A NEW SUBSPECIES OF *CITHAERIAS PYROPINA* (SALVIN & GODMAN, 1868) FROM THE CORDILLERA DE CUTUCÚ IN SOUTHEASTERN ECUADOR (NYMPHALIDAE: SATYRINAE)

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Abstract – The new subspecies *Cithaerias pyropina julia* Willmott, **n. ssp**., is described from the Cordillera de Cutucú, an isolated sedimentary mountain range in southeastern Ecuador. This is the first new insect taxon to be described from this mountain range, to which it currently appears to be endemic. The new subspecies is distinguished from other subspecies in Peru and Bolivia by its extensive dark blue iridescence and lack of pinkish markings on the dorsal hindwing.

Resumen – Se describe la nueva subespecie *Cithaerias pyropina julia* Willmott, **n. ssp**. de la Cordillera del Cutucú, una cordillera aislada de origen sedimentario en el este del Ecuador. Este representa el primer taxón nuevo descrito de esta Cordillera, donde aparentemente es endémico. La nueva subespecie se distingue de otras subespecies en Perú y Bolivia por su color de azul iridescente y la ausencia de marcas rosadas en el ala posterior en la cara dorsal.

Key words: Bolivia, *Cithaerias pyropina julia* Willmott **n. ssp**., *Cithaerias pyropina pyropina*, *Cithaerias pyropina songoana*, cloud forest, Andes, Cordillera de Kutukú

INTRODUCTION

The Cordillera de Cutucú (also spelled Kutukú and Kutucú) is an isolated mountain range in southern Ecuador, rising from around 300 m in the lowlands to 2500 m. With the Río Upano to the west and the Río Santiago to the south, the highest point of connection to the main Andean cordillera is in the northern part of the range at approximately 1150 m. The Cordillera forms part of a series of mountain ranges lying at the eastern edge of the Andes, including the Cordillera del Cóndor to the south and the Cordillera Galeras to the north, whose unusual sedimentary geology has resulted in these peaks showing the distinctive table-top profile of the Guianan highland 'tepuis'.

The Cordillera del Cóndor has been the target of various biological expeditions (e.g., Schulenberg & Awbrey, 1997; Neill, 2007; Guayasamín & Bonaccorso, 2011), and, although the butterfly fauna appears to be unrelated to that of the Guianan tepuis (e.g., Costa *et al*., 2013), it is still known to harbor a number of endemic taxa (e.g. Lamas, 1997; Radford & Willmott, 2013), although most remain to be described. The Cordillera de Cutucú, however, remains extremely poorly studied. An ornithological expedition in 1984 surveyed four sites on the western slopes from 1000-2300 m, accessing the mountain range along the old trail from the town of Logroño in the west to Yaupi in the east. The avian fauna recorded proved to be very similar to sites in the Cordillera del Cóndor and adjacent Andes (Robbins *et al*., 1987), but several anuran amphibians collected during that expedition proved to be undescribed and apparently endemic to the mountain range (Duellman & Lynch, 1988), opening up the possibility of endemic taxa in more sedentary organisms. Aside from this expedition, Brito & Pozo-Zamora (2013) recently reported a new species of frog collected during an expedition in 2012 along the same trail. Otherwise, I have not been able to find any other publications about the fauna of the Cordillera at elevations above 1500 m.

Similarly to other organisms, therefore, the butterflies of the Cordillera de Cutucú also remain very poorly known. British entomologist Martin Cooper made a collection of insects in the late 1970s and early 1980s along a trail that crossed the mountain range due east of Macas to the Río Mangosisca (M. Cooper, pers. comm.). Few butterflies were collected at higher elevations, unfortunately, and only the ithomiine *Hylayris antea achuar* Vitale & Bollino, 2000, which also occurs in the adjacent Andes above Macas, provided any indication of faunistic affinities.

As part of a long-term inventory of the butterflies of Ecuador (www.butterfliesofecuador.com), we made a short expedition into the Cordillera de Cutucú to sample butterflies at middle elevations in 2003. The expedition resulted in a number of interesting cloud forest butterfly taxa (e.g., *Pachacutia baroni* Willmott & Lamas, 2007), including a new taxon in the small genus of transparent satyrine butterflies *Cithaerias* Hübner, [1819].

