



Four new species and one new subspecies of Arctiinae (Lepidoptera: Erebidae) from the Tambopata river, Madre de Dios, Peru

JUAN GRADOS

Departamento de Entomología, Museo de Historia Natural, Universidad Nacional Mayor de San Marcos, Apartado 14-0434, Lima 14, PERÚ. E-mail: gradosjuan@hotmail.com

Abstract

Four new species and one new subspecies of Arctiinae (Lepidoptera: Erebidae) are described. *Aphyle niedmandi* sp. nov., *Evius ocausus* sp. nov., *Paranerita maculata sandeepani* ssp. nov., *Paranerita kotohnuki* sp. nov. and *Baritius flexuosus* sp. nov. were collected in the Tambopata River region, Madre de Dios (Peru), as part of a Citizen Science Project, in mutual collaboration between the Natural History Museum (Lima–Peru) and Rainforest Expeditions. External morphological descriptions, morphology of male genitalia, and geographic distributions in Peru are given for all taxa as well as their barcoding.

Key words: citizen science, Neotropical, Phaegopterina, taxonomy

Introduction

Advances in the last decades in the knowledge of Neotropical Arctiinae are based on phylogeny studies (Jacobson & Weller 2002; Zaspel *et al.* 2014; Zenker *et al.* 2017), revisions of some genera (Dietz & Duckworth 1976; Dietz 1994; Simmons & Weller 2006; Pinheiro & Duarte 2010; Pinheiro & Mey 2015), morphological studies (Weller *et al.* 2000), faunistic studies (*e.g.*, Grados 1999, 2001; Piñas *et al.* 2000; Piñas & Manzano 2003; Teston & Corseuil 2004; Cerda 2008; Teston & Ferro 2016), new species descriptions (*e.g.*, Grados 2004, 2015; Vincent 2011, Vincent *et al.* 2014; Coenen & Gibeaux 2014; Pinheiro 2016) and the publication of some synonyms (*e.g.*, Grados 2002; Pinheiro & Duarte 2013; Beccacece & Zapata 2017).

Systematists have always faced a great problem to correctly identify species. In the case of Arctiinae, these are partly related to the lack of sufficient material to study and to analyze in depth the traits that delimit species. It is possible to mention that at present, after 250 years of the initiation of systematists work at the world level (Linnaeus 1758; ICNZ 1999), in many species only the type specimen or the type series specimens are known. This lack of material has become more critical in the last decades, due to the innumerable demands and documents that the different governments request to make collections of biological specimens for scientific research purposes, including the loan of material among institutions dedicated to research, without getting into details on the total restrictions that some countries have.

Estimates on the number of species that inhabit the planet vary depending on the authors and what groups they work on. The more conservative estimates indicate that there would be more than 5 million species (Wilson 1988; Stork 1993). With the current rate of new species descriptions, the estimate of having more than 1,500 systematic specialists worldwide and the need to have 25,000 full-time professionals to fully know the diversity of the planet, considering also that actually there is a global level reduction of resources in the formation of taxonomists, which requires years of preparation and specialization, entering the whirlpool without exit of the need, yet in turn, no investment, getting to extents such as that in many museums of the world, curators, are barely supplied for their basic tasks, the taxonomy crisis is evident, some having called this the "taxonomic impediment" to get to know the true biodiversity of the planet (Wilson 1988, Mallet & Willmott 2003, Wheeler *et al.* 2004, Agnarsson & Kuntner 2007). Against this background, the use of the sequencing a small 600–base pair fragment of a gene, the

Cytochrome Oxidase subunit 1 (COI) known as "barcoding", has been proposed as a molecular universal alternative for solving the taxonomic identification problem for the rapidity, low cost and reliability, and that in the future it could replace the experience and knowledge of the traditional systematic (Hebert *et al.* 2003). However, some critiques have been swift to show up (Mallet & Willmott 2003), due to the limitations it presents in view of the results obtained (Rubinoff *et al.* 2006; Meier *et al.* 2006; Johnsen *et al.* 2010). We can mention one of the emblematic cases in Lepidoptera. The species *Astrartes fulgerator* has been considered as a single one, variable and with broad geographic distribution: from the southern United States to northern Argentina. By means of barcoding studies it has been proposed that it would actually be a set of 10 cryptic species (Hebert *et al.* 2004). However in the same study, the authors point out that with the information they have about host plants, larval coloring pattern and adult phenotype, *Astrartes fulgerator* would actually be composed of a complex of six or seven species. Just a controversial position is provided by Brower (2006), in relation to the molecular approach of Hebert *et al.* (2004). By reanalyzing the data obtained and proposing that it would be seven species instead of ten. In another study of the Ithomiinae (Nymphalidae) butterfly community of the tropical forest in Ecuador (Elias *et al.* 2007) it has been shown that barcoding success in species identification barely reached 77%. More and more work mentions that reliability in species identification through barcoding has serious limitations. This implies that DNA barcoding only cannot support the diagnosis of valid species, being essential to find other characters, either morphological at different stages in insects (Yassin *et al.* 2010), ecological, ethological or biogeographic (Dayrat 2005; Rubinoff *et al.* 2006; Burn *et al.* 2008; Yassin *et al.* 2010; Whinnett *et al.* 2005). For these reasons, I have used barcoding as one in set tools for diagnosing new species (Mallet & Willmott 2003) and not as a unique and irreplaceable tool.

On the other hand, it is necessary to point out the existence of complexes of species, which have a very similar external morphology and, after doing taxonomic revisions, with studies of genitalia, have revealed the existence of complexes with greater number of species than what was known. In fact, in several of these groups, where reviews have not been carried out, mainly due to the lack of specialists, is where barcoding analysis has led to the revision and confirmation of a greater number of species. This implies that barcoding can become an alert tool for taxonomic revisions in species complexes and, in cases of twin species, to find the characters that differentiate species (De Salle 2006; Burns *et al.* 2008; Beccacece & Vincent 2014). It has been 14 years since Hebert *et al.* (2003) proposed that the COI database could be developed for the 5–10 million species of animals. For now, the information gaps are huge. The identification of species based on barcoding is limited, in addition to the factors pointed out by Rubinoff *et al.* (2006) and several others, by the existence of the sequencing in the database. If the sequencing does not exist, identification is not feasible and much less it is adventuring to claim that it would be an unknown species.

Another important factor is who identifies the species, since the database is the starting point for other users to take this as a reference. Just as in the morphological systematics, it is essential and necessary in order to have objectivity, to review the primary sources, that is, to analyze the types. In the same way the barcode would need to be nourished from the same sources. The usefulness of the databases will increase to the extent that they are more complete for the respective groups to be analyzed.

In this work, for each species is provided a diagnosis, external morphological descriptions, internal anatomy characters of males genitalia, geographic distributions and the sequencing of the mitochondrial gene, Cytochrome C Oxidase subunit 1 (COI).

Materials and methods

The descriptions of the four new species and one new subspecies are the result of daily collections at Refugio Amazonas Lodge (ARA), located at the right bank of the Tambopata River (Madre de Dios, Peru), as part of a Citizen Science program, whom direct participants were guests of the Lodge, with the mutual collaboration between the Natural History Museum (MUSM) and the company Rainforest Expeditions. A light trap with a mixed light bulb of 250 V was used to capture the specimens. The samples were sacrificed using a butyl acetate lethal jar, and were processed at the Museo de Historia Natural, Universidad Nacional Mayor de San Marcos. The sequencing of the mitochondrial gene, Cytochrome C Oxidase subunit 1 (COI), was carried out in the Biodiversity Institute of Ontario, University of Guelph, according to the protocol described in Vaglia *et al.* (2008). All samples (tissue from right hind legs) submitted for sequencing were from Tambopata River (Madre de Dios, Peru). The

distance was calculated using MEGA7 (Kumar *et al.* 2015), using Kimura 2-parameter model. The abdomens and genitalia of the male specimens were dissected and prepared using hot KOH solution (10%). Photographs of adults were taken with a Nikon D80 and the photographs of the genitalia with a Canon EOS Rebel T6.

The entomological collections revised for the elaboration of this work were: **(MUSM)** Museo de Historia Natural, Universidad Nacional Mayor de San Marcos, Lima, Peru; **(NHMUK)** Natural History Museum, London, United Kingdom; **(USNM)** United States National Museum, Smithsonian Institution, USA. All specimens have been deposited in the Museo de Historia Natural, Universidad Nacional Mayor de San Marcos (MUSM).

Wing venation terminology follows Comstock & Needham (1898, 1899), Miller (1970) & Common (1990). Genitalia terminology follows Sibatani *et al.* (1954), Kuznetsov (1967) and Klots (1970). The species sequencing are available on GenBank; the accession numbers are provided in the treatment of each species below.

