A new species and eight new subspecies of high elevation Actinote from Colombia, Ecuador and Peru (Nymphalidae, Heliconiinae, Acraeini)

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Key words: Andes; COI barcode; morphology; taxonomy.

INTRODUCTION

The Neotropical Acraeini comprises over 50 described species and a half-dozen or more known, undescribed species (Lamas, 2004; Francini et al., 2004; Paluch et al., 2006; Neild, 2008; Willmott et al., 2009; Winhard, 2017; Willmott et al., 2017; Freitas et al., 2018). The generic classification of these butterflies has remained remarkably unstable in recent decades, with Pierre (1987) placing all Neotropical species within the pantropical genus Acraea Fabricius, 1807, and Lamas (2004) recognizing three genera for these species, Actinote Hübn., [1819], Altinote Potts, 1943, and Abananote Potts, 1943. Silva-Brandão et al. (2008) showed that neither Altinote nor Abananote was monophyletic and suggested treating all Neotropical species within a single genus, Actinote, a decision followed by Willmott et al. (2017) and Carvalho et al. (2021; albeit as a subgenus of Acraea), and formalized by Zhang et al. (2021) with the synonymy of Potts’s generic names and recognition of Actinote as the sole genus of American Acraeini (see also Williams & Henning, 2023).

Actinote are relatively large, conspicuous, colorful and slow-flying butterflies, distributed throughout the Neotropics,
mostly in forest habitats, from sea level to 4050 m. Although several species are very common, a number are very rare, and new species continue to be described from the two centers of diversity for the genus, the Atlantic forest (e.g., Francini et al., 2004; Freitas et al., 2018) and the Andes (e.g., Neild, 2008; Willmott et al., 2009; Winhard, 2017; Willmott et al., 2017). The uppermost forests of the Andes, in particular, contain several species that are poorly represented in most collections, with a number of distinctive populations scattered throughout this tropical montane region. To contribute to ongoing faunistic studies in the Andes, we here describe a new species and eight new subspecies of high Andean Actinote.

MATERIALS AND METHODS

Actinote specimens and information on distribution and natural history were collected by the authors and colleagues throughout Ecuador and Peru, and in numerous collections, over many years. Morphological and molecular methods follow Willmott et al. (2017), and are described only briefly here. The following collection acronyms are used: AWLW: Allan & Lesley Wolhuter collection, United Kingdom; CAS: California Academy of Sciences, San Francisco, USA; HAWA: Haydon Warren-Gash collection, Pressac, France; INABIO: Instituto Nacional de Biodiversidad, Quito, Ecuador; JEPE: Jean-Claude Petit collection, Ducy, France; MGCL: McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, Gainesville, USA; MUSM: Museo de Historia Natural, Universidad Nacional Mayor de San Marcos, Lima, Peru; CEPUJ: Nature Education Centre, Jagiellonian University (formerly Zoological Museum, MZUJ); NHMUK: Natural History Museum, London, UK; PIBO: Pierre Boyer collection, Le Puy Sainte Réparade, France; RCCP: Research Collection of Carlos Prieto, Cali, Colombia; USNM: National Museum of Natural History, Smithsonian Institution, Washington, DC, USA.

Adult abdomens were 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 up to 100x magnification. The terminology for male genitalia and abdominal structures follows Scoble (1992), and nomenclature for venation follows Comstock & Needham (1898). We use the abbreviations DFW, VFW, DHW and VHW for dorsal and ventral forewing and hindwing, and HT and LT for Holotype and Lectotype, respectively.

For most specimens, genomic DNA was extracted from Actinote specimens using Qiagen’s DNeasy Blood & Tissue Kit following the manufacturer’s protocol, incubating samples overnight (24 h) and using a final elution volume of 50 ul. We amplified the first half of the mitochondrial gene cytochrome oxidase I (COI), also known as the barcode region for animals (Hebert et al., 2003), using primers and methods described by Willmott et al. (2017). Single strands of the PCR products were sequenced by the University of Florida’s Interdisciplinary Center for Biotechnology Research Sanger Sequencing Group or by Eurofins Genomics, using the same primers as in the PCR. Two new sequences were obtained using methods described by Kawahara et al. (2023).

Where necessary, fragments were assembled into composite sequences and all 18 new sequences were aligned using BioEdit v. 7.1.3 (Hall, 1999), with 26 additional sequences obtained from GenBank (Appendix 1). The final aligned sequences were of length 633 bp, and new sequences are deposited in GenBank (Appendix 1). To examine relationships among taxa we conducted a phylogenetic analysis using the Maximum Likelihood (ML) method in MEGA11 (Tamura et al., 2021). The best substitution model (lowest Bayesian Information Criterion score) was TN93+G+I, and this model was used in the ML search with 100 bootstrap replicates to estimate branch support. The tree was rooted with a sequence from Telchinia issoria (Hübner, [1819]), a member of the clade sister to Actinote (Carvalho et al., 2021). We also calculated mean within-group and between-group genetic divergence using MEGA11, with partial deletion of missing data with 90% cut-off, p-distance as the substitution model, and other default options.

RESULTS AND DISCUSSION

DNA barcodes and relationships among Actinote taxa

The ML analysis of COI barcode sequences (Fig. 1) recovered three main clades as in Carvalho et al. (2021), with strong support (100% bootstrap) for a clade containing A. pyrrhosticta n. sp., A. eresia (C. Felder & R. Felder, 1862) and A. hilaris Jordan, 1910, and with weak support (57% bootstrap) for A. pyrrhosticta being sister to the other two species. Although the relationships among the three main clades differ from those in Carvalho et al. (2021), in which A. eresia+A. hilaris were placed as sister to all other Actinote, this discrepancy likely reflects the lack of nuclear gene data in our analysis that would be needed to confidently resolve deeper nodes. In terms of species relationships, in our analysis Actinote eresia canyaris n. ssp. formed a strongly supported clade with A. eresia eresia and A. eresia leptogramma Jordan, 1913 (92% bootstrap), and A. hilaris arcoiris n. ssp. and A. hilaris sourakovi n. ssp. formed a strongly supported clade with A. hilaris desmiala Jordan, 1913 (99% bootstrap; the nominate subspecies of A. hilaris was not sampled). Actinote eresia eresina (Hopffer, 1874) did not form a clade with other A. eresia, but instead was moderately well supported as sister to A. hilaris, a result discussed below in the annotated checklist.

Taxonomy

Actinote pyrrhosticta Lamas, Willmott & Hall, new species
Figs. 2A-C, 6A,D-H, 9A, 10A-D, 11A,B

Diagnosis and identification: Analysis of multiple nuclear and mitochondrial gene sequences showed that A. eresia and A. hilaris form a clade that is sister to all other Neotropical Acraeini (Carvalho et al., 2021; Chazot et al., 2021). Our analysis of COI sequence data shows that A. pyrrhosticta n. sp. is also a member of this clade, and sister to these two species (Fig. 1). These three species share a distinctive VHW pattern, with a thin, only slightly kinked brown discal line bordered distally by a pale postdiscal band (Figs. 2-5). The definition of the discal line and the expression of the pale postdiscal band are rather variable,
but together they nevertheless enable ready recognition of almost all specimens of these three species, in comparison with all other Neotropical Acraeini. Perhaps the most superficially similar species are *A. rubrocellulata* Hayward, 1960 (central Peru) and *A. mamita* (Burmeister, 1861) (Atlantic forest), but the former lacks the brown VHW discal line and pale postdiscal band, while the latter has a brown VHW discal line but it is more strongly kinked, as in other *Actinote sensu* Lamas (2004), and lacks the pale postdiscal band. Both *A. rubrocellulata* and *A. mamita* were included in recent molecular phylogenetic studies (Carvalho et al., 2021) and were not recovered as being closely related to the *A. eresia* clade.

