

INSECTA MUNDI

A Journal of World Insect Systematics

0029

Hesperiidae of Rondônia, Brazil: Taxonomic comments
on “night” skippers, with descriptions of new genera and species
(Lepidoptera: Eudaminae)

George T. Austin

McGuire Center for Lepidoptera and Biodiversity
Florida Museum of Natural History, University of Florida
P.O. Box 112710, Gainesville, Florida 32611

Date of Issue: March 3, 2008

George T. Austin

Hesperiidae of Rondônia, Brazil: Taxonomic comments on “night” skippers, with descriptions of new genera and species (Lepidoptera: Eudaminae)

Insecta Mundi 0029: 1-36

Published in 2008 by

Center for Systematic Entomology, Inc.

P. O. Box 147100

Gainesville, FL 32614-7100 U. S. A.

<http://www.centerforsystematicentomology.org/>

Insecta Mundi is a journal primarily devoted to insect systematics, but articles can be published on any non-marine arthropod taxon. Manuscripts considered for publication include, but are not limited to, systematic or taxonomic studies, revisions, nomenclatural changes, faunal studies, book reviews, phylogenetic analyses, biological or behavioral studies, etc. ***Insecta Mundi*** is widely distributed, and referenced or abstracted by several sources including the Zoological Record, CAB Abstracts, etc.

As of 2007, ***Insecta Mundi*** is published irregularly throughout the year, not as a quarterly issues. As manuscripts are completed they are published and given an individual number. Manuscripts must be peer reviewed prior to submission, after which they are again reviewed by the editorial board to insure quality. One author of each submitted manuscript must be a current member of the Center for Systematic Entomology.

Managing editor: Paul E. Skelley, e-mail: skellep@doacs.state.fl.us, insectamundi@gmail.com

Production editor: Michael C. Thomas, e-mail: thomasm@doacs.state.fl.us

Editorial board: J .H. Frank, M. J. Paulsen

Printed copies deposited in libraries of:

CSIRO, Canberra, ACT, Australia

Museu de Zoologia, São Paulo, Brazil

Agriculture and Agrifood Canada, Ottawa, Ontario, Canada

The Natural History Museum, London, England

Muzeum I Instytut Zoologii Pan, Warsaw, Poland

National Taiwan University, Taipei, Taiwan

California Academy of Sciences, San Francisco, CA, USA

Florida Department of Agriculture and Consumer Services, Gainesville, FL, USA

Field Museum of Natural History, Chicago, IL, USA

National Museum of Natural History, Smithsonian Institution, Washington, DC, USA

Electronic copies in PDF format:

Printed CD mailed to all members at end of year.

Florida Center for Library Automation: purl.fcla.edu/fcla/insectamundi

Author instructions available on the *Insecta Mundi* page at:

<http://www.centerforsystematicentomology.org/insectamundi/>

ISSN 0749-6737

Hesperiidae of Rondônia, Brazil: Taxonomic comments on “night” skippers, with descriptions of new genera and species (Lepidoptera: Eudaminae)

George T. Austin

McGuire Center for Lepidoptera and Biodiversity
Florida Museum of Natural History, University of Florida
P.O. Box 112710, Gainesville, Florida 32611

Abstract. Nineteen species of crepuscular and perhaps nocturnal eudamine skippers (Lepidoptera: Hesperiidae) included in Evans' (1952) group “D” genera *Bungalotis* Watson, *Salatis* Evans, *Sarmientoia* Berg, *Dyscophellus* Godman and Salvin, and *Nascus* Watson occur in the Cacaúlândia area of central Rondônia, Brazil. Their relative abundance and phenology there are given. Taxonomic comments and comparisons with published information are made. *Bungalotis lactos* Evans, 1952, new status, is considered a species separate from *Bungalotis borax* Evans, 1952. **New genera** *Nicephellus* and *Euriphellus* are proposed for *Eudamus nicephorus* Hewitson, 1876, and *Papilio euribates* Stoll, 1782, respectively, removing both from *Dyscophellus* and creating new combinations. *Discophellus porsena* Bell, 1934, reinstated status, is raised from synonymy to a full species of *Dyscophellus*. The subspecies of *Dyscophellus ramusis* (Stoll, 1781), as presently recognized, are probably good species; *Dyscophellus ramon* Evans, 1952, new status, is considered a full species. *Pseudonascus*, **new genus**, is proposed for *Papilio paullinae* Sepp, [1842], removing this species from *Nascus* and creating a new combination. Two **new species**, *Bungalotis aureus* from Ecuador and *Dyscophellus mielkei* from Rondônia, Brazil, are described. Male and female genitalia are illustrated for all taxa available from the Rondonian study site plus some from other areas.

Key Words: Central America, Costa Rica, Guatemala, Mexico, South America.

Introduction

A number of species of neotropical Hesperiidae (Lepidoptera) are active in the late afternoon, usually just before sunset, continue to fly until after dark, and occasionally are encountered in the early morning. One group of large-sized Eudaminae Mabille, 1877 particularly exhibits this crepuscular (and possibly nocturnal) behavior (Mielke 1967a, Biezanko and Mielke 1973, DeVries 1983, Brown 1992, Nuñez Bustos 2006, Austin, unpublished data) and their presence at dusk is often known by the hummingbird-like sound of their wings in flight. As a consequence, they are relatively rarely observed, are only fortuitously encountered by diurnal lepidopterists, but, at times, some may be attracted to lights during the night (Mielke 1973, de Jong 1983, Cock and Alston-Smith 1990, Miller et al. 2006, Austin, pers. obs.). At least some of these species also visit flowers for nectar (Darrault and Schlindwein 2005). These “night” skippers treated herein are the first five genera of Evans' (1952) group “D”: *Bungalotis* E. Y. Watson, 1893; *Salatis* Evans, 1952; *Sarmientoia* Berg, 1897; *Dyscophellus* Godman and Salvin, 1893; and *Nascus* E. Y. Watson, 1893. Intensive investigations of the butterfly fauna near Cacaúlândia in central Rondônia, Brazil, ongoing since 1989 (Emmel 1989, Emmel and Austin 1990, Austin et al., in press), have included an emphasis on the behavior (Austin et al. 1993, DeVries et al., in press) and taxonomy (Austin 1993, 1994, 1995, 1996, 1997, 1998, 2000; Austin and Steinhauser 1996; Austin et al. 1997; Austin and Mielke 1997, 2000) of hesperiids. Nineteen species of the above listed genera were encountered during these studies of which one *Dyscophellus* is undescribed. In addition, a new species of *Bungalotis* from Ecuador was discovered among comparative material. The species of these genera are discussed herein, three new genera are proposed, and the two new species are described. Most individuals were found associated with army ants (Hymenoptera: Formicidae: Ecitoninae) or were attracted to paper lures (Austin et al. 1993). By far, the most comprehensive local treatment of this group of species, including information on their life history (see also Moss 1949, Janzen and Hallwachs 2005) was by Cock and Alston-Smith (1990) in Trinidad.

Forewing (FW) measurements are from Rondonian material unless noted otherwise. Genitalia are illustrated for males and females of all species that were readily available and will provide a starting point for future investigations. Male genitalia of these genera have not been widely illustrated; those shown by Evans (1952) often look somewhat different from the few other published figures and reality, or even may

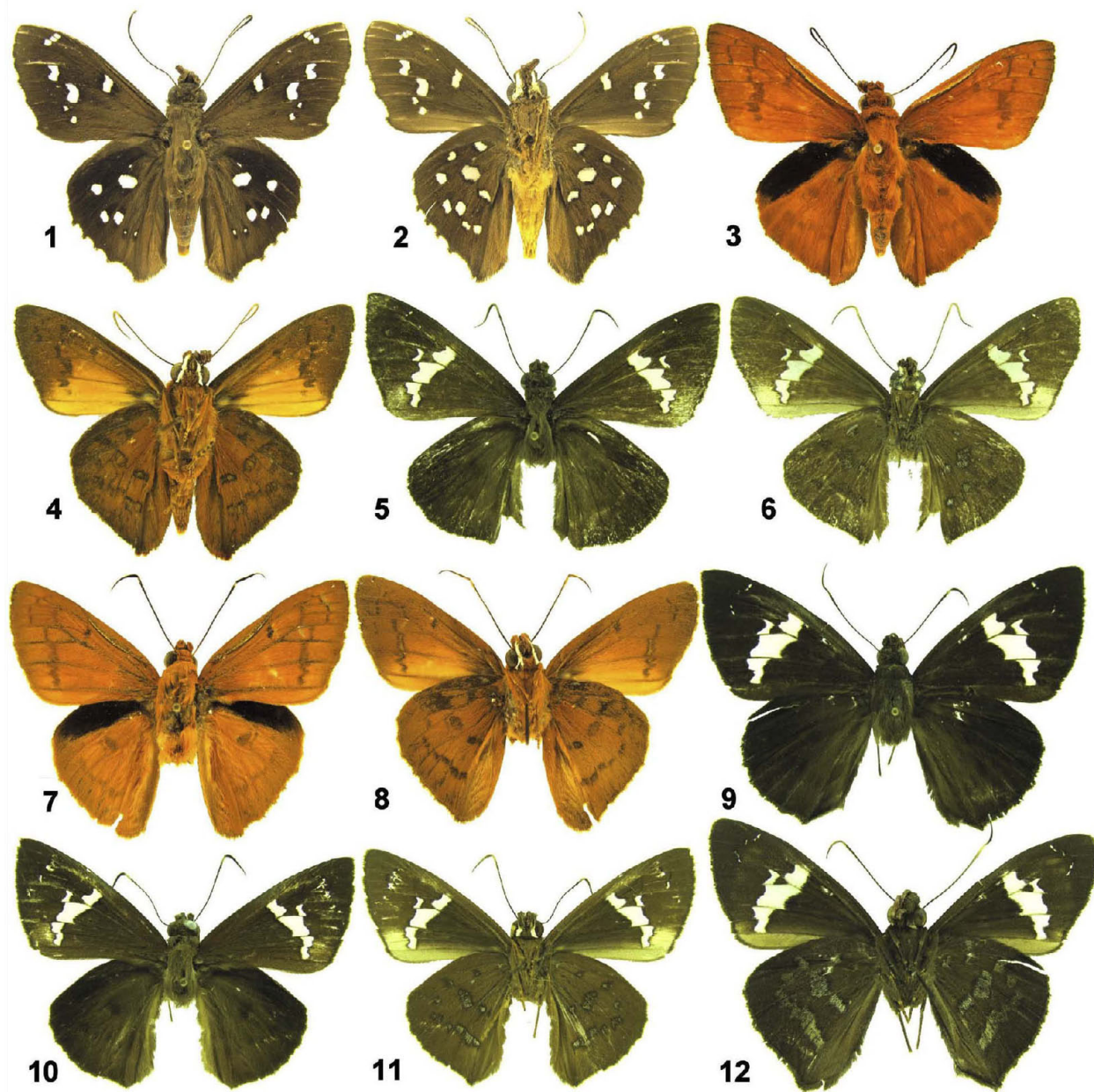


Figure 1-12. *Bungalotis* (from BRAZIL: Rondônia, unless noted otherwise; dorsum and venter of same specimens). 1-2) *B. erythus* male, 5 km S of Cacaulândia, 19 Dec 1993. 3-4) *B. midas* male, Fazenda Rancho Grande, 19 Jul 1994. 5-6) *B. midas* female, 5 km S of Cacaulândia, 9 Jan 1994. 7-8) *B. aureus* holotype male, data in text. 9, 12) *B. milleri* female, MEXICO: Veracruz; Catemaco, 21 Jul 1981. 10-11) *Bungalotis* sp. (“*midas*” group) female, GUATEMALA: Petén; El Remate, Cerro Cahul, 29 Sep 1994.

represent undescribed taxa. Female genitalia of the various genera have not previously been described or illustrated except for certain *Sarmientoia* by Mielke (1967a). The genera treated here frequently have a broad, often bulbous caudad, ductus bursae (*sensu* Burns 1996) that is joined cephalad of its caudal end by a usually membranous tube leading from an often sclerotized antrum. Full synonymies are given by Mielke (2005). Voucher specimens are deposited at the Universidade Federal do Paraná, Curitiba, Brazil and the McGuire Center for Lepidoptera and Biodiversity.