Results

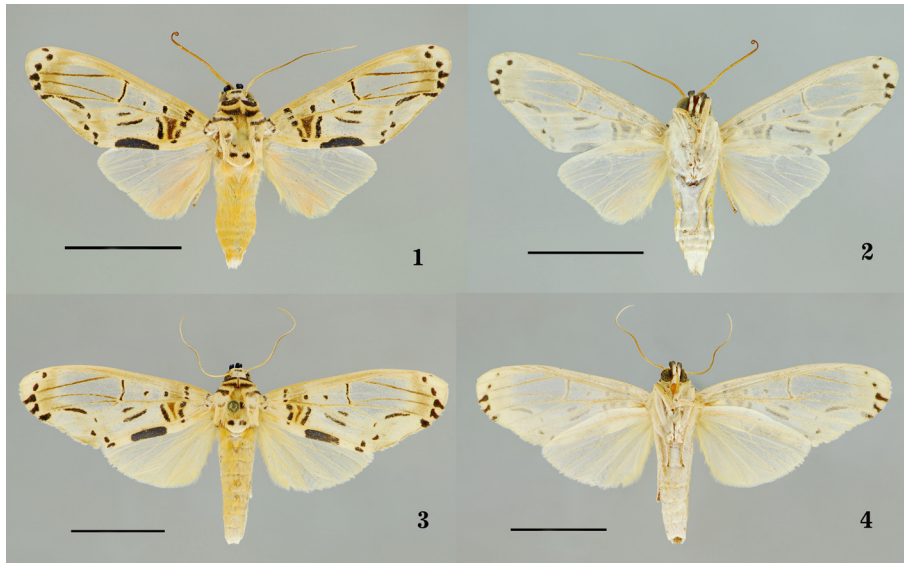
Aphyle niedmandi sp. nov.

(Figs. 1–8, 12, 14, 16)

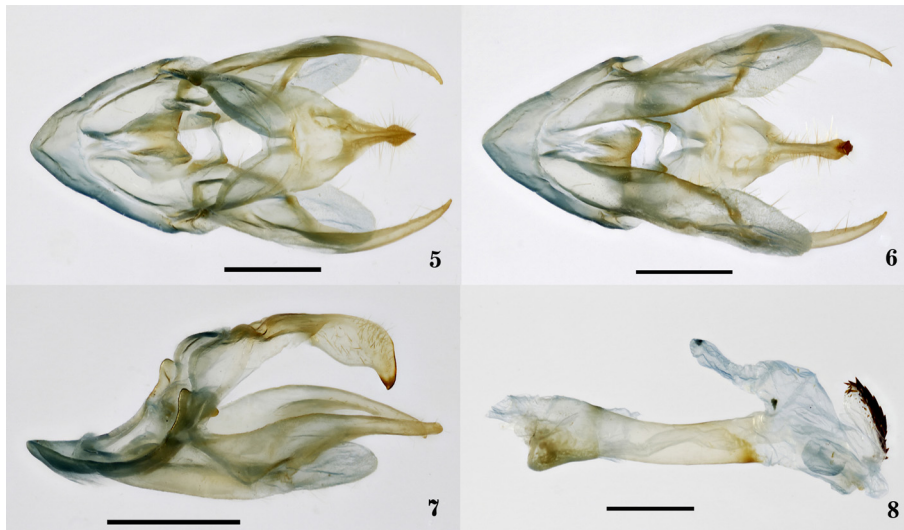
Holotype male (Figs. 1–2): **PERU, Madre de Dios**, Albergue Refugio Amazonas, 12°52'30"S, 69°24'35"W, 231m, 17.vii.2016 (D. Couceiro). 20 paratypes (15 males and 5 females): **PERU, Loreto**, 1 male, Campamento Paiche (Río Curaray), 01°29'25"S, 75°23'53"W, 200m, 02.iii.2008 (W. Yawuarcani); 1 male, Campamento Dorado (Quebrada Rumiyacu), 01°48'09"S, 75°29'14"W, 230m, 23.ii.2008 (W. Yawuarcani). **Ucayali**, 1 male, Quebrada Shaguauya, 08°39'12"S, 73°21'25"W, 275m, 04.xi.2008 (S. Carbonel). **Junin**, 1 male, Río Venado, 1050m, 01.i.2009 (V. Izersky). **CUSCO**, 1 male, 1 female, Cashiriari, 11°52'S, 72°39'W, 690m, 02.xii.1997 (J. Grados); 1 male, C.C. Kitaparay, 12°12'47.73"S, 72°49'11.42"W, 474m, 13.xi.2009 (C. Espinoza & E. Rázuri); 1 male, C.C. Timpia, 12°06'52.69"S, 72°49'48.64"W, 486m, 21.x.2009 (M. Alvarado & E. Rázuri); 1 female, 12 km O de Sonampiato, 12°39'52.07"S, 73°14'35.01"W, 887m, 30.v.2011 (C. Espinoza); 1 female, Campamento Comerciato, 12°47'S, 73°22'W, 1360m, 18.xi.2002 (J. Grados). **Madre de Dios**, 1 male, CICRA (Río Los Amigos), 12°33'36.3"S, 70°06'17.3"W, 280m, 10.xii.2005 (J. Grados); 1 female, idem except, 06.xii.2005; 1 male, idem except, 01.v.2006 (A. Asenjo); 1 male, idem except, 29.x.2006 (A. Asenjo); 1 male, idem except, 17.xi.2006 (A. Asenjo); 1 male, idem except, 23.viii–15.ix.2008 (A. Asenjo); 1 female, Albergue Refugio Amazonas, 12°52'30"S, 69°24'35"W, 231m, 07.iv.2016 (Harald Niedman, Karen Niedman, Emily Niedman, Dominic Niedman & D. Couceiro); 1 male, idem except, 10.viii.2016 (D. Couceiro); 1 male, idem except, 02.x.2016 (D. Couceiro); 1 male, idem except, 07.x.2016 (D. Couceiro).

Diagnosis (male and female): Head creamy, frontoclypeous light brown, with a black spot between antennae. Thorax creamy white, patagia black with blue iridescence. Two black dots on medial part of mesoscutum, and another two on central part of mesoscutellum. Forewing creamy brown, with two small black spots on its base. A continuous series of five black spots close to wing base, from costal margin until below vein 1A+2A, arranged crosswise. Black dots close to apex and tornus. Hindwing diaphanous creamy white, with creamy hairs on inner margin. Abdomen creamy yellow dorsally, whitish ventrally.

Description male (Figs. 1–2) **and female** (Figs. 3–4). Forewing span: 9–12 mm in males (n=16), 20–21 mm in females (n=5). **Head**: Frontoclypeous light brown. Between the scapes, a black line. Posterior margin of vertex with light brown scales. Palpi black with blue iridescence, except for the frontal surface of first palpomere, and proximal frontal surfaces of second and third palpomeres, creamy white. Occiput whitish laterally. Antennae creamy, slightly bipectinated with very small rami. **Thorax**: Creamy white. Patagia black with blue iridescence, and a white line on anterior surface, plus a creamy transversal line before posterior margin. Tegulae creamy with a black line across situated before the beginning of the first pair of wings and a black spot towards tegulae posterior. Two black dots on medial surface of mesoscutum, and two other on the medial part of the mesoscutellum. Creamy hair-like scales laterally between metascutum and metascutellum. Prothoracic legs creamy white. Prothoracic femora with a black spot on inner surface, about three quarters from distal end of the segment. Another black spot on inner distal surface of tibia. Proximal surface of the last four tarsal segments brown scaled. Mesothoracic legs creamy with two brown spots, on distal end of femora and on proximal end of tibiae. Metathoracic legs entirely creamy.



FIGURES 1–4. *Aphyle niedmandi* Grados new species. 1. Holotype male, dorsal. 2. Holotype male, ventral. 3. Paratype female, dorsal (CICRA, Río Los Amigos). 4. Paratype female, ventral. Scales=10 mm.



FIGURES 5–8. Genitalia of *Aphyle niedmandi* Grados, new species. (Genitalia # JGA–729). 5. Dorsal view. 6. Ventral view. 7. Lateral view. 8. Aedeagus. Scales= 1 mm.

Forewing: Dorsal surface with costal margin sandy brown. Two small black spots on the wing base. A continuous series of five black spots close to the wing base, going from costal margin until below vein 1A+2A, arranged crosswise. Very close to these, a brown spot from C to the 2A. Also very close to these and towards the distal surface, a black spot between C and 2A. Two black spots inside discal cell, the larger one close to the wing base. On proximal surface of cell C₁-C₂, a black elongated spot. Below the beginning of Cu₂-1A, another black elongated spot. A large, elongated spot on anal cell, comprising the vein 2A and reaching posterior margin. Veins M₁, M₂ and M₃ brown. This color not reaching the termen. Three black points near apex: between veins R₃ and R₄, R₄ and R₅, and R₅ and M₁. Three black spots reaching termen, wider towards mesal area; between M₁-M₂, M₂-M₃ and M₃-Cu₁. A sandy brown spot towards the proximal region. A series of black dots located between M₃ and tornus: an elongated dot obliquely arranged on subdistal part of M₃-Cu₁; a dot subdistal on Cu₁-Cu₂; a black spot on Cu₂-1A; a subdistal black dot on 1A-2A; finally, a dot on tornus. Tornus with a sandy brown spot. Ventral surface creamy whitish and hyaline. A series of black dots present near apex, similar to those on dorsal side, but smaller: between veins R₃ and R₄, R₄ and R₅, and R₅ and M₁. Three black spots reaching termen and wider towards mesal

area, but not as dark as the dorsal side: between M_1 - M_2 , M_2 - M_3 and M_3 - CU_1 . **Hindwing:** Both dorsal and ventral surfaces identical. Creamy whitish and hyaline, with creamy hairs on inner margin. **Abdomen:** Creamy yellowish dorsally, slightly hairy on first three terga, with creamy and white hairs on remaining terga. White ventrally. **Male genitalia** (Figs. 5–8) (Genitalia # JGA 729): Tegumen short. Uncus wide at base; in dorsal view thinning towards distal end, and more sclerotized towards the tip; in lateral view, wider medially. Sacculus elongated and ventral process of valvae short and rounded. Dorsal process of valvae elongated and curved, twice the length of ventral process. Aedeagus with small caecum penis. Vesica with a membranous process towards the ventral side and elongated dorsal process. Numerous cornuti on a well delimited on distal process.



