

## Revisional notes on the genus *Stichophthalma* C. & R. FELDER, 1862

(Lepidoptera, Amathusiidae)

by

ALEXANDER L. MONASTYRSKII & ALEXEY L. DEYATKIN

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**Summary:** The diagnoses and tentative taxonomic composition of the *Stichophthalma louisa* WOOD-MASON, 1877 and *S. howqua* (WESTWOOD, 1851) - groups of taxa are presented; *S. louisa mathilda* JANET, 1905 and *S. louisa eamesi* MONASTYRSKII, DEYATKIN & UEMURA, 2000 are elevated to species. The taxon *suffusa* LEECH, 1892, previously regarded as a subspecies of *S. howqua* (WESTWOOD), is raised to species. The taxonomic status of other formal subspecies in both groups needs further study.

Abbreviations: BMNH – The Natural History Museum, London

MNHN – Museum National d’Histoire Naturelle, Paris

According to some modern taxonomic views, the genus *Stichophthalma* includes about ten species distributed in the South-East Asia mainland and in China (WAHLBERG, [www.nymphalidae.net/Classification/Higher\\_clas.com](http://www.nymphalidae.net/Classification/Higher_clas.com)).

Despite a relatively restricted distribution of this genus, the representatives of some species demonstrate high variability in the external characters and genitalia, this fact making it difficult to understand their real taxonomic status. Although some attempts to revise this group have already been made (SPITZER & JAROS, 1996; NISHIMURA, 1998), the results did not clarify the taxonomic status of several taxa. In particular, this is true for the species *S. louisa* WOOD-MASON, 1877 and *S. howqua* (WESTWOOD, 1851), including a number of taxa considered as their subspecies. It has become even more important to revise these species complexes after the discovery in Vietnam of new taxa which show differences from their allies (MONASTYRSKII & DEYATKIN, 2000).

The present paper contains some preliminary taxonomic results based on the comparison of the wing pattern, colour and characters of the  $\sigma$  genitalia.

Apart from the authors’ material, this study is based also on the examination of the collections of The Natural History Museum (London).

### **The *Stichophthalma louisa* (WOOD-MASON, 1877)-group**

The group diagnosis.

The *S. louisa* - group is distinguished within the genus by weakly developed sexual dimorphism; the ♀♀ are usually just larger.

Upperside: 1. Extensive pure white distal area on forewing.

2. Prominent and pointed black arrowhead submarginal markings.

3. Basal and subbasal areas on both wings uniform and varying from deep yellow to reddish or almost chocolate brown.

4. Ground colour of the submarginal area on hindwing much paler than other areas of

the wing.

Underside: 1. Ground colour brownish with a greenish tinge.

2. All submarginal ocelli on forewing similar in size (variable within the group); submarginal ocelli on hindwing well developed, with ocelli in spaces 2 and 6 usually larger.

3. Discal area on hindwing without a small streak inside the discal cell (this streak is characteristic for another group which includes the species *S. fruhstorferi* RÖBER, 1903, *S. uemurai* NISHIMURA, 1998, *S. cambodia* (HEWITSON, [1862]) and *S. neumogeni* LEECH, 1892).

According to the characters listed above, the *S. louisa*-group includes the taxa *S. louisa louisa* (WOOD-MASON, 1877), *S. nlouisa antonia* RÖBER, 1926, *S. louisa ranohngensis* OKANO, 1985, *S. louisa siamensis* ROTHSCHILD, 1916, *S. louisa mathilda* JANET, 1905 and *S. louisa eamesi* MONASTYRSKII, DEVYATKIN & UEMURA, 2000.

New revised data concerning the taxonomic status of some members of the *S. louisa*-group are presented below.

***S. louisa*** (WOOD-MASON, 1877), ***S. mathilda*** JANET, 1905 **stat. rev.** and ***S. eamesi*** MONASTYRSKII, DEVYATKIN & UEMURA, 2000 **stat. nov.** (colour plates 20A: 1, 2; 21: 3-6)

*S. louisa* (WOOD-MASON) was described as a distinct species from Tenasserim (Burma). WOOD-MASON's type is unknown, although it is likely to have been deposited in the museum of the Bombay Natural History Society in India. Other specimens collected in the type locality are deposited in the main collection of BMNH. A detailed description is given by FRUHSTORFER (1911). The main characteristics of the nominotypical taxon of this group are as follows:

Both sexes are relatively small: Length of forewing in the ♂ 60–64 mm; ♀ 63–68 mm.