*Actinote pyrrhosticta* n. sp. can be consistently distinguished from *A. eresia* by the following characters: 1) The black ‘S’-shaped discocellular bar on the FW extends as a continuous line through the base of vein Cu₁ to the anal margin; in *A. eresia*, the line is more distally placed in the discal cell, and the black marking in cell 2A-Cu₁ is reduced to a small spot or absent, not meeting the discocellular line (Figs. 2-4). 2) The black postdiscal line in VFW cell Cu₁-Cu₂ is placed directly in a line with that in cell Cu₁-M₁, while in *A. eresia* it is displaced distally or absent; overall, the curving black postdiscal line on the VFW of *A. pyrrhosticta* is more basally positioned than it is in *A. eresia* (Figs. 2-4). 3) The distinct block of pale scaling in *A. pyrrhosticta* at the base of the VHW in cell Rs-Sc+R₁ contrasts with the darker coloring of the anterior half of the discal cell; in *A. eresia*, the anterior half of the discal cell is similarly pale-colored. In *A. hilaris*, the black FW postdiscal line and cell-end bar are fused, forming a broad black band in the middle of the wing (Figs. 2-5). 4) A series of orange dorsolateral spots is present along the abdomen in *A. pyrrhosticta* (a single lateral spot in the middle of each tergite, e.g., Figs. 2I, 11A,F,H,I), which is absent or, at most, barely visible in only some tergites (e.g., *A. e. eresia*) in the two related species (e.g., Fig. 11J,L). 5) The sphragis of *A. pyrrhosticta* barely protrudes beyond the ventral edge of the abdomen (Fig. 2J), in contrast to the protruding sphragis of *A. eresia* (Fig. 2K) and *A. hilaris* (Fig. 2L). The tapering male genitalia valva of *A.
**pyrrhosticta** (Fig. 6A-C) is distinct from the broader, blunter valva of *A. eresia leptogramma* (Fig. 7B), but similar to that of *A. eresia eresina* (Fig. 7C) and *A. hilaris* (Fig. 7E,F). Other characters distinguishing subspecies of *A. pyrrhosticta* from those of *A. eresia* occurring in the same region are discussed under the accounts of each taxon.

**Description:** MALE (Fig. 2A,C): Forewing length of HT 24.5 mm (23-25 mm, mean 23.9 mm, n=10). Wings: as illustrated. VHW with long, black hair-like scales ('bristles' of Jordan (1913) and Potts (1943)) along veins, including location of vestigial vein 1A (vein visible in distal fifth of wing). Head: eyes black, bare; antennae black with sparse black needle-like scales dorsally, 35 antennomeres with terminal 9 antennomeres comprising club; labial palpi with sparse, long, black, hair-like scales ventrally (much shorter, similar scales dorsally) on basal and middle segment, sparse black scales laterally on middle and terminal segment; top of head black, frons with sparse, long, black, hair-like scales, two tufts of orange hair-like scales dorsolaterally on patagia. Thorax: black with sparse, long black and brown hair-like scales, except ventrally with lateral orange spot on meso- and metathorax approximately in region of epimeron and katepisternum, forelegs, mid- and hindlegs black. Abdomen: dorsal surface black except for orange spot in middle of each tergite laterally, ventral surface black except for spots of orange scaling in middle of each sternite in anterior half, laterally with line of orange scaling dorsal of sternites and orange dashes ventral of tergites. Genitalia (Fig. 6A): as illustrated, notable features include broad-based, upwardly tapering valva with indented basal edge, and relatively broad aedeagus. Juxta is a rather elongate, approximately 'V'-shaped plate.

FEMALE: (Fig. 2B,J): Forewing length mean 28.1 mm (26.5-29.5 mm, n=7). Wings: similar to male except FW slightly broader. Dorsal surface: similar to male. Ventral surface: similar to male except whitish scaling in basal third of VHW more extensive, reaching posteriorly to vein 3A. Head, thorax, abdomen: similar to male in coloration. Out of six examined females, all possessed a sphragis, a curving, rectangular plate closely appressed to tip of abdomen, not protruding ventrally beyond terminal sternite (Fig. 2J). Genitalia (Fig. 6A): as illustrated, notable features include broad-based, upwardly tapering valva with indented basal edge, and relatively broad aedeagus. Juxta is a rather elongate, approximately 'V'-shaped plate.

**Figure 2.** *Actinote* specimens (A-F), left half dorsal surface, right half ventral surface. A) *A. pyrrhosticta* n. sp., HT ♂, Ecuador, Loja, km 13.2 Jimbura-San Andrés rd. (FLMNH-MGCL-209919); B) *A. pyrrhosticta* n. sp., ♀, Ecuador, Loja, km 13.2 Jimbura-San Andrés rd. (FLMNH-MGCL-209929); C) *A. pyrrhosticta* n. sp., ♀, Peru, Cajamarca, N El Pargo (MZUJ); D) *A. pyrrhosticta* quintecocha n. ssp., HT ♂, Peru, Amazonas, Quintecocha (MUSM-ENT-007883); E) *A. pyrrhosticta* apurimac n. ssp., HT ♀, Peru, Apurimac, Laguna Angascocha (MUSM-ENT-007885); F) *A. pyrrhosticta* apurimac n. ssp., ♀, Peru, Apurimac, Laguna Uspacocha (MUSM); G) *A. pyrrhosticta* apurimac n. ssp., ♂, Peru, Apurimac, via Huanipaca km 8 (MZUJ); H) *A. pyrrhosticta* alfarayo n. ssp., ♂, Peru, Cuzco, Rio Santa Maria (MUSM-ENT-007887); I) *A. pyrrhosticta* alfarayo n. ssp., ♀, Peru, Cuzco, ‘Kitemi’, (PIBO). *Actinote* abdomen, lateral view (J-L). J) *A. pyrrhosticta* pyrrhosticta (FLMNH-MGCL-109926); K) *A. eresia leptogramma* (FLMNH-MGCL-119804); L) *A. hilaris sourakovi* (FLMNH-MGCL-145578).
protrudes postero-ventrally (Fig. 6E); ductus bursae very short, broad, merging into amorphous, small corpus bursae, similar in size to lamella antevaginalis plus lamella postvaginalis (Fig. 6F), ductus seminalis narrow; subpapillary glands similar in size to papillae anales (Fig. 6G,H).