Cithaerias is confined to the Neotropics and contains fewer than 10 species, most of which are found in lowland forests, especially in the Amazon (Lamas, 2004; Penz *et al*., 2014). The immature stages feed on Araceae (e.g., Murillo, 2009; Janzen & Hallwachs, 2015), common plants in the understorey of humid forest. Often noticed by non-lepidopterists because of their abundance, low flight and conspicuous hindwing coloration, the taxonomy of *Cithaerias* is nevertheless still poorly understood (e.g., Penz *et al*., 2014). I here describe a new subspecies of the east Andean *Cithaerias pyropina* (Salvin & Godman, 1868), perhaps the only true cloud forest species in the genus, to contribute to improving our knowledge partly of *Cithaerias* taxonomy, and partly of the fauna of the Cordillera de Cutucú.

METHODS

Morphology was studied using standard techniques, with adult abdomens being soaked in hot 10% KOH for 10-15 minutes, dissected and subsequently stored in glycerine. Body morphology and dissections were studied using a binocular microscope at 50x magnification. The terminology for male

genitalic and abdominal structures follows Scoble (1992), and nomenclature for venation follows Comstock & Needham (1918).

Distributional data and field observations for *Cithaerias* were also gathered by myself and colleagues during more than 700 days of field work in Ecuador between 1991 and 2014, representing 600 sites in 20 provinces, ranging from sea level to 4000 m on both Andean slopes. Access to the Cordillera de Cutucú was from the village of Tayuza, just south of Logroño. Butterfly sampling was conducted at three sites along a trail leading from the village of Yakunk (02°44.432' S, 78°12.242' W) up into the western slopes of the Cordillera, including flat primary forest at 1000 m (02°45.112' S, 78°10.913' W), ridgetop primary forest at 1340-1400 m (the type locality), and ridgetop secondary forest and pasture at 1570 m (02°45.815' S, 78°08.662' W).

Recent taxonomic papers on the genus (Constantino, 1995; Penz *et al*., 2014) were examined for relevant taxa and information. Original descriptions of all names listed as subspecies or synonyms of *C. pyropina* by Lamas (2004) were also examined, and information from those descriptions was used to confirm the validity of the putative type specimens of all of these names illustrated on www.butterfliesofamerica.com.

RESULTS AND DISCUSSION

Cithaerias pyropina julia Willmott, new subspecies
Figs. 1-3.

Description and diagnosis: This subspecies differs from the nominate subspecies (Fig. 1) by having smaller, pale submarginal and marginal spots in DHW cells 2A-Cu2, Cu2-Cu1 and Cu1-M3, which appear dirty white rather than pinkish, and the dark iridescent surrounding patch of scales is a paler, sapphire blue rather than dark purplish blue. In contrast, the white submarginal spot in DHW cell M3-M2 is larger than in the nominate subspecies, being similar in size to the corresponding spot in cell Cu1-M3. Overall, the hindwing tornal colored patch appears dark blue in flight, without any evidence of pink coloration.

Taxonomy: *Cithaerias pyropina* is currently treated as containing two subspecies (Lamas, 2004). The nominate subspecies was described by Salvin & Godman (1868) from Peru (Type locality [TL]: Peru: lower Huallaga; Pozuzo), and the names *Callitaera pyropina roquensis* Bryk, 1953 (TL: Peru: Roque) and *Callitaera pyropina* var. *rosacea* Langer, 1944 (TL: Peru: upper Huallaga) are currently treated as synonyms (Lamas, 2004). *Cithaerias pyropina songoana* (Langer, 1944), from Bolivia (TL: Río Songo), differs from the nominate subspecies in having a pink flush extending across the dark blue areas in the DHW tornus, thus somewhat resembling the lowland species *Cithaerias pireta* (Stoll, 1780).

The male genitalia of *C. pyropina* are rather distinctive in comparison with *C. pireta* and relatives (Constantino, 1995; Penz *et al*., 2014). The taxon described here is treated as a subspecies of *C. pyropina* based on several distinctive male genitalic characters shared with a dissected male of *C. pyropina pyropina* from Tingo María (Peru: Huánuco; FLMNH genitalia dissection vial KW-14-84), and (where visible) in illustrations of male genitalia of *C. p. pyropina* and *C. p. songoana* in Langer (1944). These include the flared anterior tip to the aedeagus in dorsal view (Fig. 2C), multiple projections and cup-like inner valve surface at the distal tip of the valvae (Fig. 2A) and the short, rounded, studded subscaphium (Fig. 2B). Insufficient specimens were examined to determine whether there were any

