

## TWO NEW SPECIES AND ONE SUBSPECIES OF RIODINID FROM SOUTHWEST BRAZIL (LEPIDOPTERA: RIODINIDAE)

JASON P. W. HALL<sup>1</sup> AND EURIDES FURTADO<sup>2</sup>

<sup>1</sup>Dept. of Entomology and Nematology, University of Florida, Gainesville, Florida 32611, USA; and

<sup>2</sup>Caixa Postal 97, 78400-000 Diamantino, Mato Grosso, Brazil

**ABSTRACT.**— Two new species and one subspecies in the riodinid genera *Xenandra* C. & R. Felder, 1865, *Argyrogrammana* Strand, 1932, and *Pachythone* Bates, 1868, are described from Mato Grosso and Rondônia states in south-west Brazil. The symmachiine species *caeruleata* Godman & Salvin, 1878, is transferred to the genus *Esthemopsis* C. & R. Felder, 1865, from *Xenandra* (stat. rev.).

**KEY WORDS:** Amazon, androconia, *Argyrogrammana*, *Argyrogrammana talboti naranjilla* n. ssp., Bolivia, Dioprinae, Ecuador, *Esthemopsis*, Guianas, Leguminosae, Mato Grosso, *Mesene*, *Mesenopsis*, Neotropical, *Pachythone*, *Pachythone analucia* n. sp., Peru, Proteaceae, Rondônia, Sapindaceae, *Stichelia*, Symmachiini, taxonomy, *Xenandra*, *Xenandra mielkei* n. sp.

The purpose of this paper is to describe three new riodinid taxa in the genera *Xenandra* C. & R. Felder, 1865, *Argyrogrammana* Strand, 1932, and *Pachythone* Bates, 1868, to facilitate the compilation of butterfly checklists for the Alto Rio Arinos area of Diamantino in Mato Grosso state, Brazil (EF), and Ecuador (JPWH). P. J. DeVries, as the co-discoverer of the new *Pachythone* species, is included as an author on that taxon. All of the unstarred collections listed in Hall (1999) have been examined for relevant types and additional material of the taxa described here. The following collection acronyms are used throughout the text:

- AMNH American Museum of Natural History, New York, USA
- BMNH (British) Natural History Museum, London, England
- EF Eurides Furtado collection, Diamantino, Mato Grosso, Brazil
- PJD Philip J. DeVries collection, Eugene, Oregon, USA
- UFPC Universidade Federal do Paraná, Departamento de Zoologia, Curitiba, Paraná, Brazil
- USNM United States National Museum, Smithsonian Institution, Washington, USA

### *Xenandra mielkei* Hall & Furtado, n. sp.

Fig. 1a-d; 4a-c

**Description.**— MALE: forewing length 15.5mm. Forewing costal margin shallowly convex towards base, distal margin strongly convex; hindwing angular, tornus pointed. *Dorsal surface:* forewing ground color dark brown; dark orange-red at very base of anal margin and along vein at lower edge of discal cell, becoming slightly broader in postdiscal region and extending to base of veins Cu<sub>1</sub> and M<sub>3</sub> and along discal cell end; fringe brown. Hindwing ground color dark brown, paler brown at very base of wing; large patch of dark orange-red extends from costal margin to a point in middle of cell 2A two-fifths distance from base to wing margin, and then as a semicircle to apex, small area of dark orange-red scaling in lower middle portion of cell 2A; long orange-brown, erectile, androconial setae along medial region of cell 2A extend towards anal margin; fringe brown. *Ventral surface:* ground color of both wings dark brown, paler brown at anal margin of forewing; orange-red dorsal pattern very faintly visible. *Head:* first and third segments of labial palpi brown, dorsal surface of second segment brown, ventral surface orange; third segment very short. Eyes brown and bare, margins with orange scaling. Frons orange. Antennal segments and tubular clubs entirely black. *Body:* both surfaces of thorax black, patagia orange. Dorsal surface of abdomen black, sides and ventral surface of distal half orange, except for narrow medial black line. A broad band of concealed androconial scales with

