



## A new species of *Iolaus* Hübner, [1819] subgenus *Epamera* Druce, 1891 (Lepidoptera: Lycaenidae: Theclinae) from Mts Namuli and Mabu, Northern Mozambique

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**Abstract:** This paper describes a new species of *Iolaus* (*Epamera*) from two mountains in northern Mozambique - Mts Namuli and Mabu - with life history notes on its early stages, habits, and habitat. The species was collected on the forest edge at Mt. Namuli and close to the summit on Mt. Mabu over the course of several biological expeditions to survey the high altitude mountains of northern Mozambique, which also resulted in the discovery of many other species. It belongs in the 'pollux' group, associated with montane forests, and which have an unusual larval form, although it is closest to *Iolaus* (*Epamera*) *helenae*. The larvae of the new species of *Iolaus* described in this paper feed on a species of Loranthaceae. It is, however, easily distinguished from *I. (E.) helenae* by the colour of the distal stripes and subbasal spot. The status of *Iolaus* (*Epamera*) *nolaensis amanica* and *Iolaus* (*Epamera*) *silanus alticola* are also revised, as is the taxonomic key to the *pollux* subgroup which is amended accordingly to describe 7 species in total, as opposed to the previous 4 species.

**Key words:** *Iolaus*, *Epamera*, *pollux* subgroup, Loranthaceae

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### INTRODUCTION

The high altitude mountains of northern Mozambique have only recently started to reveal their biological secrets. From 2005 a series of expeditions was organised to survey the biodiversity of a selection of these mountains that rise above 1500 m in Zambezia Province (Fig. 1). Originally coordinated by the Royal Botanic Gardens Kew (London) and the Mulanje Mountain Conservation Trust (Malawi) a total of six mountains were visited on several occasions during which a series of biodiversity surveys was undertaken. As a result more than 20 new species were discovered (Bayliss, 2008; Branch & Bayliss, 2009; Branch & Tolley, 2010; Staude *et al.*, 2011; Savel & Bayliss, 2012; Monadjem *et al.*, 2010; Taylor *et al.*, 2012; Savel *et al.*, 2014; Branch *et al.*, 2014), which included four new species and four new sub-species of butterfly (Congdon & Bampton, 2009; Congdon *et al.*, 2010; Congdon & Bayliss, 2012), and most significantly the discovery of the largest continuous tract of medium altitude rainforest in southern Africa (Bayliss *et al.*,

2014). One of these discoveries is the new species of *Iolaus* (*Epamera*) described in this publication.

### GENUS *IOLAUS* HÜBNER [1819]: SUBGENUS *EPAMERA* DRUCE, 1891

The Afrotropical subgenus *Epamera* contains 66 described species (Williams, 2015). All known *Epamera* larvae feed on the parasitic Loranthaceae. *Epamera* divides naturally on morphological grounds into species with black, brown, yellow or orange underside stripes. Four species with mainly black underside stripes were referred to by Henning & Henning (1989) as the 'pollux' subgroup, which is reviewed and expanded below.

#### The *pollux* subgroup

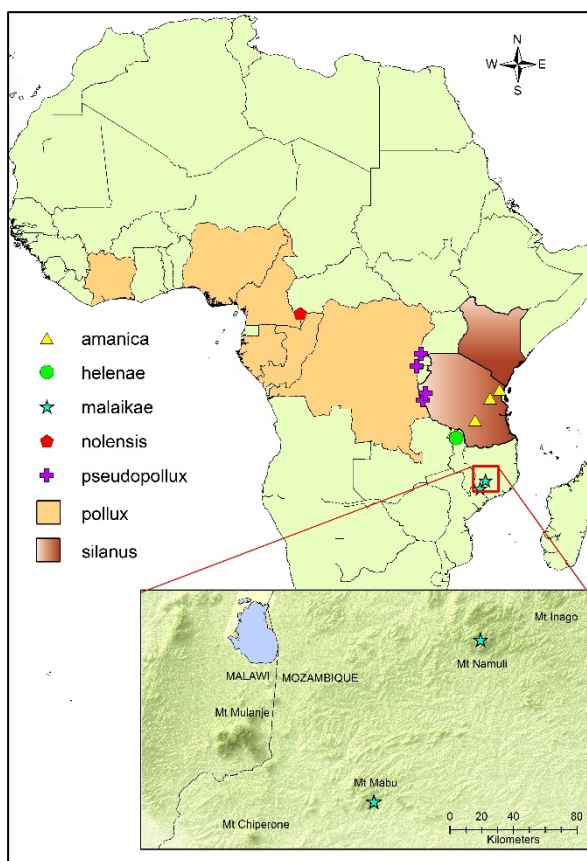
*Iolaus* (*Epamera*) *pollux* (Aurivillius, 1895) is a forest species, distributed from West Africa to Uganda and north-western Tanzania and north-western Zambia (subspecies *albocaerulea* Riley, 1929). It is generally smaller than others in this group and its larvae (Plate 1A) feed on *Agelanthus krausei* (Engl.) Polhill & Wiens (Loranthaceae), with a pupa that mimics lichen.

