FOUR NEW RIODINID SPECIES FROM EASTERN ECUADOR
(Lepidoptera: Riodinidae)

Jason P. W. HALL * & Keith R. WILLMOTT *

* Department of Entomology and Nematology, University of Florida, Gainesville, Florida 32611, USA.

Abstract: Four new riodinid species in the genera Argyrogrammana Strand, 1932, Anteros Hübner, [1819], Napaea Hübner, [1809] and Ithomiola C. & R. Felder, 1865, are described from eastern Ecuador with brief notes on their habitats and behaviour and illustrations of similar species. Anteros violella Hall, 1939, is synonymised with Anteros aerousa Stichel, 1924 syn. nov.

Key-words: Anteros yurakchupa sp. nov., Argyrogrammana pacsa sp. nov., Ithomiola buckleyi sp. nov., Napaea neilid sp. nov., perching behaviour, Peru.

Introduction

Four new riodinid species are herein described from the east Andean slope in Ecuador, as part of an ongoing faunistic study of the Papilionoidea of that country; three of these are from premontane cloud forest localities, again proving the unexpected riodinid diversity in these habitats (HALL & WILLMOTT, 1995a, b, in press) even in well studied genera such as Argyrogrammana (BREVIGNON & GALLARD, 1995; HALL & WILLMOTT, 1995b, 1996).

The following museum acronyms are used throughout the text:
AMNH - American Museum of Natural History, New York, USA
BMNH - Natural History Museum, London, England
MNNSM - Museo Nacional Mayor de San Marcos, Lima, Peru
USNM - United States National Museum, Smithsonian, Washington, USA
ZMHU - Zoologische Museum Humboldt Universität, Berlin, Germany

Argyrographmana pacsa Hall & Willmott, sp. nov.
Figs. 1a-d, 8a,b.

Description: Male: forewing length 15.5mm. Hindwing somewhat elongate and rounded. Dorsal surface: forewing ground colour black; patch of red-brown filling a basal triangle bounded by the anal margin, costa and an uneven line from discal cell end to near tornus; four black marks in discal cell, one at cell end, two in middle, one at base that extends as a line to vein 1A+2A; two vertical red-brown streaks in tornus extend from anal margin to just above cell 1A+2A, large, postdiscal, turquoise patch, roughly rectangular but rounded at lower edge, extends from middle of cell Cu to vein M2; thin silver-blue submarginal line extends from tornus to apex, where it becomes slightly convex; white fringe elements at distal margin of cells 1A+2A, Cu, M1 and M2. Hindwing ground colour red-brown; line of black submarginal spots extends from tornus to apex, an additional, more proximal spot in tornus and apex; thin, silver-blue, more distal submarginal line extends from tornus to apex. Ventral surface: forewing ground colour brown; five black marks in discal cell surrounded by pale blue, one marking cell end, other four equidistant and alternating between lower and upper edge of cell beginning distally at lower edge; two black rectangles with pale blue around upper edges at base of cell 1A+2A; disjuncted, postdiscal line of pale blue spots, with similarly shaped black spots proximally and distally, consists of a small streak in middle of cell R3, a tiny streak at base of cell R4, a small square towards base of cell M3, a larger rectangle towards base of cell M4, a smaller square towards middle of cell M4, a large
rectangle towards base of cell Cu, and a similar rectangle more proximally positioned in cell Cu, only two black rectangles below in cell 1A+2A; disjonted, more distal line of smaller pale blue marks extends from vein 1A+2A to subapex with black inbetween a thin, parallel, slightly disjonted submarginal line of silver-blue that extends from tornus to apex where it is slightly convex; orange distal to this line in apex and cells Cu, and 1A+2A. Hindwing ground colour pale blue; three black marks in discal cell, one mark at cell end, two black spots in basal half of cell 1A+2A, black spot at wing base, two black squares in middle of cell Rs; disjonted postdiscal line of black spots extends from cell 1A+2A-M; a less disjonted, more distal line of arrow-shaped black marks extends from tornus to apex where they become larger, submarginal line of rounded black triangles extends from tornus to apex with thin silver-blue immediately distal. Labial palpi brown with some yellow scales. Eyes brown and bare with black medial stripe. Frons black with yellow band across middle. Antennal segments brown with white scaling basally, clubs brown. Thorax black with some red-brown dorsally, ventral surface brown; abdomen dorsal surface red-brown, ventral surface brown. Legs brown. Genitalia (Fig. 8a,b): uncus angularly rounded, saccus small, valvae upwardly pointed and inwardly curved at tip with sclerotised arch below tips sheathing aedeagus, smaller point at lower middle; aedeagus long, narrow and pointed at tip with long stripelike serrate cornutus in middle; pedicel broadens towards middle to support aedeagus and extends almost to tip of aedeagus posteriorly before joining at base of vinculum. Female: unknown.

