ANNALES HISTORICO-NATURALES MUSEI NATIONALIS HUNGARICI
Volume 89. Budapest, 1997 pp. 141–150.

New species of Cyanophrys sensu lato from the Andean region of Argentina (Lepidoptera: Lycaenidae)

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BÁLINT, ZS. & JOHNSON, K. (1997): New species of Cyanophrys sensu lato from the Andean region of Argentina (Lepidoptera: Lycaenidae, Lycaenidae). – *Annls hist. nat. Mus. natn. hung.* **89**: 141–150.

Abstract – Four new species are described from tropical forest remnants in upland regions of northwestern Argentina: *Cyanophrys mykros*, *C. nescus*, *C. octonarius*, and *Plesiocyanophrys runa*. The species have been previously mentioned in literature concerning endemic upland faunas of the region but never formally described. With 18 figures.

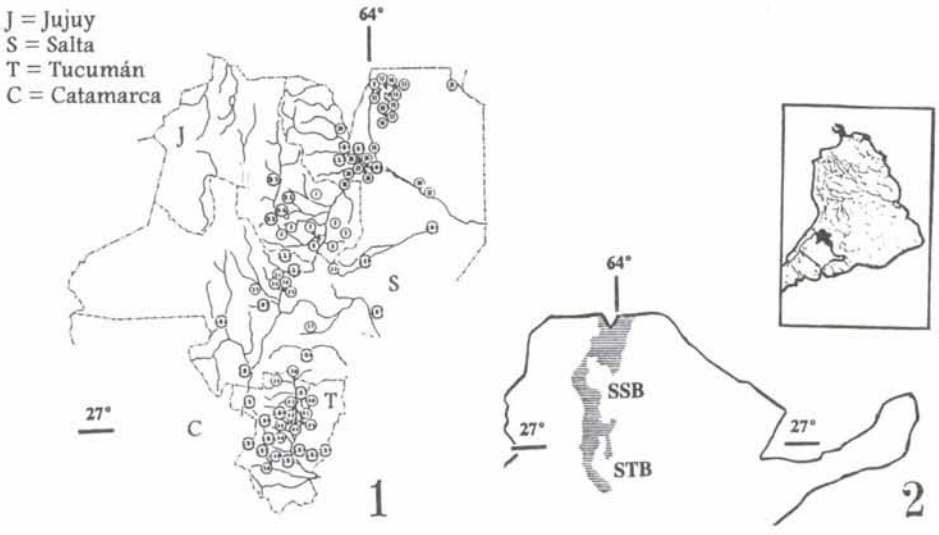
INTRODUCTION

Over the last years the present authors have published numerous studies of polyommatine lycaenids from the Andean region of South Amercia. In a biogeographical study concerning the origin of the Andean butterfly fauna, DESCIMON (1986) mentioned some species of the eumaeine lycaenid genus *Cyanophrys* CLENCH, 1961 (CLENCH 1961) which were unique to uplands of northern Argentina. Generally, this genus typifies tropical forests throughout lowland regions of the neotropics. However, the Andean uplift appears to have fostered the vicariant origin of several *Cyanophrys* species in northern Argentina where remnant tropical forests persist in scattered colonies near and south of the Tropic of Capricorn (JOHNSON 1995 and Figs 1–2). To date, these species have remained undescribed.

JOHNSON (1980, doctoral dissertation unpublished for taxonomic purposes) first elaborated various northern Argentine *Cyanophrys* mentioned by DESCIMON (1986). Since then, additional material from the Instituto Miguel Lillo (Tucumán, Argentina), ROBERT C. EISELE (Jujuy, Argentina) and BRUCE MACPHERSON (Salta, Argentina) has allowed further verification of these entities. Since *Cyanophrys* species share a common adaptive trait of the wing dorsa (an iridescent blue "flash" pattern), congeners do not differ much in macular pattern. Fortunately for diagnostic purposes, the montane *Cyanophrys* of Ar-

gentina are more divergent in wing pattern than most members of the genus. Accordingly, the purpose of the present paper is to describe these new entities so they can be properly monitored in future biological work concerning the region.

