

SYSTEMATICS, MORPHOLOGY AND PHYSIOLOGY

A New Species of *Eretris* Thieme (Lepidoptera: Nymphalidae, Satyrinae)
from the Elbow of the Andes Region in BoliviaTOMASZ W PYRCZ¹, YUVINKA GARECA²¹Zoological Museum, Jagiellonian Univ. Ingardena 6, 30-060 Kraków, Poland; ²Museo de Historia Natural Alcide d'Orbigny, Cochabamba, Bolivia

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Neotropical Entomology 38(3):370-375 (2009)Una Nueva Especie de *Eretris* Thieme (Lepidoptera: Nymphalidae, Satyrinae) de la Región del
Codo de Los Andes en Bolivia

RESUMEN - Se describe una nueva especie de mariposa de bosque nublado, *Eretris julieta* n. sp. de la región situada en el centro-sur de Bolivia, conocida como el Codo de los Andes. Esta especie es la más sureña de todo el género y es conocida hasta la fecha únicamente de una área restringida de valles interandinos en el departamento de Santa Cruz. Se evalúan sus afinidades con otras especies del género *Eretris*.

PALABRAS-CLAVE: *Eretris subpunctata*, ocelos, Pronophilina, Yungas, taxonomía

ABSTRACT - A new species of cloud forest butterfly, *Eretris julieta* n. sp. is described from a region of south-central Bolivia known as the Elbow of the Andes. It is the southernmost known representative of the genus, hitherto known only from a restricted area of interandean valleys in the department of Santa Cruz. Its affinities with other congeners are evaluated.

KEY WORDS: *Eretris subpunctata*, ocelli, Pronophilina, Yungas, taxonomy

The genus *Eretris* was described by Thieme (1905) for 13 species, 11 of which were previously included in *Pedaliodes* Butler (1867), and was placed in the tribe Pronophilini, a Neotropical section of the cosmopolitan nymphalid subfamily Satyrinae by Miller (1968). Pronophilini was down-ranked arbitrarily to the subtribal level by Harvey (1991).

Viloria (2007) proposed a revised systematics of the Pronophilina based on adult morphology, removing several genera from this subtribe and placing them in the predominantly Australian Hypocystina or Holarctic Erebiina, but he did not challenge the subtribal position of *Eretris*. According to Viloria (*op. cit.*) the genera belonging to Pronophilina can be separated from other American satyrines by the exclusive combination of three morphological characters: hairy eyes; maximum length of hindwing discal cell equal or longer than half total maximum length of hindwing; hindwing cross vein m1-m2 always curved or angled basally into the discal cell. Viloria (*op. cit.*) maintains that venation pattern is the only solid character of external morphology discriminating the Pronophilina from the second largest Neotropical Satyrini subtribe, the Euptychiina (Murray & Prowell 2005). However, the above mentioned three characters, as already pointed out by Miller (1968), are also found in the Holarctic Satyrina. According to Miller (*op.*

cit.) the latter tribe can be recognized by the shorter midtibia and the presence of a dorsal, distal midtibial spine. Peña *et al.* (2006), in a phylogenetic revision of the Satyrinae based on DNA sequence data, rejected some of Viloria's conclusions on higher systematics of the Pronophilina, namely the placement of 19 genera in the subtribe Hypocystina, but they did not examine the genus *Eretris*, and therefore did not discuss its position within the phylogeny of Satyrinae. DeVries (1987) speculated that the possible relative of *Eretris* could be *Calisto* Lathy, a pronophiline genus confined to the West Indies. This hypothesis cannot be confirmed in the light of current morphological data.

