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Epizygaenella erythrosoma (HAMPSON, [1893]), with notes on the taxonomic treatment of the genus *Epizygaenella* TREMEWAN & POVOLNÝ, 1968

(Lepidoptera, Zygaenidae)

By Clas M. NAUMANN*

Abstract

Epizygaenella erythrosoma (HAMPSON, [1893]) represents a second species of the Himalayan genus *Epizygaenella*. The species is redescribed and morphological details of the male and female genitalia are figured. The phylogenetic significance of this species is discussed with special regard to the derived characters of the genus *Epizygaenella*. In addition recent data on the distribution of *Epizygaenella caschmirensis* (KOLLAR, 1844) are given. The distribution of the two species of *Epizygaenella* is mapped.

Hitherto the Zygaeninae were believed to be represented by only one species in the Himalayan region, namely *Epizygaenella caschmirensis* (KOLLAR, 1844). In 1893 HAMPSON described "*Zygaena erythrosoma*" from Almora (Northern India); his description was rather short, consequently this raised doubts as to whether the taxon was a biospecies different from *E. caschmirensis*. Such doubts were furthered also by the fact that authentic specimens remained extremely few, even to the present day: at the time of writing only six specimens in the British Museum (Natural History) are known to me. ALBERTI (1958/59) tended to treat the taxon as a subspecies of *E. caschmirensis*, while TREMEWAN & POVOLNÝ (1968) believed it to be a distinct species. Due to lack of material no decision was made by NAUMANN (1977 b).

During a visit to the British Museum (Natural History) in September 1984 I had the opportunity to study the type of *Z. erythrosoma* and discovered a further five specimens in various parts of the collection, so that the morphological characters of both sexes could be investigated. These studies confirm that *Z. erythrosoma* is a species distinct from *E. caschmirensis* and suggest that a derived character, believed to be constitutive for the genus *Epizygaenella*, represents an autapomorphy of *E. caschmirensis* only.

Epizygaenella erythrosoma (HAMPSON, [1893])

Zygaena erythrosoma HAMPSON [1893], Fauna of British India vol. 1. (1892): 231.

Epizygaena erythrosoma HAMPSON; JORDAN, 1908, in: SEITZ, Groß-Schmetterlinge der Erde 10: 52, pl. 8 l.

Epizygaena erythrosoma (HAMPSON); BRYK, 1936, Lepidopterorum Catalogus, pars 71: 275.

Epizygaena (*Epizygaena*) *caschmirensis* ssp. *erythrosoma* (HAMPSON); ALBERTI, 1958, Mitt. zool. Mus. Berlin 34: 287, 349.

Praezygaena (*Epizygaenella*) *erythrosoma* (HAMPSON); TREMEWAN & POVOLNÝ, 1968, Čas. morav. Mus. Brně (Acta Mus. Morav.) 53, Supplementum: 162.

* 54th contribution to the study of the genus *Zygaena* F. and related taxa (Insecta, Lepidoptera) (53: *Z. Naturforsch.*: in press)