Figure 13. *Bungalotis midas* male at paper lure, BRAZIL: Rondônia, Fazenda Rancho Grande (photograph by Andrei Sourakov).

GENUS *Bungalotis* E. Y. Watson, 1893

Evans (1952) included seven large and robust species in this genus distributed from Mexico to Argentina, Paraguay, and southern Brazil (Godman and Salvin 1879-1901; Draudt 1921-1924; Davis 1928; Williams and Bell 1934; Hoffmann 1941; Evans 1952; Brown and Mielke 1967; Mielke 1967b, 1973; Steinhauser 1975; Freeman 1976, 1977; de Jong 1983; de la Maza and de la Maza 1985; Cock and Alston-Smith 1990; de la Maza et al. 1991; de la Maza and Gutiérrez 1992; Meerman and Boomsma 1993; Lamas 1994; Lamas et al. 1996; Murray 1996; Robbins et al. 1996; Austin et al. 1996; Luis et al. 2004; Nuñez Bustos 2006; Pinheiro and Emery 2006). Three additional species were subsequently described (Mielke 1967b, Freeman 1977, de Jong 1983). Six species of *Bungalotis* were encountered near Cacaulândia and a new species was found among material from Ecuador. One taxon, formerly considered a subspecies, is raised to species-level status, resulting in a total of twelve formally recognized species.

As noted by Evans (1952), male genitalia of *Bungalotis* indicate a compact group having a relatively broad tegumen, a robust and undivided uncus, a divided gnathos with broad ventral lobes, an ampulla with a prominent style, an elongate harpe, and a slender aedeagus with a series of spike-like cornuti. Specific differences are in the shape of the tegumen/uncus in dorsal view, the form of the juxta, and the form of the harpe. Females of too few species of *Bungalotis* were examined to characterize their genitalia for the genus as a whole. For the five phenotypes examined (Fig. 93-97), the genital plate is both broad and elongate with the lamella antevaginalis broader than the lamella postvaginalis; the antrum is prominent, long, and at least partially sclerotized; the ductus bursae is very broad; and the corpus bursae is globular or oblong. In one group, herein called the “*midas*” group (including *B. midas* Cramer, 1775, *B. astylos* (Cramer, 1780), *B. milleri* Freeman, 1977, and an unknown species), the antrum is a long and entirely sclerotized ribbon-like structure that joins the ductus bursae cephalad of its caudal end (Fig. 93-96). The only other species for which the female was examined, *Bungalotis quadratum* (Sepp, [1845]) (Fig. 18-19), has a shorter sclerotized antrum joining a membranous tube of similar width leading to a bulbous ductus bursae (Fig. 97).

Bungalotis erythus (Cramer, 1775)

(Fig. 1-2, 86, 126)

Material of *B. erythus* from central Rondônia appears typical (figured in Seitz 1907-1924, Cock and Alston-Smith 1990; male mean FW length = 32.0 mm [31.5-33.0, n = 4]); male genitalia (Fig. 86) do not differ appreciably from those illustrated by Williams and Bell (1934). The valva in Evans' (1952) illustration is shorter than reality, a feature common to many of his *Bungalotis* depictions. No variation was noted within the series from Rondônia.

Bungalotis erythus is rare in the vicinity of Cacaulândia, with records for February, July, November, and December (Fig. 126). This species has been reported from southern Mexico south into northeastern South America to Ecuador, Peru, Bolivia, and the Distrito Federal, Brazil (Williams and Bell 1934, Evans

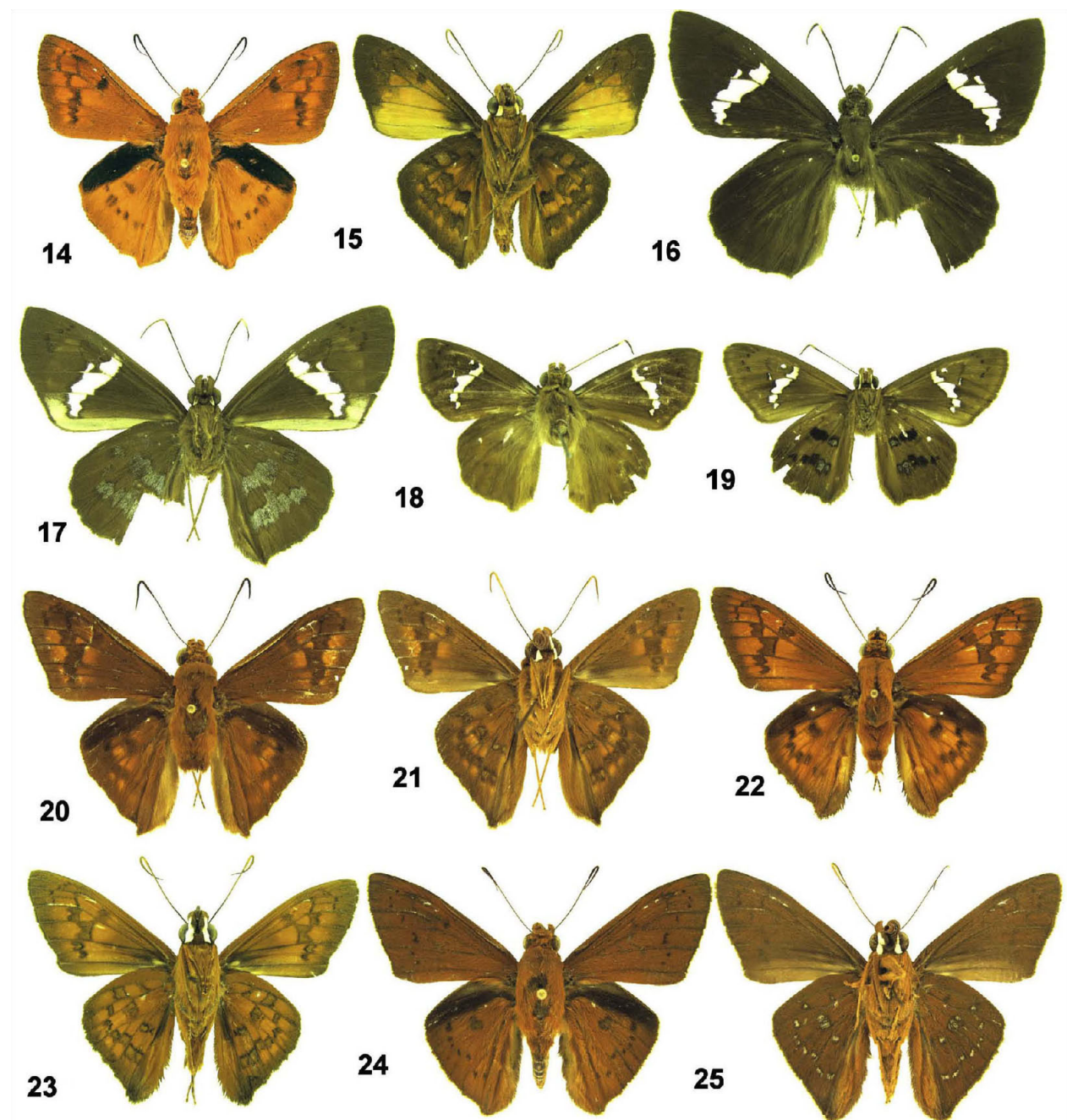


Figure 14-25. *Bungalotis* (from BRAZIL: Rondônia, unless noted otherwise; dorsum and venter of same specimens). 14-15) *B. astylos* male, Fazenda Rancho Grande, 6 Oct 1993. 16-17) *B. astylos* female, Fazenda Rancho Grande, 29 Nov 1991. 18-19) *B. quadratum* female, TRINIDAD, no date. 20-21) *B. lactos* male, Fazenda Rancho Grande, 14 Jun 1993. 22-23) *B. borax* male, Fazenda Rancho Grande, 17 Apr 1997. 24-25) *B. gagarini* male, Fazenda Rancho Grande, 5 May 1995.

1952, Brown and Mielke 1967, Freeman 1976, de la Maza and de la Maza 1985, Cock and Alston-Smith 1990, de la Maza and Gutiérrez 1992, Murray 1996, Robbins et al. 1996, Warren 2000, Pinheiro and Emery 2006).

***Bungalotis midas* (Cramer, 1775)**

(Fig. 3-6, 13, 87, 93, 125)

Bungalotis midas from Rondônia seem to be typical (male mean FW length = 29.9 mm [28.7-31.8, n = 10]; female FW length = 33.6 mm [n = 1], see figures in Cock and Alston-Smith 1990) and male genitalia (Fig. 87) match those illustrated by Godman and Salvin (1879-1901) that are taken to be representative of the species, except for the lack of a style on the ampulla (this omission also noted by Evans 1952). Evans' (1952) illustration, however, does not match this and shows, among other differences, a shortened valva with an extended lower edge. Perhaps this represents another species, although Evans (1952) recognized Godman and Salvin's (1879-1901) concept to be the same as his; the extreme in the variation seen in the valva among *B. midas* from Rondônia (Fig. 87) approaches Evans' (1952) figure.

Males in Rondônia vary in their dorsal wing color from pale to medium tawny, in the prominence of the forewing dark markings, and in the amount and extent of dark brown overscaling. Female genitalia (Fig. 93) have broad, but relatively short, lamellae. The lamella postvaginalis is very broadly V-shaped caudad from its lateral margin with the edges folded over dorsad. The lamella antevaginalis has the caudal margin broadly excavate, again nearly from its lateral margin with a narrow U-shaped indentation centrally. The antrum is prominent, sclerotized, and ribbon-like curving to a broad and oblong ductus bursae. The corpus bursae is small and globular.

Bungalotis midas is common near Cacaupônia and has been recorded throughout the year, but 22 of 47 records are in July and August towards the end of the dry season (Fig. 125). The species is reported to occur from southern Mexico to Paraguay and southern Brazil (Hoffmann 1941, Evans 1952, de la Maza and de la Maza 1985, Cock and Alston-Smith 1990, Warren 2000, Luis et al. 2004, Nuñez Bustos 2006), but some of these records may pertain to other species (see below).

While examining comparative material of *B. midas*, a male was discovered from Ecuador with different genitalia. This is described below.

