A NEW ENDEMIC SPECIES OF CORADES FROM THE CHILES VOLCANO MASSIF IN NORTH-WESTERN ECUADOR (Lepidoptera: Nymphalidae: Satyrinae)

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Abstract: A new species of satyrine - Corades liliaceus - is described. It is apparently endemic on the western slopes of the volcano Chiles in northern Ecuador. Taxonomy, zoogeography and behaviour of Corades are briefly discussed. The affinities of the new species are evaluated.

Key words: Andes, Chiles, Chocó, cloud forests, C. liliaceus n. sp., Ecuador, endemism, Golondrinas Ecological Reserve, male genitalia, taxonomy.

Fig. 1. Corades liliaceus male (holotype) dorsum/venter

Introduction

The genus Corades belongs to the Neotropical sub-tribe Pronophilina (Nymphalidae, Satyrinae, Satyrini) as defined by Miller (1968), with subsequent modifications by Lámas et al., (2004). Despite the fact that all Corades are quite characteristic butterflies fairly easy to separate from other Pronophilina, the only salient synapomorphy of the genus is the outer margin of the hindwing forming a tail-like extension at vein Cu2. Other morphological characters are variable and do not allow to distinguish the adults of Corades (larval morphology being completely unknown) from other genera of Pronophilina. Wing colour pattern is highly divergent. Venation pattern is typical of the sub-tribe Pronophilina, with the diagnostic hindwing discal cross-vein m1-m2 strongly curved basally (Miller, 1968). Male genitalia vary considerably between species: valvae without dorsal process, relatively short in
C. enyo and related, very long but simple in C. melanita Staudinger (1897) or wide with a denteate ampulla in C. medebra; uncus moderately long in most species but extremely long in C. melanita and C. chirone Hewitson (1863); aedeagus generally straight. The genus Corades is inseparable on the basis of mal genitalia from Pronopilia Westwood, Lasioptila C. & R. Felder, Aruaco Adams & Bernard and Pseudomaniola Röber. Female genitalia have not been examined. This anatomic feature is still poorly researched in the sub-tribe Pronopilina and at this stage is therefore little informative (Pyrcz, 1995, 2004).

Most species of Corades were described in the early days of the Neotropical lepidopterology by Hewitson (1849, 1850, 1863, 1874), Butler (1866, 1868, 1870, 1873), Weymer (1890) and Staudinger (1897). Thieme (1907) produced the first, fairly good generic monograph and described numerous new taxa. He also erected the genus Panarche, which is considered a subjective junior synonym of Corades (Lamas et al., 2004). Weymer (1912) illustrated most of the known taxa in the Seitz catalogue, which remained for long the primary reference for quick identification of species. Most Corades were illustrated again by D’Abrera (1988) in a lavish album, unfortunately quite unreliable because of numerous identification errors. The last species of Corades described prior to this paper was C. pax Watkins, back in 1939 Adams & Bernard (1977, 1981) and Adams (1985, 1986) during over twenty years of research work on north Andean satyrids did not publish any new names for Corades implying that the systematics of the genus are well known. This is however far from being the case as recent research revealed several new taxa of Corades both at the subspecific and specific level (Pyrcz, 2004).

The genus Corades comprises 23 species (Lamas et al., 2004). They are found exclusively in the Andes and their peripheral ranges of Santa Marta, Peru, Cordillera de Mérida, Cordillera de la Costa and Tumiquique (contrary to several other genera of Pronopilina such as Pronopilia, Pedaliones Butler, Lymanoptera Westwood, Oxoarchusius Butler or Eretris Thieme represented also in the Central American highlands of Costa Rica, Panama or Guatemala, De Vries, 1987). Peripheral ranges of northern South America have impoverished local faunas comprising 3-5 species, compared to most of the northern main Andes ranges, that harbour local faunas of 7 widespread species: C. enyo, C. dymanatis Thieme, C. cybele Butler, C. pannonia Hewitson, C. medebra Hewitson, C. cheironis Hewitson and C. chirone Hewitson. The highest species diversity of Corades faunas is reported in southern Peru and the Bolivian Yungas where up to 12 species can be found in the same locality along an altitudinal gradient (Forster, 1964). Corades enyo has the widest distribution of all species of Pronopilina ranging from Bolivia to the Venezuelan Sierra de Turimiquique. In the northern Andes, the only hitherto known narrow endemic species is C. pax restricted to the Venezuelan Cordillera de Mérida. Only one species, C. iduna procellaria Thieme is known to occur in southern Bolivia and northern Argentina. Nine species are found on the western slopes of the Andes in Ecuador including one (apart from the new one) endemic species, C. lacteifera Thieme, distributed from north Western Peru to south western Colombia.

