrower and longer, while the lamella antevaginalis is normal and does not possess a large distal sclerotized plate as in *N. plumbagina* JOHNSON.

The generic classification of *Novosatsuma* JOHNSON, 1992 bears many problems as JOHNSON (1992) has designated the type ♂ of *N. monstrabila* JOHNSON as type species of *Novosatsuma* JOHNSON. As the senior author has stated in recent works, differences between the ♂ genitalia of *Ahlbergia* BRYK, *Novosatsuma* JOHNSON and *Cissatsuma* JOHNSON are slight. Only the ♀ genitalia exhibit reliable diagnostic characters between these genera. Unfortunately, JOHNSON did not use ♀ genital characters as his primary diagnostic characters to distinguish the genera. Moreover the differences in ♀ genitalia stated by JOHNSON are not clearly defined. It is apparent that *N. plumbagina* JOHNSON, *N. pratti* LEECH, *N. oppocoenosa* JOHNSON and *N. magnapurpurea* JOHNSON are not homotypic in ♂ genital structures: *N. plumbagina* JOHNSON is unique in having the lamella antevaginalis fully developed, *N. pratti* LEECH shows more similarities to *Cissatsuma* JOHNSON than to both *N. oppocoenosa* JOHNSON and *N. magnapurpurea* JOHNSON in having its ductus bursae very broad and with no clearly marked antrum near lamellae (*N. pratti* LEECH only shares a transparent zone in the caudal end of the ductus bursae in *N. oppocoenosa* JOHNSON and *N. magnapurpurea* JOHNSON, but such transparent zones usually vary individually in ♀ genitalia of lycaenids), only *N. oppocoenosa* JOHNSON and *N. magnapurpurea* JOHNSON are homotypic in ♀ genitalia. Therefore, the species grouped by JOHNSON under *Novosatsuma* JOHNSON may not be a monophyletic group. The stable generic classification needs the dissection of both sexes for all known species in the future.

An examination of ♀ genitalia of *N. collosa* JOHNSON from Shaanxi shows that this species most probably belongs to *Ahlbergia* BRYK instead of *Novosatsuma* JOHNSON, with its ductus bursae very narrow and gradually expanding to the lamellae.

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Colourplate 3/ Farbtafel 3, p. 283

Fig. 1: *Ahlbergia luoliangi* **spec.nov.** Holotype ♂ upperside (♂ brand outlined in white on left forewing).

Fig. 2: *Ahlbergia luoliangi* **spec. nov.** Holotype ♂ underside.

Fig. 3: *Ahlbergia luoliangi* **spec.nov.** Paratype ♀ upperside (left half) and underside (right half).

Fig. 4: *Ahlbergia leei* JOHNSON, 1992 ♀ (Chang-an, Shaanxi) upperside (left half, with ♀ brand outlined in white) and underside (right half).

Fig. 5: *Ahlbergia leei* JOHNSON, 1992, ♀ (Chang-an, Shaanxi) upperside (left half) and underside (right half).

Fig. 6: *Ahlbergia hsui* JOHNSON, 2000, ♂ (Xing-long-shan, S. Gansu) upperside (left half) and underside (right half).

Fig. 7: *Ahlbergia hsui* JOHNSON, 2000, Holotype ♂ (Kang-xian, S. Gansu, deposited in IZAS) upperside (left half) and underside (right half).

Fig. 8: *Novosatsuma collosa* JOHNSON, 1992, ♂ (Chang-an, Shaanxi) upperside (left half, with ♂ brand outlined in white) and underside (right half).

Fig. 9: *Novosatsuma collosa* JOHNSON, 1992, ♂ (Chang-an, Shaanxi) upperside (left half) and underside (right half).

Fig. 10: Costal area of forewing showing ♂ brand. C: *A. clarofacia* JOHNSON; Le: *A. leei* JOHNSON, 1992; Lu: *A. luoliangi* **spec.nov.**; H: *A. hsui* JOHNSON, 2000; A: *Cissatsuma albilinea* (RILEY, 1939); D: *A. dongyui* HUANG & ZHAN, 2006.

Explanation of the figures on p. 167:

Fig. 11: ♂ genitalia of *Ahlbergia luoliangi* **spec.nov.** taken from holotype (A: aedeagus tip enlarged; L: lateral view of whole genitalia; V: valvae in ventral view; R: ring in ventral view).

