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A review of *Rhamma bilix* DRAUDT with description of the male phenotype (Lepidoptera: Lycaenidae: Eumaeini)

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ABSTRACT. The eumaeine lycaenid *Rhamma bilix* DRAUDT, 1919 is reviewed. The neotype female is designated and hitherto unknown male phenotype of this species is described. The taxon *Radissima esolana* JOHNSON, 1992 suggested previously as a junior synonym of *Thecla bilix*, is considered to be an incertae sedis species and the genus *Pontirama* JOHNSON, 1992 a subjective synonym of *Rhamma* JOHNSON, 1992. Some observations of these butterflies in their collection sites are given.

Key words: entomology, synonyms, redescription, Lepidoptera, Lycaenidae, *Rhamma*, South America, Andes, Colombia, Ecuador.

INTRODUCTION

The nominal species *Thecla bilix* DRAUDT, 1919 was described on the basis of the single "male" specimen from FASSL's material collected in Colombia ("Rio Aguacatal"). The specimen is the name bearing holotype by monotypy (INTERNATIONAL CODE OF ZOOLOGICAL NOMENCLATURE (ICZN) 1999, Art. 73.1.2.). The holotype of *Thecla bilix* was figured on a colour plate, and was accompanied by a fair description of the ventral side in the text volume (DRAUDT 1919). It has to be mentioned that the collection data of many eumaeine lycaenid types originating from FASSL's collection are uncertain and many specimens were considered lost (JOHSNON 1991, JOHNSON 1992), except for some holotypes for which the location has been recently identified (FAYNEL & BÁLINT 2004).

The nominal species *Thecla bilix* had been reviewed for the first time by JOHNSON (1992), who transferred the taxon to the *mishma* subgroup of the genus *Rhamma* JOHNSON, 1992 (type species: *Thecla oxida* HEWITSON, 1870, by original designation). This placement was accepted by ROBBINS in the LAMAS-edited checklist (abbreviated: LC) (LAMAS 2004: 98). In this checklist *Radissima esolana* K. JOHNSON, 1992 was indicated as a junior subjective synonym of *Rhamma bilix*.

The present paper aims (1) to review *Thecla bilix* original documentation and fix the name objectively with a neotype selection in concordance with the ICZN Art. 75.3, (2) to redescribe the taxon, present the first diagnosis of the hitherto unknown male phenotype and place it within the eumaeine system proposed by the LC, (3) to discuss the status of the nominal taxon *Radissima esolana* JOHNSON, 1992 that was suggested in the LC as a junior synonym of *Rhamma bilix* without any support, and (4) to provide some information on the behaviour, biology and distribution of the species.

Our methods and terminology are compatible with those published on this genus (BÁLINT & WOJTUSIAK 2002).

Abbreviations

FW – forewing; HW – hindwing; D – dorsal side; V – ventral side.

Rhamma bilix (DRAUDT, 1919) JOHNSON, 1992

(Figs 1-6)

