

A new species of *Zographetus* Watson, 1893 (Lepidoptera, Hesperiiidae, Hesperiiinae) from the Western Ghats, Peninsular India

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ABSTRACT: A new species of *Zographetus* Watson, 1893 (Lepidoptera, Hesperiiidae, Hesperiiinae) is described from the Western Ghats of Peninsular India. *Zographetus mathewi* Sadasivan and Kochunarayanan, **sp. nov.**, fits in the *Z. satwa* species-group based on the forewing venation, with vein Cu₂ arising much closer to the wing base than vein Cu₁, and the basal portion of vein Cu₂ and the cubitus up to the origin of Cu₁ swollen. Field images of adults, illustrations of genitalia and information on the early stages of this species are also provided. The larval host plant was identified as *Aganope thyrsoflora* (Fabaceae). A key to the species of the Oriental genus *Zographetus* is also provided.

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KEY WORDS: Biodiversity hotspot, skipper, butterfly, Kerala, Agasthyamalais

INTRODUCTION

Zographetus Watson, 1893 (Lepidoptera, Hesperiiidae), limited to the Oriental Region, is represented by 14 species (Fan *et al.*, 2007; Xue *et*

al., 2019; Karmarkar *et al.*, 2021). The currently known distribution of the genus is confined to peninsular India, northeastern India, the Andaman Islands, Indo-China, China, Malay Peninsula, Sumatra, Java, Lesser Sunda Islands, Borneo,

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Palawan, Philippines and Sulawesi (Vane-Wright and de Jong, 2003). These are generally rare skippers and the larvae feed on Gnetaceae, Poaceae, Sterculiaceae and Fabaceae; this polyphagous nature may reflect the morphological heterogeneity of the genus (Vane-Wright and de Jong, 2003; Anonymous, 2023). Members of *Zographetus* may be classified into two species-groups based on male wing venation (position of the origin of vein Cu_2) and secondary sexual characters (swollen veins) (Xue *et al.*, 2019; Fan *et al.*, 2007). The first group is characterised by the forewing vein Cu_2 arising much closer to the wing base than vein Cu_1 , and the basal portion of vein Cu_2 with the cubitus swollen in the males (*Z. satwa* species-group); the second is composed of species with forewing vein Cu_2 arising midway or closer to vein Cu_1 than to the wing base, and males without swollen veins (*Z. ogygia* species-group) (Corbet and Pendlebury, 1992; Fan *et al.*, 2007; Xue *et al.*, 2019). The following species belong to the *Z. satwa* species-group: *Z. satwa* (de Nicéville, [1884]), *Z. abima* (Hewitson, 1877), *Z. pallens* de Jong & Treadaway, 1993, *Z. rama* (Mabille, 1876), and *Z. rienki* Xue, 2019. The *Zographetus ogygia* species-group currently includes *Z. ogygia* (Hewitson, [1866]), *Z. doxus* Eliot, 1959, *Z. durga* (Plötz, 1884), *Z. flavalum* de Nicéville, 1887, *Z. hainanensis* Fan and Wang, 2007, *Z. ogygioides* Elwes & Edwards, 1897, *Z. kutu* Eliot, 1959, and *Z. pangi* Fan and Wang, 2007 (Corbet and Pendlebury, 1992; Fan *et al.*, 2007; Xue *et al.*, 2019).

From India, four species of *Zographetus* are currently known: *Z. dzonguensis* Kunte, Karmakar & Lepcha, 2021; *Z. flavalum*; *Z. ogygia*; and *Z. satwa* (Eliot, 1959; Evans, 1932, 1949; Corbet and Pendlebury, 1992; Karmakar *et al.*, 2021). *Zographetus flavalum*, earlier considered a synonym of *Z. ogygia* by Evans (1949), was resurrected by Eliot (1959) and is known only from Sikkim, its type locality; *Z. dzonguensis* is also known only from its type locality in north Sikkim (Karmakar *et al.*, 2021); *Z. ogygia* is known from the Western Ghats (WG), Eastern Himalaya, NE India and Andamans, extending into southeast Asia, Sumatra, Java and

Borneo; and *Z. satwa* is distributed from Kumaon eastward into the Himalayas and NE India, extending into southeast Asia, Sumatra and Java (Bell, 1925; Evans, 1932, 1949; Corbet and Pendlebury, 1992). Thus, only one species, *Z. ogygia* (Hewitson, [1866]), was known from the WG of Peninsular India. The only available historical record of this taxon from WG is traceable to Bell (1925), where a single specimen was caught in Kanara (in present-day Karnataka state) near the seacoast in the semi-evergreen forest at approximately 800 ft above sea level (ASL) during the monsoon, and it was identified by de Nicéville. Evans (1932) recorded it as *Z. ogygia ogygia* (Hewitson, [1866]) from southern India and its status was mentioned as being rare. However, this taxon found no mention in Evans (1949), Larsen (1988) or Gaonkar (1996) for the WG.