***Bungalotis aureus* Austin, new species**

(Fig. 7-8, 88)

Description. Male: FW length = 31.0 mm (holotype); forewing with prominent costal fold, apex slightly produced, termen slightly convex; hindwing termen slightly undulate, convex to CuA_2-2A where vaguely concave to short tornal lobe; dorsum bright tawny-orange; forewing with lavender iridescence at base; faint brownish postmedial consisting of curved thin line from costa to M_3 and broader irregular line offset slightly basad from M_3 to $2A$; discal cell with vague brown line at distal end and brownish macule 1/3 distance from this to wing base; fringe dark gray. Hindwing costa black with bright purple iridescence to vein R_s , nearly reaching termen in $Sc+R_1-R_s$; very vague submarginal series of brownish macules from R_s to $2A$; vague brownish macule at distal end of discal cell; fringe dark gray.

Ventral forewing dull tawny-orange grading gradually to yellow-orange along anal margin; dark macules more or less as on dorsum, but no more prominent. Ventral hindwing dull tawny-orange, slightly darker along costal and outer margins; submarginal series of poorly defined square brownish macules with ground-colored centers, macule in $Sc+R_1-R_s$ offset basad; similar postmedial series, macule in discal cell centered with ground color, macule in $Sc+R_1-R_s$ offset far basad.

Head (including palpi), thorax, and abdomen bright tawny-orange; white beneath and behind eyes, this extending onto outer sides of palpi; antennae black, bright tawny-orange proximad on dorsum, ochreous distad on venter including club and apiculus, broadly encircled just before nudum by very pale yellow, nudum orange-brown, 32 segments.

Genitalia (Fig. 88): tegumen slender in both lateral and dorsal views; uncus thin in lateral view, more or less rectangular in dorsal view with the edges concave; gnathos with arms slender, especially in ventral view; valva with cephalic portion broad and quadrate, prominent style caudad from ampulla, harpe elongate with broad dorsal triangular projection and narrow caudal projection, dorsal and caudal edges finely serrate; aedeagus slightly longer than valva, moderately robust; cornuti as series of spikes; juxta more or less quadrate.

Female: unknown (see below).

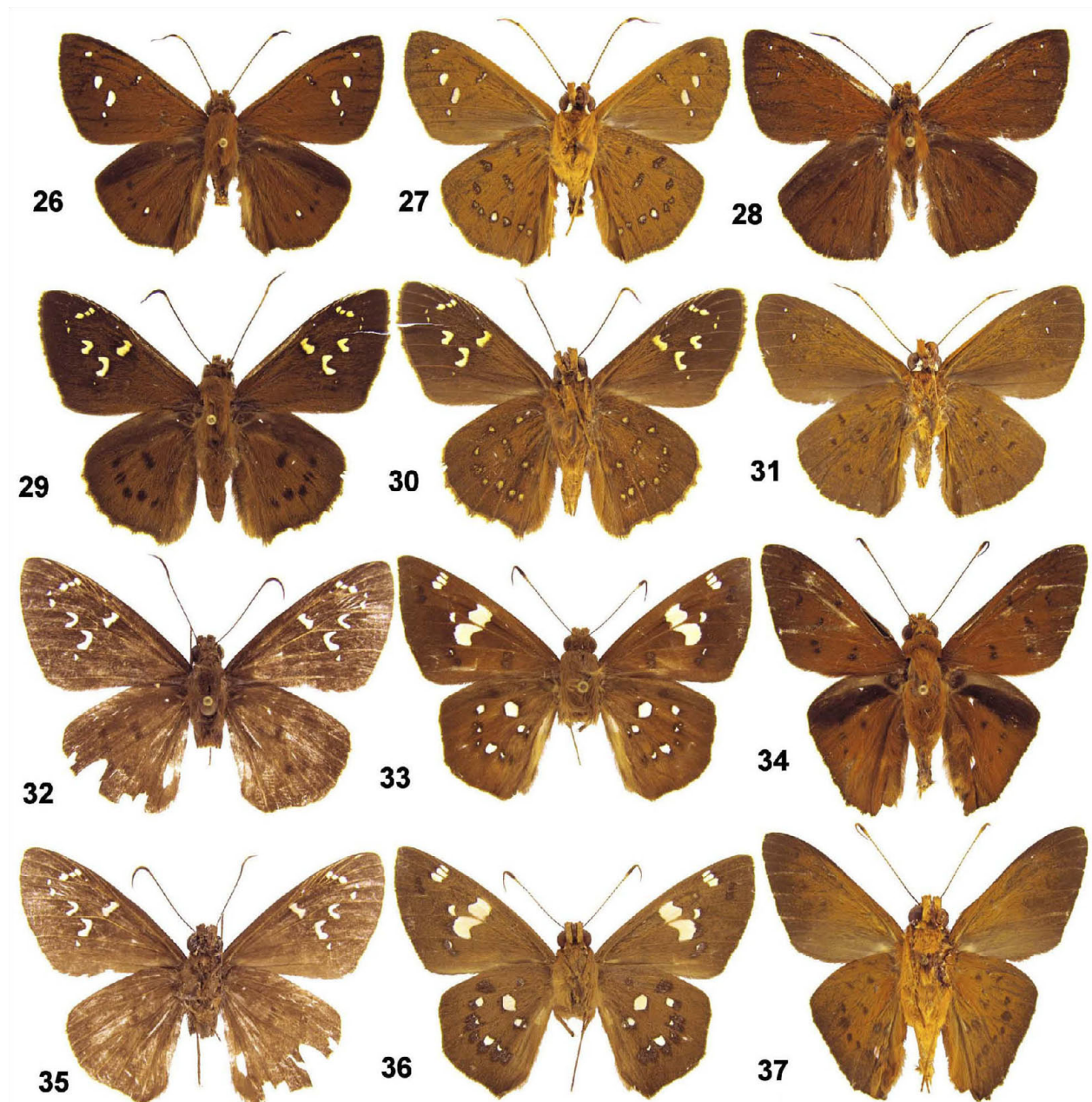


Figure 26-37. *Salatis*, *Sarmientoia*, and *Dyscophellus* (from BRAZIL: Rondônia, unless noted otherwise; dorsum and venter of same specimens). **26-27)** *Salatis salatis* male, 3 km E of Fazenda Rancho Grande, 15 Jun 1993. **28, 31)** *Salatis salatis* male, 5 km S of Cacaulândia, 18 Apr 1995. **29-30)** *Sarmientoia similis* male, Fazenda Rancho Grande, 20 Apr 1991. **32, 35)** *Sarmientoia similis* female, 5 km S of Cacaulândia, 27 Mar 1994. **33, 36)** *Dyscophellus* sp. (*D. sebalus*?) female, COSTA RICA: Heredia Prov.; Chilamate, 22 Mar 1989. **34, 37)** *D. diaphorus* male, Fazenda Rancho Grande, 9 Jun 1993.

Type. Holotype male with the following labels: white, printed and hand printed - / Tinalandia Hotel / 13 km east of Santo / Domingo de Los / Colorados, Ecuador / 14-18 July 1983 / leg. Jim Brock /; white, printed and hand printed - / Genitalia Vial / GTA - 3387 /; red, printed - / HOLOTYPE / *Bungalotis aureus* / Austin /. Deposited at the McGuire Center for Lepidoptera and Biodiversity, Gainesville, Florida.

Type locality. ECUADOR: Pichincha Province: Hotel Tinalandia, 13 kilometers east of Santo Domingo de los Colorados.

Etymology. The name means “golden” referring to the dorsal color. The element of this color was the passion of Midas, after whom a closely related species was named.

Distribution and phenology. The species is known only from the type. It is very likely, given the popularity of the type locality for collectors, that additional material from there (and probably from elsewhere) exists in collections and is identified as *B. midas*.

Diagnosis and discussion. *Bungalotis aureus* is superficially so similar to *B. midas* (Cramer, [1775]), that it was considered as that species until it was examined more closely. Both the forewing and hindwing of *B. midas* are less broadly rounded, the ventral wings are extensively brown on *B. midas*, and the macules of the hindwing are broader. *Bungalotis midas* also has no pale ring at the base of the club of the antenna as there occurs on *B. aureus*.

Male genitalia of the two species are substantially different (Fig. 87, 88). On *B. midas*, the tegumen and uncus are shorter and more robust than on *B. aureus*, the uncus in ventral view is rectangular (constricted with a short lateral process and notched at the caudal end on *B. aureus*), the gnathos arms are broad in ventral view and broadly expanded at their caudal ends (narrow with parallel sides on *B. aureus*), the cephalic end of the costa of the harpe is sloped caudad and the anterior valva is more or less rhomboidal (costa more erect cephalad and valva rectangular on *B. aureus*), the harpe is generally blunt-ended and with coarse serrations on its dorsal edge (caudal end of harpe pointed and with fine serrations on *B. aureus*), and the juxta is triangular (quadrate on *B. aureus*).

An unidentified female (FW length = 32.4 mm [$n = 1$]) of the “*midas*” group was seen from the Tikal area of Guatemala (Fig. 10-11). The wings are similar to those of female *B. midas* from Rondônia except they are proportionally shorter. The palpi have the white along the lateral surface as on *B. midas*. The genitalia, although similar in overall form to those of *B. midas*, are different in detail (Fig. 96) with the lamella postvaginalis much less deeply excavate, the lamella antevaginalis being very deeply excavate with a V-shape and having a prominently serrated caudal margin, and a less bulbous ductus bursae. It is unknown at present if this represents the female of *B. aureus* or yet another species. This is not *Bungalotis milleri* H. A. Freeman, 1977. Besides wing pattern differences (Fig. 9, 12), the female of *B. milleri* (Fig. 95) has a genital plate resembling that of *B. astylos* (including the prominent ridges laterad on the lamella antevaginalis), a long sclerotized antrum leading to a very broad ductus bursae, and a *B. midas*-like globular corpus bursae (note that males of *B. milleri* resemble *B. astylos* in wing pattern [except for the lack of the violet iridescence on the dorsal hindwing costa] and genitalia). The genitalia of all “*midas*” group specimens need to be examined to determine their identity and the distributions of the included taxa.

***Bungalotis astylos* (Cramer, 1780)**

(Fig. 14-17, 90, 94, 125)

The wings (male mean FW length = 32.3 mm [31.4-33.1, $n = 10$]; female mean FW length = 39.4 mm [38.6-40.7, $n = 3$]) of *B. astylos* from Rondônia have the color and pattern as shown in Seitz (1907-1924 as *B. midas*) and Cock and Alston-Smith (1990). Some variation exists in dorsal ground color of males from pale tawny to olive-tawny and in the breadth and definition of the dark macules. On the venter, the dark brown at the apex of the forewing varies in extent as does the tawny discal area on the ventral hindwing. The macules on the ventral hindwing are variable in their definition; these are vague or pale-centered on some individuals.

Evans' (1952) illustration of the male genitalia of *B. astylos* indicated a short and compact valva; specimens from Rondônia (and Bolivia) have elongate valvae. Whether this is an artifact of his dissection (note that the thin caudal end of the harpe breaks easily) or drawing or a real difference remains to be shown. The variation seen among male genitalia in Rondônia especially involves the configuration of the harpe (Fig. 90). Female genitalia (Fig. 94) are similar in overall form to those of *B. midas*. The lamella postvaginalis has an outwardly curved caudal margin with a very narrow U-shaped notch centrally. The lamella antevaginalis is excavate to a narrow central U-shaped notch and has prominent lateral ridges. The antrum is a long, curving, and ribbon-like sclerotized structure joining the side of a broad and irregularly-shaped ductus bursae. The corpus bursae is an oblong sac, constricted slightly in the middle.