FIGURES 9–10. Holotype of *Aphyle cuneata* Hampson. 9. Dorsal view. 10. Ventral view.

Etymology: *niedmandi* is a singular genitive noun, dedicated to the Niedmand family for being the first ones to collect specimens of the new species at the Refugio Amazonas Lodge.

Distribution: Known from the departments of Loreto, Ucayali, Junin and Madre de Dios (Peruvian Amazon).

Barcoding: The access number to Genbank is MG837873. The mitochondrial DNA sequence (COI) of one of the paratypes is as follows (Voucher MUSM–Arctiinae VB # 33):

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AACTTTATATTTTATTTTTGGAATTTGAGCTGGTATAAGTAGGAACTTCTTTAAGTTTATTAATCCGAGCTG
AATTAGGTAATCCTGGATCTTTAATTGGAGATGATCAAATTTATAATACTATCGTTACTGCTCATGCTTTT
ATCATAATTTTTTTTATAGTTATACCTATTATAATTGGAGGTTTTGGAAATTGATTAGTACCTTTAATATA
GGAGCCCCTGATATAGCTTTCCCCCGAATAAATAATATAAGTTTCTGACTTCTTCCCCCATCTTTAACTT
TATTAATTTCAAGAAGAATTGTAGAAAATGGAGCAGGAACAGGATGAACAGTTTACCCCCCTTTCA
TCAAATATCGCCCATGGAGGAAGATCTGTAGATCTAGCTATTTTCTCCCTACATTTAGCAGGTATCTCAT
CAATTTAGGTGCAATTAATTTTATTACCACAATCATTAAATATACGATTAATAATTTATCATTGATCAA
ATACCATTATTTGTTTGGAGCAGTAGGTATTACAGCATTTTTTATTACTATTATCTCTCCAGTTTGTAGCTGG
AGCTATTACAATATTATTAATGATCGAAATTTAAACACATCTTTTTTTGACCCTGCTGGAGGGGGGGA
TCCCATCTCTATCAACATTTATTT
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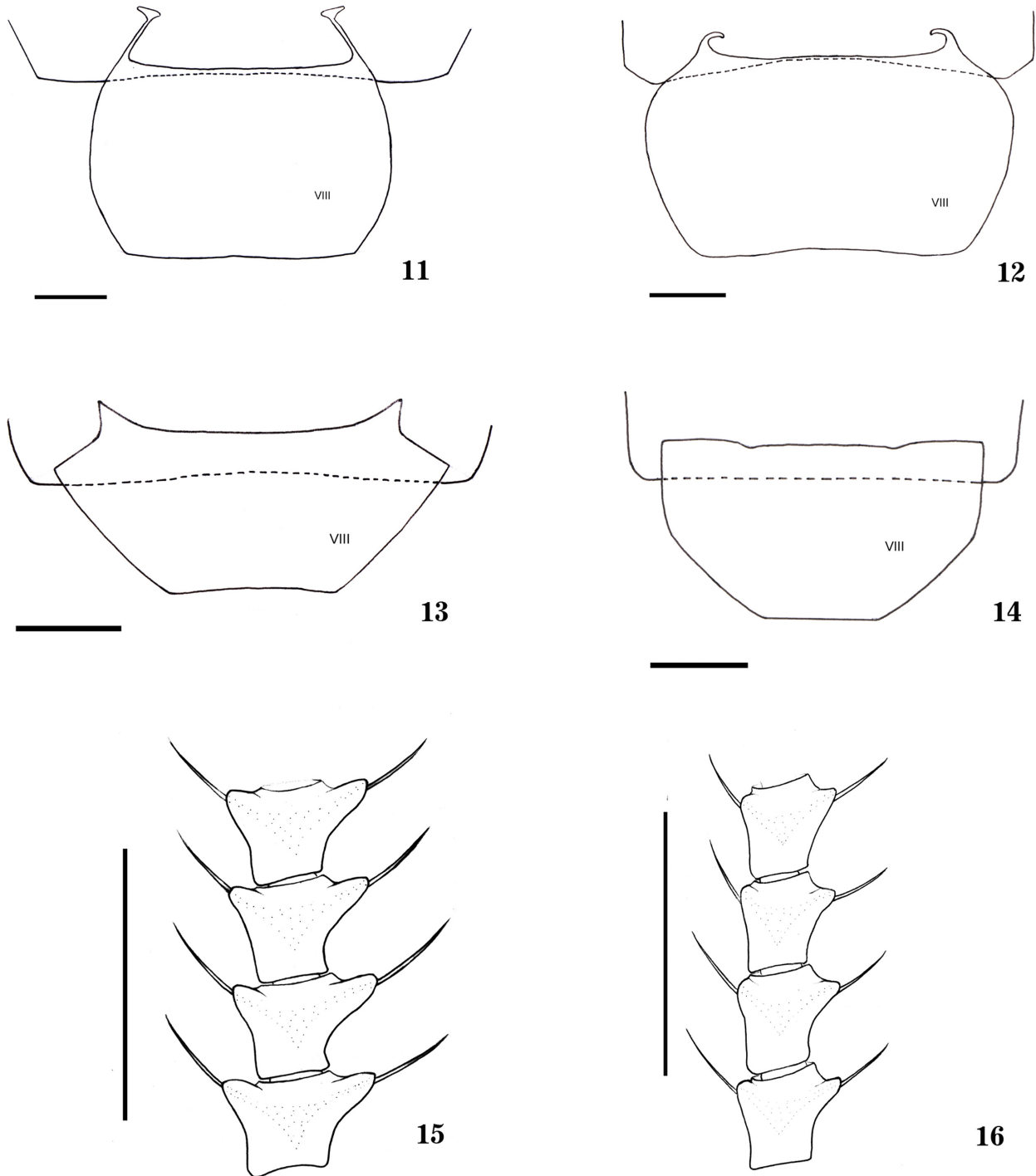
Remarks: *Aphyle cuneata* Hampson, 1905 was described from a male specimen of the Potaro River (Guyana), type deposited at the NHMUK (Figs. 9–10). The new species has a color pattern and external morphology similar to *A. cuneata*, differing from it in the black spots on the wing base:

The spot at very base of the wing and the largest proximal patch are continuous in *A. cuneata*, while in *A. niedmandi* are discontinuous, with tiny spots. The genitalia morphology is very similar in both species; the most notorious differences are in the antennae and eighth tergite and sternite. Antennae are bipectinated in both taxa, but the rami have almost the same length of the shaft in *A. cuneata*, giving it a pentagonal shape (Fig. 15), while in *A. niedmandi* they are shorter, so the flagellomeres are rectangular shaped (Fig. 16).

The eighth tergite of *A. cuneata* has large lateral apodemes, one quarter the length of the entire tergite (Fig. 11).

In *A. niedmandi* the tergite is wider, and the apodemes are small (Fig. 12). In the eighth sternite, the apodeme of *A. cuneata* is broad and has lateral extensions (Fig. 13), whereas in *A. niedmandi* the apodeme is narrow and continuous along the anterior border (Fig. 14).

Aphyle cuneata occurs in Guyana, French Guiana (MHNP), Ecuador (Piñas *et al.* 2000), and Peru. For the latter country, there are records from the departments of Loreto, Cusco and Madre de Dios. *Aphyle niedmandi*, on its turn, has been recorded from Loreto, Ucayali, Junín, Cusco and Madre de Dios. The genetic distance between both species is 5.52%.

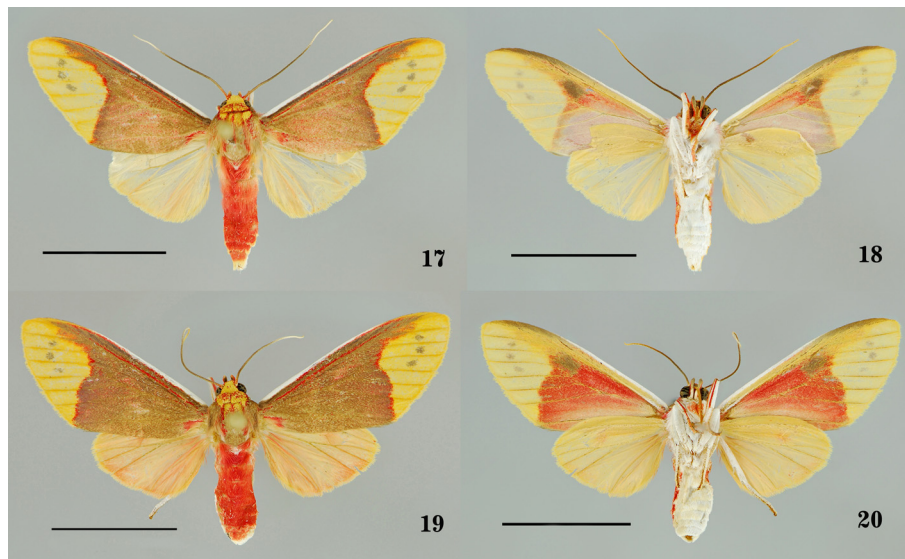


FIGURES 11–16. Tergites y sternites of *A. niedmandi* Grados and *A. cuneata* Hampson. **11.** Tergite VIII of *A. cuneata*. **12.** Tergite VIII of *A. niedmandi*. **13.** Sternite VIII of *A. cuneata*. **14.** Sternite VIII of *A. niedmandi*. (Scales=1 mm). **15.** Middle antennal segments of *A. cuneata*. **16.** Middle antennal segments of *A. niedmandi*. (Scales=0.5 mm).