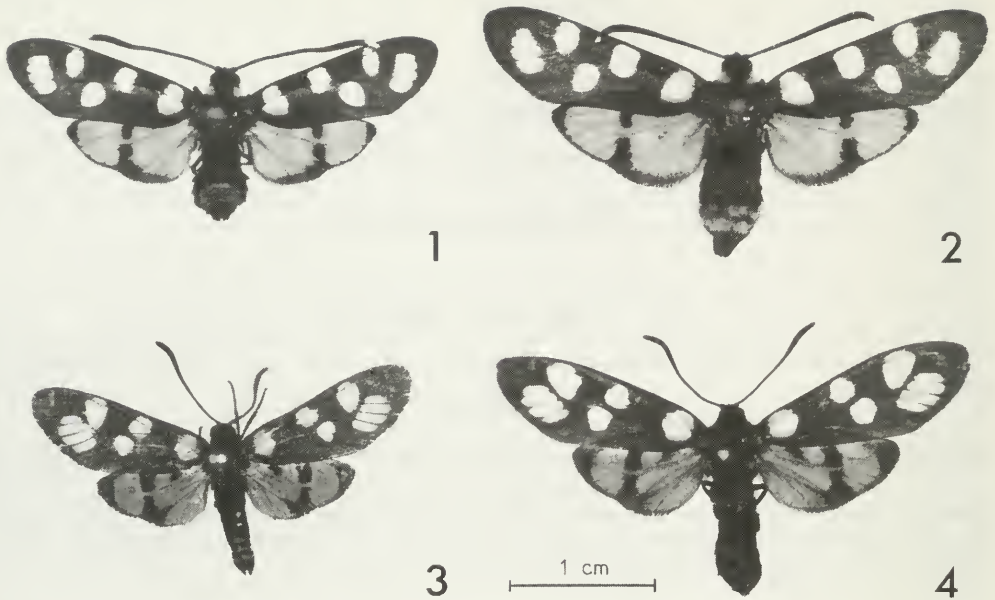


fig. 1, 2: *Epizygaenella caschmirensis* (KOLLAR, 1844) (1: ♂, 2: ♀): E-Afghanistan, Prov. Nangarhar, Dar-e-Nur, 1000 m, March 1971, leg. et coll. NAUMANN (Bielefeld).

fig. 3: *Epizygaenella erythrosoma* (HAMPSON [1893]), ♂: Himalayas, Chakrata, Bodiar, 5.7. 1906, 6000 ft., C. H. WARD; (BMNH).

fig. 4: dito, ♀: Ramgert, 11.6.25; (BMNH).

The original description reads as follows:

“♀. Differs from typical *caschmirensis* in being without the yellow spots on the collar, and in having the whole of the terminal segments of the abdomen crimson. Hab. Almora. Exp. 36 mm. Type in B.M.”

Holotype ♀: “Type” – “N. India” – “*Zygaena erythrosoma* HAMPSON, type ♀” – “*Zygaenidae* genitalia slide No. 1427 ♀”.

Locus typicus: Almora, Northern India (Kumaon, Uttar Pradesh).

Material studied: Holotype ♀, as given above. Fore-wing length: 15.0 mm.

1 ♂ (13.0 mm): “Himalayas, Chakrata, Bodiar., 5.7. 1906., 6000 ft., CH. H. Ward., 1909-133.”

1 ♂ (12.5 mm): “Kumaon, 8.1892, J. G. PILCHER”. – *Zygaenidae* genitalia slide 1438 (BMNH).

1 ♀ (16.0 mm): “Ramgert, 11.6.25”.

1 ♀ (15.0 mm): “Sikkim, Lachin Lachaong, 8000 a 16000', été 1894, Chasseurs Breteaudau”.

1 ♀ (16.5 mm): “Ex Musaeo Ach. Guenée” – “3. *Zyg. Annulata* Gn. [deleted] *Caschmirensis* Koll., Cat. no. 26 b – Koll. in Hugel p. 49 pl. 16 f. 6. himalaya. ♂ donné par M. Bero, ♀ achetée chez Becker. Cette espece est une vraie *Zygène*” [the red cingulation of this specimen consists of artificial paint, possibly attached by an entomological dealer].

These data clearly demonstrate that Guenée had intended to describe the species, but later on believed it to be identical with *E. caschmirensis*, and that the species had been represented in both British and French collections by the turn of the century. Due to the paucity of material and in order to preserve characters of the abdominal cingulation, only two of the six specimens have been dissected. As the

morphological characters are so strikingly different from those of *E. caschmirensis*, any idea of their being conspecific has to be abandoned.

Description: wing venation as in *Epizygaenella caschmirensis*, i. e. forewing veins r2–r4 stalked (cf. illustration in NAUMANN 1977 b). Other morphological characters agree with this species as well, except the specific differences given below.

Table 1: Specific differences between *Epizygaenella caschmirensis* and *E. erythrosoma*.

Character	<i>E. caschmirensis</i>	<i>E. erythrosoma</i>
patagia	yellow, centred black	black
antenna	tip white, slightly clavate, slender	tip black, even more slender
ground colour of fore-wing	greenish black	brownish black
ground colour of fore-wing spots	yellow to ochreous	whitish, 1 and 2 light cream
size of spots 3–5	nearly equal	5 bigger than 3 and 4, approximately triangular
spot 6	small, veins inconspicuous	large, crossed by black veins
hind wing ground colour	crimson	pinkish vermillion
cingulum	on segments 5–7 in ♂, and on 5–6 in ♀	on segments 5–8 in ♂, and on 5–7 in ♀ (7 at least tinged with red).
pleura	black	cream-yellow on segments 2–3
unci	short, blunt	slender, pointed at end
uncus lobes	small	large(r)
tegumen	strong	slender
lamina dorsalis	4–6 mains spines, central groove inconspicuous	approx. 12 main spines, central groove prominent
lamina ventralis	small, 1 row of spines	larger, a field of spines
cornuti	present	absent (?)
ostium bursae	small	large
ductus bursae	long, slender	short, stout
lamella postvaginalis	prominent	inconspicuous