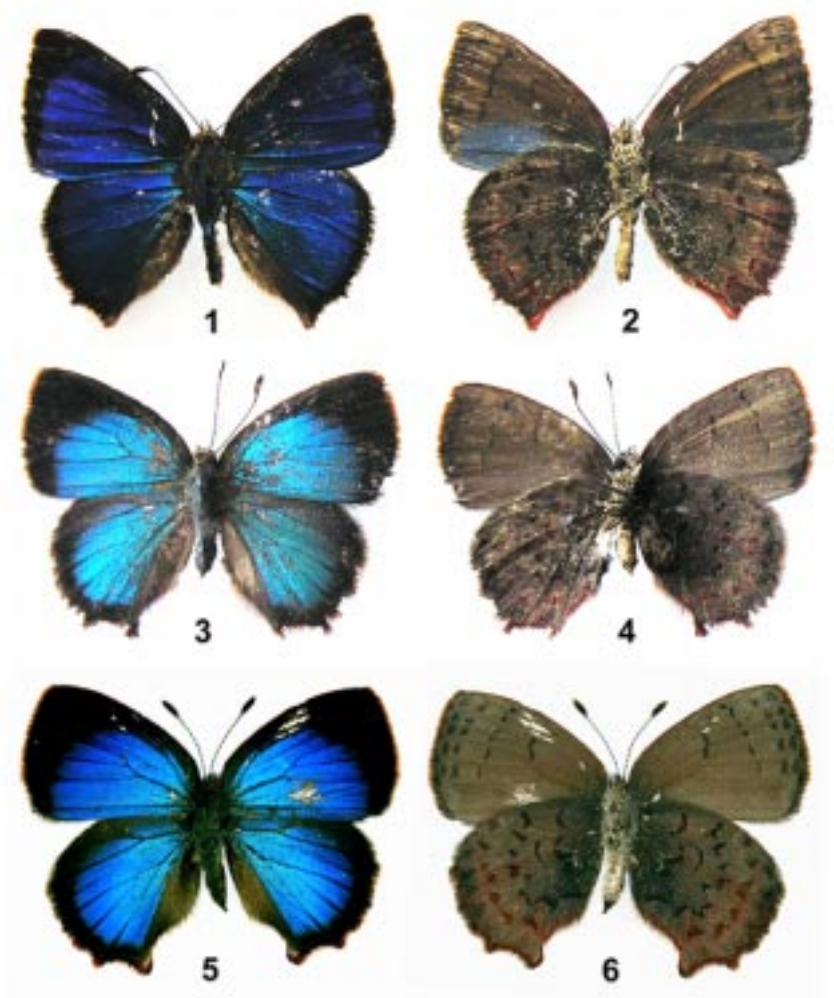
Thecla bilix DRAUDT, 1919: 759, pl 153, row g, fig. "*bilix*".
Rhamma bilix (DRAUDT) JOHNSON 1992: 52, new combination; ROBBINS 2004: 121.

TYPE MATERIAL

The holotype is considered to be lost and the status of the nominal taxon is not sufficiently clarified (see Introduction). For the purpose of fixing objectively the nominal taxon, we designate one female individual (Figs 3-4) from the DAHNERS collection (no: 7881) as Neotype. It originates from an area situated very close to the type locality, and represents the same sex as the lost holotype specimen. The neotype is in perfect condition, set dorsally, labeled as follows: "Colombia // Valle: // R. Aguacatal // S. Antonio // 24.4.2004 // 2200m [vertical]" (white oblong label with black frame, and printed letters); in coll. Dahners, will be deposited in the Instituto de Ciencias Naturales de la Universidad Nacional en Bogotá, Colombia. We have added the following red oblong label with black printed letters: "*Thecla bilix* Draudt, 1919, Neotype, designated by Zs. Bálint".

According to the original documentation the name "*Thecla bilix* " was based on the male holotype. After studying the figures and the text given by DRAUDT we are of the opinion that the sex of the holotype specimen was mistakenly determined, because it represents the female phenotype, not the male. Description of the male is given below.

Our Neotype selection is in accordance with the ICZN Article 75. This action is needed because the sex of the species "*Thecla bilix*"was misidentified, its male has never been described and systematic placement remained unsolved. Therefore, our Neotype designation helps to clarify the taxonomic status of the species and fix the type locality of "*Thecla bilix*" nominal taxon (ICZN Art. 75.3.1.). Redescription of the species provides characters by which it can be distinguished from other closely related taxa (ICZN Article 75.3.2.). The neotype is documented in colour and its data are precise and sufficient for subsequent recognition (ICZN Art. 75.3.3.). We are deeply convinced that the original, name bearing