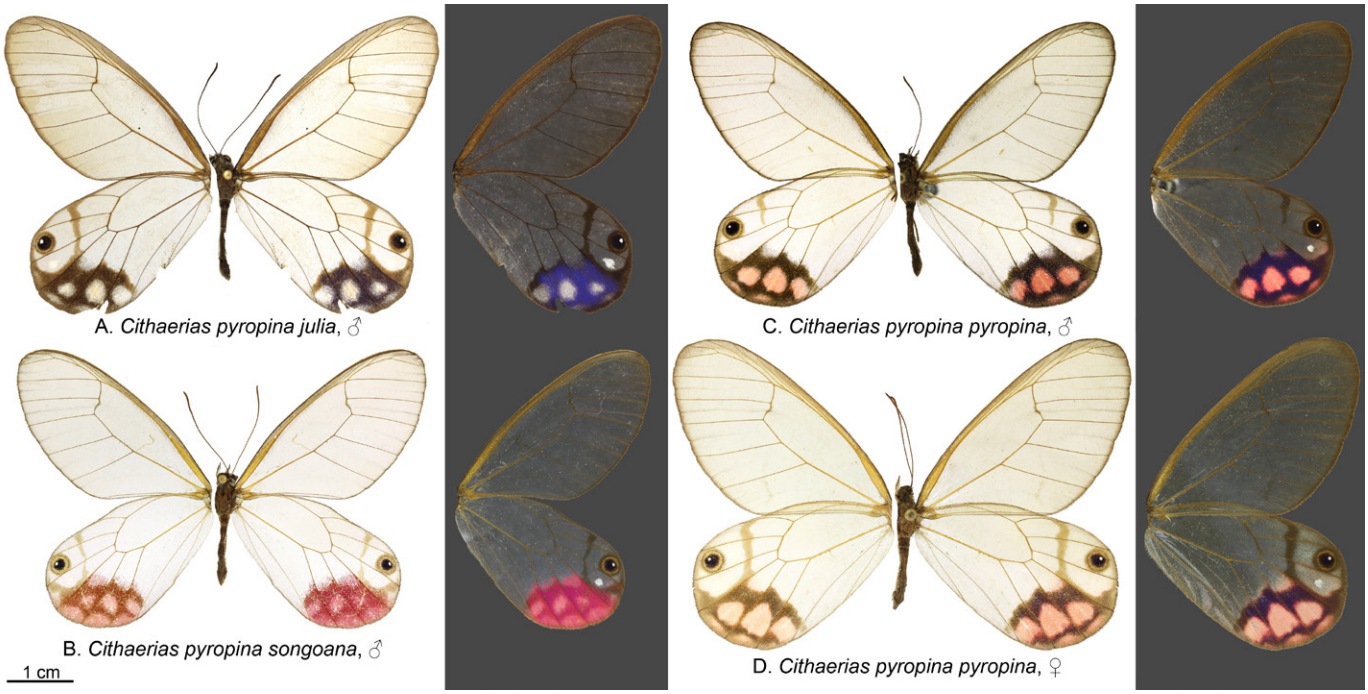

Fig. 1: *Cithaerias pyropina* subspecies: left, ventral surface; middle, dorsal surface; right, dorsal surface over dark background. **A**. *Cithaerias pyropina julia* **n. ssp**., HT♂, Ecuador. **B**. *C. pyropina songoana*, ♂, Bolivia. **C**. *C. pyropina pyropina*, ♂, Peru. **D**. *C. pyropina pyropina*, ♀, Peru.