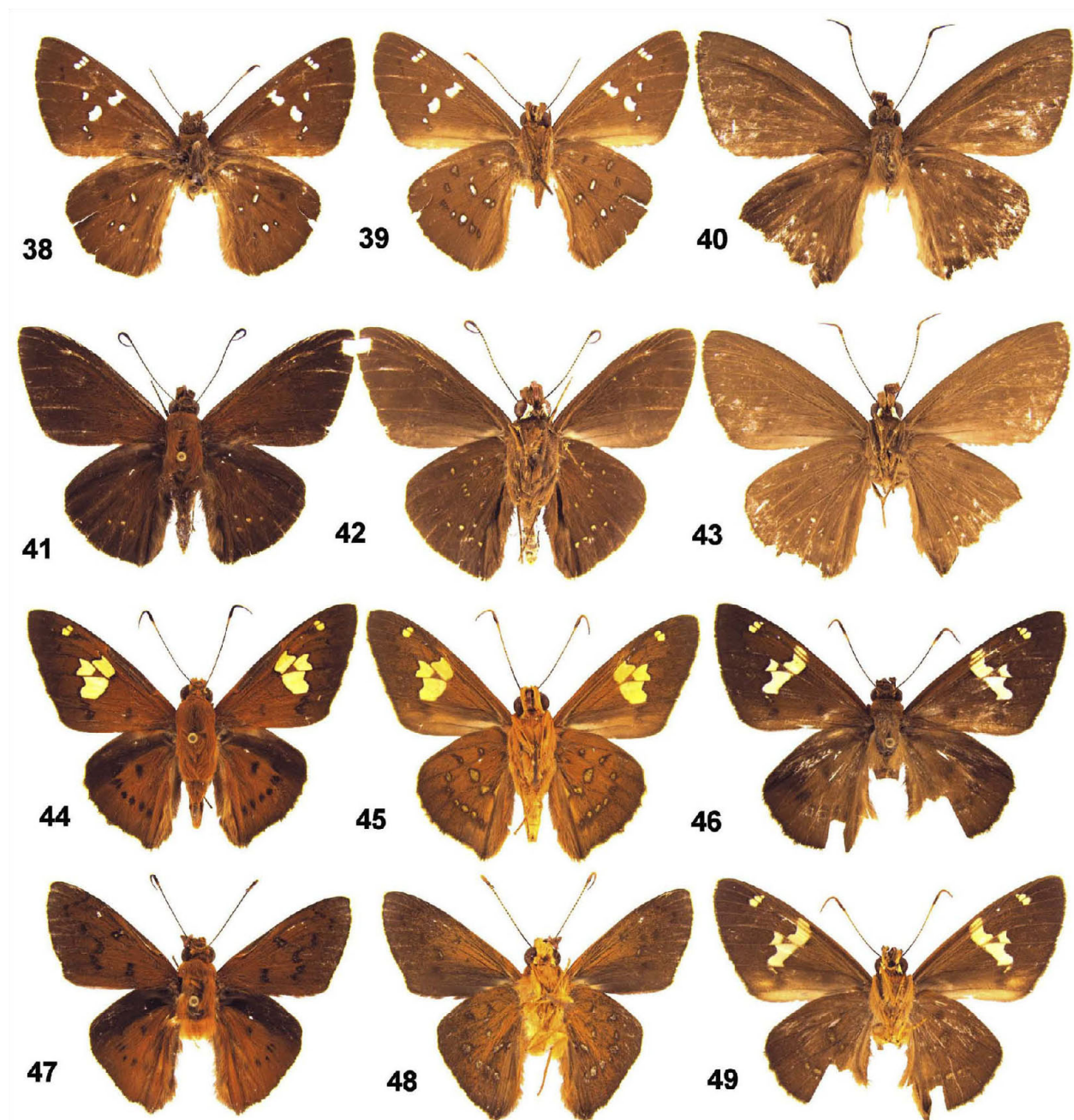


Figure 38-49. *Dyscophellus*, *Nicephellus*, and *Euriphellus* (from BRAZIL: Rondônia, unless noted otherwise; dorsum and venter of same specimens). **38-39** *Dyscophellus* sp. (*D. diaphorus*?) female, COSTA RICA: Alajuela Prov.; Upala Rd., 18.3 km S of Upala, 22 Sep 1987. **40, 43** *N. nicephorus* female, Fazenda Rancho Grande, 21 Sep 1992. **41-42** *N. nicephorus* male, Fazenda Rancho Grande, 13 May 1995. **44-45** *E. euribates euribates* male, Fazenda Rancho Grande, 5 Dec 1991. **46, 49** *E. euribates euribates* female, Fazenda Rancho Grande, 10 Nov 1995. **47-48** *D. mielkei* male, Fazenda Rancho Grande, 16 Nov 1994.

Bungalotis astylos is the most common *Bungalotis* near Cacaulândia, with records throughout most of the year (all months except September), but these are concentrated in the late dry and early wet seasons (Fig. 125). *Bungalotis astylos* occurs from Mexico to Peru and southern Brazil (Evans 1952, Freeman 1976, Cock and Alston-Smith 1990, Lamas 1994, Lamas et al. 1996, Robbins et al. 1996, Warren 2000).

***Bungalotis borax* Evans, 1952**

(Fig. 22-23, 92, 126)

Evans (1952) described *B. borax* based on a male type from French Guiana (Guyane) and additional material from there, British Guiana (Guyana), and the lower Amazon (Fonte Boa, Ega, Pará) in northern Brazil. The species was subsequently recorded from Suriname (de Jong 1983). Records for Rondônia represent a substantial distributional extension. The two males (FW length = 28.5 mm, n = 1) of *B. borax* examined from Rondônia (April, October) are bright tawny on both dorsal wings. These have narrow brown outer margins and series of postmedial brown macules. The macule in the discal cell on the forewing is close to, but not contiguous with, the macule in CuA_1-CuA_2 , which is offset proximad from the rest of the postmedial macules. The costa of the hindwing is shaded with brown distad, but the base of cell $Rs-M_1$ is of ground color proximad. The venter is similar to the dorsum, but duller, and the margins are more broadly brown. The macules on both wings have dark tawny centers. Male genitalia (Fig. 92) exhibit the distinctive short uncus and toothed sacculus as shown by Evans (1952). The differences in the configuration of the harpe between Evans' (1952) illustration and that shown here may be individual variation or Evans' depiction suffers from the same malady as many of his other illustrations of the genitalia of *Bungalotis*.

***Bungalotis lactos* Evans, 1952, new status**

(Fig. 20-21, 91, 126)

***Bungalotis borax lactos* Evans, 1952**

Evans (1952) described this taxon, based upon a single specimen from Peru, as a subspecies of *B. borax*, where it has subsequently languished (Mielke 2004, 2005). Obvious differences between the two taxa in the genitalia illustrated by Evans (1952) and shown herein (Fig. 91-92) indicate that they are separate species and *B. b. lactos* is here raised to species-level status. This had been suggested (de Jong 1983), but no action was taken. This status for *B. lactos* was unequivocally verified by finding *B. borax* sympatric with *B. lactos* in central Rondônia. Differences between the genitalia of the specimen in Evans' (1952) figure and the genitalia illustrated herein from Rondônia (Fig. 91) may be due to individual variation, these most prevalent in the configuration of the caudal end of the harpe. Male *B. lactos* from Rondônia (mean FW length = 29.1 mm [28.1-30.1, n = 4]) vary from pale to dark tawny-brown; the contrast of the paler areas adjacent to the discal macules on both wings depends upon the darkness of the ground color. The costa of the hindwing is more broadly black than on *B. borax* and the macules on both wings are broader. That in the discal cell of the forewing has its distal edge in line with the proximal edge of the macule in CuA_1-CuA_2 . The discal series of macules on the forewing is more or less aligned (distal edges) with the macule in CuA_1-CuA_2 noticeably broader than the others. The venter is similar to the dorsum and the macules on the ventral hindwing vary from vague with pale centers to distinct and enclosed within a narrow, but prominent, brown band.

Bungalotis lactos is rare at Cacauplandia, with two records in June and one each in August and October. These records extend the known distribution of the species eastward; the species had been recorded only in Peru (Evans 1952, Lamas 1994).

***Bungalotis gagarini* Mielke, 1967**

(Fig. 24-25, 89, 126)

Bungalotis gagarini was known only from a single male from Goiás, Brazil, taken in May (Mielke 1967b). Males from Rondônia (mean FW length = 29.0 mm [28.6-29.4, n = 5]) are not fulvous like *B. midas* and *B. astylos* as was described for the holotype (Mielke 1967b), but are bright red-brown and vary in the prominence of the dorsal dark macules from nearly obsolete to vague. The macules on the ventral hindwing are generally entirely dark, but the posterior submarginal macules or all of the macules may have whitish centers. Male genitalia (Fig. 89) are identical to those of the holotype illustrated by Mielke (1967b).

In Rondônia, *B. gagarini* is rare and has been recorded in May, June, October, and November (Fig. 126). These records extend the known distribution of the species about 1700km westward.