In recent years, there have been plenty of records of *Z. ogygia* from Kerala, Karnataka and Goa in southern India (Anonymous, 2023). During fieldwork in the WG of Kerala state, larvae of a skipper butterfly were noticed on the leaves of the liana *Aganope* (Fabaceae), resembling *Z. ogygia*. A detailed study of the eclosed adult specimens revealed that this taxon differed considerably from *Z. ogygia* in terms of wing venation and shape of the male genitalia. This taxon is described here as new to science, with images of adults, illustrations of male and female genitalia, and details of its early stages. A key to all known species of the Oriental genus *Zographetus* is also provided in this study.

MATERIALS AND METHODS

The taxonomy of the genus *Zographetus* follows Evans (1932, 1949), Corbet and Pendlebury (1992), Fan *et al.* (2007), Xue *et al.* (2019) and Karmakar *et al.* (2021). Photographs of the pinned specimens and larvae were taken with a Canon EOS 70D DSLR fitted with a 180mm macro lens and an MPE 65 f2.8 1–5x lens. Details of the early stages were noted after rearing field-collected larvae in the laboratory. The genitalia were dissected after overnight soaking of the severed tip of the abdomen in KOH (10%), studied under a stereo-zoom microscope (HEADZ Model HD81), and preserved

in glycerol. Illustrations were drawn by KS using the stereo-zoom microscope and then digitised. The length of the forewing (FW) was measured as the longest straight-line distance from the wing base to the wing tip, following Van Hook *et al.* (2012). The terminology for wing markings follows Evans (1932) and Corbet and Pendlebury (1992) for descriptions of the genitalia.

Abbreviations used

FW	Forewing
HW	Hindwing
TNHS	Travancore Nature History Society
UpF	Upperside of the forewing
UnF	Underside of the forewing
UpH	Upperside of the hindwing
UnH	Underside of the hindwing
WG	Western Ghats
WLS	Wildlife Sanctuary
ZSI	Zoological Survey of India

RESULTS AND DISCUSSION

Systematic account

Zographetus Watson, 1893

Zographetus Watson, 1893: 72, 84 (Type species: *Isoteinon satwa* de Nicéville).

Gehenna Watson, 1893: 92, 108 (Type species: *Hesperia abima* Hewitson).

Diagnosis of genus: *Zographetus* is a heterogenous genus characterised by palpi with the third palpomere short; FW vein M_2 downcurved at base; with ground colour on upper side dark brown with small white hyaline spots; UnH with ground colour ferruginous yellow, and black spots in cell and post-discal area. Based on forewing venation and secondary sexual characters, two species-groups are recognised. In the *Z. satwa* group, the FW vein Cu_2 arises much closer to the wing base than to vein Cu_1 , and the basal portion of vein Cu_2 and the cubitus are swollen in the males (Corbet and Pendlebury, 1992; Fan *et al.*, 2007).

Zographetus mathewi Sadasivan and Kochunarayanan, sp. nov. (Fig. 1, 2A, B, 3, 4A–F)

LSIDurn:lsid:zoobank.org:act:E6594FA0-9A45-4405-86B3-65B174E789B3

Type material: *Holotype* (Fig. 2A, B). ♂ **TLRG # 1005**, Kottiyoor, Kannur District (Coorg landscape), Kerala State, India; col. KS; 15. vi. 2021, 200m ASL, from a private homestead; dry pinned specimen eclosed from reared larvae ex *Aganope thyrsiflora* (Benth.) Polhill (Fabaceae) deposited in the insect collections of ZSI, Kozhikode, Kerala, India (No. ZSI/WGRC/IR/INV.29707).

Paratypes (n=3) (Fig. 2C, D). ♀ **TLRG # 1006**, Kallar, Thiruvananthapuram District (Agasthyamalai landscape), Kerala State, India; col. KS; 15. vi. 2021, 100m ASL, from a private homestead; dry pinned specimen eclosed from reared larvae on *Aganope thyrsiflora* (Fabaceae), deposited in the insect collections of ZSI, Kozhikode, Kerala, India (No. ZSI/WGRC/IR/INV.29708). ♂, **TLRG # 1007**, bearing the same data as TLRG 1006, wet specimen, will be retained in the insect collections of TNHS Thiruvananthapuram, Kerala, as a voucher specimen. **TLRG # 1008**, bearing the same data as the holotype, a dry pinned specimen eclosed from reared larvae, will be deposited in the insect collections of TNHS as a voucher specimen.

Description of the holotype: *Head, thorax and abdomen:* Head, palpi, thorax, femur, coxae, and abdomen clothed with ochre-yellow hairs; hairs around distal thorax and abdomen with greenish hue; legs yellow inside, brownish-yellow externally, joints darker; eyes dark brownish-black; antennae half as long as costa, black, inner aspect chequered with white, club black with a well-defined white patch superomedially, apiculus black (Fig. 2A, B).