Larval hosts of most Pronopilina (Schultze, 1929; De Vries, 1980; Pélz, 1997) are montane bamboo, chiefly of the genus Chusqua (Poaceae). Field observations indicate that this seems also be the case for Corades. Oviposition on Chusqua was observed for C. chirone in Tungurahua and C. dymanatis in Azuay, and eggs were photographed for the latter species (Pyrcz, unpubl.). Unfortunately, immature stages are so far undescribed. All Corades are associated with montane cloud and elfin forest habitats. There are however important differences in their ecological preferences. C. enyo occurs in lower montane forests and contrary to its congeners tolerates disturbed habitats and relatively dry areas. C. medebra is an inhabitant of mid-elevation cloud forest understorey where it flies along mountain streams and gullies and is very fond of organic matter found in the soil. C. ciclone, C. dymanatis and C. chirone occur at higher elevations, above 2600 m to the forest páramo ecotone. C. callipolis and C. tricordatus Hewitson occur in the uppermost elfin forest at 3000 – 3500 m in humid places. Corades are most diverse at 2400 -
2800 m (ADAMS, 1986; PYRCZ & WOJTUSIAK, 2002; PYRCZ et al., in press). Some species can be fairly common in the right biotope and sometimes muddles in large numbers. In the Cordillera de Mérida humid soil and excrement can attract dozens of C. medeba and C. chelonias. Other species are usually solitary and unpredictable, especially C. cybele and C. sareba Hewitson. Some are exceedingly rare in collections, for example the endemic C. anforus Thieme, which does not reflect its status in the field. C. anforus is actually very common at 3200 – 3400 m in the Urubamba valley in southern Peru (PYRCZ, unpubl.). Even though the early students (for example THIEME, 1907) sustain that the females of Corades are particularly rare, this is in fact due to their slightly different behaviour. Dung, rotten fruits and other decomposing organic matter attract readily the males and only occasionally the females of most species, so males are much easier to sample. Males of Corades are powerful flyers. Some species are territorial, a behaviour they share with other cloud forest satyrids such as Junea Hemming and Dracaetis Hemitou. They establish territories in light gaps in the forest subcanopy where they perch during sunshine hours and chase away other congeneres as well as other passing butterflies. Some species of Corades are involved in apparently parapatric duos or trios of species replacing each other along an altitude gradient (ADAMS, 1985; PYRCZ & WOJTUSIAK, 1999).

Material and methods
Sampling took place in the Golondrinas Ecological Reserve in June and July 1999 and along the nearby Tufín – Maldonado road in August 2004. Individuals of Corades were collected with entomological hand nets and in traps baited with dung. An extensive comparison material was obtained during field work in Ecuador (1999-2004), Colombia (1996-2003) and through exchange with museums and private collections. Types of Corades deposited in BMNH (London) and ZMHU (Berlin) were examined. A number of male genital dissections were made with hot 10% KOH solution and preserved in glycerol. Photographs of adults were taken with digital Minolta Diimage 5. Macro photographs were taken with an Olympus Camedia camera mounted on a binocular Olympus SZX9 microscope.