Upside: Basal areas on both wings of a uniform yellowish colour; ground colour of the submarginal area on hindwing pure white; arrowhead black submarginal markings on hindwing distinct.

Underside: The outward black line of the discal area nearly straight; submarginal ocelli small and uniform.

*S. louisa mathilda* JANET, 1905 was originally described as a separate species from Laos (region Lakhon) and from the south-western Tonkin, Dien-Bien Phu (North Vietnam), after a large type-series which included 30 ♂♂ and 5 ♀♀. A part of the type-series designated as „cotypes“ is deposited in MNHN. However, the type locality needs to be corrected. According to the labels under the type specimens, part of the type material was collected in a site labelled as Sakhon (not Lakhon), Siam, 1878, by Dr. HARMAND.

In Laos, the species was also collected much later; the photographs of these specimens being figured in some recent works (NISHIMURA, 1998; OSADA et al., 1999).

The populations of *S. l. mathilda* JANET from Vietnam, Laos and Thailand include specimens which are relatively larger than *S. l. louisa* (WOOD-MASON): length of forewing in the ♂♂ 61 – 65 mm; ♀♀ 67 - 72 mm.

Upside: Basal areas on both wings uniform brown; ground colour of the submarginal area on hindwing yellow.

Underside: Forewing outward black line of the discal area is 'zigzag-shaped'; submarginal ocelli large, more or less uniform and prominent except that in space 3; hindwing ocelli in spaces 2 and

6 are larger and the spot in space 3 varies in size and is sometimes obscure.

*S. louisa eamesi* MONASTYRSKII, DEVYATKIN & UÊMURA was discovered in the Vietnamese Central Highlands (the montane parts of Thua Thien Hue, Quang Nam, Kon Tum and Gia Lai provinces). Its distribution neighbours that of the taxon *mathilda* and overlaps it at high elevations in Kon Tum and Gia Lai provinces. Externally, the taxon *eamesi* is somewhat similar to *S. mathilda* JANET. However, a detailed comparison reveals some characters distinctive for both taxa (MONASTYRSKII & DEVYATKIN, 2000). *S. eamesi* MONASTYRSKII, DEVYATKIN & UÊMURA is larger ( $\sigma$  forewing 65-73 mm;  $\text{♀}$  70-76 mm) than other Indochinese taxa belonging to the *S. louisa*-group.

Besides the size, the main external characters of *S. eamesi* MONASTYRSKII, DEVYATKIN & UÊMURA are as follows:

Upperside: Wide basal areas on both wings uniform reddish brown; forewing with a white distal area and weakly developed black arrowhead markings; the submarginal area on hindwing whitish with a slight violet tinge.

Underside: Ground colour of both wings dark greenish olive being darker than in *S. mathilda* JANET; forewing outward black line of the discal area is 'zigzag-shaped'; submarginal ocelli large and well developed in all spaces. These characters distinguish *eamesi* from all other taxa belonging to the *S. louisa*-group.

It is well known that the variable  $\sigma$  genitalia of *Stichophthalma* have not been used for diagnostic purposes for a long time (SPITZER & JAROÖ, 1996). NISHIMURA (1998) showed some differences in the genitalia within the genus; however, he did not demonstrate stability of the characters. While comparing the genitalia of the taxa in study, we found some constant differences within the group.

*S. louisa louisa* (WOOD-MASON): Uncus slightly shorter than tegumen or, at most, equal to the length of tegumen; base of clasp thinner than in *mathilda*, and the clasp is always gradually converge to the pointed apex; aedeagus (dorsal view) with a sclerotized smooth apical area; saccus is relatively long.

*S. louisa mathilda* JANET: Uncus longer than tegumen; base of clasp thicker than in *S. l. louisa* (WOOD-MASON), apex of clasp varies from pointed to dulled; apical part of aedeagus with a developed tooth on the sclerotized area; saccus shorter than in *S. l. louisa* (WOOD-MASON).

