

A remarkable new butterfly species from western Amazonia (Lepidoptera: Nymphalidae: Satyrinae).

*Una notable nueva especie de mariposa de la Amazonía occidental
(Lepidoptera: Nymphalidae: Satyrinae).*

**Blanca Huertas¹, Gerardo Lamas², Giovanni Fagua³, James Mallet⁴,
Shinichi Nakahara⁵ & Keith Willmott⁵**

¹ Natural History Museum London, UK. Email: b.huertas@nhm.ac.uk

² Museo de Historia Natural de la Universidad Nacional Mayor de San Marcos, Lima, Perú.

³ Universidad Javeriana, Bogotá, Colombia.

⁴ Harvard University, Cambridge, USA.

⁵ McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, University of Florida, Gainesville, USA.

Abstract

A distinctive new species of butterfly in the subtribe Euptychiina (Nymphalidae: Satyrinae), which is widespread throughout the upper Amazon in Colombia, Ecuador and Peru, is here described. The species is provisionally placed in the genus *Magneptychia* Forster, 1964, although this is likely to change as the higher level taxonomy of Euptychiina is resolved and the genus is reviewed in detail.

Keywords: Systematics, Euptychiina, Colombia, Peru, Ecuador.

Resumen

Se describe una nueva especie de mariposa distintiva de la subtribu Euptychiina (Nymphalidae: Satyrinae), distribuida en la región amazónica de Colombia, Ecuador y Perú. La especie se ubica provisionalmente en el género *Magneptychia* Forster, 1964, lo que puede cambiar cuando se haya resuelto la sistemática de Euptychiina y el género se revise en detalle.

Palabras clave: Sistemática, Euptychiina, Colombia, Perú, Ecuador.

Introduction

The taxonomy of the Neotropical satyrine subtribe Euptychiina remains one of the most unresolved of any butterfly group, both at the species and higher levels, due to its high species richness, cryptic morphology, limited variation in wing pattern/morphology among some species, generally dull coloration and, in some clades, variability in wing pattern and paucity of useful genital characters (e.g. Peña & Lamas 2005; Murray & Prowell 2005; Peña *et al.* 2006, 2010; Marín *et al.* 2011). Furthermore, the subdued dark wing coloration of many species has apparently resulted in these butterflies often being overlooked by collectors and thus being poorly represented in many collections. *Magneptychia* Forster, 1964 is one of the largest genera of Euptychiina (Lamas 2004; Peña *et al.* 2006), including over 30 described species, with at least another 10 awaiting formal description (Lamas 2004). These butterflies inhabit tropical wet forests throughout the Neotropical region, from sea level to around 2000m elevation. Some species can be among the most locally abundant butterflies in the understorey and edges of primary and secondary forests.

The diversity of *Magneptychia* is due, at least in part, to the genus actually comprising a heterogeneous assemblage of species. Forster (1964: 125) characterized

it as '*distinguished by the robust structure and larger [wing] span, by the fundamental lack of an eye spot on the upper wing surface...and not significantly, by the different structure of the male apparatus with an essentially stronger uncus*' [translation from German]. These characters are clearly unreliable as synapomorphies since revisionary works on related genera as well as phylogenetic studies have shown that the genus is not monophyletic (Murray & Prowell 2005, Peña *et al.* 2006, Marín *et al.* 2011, Huertas 2014), containing perhaps a half dozen or more generic level clades, and is in need of a comprehensive revision. Recently, Costa *et al.* (2016) suggested that all species apart from the type and two close relatives should be excluded from *Magneptychia*, since they do not share several putative synapomorphies with those three species they proposed to retain in the genus. While we agree that the generic classification of *Magneptychia* is in strong need of revision, Costa *et al.* (2016) provided no new generic combinations for excluded species, and in the absence of a phylogenetic study to clarify the limits of genera, we continue to treat *Magneptychia* in the sense of authors immediately prior to Costa *et al.* (2016).

The focus of this paper is to describe a distinctive new euptychiine species, which we provisionally place in *Magneuptychia*. A few specimens belonging to the new species described herein remained for well over a century scattered among the various collections at NHMUK and more recently in other museums without being named. What are thought to be some of the oldest known specimens were brought to the former BMNH through the bequest of the James John Joicey Collection in 1934. Joicey had purchased the Henley Grose-Smith Collection in 1910 and the latter included five specimens of which two were labelled only 'Ecuador', one 'Yahuas Terr, Peru' and one without data. The latter, was subsequently illustrated by D'Abbrera (1988: 786-787) and labelled as '*Euptychia?* sp'. However, a further, possibly older specimen was later found by BH in the MFNB, collected by the German naturalist Paul Hahnel (1843-1887), who collected in the Amazon from 1879 to 1887 for Otto Staudinger (Staudinger 1890; Michael 1926). At MUSM, there is a large series of specimens collected in the 1990s, and identified by GL as a new species, that was also listed by Lamas (2004) as "*Magneuptychia* n. sp. [6]". During her revisionary work on Euptychiina, BH found recently collected specimens with full data in various collections and from different localities across western Amazonia. In this paper, we combine all field and collection data and formally name the new species.