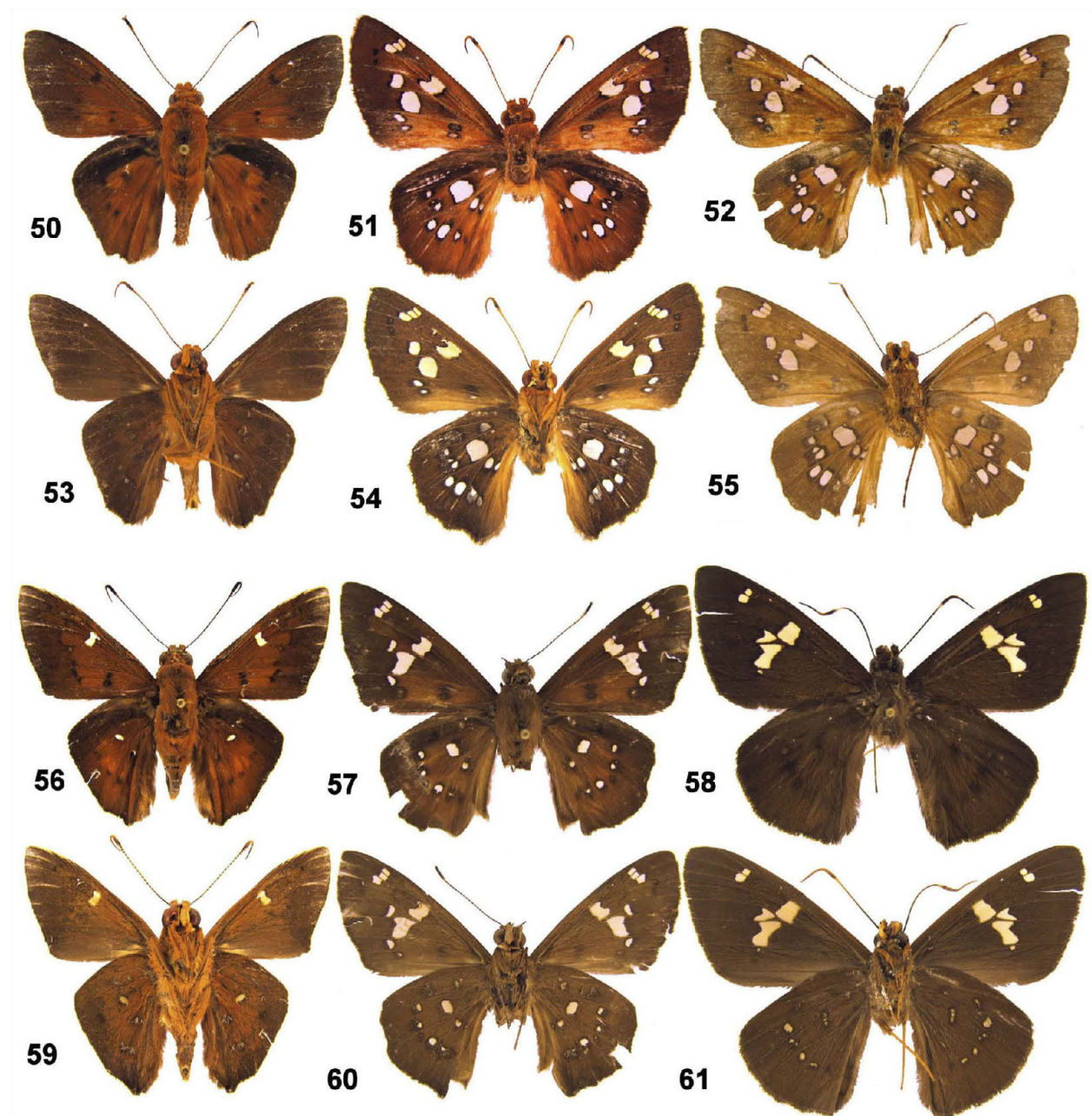


Figure 50-61. *Dyscophellus* (from BRAZIL: Rondônia, unless noted otherwise; dorsum and venter of same specimens). **50, 53)** *D. erythras* male, Fazenda Rancho Grande, 17 Aug 1993. **51, 54)** *D. erythras* female, Fazenda Rancho Grande, 19 Nov 1992. **52, 55)** *D. erythras* female, 5 km S of Cacaúlândia, 23 Oct 1994. **56, 59)** *D. porcius porcius* male, Fazenda Rancho Grande, 12 Nov 1994. **57, 60)** *D. porcius porcius* female, COSTA RICA: Puntarenas Prov.; Manual Antonio, 20 Sep 1987. **58, 61)** *D. phraxanor* female, ECUADOR: Pichincha Prov.; Hotel Tinalandia, 8 May 1988.

GENUS *Salatis* Evans, 1952

The seven recognized species of *Salatis* (Evans 1952; Mielke 2004, 2005) range from Central America to Peru and southern Brazil (Godman and Salvin 1879-1901, Draudt 1921-1924, Williams and Bell 1934, Evans 1952, Brown and Mielke 1967, Mielke 1973, de Jong 1983, Cock and Alston-Smith 1990, Brown 1992, Lamas 1994, Vieira 2004). Judging from Evans' (1952) treatment and figures of the genitalia, the genus may not be monophyletic.

***Salatis salatis* (Stoll, 1782)**

(Fig. 26-28, 31, 111, 128)

The wing markings of male *S. salatis* from Rondônia (mean FW length = 27.4 mm [26.8-27.8, n = 4]) are variable, including one individual with several large discal macules (Fig. 26-27) as that illustrated as *Salatis sebrus* (C. and R. Felder, 1867) in Seitz (1907-1924) and three with only two small discal macules (Fig. 28, 31) as illustrated for *S. salatis* in Seitz (1907-1924). Evans (1952) and Cock and Alston-Smith (1990) noted the variability of the species. The illustrated male genitalia of *S. salatis* by Godman and Salvin (1879-1901), Williams and Bell (1934, as *S. sebrus*), Hayward (1948, as *S. sebrus*), and Evans (1952) show an apparent variety of morphologies, especially in the form of the valva. Particularly if these reflect reality, the types of the several names listed as synonyms of *S. salatis* by Evans (1952) need to be examined for their conspecificity. One, *Salatis sapucayae* (Jørgensen, 1935), has already been raised from synonymy (Mielke 2004, but see Mielke 2005). The genitalia of the four males from Rondônia (Fig. 111) are identical and these match the illustration in Williams and Bell (1934).

Salatis salatis is rare at Cacauplandia, with single records for April and August and two records for June. The known distribution of the species extends from Nicaragua to Peru and southern Brazil (Williams and Bell 1934, Evans 1952, Cock and Alston-Smith 1990, Brown 1992, Lamas 1994, Vieira 2004).

GENUS *Sarmientoia* Berg, 1897

Eight species of *Sarmientoia* are recognized (Evans 1952; Mielke 1967a, 2004, 2005). They occur in South America south to Argentina (Draudt 1921-1924, Evans 1952, Mielke 1967a, de Jong 1983, Lamas 1994, Pinheiro and Emery 2006) and one species has been recorded in central Rondônia.

***Sarmientoia similis* Mielke, 1967**

(Fig. 29-30, 32, 35, 107, 113, 128)

Males (mean FW length = 29.7 mm [28.1-31.2, n = 10]) of *S. similis* from Rondônia are as originally described (Mielke 1967a), but vary on the dorsum from mostly dark brown to having considerable rich red-brown overscaling on the hindwing and base of the forewing. Females (FW length = 32.7, 33.4 mm) have broader wings than do males, are dull blackish brown, and have forewing macules as on males, but these are white instead of pale yellow. The dorsal hindwing has vague black quadrate macules, that in the discal cell being most prominent. The discal macules on the ventral hindwing are vague and without pale centers to absent.

Male genitalia of *S. similis* from Rondônia (Fig. 107) are like those shown by Mielke (1967a). Female genitalia (Fig. 113), previously undescribed, have a narrow and quadrate lamella postvaginalis with a narrow and shallow notch on the caudal edge, a broad lamella antevaginalis that is prominently serrated on its caudal edge, no obvious antrum, and a long ductus bursae that is membranous except for a weakly sclerotized band just before the globular corpus bursae.

Sarmientoia similis is common in central Rondônia, with records throughout most of the year (not recorded in September and October), but two-thirds are in the wet season (Fig. 128). This species was known only from the two male types (one from Taperinha in Pará and the other from Amazonas, Brazil) and apparently has not been subsequently reported; the records from Rondônia extend the distribution southward.

GENUS *Nicephellus* Austin, new genusType species: *Eudamus nicephorus* Hewitson, 1876

Description. Male: large in size (FW length = 28-30 mm), forewing moderately produced, with narrow costal fold (52% of forewing length) filled with very dense white hair-like scales, termen slightly convex; hindwing rounded, weakly lobed at tornus; dorsal color dark brown with red-brown overscaling based on both wings, faint pale discal macules on posterior hindwing (at times extending to forewing); venter similar to dorsum, red-brown less intense, anal margin on forewing paler; palpi robust, quadrate in

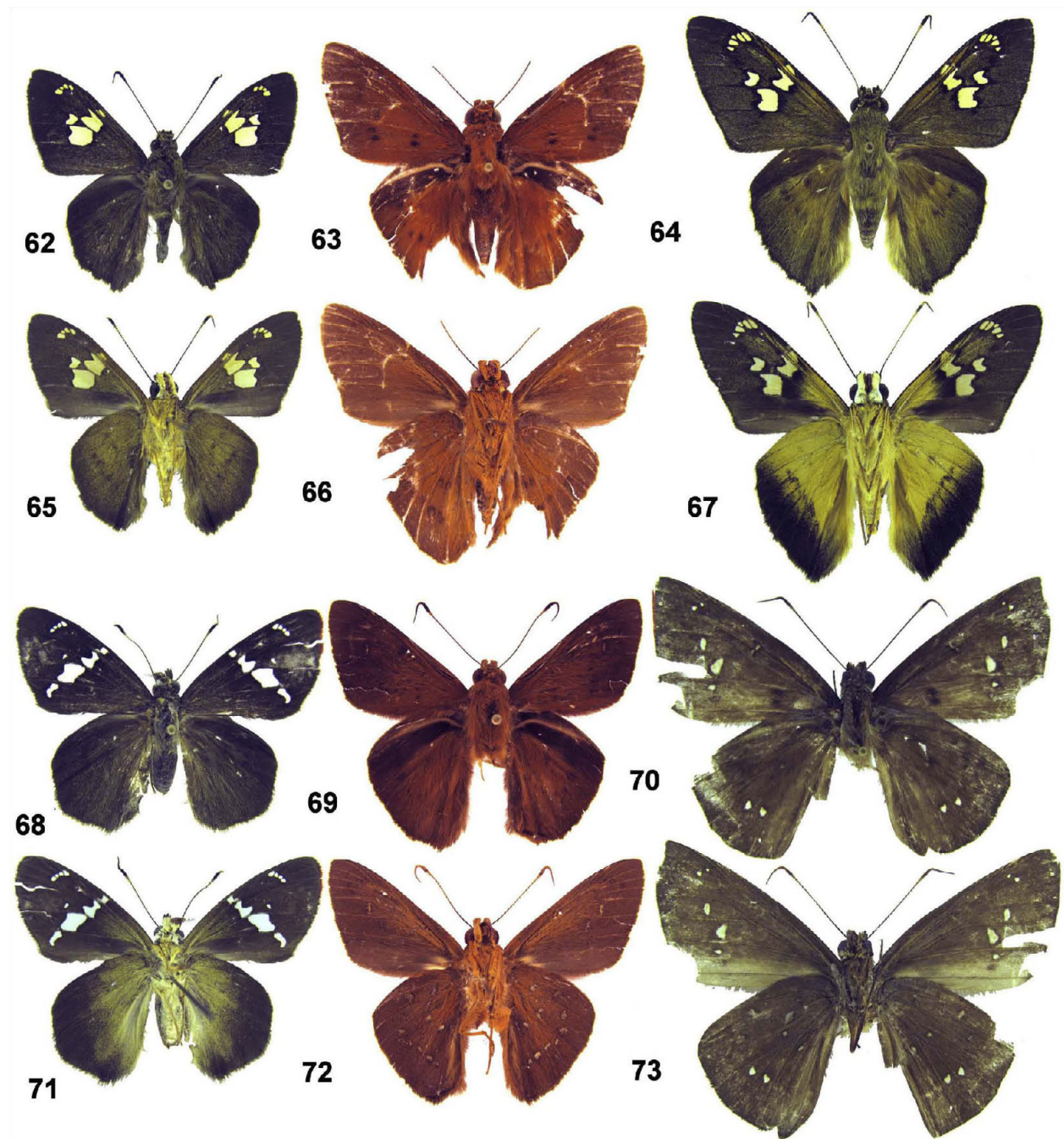


Figure 62-73. *Pseudonascus*, *Dyscophellus*, and *Nascus* (from BRAZIL: Rondônia, unless noted otherwise; dorsum and venter of same specimens). **62, 65** *P. paullinae* male, Fazenda Rancho Grande, 16 Nov 1994. **63, 66** *D. ramon* male, COSTA RICA: Puntarenas Prov.; Playa Herradura, 20 Sep 1987. **64, 67** *N. salon salon* male, Fazenda Rancho Grande, 5 Dec 1991. **68, 71** *P. paullinae* female, 5 km S of Cacaúlândia, 12 Apr 1995. **69, 72** *D. porsena* male, Fazenda Rancho Grande, 16 Nov 1994. **70, 73** *D. ramon* female, COSTA RICA: Puntarenas Prov.; 1.1 km N Tarcoles, 20 Sep 1987.

dorsal view, broadly rounded in lateral view, third segment not extending beyond scaling of second segment; antennae 55% of forewing length recurved to apiculus longer than club length, nudum of 31-32 segments; legs with dense hair-like scales on posterior edge, mid-tibia strongly spined and with single pair of spurs, hind tibia with two pairs of spurs; ventral hindwing with deep groove lined with small gray

scales on basal 2/3 of wing along vein 2A and with long recumbent hair-like scales above this on dorsal surface.