**Paratypes (18 ♂, 13 ♀):**

ECUADOR: Loja: Cordillera Lagunillas, E Jimbura’’, 2600-3000 m, (Jasinski, A.), 14 May 1998, 1 ♂, (CEPUJ); Cordillera Lagunillas, E Jimbura’, 3300 m, (Jasinski, A.), 1 ♂, (CEPUJ); nr. Amaluza, km 13.2 Jimbura-San Andrés rd., [4°42′32″S,79°26′47″W], 2900 m, (Willmott, K. R., J. I. R., J. C. R.), 12 Jun 2014, 1 ♂, [FLMNH-MGCL-209921], (MGCL), ‘‘Nord de Laguna Negra, Jimbura-Zumba 3000m′’, [4°42′32″S,79°26′47″W], 3030 m, (Boyer, P.), 4-6 Aug 2017, 1 ♂, (PIBO). (Petit, J.-C.), 4-6 Aug 2017, 1 ♂, 1 ♀, (JEPE); nr. Amaluza, km 13.2 Jimbura-San Andrés rd., [4°42′32″S,79°26′47″W], (Willmott, K. R., J. I. R., J. C. R.), 1 Jun 2014, 1 ♂, [FLMNH-MGCL-195746], 1 ♂, [FLMNH-MGCL-209918], 1 ♂, [FLMNH-MGCL-209920], 1 ♂, [FLMNH-MGCL-209923], 1 ♂, [FLMNH-MGCL-209924], 1 ♂, [FLMNH-MGCL-209925], 1 ♂, [FLMNH-MGCL-209926], 1 ♂, [FLMNH-MGCL-209927], 1 ♂, [FLMNH-MGCL-209928], 1 ♂, [FLMNH-MGCL-209929], 1 ♂, [FLMNH-MGCL-209930], (MGCL), 4 ♂, 2 ♀, (INABIO), (Boyer, P.), 4 Aug 2017, 1 ♂, 1 ♀, (PIBO). PERU: Cajamarca: Llamas–Uambos [≡Huambos], N’ Pargo [≡El Pargo], [6°27′20″S,79°41′2″W], 3000-3050 m, (Pargo), 9 Jun 2018, 1 ♂, (CEPUJ); Piura: Ayabaca, Ramos, [4°42′32″S,79°28′W], 2900 m, (Celada, W.), 2 Jun 2007, 1 ♂, (MUSM), 4 Jul 2007, 1 ♂, (MUSM), 5 Jul 2007, 1 ♂, (MUSM).

**Etymology:** The species name is derived from the Latinized Greek words pyrrhos, meaning flame-colored, and stiktos, meaning spotted, in reference to the coloration of the wings and orange dorsal abdominal spots that are distinctive for this species. The name is treated as a feminine adjective.

**Taxonomy and variation:** This species is geographically variable and four subspecies are recognized. These four taxa are grouped on the basis of the diagnostic wing and abdominal color pattern characters discussed above, in the absence of molecular data for all but the nominate subspecies, and the lack of clear morphological differences to separate A. eresia from A. pyrrhosticta n. sp. The three species in the A. eresia clade are broadly sympatric from southern Ecuador to southern Peru, but they appear typically to replace one another from lower to higher elevations in the order A. hilaris, A. eresia, and A. pyrrhosticta, and are rarely collected in microsympatry.

DNA sequence data would be useful to test the taxonomic hypothesis proposed here, given the large gap between the currently known locations of A. pyrrhosticta in southern Ecuador and northern Peru, and southern Peru (Fig. 9A). That gap seems most likely to represent a sampling artifact resulting from the rarity and restricted elevational range of this species. Mean sequence divergence within sampled A. pyrrhosticta was 0.1%, with mean divergence between A. pyrrhosticta and A. eresia being 3.6%, and between A. pyrrhosticta and A. hilaris being 4.5%.

No notable differences were observed between the genitalia of the male holotype from Ecuador and a dissected specimen from Peru (MUSM-2010-11-26-05).

**Distribution and natural history:** The nominate subspecies is known from the western slope of the Andes in extreme southern Ecuador, within a few km of the Peru border, to northwestern Peru (Cajamarca, Piura) (Fig. 9A). The taxon was first collected in Ecuador by A. Jasinski, during his pioneering trips to the Jimbura-San Andrés road (e.g., Jasinski, 1996, 1998a,b), but his two specimens, now in the CEPUJ, were labeled with imprecise data. We made a number of visits to the same road before finally observing the species flying along the edge of undisturbed forest from 2900-3030 m on the west Andean slope. On 12 June, 2014, both sexes were observed in approximately equal numbers, flying in the vicinity of a small stream (Fig. 10A) on a sunny morning from 10:20-11:30. Individuals of both sexes were observed flying over the low forest canopy and repeatedly descending to 1-2 m above the ground, with males occasionally landing on the ground. A pair was observed in copula from 11:20 to 15:00, resting on the ground on rocks along the stream and road edge (Fig. 11A,B); additional males and females were observed to fly frequently down to within 0.5 m of the mating pair before flying off. In August 2017, PB observed this species at the same stream, in a short period of bright sun at 13:30. Several individuals were seen flying over the canopy, and two females were observed resting near water. The species was only seen during a few minutes with bright sun and was not abundant, and was neither observed subsequently, nor seen again during visits to the stream over a 4-5 day period.

The lack of previous observations coupled with the abundance of the species during our observations on 12 June 2014, when multiple individuals were visible at any one time, are consistent with a synchronous emergence of adults from gregarious immature stages along with a relatively short adult life span (see also notes under A. pyrrhosticta apurimac n. ssp.).

**Actinote pyrrhosticta quintecocha** Lamas & Willmott, new subspecies

Figs. 2D, 6B, 9A

**Diagnosis and identification:** This taxon differs from the nominate in having paler, less reddish orange dorsal markings, which are also expanded in each cell, with a notably thin black postdiscal line on the DHW (Fig. 2D). The DFW orange marking at the base of cell Cu2-Cu1 is broader and the similarly colored postdiscal markings in this cell and cell Cu1-M, are reduced or absent.

**Description:** MALE (Fig. 2D): Forewing length 21.0 mm (n=1). Wings: as illustrated. Head, thorax: abdomen as in nominate subspecies. Genitalia (Fig. 6B): similar to nominate subspecies.

FEMALE: unknown.

**Types:** HOLOTYPE ♂ ECUADOR: Amazonas: Quintecocha, [6°51′30″S,77°42″W], 3150 m, (Gallusser, S.), 20 Nov 2003, [MUSM-ENT-007883; dissection, MUSM). PERU: Amazonas: Quintecocha, [6°51′52″S,77°42″W], 3150 m, (Gallusser, S.), 20 Nov 2003, 1 ♂, [MUSM-ENT-007884; dissection, MUSM-2010-11-26-07], (MUSM); same collection data, but 20 Sep 2004, 2 ♂, (MUSM).

**Etymology:** The name is derived from that of the type locality, and it is treated as a feminine noun in apposition.
**Taxonomy and variation**: Characters supporting recognition of this taxon as conspecific with *A. p. pyrrhosticta* n. sp. are discussed under the description of the nominate subspecies. It was not possible to assess variation in this subspecies since only four specimens are known. Nevertheless, the stability of the diagnostic characters of the nominate subspecies in the relatively large series examined, from multiple sites, supports recognition of *A. p. quintecocha* n. ssp. as a distinct taxon.

**Distribution and natural history**: This subspecies is known only from four specimens collected at the type locality at 3150 m in the Department of Amazonas in northern Peru (Fig. 9A).

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**Actinote pyrrhosticta apurimac** Lamas & Willmott, new subspecies

Figs. 2E-G, 6C, 9A, 11C-H

**Diagnosis and identification**: This subspecies is distinguished from *A. p. quintecocha* n. ssp. by having broader dorsal orange markings on both wings, with postdiscal spots present in cells Cu₅-M₂ on the FW, and a much broader postdiscal band on the DHW, extending almost to the distal margin near the tornus (Fig. 2E-G). Conversely, the orange markings basal of the thin, dark postdiscal line on the DHW are reduced in the discal cell and anal margin area, with this area of the wing mostly dark.
brown (instead of orange). The paler orange color of the dorsal markings, broad DHW postdiscal band, and reduced orange in the basal half of the DHW, are the most obvious characters distinguishing this taxon from the nominate subspecies.