FW. (Fig. 2A, B; 4A). Length 14 mm. *UpF:* Ground colour dark chocolate-brown; basal half of costa thickly bordered with yellowish-ochre scales, rest of costa very thinly so; space 1b (cell 1A+2A) clothed with very long golden-orange hairs; a spot in space 2 (CuA_1), just before middle of space 2, quadrate; small spot in 3 (cell M_3) well before middle of space 3, closer to its base, but not occupying its origin; a smaller lower cell-spot; a small post-discal

spot in basal space 6 (cell R_5). Lower cell-spot and spot in 3 are separated by a distance distinctly less than length of spot in 2. Spot in 2 largest, followed by that in 3, then lower cell and one in space 6. Cilia indistinctly chequered with dark and pale purple-grey. Venation with basal portions of FW vein Cu_2 and cubitus swollen up to origin of Cu_1 ; FW origin of vein Cu_2 closer to wing base than to vein Cu_1 ; M_3 origin midway between origins of M_2 and Cu_1 . *UnF*: In addition, a thick tuft of specialised appressed long black hairs at base of space 1a and 1b, tuft occupies basal margin of dorsum in space 1b, clads origin of vein 1 (A_{1+2}) and cubitus till level of origin of vein 2 (Cu_2). Ground colour bright ochreous-yellow, post-discal area and submarginal area purple-brown, post-discal spot in 6 pale yellowish white and bracketed in dark purplish scales; other spots as in UpF.

HW. UpH: Ground colour dark chocolate-brown, cell bearing long brownish-green hairs, unspotted.

UnH: Ground colour bright ochreous-yellow, post-discal area and submarginal area purple-brown, dark basal spot, and a discal spot in space 7 at its middle and a spot in cell brownish; post-discal series of purple spots from spaces 1b–6; a submarginal series of obscure oval yellowish-ochre spots from 1b–6; cilia checkered with dark and pale purple-grey (Fig. 2 A, B).

Male genitalia. (Fig. 4B–F). Vinculum and associated structures are shown in Fig. 4B; saccus relatively short, almost slightly bent upward (Fig. 4 B). Basal third of valva with dorsal margin shallowly convex, ventral margin sinuous; distal two-thirds constricted and curved upwards; dorsal margin regular, devoid of any teeth, extending posterolaterally into a blunt digitiform process, ventral margin curved upwards ending in a blunt tip (Fig. 4D). In posteroventral view, the outer arm of the vinculum is short and rudimentary, and the inner lamina is small and carries fewer large spines, roughly arranged in two rows around periphery, with a distinctly shaped clasp (Fig. 4B–F). Aedeagus, dorsal margin of distal portion shallowly concave, ventral margin of distal half convex in lateral view, tip downcurved (Fig. 4E).

Description of female:

Head, thorax and abdomen: Head, palpi, thorax, femur, coxae, and abdomen as in males; antennae half as long as costa, black, inner aspect chequered with white, club black, apiculus brown (Fig. 2C, D).

Wings. FW. Length 14 mm. *UpF*: Ground colour dark chocolate-brown; basal half of costa thickly bordered with yellowish-ochre scales, rest of costa very thinly so; space 1b (cell 1A+2A) clothed with very long orange-golden hairs; a small yellowish space streak in space 1 at middle; a long rectangular whitish spot in space 2 (CuA_1), just before middle of space 2; small spot in 3 (cell M_3) well before its middle, closer to its base, but not occupying its origin; two small cell spots mirroring each other; a small post-discal spot in basal space 6 (cell R_5) and very small one above it in space 7; lower cell-spot, a spot in 3 separated by a distance almost equal to length of spot in 2. Spot in 2 largest, followed by that in 3, then one in space 6, followed by spot in space 1. Cilia indistinctly chequered with dark and pale purple-grey. *UnF*: Ground colour chocolate-brown, post-discal area and submarginal area ferruginous-brown; spots as in UpF; thick tuft of specialised appressed long black hairs at base of space 1a and 1b as in males. *HW. UpH*: Ground colour chocolate-brown, cell bearing long brownish-green hairs, unspotted. *UnH*: Ground colour bright ochreous-yellow, post-discal area and submarginal area purple-brown, dark basal spot, and a discal spot in space 7 at middle and a spot in cell brownish; post-discal series of purple spots from spaces 1b–6; a submarginal series of obscure oval yellowish-ochre spots from 1b–6; cilia checkered with dark and pale purple-grey.

Female genitalia (Fig. 4G). In posteroventral (end-on view) papillae anales triangular, completely sclerotised, except for posteroinferior border, outer lamina covered with moderately long, sparse hairs; lamella ante-vaginalis wide, trapezoid, mid-ventral margin sharply curved like a keel; lamella post-vaginalis sclerotised, quadrangular, with a well-defined lateral triangular plate on each side from which arise, on each side, a long, curved flat spine; ductus bursae tube-like, short and sclerotised.



Fig. 1 Map showing the site records of *Zographetus mathewi* sp. nov.