Corades lilaceus Pyrcz, n. sp. (Figs. 1, 2)

Diagnosis: Wing shape and upperside colour - intensely dark brown nearly black - similar to C. pannonia but hindwing "tails" along vein Cu2 slightly shorter. Hindwing underside pattern comparable only to C. uloma and C. chiron without any yellow elements. Male genitalia reminiscent of C. pannonia and C. uloma in the most important seleris (valvae, uncus and tegumen). Labial palpi twice as long as in C. uloma.

Description:
Male (Fig. 1):
Head: eyes dark coffee brown, lustrous, covered with short, dense hair-like setae; labial palp twice the length of head, beige, covered with short, chestnut hair; antennae to half the length of costa, russet brown, club formed gradually, terminal segments dark brown; collar formed of short, black hair.
Thorax: dorsally black, covered with short, black hair, ventrally grey, sparsely hairy; first pair of legs covered with dense, grey hair; walking legs chestnut, of same colour as labial palpi, naked.
Abdomen: dorsally and laterally black, ventrally pale brown.
Wings: forewing (length: 34 mm, n=2) triangular, costa slightly curved in distal one third, apex acute, outer margin straight, torius slightly oblique; hindwing triangular, oblong, outer margin slightly sinuate, tail-like prolongation along vein Cu2. Dorsal surface uniform intensely dark brown, nearly black; forewing androconial patch little differentiated; hindwing basal and anal area covered with short, lustrous, hair-like scales. Forewing ventral surface dark coffee brown, lighter and duller towards outer and anal margin, a pale lilac postdiscal costal patch, and an apical suffusion of the
same colour, two barely visible submarginal, lighter patches on veins Cu1 and Cu2. Hindwing ventral surface basal area dark brown dusted with lilac scales; a median chocolate brown band, with nearly straight basal and distal edges, 5 mm wide on the costa and in the discal cell, then gradually narrowing towards anal margin, basally dusted with pale lilac; distally another band, pale lilac band overcast with gold and suffused with dark brown on the costa, 8 mm wide on the costa, narrowing gradually towards torus at tail base, distal edge nearly straight, very slightly produced along veins, black spots papilled with white in Rs-M1 and in Cu2-1A on the torus plus a black dot in M1-M2; the area distally to outer margin coffee dark brown, dusted with lilac scales; fringes beige, short.

Male genitalia (Fig. 2): Tegumen slender; uncus twice as long as tegumen; subuncus strongly adhered to uncus, stout in basal, thin in distal part; valva of length of tegumen + uncus, gradually narrowing distally with a smooth ampulla; sacculus rather solid and moderately long, straight; saccus straight, the length of the valva.

Female: Hitherto unknown.

Types: Holotype ♀: Ecuador, Carchi, Tufiño – Maldonado road, approx. 2600 m, 26.IV.1998, A. Jasinska leg., MZUSP; Paratypes (4 ♂ 3 ♀): 1 ♀: same data as the holotype, TWP; 2 ♂: Reserva Cerro Las Golondrinas, 2600 m, VI.1999, T. Pyrcz & J. Wojtusiak leg., 1 TWP, 1 MUSE; 1 ♂: Carchi, Tufiño – Maldonado road, 2650 m, 27.VIII.2004, T. Pyrcz leg., TWP.

Etymology: This species owes its name to its hindwing underside lilac overcast and also for the lily flowers, another passion of the discoverer of this species, Artur Jasinska.

Habitat and behaviour: C. liliaceus is an inhabitant of mid to high-elevation cloud forests (2400 – 2700 m), therefore it occurs in the same elevational band as C. dymanthis, and slightly below C. chiron. Individuals were observed at 10AM - 2PM patrolling and perching along the road. Males are readily attracted to bait consisting of dung placed in traps or on the ground.