Methods

Magneuptychia specimens were examined in major public and private collections in Europe and the Americas. In addition, specimens were collected by GJ & JM, KW & SN, and GL during field work in Colombia, Ecuador and Peru, respectively. The following acronyms are used in the text to denote the museum collections studied. In a few cases specimens, data and/or photographs were sent by the relevant curators or other researchers or field observers, when direct examination was not possible (see Acknowledgements). Relevant available online data and published works were also consulted.

DATR	David Trembath collection, United Kingdom.
FLMNH	McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, University of Florida, Gainesville, USA.
FRPI	Francisco Piñas Rubio collection, Quito, Ecuador.
JFLE	Jean François Le Crom collection, Bogotá, Colombia.
KWJH	Keith R. Willmott & Jason P. W. Hall collection, Gainesville, USA.
MECN	Museo Ecuatoriano de Ciencias Naturales, Quito, Ecuador.
MEFLG	Museo de Entomología Francisco Luis Gallego, Universidad Nacional, sede Medellín, Colombia.
MFNB	Museum für Naturkunde, Berlin, Germany.

MPUJ	Museo de Historia Natural de la Pontificia Universidad Javeriana, Bogotá, Colombia
MUA	Museo de la Universidad de Antioquia, Medellín, Colombia.
MUSM	Museo de Historia Natural de la Universidad Nacional Mayor de San Marcos, Lima, Perú.
NHMUK	Natural History Museum (former BMNH British Museum of Natural History), London, United Kingdom.
SHNA	Shinichi Nakahara collection, Gainesville, USA.

All specimens were photographed using digital cameras and images of the holotype were processed using Adobe© Photoshop CS2 version 9.0. Nomenclature for wing veins and cells follows Comstock & Needham (1918) and Peña & Lamas (2005). Genitalia terminology follows Klots (1970). We refer to dorsal forewing, dorsal hindwing, ventral forewing and ventral hindwing as DFW, DHW, VFW, and VHW, respectively.

Genitalia dissections were made using standard protocols, with maceration in a 10% aqueous solution of potassium hydroxide (KOH). Due to the number of females available and the lack of complete comparative material, dissections of females were limited and data relating to such dissections were not studied as comprehensively as for the male genitalia.

Systematics

Magneuptychia pax sp. nov.

Huertas, Lamas, Fagua & Willmott

'*Euptychia?*' sp.: D'Abbrera 1988: 786-787, figs. (Peru? Ecuador).

Magneuptychia sp. n. 1: Lamas, Robbins & Harvey. [1997]: 65.

Magneuptychia [n. sp.]: Lamas, 2004: 220 (no. 1416).

Magneuptychia sp. 3: Piñas, 2004: 34, figs. 271-272.

Holotype: (Fig. 1A). Male, [Colombia, Putumayo], n[ea]r. Villa Garzón, Los Naranjos [1°34'13"N, 75°43'W], 8 Aug[ust]. 1977. J. Mallet *leg.* BMNH 2011-63. BMNH(E) 1720531 (deposited in NHMUK).

Allotype: (Fig. 1B). Female [Colombia, Putumayo], Puerto Limón, marshy forest [1°2'N, 76°33'W] 26 Apr[il]. 1977. J. Mallet *leg.* BMNH 2011-63. BMNH(E) 1720530 (deposited NHMUK).

Diagnosis

Magneuptychia pax n. sp. broadly resembles other species in this genus due to its size, general coloration and patterning, but it is distinguished from all other Euptychiina species by the broad, white hindwing marginal border, which extends from the postdiscal ocelli to the wing margin, and otherwise dark brown wing ground colour. The ventral surface wing pattern in general resembles that of several species currently placed in *Magneuptychia*, such as *M. fugitiva* Lamas, 1997, but



Figure 1. *Magneuptychia pax* n. sp. **A.** (above) Male holotype dorsal view (left) and ventral view (right). **B.** (below) Female allotype dorsal view (left) and ventral view (right).

this species differs in having two dots, instead of one pale dot, in the VHW ocelli. The ocelli are similar in this respect to those of *Magneuptychia gera* (Hewitson, 1850), but while the latter species and its likely relatives often have white shading in ventral marginal areas, as in *M. pax*, they also have an extra ocellus in VHW cell 2A-Cu2, which is lacking in *M. pax*. Preliminary molecular analyses (M. Espeland *et al.*, in prep.) support the diagnosis of this new species as being highly distinct from other Euptychiina.