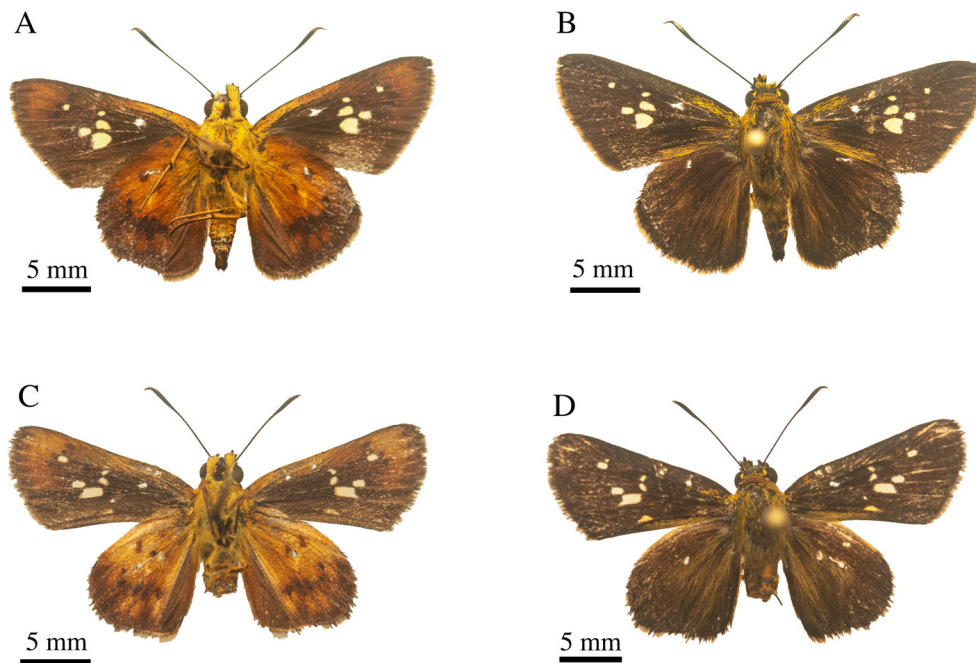


Fig. 2 *Zographetus mathewi* sp. nov., Holotype, and paratype (tip of abdomen removed for dissection). A–holotype male ventral view; B–holotype male dorsal view; C–paratype female ventral view; D–paratype female dorsal view. © Kalesh Sadasivan