The genitalia of *S. louisa eamesi* MONASTYRSKII, DEVYATKIN & UÊMURA reveal certain similarity to those of *S. louisa mathilda* JANET in their major characters.

However, while considering the differences and similarities between *S. l. louisa* (WOOD-MASON), *S. l. mathilda* JANET and *S. l. eamesi* MONASTYRSKII, DEVYATKIN & UÊMURA and noting that the wing pattern, colouration and structure of the genitalia in many Amathusiidae demonstrate conservative and constant characters, the authors regard these taxa as separate species belonging to the *S. louisa*-group: *S. louisa* (WOOD-MASON, 1877), *S. mathilda* JANET, 1905 **stat. rev.** and *S. eamesi* MONASTYRSKII, DEVYATKIN & UÊMURA, 2000 **stat. nov.**

In view of this conclusion it is necessary to study all other formal subspecies of *S. louisa* (WOOD-MASON, 1877) in order to define their real taxonomic status.

### The *Stichopthalma howqua* Westwood, 1851-group

The group diagnosis.

The representatives of this group are characterised by well developed sexual dimorphism, including wing pattern and size; the  $\sigma\sigma$  are usually smaller.

Upperside: 1. Both sexes have a more or less uniform ground colour varying from pale yellowish to dull orange.

2. There is no contrasting whitish subapical area on the upperside of the forewing (it may be just paler, especially in the  $\text{♀♀}$ ).

Underside: 1. The  $\sigma\sigma$  of the majority of taxa have a brownish orange tinge on both wings; only the  $\sigma$  of *S. h. tonkiniana* FRUHST. has a brown ground colour.

2. The  $\text{♀♀}$  have a greyish brown ground colour on both wings, sometimes with a dirty olive tinge; they also have whitish discal band located behind the subbasal area which is margined by black 'zigzag' lines. Only in *S. h. tonkiniana* FRUHST. the  $\text{♀♀}$  have more intensive greenish brown ground colour on both wings.

3. The  $\sigma\sigma$  of most taxa lack this whitish discal band on both wings; the  $\sigma\sigma$  of *S. h. tonkiniana* FRUHST. have a very pale brownish discal band.

According to the characters listed above, the *S. howqua*-group includes the taxa: *S. howqua howqua* (WESTWOOD, 1851); *S. howqua suffusa* LEECH, 1892; *S. howqua iapetus* BROOKS, 1949; *S. howqua bowringi* CHUN, 1929; *S. howqua formosana* FRUHSTORFER, 1908; *S. howqua tonkiniana* FRUHSTORFER, 1901; *S. howqua miyana* FRUHSTORFER, 1913. However, recently received data demonstrate that the taxonomic status of some members of this group needs a revision. The results of a preliminary analysis are presented below.

*S. howqua* (WESTWOOD, 1851); *S. suffusa* LEECH, 1892 **stat. nov.** (colour plates 21: 7, 8; 22: 9-14)

*S. howqua* (WESTW.) was described from E. China. The type is deposited in BMNH (Type: Shanghai 51.13; B.M. Type No Rh6017; *Thaumanatis howqua*  $\sigma$  WESTWOOD).

The material examined from China shows high similarity between the populations from Shanghai ( $\sigma$  type,  $\sigma$ ,  $\text{♀}$ , topotypes) and from Peking (N. China). All specimens have similar size and wing pattern. STICHEL (1909) gives a characteristic of *S. howqua* (WESTW.) mentioning the ochre-yellow ground colour on the upperside of both wings with distinct marginal black markings on the hindwing. The butterflies with such characters are distributed from N. & C. China to Formosa (*S. howqua formosana* FRUHSTORFER, 1908)