Description of the male

See Fig. 1A. **Head:** Eyes hairy, dark brown; palpi approximately twice as long as head, brush-like black and white, antennae brown. **Thorax:** Dark brown. **Abdomen:** Dark brown with hair-like scales. **Wings:** Forewing mean length 21.2 mm (n=9). DFW brown, with slightly darker submarginal and two marginal lines. DHW predominantly brown, except for broad white marginal band from tornus to M2-M1, broadening in middle where extending in from wing margin to as far as middle of cell Cu1-M3; one darker brown submarginal line and two dark brown marginal lines, latter closely parallel to wing margin, former more strongly undulate; indistinct, black submarginal ocellus in cell Cu2-Cu1,

with dark yellow ring. VFW with brown ground colour except for a whitish grey marginal band enclosing darker brown submarginal line and two darker brown marginal lines, latter closely parallel to wing margin, former more undulate; broad, dark brown discal and post-discal bands extending across almost all of wing, except at costa; small, black, dark-centred ocellus with a dark orange border and small greyish centre present in R5-M1. VHW with similar brown ground colour except for broad white marginal band enclosing one darker brown submarginal line and two marginal lines, as on DHW; row of five submarginal ocelli, those in cells Cu2-Cu1, M2-M1 and M1-Rs black with a narrow yellow ring and silver dot at centre, first two ocelli large, last small, ocelli in cells Cu1-M2 ovoid, brown with a narrow yellow ring and large silver spot at centre; broad, dark brown discal and post-discal bands extending across wing, latter kinked outwards at vein M1. **Abdomen and genitalia:** (Figs. 2A-D). As illustrated. Eighth tergite largely membranous, sclerotized portion reduced to a narrow anterior strip; uncus relatively long, straight and even in width except tapering at the very end; subuncus directed dorsally of uncus and slightly shorter than it, much narrower than uncus and curved inwards at tip; tegumen small and mitre-shaped; valvae hirsute, especially on distal and