Due to the absence of DNA data, and of any data on the early stages, at present the position of the genus *Eretris* can be evaluated only based on adult morphology. Since *Eretris* possesses all three synapomorphies specified by Viloria (2007), it has to be considered as belonging to Pronophilina, but it is worth pointing out that this genus presents several characters not found in any other genus of this subtribe. Two of these were mentioned in the original description of the genus, namely the slender, very short antennae reaching roughly 1/3 the length of costa (compared to 2/5-1/2 in other Pronophilina), and the lack of specialized forewing upperside male androconial scales (present in all other Pronophilina except *Lymanopoda* Westwood) (Thieme 1905). In addition,

the male genitalia of *Eretris* are highly distinctive and unlike those of other Pronophilina. They present several likely synapomorphies, particularly a short, tubular, singularly sculptured aedeagus, usually curved in the middle; a weakly sclerotised transtilla; and elongated, slit-like smooth valvae (Pyrzcz 2004). Another diagnostic feature of *Eretris* is the presence of fully developed submarginal ocelli on the ventral hindwing, an exclusive among the Pronophilina, but common in the Euptychiina and other world Satyrinae. The genus *Eretris* is morphologically highly homogenous and although there was no cladistic study of the genus, there is a strong basis to consider *Eretris* to be monophyletic, with the characters discussed above as potential qualitative synapomorphies.

Species level taxonomy of *Eretris* is demanding because the differences in colour patterns between several sympatric species are in several cases less obvious than between allopatric populations of the same species (Adams 1986). Therefore, when evaluating the status of allopatric populations of *Eretris*, their ecological traits, especially altitudinal distribution patterns, are to be taken into consideration. Among the most useful colour pattern characters are the size of HWV ocelli and the shape of HWV postmedian-submarginal band. The male genitalia, although rather simple in structure, present several characters that allow assigning the species of *Eretris* into possibly monophyletic groups. In *E. porphyria* and *E. apuleja* the aedeagus is straight or very slightly curved and gnathi are relatively long and stout, forming an open angle with uncus. In *E. calisto* (C & R Felder), *E. encycla* (C & R Felder) and *E. ocellifera* (C & R Felder) the aedeagus is strongly curved in the middle and gnathi (subunci) are slender and parallel to the base of uncus. *Eretris lecroimi* Pyrcz, *E. depresissima* Pyrcz and *E. oculata* (C & R Felder) present similar genitalia to the former group but their gnathi are atrophied to varying degree, reduced to a short tip in *E. oculata* (Pyrzcz & Fratello 2005). In some species, including *E. centralis* Krüger and *E. apuleina* Pyrcz, gnathi are completely atrophied. Female genitalia of *Eretris* have not been studied so far.

Lamas *et al.* (2003) identified 18 species of *Eretris*, whereas Pyrcz *et al.* (in prep.) recognized at least 25 species of *Eretris*. There has thus far been no monographic treatment, but several surveys deal with the systematics and some aspects of the ecology of *Eretris* at regional or local levels (Adams 1986, Pyrcz 1999, 2004, Pyrcz & Fratello 2005).

The genus is predominantly, but not exclusively Andean. Three species occur in Central America [*E. maria* Schaus, *E. hulda* (Butler & Druce) and *E. suzannae* DeVries], and one species, *E. agata* Pyrcz & Fratello, was discovered recently in the Guyana Shield (Pyrzcz & Fratello 2005). The fauna of *Eretris* of peripheral Andean ranges in the northern extremity of the continent exhibits little diversity. One species, *E. calisto kogui* Adams & Bernard, is found in Sierra Nevada de Santa Marta, two species, *E. encycla* (C & R Felder) and *E. neocycla* Pyrcz & Vilorio, in the Venezuelan Cordillera de La Costa, and two others, *E. encycla* and *E. porphyria* (C & R Felder), in the Cordillera de Mérida. Elsewhere in the main Andes local faunas are composed of an average of five or six species. The highest diversity of the genus was found

in the Colombian Western Cordillera and in south-eastern Ecuador and northern Peru where up to seven species occur along an altitude gradient (Pyrzcz 2004).