♂ (fig. 3): fore-wing length 12.5–13.5 mm; head, antenna, patagia, thorax and tegulae black; abdomen cingulated on segments 5–8, valvae black externally. Fore-wing ground colour brownish black; fore-wing spots much more hyaline than in *E. caschmirensis*, 1 and 2 confluent, cream; 3 and 4 of approximately equal size, whitish; 5 and 6 comparatively larger than in *E. caschmirensis*, whitish; 6 conspicuously crossed by three darkly scaled veins. Hind-wings vermillion, black indentations at dorsal and terminal margin well developed, as is the hind-wing margin at the apex. In the ♂ from Kumaon the black indentations merge in the middle of the wing. Another triangular black spot extends from well beyond one fourth of the wing length towards the centre.

♀ (fig. 4): fore-wing length 15.0–16.5 mm. Similar to ♂; cingulum well developed on segments 5 and 6, and partly also on 7. The black fascia on the hind-wing is present in three of the four specimens examined, being absent in the Sikkim specimen.

Male genitalia:

Uncus-tegumen-complex (fig. 8): uncus processes slightly more pointed than in *E. caschmirensis*, lobal sacs present, but more prominent; tegumen comparatively smaller and much more slender.

Lamina dorsalis (fig. 12): much broader than in *E. caschmirensis*, with a well-defined central groove, bearing 6-7 main spines, of which the outer and lower ones are more prominent.

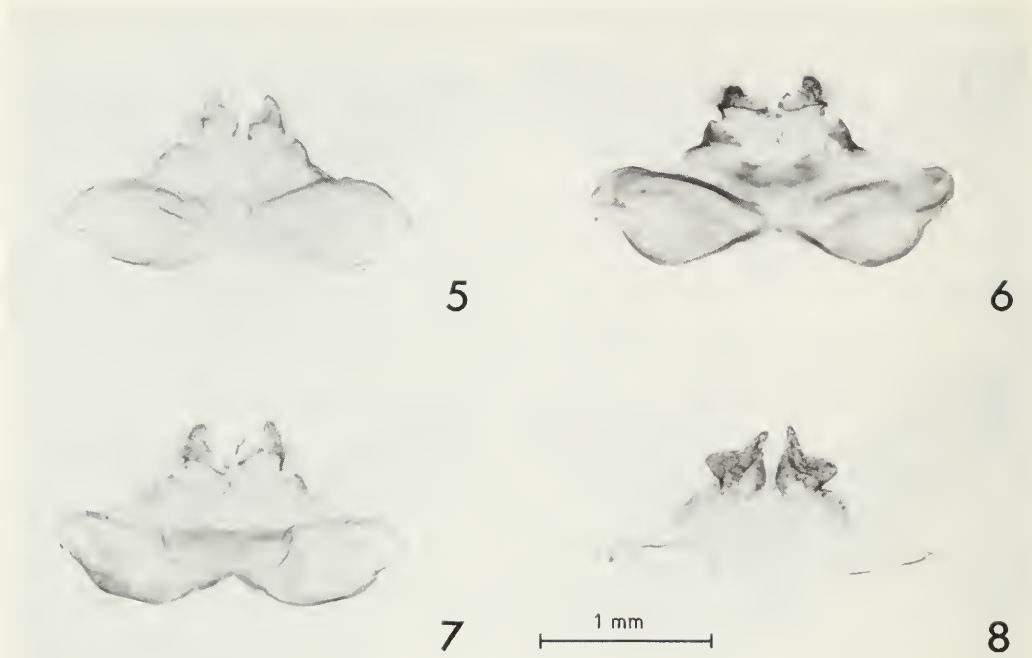


fig. 5-8: Uncus-tegumen-complex. 5-7: *E. caschmirensis* (KOLLAR, 1844), Afghanistan, Dar-e-Nur, genitalia prep. 808, 902, 906 (author's collection); 8: *E. erythrosoma* HAMPSON [1893]: Kumaon, 8. 1892; genitalia prep. BMNH Zygaenidae 1438 (BMNH).