**Description:** MALE (Fig. 2E,G): Forewing length 23.1 mm (n=1). Wings: as illustrated. Head, thorax, abdomen: as in nominate subspecies. Genitalia (Fig. 6C): similar to nominate subspecies.

FEMALE: (Fig. 2F): Forewing length 28.4 mm (n=1). Wings: as illustrated, differing from male most notably in having broader white scaling in basal
third of VHW, as in other subspecies. Head, thorax, abdomen: similar to male. Genitalia: not examined.


PARATYPES (0 ♀, 2 ♀): PERU: Apurimac: [San]tuarituar. N[ac]tuarituar], Amay, via Huarapecana 8 km, [13°35′5′′S,72°5′56′′W], 3800 m, (Pycz, T. W.), 7 Sep 2008, 1 ♂, [CEPU], 3950 m, (Boyer, P.), 7 Sep 2008, 5 ♂, [COBO]; [San]tuarituar]. N[ac]tuarituar], Apay, Laguna Angasacocha, [13°35′3′′S,72°5′56′′W], 3200 m, (Curo, J., L.), 21 Jul 2001, 1 ♂, MUSM-ENT-007886; dissection, MUSM-2010-11-08; (MUSM); [San]tuarituar]. N[ac]tuarituar], Amay, Explana[da], 3600 m, (Curo, J., Mayorga, O., Astete, C.), 25 Jul 2001, 1 ♂, 1 ♀, (MUSM); [San]tuarituar]. N[ac]tuarituar], Apay Laguna Uspacocha, [13°34′38′′S,72°53′10′′W], 3750 m, (Curo, J., Mayorga, O., Astete, C.), 25 Jul 2001, 1 ♂ MUSM-ENT-007887, (MUSM); [San]tuarituar]. N[ac]tuarituar], Cuzco (Fig. 9A), where it occurs in the uppermost cloudforest, from 3200-3950 m in southern Peru, in the headwaters of the Río Santa María.

**Distribution and natural history:** This taxon is known from 3200-3950 m in southern Peru, in the headwaters of the Apurimac valley in the department of that name and adjacent Cuzco (Fig. 9A), where it occurs in the uppermost cloudforest, with records of adults from April to September. David Geale (see iNaturalist references above) photographed both sexes nectaring on two Asteraceae species (Fig. 11F-H), as well as a single moribund larva (Fig. 11C) and clusters of hundreds of pupae (Fig. 11D,E), assumed to be this species based on the abundance of adults, lack of other species, and a freshly emerged adult female (Fig. 11D). PB also observed males nectaring on Asteraceae along the Huanipaca road.

**Actinote pyrrhosticta alfamayo** Lamas & Willmott, new subspecies Figs. 2H,I, 9A

**Diagnosis and identification:** This subspecies is distinguished from *A. p. apurimac* n. ssp. by the more extensive orange dorsal markings, including postdiscal markings on the FW in cells Cu₁-M₁ that are broader than the orange marking at the base of cell Cu₁-M₁, and orange covering almost the entire DHW, except for the veins in the basal half of the wing, a dark postdiscal line, and black intervalenal stripes intruding from the distal margin (Fig. 2H,I).

**Description:** MALE (Fig. 2H): Forewing length 22.1 mm (n=1). Wings: as illustrated. Head, thorax, abdomen: as in nominate subspecies. Genitalia: somewhat intermediate between those of *A. pyrrhosticta quinotecochoa* n. ssp. (Fig. 6B) and *A. pyrrhosticta apurimac* n. ssp. (Fig. 6C), in other words not showing notable differences from either taxon.

FEMALE: (Fig. 2I): Forewing length 22 mm (n=1). Wings: as illustrated. Head, thorax, abdomen: similar to male. Genitalia: not examined.

**Types:** HOLOTYPE ♀, PERU: Cuzco: Rio Santa María, 7-14 km E Alfamayo, [13°35′5′′S,72°23′22′′W], 2700-3000 m, (Lamas, G.), 6 Oct 1981, [MUSM-ENT-007887], (MUSM).


**Etyymology:** The name is derived from that of the type locality, and it is treated as a masculine noun in apposition.

**Taxyonomy and variation:** Characters supporting recognition of this taxon as conspecific with *A. p. pyrrhosticta* are discussed under the description of the nominate subspecies. Obviously it would be desirable to obtain additional material of this taxon and *A. pyrrhosticta apurimac*, to better assess geographic variation. Available data show these taxa to be allopatric and consistently different in the small series examined. To our knowledge, no specimens of *A. pyrrhosticta alfamayo* have been collected in the last 42 years, and thus we prefer to name this taxon now rather than wait in the hope that further material might become available for study.

**Distribution and natural history:** Label data for this taxon suggest that it occurs from 2700-3000 m, at lower elevations than the neighboring *A. p. apurimac* n. ssp., in the upper headwaters of the Rio Urubamba (Fig. 9A). The collector of the female specimen, Jean-Claude Weiss, reported to PB (pers. comm.) that he collected at Kiteni on 20-21 July 1978, and thus the specimen was most likely collected between Abra Málaga and Quillabamba on his way to or from Kiteni, the elevation of which (approximately 600 m) is clearly too low for this taxon.

**Actinote eresia albesia** Lamas & Willmott, new subspecies Figs. 4A,B, 9B

**Diagnosis and identification:** This subspecies is distinguished from all other *A. eresia* subspecies by the typically orange wing areas instead being very pale whitish gray (Fig. 4A,B). In wing pattern, it is perhaps most similar to *A. e. leptogramma*, except for having slightly broader dark borders on the DHW.

**Description:** MALE (Fig. 4A): Forewing length 22.0 mm (n=1). Wings: as illustrated. Head, thorax, abdomen: similar to *A. pyrrhosticta* n. sp. except with tufts of hair-like scales dorso-laterally on patagia yellowish, lacking conspicuous orange subdorsal spots on abdomen, and with pale yellowish (instead of orange) spots ventrally on thorax. Genitalia: not examined.

FEMALE: (Fig. 4B): Forewing length 29.5 mm (n=1). Wings: as illustrated. Head, thorax, abdomen: similar to male. Genitalia: not examined.

**Etymology:** The name is derived from that of the type locality, and it is treated as a masculine noun in apposition.

**Taxyonomy and variation:** Characters supporting recognition of this taxon as conspecific with *A. p. pyrrhosticta* are discussed under the description of the nominate subspecies. Obviously it would be desirable to obtain additional material of this taxon and *A. pyrrhosticta apurimac*, to better assess geographic variation. Available data show these taxa to be allopatric and consistently different in the small series examined. To our knowledge, no specimens of *A. pyrrhosticta alfamayo* have been collected in the last 42 years, and thus we prefer to name this taxon now rather than wait in the hope that further material might become available for study.
Types: HOLOTYPE ♀, PERU: Amazonas: Quebrada ‘Chiro’ [=Chido], [ca. 5°49'S,78°02'W], 2300-2500 m, (Lamas, G.), 24 Aug 1998, (MUSM).

PARATYPES (8♂, 1♀): PERU: Amazonas: Alto Nieva, [ca. 5°40'S,77°47'W], 2000-2500 m, (local collector), Apr 2005, 2♂, (PIBO); Quebrada Chido, [5°50'S,78°00'W], 2300-2500 m, (Cádiz, V. B.), Nov 1999, 1♂, (MUSM); San Lorenzo, [5°48'S,77°58'W], 2300 m, (Pintado, J.), Feb 2011, 1♂, (MUSM); Oso Perdido, [5°43'S,77°50'W], 2125 m, (Pintado, J.), Apr 2015, 2♂, (MUSM); Pomacochas, [5°49'S,77°58'W], 2200 m, (Pycz, T. W.), 17 Aug 1998, 2♂, (CEPUJ); Country unknown: Not located: no data, 1♂, (CEPUJ).