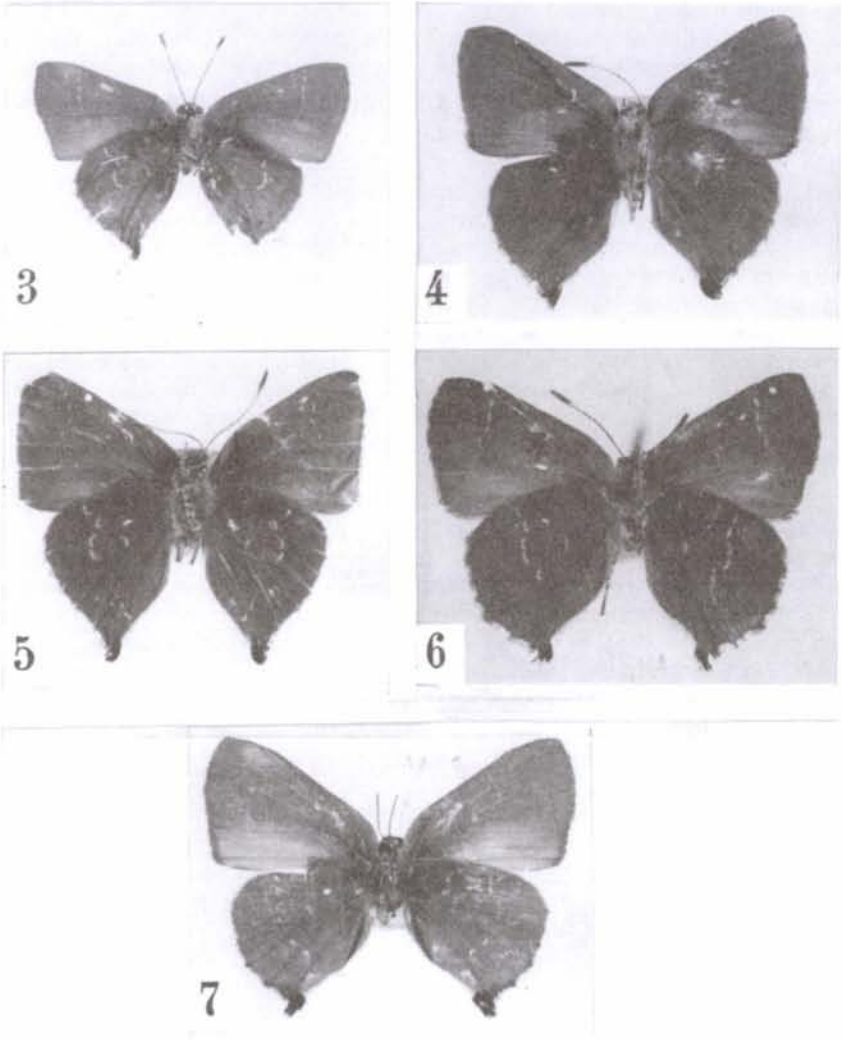
We employ the generic taxonomy of JOHNSON *et al.* (1993) and descriptive terminology of JOHNSON *et al.* (1988, 1990). For descriptive convenience we employ the "common usage" species groups originating with CLENCH (1944, 1946). We use the abbreviations DFW, DHW and VFW, VHW for dorsal and ventral fore- and hindwings, respectively. For consistency, we conform primary types to the specimen originally so-labelled by JOHNSON (1980), using subsequently added material as paratypes. As appropriate we use original unpublished names of JOHNSON (1980) except whereas noted in Remarks. Institutional abbreviations (alphabetical order) are as follows: AMNH, American Museum of Natural History; BMNH, The Natural History Museum, London; FSCA, Florida State Collection of Arthropods; HNHM, Hungarian Natural History Museum; IML, Instituto Miguel Lillo (Tucumán,, Argentina); MCZ, Museum of Comparative Zoology, Harvard University; and MNHN, Museum National d'Histoire Naturelle, Paris. Private collections are individually noted.