Discussion

The discovery of a new species of Corades in the far northern Ecuador on the Pacific slopes of the Chiles volcano (4748 m) is very unexpected. Even though the western slopes of the Andes in Ecuador have been extensively sampled in the recent years by the author of this article and many other lepidopterists, C. liliaceus has not been recorded from any other place than the type locality. Corades are conspicuous pronorphilines easily attracted to a number of baits and generally their local faunas are well known in short time. Moreover, C. liliaceus is not uncommon in the type locality. It is therefore very likely that it is endemic in the area delimited by the valleys of the Río Mira in the south and the Río Patía in the north. The presence of a narrow endemic species in this part of the Andes is particularly surprising considering that most species of Corades have wide geographic ranges. C. enyo, as already stated, is probably the most widespread species of the sub-tribe Pronorphilina. It is distributed between the Venezuelan Cordillera de Turimiquire and the Colombian Santa Marta in the north to the Bolivian Yungas in the south C. panmonia and C. medeba also range from Venezuela to Bolivia. C. dymanthis, C. cybele, C. chelomis and C. chiron are found throughout northern Andes of Venezuela, Colombia and Ecuador and three more species occur in the eastern slopes of the Andes - C. ulena, C. cistone and C. idona – from Ecuador to Bolivia. One range endemic species are found in the southern part of the tropical montane forest belt, in southern Peru - C. unfortas, C. n.sp. - and Bolivia - C. callipolis and C. ricordatus. Prior to the description of C. liliaceus only one endemic species was known to occur in the northern Andes - C. pac - found exclusively in the Venezuelan Cordillera de Mérida. The latter is however a geographically well isolated range renowned for its high ratio of endemic subspecies, species and even genera: Radonda Adams & Bernard, Steromepaleoides Forster, Diaphanous Adams & Bernard, Cheimias Thieue (Adams & Bernard, 1981; Pyrcz & Wojtusiak, 2002). On the other hand, the area where C. liliaceus occurs is not isolated notably from the rest of the Ecuadorian Western Cordillera. There is
arguably an important ecological and topographic barrier in the north, the Rio Patía valley, which is well reflected in the distribution patterns of Pronophilina (Pyrcz et al., in prep.). However, to the south, apart from the Rio Mira valley, there are no apparent sharp zoogeographical barriers. The Pacific slopes of the volcanoes Chiles - Cumbal along the Colombia – Ecuador border confirm however as a local centre of endemism of Pronophilina (Pyrcz, 1999; Pyrcz & Viloria, 1999; Pyrcz et al., in prep). At the specific level two endemic taxa were identified: Manerebia sp, Pyrcz et al (in prep.) and Davedalma sp. (Pyrcz & Greeney, in prep.). Most endemics reported to date are however subspecies of the species whose ranges spread further towards north or south: Eretris depressissima miambil Pyrcz (1999), a Chocoan endemic whose nominate subspecies is found in the central Colombia; Pedaliodes phileusia inaculata Pyrcz (1999a), a local race of a widespread Andean species; Lasiophilina phalesiae alce Pyrcz (1999b), the most northern subspecies of a polytypic species whose nominate race occurs in the northern Peru and south-western Ecuador on both cast and west slopes of the Andes. Further six undescribed subspecies of Pedaliodes were discovered in the area (Pyrcz, in prep.).

Whereas C. pax is closely related to its lower parapatric replacement, C. cheloniis, from which it differs only in having an extra orange patch on the torus of the forewing, and besides is almost identical in male genitalia, C. illiaecus is not closely related to any congener found on the eastern slopes of the Andes or further south in western Ecuador. The male genitalia of C. illiaecus are somewhat similar to the sympatric C. pannonia and to C. ulena. C. ulena shows some similarities of the wing colour pattern reflected in the shape of the hindwing underside lighter and darker bands. However, C. ulena stands well apart from C. illiaecus as far as other morphological features are concerned, having much shorter palpi and the conspicuous, specialised androconial scales on the forewing upper side. Wing shape of C. illiaecus is most reminiscent of C. chirone, another sympatric congener. However, any closer affinity of C. illiaecus and C. chirone has to be ruled out in the light of a completely different male genitalia in C. chirone characterised by an extraordinary, extremely long tegumen, a structure shared only by the Bolivian species C. melanura. The systematic position of C. illiaecus is therefore unclear.

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Fig. 2. Corades liliacus male (paratype) genitalia (lateral view, aedeagus removed).