Etymology: The name is an amalgam of the feminine Latin adjective alba, meaning white, and the species name eresia, and it is treated as a feminine noun in apposition.

Taxonomy and variation: Characters supporting recognition of this taxon as conspecific with A. eresia eresia are discussed under the description of A. pyrrhosticta n. sp. A male specimen from Peru, Amazonas, Molinopampa, in the CEPUJ has a narrow black DHW border (as in A. eresia eresina) but washed-out orange markings, especially in FW cell 2A-Cu, (Fig. 4E), and perhaps represents a transitional phenotype between A. e. albesia n. ssp. and A. eresia eresina.

Distribution and natural history: This taxon is known only from northeastern Peru in Amazonas (Fig. 9B), where it is known only from the type locality from 2700-2800 m.

Actinote eresia canyaris Pyrcz & Lamas, new subspecies  Figs. 4C, D, 7A, 9B

Diagnosis and identification: This subspecies differs from A. eresia leptogramma by having darker dorsal orange markings, a broader black area separating the basal orange area of the DFW from the orange postdiscl band (resulting from loss of the orange postdiscl spots that are present in A. e. leptogramma) in the basal part of cell Cu$_{-}$M, and just distal of the discocellular veins), no dark spot in the middle of the FW discal cell orange area, a very indistinct dark discal line within the DHW orange area, and less contrasting ventral coloration (Fig. 4D, E).

Description: MALE (Fig. 4C): Forewing length 22.5 mm (n=1). Wings: as illustrated. Head, thorax, abdomen: as in A. eresia albesia except with dark orange scale tufts on patagia and ventral thorax spots orange. Genitalia (Fig. 7D): similar to nominate subspecies (Fig. 7A) except vulva broader and blunter, as in A. eresia leptogramma.

FEMALE: (Fig. 4D): Forewing length 26.2 mm (n=1). Wings: as illustrated. Head, thorax, abdomen: similar to male. Genitalia: not examined.


Etymology: The subspecies name is derived from that of the type locality and is treated as a feminine noun in apposition.

Taxonomy and variation: Characters supporting recognition of this taxon as conspecific with A. eresia eresia are discussed under the description of A. pyrrhosticta n. sp., and this hypothesis is supported by analysis of DNA barcode sequence data (Fig. 1). With only two specimens known it is not possible to reasonably assess variation.

Distribution and natural history: This is the only representative of A. eresia so far known from the western Andes in Peru (Fig. 9B), where it is known only from the type locality from 2700-2800 m.

Actinote hilaris arcoiris Willmott & Hall, new subspecies Figs. 5C-H, 7E, 9B, 11J

Diagnosis and identification: This new subspecies (Fig. 5C-H) is perhaps superficially most similar to the nominate subspecies (Fig. 5K-L), which occurs from central Peru (Pasco) to the northern Andes of Bolivia. It may be distinguished from that subspecies by having slightly paler orange coloration, and, in the male, by the basal half of the VHW being dark orange, rather than being predominantly yellowish white. Females may be superficially similar to those of A. eresia leptogramma, but can be distinguished by the broad, even black band separating the basal orange area from the orange postdiscl band on the VFW, instead of having a thin, irregular black line which appears to fork at the costa. Although this taxon is also superficially similar to other less closely related Andean Actinote, the whitish band through the middle of the VHW distinguishes this species.

Description: MALE (Fig. 5C): Forewing length of HT 27.5 mm (22.0-27.7 mm, mean 25.8 mm, n=10). Wings: as illustrated. Head, thorax, abdomen: as in A. pyrrhosticta n. sp., except with 39 antennomeres, frons with dense, long, black, hair-like scales, patagia black, ventral spots on thorax orange, mesothorax meron with patch of very long, yellow, hair-like scales, abdomen black except for scattered ventral orange scaling in middle of sternites and thin lateral line of yellow scales just dorsal of sternites. Genitalia (Fig. 7E): similar to nominate subspecies (pers. obs.).

FEMALE: (Fig. 5D-H): Forewing length mean 30.5 mm (26.3-32.5 mm, n=4). Wings: as illustrated, variable with respect to color of basal half of DFW and width and color of DFW postdiscl band. Head, thorax, abdomen: similar in color to male, saphraxis present in two examined specimens as a broad, blunt rectangular plate extending beyond ventral edge of sternites, similar to A. hilaris sourouxi n. ssp. (Fig. 2L). Genitalia: not examined.

Types: HOLOTYPE ♀, ECUADOR: Morona-Santiago: Guaramales/ Hidrapuente, [2°34’34”S,78°30’46”W], 1800 m, (Mett, J-C.), 29 Oct 2009, 1♀, (JEPE); km 22 Limón-Gualaceo rd., [3°0’30”S,78°32’20”W], 2100 m, (Willmott, K. R.), 25 Nov 2003, [DNA voucher LEP-01555; Genitalic dissection KW-19-065], (MGCL, to be deposited in INABIO).

PARATYPES (1♂, 1♀): ECUADOR: Morona-Santiago: Guaramales/ Hidrapuente, [2°34’34”S,78°30’46”W], 1800 m, (Mett, J-C.), 29 Oct 2009, 1♀, (JEPE); km 22 Limón-Gualaceo rd., [3°0’30”S,78°32’20”W], 2100 m, (Willmott, K. R.), 25 Nov 2003, [DNA voucher LEP-01555; Genitalic dissection KW-19-065], (MGCL, to be deposited in INABIO).

Other records: Ecuador: Morona-Santiago: Alshî, [2°13′47″S, 78°13′11″W], (Wohluter, A. & L.), 19 Sep 2002, 1 ♂, (AWLW) (Wohluter, A. & L. (pers. comm. with CD of images to KRW)); Guarumales/Hidropauta, [2°34′34″S, 78°30′46″W], (Petit, J.-C.), 1 ♀, (JEPE); Loja: c. 3 km ESE Loja, Escuela Amauta, [4°2′38″S, 79°10′24″W], 2300 m, (Piedra, V.), 30 Apr 2022, 1 ♂, (photograph of live specimen) (https://www.inaturalist.org/observations/114043083).

Etymology: The subspecies name is derived from that of the type locality and is also the Spanish word for ‘rainbow’. It is treated as a masculine noun in apposition.

Taxonomy and variation: Characters supporting recognition of this taxon as conspecific with *A. hilaris hilaris* are discussed
under the description of *A. pyrrhosticta* n. sp. DNA barcode sequence data support conspecificity of this taxon with *A. hilaris sourakovi* n. ssp. and *A. hilaris desmiala* (Fig. 1). Mean pairwise sequence divergence within *A. hilaris* was 0.9%, and mean between-group divergence was 3.9% (*A. hilaris/A. eresia* and 4.5% (*A. hilaris/A. pyrrhosticta*). The female of this taxon is rather variable in the tone of the FW orange markings, the extent to which the orange DFW basal area is obscured with black scaling, and in the color of the DFW postdiscal band, which may be a pale cream color (Fig. 5D-H). We have not examined a sufficient number of specimens to determine whether females of *A. hilaris arcoiris* n. ssp. can be consistently distinguished from those of the nominate subspecies (Fig. 5L), but these two taxa are widely disjunct.