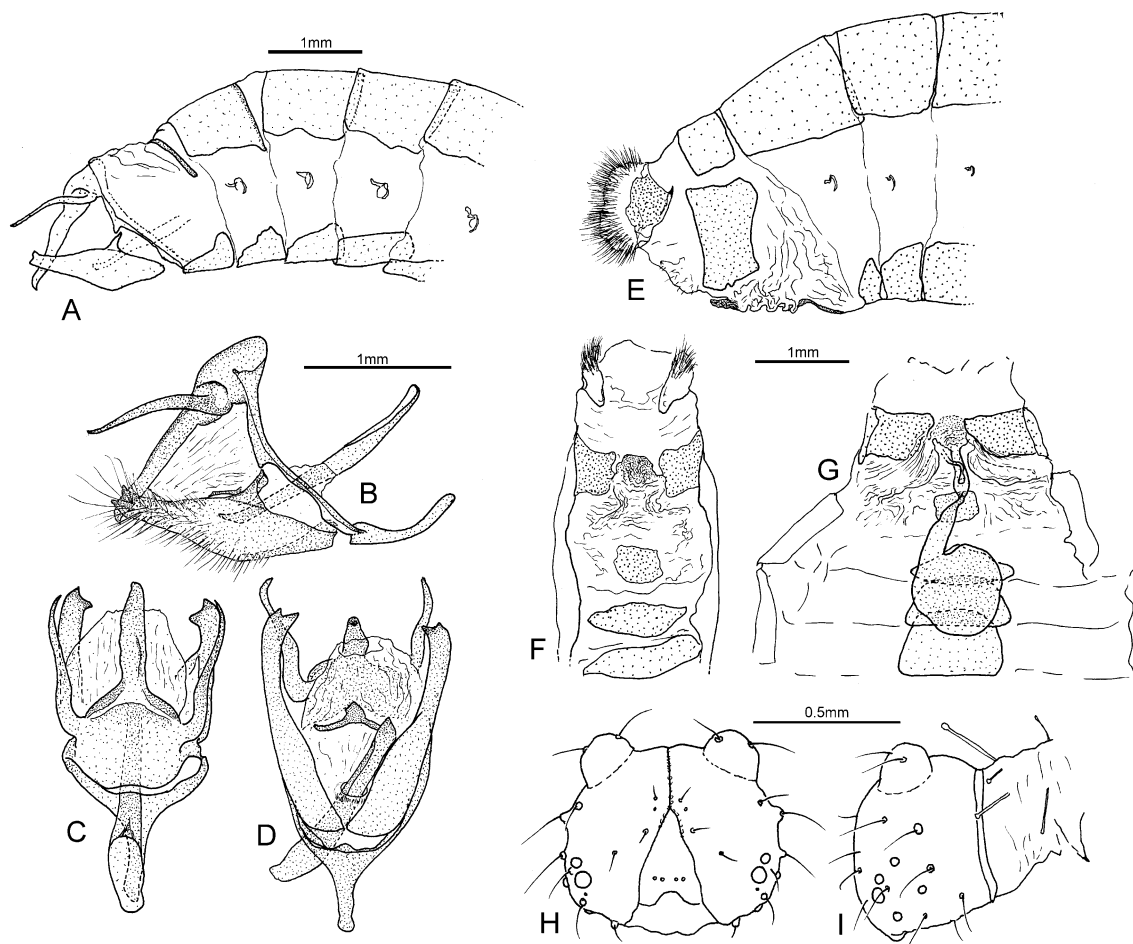


Figure 2. Illustration of structures in *Magneptychia pax* n. sp. **A.** Male abdomen. **B-D.** Male genitalia **E.** Female abdomen **F-G.** Female genitalia. **H.** Head capsule of first instar larva.

ventral sides, terminating in double prongs; saccus short, narrow; phallus slender, lacking cornuti, slightly more sclerotized in the central part, a little wider proximally and slightly flared distally at tip in ventral view; no visible juxta; 'V'-shaped sclerotized band, isolated, on ventral surface of tuba analis.

Description of the female

See Fig. 1B. As illustrated; similar to male holotype, not significantly smaller, wings more rounded, ground colour paler, ventral ocelli showing more clearly on DHW.

Wings: Forewing mean length 20.6 mm (n=4).

Abdomen and genitalia: (Figs. 2E-G). As illustrated. Eighth tergite relatively reduced in size; intersegmental membrane between 7th and 8th segments soft, pliable and expanded greatly ventrally to form a series of wrinkled ventral folds, also forming small, lightly sclerotized 'plate' underlying ostium bursae; lamella postvaginalis an isolated, small, square plate; lamella antevaginalis a large, rectangular lateral plate, not meeting ventrally and isolated from 8th tergite; ductus bursae unsclerotized, leading to a small, rounded corpus bursae, ductus seminalis origin near ostium bursae.

Wing pattern variation

Some specimens have only a weak ocellus in R5-M1 in the HW dorsal, while in other specimens it is lacking altogether. Some specimens have white scales on the base of the antennae. In the HW the black submarginal ocellus in cell Cu2-Cu1 is variable in size and the dark yellow ring may vary from distinct to very indistinct.

Immature stages

One dissected female contained a first instar larva. The head capsule is rounded in anterior view, with two short, rounded dorsal head 'horns' (Fig. 2H).

Paratypes

Colombia: (n=6♂ 1♀). *Amazonas:* 1♂, Puerto Nariño, [3°45'S, 70°22'W], 27 Sep 1994++, J. F. Le Crom *leg.* (JFLE); *Caquetá:* 3♂, Serranía de Chiribiquete, Río Cuñaré, Verde Biche Bosque, 0°32'4"N, 72°37'57"W, 19 Feb 2001, G. Fagua *et al. leg.* (MPUJ); 1♂, Solano, Vereda El Quince, 0°48'11"N, 75°11'58"W, 204m, Jama. 4 Sep 2007, 1505h. C. Sañudo *leg.* Catálogo 15058 93-CP 36- (MEFLG); 1♂, Solano, Vereda El Quince,

Parcela la Sombra, 0°48'11"N, 75°11'58"W, Jama. 204m, 4 Sep 2007, C. Sañudo & F. Muñoz *leg.* MUA-INN 111-71 (MUA); *Putumayo*: 1♀, Río Caquetá, nr. José María, Los Naranjos, [1°34'13"N, 75°43'W], 200m, 3 Aug 1977, J. Mallet, D. Jackson and P. Garcia-C. *leg.* FLMNH-MGCL-195896 (FLMNH).