There is a disproportion between the number of papers dedicated to the fauna of *Eretris* in the northern as compared to south tropical Andes. All but one species included originally by Thieme (1905) in the genus *Eretris* were described from Colombia and Venezuela. In the last three decades several new taxa were described from Venezuela (Adams & Bernard 1979, Pyrcz & Fratello 2005, Vilorio *et al.* in press), Colombia (Adams & Bernard 1977, Adams 1986, Pyrcz 1999), Ecuador (Pyrzcz 2004) and northern Peru (Pyrzcz 2004).

The only species described hitherto from Bolivia is *E. subpunctata*, discovered over a hundred years ago (Grose-Smith 1896)! This by no means indicates a low diversity of *Eretris* in Bolivia, but merely is the outcome of little research that has been done on montane satyrine faunas of this country. In fact, the most recent catalogues specify a certain number of identified, but yet undescribed taxa of Bolivian *Eretris* (Lamas *et al.* 2004). Gareca *et al.* (2006) in the first ever check-list of Bolivian butterflies mentioned five species for Bolivia, including four undescribed. Three of them occur in the Yungas de La Paz and the Yungas de Cochabamba, and belong to widespread, polytypic species. Their description will require a thorough taxonomic approach to the genus *Eretris*, which due to still insufficient data from some key areas is premature. The new taxon described herein presents exclusive morphological characters and is geographically restricted, allowing us to discuss it in a separate paper.

Material and Methods

Type material was examined in ZMHB, BMNH, MUSM and MZUJ. Additional material was examined in other public and private collections. Male genitalia were dissected according to standard procedure, preserved in glycerol, and examined, alongside other morphological microstructures, under an Olympus SZX9 stereomicroscope. Adults were photographed with an Olympus E-500 digital camera, and colour plates were composed using Adobe PhotoShop version 7 software. The following abbreviations and collection codes were used:

FW: forewing

HW: hindwing

V: venter

D: dorsum

BMNH: Natural History Museum, London, UK [formerly British Museum (Natural History)]

MHN-NKM: Museo de Historia Natural "Noel Kempff Mercado", Santa Cruz, Bolivia

MHNC: Museo de Historia Natural "Alcide d'Orbigny", Cochabamba, Bolivia

MUSM: Museo de Historia Natural de la Universidad Nacional Mayor de San Marcos, Lima, Peru