**Distribution and natural history:** This subspecies is known from central to southeastern Ecuador in the provinces of Morona-Santiago and Zamora-Chinchipe, where it is rather
rare and typically found in relatively undisturbed cloud forest from 1600-2300 m. In Ecuador, males were found feeding on flowers in the forest canopy 20 m above the ground from 10:00-11:00 hr and 14:00-16:00 hr, and were also observed flying 2-3 m above a forested river in bright sun from 10:00-11:00 hr. A female was encountered flying 4 m above the ground over a ridgetop road through forest at 13:00 hrs, and two others were observed puddling solitarily in the morning at damp sand, not in the company of males.

**Actinote hilaris sourakovi** Willmott & Lamas, **new subspecies**

**Figs. 2L, 5I,J, 7F, 9C, 11K,L**

**Diagnosis and identification:** This subspecies is easily distinguished from all other taxa within *A. hilaris*, *A. eresia* and *A. pyrrhosticta* **n. sp.** by the entirely black DFW basal area (Fig. 5I,J). The VHW is similar to that of *A. hilaris hilaris* in having pale yellowish white scaling extending from the base.
to the edge of the pale postdiscal band in the posterior half of
the wing, and in this respect it differs (in males) from A. hilaris arcoiris n. ssp.

**Description:** MALE (Fig. 5I): Forewing length of HT 27.9 mm (27.9-31.4
mm, mean 29.8 mm, n=4). Wings: as illustrated. Head, thorax, abdomen: as in A. hilaris arcoiris n. ssp., except ventral thoracic spots on katepisternum and epimeron orange (not yellow). Genitalia (Fig. 7F): similar to A. hilaris arcoiris (Fig. 7E) and nominate subspecies (pers. obs.).

FEMALE: (Fig. 5J): Forewing length mean 34.3 mm (32.8-36.7 mm, n=3).
Wings: as illustrated. Head, thorax, abdomen: similar to A. hilaris arcoiris n. ssp., including sphragis (Fig. 2L) (present in three specimens). Genitalia: not examined.

**Types:** HOLOTYPE: ♂ ECUADOR: Zamora-Chinchipe: Reserva Tapichalaca, Quebrada Honda trail, [4°28′21″S,79°7′18″W], 1900 m, (Willmott, K. R.), 30 Nov 2005, [FLMNH-MGCL-111075; DNA voucher LEP-00007; Genitalic dissection KW-19-064], (MGCL, to be deposited in INABIO).

PARATYPES: 12 ♂, 11 ♀: ECUADOR: Loja: ‘above Yangana’ [=La Entrada], [4°25′0″S,79°9′18″W], 2500 m, (Aldas, I.), May 2000, 1 ♂, (PIBO); (Boyer, P.), May 2000, 3 ♂, (PIBO); Zamora-Chinchipe: above Valladolid, [4°31′18″S,79°7′48″W], (Sourakov, A.), 17-21 May 1993, 1 ♀ [FLMNH-MGCL-281001], (MGCL); above Valladolid, [4°33′18″S,79°7′48″W], 2000 m, (Sourakov, A.), 17-21 May 1993, 1 ♀, (MGCL); km 4.3 San Andrés-Jimbura rd., [4°47′53″S,79°18′34″W], 2010, 1 ♂, (Willmott, K. R.), 30 Oct 2010, 1 ♂ [FLMNH-MGCL-146473], (MGCL); km 5.3 San Andrés-Jimbura rd., Finca San Carlos, [4°47′53″S,79°18′34″W], 2000 m, (Willmott, K. R.), 15 Oct 2010, 1 ♀ [FLMNH-MGCL-145578], (MGCL); km 8 Valladolid-Tapala rd., [4°32′22″S,79°6′21″W], 1600 m, (Willmott, K. R.), 1 Dec 2005, 1 ♀ [FLMNH-MGCL-111076], (MGCL); Reserva Tapichalaca, Quebrada Honda trail, [4°28′21″S,79°7′18″W], 1900 m, (Willmott, K. R.), 30 Nov 2005, 1 ♀ [FLMNH-MGCL-111074], (MGCL).

**Other records:** PERU: Amazonas: 2 km NW Ocol, [6°15′S,77°35′W], 2550 m, (Grados, J.), 19 Aug 1998, 1 ♀ [MUSM-ENT-7540], (MUSM); 3 km N Nueva Esperanza, Quebrada Piruro, [6°23′S,77°26′W], 1700 m, (Wejtsiak, J.), 19 Sep 1999, 1 ♀, (CEPUJ); 5 km N Molinopampa, [6°10′5″S,77°39′W], 3000 m, (Grados, J.), 20 Aug 1998, 1 ♀ [MUSM-ENT-7538], 1 ♀ [MUSM-ENT-7539], (MUSM); Rodríguez de Mendoza, ‘Hingil Pata’ [=Inguilpata], [6°14′S,77°57′W], 2300 m, (Calderón, B.), 2 Sep 1998, 1 ♀, (CEPUJ); Rodríguez de Mendoza, ‘Llanocauco’ [=Quebrada Yanahuayco], [6°24′S,77°26′W], 1600-2000 m, (Pyrcz, T. W.), Sep 1998, 1 ♀, (CEPUJ); Molinopampa-El Tingo, [6°13′15″S,77°38′37″W], 2400 m, (Pyrcz, T. W.), 26 Jun 1998, 1 ♀, (CEPUJ); Pomacochas, [5°49′S,77°58′W], 2200 m, (Calderón, B.), 18 Aug 1998, 1 ♀, (CEPUJ); Quebrada La Florida, [5°45′27.86″S,78′0′4′34″W], 2133 m, (Quispe, E. R.), 16 Nov 2019, 1 ♀, (MUSM); Cajamarca: Naranja, [6°16′S,78°51′W], 2300 m, (Grados, J.), 19 Oct 1998, 1 ♀ [MUSM-ENT-7541], (MUSM); Provincia ciega. San Ignacio, nr. C[entre], P[oblado] Pueblo Libre, [5°06′2″S,79°14′12″W], 2070 m, (Sánchez, P.), 9 Oct 2017, 1 ♀, (MUSM); San Martín: ‘Jorge Chávez’ – (error), (Calderón, B.), Jul 2005, 1 ♀, (PIBO); Puente Nueva, [5°41′S,77°47′W], 2025 m, (Lamas, G.), 9 Nov 1998, 1 ♀ [MUSM-ENT-7542], (MUSM).

**Etymology:** This distinctive taxon is named for Andrei Sourakov, in recognition of many years of friendship, wit, lively debate and forthright criticism. Andrei also collected the first known specimens of this subspecies from Ecuador, during a remarkably successful expedition to the Valladolid region (KRW, JPWH).

**Taxonomy and variation:** Characters supporting recognition of this taxon as conspecific with A. hilaris hilaris are discussed under the description of A. pyrrhosticta n. sp. DNA barcode sequence data support conspecificity of this taxon with A.
Figure 9. Maps depicting recorded localities for Actinote taxa. A) *A. pyrrhosticta* n. sp.; B) *A. eresia*; C) *A. hilaris*; D) *A. trinacria*. 
hilaris arcoiris n. ssp, and A. hilaris desmiala (Fig. 1). The width of the FW orange band is slightly variable.

**Distribution and natural history:** This subspecies occurs from extreme southern Ecuador (Zamora-Chinchipe, in the upper valleys of rivers that flow into the Río Marañón) through northern Peru as far south as San Martín (Fig. 9C). A historical specimen from Pasco, within the distribution of the nominate subspecies, seems likely to be mislabeled. The taxon is found in relatively undisturbed cloud forest from 1600-2550 m (with one record from 3000 m), where it is uncommon. In Ecuador, both sexes were found feeding on flowers along the edges of rivers and roads in the mid-morning. One little-damaged male was found in early December dead on the ground by a stream in the morning, during a period of unusually clear and cold nights.