Ecuador: (n=5♂ 5♀). *Orellana*: 1♂, 28 km SE Coca, track NNE of Pindo 13 oil well, [0°39'40"S, 76°49'W], 260m, 19 Aug 2010, D. A. Trembath, A. Neild *leg.* No. 22961 (DATR); 1♂, km 21 Coca-Loreto rd., 0°29'31"S, 77°8'19"W, 300m, 8 Mar 1995, K. Willmott & J. Hall *leg.* (FLMNH); 1♀, Lagunas de Cuyabeno, La Ormiga, 0°1'S, 76°11'W, 250m, 18 Sep 1996, K. Willmott *leg.* (KWJH); *Pastaza*: 1♂, Río Curaray, Oriente, Lorocachi, 1°37'15"S, 75°59'30"W, 250m, 20 Feb 1996, C. Carpio *leg.* (37. Images 271, 272) (FRPI); 1♀, Río Pastaza, Kapawi village, 2°32'16"S, 76°50'10"W, 260m, 23 Jul 2009, K. R. Willmott & J. P. W. Hall *leg.* FLMNH-MGCL-145665 (FLMNH); 1♀, Yutsuntsa, along trail to Makusar, 2°21'5.02"S, 76°27'18.3"W, 13 Jul 2014, S. Nakahara & S. Padrón *leg.* (SHNA); *Sucumbios*: 1♀, Cuyabeno Lodge, across lagoon, [0°0'18"S, 76°10'23"W], 224m, 7 Dec 2010, J. D. Turner *leg.* FLMNH-MGCL-150974 (FLMNH); *No data*: 1♂, 'Ecuador', Ex. Grose Smith 1910, Joicey Bequest Brit. Mus. 1934-20, BMNH(E) 1720540, B.M. SLIDE 32034. 1♂, same data BMNH(E) 1720533; 1♀, same data BMNH(E) 1720534 (NHMUK).

Peru: (n=10♂ 20♀). *Loreto*: 1♂, Arcadia 0°59.37'S, 75°18.55'W, 150m, 5 Nov 1993, G. Lamas *leg.*; 1♀, same data but 4 Nov 1993, R. K. Robbins *leg.*; 3♂, same data but 5 Nov 1993; 2♀, same data but 4 Nov 1993, G. Lamas *leg.*; 1♀, same data but 8 Nov 1993; 1♀, same data but 7 Nov 1993, R. K. Robbins *leg.*; 1♀, Castaña, 0°48'S, 75°14'W, 150m, 24 Oct 1993, R. K. Robbins *leg.*; 1♀, same data but 30 Oct 1993; 1♂, Río Pucauro, Coconilla, 2°42'S, 75°6'W, 160m, 17 Jul 2003, J. J. Ramírez *leg.*; 1♂, Explornapo-ACEER, Río Sucusari, [3°15'28"S, 72°55'3"W], 140m, 22 Sep 1995, G. Lamas *leg.*; 1♀, same data but 16 Sept 1995; 1♂, same data but 13 Sept. 1995, J. Grados *leg.*; 1♂, 1♀, same data but R. K. Robbins *leg.*; 1♀, same data but 5 Sept 1995; 1♀, same data but 19 Sept 1995, A. Caldas *leg.*; 2♀, Puerto Almendra, 3°50'S, 73°23'W, 120 m, 3 Sep 1995, D. J. Harvey *leg.*; 2♀, Río Aguas Negras, 0°31'24"S, 75°15'24"W, 150m, 3 Mar 1994, G. Lamas *leg.*; 1♀, same data but 5 Mar 1994; 1♀, same data but 8 Mar 1994; 1♂, Tierra Hermosa, 3°34'S, 73°13'W, 140m, 8 Oct 2013, J.J. Ramírez *leg.*; 1♀, Picuroyacu, 3°37'S, 73°16'W, 115m, 19 Oct 2015, G. Lamas *leg.* (all in MUSM); 1♀, Pebas [3°19'S, 71°51'W, 120m], H[a]h[ne]/Euptych. sp?. nobis ignota. Genitalia vial n. M 9100 by Lee D. Miller (MFNB); 1♀, Pebas [3°19'S, 71°51'W, 120m], Amazons, M. de Mathan *leg.*, Rothschild Bequest B.M. 1939-1. BMNH(E) 1719068;

1♀, Yahuas Terr. [3°21'S, 71°59'W], Joicey Bequest Brit. Mus. 1934-20. BMNH(E) 1720535 (NHMUK). *No data*: 1♂, 'Peru'. BMNH(E) 1720532 (NHMUK).

No locality: (1♂). Ex. Grose Smith 1910. Joicey Bequest Brit. Mus. 1934-20. BMNH(E) 1720534 (NHMUK).

Distribution

Magneptychia pax n. sp. has been found to date only in a limited area of western Amazonia, where it is confirmed from specimens collected in Colombia (north to Caquetá), Ecuador and Peru (south to Loreto). All known localities are situated within 4 degrees of the Equator, suggesting a specialisation to warmer habitats within western Amazonia. This species is known to range from 115 to 300 metres above sea level (Fig. 3).

Etymology

The name *pax* is the nominative singular of a third declension Latin noun, meaning 'peace'. The name is non-variable. *Magneptychia pax* n. sp. is dedicated to the peace process in Colombia and to every person affected there by a conflict that has lasted more than five decades, including in the remote forests that this butterfly inhabits. This dedication is made in the hope that a lasting peace agreement can be reached and to focus attention on the need for conservation of Amazon forests and improvement in conditions for research and scientific discovery in that region.