*Iolaus* (*Epamera*) *pseudopollux* (Stempffer, 1962) is another small species. It is found in montane riverine forests in south western Uganda (Kigezi) and to western Tanzania (e.g. the Mahale Mountain). Its

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**Figure 1** – Map showing distribution of known locations of the pollux sub-group, and an insert of study area between Malawi and Mozambique, showing the current location of *Iolus (Epamera) malaikae* on Mts Mabu and Namuli and the surrounding mountains above 1500m.

larvae are elusive and feed on *Agelanthus zizyphifolius* (Engl.) Polhill & Wiens (Loranthaceae).

*Iolus (Epamera) nolaensis* (Stempffer, 1951) is known only from the Central African Republic. Nola, the type locality, is on a tributary of the Ubangi River. (3°31'37"N, 16°2'31"E, 400m). The holotype is in the Paris Museum. The distance from Amani in the Usambara Mountains in Tanzania (5°5'56"S, 38°37'59"E, 914m) is so vast (> 2600 km), and with no known specimens from intermediate localities, it does not seem possible that *E. nolaensis amanica* Stempffer, 1951 is a subspecies of *nolaensis*. Comparing Stempffer's (1951) description of *nolaensis* with specimens from the ABRI collection (Table 1), the main differences are in the colour of the androconial tufts, (*amanica* are black; *nolaensis* are light brown), and the discal, submarginal, and marginal lines, which in *amanica* are black, whilst in *nolaensis* they are all brown.

From this evidence *Iolus (E.) amanica* (Stempffer, 1951) is hereby raised to a full species – **stat. nov.**

The larvae of *amanica* feed on both *Agelanthus subulatus* (Engl.) Polhill & Wiens and *A. atrocronatus* Polhill & Wiens (Loranthaceae). It has also been recorded on *Agelanthus sansibarensis*

(Engl.) Polhill & Wiens (Congdon & Bampton, 2000: 35); *Agelanthus scassellatii* (Chiov.) Polhill & Wiens (Heath *et al.*, 2002: 96) and *Agelanthus tanganyikae* (Engl.) Polhill & Wiens (Heath *et al.*, 2002: 96). *I. (E.) amanica* is often confused with the coastal *silanus* (Grose-Smith, 1889), and many previous records are probably mis-identifications.

**Table 1** – Differences between Stempffer's description (1951) of *nolaensis*, and from examination of the ABRI series of *amanica*.

<i>nolaensis</i>	<i>amanica</i>
Male upper side forewing apical black patch large, cutting across cell end. Inner edge irregular.	Apical black patch much reduced, inner edge rounded.
Male underside forewing "...a fine postdiscal line, reddish brown..."	Postdiscal line black
"...a submarginal line, light brown..."	Submarginal line black
"...a marginal line, brown..."	Marginal line black
"... between [the submarginal line] and the external edge is a very light brown wash..."	Clear white in <i>amanica</i> *
"...in the middle of the inner margin, at the level of the lobe, a tuft of light brown hair..."	This must refer to the androconial patch, which is black in <i>amanica</i>

\*In the *pollux* species group, only *pollux* has this brown wash, which is quite widespread in *Epamera* generally.