Male genitalia (Fig. 114): tegumen not robust, broadening cephalad in dorsal view with pair of thin processes from caudal end overlaying uncus in lateral view; uncus robust, undivided, narrowing gradually caudad from termen in dorsal view; gnathos well-developed, undivided; valva broad, broadest cephalad, harpe tapered with broad rounded dorsal flap that is variably bent inwards, edges finely serrate; aedeagus about length of valva, slender, with thin and hook-like process from ventral edge of caudal end; no cornutus. Neither the processes of the tegumen nor the form of the aedeagus were indicated by Evans (1952).

Female: similar to male, larger (FW length = 33.3 mm, n = 1), wings more rounded, forewing less produced, no costal fold on forewing or groove on ventral hindwing, paler brown.

Female genitalia (Fig. 116): lamella postvaginalis narrow with deep central notch, becoming membranous cephalad; lamella antevaginalis represented by pair of broad lateral plates; antrum short and sclerotized.

Distribution. *Nicephellus* occurs from southern Mexico to Peru and western Brazil (Godman and Salvin 1879-1901, Draudt 1921-1924, Hoffmann 1941, Evans 1952, de la Maza and de la Maza 1985, Cock and Alston-Smith 1990, de la Maza et al. 1991, Lamas 1994, Robbins et al. 1996, Warren 2000).

Etymology. The name of this genus is a combination of parts of the specific name of its single included species and the name of its previous genus.

Diagnosis and discussion. Evans (1952) included *Eudamus nicephorus* in *Dyscophellus* based apparently upon its antennae (“bent to the apiculus well after the beginning of the nudum”), its “slender” uncus, and the presence of a costal fold. While these characters are like those of the other taxa included in that genus, the overall aspect of *Nicephellus* is quite different from that of *Dyscophellus*. Both sexes of *Nicephellus* have broadly rounded wings (male *Dyscophellus* have a relatively short and less rounded forewing and a more tornally produced hindwing generally angled at CuA_2 and again at 2A) and there is little sexual dimorphism in wing shape or markings as is prevalent among *Dyscophellus* in which females have broad wings and often large pale macules. The palpi of *Dyscophellus* are more rounded in dorsal view than are those of *Nicephellus*, less broadly rounded in lateral view, and have the third segment extending slightly forward of the scales of the second segment. The mid-tibia of *Nicephellus* is prominently spined, but is unspined on *Dyscophellus*. On the dorsal hindwing of male *Dyscophellus*, vein $Sc+R_1$ is usually prominently pale for at least part of its length with a shiny area anterior to this; this is not seen on *Nicephellus*. The costal fold of *Dyscophellus* is proportionally considerably shorter (33-42% of forewing length) than on *Nicephellus*. The antennae are of similar proportional length (49-54% of forewing length on *Dyscophellus*) in the two genera with a similar number of segments to the nudum (31-35 on *Dyscophellus*), but the club of *Dyscophellus* is longer, being approximately the length of the apiculus. The genitalia especially set *Nicephellus* apart from *Dyscophellus*. On the male (Fig. 114), this includes the robust uncus, which tapers gradually caudad (thin and abruptly very narrow on *Dyscophellus*), the processes of the tegumen (absent on *Dyscophellus*), the well-developed gnathos (generally weakly developed on *Dyscophellus*), the aedeagus with its curious twisted caudal process (caudal process absent on *Dyscophellus*), and the absence of a cornutus (present as two groups of spikes on *Dyscophellus*). Female genitalia (Fig. 116) are likewise different, with a narrow and deeply notched lamella postvaginalis (broad and shallowly notched on *Dyscophellus*) and no central portion to the lamella antevaginalis (well-developed on *Dyscophellus*). The relationships of the apparently monotypic *Nicephellus* (but note that the status of *Telegonus dexo* Mabille, 1888, a putative synonym of *Eudamus nicephorus*, has yet to be established) are problematical, but nothing is lost for the moment by leaving it associated with other group “D” species. Recently, information on life history and DNA have reinforced the disassociation of *Nicephellus* from *Dyscophellus* and suggested its affinity with *Bungalotis* and *Salatis* (Janzen et al. 2005).

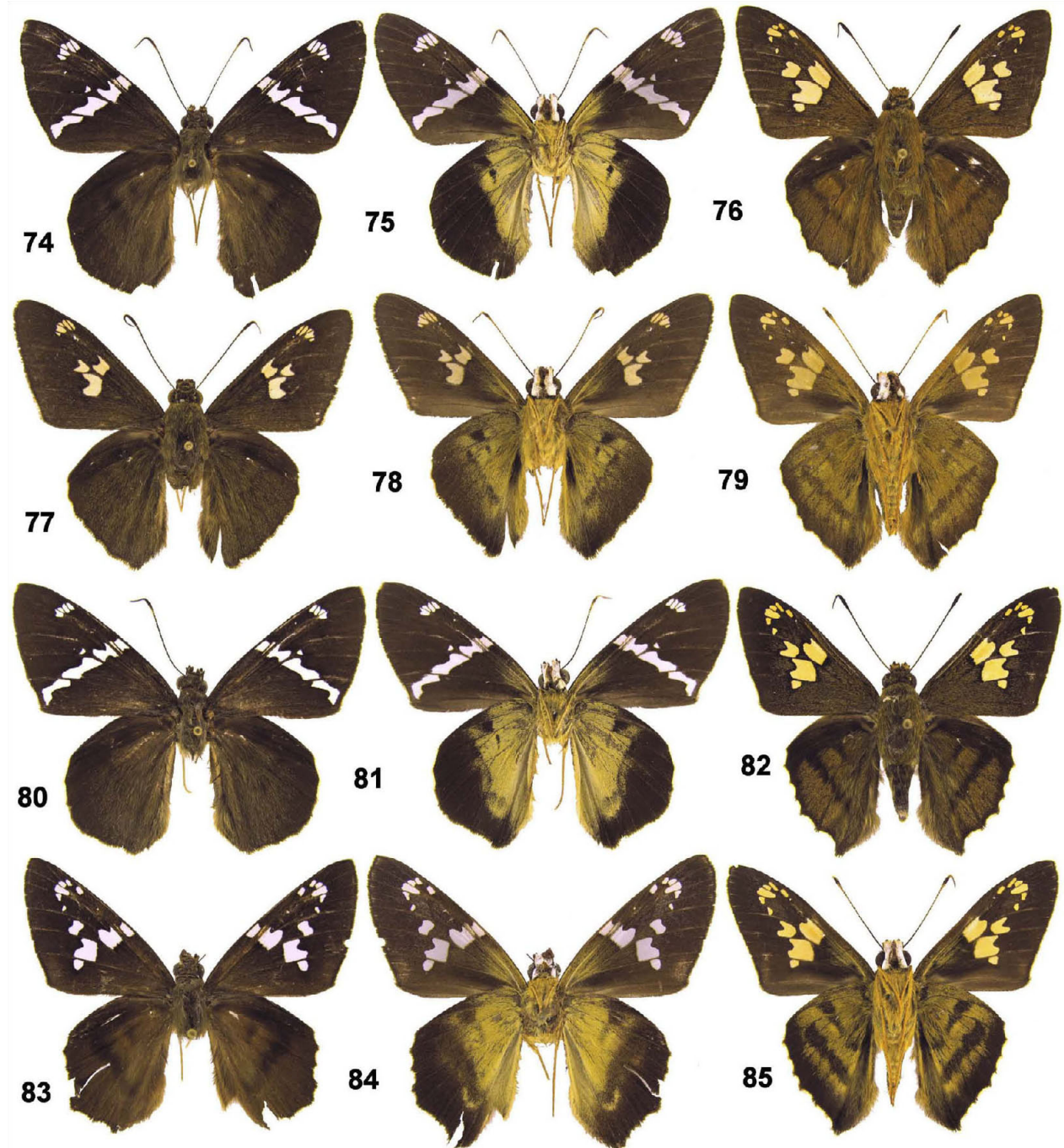


Figure 74-85. *Nascus* (from BRAZIL: Rondônia, unless noted otherwise; dorsum and venter of same specimens). **74-75)** *N. salon salon* female, 5 km S of Cacauplandia, 10 Jul 1993. **76, 79)** *N. phocus* male, Fazenda Rancho Grande, 14 Aug 1993. **77-78)** *N. broteas* male, Fazenda Rancho Grande, 16 Aug 1993. **80-81)** *N. broteas* female, Fazenda Rancho Grande, 16 Jun 1991. **82, 85)** *N. phocus* male, Fazenda Rancho Grande, 16 Nov 1992. **83, 84)** *N. phocus* female, COSTA RICA: Heredia Prov.; Chilamate, 30 Mar 1989.

***Nicephellus nicephorus* (Hewitson, 1876), new combination**
(Fig. 40-43, 114, 116, 129)

Eudamus nicephorus Hewitson, 1876

Dyscophellus nicephorus (Hewitson, 1876): Evans, 1952

Rondonian material of *N. nicephorus* (male mean FW length = 29.4 mm [28.0-30.3, n = 4]; female FW length = 33.3 mm [n = 1]) is superficially like the male illustrated in Seitz (1907-1924; see also Cock and Alston-Smith 1990), but the submarginal macules of the dorsal hindwing do not extend as far forward. The harpe of males (Fig. 114) often appears narrower than shown by Evans (1952); its dorsal edge variably bends inward and apparent harpe width depends upon the viewing angle. Evans (1952), however, failed to note characters of *N. nicephorus* that set the species apart from *Dyscophellus*, including the processes of the tegumen, the thin and curved caudal end of the aedeagus, and the absence of a cornutus. Female genitalia (Fig. 116) were described above in the generic description. Individuals of both sexes illustrated in Godman and Salvin (1879-1901) as *Bungalotis dexo*, as well as the male illustrated in the original description of that taxon (Mabille 1888), exhibit small pale macules extending onto the forewing.

Nicephellus nicephorus is rare in central Rondônia with single records in May, September, and October and four records for August (Fig. 129). The species has been reported from southern Mexico, south into Pará and Paraíba, Brazil, and the upper Amazonian drainage into Peru (Hoffmann 1941, Evans 1952, de la Maza and de la Maza 1985, Cock and Alston-Smith 1990, Lamas 1994, Warren 2000, Darrault and Schindwein 2005).