Ecology

During fieldwork in Serranía de Chiribiquete, Colombia, *Magneptychia pax* n. sp. was a common species in the understory of Amazonian forests that were transitional between flooded and *terra firme* forest. This species was found in natural forest edges and clearings, such as near riverbanks or in the transitional areas from forest to sandy or rocky areas. It seemed to particularly prefer white sand forests and forest edges. The species was collected at this locality only during expeditions in February, although it has been recorded in other months of the year elsewhere. However, it was not present in a recent study of stunted tepui-top habitats in the Chiribiquete region (Huertas *et al.* 2015). The ecological preferences of the new species in Colombia are notable because many other *Magneptychia* are more often found in the interior of dense lowland forest, with closed canopy and a sparse understory. The white markings on the new species may assist matching to pale substrate in sand forest edge habitats. In Ecuador, the species is known only from flat, eastern lowland forest, most often near black water rivers, where individuals were encountered flying singly in the understory of primary forest from 1100hrs to 1330hrs.

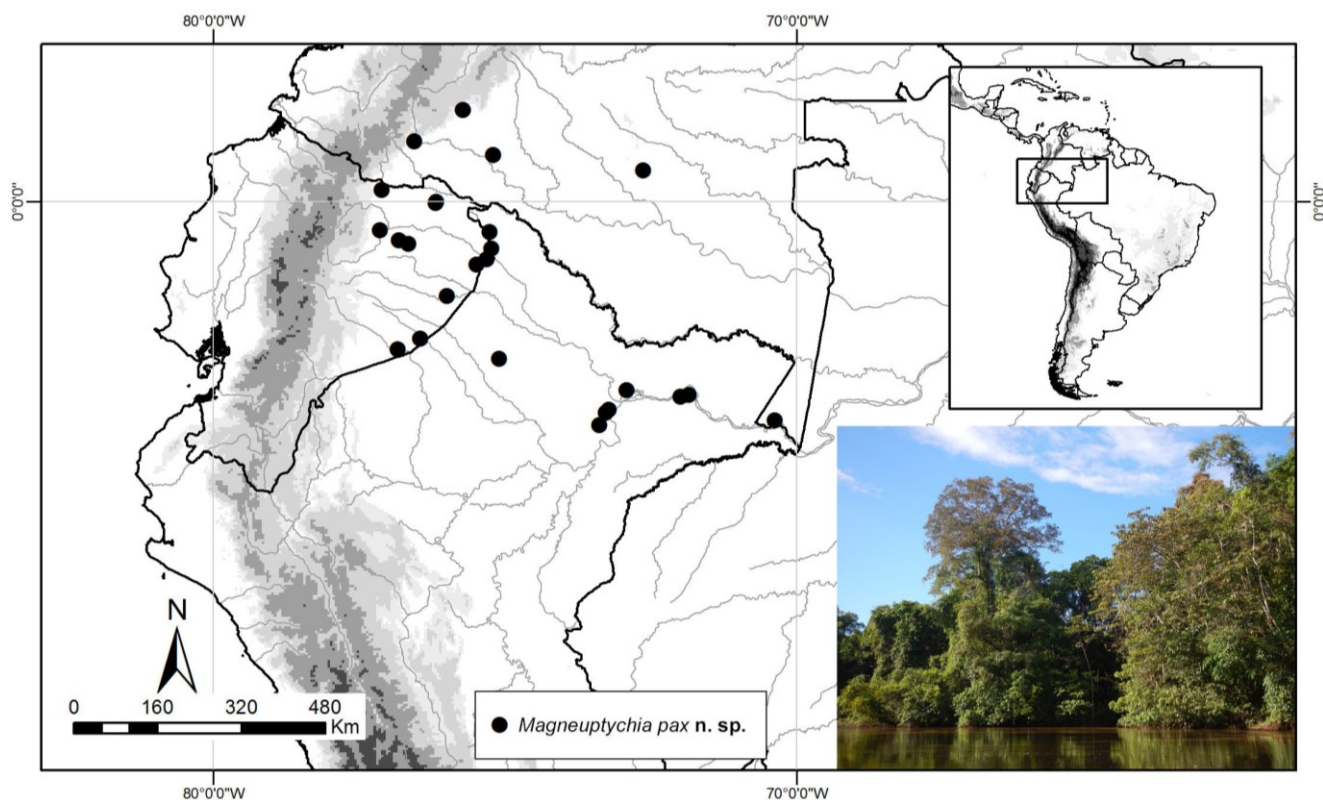


Figure 3. Map of northern South America showing localities where *Magneptychia pax* n. sp. has been recorded. Photo: Orellana, Parque Nacional Yasuní, Río Yasuní, vicinity of 'Baradero' trail, Ecuador by KW.