*I. (E.) amanica* can be distinguished from *silanus* by having only two well-developed hind wing tails instead of three; a darker male with more extensive blue on the forewing upper side, the female often lacking the prominent black line on the hindwing upper side, and the forewing with no white area. The final instar larvae (Plate 1B) are less angular in dorsal view. Material from the nearby Nguru Mountains, the Udzungwa Mountains in southern Tanzania and from northern Malawi/ Zambia may well prove to be distinct (see Plates 2–5) but must be also considered as *amanica* in the meantime.

*Iolus (Epamera) silanus* (Grose-Smith, 1889) is found in eastern coastal forests from Kenya, south through Tanzania to the Rondo Plateau, and on Zanzibar. Subspecies *silenus* (Hawker-Smith, 1928) from south-eastern Democratic Republic of Congo may possibly represent a race of *I. (E.) amanica*, if not a separate species (no material has been studied). The larva of *I. (E.) silanus* (Plate 1C) feeds on *Agelanthus sansibarensis* (Engl.) Polhill & Wiens (Loranthaceae) in coastal forest, and on *Spragueanella rhamnifolia* (Engl.) Balle (Loranthaceae) on the Rondo Plateau and on Zanzibar. *Agelanthus subulatus* (Engl.) Polhill & Wiens is also recorded as a host plant by Congdon & Bampton, 2000. Stempffer (1961) described subspecies *alticola* from Amani, and his description could equally fit *amanica*. We have been unable to locate any material of *I. (E.) silanus alticola*, and after

careful reading of the original descriptions, we conclude that *Iolaus (Epamera) silanus alticola* is a synonym of *Iolaus (Epamera) amanica* – **stat. nov.**

*Iolaus (Epamera) helenae* (Henning & Henning, 1989) is only known from the Chowo and Manyanjere forests on the Nyika Plateau in Zambia and Malawi respectively. Its larvae feed on *Agelanthus zizyphifolius* (Engl.) Polhill & Wiens) subspecies *vittatus*, *A. subulatus* (Engl.) Polhill & Wiens and *Englerina inaequilatera* (Engl.) Gilli (Loranthaceae). The larva (Plate 1D) eventually changes in colouration to mimic lichen before pupating, after which it is thought to mimic a gall and is attached to the stem of the foodplant. The first known specimens of this butterfly were raised from larvae on *A. z. vittatus* by Bampton. Until 1996, only five specimens were known. The new species described below most closely resembles *I. (E.) helenae*.

***Iolaus (Epamera) malaikae*** Bayliss, Collins & Congdon **sp. nov.** (Plate 6)

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**Holotype** (♀): Mozambique, Mt Namuli, Manho Forest (15°23'32.0"S 37°01'29.8"E), 20–30.xi.2008, Julian Bayliss (JB)/ Ivan Bampton (IB)/ Colin Congdon (TCEC)/ Martin Hassan (MH). Deposited in ABRI collection, Nairobi.

**Paratypes:** 2 ♀, Mozambique, same data; 1 ♀, Mozambique, Mt Manuli, Manho Forest 29.xi.2008, TCEC/MH. Deposited in ABRI collection, Nairobi.

**Other material:** 2 ♀ Mozambique, Mt Mabu (16°17'52.7"S; 36°23'41.8"E), 13.xi.2010, TCEC/MH, at ABRI collection, Nairobi.

### Description

**Female:** frons orange red. **Upper side:** forewing apical area black, extending along costa to base, and along whole of outer margin. Discal area rich blue extending to inner margin. Hind wing with three tails, black with white tips; uppermost tail short. Broadly black along costa, narrowing to thin black marginal band. Anal fold greyish. Anal angle with dull red spot, minutely subtended with green scaling. Black discal line sharply angled basad at vein 2, then continuing downwards to anal fold. Irregular black sub-marginal band from spaces 1 to 4. Remainder of wing blue as forewing. **Underside:** ground colour silvery white. Forewing with narrow brownish submarginal line, broader black post discal line, and black bar at cell end. Very narrow black marginal line. Cilia white. Hind wing with small black basal spot, broad black discal line angled basad at vein 2, and continuing in u-shape to near inner margin. Brownish submarginal band of forewing continuing on hindwing to space 4, broadening and becoming orange and then maroon in space 1, where overlaid with white scaling. Round black sub-marginal spots in space 3 and at anal angle, where subtended with golden bronze scaling. Very narrow marginal black band of forewing continued on hindwing. Cilia white.