1-6. *Rhamma bilix* (Draudt) adult phenotypes: 1- male, dorsum (Colombia, Valle), 2 - ditto, ventrum; 3 - Neotype female, dorsum (Colombia, Valle), 4 - ditto, ventrum; 5 - male, dorsum (Ecuador, Azuay), 6 - ditto, ventrum

holotype, is presumably lost as we could not locate it among other DRAUDT'S types (ICZN Art. 75.3.4.). The selected neotype specimen is consistent with DRAUDT'S concept of "*Thecla bilix*" because the two phenotypes are indentical, just the sex of the holotype was misidentified (ICZN Art. 75.3.5). The neotype also originates from a site situated in the same river valley where presumably the lost holotype was collected (ICZN Art. 75.3.6.). Neotype will be curated in a recognized university and accessible for future studies (ICZN Art. 75.3.7.).

MATERIAL EXAMINED

COLOMBIA: Collection Dahners (CD): 57 males, 5 females, all from the departamento del Valle, Río Aguacatal, S. Antonio, 2200 m (near the city of Cali; in brackets the CD inventory number): 21.IX.9.1997. (female, 5349); 22.III.2003. (male, 6872); 20.V.2003. (male, 7002); 29.VI.2003 (2 males, 7124, 7125); 2.VII.2003. (male, 7146); 14.VII.2003. (male, 7200); 19.VII.2003. (male, 7201); 21.VII.2003. (male, 7202); 4.VIII.2003.(2 males, 7317, 7335); 7.VIII.2003. (male, 7336); 10.VIII.2003. (male, 7337); 16.VIII.2003. (2 males, 7361, 7362); 17.VIII.2003. (2 males, 7473, 7474); 19.VIII.2003. (male, 6915); 23.VIII.2003 (male, 7377); 26.VIII.2003. (4 males, 7378-81); 30.VIII.2003. (3 males, 7401-03); 31.VIII.2003. (2 males, 7404-05); 14.IX.2003. (male, 7422); 4.X.2003. (male, 7450); 13.X.2003. (male, 7451); 19.X.2003. (male, 7469); 25.X.2003. (male, 7498); 16.XI.2003. (male, 7518);26.XI.2003. (male, 7519); 12.XII.2003. (male, 7546); 3.II.2004. (2 males, 7633-34); 5.II.2004. (male, 7635); 8.II.2004. (male, 7636); 18.II.2004.(2 males, 7676-77); 24.II.2004. (female, 7698); 28.II.2004. (male, 7696); 29.II.2004. (male, 7697, female, 7699); 2.III.2004. (male, 7732); 7.III.2004. (2 males, 7733-34); 8.III.2004. (male, 7735); 13.III. 2004. (2 males, 7736-77); 14.III.2004. (male, 7738); 22.III.2004. (male, 7777); 19.IV.2004 (male, 7871); 29.IV.2004. (2 males, 7882-83); 2.V.2004. (2 males, 7884-85); 16.VI.2004. (male, 7977); 5.VII.2004. (female, 8002).

ECUADOR: prov. Azuay, Gualaceo-Limon (East), 2450 m, 02.VIII.2004, leg. Wojtusiak (MZUJ: female; gen. prep. Bálint no. 1075).

DESCRIPTION

Male. The abdomen is covered with scales generating vivid blue colours. The FW costa straight, FWD with structural, deep violet colouration; black distal margin widening in the apical area. The HW similarly coloured with a slightly narrower black distal margin and with small grey tornal lobe extending around the end of vein CuA2. The cilia base on both wings grey, termini reddish brown. Ground colour of FWV rufous brown with discoidal line, medial and antemarginal patterns consisting of black intercellular lines or spots, but the anal area up to vein CuA1 is vivid blue. Colour and pattern of the HWV similar as on FW, with black subbasal area and rufous brown submedian and antemarginal spots; large black androconial patch, which is common in other *Rhamma* groups, is lacking but the anal part of FW has blue structural colour. Cilia on the anal edge of HW are long, reddish brown.

Female. Colouration and pattern are similar to those in the male but with the following differences: (1) FW costa and distal margin are convex, (2) FWD has wider black marginal bands, (3) FWV without blue anal area, (4) ciliation is completely rufous brown and (5) the HW CuA2 terminus and the tornal lobe are more conspicuous.