Discussion

A priority for a much-needed broader taxonomic revision of *Magneptychia* will be the delimitation of new genera, which will in turn permit more detailed study of species relationships. Work is underway in developing morphological and molecular datasets (Systematics of Euptychiina project, unpublished data) to produce a more robust higher-level classification. A separate challenge arises from the number of undescribed species in *Magneptychia*. The existence of distinctive (and often phylogenetically significant) undescribed species such as *M. pax* remains a barrier to a proper understanding of the group. Thus, although taxonomic revisions are our ultimate goal for a number of Euptychiina genera, including *Magneptychia* (see <http://www.flmnh.ufl.edu/museum-voices/euptychiina/>), we believe it is helpful to describe the more distinctive species that it will be essential to include in higher level phylogenies, even if their generic placement is provisional. Other authors have followed this approach in recent years with the descriptions of several *Magneptychia* species (e.g., Brévignon 2005, Brévignon & Benmesbah 2012, Zacca *et al.* 2014).

The relationships of this new species remain unclear. Preliminary sequence data from several nuclear and mitochondrial genes (Espeland *et al.*, unpublished data) suggest that *M. pax* may not have any very close relatives and is not closely related to type species *M. libye* (Linnaeus, 1767) and so could ultimately require its own

genus. However, at present, description of a genus would be premature given that work is underway to better resolve the phylogeny of Euptychiina. Such work will help inform a more appropriate generic classification for this and many other species that are currently assigned to *Magneptychia* due to historical reasons or by default. The restricted region from which *Magneptychia pax* is known remains rather inaccessible and poorly explored, not only due to innate complexity of the Amazon landscape but also due to political instability in these habitats particularly in Colombia. Western Amazonia supports many other undescribed euptychiine taxa (Fagua & Sánchez unpublished; von Hildebrand unpublished; Huertas 2014), and more detailed exploration of remote Amazonian localities, and white sand forest regions in particular, is warranted.

Acknowledgements

We thank fellow curators and collectors for facilitating visits, loans and for sending data and photos from specimens; BH sincerely acknowledges assistance received from Dr Wolfram Mey (MFNB), Fernando Valencia and Alexis Acosta (MUA), Jean François LeCrom (JFLE), Francisco Piñas Rubio (FRPI), Andrew Neild and David Trembath. Sincere thanks to NHM staff Dr Klaus Sattler for helping with German translations, the butterfly collections' team of volunteers helping with curation of Euptychiina, library staff who provided help with references and the Photo Unit team Harry Taylor

and Jonathan Jackson who provided photos of the type specimens. KW thanks Jon D. Turner. GF thanks Fernando Gast Harders (Chiribiquete Project), and Patricio von Hildebrand (Fundación Puerto Rastrojo) for their support. The specimens from Serranía de Chiribiquete (Colombia) were collected during the initiative “Inventory of the National Natural Park of Chiribiquete” made by the GEMA group (Group of Exploration and Environmental Monitoring) with researchers from the Alexander von Humboldt Institute (IAvH) and Fundación Puerto Rastrojo, Colombia. Research on Ecuadorian butterflies and euptychiines in general was supported in part by the Florida Museum of Natural History and FLMNH Museum Associates, the National Geographic Society (Research and Exploration Grant #5751-96) and the National Science Foundation (grants #0103746, #1256742). We also thank S. Villamarin, the MECN and Ecuadorian Ministerio del Ambiente for arranging the necessary permits for research in Ecuador. KW also thanks Jason Hall for many years of collaboration in research on Ecuador's butterflies, and Julia and Jamie Robinson Willmott for their fine company in the field. BH thanks Thomas Donegan for his continuous support and fruitful discussions to improve this manuscript. Finally, thanks to Dr David Lees (NHM) and two other anonymous reviewers for their comments on this paper.