a small gap dorsally on upper half of abdominal tergites 4 and 5 (Fig. 4c) (see Harvey, 1987, and Hall & Willmott, 1996a, for SEM illustrations of this scale type). All legs brown. *Genitalia* (Fig. 4a,b): uncus rounded at lower posterior corner, produced into point at dorsal tip; tegumen triangular with large rectangular lightly sclerotised region anteriorly; falci of medium size and width; vinculum a narrow ribbon, produced into broad, short saccus ventrally; valvae consist of well sclerotised lower portion produced into a single rounded point, and a more lightly sclerotised upper portion encircling aedeagus and produced into a rounded lobe; aedeagus of even width and slightly downwardly pointed, anterior opening directed ventrally, posterior opening directed ventrally and to right with tip curled inwards; a single large cluster of hair-like cornuti; pedicel large and well sclerotised, produced into a pronouncedly rounded posterior curve.

**FEMALE:** forewing length 15.5mm. Wing shape similar to that of male but both wings more narrow. *Dorsal surface:* forewing ground color brown; yellow longitudinal stripe extends and broadens from wing base to near distal margin, encompassing lower half of discal cell, upper basal half of cell 2A, and basal two-thirds of cells Cu<sub>2</sub> to M<sub>3</sub> (some brown scaling at upper edge of latter cell); fringe brown. Hindwing ground color brown; yellow longitudinal stripe extends and broadens from wing base to near distal margin, encompassing lower half of discal cell, upper basal half of cell 2A, basal half of cell Cu<sub>2</sub>, and basal three-quarters of cells Cu<sub>1</sub> and M<sub>3</sub> (some brown scaling at upper edge of latter cell); costal and distal fringes brown, anal fringe yellow. *Ventral surface:* differs from dorsal surface in following respects: yellow scaling present on forewing as a band along base of costa and as a small fleck in tornus, and on hindwing as two small yellow spots at wing base above discal cell. *Head:* labial palpi a mixture of yellow and brown scaling on all segments. Eyes brown and bare, margins with yellow scaling. Frons yellow. Antennal segments and tubular clubs entirely black. *Body:* thorax brown with yellow scaling posteriorly at sides on dorsal surface and as a spot at middle of sides on ventral surface; patagia brown. Dorsal surface of abdomen brown, remainder yellow except for narrow medial brown line at sides and on ventral surface. All legs yellow-brown.

**Types.**— *Holotype* ♂: BRAZIL.— Mato Grosso, Alto Rio Arinos, nr. Diamantino, 400m, 2 Nov 1989 (E. Furtado); to be deposited in the USNM.

*Allotype* ♀: BRAZIL.— Mato Grosso, Alto Rio Arinos, nr. Diamantino, 400m, 24 Nov 1991 (E. Furtado); to be deposited in the USNM. *Paratypes:* BRAZIL.— Mato Grosso, same locality data as HT: 1 ♂: 18 Dec 1975; 1 ♂: 6 Oct 1990; 1 ♂: 21 Oct 1990; 1 ♂: 28 Oct 1990; 1 ♀: 5 Oct 1980; 1 ♀: 20 Oct 1998 (all E. Furtado); all in the EF. 1 ♂: 2 Nov 1989; 1 ♀: 21 Jul 1992 (both E. Furtado); to be deposited in the UFPC.

**Etymology.**— This species is named in honor of our friend, the eminent Brazilian lepidopterist, Olaf H. H. Mielke.



Fig. 1-3. 1. *Xenandra mielkei* Hall & Furtado n. sp., holotype ♂ [USNM]: a) dorsal surface; b) ventral surface. Allotype ♀ [USNM]: c) dorsal surface; d) ventral surface. 2. *Argyrogrammana talboti talboti* Brévignon & Gallard, 1998, ♂, Alto Rio Arinos, nr. Diamantino, Brazil [USNM]: a) dorsal surface; b) ventral surface. Holotype ♀, "French Guiana" [BMNH]: c) dorsal surface; d) ventral surface. *Argyrogrammana talboti naranjilla* Hall & Furtado n. ssp., holotype ♂ [AMNH]: e) dorsal surface; f) ventral surface. Allotype ♀ [USNM]: g) dorsal surface; h) ventral surface. 3. *Pachythone analuciae* Hall, Furtado & DeVries n. sp., holotype ♂ [USNM]: a) dorsal surface; b) ventral surface. Ecuadorian paratype ♂ [PJD]: c) dorsal surface; d) ventral surface.