GENUS *Euriphellus* Austin, new genus

Type species: *Papilio euribates* Stoll, 1782

Description. Male: large in size (FW length = 28-30 mm), forewing prominently produced apically, with short (36% of forewing length) and broad costal fold, this fringed with dense pale gray-brown hair-like scales and having dense white hair-like scales within, termen nearly straight; hindwing rounded with short lobe at tornus, more or less pointed at 2A; dorsal surface largely tawny-brown, venter less tawny, forewing with three large yellow-orange discal partially translucent macules and 2-3 translucent subapical macules of same color; dorsal hindwing with small area of shiny scales basad anterior to Sc+R₁; palpi robust, more or less quadrate in dorsal view, rounded in lateral view, third segment extending slightly beyond scaling of second segment; antennae 51% of forewing length recurved to long apiculus of about club length, nudum of 36-38 segments; legs with dense hair-like scales on posterior edge, mid-tibia without spines and with single pair of spurs, hind tibia with two pairs of spurs; ventral hindwing with relatively shallow groove lined with small hair-like scales of ground color expanding in width towards termen along 2A, recumbent hair-like scales above this on dorsal surface.

Male genitalia (Fig. 112): tegumen robust, bulbous caudad in dorsal view; uncus robust, narrowing gradually caudad from tegumen in dorsal view, undivided; gnathos well developed, undivided; vinculum strongly angled from plane of tegumen; saccus robust, curved sharply dorsad; valva elongate, cephalic portion more or less rectangular, harpe with prominent serrated dorsal crest that bends variably inward; aedeagus moderately robust, shorter than valva; cornuti of apparently three series of spikes.

Female: larger than male (FW length = 30-32 mm), wings less produced, duller and paler red-brown in color, forewing macules paler than on male with additional macule at costa anterior to discal cell macule, often a small macule in anterior part of CuA₂-2A.

Female genitalia (Fig. 115): lamella postvaginalis with broadly rounded lateral lobes separated by V-shaped notch on caudal edge; lamella antevaginalis with broad lateral plates, caudal margin dentate and armed with central spines and lateral hooks; antrum sclerotized leading to membranous curved tube entering side of broad ductus bursae anterior of its caudal end with weakly sclerotized oval plate just caudad of this junction, constricted slightly just before joining with bulbous corpus bursae.

Distribution. *Euriphellus* occurs from southern Central America to southern Brazil (Draudt 1921-1924, Williams and Bell 1934, Evans 1952, de Jong 1983, Cock and Alston-Smith 1990, Lamas 1994, Murray 1996, Robbins et al. 1996).

Etymology. The name of this genus is a combination of parts of the specific name of its single included species and the name of its previous genus.

Diagnosis and discussion. *Papilio euribates* was another species that showed both superficial and genital characters at odds with the overall close similarities among most species of *Dyscophellus* (*sensu* Evans 1952). Unlike *Dyscophellus*, *Euriphellus* has broad macules on the forewings of both sexes, the forewings of males are prominently produced, and the hindwing is short and rounded. Females are generally similar to the male in wing shape and markings. The palpi are more quadrate than are those of *Dyscophellus*; the costal fold is nearly of the same proportional length, but much broader, and there are more segments to the nudum (31-35 on *Dyscophellus*). *Euriphellus* differs from *Nicephellus* (see above) by its large macules, short and broad costal fold, differently shaped palpi with a protruding third segment, longer antennal club in relation to apiculus length, and more segments to the nudum. The genitalia of *Euriphellus* are distinctive. On the male, the vinculum is severely angled cephalad (erect on *Dyscophellus* and *Nicephellus*), the saccus is robust and bent upward (thin and slightly curved on *Dyscophellus* and *Nicephellus*), the tegumen is bulbous caudad (not so on *Dyscophellus* and *Nicephellus*), there are no caudal processes of the tegumen (as on *Dyscophellus* and unlike *Nicephellus*), the uncus is robust and broad in dorsal view (thin on *Dyscophellus*, tapering on *Nicephellus*), and the gnathos is well developed (generally weakly developed on *Dyscophellus*). Female genitalia are similar to those of *Dyscophellus* and *Nicephellus* in some respects, but the genital plate is quite different with its broadly lobate and deeply notched lamella postvaginalis (not lobate and shallowly notched on both *Dyscophellus* and *Nicephellus*), and without prominent striations across the membranous area similar to *Nicephellus* (with prominent cross striations on *Dyscophellus*), and the broad and hooked lamella antevaginalis without a central lobe (less broad, not hooked on *Dyscophellus* and *Nicephellus*; with a central lobe on *Dyscophellus*). *Euriphellus*, however, appears to be allied to *Dyscophellus*; similarities exist in some pattern elements; in the general

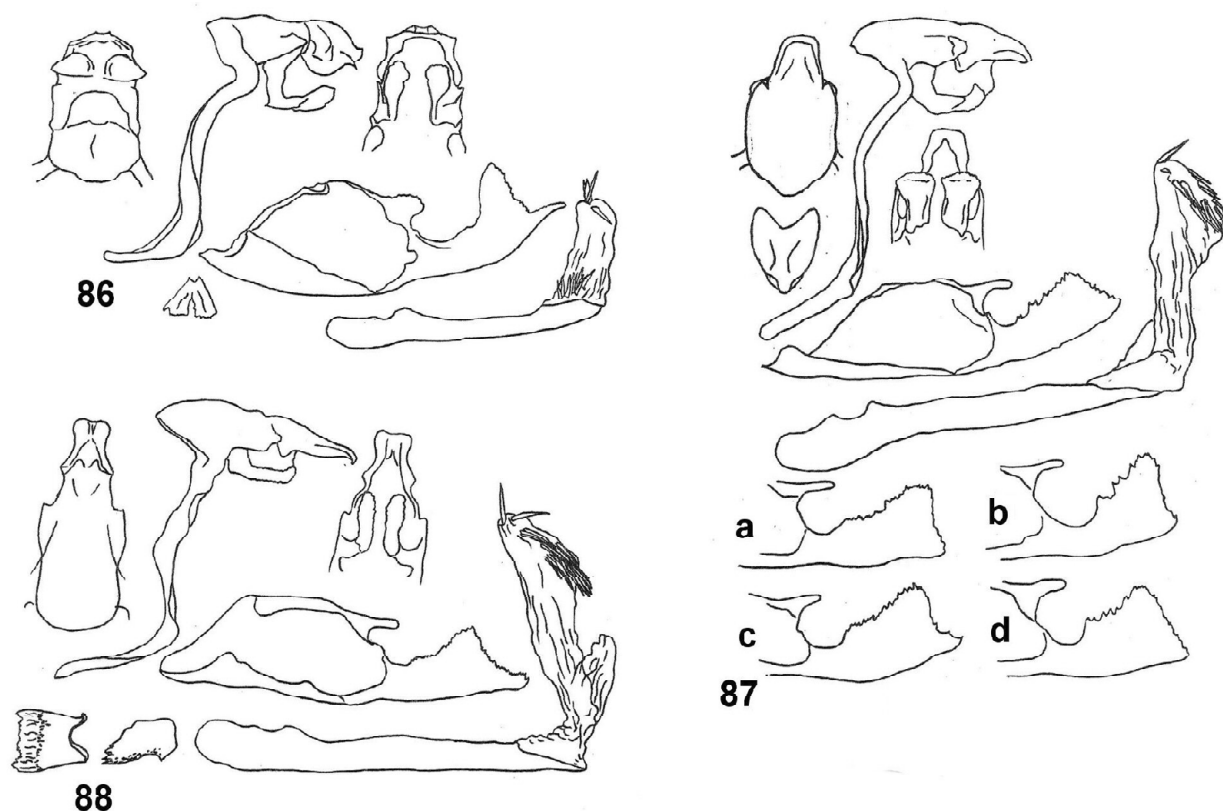


Figure 86-88. Male genitalia of *Bungalotis* (from BRAZIL: Rondônia, unless noted otherwise). Structures shown are lateral, dorsal, and ventral views of tegumen, uncus, gnathos, and associated structures; lateral internal view of right valva; lateral view of aedeagus and associated structures; and ventral view of transtilla and juxta. **86)** *B. erythus* (GTA #4155). **87)** *B. midas* (GTA #3168); variation of valvae, **a.** (GTA #7215), **b.** (GTA #7216), **c.** (GTA #7217), **d.** (GTA #7218). **88)** *B. aureus* holotype, ECUADOR (GTA #3387), including lateral view juxta.

form of the harpe, aedeagus, and cornutus of the male; and in the morphology of the female genitalia cephalad of the genital plate.

***Euriphellus euribates euribates* (Stoll, 1782), new combination**

(Fig. 44-46, 49, 112, 115, 129)

Papilio euribates Stoll, 1782

Dyscophellus euribates (Stoll, 1782): Evans, 1952

Material of *E. euribates* from Rondônia (male mean FW length = 29.1 mm [27.6-29.8, n = 10]; female mean FW length = 31.3 mm [30.2-32.3, n = 3]) appears typical of the nominotypical subspecies as illustrated in Seitz (1907-1924) as *Nascus hesus* (Westwood, 1852) and Cock and Alston-Smith (1990). Variation of males includes the extent of the discal tawny color on the dorsal forewing, extending on some individuals prominently distad of the macules; the size of the discal macules; the anteriormost subapical macule that is absent on some individuals; the amount of tawny on the ventral hindwing; and the macules on the ventral hindwing that range from vague to large with variable pale centers. Females vary in the breadth of the forewing macules. The genitalia of males from Rondônia (Fig. 112) are as illustrated by Skinner and Williams (1923, as *Nascus hesus*), Lindsey et al. (1931, as *N. hesus*), and Evans (1952). Female genitalia (Fig. 115) were described above in the generic description.

Euriphellus euribates is one of the commonest of the dusk-flying skippers in central Rondônia, occurring throughout the year (not recorded in May) with the majority of records from October to December in the early wet season (Fig. 129). The species is wide ranging from Costa Rica south to Bolivia and southern Brazil (Evans 1952, Cock and Alston-Smith 1990, Murray 1996).

The status of *Hesperia polygius* Latreille, [1824], as a subspecies of *E. euribates* (see Evans 1952), yet needs to be confirmed. Its genitalia, illustrated by Williams and Bell (1934) and Evans (1952), appear to be different from those of *E. euribates*.

GENUS *Dyscophellus* Godman and Salvin, 1893

Evans (1952) and Mielke (2004, 2005) recognized nine species of these large skippers, distributed from Mexico to Argentina, Paraguay, and southern Brazil (Godman and Salvin 1879-1901; Draudt 1921-1924; Hoffmann 1941; Evans 1952; Mielke 1973; Freeman 1976; de Jong 1983; de la Maza and de la Maza 1985; Cock and Alston-Smith 1990; Lamas et al. 1991, 1996; de la Maza et al. 1991; Brown 1992; de la Maza and Gutiérrez 1992; Lamas 1994, 2003; Murray 1996; Robbins et al. 1996; Mielke and Casagrande 1997; Warren 2000; Luis et al. 2004, Nuñez Bustos 2006). Two subspecies of *Dyscophellus ramusis* (Stoll, 1781), *Dyscophellus ramusis ramon* Evans, 1952, and *Dyscophellus ramusis damias* (Plötz, 1882), have been treated as separate species by some authors (e.g., Bridges 1988; see below). With the two species removed above (*N. nicephorus*, *E. euribates*), a new species described below, and two raised from synonymy or subspecific status below, the genus currently has ten described species; additional species, but yet undescribed, are known (Miller et al. 2006).