Measurements: FW male length 10.6 mm, SD=0.7, range = 8-12 mm (n = 57), FW female length 11 mm (n= 5).

BIONOMICS

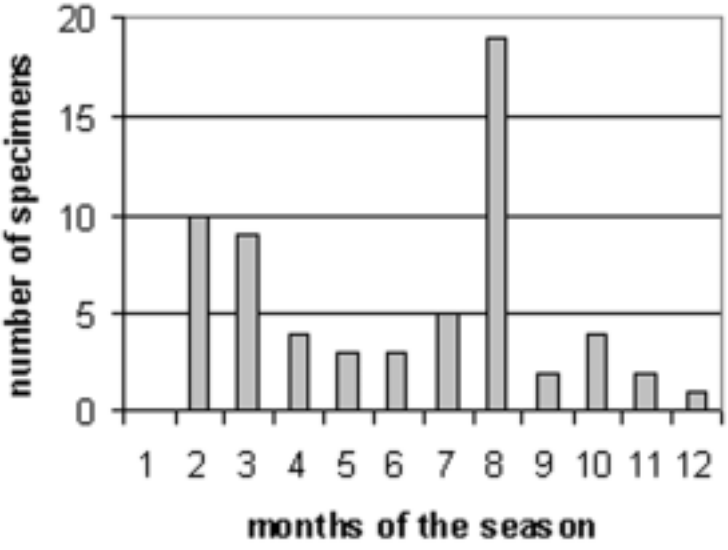
Geographical: Known to occur in Western Colombia (near Cali/Valle) and Ecuador (prov. Azuay). Spatial: Known from the elevation 2200 m (Colombia) and 2450 m (Ecuador). Temporal: It was recorded all year round in Colombia, excluding January. The Ecuadorian specimen was collected in August.

DISCUSSION

FIELD OBSERVATIONS

All 62 Colombian specimens of *R. bilix* (57 males and 5 females) were collected during the period from 1997 to 2004 at the main peak of the Cerro San Antonio (about 2200 m) in the Western Cordillera near the City of Cali. The species occurs at that site throughout the year, with a maximum abundance peak in August and a minor peak in February/March. In spite that the site was visited in January 2004 on ten occasions, no specimens of *R. bilix* were found in this month.

B



7. Yearly distribution of *Rhamma bilix* catches on Cerro San Antonio, Colombia

In Colombia, on a sunny day, first specimens start flying at about 10am, but when the sky is cloudy the flight is delayed. The males fly around certain preferred perching sites, occasionally attempting mating flights after which they often return to the same perching site rarely chosing another one. Their activity decreases significantly in the afternoon and after 2pm none of them can be seen.

The top of the Cerro San Antonio mountain, the main collection site, is flattened constituting a room size area covered with shrubs, ferns and a few trees. In that area, three to five metres above the ground, males of *R. bilix* estabilish their territories above tree tops exhibiting typical hilltopping behaviour. It was observed that there is a competition among various eumaeini taxa in taking over particular perching sites, namely among *Atlides browni* (CONSTANTINO, SALAZAR & JOHNSON, 1993), *Atlides polybe* (LINNAEUS, 1763), *Cyanophrys agricolor* (BUTLER et H. DRUCE, 1872), *Parrhasius* sp. n., *Erora* sp. n. and occasionally *Atlides scamander* HÜBNER, 1819 and *Brangas coccineifrons* (GODMAN et SALVIN, 1887). Also present is *Thecloxurina loxurina* (FELDER et FELDER, 1865) but this species perches near the ground or above some shrubs up to 1m high together with *Theritas paupera* (FELDER et FELDER, 1865).

All the collected females were captured when visiting flowering trees in the same site.