Figs 1–2. Comparative maps of northern Argentina (64 W longitude, 27 S latitude for orientation). 1 = Provinces of Jujuy (J), Salta (S), Tucumán (T), and Catamarca (C) in relation to dotted locations of recent sampling by lepidoperists (Johnson *et al.* 1988, 1990). 2 = Areas of Fig. 1. (as in South America inset): shaded distribution of tropical and subtropical forest extending southward into northern Argentina. Tropical forests (APN 1987), including northward, "la selva subtropical de montaña" (SSB, from Santa Cruz area of Bolivia down the Andes through Jujuy and into Salta) and, southward, a subtropical satellite "la selva Tucumáno-boliviana" (STB, including the "frost free island" of Tucumán and areas of eastern Catamarca Province)

Cyanophrys CLENCH, 1961 *sensu stricto*

JOHNSON *et al.* (1993) restricted the use of the generic name to the diverse group of species sharing very complex genital components (highly sculptured and with additional components). In ELIOT's (1973) scheme of the Eumaeini such complex components were considered apomorphic. All these species iridescent blue on the dorsum with green venters showing various patterns of white spots, stripes, or mottling.



Figs 3–7. Adults of certain *Cyanophrys* (sensu lato) species (venter only). 3 = holotype male, *Cyanophrys mykros,* 4 = holotype male, *C. nescus,* 5 = holotype male, *C. octonarius.* 6 = allotype female, *C. octonarius,* 7= holotype female, *Plesiocyanophrys runa*

"*remus*" species group

Cyanophrys mykros sp. n.
(Figs 3, 8–10)

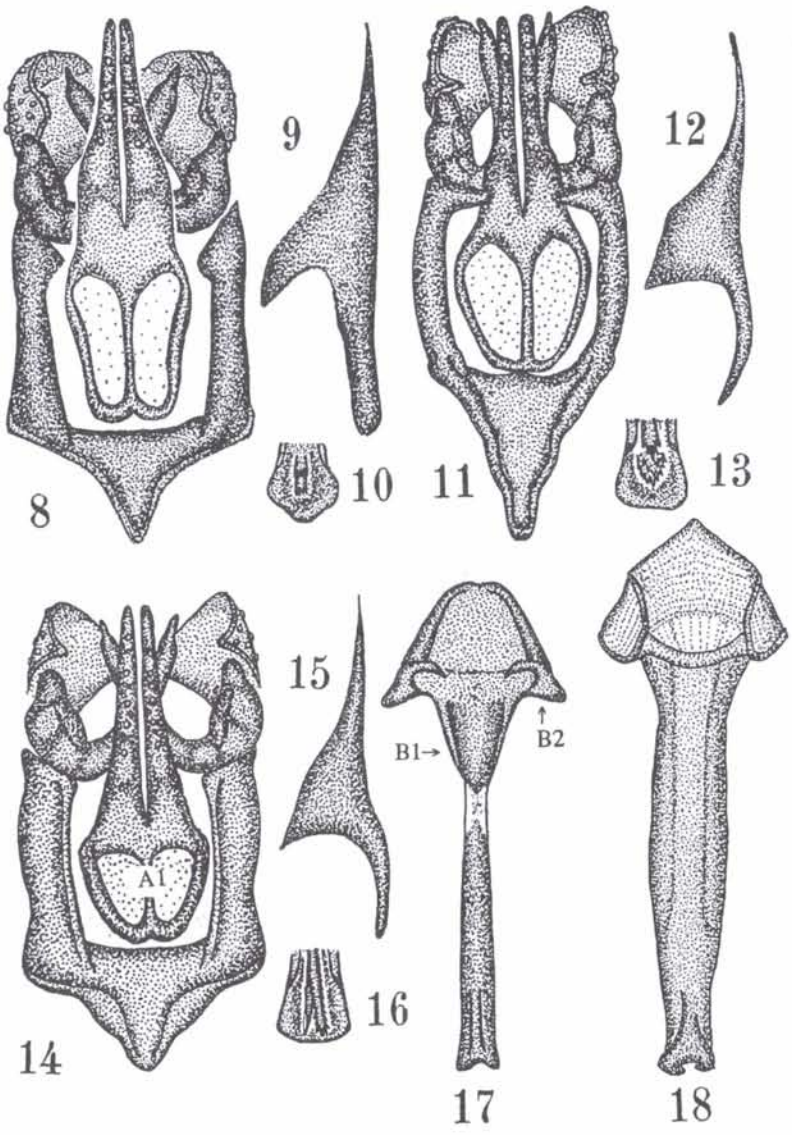
Diagnosis. A small (FW 10–11 mm) tailless species with extremely distended HW anal lobe and, on VHW, crescent-shaped white markings paralleling each other in the postbasal and medial areas. The species resembles no other in the region and, in the neotropics, can be readily separated from *C. remus* (HEWITSON) which has a suffusive yellow-green medial line on the HW, strewn with various specks or slashes of white. The male genitalia of *C. mykros* typify the "remus" group of *Cyanophrys, C. octonarius* showing little flaring the vincular base, a short saccus, and valvae with irregularly elliptic bilobes and unevenly sloped caudal extensions.