**Figure 10.** Habitats of new Actinote taxa. A) Ecuador, Loja, Jimbura-San André road, type locality of Actinote pyrrhosticta n. sp., stream gully and road where numerous individuals were observed on the morning of 12 June 2014; B) Peru, Cajamarca, El Pargo, habitat of A. pyrrhosticta n. sp. C) Peru, Apurímac, Santuario Nacional Ampay, Laguna Angasocha, type locality of A. pyrrhosticta apurimac n. ssp. D) Peru, Apurímac, Santuario Nacional Ampay, Laguna Uspacocha, habitat of A. pyrrhosticta apurimac n. ssp. E) Peru, Lambayeque, Canaris, type locality of Actinote eresia canyaris n. ssp. F) Ecuador, Zamora-Chinchipe, San Francisco, type locality of Actinote hilaris arcoiris n. ssp.
**Actinote trinacria alegria** Boyer & Willmott, new subspecies

Figs. 7G, 8C,D, 9D

**Diagnosis and identification:** This subspecies is distinguished from other *A. trinacria* (C. Felder & R. Felder, 1862) taxa by the dark DFW, lacking any orange markings in the discal cell (otherwise occurring only in *A. trinacria tenebrarum* Oberthür, 1917), and by the unique whitish patches in the basal third of the DHW (Fig. 8C,D). The ground color of the wings is dark brown, rather than black as in other subspecies of *A. trinacria*.

**Description:** MALE (Fig. 8C): Forewing length 24.2 mm (n=1). Wings: as illustrated, veins M, and Rs fused near their base. Head, thorax, abdomen: as in nominate subspecies, including spots of orange-yellow scales on ventral thorax near base of legs which appear to be smaller than in nominate subspecies, and no orange-red line down middle of ventral abdomen, in contrast to *A. t. trinacria* and *A. t. naura*. Genitalia (Fig. 7G): uncus curving downwards, valva elongate, narrow, of even width throughout most of length, upwardly curved in middle.

FEMALE: unknown.

**Types:** HOLOTYPE ♂: ECUADOR: Sucumbios: El Calvario-La Alegria rd., [0°36'N,77°28'36"W], 2800 m, (Boyer, P.), 26 Nov 1999, (PIBO, to be deposited in CEPUJ).

**Other specimens examined** (see discussion under Taxonomy and variation) (2 ♂): COLOMBIA: Caucá: eastern slopes of Cordillera Central, [Santa] Leticia to Puracé, [2°17'53"N,76°13'57"W], 2650-2700 m, (Adams, M. J., Hardy, P. J.), Aug 1979, 1 ♂, (NHMUK); San Juan de Villalobos km 90, [1°29'53"N,76°22'32"W], 1800 m, (Prieto, C.), 22 Jun 2013, 1 ♂ [g 066], (RCCP) (photograph examined).

**Etymology:** The subspecies name is derived from that of the type locality, and is also, appropriately, the Spanish word for ‘happiness’, given the serendipity of the collection of the type locality, and is also, appropriately, the Spanish word.

**Taxonomy and variation:** This taxon is associated with other taxa currently treated as subspecies of *A. trinacria* on the basis of several shared characters, including: relatively small size, whitish gray VHW discal cell contrasting with reddish spots at the base of the wing anterior and posterior of the discal cell, and indistinct whitish-gray VHW postdiscal band tapering anteriorly (e.g., Fig. 8A,B). The genitalia of the holotype of *A. trinacria alegria* n. ssp. are similar to those of a dissected specimen of *A. trinacria trinacria* (Colombia, Boyacá, vic. Arcabuco, in MGCL) in having narrow, upwardly curving valvae, a character that may prove to be distinctive for this species. We examined two Colombian specimens (Fig. 8D) that are similar to this taxon in lacking conspicuous orange DFW markings and in the pale shading in the basal half of the DHW, although both differ from the holotype of *A. t. alegria* n. ssp. in having more muted whitish gray coloring on the HW, especially the specimen from Leticia-Puracé, and in the orange on the VFW being reduced (absent in cell Cu₁-M₁ and reduced in cell 2A-Cu₁). In addition, the figured Colombian specimen from Leticia to Puracé (Fig. 8D) differs from the holotype of *A. trinacria alegria* n. ssp. (Fig. 8C) in having HW veins M₁ and Rs separate at their bases. Although the fusion or not of the bases of these two veins can be taxonomically important in *Actinote* (e.g., see description of *Actinote balletae* Neild & Romero, 2008 (Neild, 2008: 32)), in this case the difference seems to represent intraspecific variation, since the other Colombian specimen has these veins touching where they leave the discal cell, intermediate between the two states discussed above. Furthermore, we observed similar variation in other species of *Actinote*, such as *A. johncoulsoni* Willmott, Lamas & Hall, 2017 and *A. stratonice* (Lateirell, [1813]). The two Colombian specimens are regarded at present as representing the same taxon as the Ecuadorian holotype, but were excluded from the type series and may ultimately prove to represent a distinct subspecies.

**Distribution and natural history:** This taxon is the southernmost representative of *A. trinacria*, occurring in northeastern Ecuador in Sucumbios, potentially to southern Colombia in Cauca on the eastern slopes of the Cordilleras Central and Oriental (Fig. 9D). The three specimens discussed here were collected between 1800-2800 m. The holotype was found crawling across a damp, dirt road through cloud forest on a very cool, overcast morning.

**Annotated checklist of relevant species**

A single dash before a name indicates a valid subspecific name and two dashes indicates a synonym. All distributions from Ecuador to Bolivia are on the eastern slopes of the Andes unless otherwise noted.

**pyrrhosticta** Lamas, Willmott & Hall, n. sp. [Fig. 2A-C; S.W. Ecuador (Loja to N.W. Peru (Cajamarca, Piura)]

- quintecocha Lamas & Willmott, n. ssp. [Fig. 2D; N. Peru (Amazonas)]

- apurimac Lamas & Willmott, n. ssp. [Fig. 2E-G; S. Peru (Apurimac, Cuzco)]

- alfanayo Lamas & Willmott, n. ssp. [Fig. 2H-I; S. Peru (Cuzco)]

- n. ssp.? [Fig. 11I; Peru (La Libertad)]; photographs of live butterflies taken by Jonathan Newman (Fig. 11I) and Remco Hofland (https://observation.org/observation/175942503/) on the same day at Cochorco, La Libertad, Peru (7°45'28"S,77°46'20"W) may represent an additional undescribed subspecies not yet represented in any collection. These specimens are similar to the nominate subspecies but the outer edges of the orange postdiscal bands on both wings are tinged pale yellowish. Hofland (pers. comm.) reported seeing approximately 20 adults in the early afternoon of 7 July 2019 at Cochorco, which is also one of the few known sites for the extremely localized endemic Peruvian hummingbird Purple-backed Sunbeam (*Aglaeactis aliciae* Salvin). Given the large gaps within the distribution of *A. pyrrhosticta*, additional undescribed taxa seem likely.