fig. 9-12: Lamina dorsalis: 9-11. *E. caschmirensis* (KOLLAR, 1844); 12: *E. erythrosoma* (HAMPSON, [1893]). Data as in fig. 5-8.

fig. 13-16: Lamina ventralis. 13-15: *E. caschmirensis* (KOLLAR, 1844), 16: *E. erythrosoma* (HAMPSON, [1893]). Data as in fig. 5-8.

Lamina ventralis (fig. 16): in contrast to that of *E. caschmirensis* this structure does not consist of a single row of rather prominent spines, but of a small field of partly very small, partly larger spines. The largest spines are arranged near the centre, which is divided by a small groove.

Cornuti of the aedoeagus (fig. 17): in the single preparation proper cornuti, which are present in *E. caschmirensis*, have not been found, but there is a small clearly sclerotized plate near the tip of the vesica, which might bear one or several cornuti in other specimens.

Valva (fig. 20): inconspicuous, surface smooth, covered with a few thin setae in the apical portion, without the dorsal processes which are characteristic for *E. caschmirensis*.

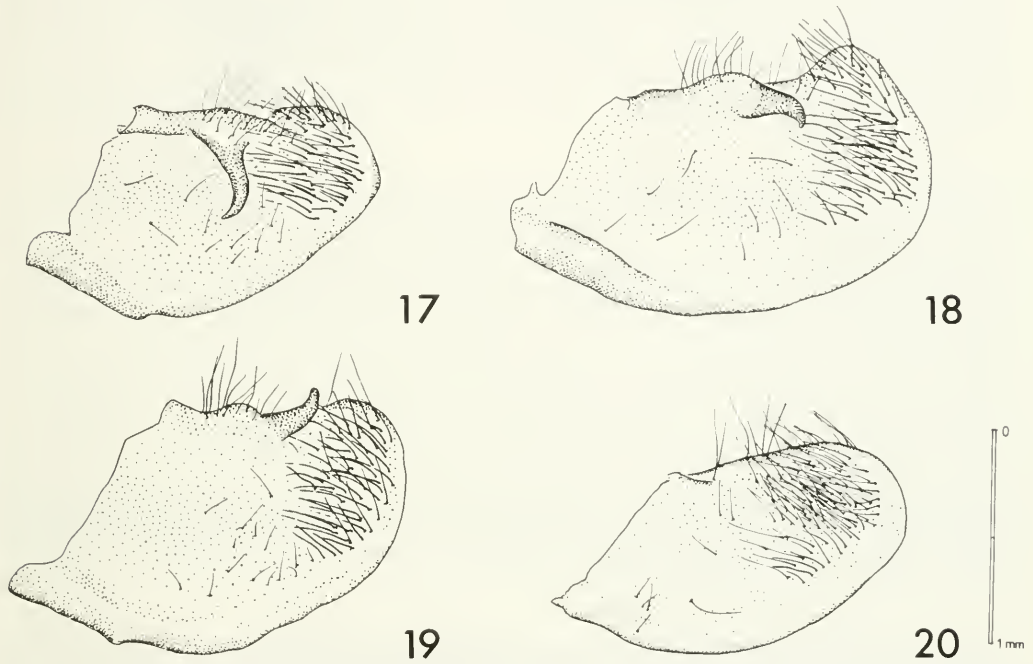


fig. 17–20: Right valva. 17–19: *E. caschmirensis* (KOLLAR, 1844), 20: *E. erythrosoma* (HAMPSON, [1893]). Data as in fig. 5–8.

Female genitalia (fig. 21–22):

Smaller than in *E. caschmirensis*, the ostium bursae somewhat less well shaped, but slightly larger than in *E. caschmirensis*; the postvaginal plate, which is so well developed and clearly shaped in *E. caschmirensis* is rather inconspicuous; the ductus bursae is broader and shorter than in *E. caschmirensis*, but bears the same longitudinal wrinkles as in this species; the corpus bursae is smaller in the preparation figured here, but may be larger in mated females. The ductus seminalis branches off from the highest part of the ductus bursae and not from a slightly lower position as in *E. caschmirensis*. This character may be influenced by individual variation.