Description. Male. Head with frons green. DFW, DHW shiny deep navy blue except for narrow (1 mm) fuscous margins (somewhat wider at FW apex), FW scent brand obscured by dark dorsal color or absent; FW outer margin convex toward apex. HW with greatly distended anal lobe colored centrally blackish brown, no hairlike tails along limbal margin, and with outer margin somewhat crennate between the veins. VFW, VHW chartreuse-hued green except for a grayish black basal area on FW. FW with postmedial line of white spots, costa to cell CuA2, faintly bordered basally with red brown. HW with a costo-postmedial marking made up of two fused white crescents (veins M3 to M1, M1 to Sc + R1) paralleled postbasally by a slash from the discal cell to vein M3; distally, submargin with faint line of red-brown spots across entire wing. FW length: 10.5 mm (holotype), paratypes 10–11 mm. Female. Unknown. Male genitalia: Figs 8–10. Vinculum robust with base slightly flared, saccus short but widely elliptic. Valvae with bilobed areas elliptic but with irregular, slightly concave, lateral margins and an indented base; caudal extensions unevenly sloping to pointed termini. Aedeagus robust, terminus with two modestly spined cornuti.

Type material. Holotype, male (Fig. 3), Argentina, Tucumán [Province], no other data, deposited AMNH. Paratypes. BMNH, same data as primary type (one male). HNHM, Argentina, Salta Province, Cerrillos, 1300 m. (margin of mesic woodland at mountain base), 9 October 1976, leg. B. MACPHERSON (one male). FSCA, Argentina, Salta Province, La Caldera to Jujuy Prov. border, Rt. 9, nr. km. 20, post 1642, 1450 m., 12 February 1991, leg. K. JOHNSON et al (one male). IML. Tucumán [Province], leg. WILLINK, (one male); Tucumán Prov., Villa Nougués [1250 m.], leg. K. J. HAYWARD (one male).

Remarks. General data on the primary types and more detailed data on recent paratypes suggests this species is seldom collected, since K. J. HAYWARD maintained a large collection from Villa Nougués and modernday collections in the region have been very frequent. However, HAYWARD's specimen from Villa Nougués, B. MACPHERSON's from Cerrillos (see JOHNSON *et al.* 1988) and K. JOHNSON *et al.*'s from La Caldera (see JOHNSON *et al.* 1990) suggest the species inhabitats montane mesic subtropical forest (both "la selva subtropical de montaña" northward and "la selva Tucumáno-boliviana" southward, Fig. 2).

Etymology. The Greek name means "small" and refers to the small size and ventral macular pattern in this species.



Figs 8–18. Genitalia of certain *Cyanophrys* (sensu lato) species (males showing three elements: left, ventral view without aedeagus; right, lateral view of valvae; below, aedeagus terminus and cornuti; females showing ductus bursae, ventral view). 8–10. *C. mykros*, holotype, male genitalia. 8 = genitalia, without aedeagus, 9 = lateral view of valva, 10 = aedeagus, terminus and cornuti. 11–13. *C. nescus*, holotype, male genitalia. 11 = genitalia, without aedeagus, 12 = lateral view of valva, 13 = aedeagus terminus and cornuti. 14–16 = *C. octonarius*, holotype, male genitalia (A1 element as indicated in text). 14 = genitalia, without adeagus, 15 = lateral view of valva, 16 = aedeagus terminus and cornuti. 17 = *C. nescus*, allotype, female genitalia (B1 and B2 elements as indicated in text). 18 = *Plesiocyanophrys runa*, holotype, female genitalia

Cyanophrys nescus sp. n.
(Figs 4, 11–13)

Diagnosis. A moderate sized (FW 15.5 mm) species with dorsum bright violaceous blue and venter immaculate deep green except for a faint white slash at the apex of HW discal cell and traces of intercellular brown across the submargin. The genitalia typify the "*miserabilis*" group of *Cyanophrys*, making the species the only described member of this group in South America; the members in Central America have broad suffusions of maroon across the VHW limbal area.