MZUJ: Muzeum Zoologiczne Uniwersytetu Jagiellońskiego, Kraków, Poland

ZMHB: Zoologische Museum, Humboldt Universität, Berlin, Germany

***Eretris julieta* Pyrcz & Gareca, new sp.**

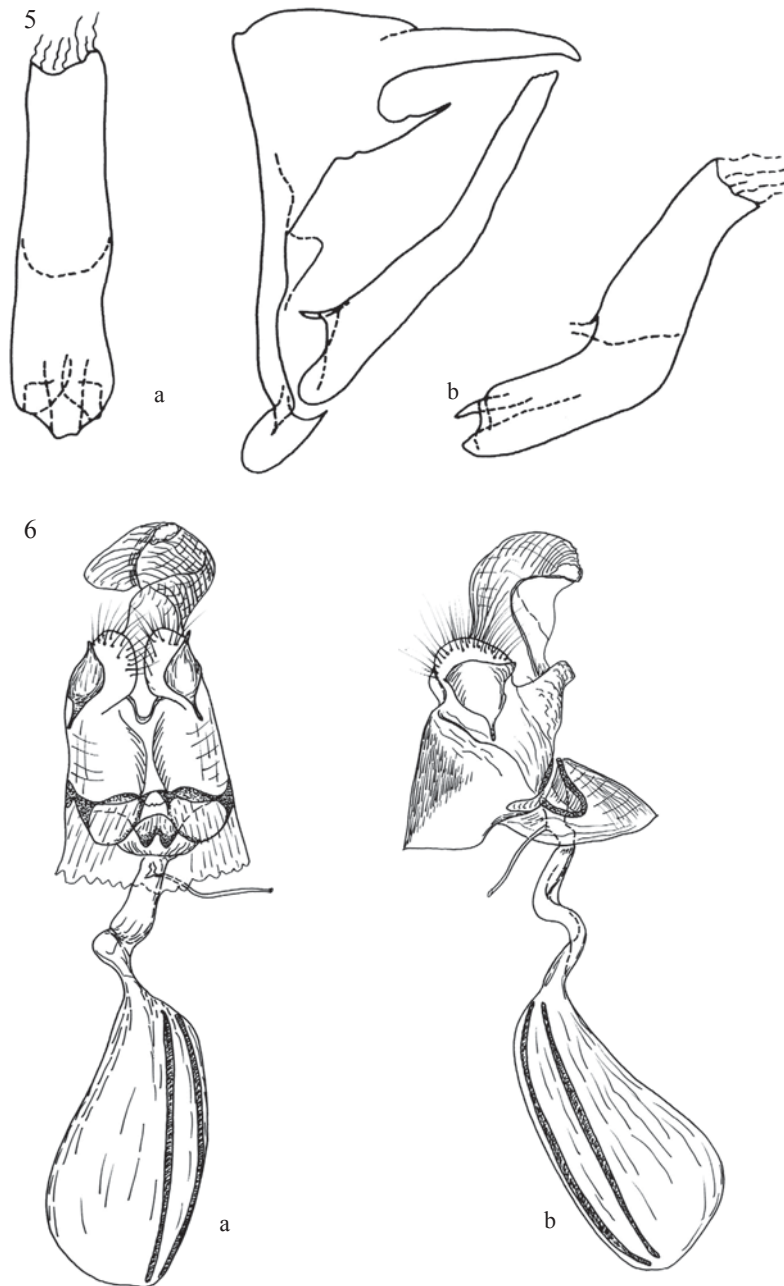
Type locality. La Hoyada, Cantón Pampa Grande, Provincia Florida, Departamento Santa Cruz, Bolivia.

Description. Male (Figs 1, 2): Head: eyes chocolate brown covered with short, dense black setae; labial palpi short, ~1.2-1.5 mm, brown, covered with chestnut and brown hair, third segment suffused with milky white scales; antennae very short, ~8 mm, and slender, orange suffused with white scales denser towards basal segments, four terminal segments black, club formed gradually, with two lateral ribs. Thorax: dorsally and ventrally dark brown, legs chestnut. Abdomen: dorsally dark brown, laterally and ventrally chestnut. Wings: FW length: 22-23 mm, mean: 22.5 mm (n = 6), apex blunt, outer margin angled at vein M2, from M2 to tornus straight; fringes very short, yellow-brown. HW subtriangular, outer margin slightly undulated, anal margin with a shallow incision near tornus; fringes very short, yellow-brown. FWD varying between chestnut and medium brown, a shade darker in basal half, a fine dark brown submarginal line, and parallel to outer margin. HWD same as on the forewing, uniform, a fine, barely

noticeably dark brown undulated submarginal line. FWV light brown, very light, pale brown in postmedian to submarginal area; a medium brown, arched median line across discal cell; a crimson red-brown postmedian line, straight from costa to Cu1, zigzagging from Cu1 to anal margin near tornus; a light brown submarginal band, delicately incised along veins, with a darker, medium brown basal edge; marginal area dark brown. HWV ground colour same as on the forewing, with a delicate yellowish suffusion turning heavier towards outer and anal one-third, particularly along inner margin of postmedian line between M3 and 1A; a crimson red-brown, median line from costa to 1A, gently curved basally towards the extremities; a crimson red-brown postmedian-submarginal band, slightly sinuate, with one deeper basal protrusion in Cu1-Cu2; a series of 3-5 min, barely noticeable vestigial ore very small ocelli, in cells Rs-M1 to Cu1-Cu2, the most prominent of which is invariably the one in Cu1-Cu2; an orange-brown submarginal line with shallow incisions on the veins, converging with postmedian band in Cu2-1A near tornus; the area between submarginal and marginal lines a shade darker brown than the remainder surface of the wing; marginal area dark brown. Genitalia (Fig 5): Uncus stout, slightly (1/5) longer than tegumen, straight except for



Figs 1-4. *Eretris julieta* 1. Male (HOLOTYPE), dorsum/venter ; 2 Male (PARATYPE), dorsum/venter ; 3-4 Female (PARATYPE), dorsum/venter.