Types: Holotype ♂: Ecuador - Zamora-Chinchipe Prov., Romerillos, ridge to west of Rio Janboe, 1600m, 1 Nov 1997 (K. R. Willmott); to be deposited in the BMNH. Paratypes: Ecuador - 1 ♀: Morona-Santiago Prov., km 20 Macas-Nueve de Octubre rd., Rio Abanico, 1600m, 27 Sept 1997 (G. W. Busby III); in coll. G. W. Busby III, Boston, USA.

Etymology: This species is named after the Quecha word "paca", meaning beautiful and shining, in reference to the dorsal blue forewing patch.

Diagnosis: Argyrogrammana pacsa sp. nov. is superficially most similar to Argyrogrammana natalia Hall & Willmott, 1995 (Fig. 2a,b), but differs most prominently by having a more elongate, rounded hindwing, and on the dorsal surface a larger, paler turquoise blue forewing patch, darker red-brown colouration, less black speckling in the forewing discal cell, one or two red-brown streaks in the forewing tornus and black submarginal spots on the hindwing separate from the silver-blue line; on the ventral surface, A. pacsa has paler, turquoise blue colouration on both wings, smaller turquoise instead of lilac postdiscal forewing markings, more triangular submarginal black markings on both wings and marginal orange on the forewing. However, the male genitalia of A. pacsa are somewhat more similar to those of Argyrogrammana caelestina Hall & Willmott, 1995 (see Hall & Willmott, 1995b), differing only by having a slightly narrower, shorter saccus, a single, longer aedeagal cornutus instead of two and a more shallowly indented uncus posteriorly. A. caelestina can immediately be distinguished from A. pacsa by having slightly darker red-brown dorsal colouration that is reduced on the forewing and a very large, brilliant turquoise postdiscal forewing patch that is evident on both wing surfaces.

Discussion: A. pacsa is only known with certainty from the two Ecuadorian localities at 1600m, but there is a similar specimen in the MNMSM from central Peru, labelled "Junin, 1-3 km SW of Mina Pichita, 2100m" that probably belongs to this species (KRW). This is therefore the highest occurring species known in the genus and it perhaps replaces the lower flying A. caelestina (now known from Colombia (Callaghan, pers. comm.) to Peru (specimen in the MNMSM)) for which we now have altitudinal records from 600-1300m. The holotype male of A. pacsa was found at 12:15h in a trap baited with rotting fish that was placed 10 metres above the ground in a small, enclosed ridgetop clearing; the paratype male was collected from a similarly baited trap on which additional specimens were seen (G. W. Busby, pers. comm.). This
is very unusual behaviour for a member of this genus, but it increases the number of undescribed species discovered through the use of traps with this type of bait (HALL & WILLMOTT, 1995a, in press). Interestingly, A. natalitla males (one of which is illustrated in Fig. 2a,b) were found perching on the same ridgetop where the holotype of A. paesa was collected, and the latter species will presumably be found perching there.