References

- Brévignon, C. 2005. Description de nouveaux Satyrinae provenant de Guyane française (Lepidoptera, Nymphalidae). *Lambillionea* 105(3)(1): 393-404.
- Brévignon, C. & Benmesbah, M. 2012. Complément à l'inventaire des Satyrinae de Guyane (Lepidoptera: Nymphalidae), pp. 36-52, 4 pls., 1 tab. In: Lacomme, D. & L. Manil (eds.), *Lépidoptères de Guyane. Tome 7. Nymphalidae*. Paris, Association des Lépidoptéristes de France.
- Comstock, J.H. & Needham, J.G. 1918. The wings of insects. *American Naturalist* 32: 231-257.
- Costa M., Vilorio, A.L., Attal, S., Neild A.F.E., Fratello S.A. & Nakahara S. 2016. Lepidoptera del Pantepui. Parte III. Nuevos Nymphalidae Cyrestinae y Satyrinae. *Bulletin de la Société entomologique de France* 121(2), 2016: 179-206.
- D'Abbrera, B. 1988. *Butterflies of the Neotropical Region, Part V. Nymphalidae (conc.) and Satyridae*. Victoria, Australia: Hill House. Pp. 679-877.
- Forster, W. 1964. Beitrage zur Kenntnis der Insektenfauna Boliviens XIX. Lepidoptera III, Satyridae. *Veröffentlichungen der zoologischen Staatssammlung München* 8: 51-188, pls. 27-35.
- Hewitson, W. C. 1850. Descriptions of some new species of butterflies. *Annals and Magazine of natural History* (2)6(36):434-440, pls. 9-10 (1 December).
- Huertas, B. 2014. *Evaluating the conservation status of Neotropical butterflies and the impact of systematics on threat assessments*. PhD Thesis, University College London, Division of Biosciences.
- Huertas, B., Moorwood, A., Forero, F., Kirby, R., Rodriguez, A. & Doyer, T. 2015. What's the point? New biodiversity records from a rapid assessment of a tepuy in PNN Serranía de Chiribiquete during the filming of the National Geographic documentary 'Wild Colombia' and the feature film 'Colombia Magia Salvaje'. *Conservación Colombiana* 23:82-90.
- Klots, A.B. 1970. *Lepidoptera*, pp. 97-110 In: Tuxen, S.L. ed. *Taxonomist's Glossary of Genitalia of Insects*. Copenhagen, Munksgaard. 359 p.
- Lamas, G. 2004. *Nymphalidae. Satyrinae. Tribe Satyrini. Subtribe Euptychiina*, pp. 217-223. In: Lamas, G. (ed.) Checklist: Part 4A. Hesperioidea - Papilionoidea. In: Heppner, J. B. (ed.) *Atlas of Neotropical Lepidoptera. Volume 5A*. Gainesville, Association for Tropical Lepidoptera; Scientific Publishers.
- Lamas, G., Robbins, R.K., Harvey, D.J. [1997]. Mariposas del alto Río Napo, Loreto, Perú (Lepidoptera: Papilionoidea y Hesperioidea). *Revista peruana de Entomología* 39: 63-74.
- Marín, M.A., Peña, C., Freitas, A.V.L., Wahlberg, N. & Uribe, S.I. 2011. From the phylogeny of the Satyrinae butterflies to the systematics of Euptychiina (Lepidoptera: Nymphalidae): History, progress and prospects. *Neotropical Entomology* 40(1): 1-13.
- Michael, O. 1926. *Erinnerungen aus Süd-Amerika. Dr. Paul Hahnels letzte Reise nach dem Amazonas!* Frankfurt am Main, Verlag des Internationalen Entomologischen Vereins. 96 + [1] pp., 4 pls.
- Murray, D.L. & Prowell, D.P. 2005. Molecular phylogenetics and evolutionary history of the neotropical satyrine subtribe Euptychiina (Nymphalidae: Satyrinae). *Molecular Phylogenetics and Evolution* 34(1): 67-80.
- Piñas, F. 2004. *Mariposas del Ecuador. Vol. 11b. Familia: Nymphalidae. Subfamilia: Satyrinae*. Quito, Compañía de Jesús. v + 90 pp. + CD.
- Peña, C. & Lamas, G. 2005. Revision of the butterfly genus *Forsterinaria* Gray, 1973 (Lepidoptera: Nymphalidae, Satyrinae). *Revista peruana de Biología* 12(1): 5-48.
- Peña, C., Nylin, S., Freitas, A.V.L., Wahlberg, N. 2010. Biogeographic history of the butterfly subtribe Euptychiina (Lepidoptera, Nymphalidae, Satyrinae). *Zoologica Scripta* 39(3): 243-258.
- Peña, C., Wahlberg, N., Weingartner, E., Kodandaramaiah, U., Nylin, S., Freitas, A. V.L & Brower, A.V.Z. 2006. Higher level phylogeny of Satyrinae butterflies (Lepidoptera: Nymphalidae) based on DNA sequence data. *Molecular Phylogenetics and Evolution* 40(1): 29-49.
- Staudinger, O. 1890. Lebesnskizze des Dr. Paul Hahnel. *Deutsche entomologische Zeitschrift "Iris"* 3(1): 128-132.
- Zacca, T., Siewert, R.R., Mielke, O.H.H. & Casagrande, M.M. 2014. A new species of *Magneuptychia* Forster, 1964 (Lepidoptera: Nymphalidae: Satyrinae) from Brazilian savannah. *Zootaxa* 3795(1): 71-78.

Fundación ProAves
Carrera 20 No. 36-61
Bogotá, Colombia
Tels: +57-1-245.5134 /340.3229
Fax: +57-1-340.3285
Email: fundacion@proaves.org



www.proaves.org