Figs 5-6. *Eretris julieta* genitalia. 5. Male genitalia, aedeagus extracted in dorsal (a) and lateral (b) view ; 6. Female genitalia in lateral (a) and ventral (b) view.

a hooked tip; gnathos short, 1/3 the length of uncus, wide at base, thin in distal half, sharpened; vinculum straight, aligned to tegumen basal surface; saccus short, globular; valvae thin and elongated, 1/3 longer than tegumen+uncus, approximately the same width throughout, gently bent in the middle, apical part slightly serrate; aedeagus twice as wide and slightly (1/5) shorter than valvae, approximately the same width throughout, gently bent in the middle.

Female (Figs 3, 4): Slightly larger than the male, FW length 22.5-24 mm, mean: 23.2 mm (n = 8); FWD is a shade lighter; a faint, darker brown postmedian line, zigzagging from Cu1 to anal margin; a faint crimson red suffusion in postmedian

area between Cu1 and anal margin (barely noticeable in one of the examined specimens); a darker, medium submarginal line, parallel to outer margin. HWD slightly lighter; a very faint, barely visible darker brown postmedian line, noticeably only from costal area to M3-Cu1; a similarly coloured and faint submarginal, slightly undulated line. FWV and HWV colours and pattern similar to the male except than a shade lighter and paler; FWV postmedian-submarginal line conspicuously edged basally with crimson-red. Genitalia (Fig 6): Papillae anales small, outer walls with a triangular sclerotization covering two-third of their surface; apophyses posteriores small. Lamella postvaginalis with a

heavy spectacle-like sclerotisation (when seen from ventral side), which constitutes a frame surrounding the ostium and continuing on lamella antevaginalis. Ductus seminalis meets ductus bursae near ostium. Ductus bursae S-curved, slightly shorter than bursa copulatrix. Bursa copulatrix elongated, pear-like with two long ribbon-like ostia almost as long as bursa. Pocket of ventral gland delicately ribbed.

Type material. Holotype ♂: BOLIVIA, Departamento Santa Cruz, Provincia Florida, Cantón Pampa Grande, La Hoyada (18°07'30"S, 64°01'25"W), 1800-1900 m, 03.VIII.2000, T. Pycrz & Y. Gareca leg., MHN-NKM; Paratypes (16 ♀ and 20 ♂): seven ♀: and eight ♂: same data as the holotype, four ♀ and three ♂ MHCN, three ♀ and five ♂ MZUJ; seven ♀ and nine ♂: Tunas Pampa, Prov. Caballeros, Depto. Santa Cruz, 11-14.IX.2007, 1600 m, D. Galindo & T. Viaduarre leg., MHN-NKM; one ♀ and two ♂: El Chontal, Prov. Caballeros, Depto. Santa Cruz, 18-21.IX.2007, 1600 m, D. Galindo & T. Viaduarre leg., MHN-NKM; one ♀ and one ♂: Barrientos, Prov. Florida, Depto. Santa Cruz, 04-07.IX.2007, 1600 m, D. Galindo & T. Viaduarre leg., MHN-NKM.

Etymology. This species is dedicated to Julieta Ledezma, head of the Lepidoptera department at the Museo de Historia Natural "Noel Kempff Mercado" in Santa Cruz, Bolivia.