**Diagnosis.**—*Xenandra mielkei* n. sp. presents a remarkably interesting phenotype that appears to be an evolutionary intermediate between the genera *Xenandra* and *Mesenopsis* Godman & Salvin, [1886], and its discovery provides evidence that *Mesenopsis* may be a derived clade within *Xenandra*. Longitudinal stripes represent a very rare wing pattern in butterflies and in the moths (primarily Dioptriinae) which are believed to act as their mimetic models (Miller, 1996), thus it seems most likely that *Mesenopsis* species, whose sexes both have longitudinal stripes, are more derived than *Xenandra* species. In previously described species of the latter genus, the male is typically black with a variably sized red patch at the costal margin of the hindwing while the female has a transverse red forewing band. However, *X. mielkei* is unique in presenting a typical *Xenandra*-like male phenotype and a *Mesenopsis*-like female phenotype. It is most interesting to note the wing pattern variation among paratype males. The red hindwing patch varies in size and the extent to which it extends to the costal margin but, most importantly, the medial forewing red scaling varies from being completely absent (as in typical *Xenandra* males) to being very extensive and similar in shape to that of the female forewing yellow. It is not difficult to imagine how the hindwing red of the male could evolve into a longitudinal stripe by a reduction of red along the length of the costal margin. Unlike all other *Xenandra* species, *X. mielkei* lacks the apomorphic grayish-green interneural stripes on both ventral wing surfaces which perhaps also suggests that it may be close to the progenitor of the currently recognised genera *Xenandra* and *Mesenopsis*. Other external characters of *X. mielkei* that are typical of *Mesenopsis* include the orange/yellow patagia, frons and palpi.

Another character set indicating the close relationship between *Xenandra* and *Mesenopsis* is their distribution of concealed abdominal androconial scales in males. In the three *Xenandra* species examined and in all *Mesenopsis* species, there is a single band of these scales on segments 4 and 5. *X. mielkei* is typical in this respect except that there is a small gap dividing the band dorsally. It is important to note that the distribution pattern "1,1,1,1" on segments 4-7 in *Mesenopsis pulchella* Godman, 1903, reported by Harvey (1987) and subsequently cited by Hall & Willmott (1996a) is erroneous and should be "1,1" on segments 4 and 5. It is assumed that this entry was mixed by Harvey (1987) with *Mesene margareta* (White, 1843), which was recorded as having a "1,1" pattern on segments 4 and 5, but which actually has a "1,1,1,1" pattern on segments 4-7 (note that the typical pattern for *Mesene* is "1,1,1" on segments 4-6). It is also worth noting here that the abdominal androconial patch distribution, wing pattern and male genitalia of the species *caeruleata* Godman & Salvin, 1878, which is currently treated in *Xenandra* (Bridges, 1994), place it in the genus *Esthemopsis* C. & R. Felder, [1865] (stat. rev.), as first suggested by Godman & Salvin (1886) and also recently by Hall & Willmott (1996a).

The male genitalia of *X. mielkei* exhibit some characters in common with members of *Xenandra*, some with members of *Mesenopsis*, and some that are unique. The shapes of the uncus and tegumen are most similar to those of *Mesenopsis* species, but the unusual lightly sclerotised rectangle at the anterior edge of the tegumen is only seen in *Xenandra*, in a much reduced form. The valvae, which are relatively small with a single posterior point and only a lightly sclerotised dorsal portion over the aedeagus, are most similar to those of *Xenandra* species, while the pronouncedly curved pedicel appears to be somewhat intermediate between that of *Xenandra* and *Mesenopsis*. In the examined *Xenandra* species the pedicel is simple and strap-like while in all *Mesenopsis* species the pedicel is highly modified into a posteriorly projecting horn (a recurring character state in the Symmachiini: e.g. in the genera *Stichelia* Zikán, 1949, and *Mesene* Doubleday, 1847). Finally, many

characters of the aedeagus, including the ventral instead of anterior opening anteriorly, the ventral and right opening posteriorly, and the single cluster of long hair-like setae, do not occur in any of the *Xenandra* species examined and in no *Mesenopsis* species.