Among *Cyanophrys* the immaculate venter of *C. nescus* is comparable only to *Cyanophrys legionis* (CLENCH, 1944) of the "*acaste*" group. However, this species is dark navy blue on the dorsum, with distended anal lobes on HW, and VHW green not concolorous (rather, showing a distinctly lighter chartreuse hue across the cells of the postmedial area). Male genitalia of *C. nescus* show a funnel-shaped saccus and valvae with widely elliptic bilobes and elongate, unevenly tapered, caudal extensions.

Description. Head with frons green. Male. DFW, DHW bright iridescent violaceous blue with silver hue in basal one-half; margins with narrow (0.5 mm) black borders. FW with elliptic iridescent blue-hued scent brand. HW with anal lobe not greatly distended, colored brown within; HW outer margins without hairlike tails in limbal area. VFW, VHW nearly immaculate dark "winter" green, HW with vague hint of white slash across distal end of discal cell and extremely vague brown intercellular lines across the submargin. FW length 15.5 (holotype), paratypes 15.0–15.0 mm. Female. Unknown. Male genitalia: Figs 11–13. Characteristic of the "miserabilis" group with extremely elongate valvae, bilobed area elliptic, caudal extensions elongate, sloping in two successive steps to blunter terminus, length exceeding the uncus in caudal expanse. Vinculum robust, only slightly flared at base and with narrow vincular spurs abutting the lateral area of the valve's bilobes; saccus funnel-shaped.

Type material. Holotype male (Fig. 4), Argentina, Jujuy Province, San Pedro, 600 m.,17 July 1978, leg. R. C. EISELE, deposited FSCA. Paratypes. HNHM, Argentina, Mosconi, 450 m., 19 June 1977, leg. B. MACPHERSON (one male). MNHN, "Argentina", no other data (one male).

Remarks. Both collection sites are in lowlands adjacent montane areas and both exhibit relatively xeric woodland margins between steep upland areas and adjacent agricultural areas (JOHNSON *et al.* 1988).

Etymology. The Latin name means "dash" and refers to the single white mark characterizing the VHW. For historical consistency we note this species was originally given another manuscript name not used here (JOHNSON 1980: 323, second name in directory of treatments at top of page).

"*acaste*" species group

Cyanophrys octonarius sp. n.
(Figs 5–6, 14–17)

Diagnosis. A moderate sized species (FW 15 mm) characterized by white crescents of the VHW postbasal and medial areas mirroring each other so as to form a "figure-8" shaped mark over otherwise immaculate green ground color. Other "*acaste*" group taxa exhibit a medial white stripe across the VHW (variously straight, jagged, or broken, depending on the species) and seldom any postbasal marks. Genitalia are distinctive in both sexes: valvae of males with small elliptic bilobes and elongate caudal extensions (Fig. 14: A1) (contrasting prominent bilobes in the "*acaste*" group); females with elongate antrum (Fig. 17: B1) and anteriorly directed lamella antevaginalis (Fig. 17: B2) forming an overall "arrowhead"-shape (contrasting smaller antrums, if occurring at all, and laterally oriented lamellae forming an overall "*chalis*"-shape in the "*acaste*" group).