**Anteros yurakchupa** Hall & Willmott, sp. nov.
Figs. 3a,b; 9a,b.

**Description**: Male: forewing length 12.5mm. Forewing costa sharply convex towards apex, distal margin angular at apex; hindwing tornus pointed. Dorsal surface: forewing ground colour black; large, opaque white square at end of discal cell, small, white square in middle of cell Cu1; a few blue setae at wing base; two cream fringe elements at distal margin of cell 1A+2A, one element at margin of cells Cu, Cu1, M, and M1. Hindwing ground colour black; basal and anal two-thirds of wing covered with blue setae, tornus setose, small area of red-brown in tornus; cream fringe elements at distal margin as on forewing. Ventral surface: forewing ground colour brown along anal margin up to vein Cu1; remainder of wing dark red, mottled with white and yellow scales, mostly red in distal half of cell M, and at cell end, yellow along basal half of costa, in apex and at base of discal cell; white squares same as dorsal surface; silver streak at discal cell end, wing base, and two in middle of discal cell with red inbetween; faint trace of postdiscal black scaling creating a disjointed line; silver submarginal line extends from middle of cell 1A+2A to apex with red proximally and alternating pattern of red and yellow spots distally. Hindwing ground colour dark red heavily overlaid in discal portion with white scaling and above discal cell with yellow scaling; two red spots at base of costa with pale yellow inbetween, three red marks in discal cell with others below it marked distally with yellow; silver submarginal line extending from middle of cell 1A+2A to apex, with thick dark red proximally, and into tornus, with alternating pattern of yellow and red spots distally; tornus setose with patches of red and black, anal margin a mixture of white and black. Labial palpi dark red with some yellow and orange scaling. Eyes brown and setose. Frons dark red. Antennal segments towards base black with white scaling in basal half of segment, towards apex with white scaling in basal three-quarters of segment; clubs black, tips orange-brown. Thorax dorsal surface black with blue scaling, ventral surface black; abdomen dorsal surface black with blue scaling, ventral surface yellowish brown. Fore and midlegs dark red, hindlegs dark red with lower half of tibia white. Genitalia (Fig. 9a,b): unicus rounded, medially pointed at posterior margin on dorsum; saccus almost absent; heavily sclerotised sections of valvae joined by membrane, lower, short pointed projection, broad, elongate upper projection upwardly turned at tip; arising from the anterior portion of this upper projection is a heavily sclerotised rod that nearly joins over dorsum of aedeagus but has only a membranous final connection; aedeagus short, narrow and pointed at tip, pedicel broad at base.

**Female**: unknown.

**Types**: Holotype ♀: Ecuador.- Napo Prov., km 20 Tena-Puyo rd., Apuya, 600m, 6 Dec 1996 (K. R. Willmott), to be deposited in the BMNH.
Paratypes: Ecuador.- 1 ♀: same locality data as above, 2 Oct 1997 (R. C. Busby), in coll. of the authors.

**Etymology**: The name is derived from the Quechua words "yurak", meaning "white", and "chupa", meaning "shin", in reference to the diagnostic white hindleg tibia in this species.

**Diagnosis**: The valve shape of the male genitalia and wing pattern of *Anteros yurakchupa* sp. nov. place it in the Sarota-like "A. carausus group" of *Anteros*. Indeed, it is most similar to *Anteros carausus* Westwood, [1851], itself. Although the two
illustrated specimens of *A. yurakchupa* and *A. carausius principalis* Hopffer, 1874 (the east Andean subspecies, Fig. 4a,b), collected at nearby sites in eastern Ecuador, exhibit quite different wing patterns; the enormous variability of the latter means that there are few definitive wing pattern characters to distinguish the two species. The figured specimen of *A. carausius principalis* has well contrasted ventral hindwing pattern elements (as seen in the type of *carus* Godman, 1903, a synonym of *principalis*), but these may be more diffuse (as seen in the type of *principalis* and the type of *medusa* H. Druce, 1874, a synonym of nominate *carausius*) and the ventral hindwing provides no reliably consistent differences between the species. The same can be said for the discal to postdiscal areas of the ventral forewing, but *A. carausius* always has a red triangle at the base of the discal cell whereas this is yellow in *A. yurakchupa*. *A. yurakchupa* also lacks the tiny white flecks in cell Cu of the dorsal forewing and hindwing of east Andean *A. carausius* specimens and has less blue scaling on the dorsal forewing. The most invariably distinguishing features of *A. yurakchupa* are its wing shape, with a forewing costa that is more convex near the apex and a distal margin that is markedly more angular at the apex, its white instead or red-brown hindleg tibia and male genitalia; the uncus of the male genitalia of *A. yurakchupa* is more bulbously rounded, the falci are shorter, the saccus is smaller, the upper portion of the valvae are significantly longer, of more uniform width and upturned at the tip, and the anteriorly directed sclerotised "rods" do not meet over the dorsum of the aedeagus whereas they do in *A. carausius* (see Fig. 10).