### Diagnosis

Closest to *Iolaus (Epamera) helenae*. The main differences in the female are:

- Upper side hind wing discal black band broader, and sharply angled at vein 2. In *helenae* it is straight, and narrower.
- Upper side hind wing tornal spot subtended with green scaling, absent in *helenae*.
- Underside forewing post discal and cell markings black. These are a brick red in *helenae*.
- Underside hind wing submarginal band nearer margin than in *helenae*.
- Underside hind wing discal band black throughout – brown from costa to vein 3 in *helenae*.
- Underside hind wing tornal spot in *helenae* not subtended with golden bronze scaling, and surrounded by orange, not maroon.

### Revised key to *Iolaus (Epamera) pollux* subgroup

1. Hind wing underside with medial black line running from veins 3A to CuA2 sharply angled in area CuA2, forewing underside marginal area brown.....*pollux*
  - Hind wing underside with medial black line running from veins 3A to CuA2 not sharply angled in area CuA2. Hind wing underside spot absent in Sc + R1.....2
  - Hind wing underside with medial black line running from veins 3A to CuA2 not sharply angled in area CuA2. Hind wing underside discal stripes broader, brown to reddish-brown or black. Hind wing underside spot present in Sc + R1.....4
2. Hind wing underside discal stripes thin, brown. Hind wing upper side with narrow costal border. ....*pseudopollux*
  - Hind wing discal stripes thin, black.....3
3. Fore wing underside first submarginal line black to brown, Hind wing with three distinct hindwing tails.....*silanus*
  - Fore wing underside first submarginal and marginal line brown, Hind wing with two tails, the third much reduced or absent, androconial patch brown.....*nolaensis*
  - Forewing underside first submarginal and marginal line black, hind wing with two tails, the third much reduced or absent, androconial patch black.....*amanica*
4. Hind wing upper side with broad costal border extending to vein M1. Hind wing discal bands broad, hind wing under side discal stripe reddish-brown from costa to vein 3 with a reddish-brown spot subbasally in Sc + R1.....*helenae*
  - Hind wing upper side with broad costal border extending to vein M1 and distinct discal black line running from middle of Sc+R1 to CuA1 rounded in CuA2 to 3A. Underside discal line black as with upper side. Under side bands black and grey, hind wing under side with a black spot subbasally in Sc + R1. Tornal spot subtended with greenish at margin.....*malaikae*

The species with brown underside stripes are not included in this key. They include *I. (E.) flavilinea* (Riley, 1928), which Henning & Henning (1989) included in the group, and the recently described *I. (E.) adorabilis* Collins & Larsen, 2008. We have not seen the type of *flavilinea*, described from the Bitje River, Cameroon, but a male from north eastern Zambia, illustrated in d'Abrera 2009; 746, may possibly be this species despite the disjunction in distribution. *I. (E.) adorabilis* was described from Nigeria, and there is a complex of undescribed species in the group, centred on the eastern Democratic Republic of Congo. These, together with *flavilinea*, will need to be treated in a separate paper.

### Etymology

*I. (E.) malaikae* is named after Malaika Sacranie for her dedication to supporting the field work in discovering this species on the various expeditions in northern Mozambique (Bayliss, 2008; Congdon *et al.*, 2010; Congdon & Bayliss, 2012; Bayliss *et al.*, 2014). Malaika is also Kiswahili for 'angel', and so both are fitting dedications for such an attractive butterfly.

### Host-plant

Females of *I. (E.) malaikae* were observed ovipositing, and larvae were found, on *Actinanthella menyharthii* (Engl. & Schinz ex Schinz) Balle (Loranthaceae). They refused to feed on *Englerina* or *Agelanthus* in captivity. They were not found on nearby *Englerina* species (Congdon pers. observ.). *Actinanthella menyharthii* is a tapinanthoid loranth which is found from Zambia, Zimbabwe and Mozambique (between the Ligonha and Limpopo rivers), mainly in the hotter, dryer valleys, on *Erythroxylum*, *Boscia*, *Olea*, mangroves and various other hosts. It flowers from February to June or later on the coast according to Polhill & Wiens (1998).