***Evius ocassus* sp. nov.**

(Figs. 17–24)

Holotype male (Figs. 17–18): **PERU, Madre de Dios**, Albergue Refugio Amazonas, 12°52'30"S, 69°24'35"W, 231m, 21.iv.2016 (D. Couceiro). 73 Paratypes (42 males and 31 females): **PERU, Madre de Dios**, 1 male, CICRA, Río Los Amigos, 12°34'07.35"S, 70°05'56.8"W, 380m, 08.xii.2005 (J. Grados); 2 males, Madre de Dios, CICRA, Río Los Amigos, 12°33'36.3"S, 70°06'17.3"W, 380m, 09.xii.2005 (J. Grados); 7 males, idem except, 10.xii.2005; 1 female, idem except, 23.vii.2006 (A. Asenjo); 1 male, idem except, 26.vii.2006; 1 female, idem except, 28.vii.2006; 1 male, idem except, 02.viii.2006; 1 male, idem except 15.ix.2006; 1 male, idem except, 13.i.2007; 2 males, idem, except, 19.i.2007; 2 males, idem except, 21.i.2007; 1 male, 1 female, Alto Madre de Dios, Albergue Pantiacolla, nr. 12°47'S, 71°13'W, 450m, 30.ix–03.x.1998 (J. Grados); 1 male, Río Alto Madre de Dios, nr. Atalaya, 12°53'S, 71°22'W, 587m, 01.v.2006 (P. Centeno); 1 female, idem except, 16.ii.2007; 1 male, 1 female, idem except, 17.ii.2007; 1 male, idem except, 18.ii.2007; 2 males, idem except, 20.ii.2007; 2 males, 1 female, idem except, 21.ii.2007; 2 males, Albergue Refugio Amazonas, 12°52'30"S, 69°24'35"W, 231m, 23.ii.2016 (J. Grados); 1 female, idem except, 25.ii.2016; 1 female, idem except, 27.ii.2016; 1 female, Albergue Refugio Amazonas, 12°52'30"S, 69°24'35"W, 231m, 06.iv.2016 (D. Couceiro); 1 male, idem except, 12.iv.2016 (Michael Loia, Gina Loia, Giovana Loia & D. Couceiro); 2 females, idem except, 13.iv.2016; 1 female, idem except, 14.iv.2016; 1 male, 1 female, idem except, 15.iv.2016; 3 females, idem except, 16.iv.2016; 1 female, idem except, 17.iv.2016; 1 female, idem except, 18.iv.2016; 1 female, idem except, 19.iv.2016; 3 females, idem except, 20.iv.2016; 2 males, 5 females, idem except, 21.iv.2016; 2 males, idem except, 27.iv.2016; 1 female, idem except, 30.iv.2016; 1 male, idem except, 03.v.2016; 1 female, idem except, 07.v.2016; 1 female, idem except, 20.v.2016; 1 female, idem except, 27.v.2016; 1 female, idem except, 19.viii.2016; 1 female, idem except, 02.x.2016; 1 male, idem except, 08.x.2016; 1 male, idem except, 20.x.2016; 2 males, idem except, 21.x.2016; 1 male, idem except, 22.x.2016.



FIGURES 17–20. *Evius ocassus* Grados new species. 17. Holotype male, dorsal. 18. Holotype male, ventral. 19. Paratype female, dorsal (Albergue Refugio Amazonas). 20. Paratype female, ventral. Scales=10 mm.

Diagnosis (male and female): Head and patagia reddish yellow. Tegulae and thorax brown with yellow areas and red scales. Forewing with large reddish brown area of bluish hue at the two proximal thirds: rising from the tornus up to Cu_1 , where it projects towards the mesal margin reaching M_3 and then towards the ectal margin, reaching the intersection of M_1 and R_4+R_5 . It projects towards cell R_5 , comprising the proximal half, and this part being red with brown scales. White costal margin, from the base up to the level of R_4+R_5 and M_1 . Creamy translucent hind wings from the middle to the costal margin. The other half is yellow with a soft reddish hue. The new species is recognizable for bearing a reddish brown spot from the joining of R_4 y R_5 , up to the middle area of the R_5 cell.

Description male (Figs. 17–18) and female (Figs. 19–20). Forewing span: 14–16 mm in males (n=42), 16–17 mm in females) (n=31). **Head:** Bottom half of the frons brown. Transverse red line rises by its sides up to the base of the antennae. Vertex and upper half of the frons yellow. Occiput with a line of red scales. Proboscis brown. First palpi segment red to the sides and white on the front. Second segment brown on the front and the inner sides and red on the outer sides. Third segment minute, reddish with brown front and inner sides. Antennae brown, except for the scape and pedicel, with red scales at the base of the flagellum and white ones at the distal fourth part. The rami are minute. In female, the antennae are thinner. **Thorax:** Patagia reddish yellow, due to disperse presence of scales of both colors. A marked red spot at the antero–lateral area. Tegula brown with red scales at the postero–lateral part. Yellow spot at the mesal margin of the anterior part, limited by a red edge. Brown mesoscutum, with the anterior part yellow, speckled which presents red scales. A longitudinal line of red scales at the central part. Posterolateral part with white and red scales. Brown mesoscutellum. Metascutum covered with reddish hair and metascutellum red. First pair of legs white, with the front part of the coxa, the mesal area of the femur and tibia, red. Ectal area of the three first tarsal segments red. The last two red. Second and third pair of legs white.

Forewing: Dorsal surface with a large reddish brown area with a soft purple reflection, that covers two thirds of the wings, from the base to the external margin. The edge of the spot, towards the external margin delimited with red scales. The limit of the area reaches the tornus, rising up to Cu_1 , from where it projects towards the mesal margin reaching M_3 , to go to the ectal margin, reaching the intersection of M_1 and R_4+R_5 . It projects to R_5-M_1 , covering the proximal half, this part being red with brown scales. Costal margin white, from the base up to the level of R_4+R_5 . From this point, up to the apex, brown. Under the costal margin, from the middle up to the external margin, very close to the apex, presence of a thin red line. Another red thin line over R. Third external part of the wing, towards the margin, yellow with three brown dots. Each one in the respective cell R_5-M_1 , M_1-M_2-M . Disperse reddish scales at the base of the wing and a red spot at the base of the anal cell. Ventral surface with costal margin white, from the base of the wing up to the beginning of the M_1 and from there up to the apex, turning broader and brown. A large red spot comprising the anterior part of the discal cell and the proximal areas of cells M_2-M_3 and M_3-Cu_1 , projects towards the posterior part, covering like a thin line the middle part of Cu_1-Cu_2 , the distal part of Cu_1A and the distal part of $1A-2A$, reaching the tornus. Tornus with yellow scales. A brown spot in the proximal part of the M_1-M_2 . An area with whitish scales comprises the posterior part of the discal cell, the posterior and proximal half of Cu_1-Cu_2 , almost all Cu_2-1A , $2A-1A$ and the anal cell. Three small brown spots located on each of cells R_5-M_1 , M_1-M_2 and M_2-M_3 . **Hindwing:** Rounded. Dorsal surface with the area from the costal margin, the discal cell to M_3-C_1 , with creamy scales; an elongated area in the proximal half of Cu_1-Cu_2 and the proximal area of M_3-Cu_1 , semihyaline; the rest of the wing, with cream and red scales. In females, the hindwings oblong and the dorsal surface reddish. Ventral surface yellow, semihyaline in the proximal half of Cu_1-Cu_2 and the proximal area of M_3-Cu_1 . **Abdomen:** Red with a white point at the anterior central part of the first tergite. White scales present on the posterolateral parts from the fourth to seventh tergite. White scales at the posterior part of the last tergite. White ventrally. **Male genitalia** (Figs. 21–24) (Genitalia # JGA 767): Uncus elongated, setose and lightly curved downward ventrally at the tip. Sacculus elongated, with setae along its margin, being more abundant towards the distal extreme. Ventral process small, oval and membranous. Dorsal process elongated, curved and thin, being three times larger than the ventral process. It bears setae on its distal extreme. Juxta elongated. Transtilla broad, reaching half of the width of each sacculus. Caecum penis short. Vesica short, expanding towards the ventral part; and with a short and thin extension towards the dorsal part.

Etymology: *ocassus* is an adjective in singular nominative which means sunset. It is an allusion to the wing color.

Distribution: Known only from the department of Madre de Dios, southeast of the Peruvian Amazon. At the moment, its area of distribution includes the Tambopata River and the Madre de Dios River. *Evius ocassus* is common in its type locality.