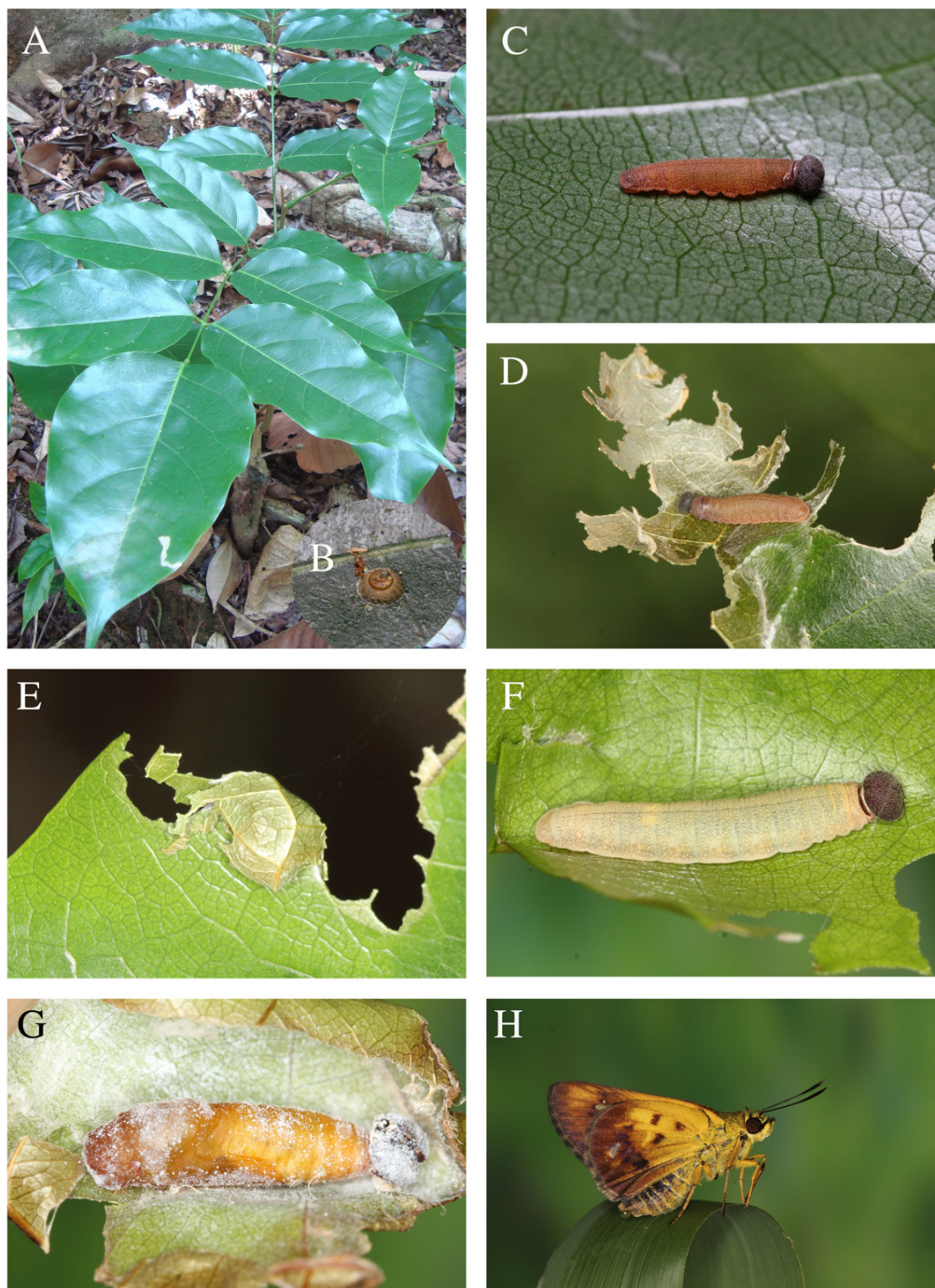


Fig. 3 *Zographetus mathewi* **sp. nov.**, Lifecycle and hostplant. A–*Aganope thyrsiflora* (Benth.) Polhill (Fabaceae); B–egg; C–larva; D–intermediate (third) instar larva with the shelter opened showing fir-tree appearance; E–spherical larval shelter in situ; F–final instar larva; G–pupa; H–adult butterfly. © Baiju Kochunarayanan

Variation: The upper cell-spot on UpF in some specimens was highly reduced or absent in males. The quadrangular spot in space 2 is occasionally higher than broad but never longer than high. A small apical spot may occasionally be observed in the UnF space 7.

Etymology: The new species is named after Dr. George Mathew, an Indian lepidopterist and former Head of the Entomology Division at the Kerala Forest Research Institute (KFRI), Peechi, Thrissur, Kerala, for his significant contributions to lepidopteran and forest insect research in the state. The proposed common English name is Sahyadri Spotted Flitter.

Distribution: The butterfly is seen in the semi-evergreen, moist deciduous, and West-coast Evergreen forests of Kerala in all landscapes below 600 m. Site-specific personal records of larvae are from Aralam and Kottiyoor (Kannur District), Nilambur (Malappuram District), Edamalayar-Pooyamkutty (Ernakulam District), Shendurney (Kollam District), Kallar-Ponmudi Valley, Bonaccord, Peppara WLS, and Neyyar WLS (Thiruvananthapuram District). Adults are extremely rare in the field, and the only record from our side is from Edamalayar in the Lower Periyar landscape from a West-Coast Tropical Evergreen Forest in March 2022 (JJ and TA). To the best of our knowledge, this new species is endemic to the WG.

Ecological notes and early stages (Fig. 3): The eggs are laid on the adaxial surface of the leaf, usually on mature leaves. They never use fresh or immature leaves. The newly hatched larva cuts the margin of the leaf and makes a small cell (larval shelter). When opened, the mature larval cell (larval shelter) has a fir-tree appearance, and when folded with larval silk, it creates a spherical cell. Feeding occurs around the leaf blade near the cell and has a moth-eaten appearance. The total duration of the larval stages is 21–26 days, the final instar lasts 5–6 days, and the pupal period is 10–11 days. The new species feeds on *Aganope thyrsoflora* (Benth.) Polhill (Fabaceae), as far as is known (Fig. 3A). The larvae of *Z. ogygia* and *Z. doxus* occur on

Archidendron jiringa (Jack) Nielsen (Fabaceae), *Z. rama* is recorded on *Gnetum* (Gnetaceae), *Z. abima* on *Pterospermum* (Sterculiaceae) as per Igarashi & Fukuda (2000) and Eliot *et al.* (2006). Due to the paucity of published data on the early stages of other known species of *Zographetus*, finer comparisons of larval morphology could not be performed.

DISCUSSION

Zographetus mathewi sp. nov. is distinguished from all the other members of the genus by the combination of the following characters – forewing dorsal side with basal portions of vein Cu₂ and cubitus swollen, this glandular swelling of cubitus long, reaching more than halfway to vein Cu₁; origin of vein Cu₂ closer to wing base than to vein Cu₁; spot in space Cu₁ (space 2) is broad, quadrate in males, rectangular in females; distance between lower cell-spot and the spot in 3 is always less than the length of the spot in 2; ventral side of forewing with a basal black hair tuft; hindwing ventral side with yellow-ochre super-scaling not condensed into a band; the dark discal spots well-defined, with the black spot in space 7 at its middle.

Relationships of the new species to currently recognised *Zographetus* species-groups

1. Affinity of *Z. mathewi* sp. nov. to *Zographetus* species-groups based on wing venation

Based on forewing venation and secondary sexual characters, the genus includes two distinct species-groups proposed by Eliot (1992), followed by Fan *et al.* (2007). One group has forewing vein Cu₂ arising much closer to the wing base than to vein Cu₁, and the basal portion of vein Cu₂ and the cubitus are swollen in the male (*Z. satwa* species-group); the second is composed of the remaining species, with forewing vein Cu₂ arising slightly closer to vein Cu₁ than to the wing base, and the male without a swollen vein (*Z. ogygia* species-group). Species-group classifications, though somewhat artificial, may be practically useful in segregating and differentiating species within a genus with ease.