Distribution (fig. 23): The few known localities range from the Mussorie area to Sikkim and include the Kumaon, where the type was taken. The species has not yet been recorded from Nepal, but may be expected in that country. Both species of *Epizygaenella* seem to be parapatric in distribution, since at least two of the localities given above (Chakrata and Almora) are very close to known localities of *E. caschmirensis*.

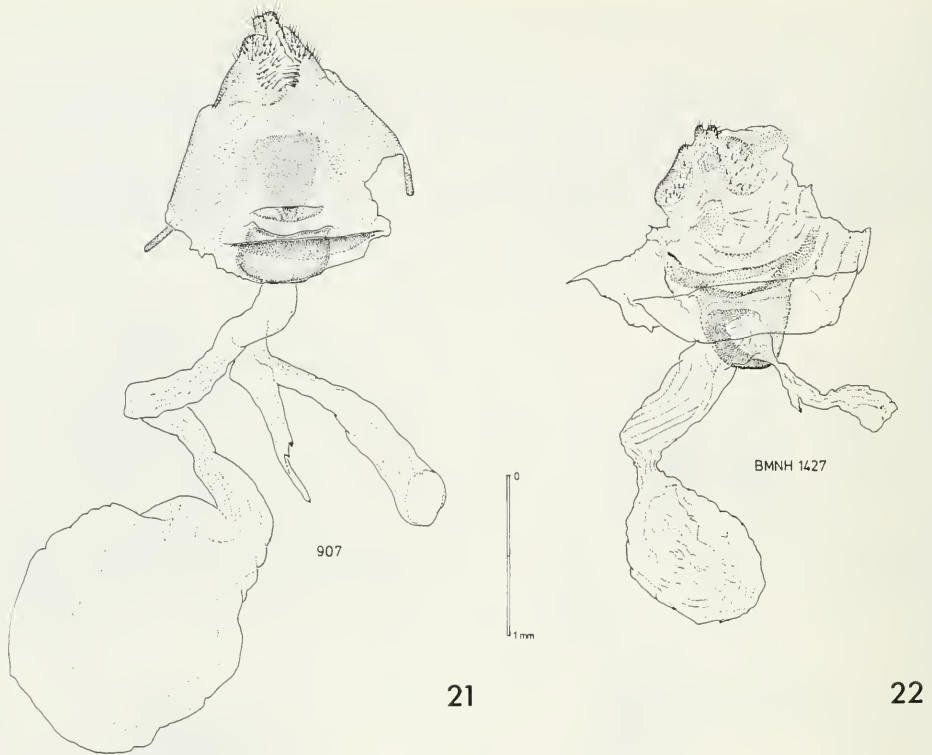


fig. 21, 22: Female external genitalia. 21: *E. caschmirensis* (KOLLAR, 1844), Afghanistan, Dar-e-Nur, 1 200 m, September 1972, leg. et coll. NAUMANN (Bielefeld); genitalia prep. 907. — 22: *E. erythrosoma* (HAMPSON, [1893]), holotype: N. India; genitalia prep. BMNH Zygaenidae 1427.

Ecology: Nothing is known about ecological adaptations and requirements of the species, but the two localities with altitude data indicate that this species lives at slightly higher altitudes than *E. caschmirensis*. Considering the fact that many specimens of *E. caschmirensis* have been collected in recent times in India and Nepal (see below) it is astonishing that there are no recent records of *E. erythrosoma*. With the exception of members of the most advanced genus, i. e. *Zygaena*, all other Zygaeninae live on Celastraceae, therefore it may be considered for sure that *E. erythrosoma* larvae live also on a species of that family, most likely on *Maytenus* (= *Gymnosporia*).

Taxonomic notes on *Epizygaenella*:

ALBERTI (1958/59 and 1965) considered the species of the Afrotropical taxon *Praezygaena* ALBERTI, 1954 (i. e. *myodes* DRUCE, 1899, *agrii* DISTANT, 1902, *ochroptera* FELDER & FELDER, 1874, *conjuncta* HAMPSON, 1919) and *E. caschmirensis* to form a monophyletic entity and in consequence placed both taxa into one genus, i. e. *Epizygaena* JORDAN, 1907. Somewhat later TREMEWAN & POVOLNY (1968) demonstrated that the type-species of *Epizygaena* has to be placed in *Zygaena* and proposed the new subgeneric name *Epizygaenella* for *caschmirensis* and *erythrosoma*, both to be included in *Praezygaena*. The view that the Afrotropical species and the two externally similar Himalayan taxa form a monophyletic group was also followed by NAUMANN (1977 a, b).