The third member of the "*A. carausius group" is *Anteros aerosus* Stichel, 1924 (an examination of both types reveals that *Anteros violetta* Hall, 1939 is a synonym, n. syn.); it differs most prominently from the other two species by having a single white forewing patch in cell C_{0}, three proximally directed silver streaks in the apex of the ventral forewing and pure yellow instead of alternating red and yellow margins on both ventral wing surfaces.

**Discussion:** No specimens of this new species were uncovered during recent searches of the AMNH, BMNH, USNM and ZMHU collections and *A. yurakchupa* remains known to us only from the type locality at the base of the east Ecuadorian Andes. The holotype male was found at 13:25h in a trap baited with rotting fish that was suspended 15 metres above the ground in an open ridgetop light gap. The paratype was also collected in a similarly baited trap (R. C. Busby, pers. comm.).

**Napaea neildi** Hall & Willmott, sp. nov.  
Figs. 5a,b, 11.

**Description:** Male: forewing length 18mm. Wing shape elongate, forewing very slightly falcate; forewing has five radial veins. **Dorsal surface:** forewing ground colour chestnut brown; small white spot at upper edge of discal cell end, discal cell end marked with darker brown, small dark brown patch at base of cell 1A+2A; two small postdiscal white rectangles near costa, one at base of cell M_{0} and one in R_{4}, another more hazy white spot in distal portion of cell M_{0}, darker brown colouration proximal to these white markings continues as disjointed, faint band into cells Cu and Cu_{2}, two small apical white spots, increasingly fainter submarginal spots in subsequent cells, all lined proximally with darker brown that continues along submargin towards tornus. Hindwing ground colour chestnut brown; disjointed, poorly defined darker brown postdiscal and submarginal lines traverse wing. **Ventral surface:** forewing ground colour brown; small grey marks at base of cell 1A+2A and discal cell, grey streak across middle and at end of discal cell, small white spot at upper edge of discal cell just proximal to cell end; three dark brown spots at upper edge of basal half of cell 1A+2A; jagged postdiscal line consists of white rectangles at base of cell M_{0} and in R_{4}, a small grey mark in middle of cell M_{0}, a large grey square in distal portion of M_{0}, a small grey mark at base of cell Cu_{2} and a larger grey mark somewhat more distally in middle of
cell Cu₂, all of these marks with dark brown proximally up until a point corresponding to discal cell end; a small grey-white submarginal spot in cells R₄, M₁-Cu₁, a pair in 1A+2A lined with dark brown proximally. Hindwing ground colour grey, becoming brown towards submargin; dark brown streak at discal cell end, one just before cell end, three dark brown spots along costa above discal cell; disjunct postdiscal line of dark brown spots extends from costa, curving outwards then inwards to cell 1A+2A; grey-white submarginal spot in M₄ with dark brown proximally, probably also in cell M₃ and perhaps Cu₄ (submargins of these cells not present on either wing). Labial palpi long, a mixture of dark brown and grey scales. Eyes rare and brown. Frons a mixture of pale brown and grey scales. Antennal segments black with basal white scaling; clubs black, tips orange-brown. Thorax brown on dorsal and ventral surface; abdomen chestnut-brown on dorsal surface and grey on ventral surface. Forelegs grey; femur of mid and hindlegs grey, remainder brown. Genitalia (Fig. 11): uncus rounded; saccus small; valvae with upwardly curved and pointed lower projection and smaller, rounded upper projection with slight point inbetween; distal portion of aedeagus flattened and narrowed into a point; posterior portion of vesica studded with tiny sclerotised structures, anterior portion of aedeagus contains several sets of sclerotised cornuti, one set of three, then three pairs, then one set of three then another pair.

Female: unknown.