In conclusion, *X. mielkei* uniquely presents a blend of characters typical of the genera *Xenandra* and *Mesenopsis*, and the discussion above presents evidence that the latter genus may be phylogenetically embedded in the former or that *X. mielkei* may be closely related to the progenitor of both genera. Either way, it is highly probable that cladistic analyses of the Symmachiini will show that these genera should be combined. With this outcome in mind, this new species is placed in the first described of the aforementioned genera, *Xenandra*. **Discussion.**—*X. mielkei* is currently known only from the Diamantino region of central-western Mato Grosso state in south-west Brazil, although it will certainly be found to be more widespread in the south-western Amazon basin.

Both sexes of *X. mielkei* were encountered resting under leaves less than 2m above the ground along forest edges around mid-day, and females were also observed visiting flowers of *Inga laurina* (Leguminosae) and a *Roupala* species (Proteaceae).

*Argyrogrammana talboti naranjilla* Hall & Furtado, n. ssp.

Fig. 2c-h; 5a,b

**Description.**—MALE: forewing length 16.5mm. Forewing costa straight, distal margin very slightly convex; hindwing rounded. *Dorsal surface*: forewing ground color black; large orange-yellow patch extends from wing base to near submargin and as an in-curving band around end of discal cell to near costa, with uneven distal margin, that is orange below vein  $Cu_1$  and yellow in the upper distal corner of that cell and above, thin line of yellow scaling at distal margin of orange; three small, evenly spaced triangles in discal cell of which basal two orange, distal one yellow; two small pale blue squares in middle of cells  $M_3$  and  $M_2$  (very faint in paratype); thin, undulating, faintly discontinuous silver-blue submarginal line extends from tornus to apex, where elements are crescent-shaped and largest; fringe black with white scaling at margin of cells 2A,  $Cu_1$ ,  $M_2$  and  $M_1$ . Hindwing ground color black; large orange patch extends from wing base to near submargin, distal margin uneven with thin line of yellow scaling, anal margin paler orange; thin, undulating, faintly discontinuous silver-blue submarginal line extends from tornus to apex; distal fringe black with white scaling at margin of cells  $Cu_1$  and  $M_2$ , anal and costal fringes orange. *Ventral surface*: differs from dorsal surface in following respects: blue squares in forewing cells  $M_3$  and  $M_2$  very faint, an additional more prominent one in cell  $M_1$ ; apical element of forewing submarginal silver-blue line notably larger; two tiny black spots at upper base of hindwing discal cell. *Head*: labial palpi mixture of very long brown and cream setae. Eyes brown and bare, margins with orange scaling. Frons brown with some lateral cream scaling. Antennal segments (of paratype) black with basal white scaling, tubular clubs black. *Body*: dorsal surface of thorax black with extensive orange scaling, patagia orange. Abdomen orange with slightly paler cream-orange ventrally. All legs cream. *Genitalia* (Fig. 5a,b): uncus angular, slightly indented at dorsal tip; tegumen elongate, anteriorly notched; falci somewhat large; vinculum narrow ribbon, produced into long saccus ventrally; valvae narrow and elongate, small angular point at lower margin, narrow distal portion joined at tip by small, downwardly posteriorly pointing spine; aedeagus long, narrow and pointed at tip; long continuous sclerotised cornutal band with jagged dorsal margin; pedicel long, broad at middle supporting aedeagus.

FEMALE: differs from male in following respects: forewing length 21mm. Wing shape more elongate. *Dorsal surface*: all marks in forewing discal cell larger and orange, orange extends above vein  $Cu_1$  at base of forewing postdiscal band, blue squares in forewing subapex absent; line of yellow scaling at distal margin of orange on hindwing slightly broader. *Ventral surface*: same differences as dorsal surface except that orange does not extend above vein  $Cu_1$  at base of forewing postdiscal band and a small area of additional black scaling present towards upper base of cell 2A.

**Types.**—*Holotype* ♂: BRAZIL.—"Amazonas"; in the AMNH.