### Distribution

*I. (E.) malaikae* is currently only known from two mountains in Mozambique north of the Zambezi River: Mts Namuli and Mabu (see Fig. 1).

### DISCUSSION

This paper addresses a number of issues. Firstly it describes a new species of *Iolau* (*Epamera*) based on a series of female specimens caught at two montane sites in northern Mozambique. These specimens show clear differences from other species within the *pollux* subgroup. These differences are clearly explained and are known to be common features to both males and females within the *pollux* group, hence this description based on a holotype and paratype series of females only is valid.

In the process of describing *I. (E.) malaikae* it was concluded that a revision of the *pollux* subgroup was also necessary, justifying the change in status of two of the other species; notably the raising in taxonomic status of *I. (E.) nolaensis amanica* to *I. (E.) amanica* **stat. nov.** This is based on the analysis of the original

description of *I. (E.) nolaensis amanica* by Stempffer in 1951. Stempffer acknowledged the dissimilarity in appearance between the two taxa, but put them together on the grounds of the similarity of the male genitalia. Unfortunately he did not figure the genitalia in his description. In any case, we believe the differences in the facies, and most particularly the difference in the colour of the androconial tuft, justify the separation of *I. (E.) amanica* from *I. (E.) nolaensis* (Table 1). Stempffer had only one male each of *nolaensis* and *amanica*. The male of *amanica* was supplied by Jackson, and is illustrated by d'Abrera (2009 p. 749). The locality is given as 'Amani, Usambara', and the date as April 1945. Stempffer (1961) also describes *I. (E.) silanus alticola* from Amani in the Usambara Mountains of Tanzania; however his description could equally fit that of *I. (E.) amanica*. We have been unable to locate any material of *I. (E.) silanus alticola*, and after careful reading of the original descriptions, we conclude that *I. (E.) silanus alticola* is a synonym of *I. (E.) amanica* and have changed the status of this sub-species accordingly.

As a result of the above it was necessary to revise the taxonomic key to the *pollux* subgroup, which is presented in this manuscript. The previous version of the *pollux* key was published by Henning & Henning (1989).

Finally, this manuscript highlights the importance of the high altitude mountains of northern Mozambique (>1500 m) and the discovery of new species from these sites. These sites have previously largely been overlooked due to the civil war that occurred in Mozambique over the last few decades. They have become accessible only recently, and have yielded many new species in most taxonomic groups. It is thought that there are still many new species (especially butterflies) yet to be found.