Description. Male. Head with frons green. DFW, DHW bright iridescent violaceous blue with narrow (1 mm) black borders widening to 2–3 mm at FW apex. HW anal lobe somewhat distended, colored centrally brownish, limbal margin without hairlike tails. FW with obvious elliptic blue-hued black scent brand. VFW, VHW deep "kelly" green except for gray-black area of FW base; FW with faint, white-spotted postmedial line, costa to cell CuA1, HW with "figure-8" shaped pattern formed by crescent-shaped white crescent-like slashes in postbasal area paralleling costal slashes in the medial band. Wing otherwise immaculate green except for faint white markings along anal margin and a brown arc occurring faintly along the submargin. FW length: 15.0 mm (holotype); paratypes 14–15 mm. Female. Wing shape more rounded than male, DFW, DHW dark violaceous gray, FW darker (especially distad), VFW,VHW similar to male but with anal and submargin markings slightly more pronounced. FW length: 15.0 mm (allotype); paratypes 14–15 mm Male genitalia: Figs 14–16. Vinculum robust with base near saccus flared, saccus short and funnel-shaped; valvae with small elliptic bilobes (Fig. 14: A1) and elongate caudal extensions; aedeagus terminus rather flat, with two pencilate and slightly spinate cornuti. Female genitalia: Fig. 17. Ductus bursae terminating with elongate antrum (Fig. 17: B1) and elliptic lamellae with lateral lobes of lamella antevaginalis anteriorly directed (Fig. 17: B2) giving an overall "arrowhead"-shape to the terminus.

Type material. Holotype male (Fig. 5), allotype female (Fig. 6), Argentina, Jujuy Province, San Pedro, 17 July 1978, leg. R. EISELE, deposited FSCA. Paratypes. HNHM, Argentina, Salta Prov.,Yariquarenda, 550 m., in mesic woodland, 17 October 1977, leg. B. MACPHERSON (one male); Jujuy Prov., Cucho, 1200–1500 m., very mesic woodland, S. slopes of Cerro Labrado, 13 January 1987, leg. B. MACPHERSON (two females); Tucumán Prov., Dept. Yerba Buena, Anta Merta Rt. 338, 1 km S of Summit Hotel, Cumbres de San Javier, 1250 m., 9 February 1991, high ridge margin of mesic forest (below) and xeric savannah (above), leg. K. JOHNSON *et al.* IML. Argentina, Tucumán Province, San Pedro de Colaleo (sic) [Colalao], March, leg. A. Teran (one male), January, 1920, no other data (one female); Tucumán Prov., Villa Nougus, Argentina, 21 January , 1921 (one male); Salta Prov., Abra Grande, Oran, 10 January to 1 March 1967, leg. R. GOLBACH (one male).

Remarks. Review of the type data indicates the habitat is mesic upland subtropical forest (in both the northern and southern remnants) except that the Abra Grande locality is today disturbed by agriculture and nothing is known of the original San Pedro de Colaleo habitat. The 1991 Cumbres de San Javier collections were in the vicinity of Villa Nougués (a favorite Hayward locality) and characterized by hilltopping above mesic forest at a broken margin with a roadway. Numerous tropical forest butterfly species occur in this limited region of Tucumán Province; these include, in the Lycaenidae, forest elfins like the Argentine endemics *Rhamma amethystina* (HAYWARD, 1949) and *Pontirama brunea* JOHNSON, 1992 and seldom collected forest hairstreaks like *Terra cana* (HAYWARD, 1949) and *Strymon oreala* (HEWITSON, 1868) (southernmost record for South America).

It is important that lepidopterists not confuse C. *octonarius* with *C. portoena* (CLENCH), 1944 (type MCZ, type locality: Cussiluni, Bolivia) a member of the "*acaste*" species complex (or "superspecies") which has a limited VHW dashed lineal band. Taxa pairs like *acaste* PRITTWITZ, 1865 / *lycimna* HEWITSON, 1868 and *abnormis* CLENCH, 1946 / *catharinensis* CLENCH, 1944 also belong to this complex and share a distinctive morphology. Geographic distributions of these taxa reflect vicariances related to the Paraná River basin, *C. portaena* being restricted northward in the Bolivian yungas and immediately adjacent areas of Argentina. The complex needs further evaluation as to taxonomic rank. *Cyanophrys portaena* (or, alternatively, *C. acaste portaena*, depending on usage) does not have the indented, "figure-8", shape to its white ventral markings and also differs from *C. octonarius* in the genitalia of both sexes.