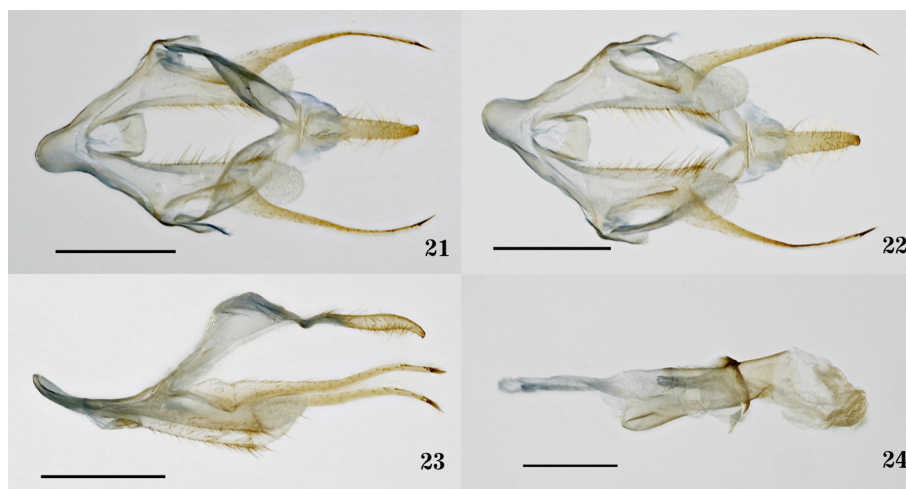
Barcoding: The access number to Genbank is MG837874. The mitochondrial DNA sequence (COI) of one of the paratypes is as follows (Voucher MUSM–Arctiinae VB # 86):

```
AACATTATATTTTATTTTTGGAATTTGAGCTGGAATAGTTGGAACCTTCATTAAGACTATTAATTCGTGCA  
GAATTAGGTAATCCAGGATCTTTAATTGGAGATGATCAAATCTATAATACTATTGTAAGTCCCATGCTT  
TTATTATAATTTTTTTTATAGTTATAACCAATTATAATTGGAGGATTTGGTAATTGATTAGTTCCTTTAATATT
```


AGGAGCTCCAGATATAGCTTTCCCTCGAATAAATAATATAAGATTTTGACTTCTGCCCCCTTCTTTAACA
 TTATTAATTTCAAGAAGAATCGTAGAAAATGGAGCAGGAACAGGATGAACAGTTTATCCCCCACTTTC
 TTCCAATATTGCTCACGGAGGAAGATCTGTAGACCTAGCTATTTTTTCTCTTCATTTAGCTGGAATCTCA
 TCAATTTTAGGGGCAATTAATTTTATCACTACAATTATCAATATACGACTAAATAATTTATCATTGACCA
 AATACCACTATTTGTGTGAGCCGTCGGAATTACTGCATTTTTATTATTATTATCTTTACCTGTATTAGCAG
 GAGCTATTACTATATTATTAAGTACCGAAATCTAAATACATCTTTTTTTCGACCCAGCAGGTGGGGGTG
 ATCCTATTCTTTATCAGCATTATTT

Remarks: *Evius ocassus* is very similar to *E. roseosimulans* Coenen & Gibeaux, 2013 which has recently been described from French Guiana. The new species differs from it in the reddish brown spot on the junction of R_4 and R_5 , going up to the middle area of cell R_5-M_1 , which is not observed in *E. roseosimulans*. Both species also differ in the genitalia, where the proportion of the sizes of ventral and dorsal processes of the valvae. While in *E. roseosimulans* the dorsal process is less than double the size of the ventral one, in *Evius ocassus* n. sp. the dorsal process is three times that of the ventral.

Another species resembling *E. ocassus* is *E. cochenouri* Schaus, 1910, described from Juan Viñas, El Sitio (Costa Rica). This species is easy to tell apart from *E. ocassus* because *E. cochenouri* has yellow patagia, while they are reddish yellow; in *E. cochenouri* has a reddish brown area not reaching tornus of forewings, whereas in *E. ocassus* it does.



FIGURES 21–24. Genitalia of *Evius ocassus* Grados, new species. (Genitalia # JGA–767). **21.** Dorsal view. **22.** Ventral view. **23.** Lateral view. **24.** Aedeagus. Scales= 1 mm.

***Paranerita kotolnuki* sp. nov.**

(Figs. 25–30)

Holotype male (Figs. 25–26): **PERU, Madre de Dios**, Albergue Refugio Amazonas, 12°52'30"S, 69°24'35"W, 231m, 18.iv.2016 (Michael Galizio & D. Couceiro). 11 paratypes (11 males): **PERU, Madre de Dios**, 2 males, Albergue Refugio Amazonas, 12°52'30"S, 69°24'35"W, 231m, 19.iv.2016 (D. Couceiro); 1 male, idem except, 21.iv.2016; 1 male, idem except, 30.iv.2016 (Marci Kotolnuk); 1 male, idem except, 02.v.2016; 2 males, idem except, 21.v.2016; 1 male, idem except, 09.x.2016; 1 male, idem except, 10.x.2016; 1 male, idem except, 13.x.2016; 1 male, idem except, 24.x.2016 (J. Grados & D. Couceiro).

Diagnosis (male): Small species (11–12mm) with yellow head and yellow patagia, the latter with red spots. Brown tegulae with reddish spots. First pair of wings brown with iridescent purple scales, and with several yellow spots of reddish edges. Second pair of wings with a soft reddish hue and part of the edge of the termen brown. Abdomen red dorsally and white ventrally.



FIGURES 25–26. *Paranerita kotolnuki* Grados, new species. **25.** Holotype male, dorsal. **26.** Holotype male, ventral. Scales=5 mm.

Description male (Figs. 25–26) and females. Forewing span; 11–12 mm (n=12). **Head:** Frontoclypeus yellow, the upper part with brown scales on the sides, underneath the antennae. Vertex yellow, with groups of red scales at the base of the antennae, in the anterior part, above the brown scales. Red scales on the lateral parts of the vertex and occiput. Palpi with the first segment yellow and red scales on the external lateral side. Second and third segments red, with the front brown and the inner part yellow. Antennae bipectinate, with scape and pedicel presenting yellow and red scales. Flagellum brown with of red scales present towards the base and white scales in the distal quarter. **Thorax:** Patagia yellow, bearing a brown spot in the anterior part of the ectal margin. Adjacent to this, a red submarginal band runs from the anterior to the posterior side and then all along the edge back to anterior side. Tegula brown in the anterior part; the posterior side and mesal margin, red; the posterior part and ectal margin, yellow. Mesoscutum brown, with presence of a small triangular red spot in the central anterior part; red spots on the central and lateral parts of the ectal margin. Metascutellum brown. First pair of legs yellow, with the front of the coxae, the dorsal sides of the femur, tibia and tarsi, reddish. Second and third pair of legs yellow. **Forewing:** Dorsal surface brown with an iridescent bluish reflection. It bears yellow and red spots. A yellow spot near the base of the wing, surrounded by an irregular red band. The contour comprises near the base of the wing and below the costal margin, reaches the inner part of the base of the discal cell, crosses the Cu, projects up to below the 1A and 2A, extending towards the base of the wing. Red at the base of the R and the 1A + 2A. A bulging area at the base of the wing: below the Cu, the first quarter of the Cu₂-1A. Two spots of red contours and inner part yellow: one in the central part of anal cell reaching the posterior margin; the other in the posterodistal part of the bulging area, on Cu₂-1A. A large spot, of red contour and yellow inner part, located in the anterior and central part of the wing: originates from the proximal third of the wing, in the costal margin, extends obliquely towards the external margin, reaching the posterior angle of the discal cell, where M₂ and M₃ arise, crosses the middle part of the Cu₁-Cu₂, then ascending, across the Cu₁, M₃ and M₂ up to the sixth part of the M₁, from where it projects up to the apex. Termen yellow. An irregular patch alongside the termen, with the inner edge red and inner part yellow: arises near the tornus, rising sinusoidally to become wider in M₂-M₃, where it also closes until it reaches the termen, spot rises again obliquely towards the inside of the wing, crossing M₁, to become wider in R₅-M₁, Describing a last curve this crosses above, heading towards the termen but not reaching it, from where it rises obliquely reaching the middle part of R₄-R₅. A red spot, near the tornus, another near the base of the R₅-R₄ and another one in R₅-M₁. Retinaculum reddish yellow. Ventral surface yellow, with the spot located on the termen with the same characteristics as the dorsal side, except for the colors that are not intense. A central brown spot, running from the costal margin down to the tornus with red edges on each side: the first one with the red edge projecting towards the tornus and the second one comprises part of the discal cell, reaching up to the costal margin and running down to the base of the wing. The proximal half of the wing, yellow, with the presence of a cleft corresponding to the described area of the bulging area on the dorsal side. This cleft shows tufts of yellow androconial hairs. Retinaculum yellow with brown scales. **Hindwing:** Dorsal surface yellow, from the costal margin, which is lobulated, to the Cu, reaching the M₃. A brown edge from the M₃, becoming thinner and reaching 2A. The rest of the wing with a soft reddish hue. Ventral surface yellow with the same characteristics regarding the brown spot on the dorsal side. **Abdomen:** Dorsal side red, with yellow scales in the posterior and central part of the first sternite. The other sternites have yellow scales on the posterior edges. Yellowish white ventral side. **Male genitalia** (Figs. 27–30) (Genitalia # JGA 560, 750, 761): Saccus thick, curved and oblique pointing to the left side. Tegumen with elongated sides, sharpened towards

the anterior part, where they join the vinculum. Towards the posterior side bearing small projections at the sides of uncus. Uncus thin, elongated, curved in ventral direction, showing thickening in the ventral part, sharpened and sclerosed towards the distal part. Bearing setae on the dorsal part, more abundantly towards the base. No setae on the distal part. Sacculus oblong, with short setae in its distal margin. Valvae notoriously asymmetrical, with the end of the left one twice as wide as that of the right one. Aedeagus the size of the genital armature. Vesica Short vesica, about one third the size of the aedeagus, with small spinules towards the base and smaller distally. **Female:** Unknown.