Since *Rhamma bilix* occurs in the same kind of habitat as *Abloxurina amatista* (DOGNIN, 1895) and *Thecloxurina loxurina* (FELDER et FELDER, 1865) we can conclude that all three species exhibit similar ecological preferences to the same type of habitat and therefore, can be called "upper cloud forest species". Since this type of habitat continues from the Colombian Andes to southern Ecuador and northern Peru, we may expect that the range of geographical distribution of *Rhamma bilix* may be in fact much wider and its population may extend to the northern Peru, at least.

GENERIC PLACEMENT AND SYSTEMATICS

The taxon was originally placed in the genus *Thecla* FABRICIUS, 1807 (type species: *Papilio betulae* LINNAEUS, 1758); selected by SWAINSON, 1821. The application of the generic name *Thecla* for the Neotropical fauna was erroneous but remained in literature until D'ABRERA's (2001) work was published. As a result of consultations with Zsolt Bálint (D'ABRERA & [BÁLINT] 2001) D'ABRERA did not use the genus name *Thecla* for lycaenids of Neotropical fauna but introduced some new generic names instead.

The nominal taxon *Thecla bilix* was reviewed by JOHNSON (1992), who transferred *bilix* to the genus *mishma,* a subgroup of *Rhamma*. Unfortunately working with misidentified historical specimens and because of lack of type material, JOHNSON misdiagnosed *Thecla bilix*. He published a half-tone photograph of *Rhamma comstocki* JOHNSON, 1992 female (JOHNSON 1992: fig. 140), and figured genital structures typical for the genus *Rhamma* (JOHNSON 1992: fig. 45). In the LC checklist the taxon *bilix* was placed among the species that were described in the

genus *Pontirama* JOHNSON, 1992, but the genus itself was considered as junior synonym of *Rhamma* without any comments that could justify such a decision.

The original concept of *Pontirama* was, that it might eventually connect the genus *Penaincisalia* group (Clade I = the "*loxurina* Group" in JOHNSON 1992) with the genus *Rhamma* group (Clade II = the "*arria* Group" in JOHNSON 1992). However, since *Pontirama* had been originally characterised on the basis of its monomorphic type species *Pontirama brunea* JOHNSON, 1992, it constitutes an integral part of *Rhamma*, because the wing shape, colouration pattern, androconia and genital structures do not differ qualitatively from the type species of *Rhamma* (type species: *Thecla oxida* HEWITSON, 1870 by original designation). Consequently, *Pontirama* is in fact synonymous with *Rhamma* as it is indicated in the LC. However, *Pontirama* has page priority above *Rhamma*, so logically it should be given priority. Despite this, ROBBINS indicated priority for *Rhamma* over *Pontirama* in the LC without giving any supporting statement, despite the fact that the status of the taxa can be easily and objectively specified. Thus ROBBINS cannot be recognised as First Reviser according to the ICZN Art. 24.2. We are therefore taking the responsibility and acting here as First Reviser giving priority to the generic name *Rhamma* JOHNSON, 1992 (p. 45) and are considering *Pontirama* JOHNSON, 1992 (p. 40) its subjective synonym for the sake of stability, retaining the LC's nomenclature as guidance.

From our point of view, the taxon *bilix* most probably represents a distinct lineage as it was earlier pointed out by JOHNSON (1992: 40-41) who discussed certain taxa of *Pontirama.* Supporting arguments are (1) male fore wing shape acute, (2) hind wing tornus extended with long reddish brown scales on ventral side and (3) lamella postvaginalis in female genitalia heavily sclerotized with two pairs of distal hooks.

However, we keep the nominal taxon *bilix* in its current combination, because it is necessary to examine more material to consider a new generic name within the *Rhamma* genus group.

It has to be emphasized that the genus *Rhamma* sensu ROBBINS is in fact a large aggregate of species that should be split and certain generic names reinstated for particular species groups, as it was proposed by JOHNSON (1992), but not necessarily in accordance with Johnson's system. The importance of maintaining the generic diversity has been already stressed in the literature (see BÁLINT 2004: 269-270).