Etymology. Latin meaning "eight", referring to the distinctive "figure 8"-like markings formed by the postbasal and medial bands of the VHW. For historical consistency we note this species was originally given another manuscript name not used here (JOHNSON 1980: 442, third name in directory of treatments at top of page).

Plesiocyanophrys JOHNSON, EISELE et MACPHERSON, 1993

Plesiocyanophrys was employed by JOHNSON *et al.* (1993) to denote a clade within *Cyanophrys* sensu lato characterized by extremely simple genitalic structures. Such uncomplex elements, and those without additional components, were viewed as generally primitive in ELIOT's (1973) phylogenetic scheme for the Lycaenidae. Members of *Plesiocyanophrys* usually show only minor differences in wing pattern but genitalic structures can differ markedly.

Plesiocyanophrys runa, sp. n.
(Figs 7, 18)

Diagnosis. This species is currently known only from the limited remnant subtropical forests of Catamarca Province, Argentina. All southern South American *Plesio-*

cyanophrys species are quite similar externally, with deep iridescent blue dorsa in males (violaceous gray in females) and green venters with a white medial HW spotband. However, there are differences in wing size and shape which are paralleled by subtile differences in the appearance of the white VHW spotband and other features. *P. runa* is moderate in size (FW 13.5 mm), dorsally bright azure blue, with HW anal lobes not greatly distended, and the VHW medial spots all with pronounced distal white and basal red-brown. By contrast, *P. argentinensis* (CLENCH 1946), from the "frost-free island" in Tucumán Province (JOHNSON 1995), is small (FW 10–13 mm [see Remarks]), deep navy blue above, with distended HW anal lobes giving more triangular shape to the HW, and VHW spots limited to small specks of white. There are undescribed *Plesiocyanophrys* populations from Jujuy, Argentina and adjacent Bolivian lowland tropical forests which are far larger (FW 15–16 mm) with greatly distended HW's and profuse VHW spotbands. The genitalia of the *Plesiocyanophrys* differ markedly between species, *P. runa* being unique with a sculptured ductus bursae in females and terminal lamellae (typically paired spatulate lobes in congeners) appearing as a highly sculptured "arrowhead"-like structure.

Description. Male. Unknown. Female. Head frons green. DFW, DHW basal one-third of DFW and basal two thirds of DHW dull shiny gray, rest of wing fuscous. HW anal lobe moderatly distended, colored centrally brown distally black; no hairlike tails along HW limbal area. VFW, VHW ground bright green except for blackish FW base, HW with nearly complete medial line of white dots bordered faintly basad by red-brown, becoming slightly more obsolescent costally. Anal lobe maroon with white slash at base. FW length: 13.5 mm (holotype). Female genitalia: Fig. 18. Ductus bursae robust, somewhat swollen centrally, and sculptured throughout; structure of terminal lamellae high sculptured into a unipartite "arrowhead"-like configuration (not appearing as paired, spatulate, superior and inferior lamellae as in congeners).

Type material. Holotype female (Fig. 7), Argentina, Catamarca Province, no other data, deposited BMNH.

Remarks. Butterfly specimens from the small subtropical forest remnants of Catamarca Province are found in old BMNH collections and also in some Argentine collections by HAYWARD and WILLINK (IML). JOHNSON (1992) described several endemic elfin butterflies (Eumaeini: *Thecloxurina, Rhamma*) from the region. These and *P. runa* suggest an insular, perhaps relict, upland forest fauna. Unfortunately, the region has been too far south for regular visits by recent resident lepidopterists monitoring northern Argentina (JOHNSON *et al.* 1990).

JOHNSON (1980) originally included a wider variety of specimens in his treatment of *P. argentinensis* from Tucumán Province. Considering what is now known of the group, and their habitats, it is more likely that only smaller, diminutively marked, specimens from the Tucumán "frost-free island" represent typical *P. argentinensis*.

Etymology. The Latin name means "javelin" which refers to the unique shape of the female genitalia.

Acknowledgements – We thank Argentine lepidopterists ROBERTO C. EISELE and BRUCE MACPHERSON, and staff of the IML (Dr. Z. D. AJMAT de TOLEDO, Lepidoptera) for their help with this paper. We also thank the curators at the various institutions listed for past access to material examined.

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