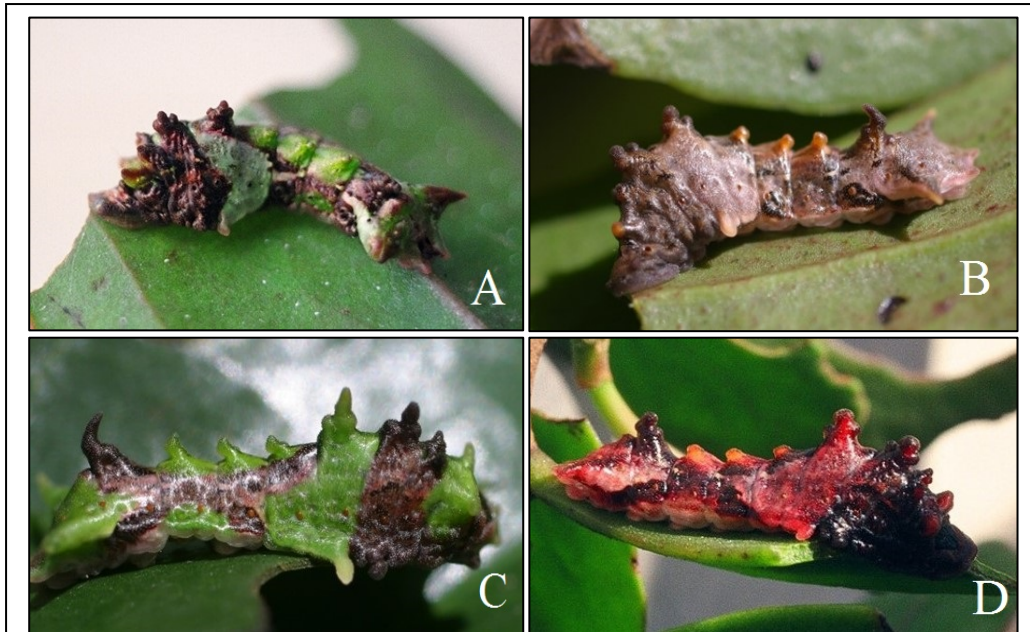
### ACKNOWLEDGEMENTS

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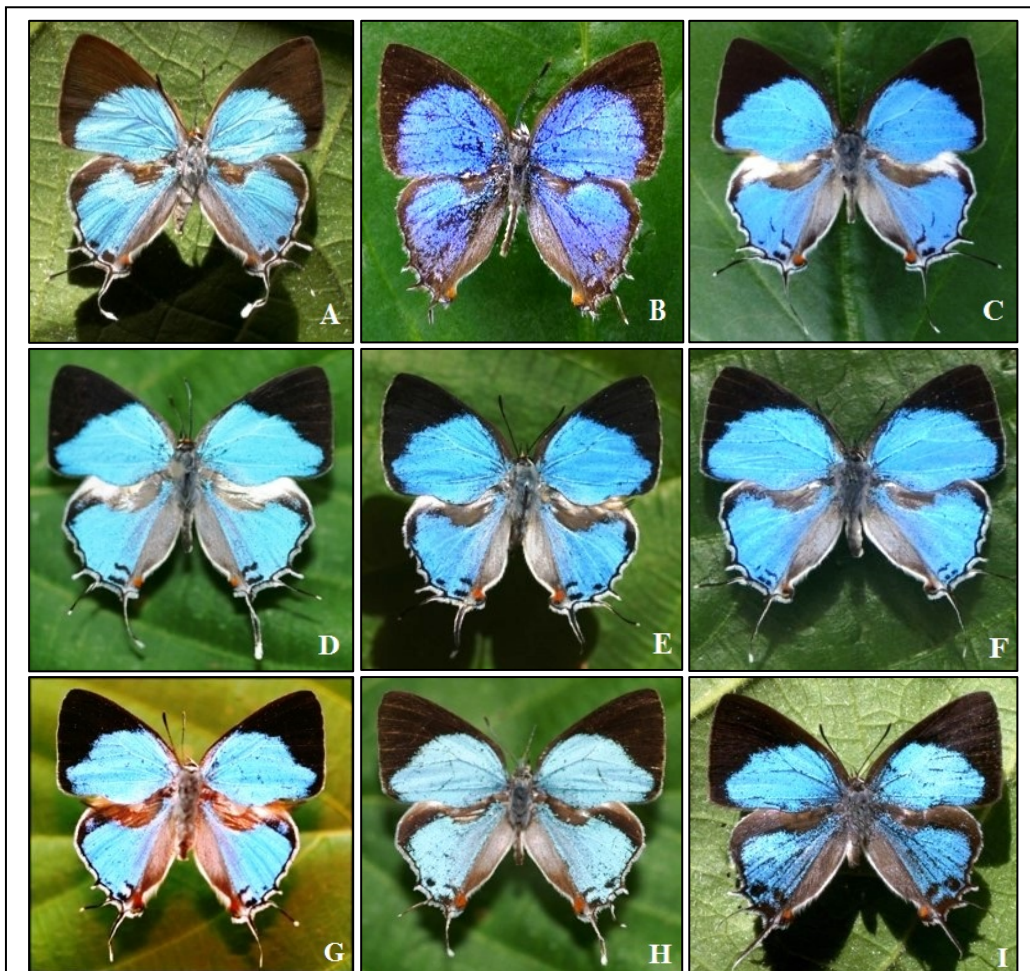