Fig. 12: ♀ genitalia of *Ahlbergia luoliangi* **spec.nov.** taken from paratype consisting of whole genitalia in lateral view (top) and of whole genitalia in ventral view (bottom).

Fig. 13: ♂ genitalia of *Ahlbergia leei* JOHNSON, 1992 taken from specimen illustrated in fig. 4 (A: aedeagus tip enlarged; L: lateral view of whole genitalia; V: valvae in ventral view; R: ring in ventral view)

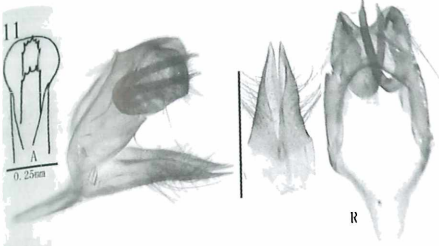
Fig. 14: ♀ genitalia of *Ahlbergia leei* JOHNSON, 1992 taken from specimen illustrated in fig. 5 consisting of whole genitalia in lateral view (top) and of whole genitalia in ventral view (bottom).

Fig. 15: ♀ genitalia of *Ahlbergia leei* JOHNSON, 1992 (specimen not illustrated) in ventral view.

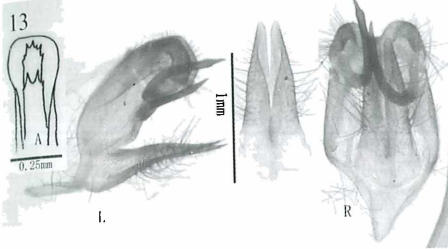
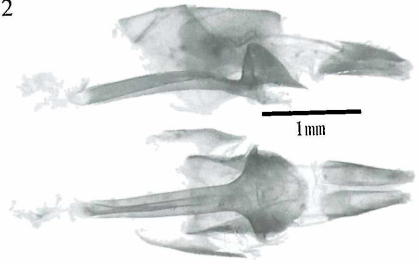
Fig. 16: ♂ genitalia of *Ahlbergia hsui* JOHNSON, 2000 taken from specimen illustrated in fig. 6 (A: aedeagus tip enlarged; V: valvae in ventral view; R: ring in ventral view).

Fig. 17: ♂ genitalia of *Novosatsuma collosa* JOHNSON, 1992 taken from specimen illustrated in fig. 8 (A: aedeagus tip enlarged; L: lateral view of whole genitalia; V: valvae in ventral view; R: ring in ventral view).

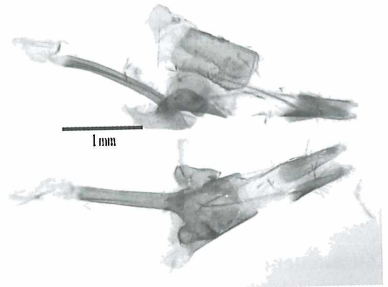
Fig. 18: ♀ genitalia of *Novosatsuma collosa* JOHNSON, 1992 taken from specimen illustrated in fig. 9 consisting of whole genitalia in lateral view (top) and of whole genitalia in ventral view (bottom).



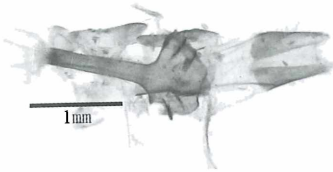
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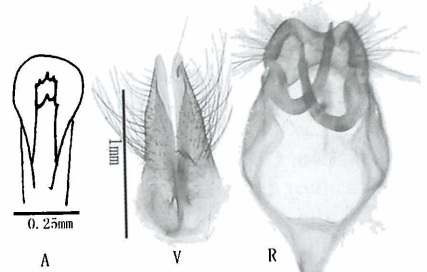
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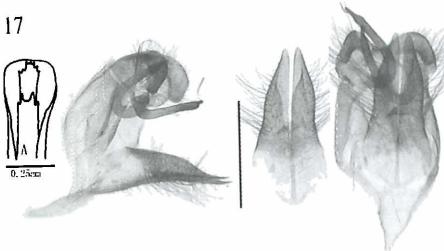
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