The taxon *suffusa* LEECH, 1892 was described as a variation of *S. howqua* (WESTW.). The types are deposited in BMNH (Types  $\sigma$ ,  $\text{♀}$ , Omei Shan, 3620ft, July 1890; B.M. Type NoRh 6018-6019). STICHEL (1909) and FRUHSTORFER (1911) showed that the taxon *suffusa* LEECH was similar to the nominate *S. howqua* (WESTW.), however, differing in broader and confluent black markings and being distributed in W. China (Washan, Chiakouhow, Kwechow, Omei-shan). A similar form was known from Tonkin (*S. howqua tonkiniana* FRUHSTORFER, 1901). Thus up to now both *suffusa* LEECH and *tonkiniana* FRUHST. have been treated as subspecies of *S. howqua* (WESTW.). The taxon *iapetus* BROOKS, 1949 was described from N. Vietnam, Lao Cai province, Chapa (=Sa Pa) as a subspecies of *S. howqua* (WESTW.). However, of the type specimens which include one  $\sigma$  and one  $\text{♀}$ , the latter belongs to the previously described taxon *S. h. tonkiniana* FRUHST., distributed

in N. Vietnam also including Lao Cai, Chapa (Hoang Lien National Park) (DUBOIS & VITALIS DE SALVAZA, 1924; MONASTYRSKII, 1998). The  $\sigma\sigma$  of *iapetus* BROOKS are of a smaller size (forewing length 53-60 mm) than the  $\sigma\sigma$  of *tonkiniana* FRUHST. (63-71 mm). The real  $\text{♀♀}$  of *iapetus* BROOKS collected in the type locality were found in the main collection of BMNH and in the general collection of MNHN. Both sexes have uniform ochre-yellow ground colour and very distinct submarginal markings on the upperside of the hindwing which are very similar to the wing pattern of the nominate subspecies of *S. howqua* (WESTW.).

Considering the results of the comparison, it is apparent that the taxa *iapetus* BROOKS and *tonkiniana* FRUHST. belong to different species similar to *S. h. howqua* (WESTW.) and *S. h. suffusa* LEECH, respectively.

A further comparison of these taxa with other formal subspecies of *S. howqua* (WESTW.) makes it clear that the *howqua*-group can be divided into two morphological subgroups:

1. The *howqua*-subgroup, including: *S. howqua howqua* (WESTW.), *S. h. iapetus* BROOKS, *S. h. bowringi* CHUN, *S. h. formosana* FRUHST.
2. The *suffusa*-subgroup, including: *S. howqua suffusa* LEECH, *S. h. tonkiniana* FRUHST., *S. h. miyana* FRUHST..

In our firm opinion, the oldest taxon of the last subgroup should be raised to species, *S. suffusa* LEECH, 1892 **stat. nov.**

The representatives of both subgroups demonstrate allopatric distribution except in the northernmost part of Vietnam (Lao Cai, Sa Pa, Hoang Lien National Park), where the taxa *iapetus* BROOKS and *tonkiniana* FRUHST. are sympatric. This distributional data also suggest that both *howqua* (WESTW.) and *suffusa* LEECH may be distinct species.

The genitalia within the group are rather variable, although the genitalia of *S. suffusa* LEECH and *S. h. tonkiniana* FRUHST. are rather similar and can be distinguished from those of *S. h. howqua* (WESTW.) and *S. h. iapetus* BROOKS. At the same time, the genitalia of *S. h. iapetus* BROOKS show some differences from those of the nominate subspecies (China, Shanghai), although additional material from other sites is required for comparison.

Thus the updated taxonomic composition of the *S. howqua*-group may be tentatively presented as follows:

*S. howqua howqua* (WESTWOOD, 1851): E. China

*S. howqua formosana* FRUHSTORFER, 1908: Taiwan

*S. howqua iapetus* BROOKS, 1949: N. Vietnam (Chapa = Sa Pa)

*S. howqua bowringi* CHUN, 1929: Hainan

*S. suffusa suffusa* LEECH, 1892: W. China

*S. suffusa tonkiniana* FRUHSTORFER 1901: N. Vietnam

*S. suffusa miyana* FRUHSTORFER, 1913: S.E. China (Canton). NISHIMURA (1998) incorrectly cited W. and C. China

The definition of real taxonomic status of all these formal subspecies needs further study and material, since some of them may theoretically prove to be conspecific or, on the contrary, represent separate species.