Taxonomy is an important tool in arguing for biodiversity conservation. With megalumped lycaenid genera such as *Evenus* HÜBNER, 1819 (type species: *Papilio endymion* FABRICIUS, 1793), *Penaincisalia* JOHNSON, 1992 (type species: *Thecla culminicola* STAUDINGER, 1896), *Rhamma* or *Theritas* (type species: *Theritas mavors*, HÜBNER, 1818) sensu LC, the efforts to discriminate and describe genera to speculate on how particular butterfly lineages have evolved, adapted to a life in a particular space and time is becoming absolutely useless.

On corresponding pages of the LC there are no scientific arguments justifying the action of synonymisation of the genera *Paralustrus* JOHNSON, 1992 (type species: *Thecla commodus* FELDER et FELDER, 1865), *Rhamma*, *Pontirama* and

Shapiroana JOHNSON, 1992 (type-species: *Shapiroana shapiroi* JOHNSON, 1992), and the decision on placing them in the large *Micandra* section was not diagnosed. Analysis of structural, behavioural and distributional data reveals that the *Micandra* section is not monophyletic; the heavily sclerotized and diverse female genital structures of *Micandra*- and *Rhamma*-like species inhabiting cloud forest, or paramo environment and other oreal taxa contradict tubular and mebranous structures of female genitals of *Penaincisalia* sensu ROBBINS and the structures of male androconia. They are certainly paraphyletic, and the inclusion of the genera *Busbiina* ROBBINS, 2004 (type species: *Thecla bosora* HEWITSON, 1870)*, Photecla* ROBBINS, 2004 (type species: *Thecla photismos* DRUCE, 1907), *Podanotum* TORRES et JOHNSON 1996 (type species: *Podanotum metallicus* TORRES et JOHNSON, 1996) and *Salazaria* D'ABRERA et BÁLINT, 2001 (type species: *Thecla sala* HEWITSON, 1867) does not solve the problem. For example, the genus *Podanotum* is obviously in sister relationships with Holarctic genera (BÁLINT *et al*. in prep).

PREVIOUSLY PROPOSED SYNONYM

In the LC the nominal taxon *Radissima esolana* JOHNSON, 1992 (Milwaukee Public Museum holotype male, BRAZIL: Rio de Janeiro: Morro d'Martha) was suggested as a junior subjective synonym of *Rhamma bilix* (DRAUDT, 1919) JOHNSON, 1992 (ROBBINS 2004: 121). The holotype of *R. esolana* is a male specimen in poor condition with broken wings, without antennae and abdomen, which was dissected. All characters on wings and configuration of genital structures of the *R. esolana* holotype are so different from those of the type species of *Radissima* JOHNSON, 1992 (*Sithon umbratus* GEYER, 1837) that one can immediately conclude that the original placement of the taxon was erroneous. Indeed, in the LC, all six species placed in *Radissima* appear in different not-so-closely related genera which demonstrates that the original concept of *Radissima* was not ripe or it was erroneous.

The holotype of *Radissima esolana* resembles the male phenotype of *bilix* that we characterised above but with the following differences: (1) according to the description, the dorsal wing colour is iridescent azure (iridescent violet in *bilix*), (2) the ventral fore wing discoidal line missing (present in *bilix*), (3) the submedian markings continuous (displaced and discontinuous in *bilix*) and (4) the ventral antemarginal spots row is lacking (present in *bilix*). The structures on male genitalia of the holotype (JOHNSON 1992: fig. 95) are not compatible with similar structures in *Pontirama* (JOHNSON 1992: figs 34-35, 38).

Consequently, we consider *Radissima esolana* JOHNSON, 1992 *incertae sedis*.

CONCLUSION

We demonstrated that *Thecla bilix* DRAUDT, 1919 was a hitherto misdiagnosed and poorly known taxon. We described the hitherto unknown male phenotype of this species providing some information on its systematic placement, behaviour, phenology and distribution.

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