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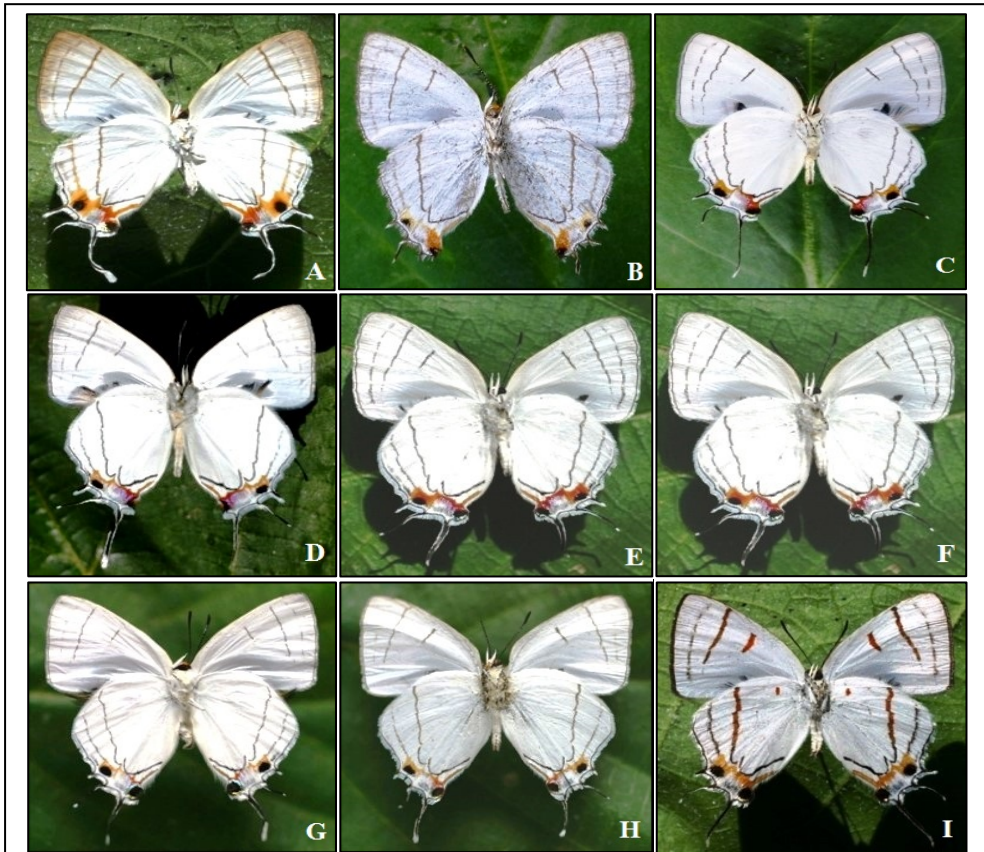
**PLATE 1** – *Iolus (Epamera) pollux* species subgroup final instar larvae (T.C.E. Congdon)