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### Addresses of the authors

Dr. ALEXANDER L. MONASTYRSKII  
Vietnam-Russia Tropical Centre  
1, Nguyen Van Huyen, Cau Giay,  
Nghia Do, Hanoi, Vietnam

Dr. ALEXEY L. DEVYATKIN  
Department of Entomology  
Faculty of Biology  
Moscow State University  
119991 Moscow, Russia

## Colour plate 20/ Farbtafel 20

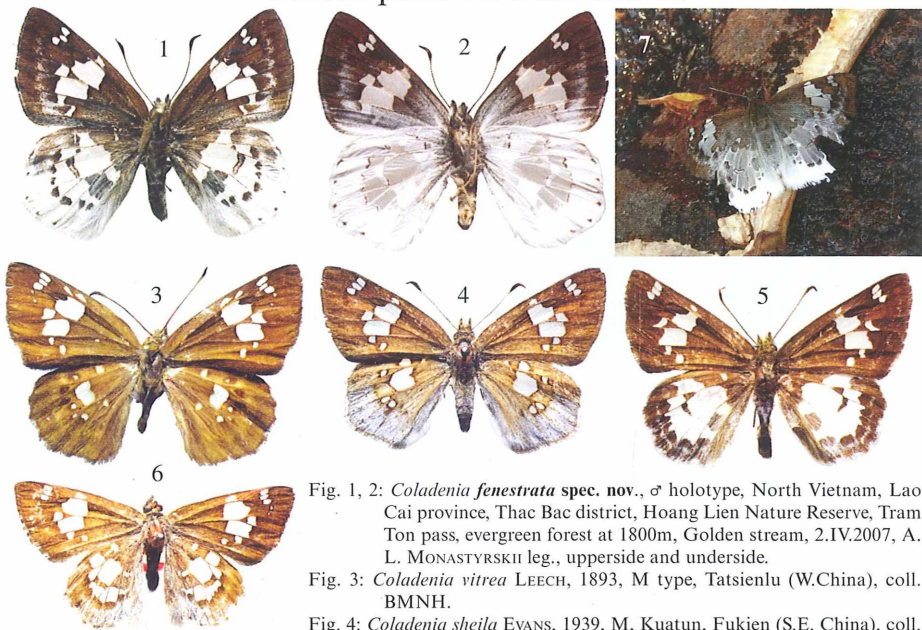


Fig. 1, 2: *Coladenia fenestrata* spec. nov., ♂ holotype, North Vietnam, Lao Cai province, Thac Bac district, Hoang Lien Nature Reserve, Tram Ton pass, evergreen forest at 1800m, Golden stream, 2.IV.2007, A. L. MONASTYRSKII leg., upperside and underside.

Fig. 3: *Coladenia vitrea* LEECH, 1893, M type, Tatsienlu (W.China), coll. BMNH.

Fig. 4: *Coladenia sheila* EVANS, 1939, M, Kuantun, Fukien (S.E. China), coll. BMNH.

Fig. 5: *C. hoenei* EVANS, 1939, F, Tapaishan in Tsinling (S.E. China), coll. BMNH.

Fig. 6: *C. maeniata* OBERTHÜR, 1896, M type, Maenia, Thibet, coll. BMNH.

Fig. 7: *Coladenia fenestrata* spec. nov., ♂ paratype in nature (photo by A. L. MONASTYRSKII).

## Colour plate 20A/ Farbtafel 20A

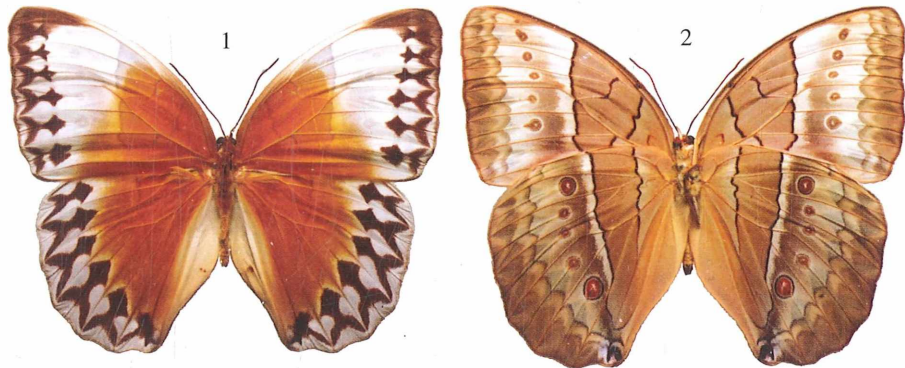


Fig. 1, 2: *Stichophthalma louisa louisa* (WOOD-MASON, 1877), ♂, Burma, Tenasserim, upperside and underside.