***Zographetus satwa* species-group.**

Zographetus abima, *Z. pallens*, *Z. rama*, *Z. rienki*, and *Z. satwa* belong to the *Z. satwa* species-group. Based on the venation, *Z. mathewi* **sp. nov.** falls into the *Z. satwa* group, with its FW vein Cu₂ arising much closer to the wing base than to vein Cu₁, M₃ origin midway between the origins of M₂ and Cu₁, and the basal portions of vein Cu₂ and cubitus being swollen. The species in the *Z. satwa* species-group are easily distinguished from *Z. mathewi* **sp. nov.**

The species *Z. abima* from Sulawesi (Celebes) is similar to the new species but is diagnosed by UnH with dark discal spot in space 7 well beyond its middle; UpF lower cell-spot and the spot in 3 separated by a distance almost equal to the length of the spot in 2. In the new species, the UnH dark discal spot in space 7 is at its middle, and the FW lower cell-spot and the spot in 3 are separated by a distance distinctly less than the length of the spot in 2. The UnH is overlaid with yellow scales condensed into a broad, pale-yellow band, whereas no such band exists in *Z. mathewi* **sp. nov.** The long glandular swelling of cubitus, reaching more than halfway to vein Cu₁, and a broad, quadrate spot in space Cu₁ (space 2) in *Z. mathewi* **sp. nov.**, eliminates *Z. rama* which has UnF with glandular swelling of cubitus short, extending only one-third of the distance to vein Cu₁; UpF with spot in space Cu₁ (space 2) narrow, higher than wide; yellow scaling pale. The well-marked UnH with well-defined dark spots differentiates *Z. mathewi* **sp. nov.**, *Z. rienki* has UnH unmarked and the yellow scaling dull and sparse, while the UnH marked with dark spots; UnH yellow scaling is of an ochreous shade in *Z. mathewi* **sp. nov.** *Zographetus satwa* lacks the UnF black hair tuft seen in *Z. mathewi* **sp. nov.**

***Zographetus ogygia* species-group.** Basal portions of FW vein Cu₂ and cubitus not swollen; FW origin of vein Cu₂ is variable in *Z. ogygia* species-group as defined here (see key below). The *Z. ogygia* group currently has *Z. doxus*, *Z. durga*, *Z. flavalum*, *Z. hainanensis*, *Z. ogygia*, *Z. ogygioides*, *Z. kutu*, and *Z. pangi*. All the species mentioned above falling in the *Z. ogygia* group are

easily differentiated from *Z. mathewi* **sp. nov.**, by the absence of swollen FW veins. In addition, *Z. doxus*, *Z. durga*, *Z. flavalum*, *Z. ogygia*, *Z. ogygioides*, and *Z. kutu*, differ from the new species by their males with FW vein Cu₂ arising closer to vein Cu₁, while in the new species, the FW vein Cu₂ arises much closer to the wing base than to vein Cu₁. The species *Z. flavalum* lacks the sub-uncal processes (Eliot, 1959), which are present in *Z. mathewi* **sp. nov.**, and other congeners.

The species *Z. dzonguensis* could not be placed in the key (see below) as the critical taxonomical details of FW venation, such as the swollen or non-swollen state of the basal portions of Cu₂ and cubitus, the origin of veins Cu₁ and Cu₂, and the status of the paired sub-uncal processes, are missing in the description in Karmarkar *et al.* (2021). However, *Z. dzonguensis* is easily distinguished from *Z. mathewi* **sp. nov.**, by the very prominent cell-spot UnH, the broad brown margins on both wings on the underside, and the absence of discal spots in mid-space 7 UnH in the former. Moreover, the structure of the male genitalia is very different in these two species, as depicted by Karmarkar *et al.* (2021).

2. Affinity of *Z. mathewi* sp. nov. to *Z. ogygia* species-complex based on the structure of male genitalia

Evans (1949) mentioned four species in his work—*Z. satwa*, *Z. ogygia*, *Z. rama* and *Z. abima*. But, considered that there was only one real species in the *Z. ogygia* (Evans 1949, op. cit., p. 300), and lumped all the described forms into four subspecies of *Z. ogygia*, viz. *Z. ogygia* with *Z. flavipennis* (de Nicéville, 1885) and *Z. flavalum* de Nicéville, 1887 listed as synonyms; *Z. andamana* Evans, 1926, *Z. durga*, and *Z. ogygioides*. Eliot (1959) revised this *Z. ogygia* species-complex of Evans (1949) into two forms based on the structure of male genitalia. The structure of the clasp (valve) and the paired sub-uncal processes with a narrow outer arm and a medial dentate lamina were the key characters. One form which belongs to the types of *Z. ogygia* has the outer arm always short,