**A** *pollux*; **B** *amanica*; **C** *silanus silanus*; **D** *helenae*

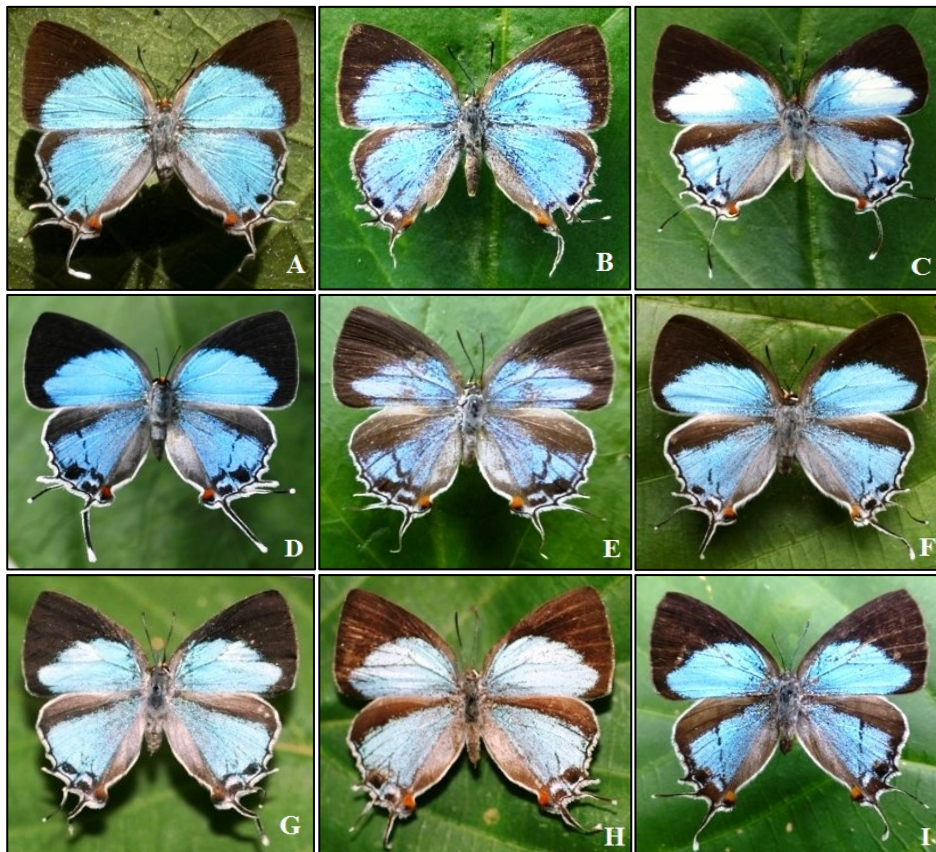


**PLATE 2** – *Iolus (Epamera) pollux* species group (♂ recto)

**A** *pollux albocaerulea* (Minziro Forest, Bukoba, Tanzania. 03.i.95. ex IB/PN. ABRI); **B** *pseudopollux*. (Ndulurera, Burundi Highlands. 10.vi.2008. Tarasens leg. ABRI); **C** *silanus silanus*. (Mkwaja Ranch, Pangani, Tanzania. 100m. ii.2009. TCEC/IB); **D** *silanus rondo*. (Rondo Plateau. S Tz, 03.iv.2007. TCEC/IB/MH/FA. ABRI); **E** *silanus zanzibarica*. (Kiwengwa, Zanzibar. 15.vi.2005. TCEC); **F** *amanica*. (Usambara. Amani, Usambara, Tanzania. 07.ii.99. IB); **G** *amanica*. (Nguru-Nguru, 1850m. 21.iv.99. TCEC) (Udzungwa?); *amanica*. (Kihansi. Kihansi Gorge, SC Tanzania. iv.2008. TCEC/IB/MH); **H** *amanica*. (Misuku, Misuku Hills, Malawi. 6000ft. Ex RJM); *amanica*. (Mafingas. Mafinga. 20.ix.81); **I** *helenae*. (Nyika Plateau, Malawi. xii.1996. TCEC/IB)



**PLATE 3** – *Iolus (Epamera) pollux* species subgroup (♂ verso) (Label data identical to Plate 1)



**PLATE 4** – *Iolus (Epamera) pollux* species subgroup (♀ recto)

**A** *pollux albocaerulea*. (Minziro, Tanzania. 1200m. 15.ii.95. TCEC); **B** *pseudopollux*. (Kanyambia, 10Km SW Lubero, DRC. viii.2011. ABRI leg.); **C** *silanus silanus*. (Mkwaja Ranch, Pangani, Tanzania. 100m. ii.2009. TCEC/IB); **D** *silanus rondo*. (Rondo Plateau. S Tanzania. 13.iii.07. TCEC/IB); **E** *silanus zanzibarica*. (Kiwengwa, Zanzibar, Tanzania. 15.vi.2005. TCEC); **F** *amanica*. (Usambara. Amani, Usambara, Tanzania. 10.ii.99. IB); *amanica*. (Nguru. Maskati, Nguru Mts, Tanzania. iii.1999. TCEC/MH/PW); *amanica*. (Kihansi. Kihansi Gorge, SC Tanzania. iv.2008. TCEC/IB/MH); **G** *amanica*. (Misuku. Misuku Hills, Malawi. 6000ft. Ex RJM); *amanica*. (Mafingas. Mafinga 25.ix.81); **I** *helenae*. (Nyika Plateau, Malawi. xii.1996. IB/TCEC)