## Colour plate 21/ Farbtafel 21

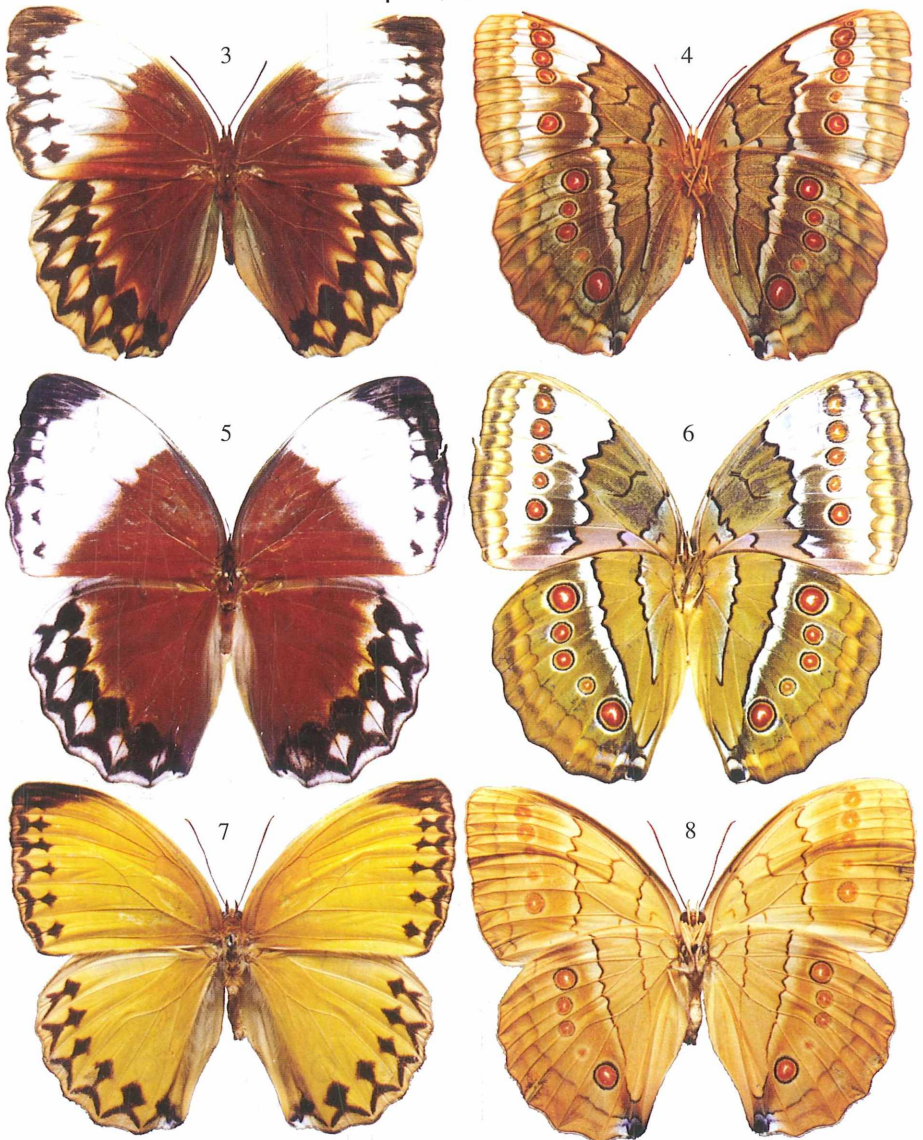


Fig. 3, 4: *Stichophthalma mathilda* JANET, 1905, ♂, Tonkin, Than Moi, upperside and underside.  
Fig. 5, 6: *Stichophthalma eamesi* MONASTYRSKII, DEVYATKIN & UEMURA, 2000, ♂ paratype, C. Vietnam, Kon Tum Prov., upperside and underside.  
Fig. 7, 8: *Stichophthalma howqua howqua* (WESTWOOD, 1851), ♂, Shanghai, China, upperside and underside.