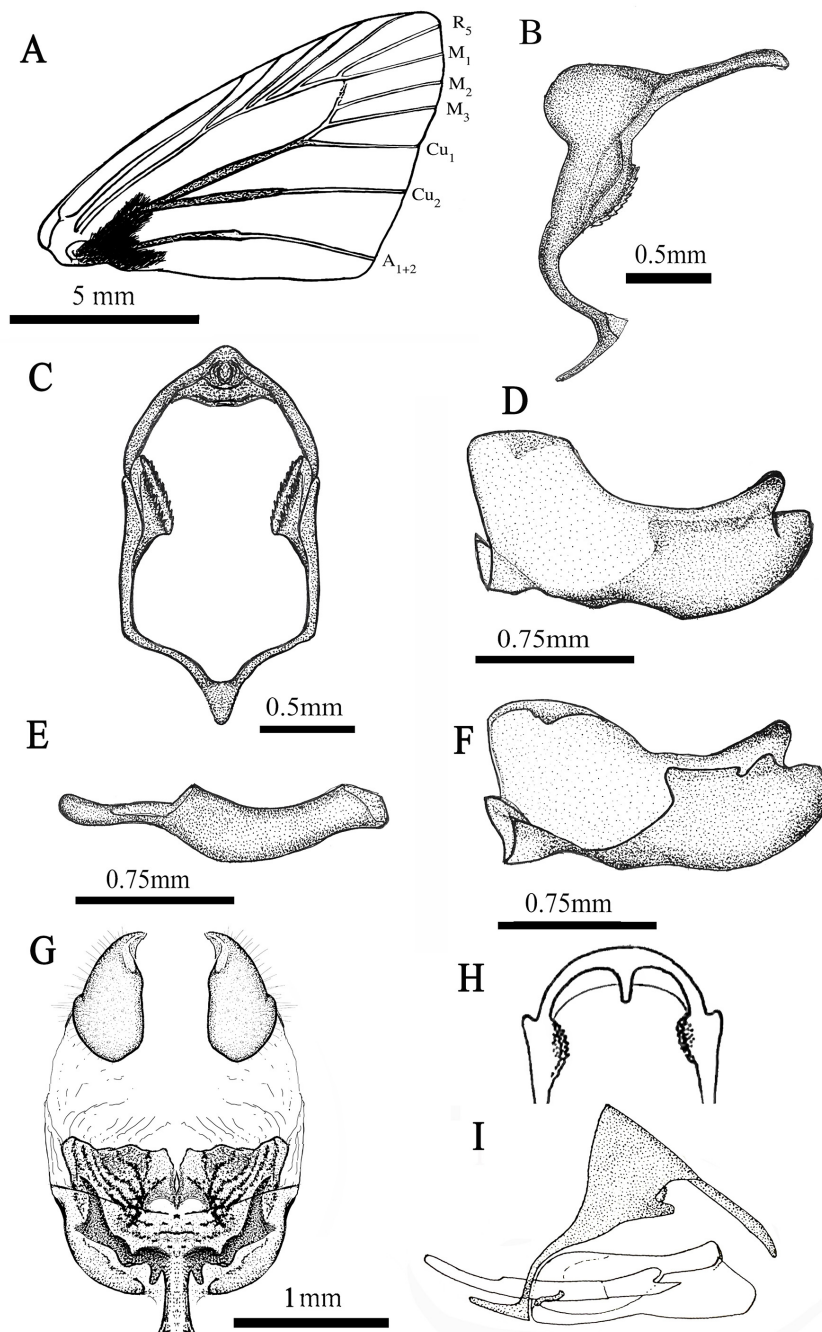


Fig. 4 *Zographetus mathewi* sp. nov., Illustrations. A—forewing venation of a male showing the swollen veins at basal portion of vein Cu_2 & cubitus up to origin of Cu_1 , and specialized basal black hair tuft at base; B—lateral view of vinculum and associated structures; C—end-on view of the uncus, showing sub-uncal processes, vinculum and associated structures; D—left valve (clasp) lateral view; E—aedeagus; F—right valve (clasp) medial view; G—ventral end-on view of female genitalia showing the sclerotized triangular anal papillae, trapezoid lamella ante-vaginalis, well-sclerotized lamella post-vaginalis with long lateral spines; H—end-on view of the male uncus, showing sub-uncal processes of *Z. ogygia* redrawn from Eliot (1959) (not to scale); I—male genitalia of *Z. ogygia* (left valve removed) based on Corbet & Pendlebury (1992) (not to scale). © Kalesh Sadasivan

the inner lamina small and carrying comparatively few large spines, usually roughly arranged in two rows around the periphery; and a second form has the outer arm of variable length, though usually longer than the other form, with the inner lamina larger and covered almost all over with numerous small teeth, seen in *Z. doxus*.

It was found that the genitalia of the new species is similar to those of the first form of the *Z. ogygia* species-complex described by Eliot (1959) (Fig. 4C). However, the new species differs from *Z. ogygia*, with which it was previously confused in the WG, by the following characteristics: FW vein Cu_2 arising much closer to the wing base than to vein Cu_1 , no bands on UpF in males, and the basal portions of vein Cu_2 and cubitus being swollen. The male genitalia of *Z. ogygia* is very different from those of *Z. mathewi* **sp. nov.** On an end-on view of the uncus, *Z. ogygia* has the outer arm always short, the rounded inner lamina small and carrying comparatively fewer large spines, usually roughly arranged in two rows around the periphery (Fig. 4H), while *Z. mathewi* **sp. nov.** completely lacks the outer arm, and the inner lamina is triangular, bearing small teeth in two rows (Fig. 4C). The structure of the clasp is very different in *Z. ogygia* (Fig. 4I), and *Z. mathewi* **sp. nov.** (Fig. 4D, F).

Key to known species and species-groups of the genus *Zographetus* Watson, 1893

The key is based on Corbet and Pendlebury (1992), Jong and Treadaway (1993), Fan *et al.* (2007), Xue *et al.* (2019) and Karmarkar *et al.* (2021). The species *Z. dzonguensis*, though distinct, could not be placed in the key as the critical details of FW venation and the status of the paired subuncal processes are lacking in the original description in Karmarkar *et al.* (2021).