Since that time I have made some observations on the preimaginal stages of *Praezygaena agria* and *P. myodes* during a field trip to South Africa in December 1984 and 1985, and through the kind help of Messrs. A. J. and N. J. DUKE in East London. Characters relevant to the reconstruction of the phylogeny of the Zygaeninae will be published elsewhere (NAUMANN, in prep.), but may be summarised briefly here as far as the phylogenetic relationship of *Praezygaena* and *Epizygaenella* is concerned. The species included in *Reissita*, *Epizygaenella* and *Zygaena* share the following derived characters: the cocoon spun by the larva is fusiform and has a characteristic silk cushion which helps the pupa to vacate the cocoon when the moth emerges (see fig. 45 in NAUMANN & EDLMANN 1984). This cushion is absent in *Praezygaena* (and in the more primitive Zygaeninae). This is a highly specialized character, and unlikely to have been lost secondarily in *Praezygaena*. Species of this genus still have the characteristic ovoid type of cocoon which is already found in *Orna* and *Epiorna*. On the other hand *Praezygaena*, *Reissita*, *Epizygaenella* and *Zygaena* are united by the possession of dorsally arranged male cremata, which are connected with a specialized folding mechanism peculiar to these genera (see fig. 60, 61 in NAUMANN & EDLMANN 1984).

ALBERTI based his arguments on the similarity of the valval spines of *E. caschmirensis* with the valval processes observed in the *Praezygaena* species, although these are arranged differently. In *E. erythrosoma* the valvae lack such dorsally arranged spines. It thus agrees very well with the valval structures of other Zygaeninae, in which the valvae form simple rounded claspers with a smooth or slightly haired surface. Unless we argue that the character state found in *E. erythrosoma* is due to secondary reduction we have to conclude that the presence of valval spines does not represent a ground-plan character of *Epizygaenella*, but an autapomorphy of *E. caschmirensis* alone. But the stalking of veins r2–r4 in the fore-wing represents an apomorphic character of *Epizygaenella* which clearly separates it from all other higher Zygaeninae genera. In consequence this leads to the treatment of *Epizygaenella* as a separate, monophyletic genus of the subfamily. It is interesting to remark that the same type of venation has been observed in the Miocene fossil *Zygaenites controversus* BURGEFF, 1951 from the Schwäbische Alb mountains of south-western Germany. This proves clearly that the sister-group of *Zygaena* occurred in the Palaearctic region as well. Considerable speciation must have taken place since (NAUMANN 1987).

Note on the distribution of *E. caschmirensis*:

A summary of the distribution of this species was given by NAUMANN (1977 b) and is repeated in an actualized form in fig. 23. Since 1977 some new and interesting localities of this species have been recorded from Pakistan, India and Nepal. These are (numbers continue the list given in NAUMANN 1977 b):

- 25 Pakistan, Prov. Rawalpindi, Salipran near Tret, 820 m, 16.3.1969, leg. KRUPKA. — coll. REISS (Stuttgart), WIEGFL (München) and NAUMANN (Bielefeld).
- 26 Pakistan, Prov. Rawalpindi, Islamabad: a very strong colony of the species was discovered by Chr. L. HAUSER, W. G. TREMFWAN and the author on hilly slopes at the western edge of the city in July and August 1982. Numerous moths hatched from these in September and October 1982. Single specimens of the spring generation are preserved in the collection of the Natural History Museum at Islamabad and have also been taken by T. B. LARSEN (pers. comm.).
- 27 Pakistan, Prov. Rawalpindi, Murree Hills, 1580 m, 26.3.1970 (1 ♀, coll. NAUMANN).
- 28 India, Simla, Mt. Kufri (2 ♀♀ coll. NAUMANN; both specimens originate from material sold by the firm STAUDINGER & BANG-HAAS before 1945).
- 29 W-Nepal, 10 km N of Pokhara, 7.10.1980, leg. STANGELMAIER (1 ♂ 2 ♀♀, coll. NAUMANN).