Etymology: *kotolnuki* is a singular genitive noun, dedicated to Marci Kotolnuk for being one of the first collectors of the new subspecies at Refugio Amazonas Lodge.

Distribution: Known from the department of Madre de Dios, southeast of the Peruvian Amazon.

Barcoding: The access number to Genbank is MG837877. The mitochondrial DNA sequence (COI) of one of the paratypes is as follows (Voucher MUSM–Arctiinae VB # 166):

```
AACATTATATTTTATTTTCGGTATTTGAGCTGGAATAGTAGGAACCTTCATTAAGTTTATTAATTCGTGCTG
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TTATTATAATTTTTTTTATAGTAATACCTATTATAATTGGTGGATTTGGTAATTGATTAATCCCTTTAATATT
AGGAGCTCCTGATATAGCTTTTCTCGAATAAATAATATAAGTTTTTGACTTTTACCCCATCTTTAACT
TTACTAATTTCAAGAAGAATCGTAGAAAATGGTGTCTGGAAGTGGTGAAGTGTGTTACCTCCTCTTTCT
TCTAATATTGCCCATGGAGGTAGATCAGTAGATTTGGCTATTTTTCCCTTCACTTAGCAGGAATTTCTT
CAATTTTAGGAGCAATTAATTTTATTACTACAATTATTAATATACGACTTAATAATCTATCATTGATCAAA
TACCTTTATTTGTATGAGCGGTAGGAATTACAGCATTCTTATTACTTTCTTTACCTGTTTGTAGCTGGG
GCTATTACTATATTACTTACAGATCGAACTTAAACACTTCTTTTTTTGATCCTGCAGGAGGAGGAGAT
CCAATTCTCTATCAACATTTATTT
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Remarks: The genus *Paranerita* was created by Hampson (1901), having as type species *Evius polyxenus* Druce, 1883 from Sarayacu (Ecuador). Seitz (1922–1925) recorded in his catalog 35 species for the genus, and Watson & Goodger (1986) recorded 46. The classification provided by Hampson (1901) and largely followed by Seitz (1922–1925) is based on wing venation, traits that have not helped to objectively determine natural groups.

Toulgoët (1991) made a study of the genus *Trichromia*, stating that *Paranerita* Hampson, *Parevia* Hampson and *Neritos* Walker are junior synonyms. Vincent & Laguerre (2014) repeated Toulgoët's (1991) suggestion, also mentioning *Antiloba* Weymer, a synonym previously proposed by Hampson (1901) which went unnoticed by Toulgoët (1991).

The genus *Neritos* was created by Walker (1855) having as a type species *Neritos repanda*, with a specimen coming from Rio (Rio de Janeiro, Brazil). The genus *Trichromia* was created by Hübner ([1819]) considering the species described by Cramer (1777) as *Phalaena onytes*, with individuals coming from Suriname. Hampson (1901) does not treat *Trichromia* as such, stating textually that *Trichroa* is a synonym for *Neritos*. In fact there was a confusion of names that was warned by Fairmaire (1894). Hampson's *Trichroa* (1901) refers to the genus *Trichromia*, knowing that the first is a genus of beetles.

Hampson (1901) had much influence on later works and that was apparently the reason why *Trichromia* was forgotten. The majority of species related to *Neritos repanda* were described under this genus. Thus, by the 1980s, of the 51 species recorded by Watson and Goodger (1986) belonging to the genus *Neritos*, 38 of them were described under this genus and none under *Trichromia*. Seitz (1922–1925) did not consider the genus *Trichromia* and Watson & Goodger (1986), stated that this together with *Neritos* were congeneric, but that the taxonomic position of many species was uncertain, reason why they chose to maintain *Trichromia* for the type species and to add another species previously described by as *Trichromia* Toulgoët (1982).

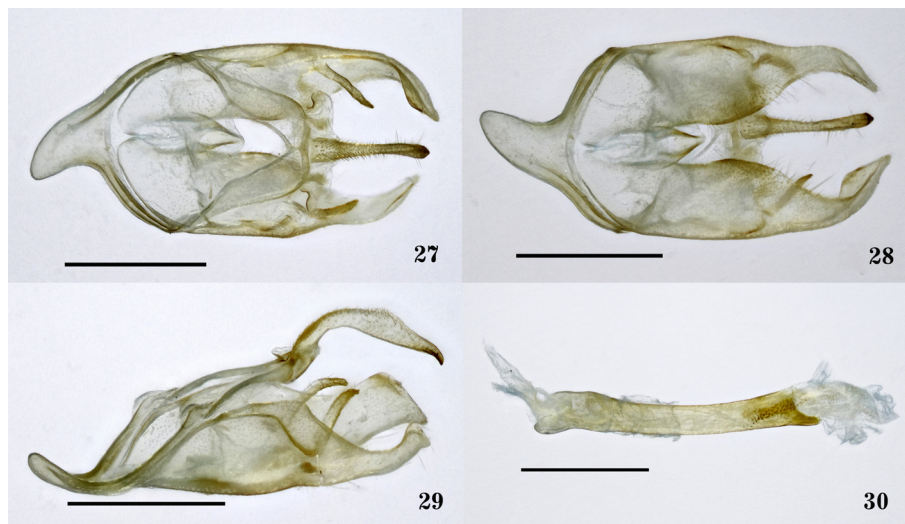
There are no phylogenetic studies of the genera mentioned to support Toulgoët's (1991) decision to synonymize all of these genera under *Trichromia*. It is most likely, due to the diversity of forms, coloring patterns and external and internal morphology, that *Trichromia*, as currently treated, is polyphyletic.

Many species, after the work of Hampson (1901) have been described under a certain genus considering the external morphology and the pattern of wing coloration and that have been compiled under different criteria in the latest available catalogs (Watson & Goodger 1986, Vincent & Laguerre 2014), which has created some controversy. This is what happens with somewhat similar genera such as *Paranerita* Hampson, *Hyponerita*

Hampson, *Neritos* Walker, *Trichromia* Hübner and *Parevia* Hampson. Watson & Goodger (1986) considered 46 species within the genus *Paranerita* Hampson, which require careful study to see if they really belong to the genus. Apparently, the species *P. polyxenus* and *P. polyxenoides* belong to a complex, considering the subspecies that are under the first species that it is necessary to elucidate.

The species *P. complicata* Schaus, 1905 was described with a male specimen (USNM 8628) of Saint Jean, Maroni River (French Guiana). It was transferred by Toulgoët (1991) to *Trichromia* and maintained as such in the work of Vincent & Laguerre (2014). I keep the species within the genus *Paranerita*, due to the fact that at the moment no phylogenetic studies exist that support the change to *Trichromia* and because reviewing the genitalia of specimens of *E. polyxenus* Druce and *T. onytes* (Cramer, 1777) (*Phalaena*) which are type species for their genera, there are significant differences, so I believe it very unlikely that they are not congeneric.

The traits of the genitalia can be observed in Watson (1971), who has made the dissection of the male holotype. The new species differs from *P. complicata* in the yellow medial area on which wing being narrower towards costal margin, as well as the yellow area below M_2 , M_3 and Cu_1 being narrow. Almost at the center of this area, where the M_2 originates, they do not present a dot of brown and red scales, which is observed in *complicata*. The hindwings of *kotolnuki* with a wide brown edge from M_3 to $1A+2A$. Regarding the genitalia, *kotolnuki* bears notoriously asymmetrical valvae, with sinusoidal inner margins, and the end of the left valva twice as wide as the right one; in *complicata*, valvae are almost simmetrical and not wide at the distal end. Vesica in *kotolnuki* bears spicules from the base to the distal area, whereas in *complicata*, spicules are only observed on the latter.



FIGURES 27–30. Genitalia of *Paranerita kotolnuki* Grados, new species. (Genitalia # JGA–761). 35. Dorsal view. 27. Ventral view. 29. Lateral view. 30. Aedeagus. Scales= 1 mm.

***Paranerita maculata sandeepani* ssp. nov.**

(Figs. 31–38)

Holotype male (Figs. 31–32): **PERU, Madre de Dios**, Albergue Refugio Amazonas, 12°52'30"S, 69°24'35"W, 231m, 22.x.2016 (J. Grados & D. Couceiro). 3 paratypes (2 males and 1 female): **PERU, Madre de Dios**, 1 female, Albergue Refugio Amazonas, 12°52'30"S, 69°24'35"W, 231m, 15.iii.2016 (D. Couceiro); 1 male, idem except, 20.v.2016; 1male, idem except 02.x.2016.

Diagnosis (male): Small species (11 mm), with yellowish red head. Thorax brown with yellow and red spots. Forewings brown with red edged yellow spots. Hindwings red with brown external margin which does not reach the anal angle. An expansion of the tornus heads towards the back and presents a fold in the inner margin. The internal margin also bears an elongated patch of brown scales on its ventral side.

Description male (Figs. 31–32) and female (Figs. 33–34). Forewing span: 11 mm in males (n=3), 12 mm in female (n=1). **Head:** Frontoclypeus yellow, with a brown cross line. At the base of the antennae, with scattered red scales. Vertex yellow, with posterolateral parts with red spots, which project forward until reaching the base of the

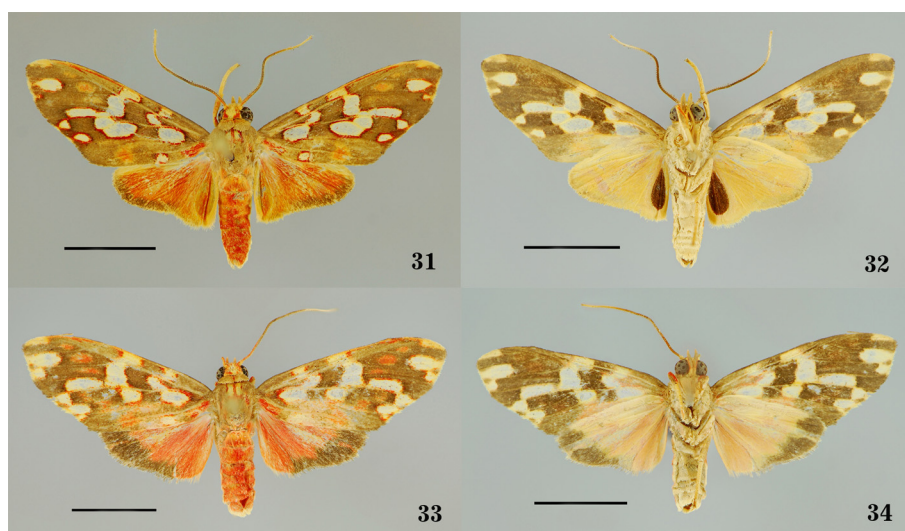
antennae. Palpi yellow, with red scales on the external side of the first segment and on the dorsolateral side of the three proximal quarters of the length of the second segment. Antennae with rami reduced with scape and pedicel both yellow. Red scales in the proximal fifth and, in the distal third with white scales. **Thorax:** Brown. Patagia with red scales on the anterior part, from the middle of the area and towards the mesal margin. Tegula with red scales towards the posterior part. Two yellow spots edged in red, located in the central and mesal part of the mesoscutum. Presence of yellow and red hairs between the metascutum and metascutellum. First pair of legs yellow, with the proximal half of the dorsal side of the femur with a red line and the distal end with a red dot. Dorsal side and mesal middle margin red. Tibia dorsal side red; and on the ectal margin, almost from the middle to the distal end brown. Second and third pair of legs, yellow. **Forewing:** Dorsal surface brown with cream spots and red contours: an oblong spot near the base of the wing and below the basal part of the Cu, projecting obliquely, being narrower, towards the outside of the wing, reaching the basal part of the discal cell, crosses the R obliquely towards the base of the wing, reaching the costal margin; a larger spot below the intersection of Cu and Cu₁ extends toward the base of cell M₃-Cu₁, from where it divides, extending the first branch toward the termen and covering the proximal two-thirds of cell M₂-M₃ and which connects with a small spot that is at the distal end of the cell M₃-Cu₁ and reaches the termen; the other branch ascends with the discal cells internal limit, reaches the intersection of R and M₁, where it becomes narrower, and then reaches the costal margin, from where a thin red line arises and goes along the margin and towards the apex without reaching it; a rounded spot in the center of the anal cell which reaches the posterior margin; a small spot on the distal end of Cu₁-Cu₂; a tiny spot at the distal end of cell M₁-M₂, reaching the termen; a somewhat elongated red spot on the distal end of cell R₄-R₅ and another near the base of cell R₅-M₁. An elongated red spot at the base of anal cell. The apex presents yellow and reddish scales. Ventral surface with the same pattern as the dorsal side with the brown background and the spots of red contours, only these are yellow instead of creamy; mesal area and posterior margin yellow. Unlike the dorsal side, the following is not observed: the rounded spot in the center of anal cell, which reaches the posterior margin; the elongated red spot at the base of anal cell; the elongated red spot on the distal end of cell R₄-R₅ and the another near the base of cell R₅-M₁. **Hindwing:** Dorsal surface red, with costal margin yellow and brown termen. In females, the brown band in the termen is wider. Tornus expanded posteriorly with a lobulated shape, and a fold in the inner margin. In females, does not show the expansion. Ventral surface yellow, with an elongated oval patch of brown scales in the fold of the inner margin. In females, does not have the elongated oval patch. **Abdomen:** Red, with yellow scales. In the distal part of the last sternite with yellow scales. Creamy yellow ventral side. **Male genitalia** (Figs. 35–38) (Genitalia # JGA 762): Saccus wide and slightly curved towards the right side in dorsal view. Tegumen wide towards posterior end, with each side of triangular shape. On the external posterior side, it forms an angle of almost ninety degrees with the distal margin, which is wide and where the uncus emerges. On the lateral sides of this distal margin, it presents two small sclerosed pointed projections. Uncus slender, curved towards the ventral side. The end has a small curvature. Long valvae with the edges of the sacculus and the costa parallel, thinning towards the distal end. Juxta wide in the anterior part and thinning towards the end. Aedeagus elongated and curved upward dorsally. Caecum penis small. Vesical short with small spicules.