**eresia** (C. Felder & R. Felder, 1862) [Fig. 3A,B; E. Colombia (Cordillera Oriental)]

- lacrymosa Oberthür, 1917 [Fig. 3C,D; C. Colombia (Cordillera Central)]
Figure 11. Images of new *Actinote* taxa in nature. A,B) Mating pair of *Actinote pyrrhosticta* n. sp., female in foreground (A), and male (B), resting on rocks and low vegetation near edge of stream gully at type locality; C-H, *Actinote pyrrhosticta* apurimac n. ssp., Peru, Cuzco, above Mollepata (photographs by David Geale). C) Last instar; D) Pupal case with freshly emerged adult adjacent; E) Cluster of pupae; F,G) Males nectaring on Asteraceae flowers; H) Female nectaring on Asteraceae flowers; I) *Actinote pyrrhosticta* n. ssp.?, Peru, La Libertad, Cochorco (photograph by Jonathan Newman); J) *A. hilaris* arcoiris n. ssp. female, puddling on damp gravel, Ecuador, Morona-Santiago, Cebadas-Macas road; K,L) *Actinote hilaris* sourakovi n. ssp. female, dorsal (K) and ventral (L), Peru, Amazonas, Abra Patricia (photographs by David Geale).
- leptogramma Jordan, 1913 [Fig. 3E-H; Ecuador (Sucumbios to Zamora-Chinchipe)]; the valva of the male genitalia in A. e. leptogramma (Fig. 7B) is noticeably broader and blunter than that of A. e. eresina (Fig. 7C) and the nominate subspecies (Fig. 7A), but it is similar to that of A. e. canyaris (Fig. 7D). Furthermore, the single available sequence of A. eresia eresina (AC87), from Cochabamba, Bolivia, did not form a clade with the remaining A. eresia sequences from Colombia and Ecuador (Fig. 1). Finally, in the few examined specimens, the sphenogaster of A. e. eresina was squared at the tip, and blunter than the pointed sphenogaster of A. e. leptogramma. Collectively, these observations suggest that A. e. eresina might perhaps be considered a species distinct from remaining A. eresia taxa, but the relatively close allopatry of known taxa suggests that they should conservatively be treated as conspecific until more data are available. Two specimens of A. eresia from west Colombia (Cauca) in the CEPUJ (Fig. 3J) and RCCP are somewhat intermediate in wing pattern between A. e. leptogramma and typical A. e. lacrymosa, and may represent an undescribed subspecies, but given the variability within A. e. leptogramma and A. e. lacrymosa, we feel that more material is needed to clarify the taxonomy. Similarly, the southernmost known specimen of A. e. leptogramma, a female from the Jimbura-San Andrés road on the southern Ecuador-northern Peru border (PIBO), might represent a distinct subspecies, although it only differs from that shown in Fig. 3J in having more reduced orange at the base of the DFW.

- albesia Lamas & Willmott, n. ssp. [Fig. 4A,B; N. Peru (Amazonas)]
- canyaris Pyycz & Lamas, n. ssp. [Fig. 4C,D; N.W. Peru (Lambayeque)]
- eresina (Hopffer, 1874) [Fig. 4E-O; N. Peru (Amazonas, an apparently intermediate specimen to albesia Fig. 4E) to Bolivia (Cochabamba)]; Lamas (2004) listed several additional undescribed subspecies from Peru, which we here provisionally treat as A. eresia eresina. There is substantial variation within A. eresia eresina, both geographic (clinal?) and local, which includes, in particular: the presence or absence of a black spot in the middle of the FW discal cell, the separation or fusion of the DFW orange postdiscal band with the immediately basal orange area, the width of the dark margin in the DFW tornus and on the DFWH, and the overall dorsal color, which varies from pale orange to a darker reddish orange (Fig. 4F-O). At least some locally distinctive phenotypes seem to be stable, but overall the picture is complex. Furthermore, the lack of DNA sequence data hinders recognition of genetically well-defined populations that might correspond with wing pattern differences, and the fact that the single available sequence for A. e. eresina does not group with other A. eresia (see discussion above under leptogramma) suggests that a thorough molecular and morphological study of A. eresia would be valuable, to determine both species and subspecies limits.

- binghamae Dyar, 1913, n. syn. [Fig. 4K]; Lamas (2004) retained Actinote binghamae Dyar, 1913 as a valid subspecies, but the type locality (San Miguel, Cuzco, Peru) lies within the range of A. eresia eresina. A somewhat similar specimen in the PIBO from Peru, Puno, Sina (Fig. 4L), and another from Peru, Huánuco, E Acomayo (not figured) suggests that the holotype of binghamae is a form of A. eresia eresina, and we therefore place the name in synonymy (n. syn.).

hilaris Jordan, 1910 [Fig. 5K,L; C. Peru (Pasco) to Bolivia (Santa Cruz)]
- desmiala Jordan, 1913 [Fig. 5A,B; N.W. Ecuador (Carchi to Pichincha), N.E. Ecuador (Sucumbios to Tungurahua)]
- culoti (Obertühr, 1916)
- - brownorum (Potts, 1943)
- - arcoiris Willmott & Hall, n. ssp. [Fig. 5C-H; S. Ecuador (Morona-Santiago to Zamora-Chinchipe)]
- - sourakovi Willmott & Lamas, n. ssp. [Fig. 5LJ; S. Ecuador (Zamora-Chinchipe) to C. Peru (San Martin)]

trinacria (C. Felder & R. Felder, 1862) [Fig. 8A; E. Colombia (E. slope Cordillera Oriental)]
- - iguaquensis Andrade & Restrepo, 1992
- - naura (Druce, 1875) [Venezuela (Cordillera de Mérida)]
- - chea Druce, 1903 [E. Colombia (W. slope Cordillera Oriental)]; three males in the HAWA from Colombia, Cundinamarca, Chicaque road, resemble A. t. trinacria but have reduced red on the DFW, and may represent a distinct subspecies. A male specimen with similar wing pattern in the HAWA was collected further north, in Boyacá, thus leap-frogging the distribution of A. trinacria chea on the western slopes of the Cordillera Oriental. There is thus the possibility that these specimens represent transitional forms between subspecies, and we refrain from describing new taxa until the distribution of these forms becomes better known.

- - tenebrarum Oberthür, 1917 [Fig. 8B; C. Colombia (Cordillera Central)]
- - - unicolor Talbot, 1932
- - - vivasi Neild & Romero, 2008 [N. Colombia (Santander) to Venezuela (Sierra de El Tamá)]
- - - santamarta (Winhard, 2017) [N. Colombia (Sierra Nevada de Santa Marta)], rev. stat. Winhard (2017) introduced the name Altinote santamarta with a simple description of the taxon, without a diagnosis, which only arguably makes the name available under Article 13.1 of the ICZN (ICZN, 1999) since the characters described were not explicitly “purported to differentiate the taxon”. Lamas (2004) listed this taxon as “Altinote trinacria n. ssp. [2]”, since it shares a number of wing pattern characters with other taxa currently treated as subspecies of A. trinacria, as discussed under the description of A. t. alegria, and we here place it as a subspecies of Actinote trinacria. Actinote trinacria santamarta is most similar in wing pattern to A. trinacria naura and A. trinacria vivasi, but differs from both in having a reddish mark at the end of the DFW discal cell, and a DFW subapical band of three reddish marks in cells M₃-R₃.

- - alegria Boyer & Willmott, n. ssp. [Fig. 8C,D; S. Colombia (Cauca) to N. Ecuador (Sucumbios)]
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LITERATURE CITED


### Appendix I. Voucher specimen information for DNA sequence data.

<table>
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<th>Taxon</th>
<th>Locality (decimal latitude and longitude)</th>
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<th>GenBank number</th>
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