## Colour plate 22/ Farbtafel 22

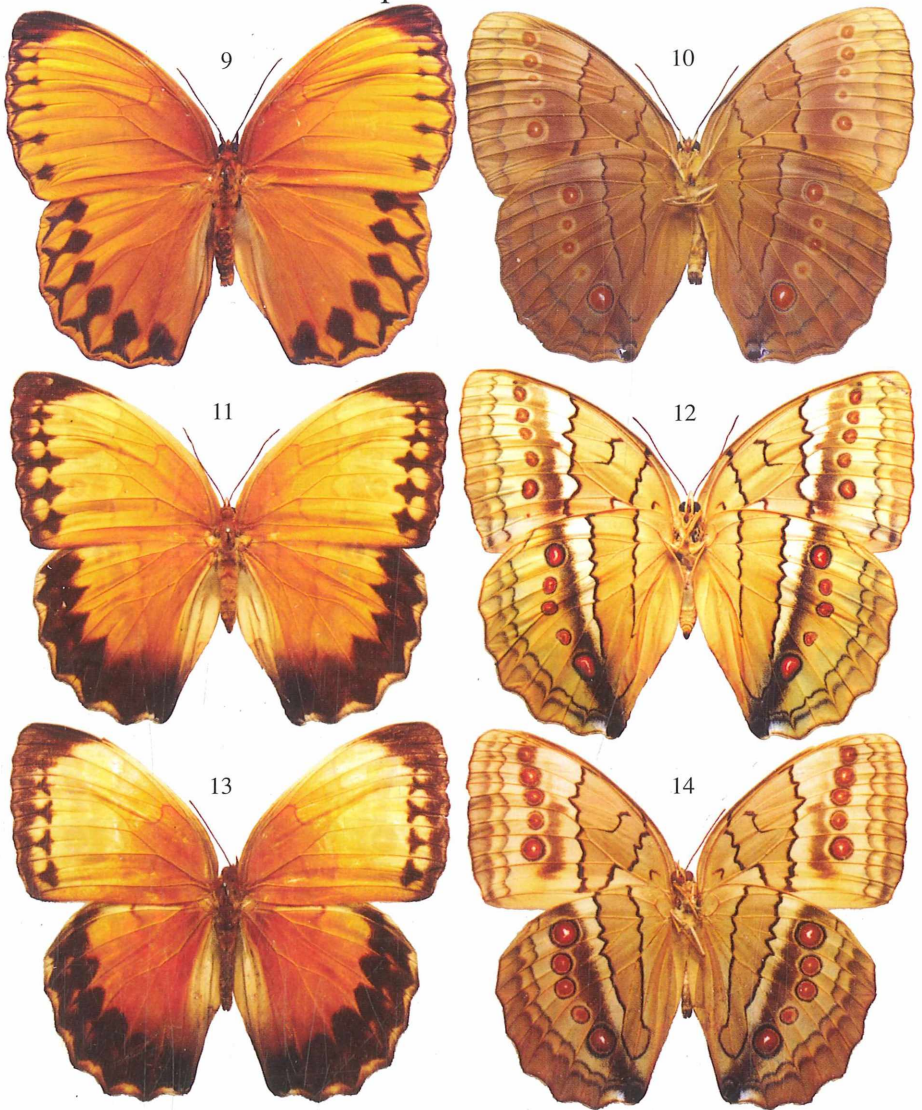


Fig. 9, 10: *Stichophthalma howqua iapetus* BROOKS, 1949, ♂ type, upperside and underside.

Fig. 11, 12: *Stichophthalma suffusa suffusa* LEECH, 1892, ♂, Szechuan, W.China, upperside and underside.

Fig. 13, 14: *Stichophthalma suffusa tonkiniana* FRUHSTORFER, 1901, ♂, Thanh Moi, upperside and underside.

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