Etymology: *sandeepani* is a singular genitive noun, dedicated to Dileep Sandeepan for having collected the first specimen at the Refugio Amazonas Lodge.

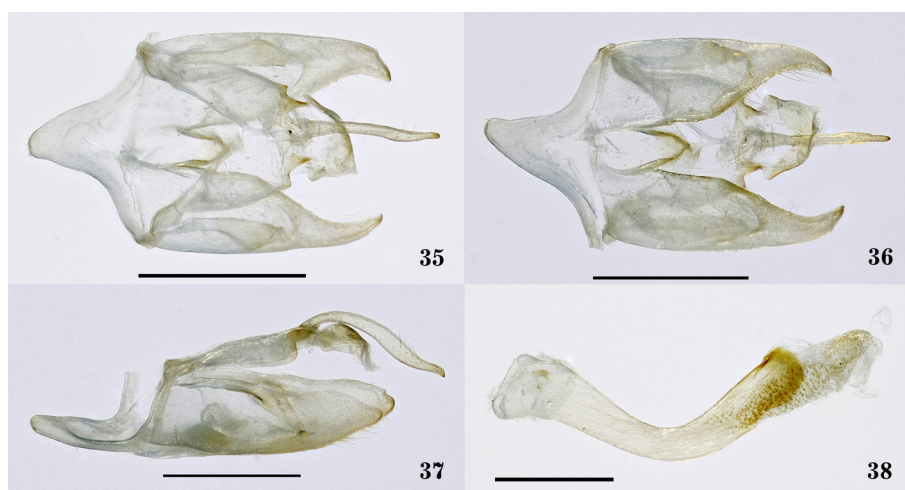
Distribution: Known only from the department of Madre de Dios, southeast of the Peruvian Amazon.

Barcoding: The access number to Genbank is MG837876. The mitochondrial DNA sequence (COI) of one of the paratypes is as follows (Voucher MUSM–Arctiinae VB # 67):

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AACTTTATATTTTATTTTGGTATTTGAGCTGGAATAGTAGGAACCTTCATTAAGTTTATTAATTCGAGCTG
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CTTTAATTTCAAGAAGAATTGTAGAAAACGGTGCTGGAACCTGGATGAACTGTTTACCCCCCTCTTTC
TTCTAATATTGCCCATGGAGGAAGATCAGTAGATCTAGCTATTTTTTCCCTTCATTTAGCTGGAATTTCT
TCAATTTTAGGAGCAATTAATTTCACTACTACAATTATTAATATAACGATTAAATAACTTATCATTGATCA
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GAGCTATTACTATGTTATTAACCTGATCGAAATTTAAATACTTCTTTTTTTCGACCCTGCTGGGGGAGGAG
ATCCAATTCCTTATCAACACTTATTT
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FIGURES 31–34. *Paranerita maculata sandeepani* Grados, new subspecies. **31.** Holotype male, dorsal. **32.** Holotype male, ventral. **33.** Paratype female, dorsal (Albergue Refugio Amazonas). **34.** Paratype female, ventral. Scales=5 mm.



FIGURES 35–38. Genitalia of *Paranerita maculata sandeepani* Grados, new species. (Genitalia # JGA–762). **35.** Dorsal view. **36.** Ventral view. **37.** Lateral view. **38.** Aedeagus. Scales= 1 mm.

Remarks: As I pointed out for the previous species, reviewing the genitalia morphology of *Paranerita polyxenus* Druce and *Trichromia onytes* Cramer, and being these the type species for each respective genera, significant differences can be observed, making it unlikely that they belong to the same genus, hence I do not consider both genera to be synonyms. For these reasons, I maintain the species *maculata* within the genus considered by Watson & Goodger (1986).

Regarding *Evius maculata maculata* (Rothschild, 1909) it was described from a female from Fonte Boa, Amazonas (Brazil) and transferred to *Paranerita* by Watson & Goodger (1986). Based on females, we observed that the *Paranerita maculata sandeepani* has the large, creamy spot that starts below the intersection of Cu and Cu_1 extending towards the base of cell Cu_1 , where it divides. The first branch extends towards the termen, covering the proximal two thirds of the cell M_2 and connects with a small spot situated on distal end of cell M_3 and which reaches the term, without interruptions until reaching the termen. In *maculata maculata* the large spot appears discontinuously, formed by three spots separated by brown areas. The main spot emerging at the intersection of Cu and Cu_1 , as it ascends has a constriction at the lower angle of the discal cell and does not extend into cell M_3 . The pattern of the *Paranerita maculata sandeepani* is also true for males, this being the first time that males of this species have been described.

***Baritius flexuosus* sp. nov.**

(Figs. 39–44)

Holotype male (Figs. 39–40): **PERU, Madre de Dios**, Albergue Refugio Amazonas, 12°52'30"S, 69°24'35"W, 231m, 11.v.2016 (D. Couceiro). Paratypes (11 males): **PERU, Madre de Dios**, 1 male, Albergue Posada Amazonas, 12°47'S, 69°14'W, 250m, 18.v.2002 (J. Grados); 1 male, idem except, 11.ix.2002 (A. Lescano); 1 male, CICRA, Río Los Amigos, 12°34'07.35"S, 70°05'56.8"W, 280m, 08.xii.2005 (J. Grados); 1 male, Río Alto Madre de Dios, nr. Atalaya, 12°53'S, 71°22'W, 587m, 23.vi.2006 (P. Centeno); 1 male, Albergue Refugio Amazonas, 12°52'30"S, 69°24'35"W, 231m, 13.iii.2016 (J. Grados); 1 male, idem except, 21.iv.2016 (Adam Julian, Aaron Edward & D. Couceiro); 1 male, idem except, 11.v.2016; 1 male, idem except, 19.v.2016; 1 male, idem except, 27.v.2016; 1 male, idem except, 28.v.2016; 1 male, idem except, 01.vi.2016.

Diagnosis (male): Head and thorax creamy, the latter with brown spots. Antennae bipectinated, creamy and with brown spots. Forewings creamy with a series of brown spots in lunular and rounded shapes. Hindwings with a cream anterior half and the posterior one of a pink hue. Dorsal surface of the abdomen pink and the ventral surface, whitish.

Description male: (Figs. 39–40). Forewing span (13–15 mm) (n=12). **Head:** Frontoclypeus creamy, with brown scales between the antennae. Vertex creamy with a brown spot in the central area. Palpi creamy. A brown spot on the external lateral side of the first segment. The second segment with a brown spot on the external lateral side, covering two-thirds of the length. Third segment small with brown scales at base. Proboscis elongated and brown. Antennae bipectinate and creamy, with brown spots at the base, at the middle and towards the distal end. **Thorax:** Patagia creamy with presence of brown scales, in greater density towards the anterior part. Tegulae creamy, with brown scales towards the anterior part and in the mesal margin, near the patagia and a small brown spot in the central part. Lines of brown scales on the sides of the mesoscutum that converge in the central part and project in a line up to the mesoscutellum. Metascutellum whitish. First pair of legs creamy, with small brown spots scattered over the tibia. A brown spot in the central part of the first tarsal segment. Brown the distal half of the third, fourth and fifth tarsal segment. Second pair of legs creamy, with a brown spot on the proximal end of the tibia and another one elongated at the distal end. A brown spot in the central part of the first tarsal segment and brown the fourth and fifth segments. Third pair of legs creamy, with a brown spot in the central part of the tibia. A brown spot on the proximal part of the first and third tarsal segments. The last two, brown. Cream tibial spurs. **Forewing:** Color pattern in dorsal surface is dominated by an irregular lattice of creamy and brown colored areas. Background creamy yellowish with a brown line near the base of the wing, from the costal margin up to anal cell. Two brown spots that arise from the costal margin and separated by a cream area, going towards the posterior part and converging in the discal cell, reaching the posterior margin. A brown spot from the costal margin, crosses the R, continues having as mesal limit the discal cell, between M_1 and M_3 , projecting itself up to the proximal part of cell M_3-Cu_1 . It is projected having only one point of contact towards the ectal margin, in cell Cu_1-Cu_2 , reaching the termen and near the tornus, like a cream spot with brown borders in the 1A-2A. Towards the mesal margin of the spots of cells Cu_1-Cu_2 and 1A-2A, a cream spot corresponding to each one. Another cream spot with brown border, close to the termen, from the distal margin of M_3-Cu_1 and ascending in the respective cells, rounded spots until the costal margin. A brown spot towards the subdistal area of the M_1-M_2 . Ventral surface creamy yellowish, the traits indicated for the dorsal side are noticeable, being more noticeable in the costal margin and the termen. **Hindwing:** Dorsal surface semihyaline from the costal margin to the middle of the wing. The other half of a soft pink hue. Ventral surface whitish, the traits indicated noticeable for the dorsal side. **Abdomen:** Dorsal side pink and ventral whitish. Distal end with white hairs. **Male genitalia** (Figs. 41–44) (Genitalia # JGA 738): Tegumen with thin and sinusoid sides, both non-symmetrical, becoming somewhat wider towards the posterior part. Uncus thin and elongated, with the distal end wider, expanding laterally with short and thin projections and hair on all its dorsal side. Transilla bearing two elongated structures ornamented with spicules. Non-symmetrical valvae, the left being longer. The valvae are widened in the middle and have setae in the dorsal and ventral margin. Towards the distal part, the valvae get thinner to project in a curved form towards the mesal margin. The latter carries spines, mainly in the inner part. The valvae in ventral view, wide near the base, from where they carry series of setae, to then become narrower in a defined concave arc, to expand towards the middle and, then to become thin again in the long process and that carries the thorns. Juxta divided and well defined, broad and with a projection in the central posterior part, with a very sclerosed line throughout its length. Aedeagus thick and with a sclerosed area in the distal part. Vesica elongated. **Female:** Unknown

Etymology: *flexuosus* is a masculine adjective in nominative singular, which means tortuous, sinuous, in allusion to how difficult it is to distinguish the new species from the already known species.

Distribution: Only in the department of Madre de Dios, southeastern Peru.

Barcoding: The access number to Genbank is MG837875. The mitochondrial DNA sequence (COI) of one of the paratypes is as follows (Voucher MUSM–Arctiinae VB # 58):

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AACTTTATATTTTATTTTTGGTATTTGGGCAGGAATATTAGGAACTTCATTAAGTTTATTAATTCGAGCTG
AATTAGGAAATCCAGGATCTTTAATTGGAGATGATCAAATTTATAATACTATTGTTACAGCTCATGCTTT
TATTATAATTTTTTTTATAGTTATAACCTATTATAATTGGAGGATTTGGTAATTGATTAGTTCCTTTAATATTA
GGAGCTCCTGATATAGCTTTCCCTCGAATAAATAATATAAGTTTTTGACTTCTACCCCATCATTAACTT
TATTAATTTTCGAGAAGAATTGTAGAAAATGGAGCAGGAACAGGATGAACAGTTTATCCCCCCTTTCA
TCTAATATTGCTCATGGAGGATCATCAGTAGATCTAGCTATTTTCTCCCTTCATTTAGCCGGAATTTCTTC
AATTTTAGGAGCAATTAATTTTATTACAACAATTATTAATATACGATTAAATAATTTATCTTTTGATCAAAT
ACCTTTATTTGTTTGAGCTGTAGGAATTACAGCATTTTTATTATTACTTTCTCTCCAGTTTTAGCAGGA
GCAATTACAATATTATTAACAGATCGAAATTTAAATACATCATTTTTTGACCCCGCTGGAGGAGGAGAT
CCAATTCCTTAT
```