Remarks. *Eretris julieta* is the only species of *Eretris* occurring in the Bolivian interandean valleys SW of Santa Cruz in the region known commonly as the Elbow of the Andes (*Codo de los Andes*). This part of the Andes is located in a transitional area between the Bolivian-Yungas and Bolivian-Tucumán biogeographical Provinces. The places where *E. julieta* has been collected, at 1600-1900 m, most likely belong to the Bolivian-Tucumán province and within this to the interandean lower sub-humid forest (Navarro, pers. comm.). The specific vegetation at the collection sites is the so-called Soto sub-humid forest, (*Stylingia yungasensis*-*Schinopsis haenkeana* series). Below to 2000 m, this place is characterized for its soto domain on the top, with many *tipu* (*Tipuana tipu*) and other indicator species for more humidity. The climate is characterized as thermotropical upper seasonal rainy sub humid lower bioclimate. (Navarro & Maldonado 2002, Navarro *et al* 2004). Close to the collection site one is able to find different more xeric vegetation types, such as the Soto semiarid forest with carapari ((*Neocardenasia herzogiana*-*Schinopsis haenkeana*, series), as well as soto dry forest (*Samaipaticereus corroanus*-*Schinopsis haenkeana*, series) (Navarro & Maldonado 2002, Navarro *et al* 2004). The type locality of *E. julieta* is heavily logged, and the remnants of cloud forests are under severe threat. Fortunately, *Chusquea* bamboo, which is the host plant of *Eretris* (De Vries 1980, 1987, Pycrz *et al* in prep.) was found to be a locally common secondary-areas plant that grows along paths and dirt roads.

Eretris julieta is geographically restricted and is effectively the southernmost representative of the genus. Recent collecting carried out by the authors and colleagues confirm that the genus *Eretris* appears to be absent from the southern Bolivian provinces of Chuquisaca and Tarija. The climate of southern Bolivia is heavily influenced by

the *surazos*, cold winter winds, which nearly reach the Elbow of the Andes. Temperatures reported in Tarija are considerably lower than in central or northern Bolivia and snow is occasionally reported below 2000 m, that is, within the altitude range inhabited by *E. julieta*. Pre-adaptation of organisms for freezing temperatures is probably the main limiting factor responsible for much lower diversity in many faunal and floral groups in the cloud forests of this part of Bolivia.

Eretris julieta is remarkable for the obsolete, and in some individuals barely noticeable, HWV submarginal ocelli. Fully developed, large ocelli are a diagnostic generic feature of *Eretris*. Their reduction occurs only in a few taxa, including *E. centralis* Krüger, a distinctive high altitude north Andean species, and *E. apuleina* Pycrz described from northern Peru. In *E. apuleina* the HWV postmedian band is similarly shaped as in *E. julieta* and runs close to the submarginal band, also a distinctive feature of *E. julieta*. The two species are additionally characterised by similar discrete HWV orange or yellow suffusion restricted to basal edge of postmedian band.

However, the similarities of the colour pattern *E. julieta* and *E. apuleina* are not congruent with male anatomical characters. The male genitalia of *E. apuleina* are completely different and characterised by a very short, wide aedeagus, and atrophied gnathi, which clearly indicates it belongs in a different section of the genus *Eretris*. Compared with other north Peruvian species, *E. julieta* has similar male genitalia to *E. truncatina* Pycrz and *E. porphyria transmaraniona* Pycrz, both completely different in facies and unlike *E. julieta* are high elevation species found above 2400 m (Pycrz 2004). Male genitalia of *E. julieta* are by the same token very similar to the group of *E. calisto* (C & R Felder), which includes *E. encycla* (C & R Felder) and *E. agata*, the latter occurring in the Venezuelan Guyana Shield (Pycrz & Fratello 2005). All the species of *E. calisto* group are immediately recognised from *E. julieta* by prominent HWV submarginal ocelli. They are denizens of low to mid elevation cloud forest and occur at 1400-2200 m, which corresponds with the altitude at which *E. julieta* was discovered. This group of species group is also represented in Bolivia by an undescribed taxon known to occur in the Yungas de La Paz and Cochabamba (Lamas *et al.* 2004).

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