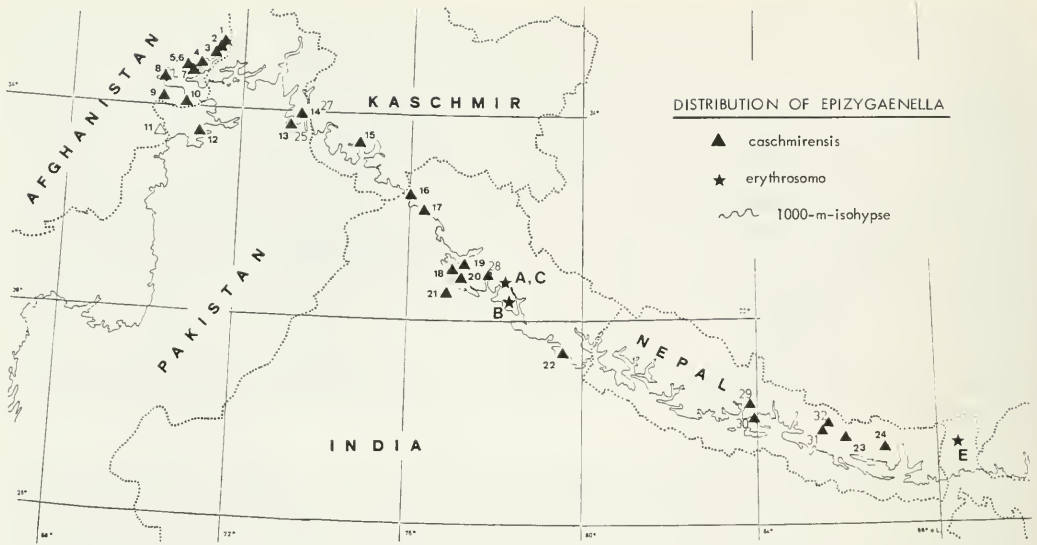


fig. 23: Distribution of *E. caschmirensis* (KOLLAR, 1844) and *E. erythrosoma* HAMLPSON, [1893]). Numbers refer to the locality data given by NAUMANN (1977) and in the text above. It proved impossible to locate the locality "Ramgert" of *E. erythrosoma*.

- 30 W-Nepal, NW Pokhara, Modi Kohola, Pothara, 1900 m, 5.–7.5.1984, C. HOLZSCHUH (15 ♂♂ 6 ♀♀, coll. NAUMANN).
- 31 C-Nepal, Nawakot, Trisuli Kohla, Manigaon – Thade Gaon, 1300–2200 m, 26.9.1982, leg. C. HOLZSCHUH (2 ♂♂ 2 ♀♀, coll. NAUMANN).
- 32 C-Nepal, Nawakot, Trisuli Khola – Langtang Khola, Syabru Bensi, 1600 m, 29.9.1982, leg. C. HOLZSCHUH (10 ♂♂, coll. NAUMANN).

The new records from Nepal are of special interest, because hitherto only two specimens of this species had been recorded from there and it had been considered very localized and rare in that country (NAUMANN 1977 b). The new data clearly demonstrate that the species occurs throughout the country and is to be expected to occur in other places. Finally, the occurrence of two distinct generations is proved by these data. All Nepalese specimens are very large and show the increase of the dark markings in the hind-wing characteristic for ssp. *asoka* MOORE, 1879.

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Zusammenfassung

Es wird belegt, daß *Epizygaenella erythrosoma* (HAMLPSON, [1893]) eine zweite, von *E. caschmirensis* (KOLLAR, 1844) verschiedene Art des Genus *Epizygaenella* darstellt; Habitus und Genital beider Ge-

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schlechter werden beschrieben und abgebildet. Die systematische Bedeutung dieser Art wird unter besonderer Berücksichtigung der Grundplanmerkmale der Gattung *Epizygaenella* diskutiert. Neuere Verbreitungsdaten von *E. caschmirensis* werden zusammengefaßt und die Verbreitung beider Arten nach dem derzeitigen Kenntnisstand dargestellt.

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Adress of author:

Prof. Dr. Clas M. NAUMANN

Abt. für Morphologie und Systematik der Tiere

Fakultät für Biologie der Universität

Postfach 8640

D-4800 Bielefeld 1

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