Types: Holotype C*: Ecuador.- Napo Prov., Baeza-Tena rd., nr. Cosanga, 2000m, 19 Sept 1995 (A. F. E. Neild), to be deposited in the BMNH.

Etymology: This species is named for our good friend Andrew Neild, who, during one of his brief but surprisingly successful forays into the realms of riodinid collecting, captured the unique holotype.

Diagnosis: Napaea neildi sp. nov. presents a unique phenotype in the genus, its elongate wing shape and chestnut brown dorsal surface, which has only a few white spots in the apex of the forewing, being diagnostic. It seems to be most closely related to the widespread species Napaea orpheus (Westwood, [1851]), which has very similar male genitalia but, although they have a number of pattern elements in common, N. orpheus has a more compact wing shape, a plain brown dorsal ground colour, numerous white dorsal forewing spots and a large white patch on the hindwing.

Discussion: We have no detailed behavioural information for this species. A. Neild (pers. comm.) informs us that the single male was perching on secondary growth vegetation at the edge of a field near forest. It is the highest flying species of Napaea in Ecuador, its close relative N. orpheus currently being known to occur only from 1050-1900m.

Ithomiola buckleyi Hall & Willmott, sp. nov.
Figs. 6a,b; 12.

Description: Male: forewing length 18.5mm. Wing shape elongate; forewing sharply convex at tornus; forewing has five radial veins; hindwing sharply convex at apex, tornus slightly pointed. Dorsal surface: forewing ground colour black; pale blue extends from wing base to near tornus between anal margin and vein Cu₁, with vein 1A+2A outlined in black, then extends as an increasingly narrower submarginal line into the apex as far as cell M₄, with all veins through it broadly marked with black; opaque white fenestration fills discal cell with single black bar towards cell end, narrow and elongate opaque white fenestration in basal two-thirds of cell Cu₁, shorter, triangular fenestration at base of cell Cu₁; diagonal, subapical band of opaque white fenestrations consists of an ovoid patch in cell R₄, a tiny fleck at the base of cell R₄, a larger elongate ovoid patch towards the base of cell M₄, a longer rectangle towards the base of cell M₄, and a triangle in the middle of cell M₄; white fringe at distal margin of cells 1A+2A and
Cu₅. Hindwing ground colour black; horizontal line of elongate, opaque white fenestrations overlayed with some black scales traverses wing below discal cell from cell 1A+2A-M₃, tiny flock of a fenestration at lower edge of discal cell; pale blue extends from these fenestrations towards distal margin, including anal margin, becoming narrower towards apex, then up to cell M₃, leaving thin black area distal to fenestrations and around distal margin; white fringe elements weakly defined at distal margins of cells 1A+2A-Cu₅, well defined in cells M₃-M₄. Ventral surface: forewing differs from dorsal surface in following ways: pale blue in cell 1A+2A reduced to one submarginal mark, one mark in middle of cell, a third towards the base; submarginal markings are more whitish in colouration, especially towards apex; faint blue scaling distal to opaque white fenestration in cells R₉, M₅-Cu₅, and at upper edge of fenestrations in discal cell. Hindwing differs from dorsal surface in following ways: pale blue at basal, upper edge of discal cell and above it at costal margin contains faint black markings and a diagonal black line at wing base; diffuse pale blue scaling at distal margins of fenestrations, additional small pale blue marks in middle of cells M₅ and M₆, and band of whitish scaling through middle of distal pale blue extending into apex. Labial palpi long, dark brown with pale blue scaling on all but last segment. Eyes brown and bare. Frons black with broad white distal margins. Antennal segments black with two patches of white scaling on basal segments, reduced to one patch on apical segments; clubs black, tips orange-brown. Thorax and abdomen dorsal surface black with pale blue scaling, ventral surface pale grey-blue. Forelegs pale grey-blue, mid and hindlegs brown with some pale blue scales and hairs. Genitalia (Fig. 12): uncus rounded, vinculum thickened at middle; sacculus tiny; valvae with a single upwardly pointed projection; aedeagus flattens abruptly and narrows towards tip, where there is a single anterior cornutus and three rows of more posteriorly positioned multiple cornuti, two rows towards the dorsum, one ventrally.