1. Basal portions of FW vein Cu_2 and cubitus swollen; FW origin of vein Cu_2 closer to wing base than to vein Cu_1 (*Z. satwa* species-group) 9

– Basal portions of FW vein Cu_2 and cubitus not swollen; FW origin of vein Cu_2 variable (*Z. ogygia* species-group)..... 2

2. UpF without secondary sexual characters; FW vein Cu_2 arises closer to vein Cu_1 than to the wing base 7

– UpF with secondary sexual characters; FW origin of vein Cu_2 variable..... 3

3. UpF with an orange hair tuft at basal dorsum; FW vein Cu_2 arises much closer to the wing base than to vein Cu_1 4

– UpF with special brands; FW vein Cu_2 arises closer to vein Cu_1 5

4. Upper cell-spot larger and distinct; space M_2 unmarked dorsally but black ventrally; subzonal sheath of aedeagus bent (China).....*Z. pangi* Fan and Wang, 2007

– Upper cell-spot smaller; spot in space M_2 white on both sides; subzonal sheath of aedeagus straight (China).....*Z. hainanensis* Fan and Wang, 2007

5. UnH basal two-thirds dusky sulphur with a dark spot in cell and space $Sc+R_1$; outer third purple-brown, more or less incorporating the dark discal spots; brands vestigial or inconspicuous; outer arm of subuncal process well-developed (Philippines)*Z. durga* (Plötz, 1884)

– UnH uniformly coloured, with a series of dark spots in spaces Cu_2 to $Sc+R_1$ (in space Rs spot may be vestigial) and in cell..... 6

6. UnH golden brown to rich ferruginous; male genitalia with outer arm of subuncal process vestigial (Sikkim to Java).....*Z. ogygia* (Hewitson, [1866])

– Discal area on UnH yellowish in males, most of the wing yellowish in females; outer arm of subuncal process more or less developed (Thailand to Borneo) *Z. doxus* Eliot, 1959

7. FW with three spots in subapical and one spot at lower half of distal cell; spot in space M_3 elongated, overlapped with that in Cu_1 and adjacent to cell-spot (Sikkim)*Z. flavalum* de Nicéville, 1887

– FW with one subapical spot and two separated

cell spots; in males, spot in space M_3 small, not overlapping with that in Cu_1 and detached from cell-spot..... 8

8. Small insect, FW 13 mm; UnH post-discal spots well marked (Thailand to Sumatra).....
.....*Z. ogygioides* Elwes & Edwards, 1897

– Larger insect, male FW 16 mm; FW cell spots subequal; UnH very dark ferruginous, more or less purple washed, spotting faint or absent (Malaysia).....*Z. kutu* Eliot, 1959

9. UnF with a basal black hair tuft; no brands on male UpF.....10

– UnF without black hair tuft, dorsal side of forewing with special brands on either side of sub-basal portions of veins A_{1+2} and Cu_2 , and on lower side of cubitus (Sikkim to Java).....
.....*Z. satwa* (de Nicéville, [1884])

10. UnH overlaid with yellow scales condensed into a pale yellow broad band from vein Cu_1 (v_2) to vein $Sc+R$ (v_8); veins swollen in the basal part only (Philippines).....
.....*Z. pallens* de Jong & Treadaway, 1993

– Yellow super-scaling on UnH not condensed into a band..... 11

11. UnF with glandular swelling of cubitus short, extending only one-third of the distance to vein Cu_1 ; UpF with spot in space Cu_1 (space 2) narrow, higher than wide; yellow scaling pale (Burma to Philippines and Sulawesi)..... *Z. rama* (Mabille, 1876)

– UnF with glandular swelling of cubitus long, reaching more than halfway to vein Cu_1 and spot in space Cu_1 (space 2) broad, quadrate, or broader than high..... 12

12. UnH not marked with dark spots; UnH yellow scaling dull and sparse (China).....
.....*Z. rienki* Xue, 2019

– UnH marked with dark spots; UnH yellow scaling ochreous..... 13

13. UnH dark discal spot in space 7 well beyond its middle; lower cell-spot and the spot in 3 separated

by a distance almost equal to the length of the spot in 2 (Sulawesi)..... *Z. abima* (Hewitson, 1877)

– UnH dark discal spot in space 7 at its middle; lower cell-spot and the spot in 3 separated by a distance distinctly less than length of spot in 2 in males (WG in Peninsular India)
..... *Z. mathewi* **sp. nov.**

The discovery of a new species of butterfly from the WG, despite more than 200 years of butterfly exploration, highlights the richness of this biodiversity hotspot remaining unexplored. The superficial resemblance of the species to *Z. ogygia* is interesting and thus reiterates the need to examine male genitalia for accurate species diagnosis in skipper butterflies. The previous records of *Z. ogygia* from this region need to be reassessed in light of this discovery. The genus *Zographetus* comprises a heterogeneous group of species with differences in forewing venation and secondary sexual characters. The heterogeneity in adult morphology and the polyphagous nature of the larvae of this genus demand a detailed morphological and phylogenetic analysis to infer lineages and the validity of species-groups within it.

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