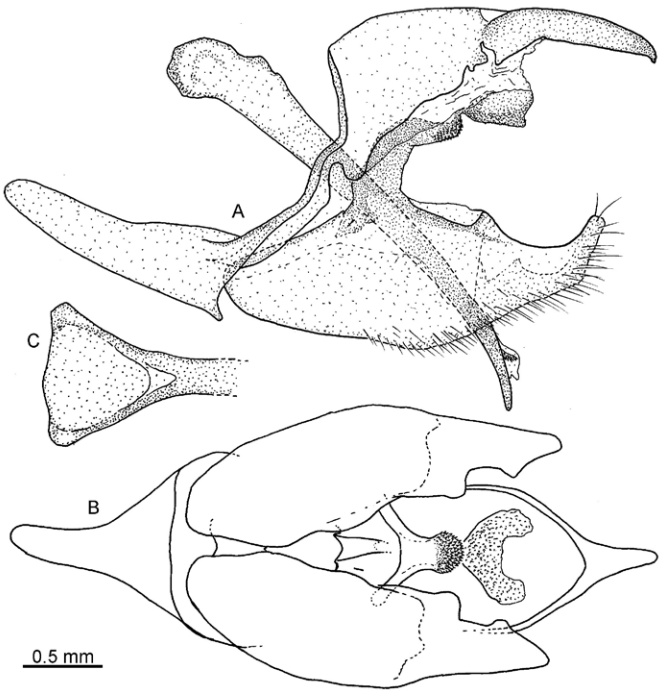

Fig. 2: *Cithaerias pyropina julia* **n. ssp**., HT♂ genitalia. **A**. lateral view. **B**. ventral view. **C**. dorsal view of anterior tip of aedeagus.

differences among subspecies in male genitalic characters. In terms of wing pattern, *C. pyropina* subspecies share elongate forewings with hardly any or no trace of a brown postdiscal stripe in cells 2A-Cu2 and Cu2-Cu1 in the male. Finally, the only other *Cithaerias* taxon with bluish DHW iridescence similar to *C. p. julia*, and which occurs at a similar elevation in the eastern Andes, is *C. p. pyropina*.

Types: HOLOTYPE ♂: **Ecuador**- *Morona-Santiago*: Yakunk-Cutucú trail, lower ridge, [2°45'40''S,78°9'40''W], 1340 m (K. Willmott), 3 December 2003, [genitalic vial KW-14-83, DNA voucher LEP-14980], 1♂ (to be deposited in Museo Ecuatoriano de Ciencias Naturales, Quito, Ecuador; MECN). PARATYPES (5♂): **Ecuador**- *Morona-Santiago*: same locality as HT, 1340-1400 m (K. Willmott), 5 December 2003, 1♂ (Florida Museum of Natural History, Gainesville, FL, USA; FLMNH), 1♂ (The Natural History Museum, London, UK); same data as HT, 3♂ (FLMNH).

Etymology: This subspecies is named for Julia Robinson Willmott, in appreciation of her great spirit and excellent company during our trek into the Cutucú, despite her poor health, monotonous food, drenching rain and abysmal mud. The subspecific name is treated as a noun in apposition.

Natural history and distribution: Males of *C. pyropina julia* were not uncommon along the trail through primary cloud forest understorey on the ridge top at the type locality from 1340-1400 m (Fig. 3B), and a single individual was observed higher up along the same ridge at 1570 m. In a similar manner to other Ecuadorian *Cithaerias*, they flew low to the ground with a steady, gliding flight, weaving among the leaf litter and fallen branches and appearing very inconspicuous with their muted hindwing coloration. No individuals were observed at a flat forest site at 1000 m further down the trail, suggesting that this taxon may typically occur in Ecuador on ridgetops and/or in a narrow elevational range.

Discussion: The only specimens of *Cithaerias pyropina* that are so far reliably known from Ecuador are those in the type series of *C. p. julia*. Specimens phenotypically similar to *C. p. songoana*, with brilliant magenta hindwing patches, occur north of the type locality in Pastaza and Napo provinces at similar elevations to *C. p. julia* (as figured by D'Abrera (1987: 740) under the name "*Cithaerias ereba browni*"). However, these specimens lack any of the distinguishing wing pattern or male genitalic (pers. obs.) characters of *C. pyropina* discussed above under Taxonomy, and are therefore apparently not conspecific with *C. pyropina*. There is a single male in the FLMNH which appears to be typical *C. p. pyropina* and which is labeled 'Mera' (Pastaza Province), a locality to the north of the Cordillera de Cutucú (marked on Fig. 3 with '??'), which would imply that the nominate subspecies should occur in central and southeastern Ecuador, at least in the main Andean