Female: differs from male in following ways: wing shape slightly broader, forewing apex less pointed, hindwing slightly more angular. Submarginal blue on dorsal forewing becomes white towards apex, an additional black bar through middle of basal opaque white fenestration in discal cell and no opaque white streak at base of cell R₉. On ventral forewing white submarginal spot is partially joined to subapical fenestration in cell M₅; on ventral hindwing, no blue-grey spots in middle of cells M₅ and M₆, central fenestrations not overlayed with darker scaling.

Types: Holotype ♂: Ecuador - Morona-Santiago Prov., km 20 Macas-Nuevo de Octubre rd., Rio Abanico, 1600m, 1 Nov 1996 (K. R. Willmott); to be deposited in the BMNH.
Paratypes: Ecuador - 2 ♂♂: Zamora-Chinchipe Prov., km 7 Zamora-Loja rd., Quebrada Chorillos, 1250m, 3 Apr 1995 (J. P. W. Hall); in coll. of the authors. Peru - 1 ♂: Amazonas, E. of Nueva Esperanza, La Orilla, Rio Huamanpata, Nov 1985 (B. Calderón); 1 ♀: 3 km N. of Nueva Esperanza, Pirullo, 1700m, 5 Mar 1986 (B. Calderón); both in the MNHSM.

Etymology: We name this species after the pioneering amateur entomologist Clarence Buckley, who collected some of the first east Andean rodinids in Ecuador in the 1860's and 70's for W. C. Hewitson (see Vane-Wright, 1991).

Diagnosis: The male genitalia and wing pattern elements clearly place this new species in Ithomiola, but in many respects the species of that genus are similar to those of Napaea and a detailed cladistic analysis may find that Ithomiola represents a derived group of mimetic species that are phylogenetically embedded within Napaea. Ithomiola buckleyi sp. nov. is very similar only to Ithomiola callixena (Hewitson, 1870) (Fig. 7a,b). It differs from that species by having only one black bar in the forewing discal cell (in males only), more elongate opaque white postdiscal and subapical fenestrations on the forewing and across the hindwing, an extra subapical flock at the base of forewing cell R₉, and by lacking the two white forewing apical spots (in males). The male genitalia of the two species are also very similar, differing only in the arrangement of aedeagal cornuti; I. buckleyi has two layers of multiple cornuti in the posterior roof of the aedeagus whereas I. callixena has only a single layer.
**Discussion:** Currently *L. callixena* is known to range from north-east Ecuador (and certainly south-east Colombia) to north-east Peru, while *L. buckleyi* is known from the more restricted range of central-east Ecuador to north-east Peru. Although the two species are thus broadly sympatric over large parts of their ranges, they have not been found at the same locality, possibly because they are altitudinally parapatric. We have Ecuadorian records of *L. callixena* from 1700-2000m, while locality data suggests *L. buckleyi* occurs lower, from 1250-1700m. Males of *L. buckleyi* are found perching singly or in small groups on streamside vegetation around 4-6 metres high and we have found them to be active between about 11:00-14:00h; their flight is rapid when engaged in spiralling male-male chases.

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**References**


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Figs. 3-7 (right). 3. *Anteros yurakchupa* Hall & Willmott sp. nov., holotype ♂: a) dorsal surface; b) ventral surface. 4. *Anteros carausius principalis* Hopffer, 1874, Ecuadorian ♂: a) dorsal surface; b) ventral surface. 5. *Napea neilbi* Hall & Willmott sp. nov., holotype ♂: a) dorsal surface; b) ventral surface. 6. *Ithomiola buckleyi* Hall & Willmott sp. nov., holotype ♂: a) dorsal surface; b) ventral surface. 7. *Ithomiola callixena* (Hewitson, 1870), Ecuadorian ♂: a) dorsal surface; b) ventral surface.
Figs. 8-12. Male genitalia. 8. Argyrogrammana pachsa sp. nov.: a) lateral view; b) ventral view. 9. Anteros yurakchupa sp. nov.: a) lateral view; b) ventral view. 10. Anteros carausus principalis Hopffer, 1874 (Ecuador). 11. Napaea neildi sp. nov. 12. Ithomiola buckleyi sp. nov.