FIGURES 39–40. *Baritius flexuosus* Grados, new species. 39. Holotype male, dorsal. 40. Holotype male, ventral. Scales=5 mm.



FIGURES 41–44. Genitalia of *Baritius flexuosus* Grados, new species. (Genitalia # JGA–739). 41. Dorsal view. 42. Ventral view. 43. Lateral view. 44. Aedeagus. Scales= 1 mm.

Remarks: The species *Baritius eleutheroides* Rothschild was described from 43 males and 5 females, from different localities: Fonte Boa, Upper Amazon (Brazil); Manaus to Yutobi River (Brazil); La Oroya, Inambari River (Peru); La Union, Huacamayo River, Carabaya (Peru); Aroewarwa Creek, Maroewym Valley (Suriname) (Rothschild, 1909).

Vincent & Laguerre (2014) designated the lectotype of the species, choosing the male syntype from Fonte Boa (Brasil). According to the analysis of the types and individuals housed at MUSM, they belong to a complex of species, very similar in external morphology and color pattern, differentiated by subtle external characters and by genitalia morphology.

It is possible to differentiate *B. eleutheroides* from *B. flexuosus* based on the following features: in *B. flexuosus* the postdiscal brown band is on the costal margin and projects close to the tornus, while in *B. eleutheroides* the band is continuous all the way to the tornus. The band in the new species is discontinuous due to a contraction it presents at cell M_3-Cu_1 , so that towards external margin there are five rounded creamy spots between R_3+R_4 and Cu_1 . Regarding the male genitalia, *B. eleutheroides* has shorter and wider valvae at base, with round distal end, while *B. flexuosus* the valvae are widened in the middle and have setae in the dorsal and ventral margin. Towards the distal part, the valvae get thinner to project in a curved form towards the mesal margin. The latter carries spines, mainly in the inner part. The elongated structures of the transtilla are triangular in *B. eleutheroides*, while in *B. flexuosus* are two elongated structures ornamented with spicules. The genetic distance between both species is 2.9%.



FIGURES 45–46. *Baritius eleutheroides* Rothschild. 45. Lectotype male, dorsal view. 46. Lectotype male, ventral view.

TABLE 1. Barcoding voucher codes in the MUSM and access number in Genbank.

Species	Voucher DNA	GENBANK
<i>Aphyle niedmandi</i>	MUSM-Arctiinae VB # 33	MG837873
<i>Evius ocellatus</i>	MUSM-Arctiinae VB # 86	MG837874
<i>Paranerita kotolnuki</i>	MUSM-Arctiinae VB # 166	MG837877
<i>Paranerita maculata sandeepani</i>	MUSM-Arctiinae VB # 67	MG837876
<i>Baritius flexuosus</i>	MUSM-Arctiinae VB # 58	MG837875

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