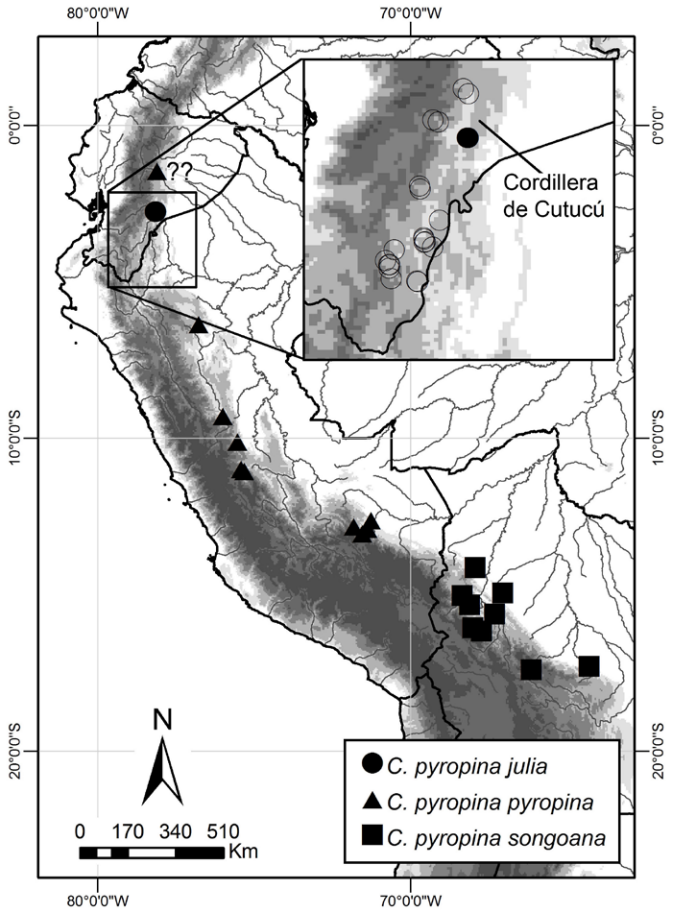

Fig. 3: Map of the tropical Andes showing the distribution of *C. pyropina*. ?? indicates a questionable locality, as discussed further in the text. Inset shows Cordillera de Cutucú, the type locality for *C. pyropina julia* **n. ssp**., and adjacent Ecuadorian Andes, with open circles indicating sampled localities with similar elevations and habitats to type locality but no records of *C. pyropina*.

cordillera. Although 'Mera' seems a plausible locality for this species in terms of elevation and habitat, the lack of any other records of *C. pyropina* from Ecuador, and from northern Peru (G. Lamas, pers. comm.), suggests that the specimen may be mislabeled. We have collected at a number of ridgetop localities in the main Andean cordillera and Cordillera del Cóndor, which are similar in topography and elevation to the type locality of *C. p. julia*, without finding *C. pyropina* (see Fig. 3). It therefore seems possible that *C. pyropina* in Ecuador is confined to the Cordillera de Cutucú, representing a remarkably isolated population.

The Cordillera de Cutucú above 1500 m is still mostly primary forest contained within the Bosque Protector Cutucú, which is listed as an Important Bird Area by BirdLife International (http://www.birdlife.org/datazone/sitefactsheet.php?id=14554). Identification of threatened or restricted-range taxa within the Cordillera could therefore strengthen arguments for the conservation of this remarkable region, given the threats to the more accessible Cordillera del Cóndor to the south from the mining industry. Gaining permission to access parts of the Cordillera remains difficult, however. Except for our visit in 2003 and the pioneering expeditions of Martin Cooper 35 years ago, therefore, nothing else is known of the butterfly fauna of this remote and potentially faunistically distinctive mountain range.

ACKNOWLEDGEMENTS

I thank the museum curators who allowed me to examine the *Cithaerias* collections under their care, and Gerardo Lamas for his advice and information about Peruvian *C. pyropina* and for making available his type photographs via the "Butterflies of America" website (www.butterfliesofamerica.com). I thank S. Villamarín, the MECN and Ecuadorian Ministerio del Ambiente for arranging the necessary permits for research in Ecuador, and Jason Hall for years of collaboration in our Ecuador research. Museum and field work was funded in part by the Leverhulme Trust, the Darwin Initiative, and the National Science Foundation (# 0847582), and field work by the National Geographic Society (Research and Exploration Grant # 5751-96) and NSF (# 0103746, #0639977, #0639861). I thank Martin Cooper for his helpful correspondence about accessing the Cordillera de Cutucú and for sharing his information about the butterfly specimens he collected there. I thank Andrew Neild and Carla Penz for their very helpful and thoughtful comments on the manuscript. Finally, I thank the many contributors to the Tropical Andean Butterfly Diversity project butterfly database, Julia Robinson Willmott for her help and company in the field, and Galo Mankash for guiding us into the Cordillera de Cutucú and for his fine net-skills.

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