Males of *Dyscophellus* have relatively short wings with the forewing produced and usually pointed apically and the hindwing elongate to the tornus. The hindwing is often prominently angled at vein CuA₂. The antennae are pale at the beginning of nudum, the legs have conspicuous hair-like scales, and males have a costal fold. The dorsal color of males ranges from brown to red-brown and there are few, small, or no pale macules. Females are very different with more broadly rounded wings, are usually differently colored than males, and often have several and large translucent or nearly transparent macules.

Dyscophellus (*sensu* Evans 1952) was not as well-defined by its genital characters as is *Bungalotis*, but, with the removal of *N. nicephorus* and *E. euribates* (see above), the genus now probably becomes monophyletic. The species examined (those in Rondônia plus *D. ramon*) have a triangular (lateral view) or oval (dorsal view) tegumen, an erect vinculum, a thin and slightly recurved saccus, an uncus that is abruptly thinner throughout than the broad tegumen, a poorly-developed gnathos, an elongate valva with fine serrations on the dorsal edge of the harpe, a generally curved aedeagus, and cornuti represented as two groups of spikes. Specific differences largely include the configuration of the valva, especially of the harpe. The female genitalia of *D. porcius* and *D. erythras* from Rondônia plus *Dyscophellus phraxanor*

(Hewitson, 1876), *D. ramon*, and two unidentified species from elsewhere exhibit very similar overall morphologies. The broad lamella postvaginalis has a narrow central notch on the caudal edge. The caudal end is well-sclerotized and becomes membranous with prominent cross striations cephalad. The lamella antevaginalis consists of two broad lateral plates with their caudal edges often serrate (armed with spines on one species) and a narrow central portion that is often notched on its caudal edge. The antrum is prominent and sclerotized and leads to a membranous tube entering the side of the ductus bursae anterior of its caudal end. At or near this junction is a single or a pair of weakly sclerotized plates. The ductus bursae is broad and usually prominently bulbous caudad and narrows before joining with an oblong or globular corpus bursae. Specific differences include the shape of the lamellae, especially the length and form of the central portion of the lamella antevaginalis.

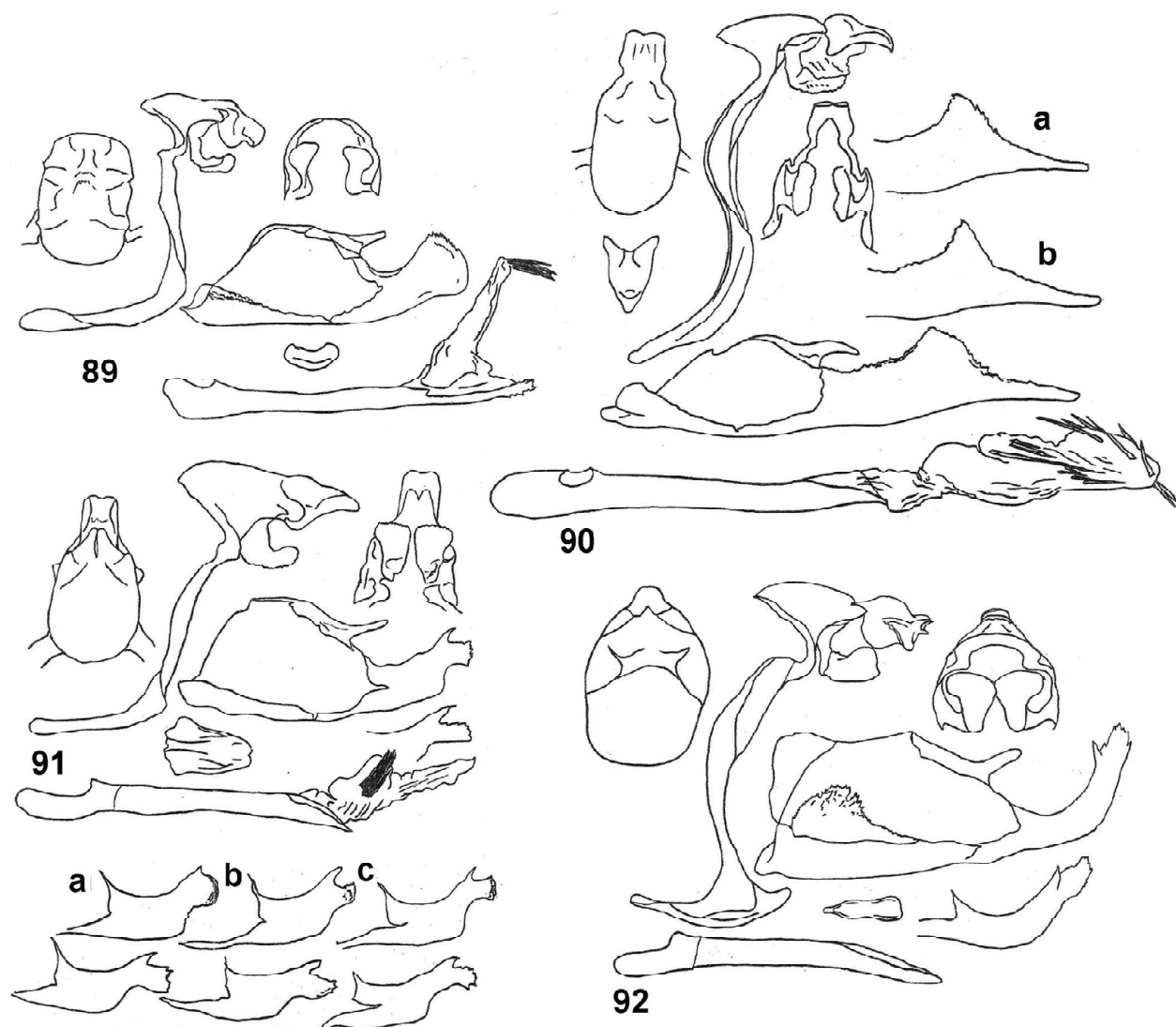


Figure 89-92. Male genitalia of *Bungalotis* (from BRAZIL: Rondônia, unless noted otherwise). Structures shown are lateral, dorsal, and ventral views of tegumen, uncus, gnathos, and associated structures; lateral internal view of right valva; lateral view of aedeagus and associated structures; and ventral view of transtilla and juxta. **89)** *B. gagarini* (GTA #1617). **90)** *B. astylos* (GTA #3166); variation of valvae, **a.** (GTA #3189, flattened), **b.** (GTA # 3166, flattened). **91)** *B. lactos* (GTA #3062); variation of valvae, **a.** (GTA #7196), **b.** (GTA #4133), **c.** (GTA #7914), all including flattened view of caudal end of valva. **92)** *B. borax* (GTA #7866), including flattened view of caudal end of valva.

Although included in *Dyscophellus* by Evans (1952), the placement of *Eudamus phraxanor* (Fig. 58, 61) and *Dyscophellus marian* Evans, 1952 is not clear. These were not examined as part of this study, except for a female of the former species. Both have prominent discal and subapical pale macules on the forewing (like *Euriphellus euribates*) and the male genitalia appear divergent from the usual *Dyscophellus* pattern (figures in Godman and Salvin 1879-1901, Evans 1952). Female genitalia of *D. phraxanor*, however, are more typical of the genus (Fig. 104), although the lamella antevaginalis is armed with prominent teeth on its caudal edge.

Five species of *Dyscophellus*, including one undescribed, are known from central Rondônia. Females are rare in collections and those of some species are very similar to each other and not easily matched with their males. Local sympatries may help to some extent and their wings and genitalia are illustrated here as material was available.

***Dyscophellus porcius porcius* (C. and R. Felder, 1862)**

(Fig. 56-57, 59-60, 98, 105, 127)

Dyscophellus porcius from Rondônia (male mean FW length = 26.7 mm [24.9-28.0, n = 10]) seem typical (e.g., see Cock and Alston-Smith 1990). The dorsal color varies in the brightness of the red-brown and in the definition of the darker brown margins, the latter a function of the intensity of red-brown overscaling. There is slight variation in the size of the discal cell macules on both the forewing and hindwing and considerable variation in the size and definition of and the amount of white within the macules on the ventral hindwing.

Male genitalia (Fig. 98) of Rondonian material are like those illustrated by Godman and Salvin (1879-1901) as *Dyscophellus doriscus* (Hewitson, 1867) and Hayward (1948), but do not show the recurved harpe as illustrated by Evans (1952). The genitalia of a single female of what is possibly *D. porcius* (from Costa Rica, but see Miller et al. 2006) were examined (Fig. 105). The lamella postvaginalis slopes laterad from a shallow V-shaped central indentation, the lamella antevaginalis has two large lateral plates without serrations or spines and a short central portion having a pair of short lateral lobes extending caudad, and a broad sclerotized antrum followed by a membranous tube joining the side of the broadly oval ductus bursae cephalad of its caudal end, this constricting slightly cephalad before an oblong corpus bursae. The caudal end of the ductus bursae has a weakly sclerotized plate with its postero-lateral corners as heavily sclerotized points.

Two additional phenotypes of female *Dyscophellus* were examined from Costa Rica that could not be placed with certainty into this species. One (FW length = 31.1 mm), which may be *Dyscophellus sebalus* (Stoll, 1781), superficially resembles the female of *D. porcius* (Fig. 33, 36), but the forewing is more produced, the large forewing macules are different in size and shape, and, on the ventral hindwing, the submarginal macules are margined distad by dark macules with scattered white scales. This female has the lamella postvaginalis produced into two caudal lobes separated by a U-shaped central notch (Fig. 106). The lateral plates of the lamella antevaginalis are narrow with a weakly serrated caudal edge and the central portion is short and quadrate. The sclerotized antrum is short.

The other phenotype (FW length = 30.2 mm), possibly *D. diaphorus*, is red-brown, becoming gradually browner towards the margins (Fig. 38-39). The macules are small, nearly as small as on *D. ramon*. The lamella postvaginalis of this female (Fig. 110) has a nearly quadrate caudal edge with a narrow U-shaped central notch; a lamella antevaginalis with the broad lateral plates having a serrated caudal edge and a central portion that is long, rectangular, and slightly notched on its caudal edge; and a short membranous tube caudad of the sclerotized antrum with a rectangular sclerotized plate at its junction with the ductus bursae just cephalad of its caudal end. The ductus bursae is bulbous caudad, but narrows to a long tube before the globular corpus bursae. This is the only species of *Dyscophellus* on which this long tubular portion of the ductus bursae has been seen.

Dyscophellus porcius is uncommon in central Rondônia, with records scattered through the year (Fig. 127). This species is wide ranging from southern Mexico to Paraguay and southern Brazil (Hoffmann 1941, Evans 1952, Cock and Alston-Smith 1990, Brown 1992, de la Maza and Gutiérrez 1992, Mielke and Casagrande 1997, Warren 2000, Luis et al. 2004).

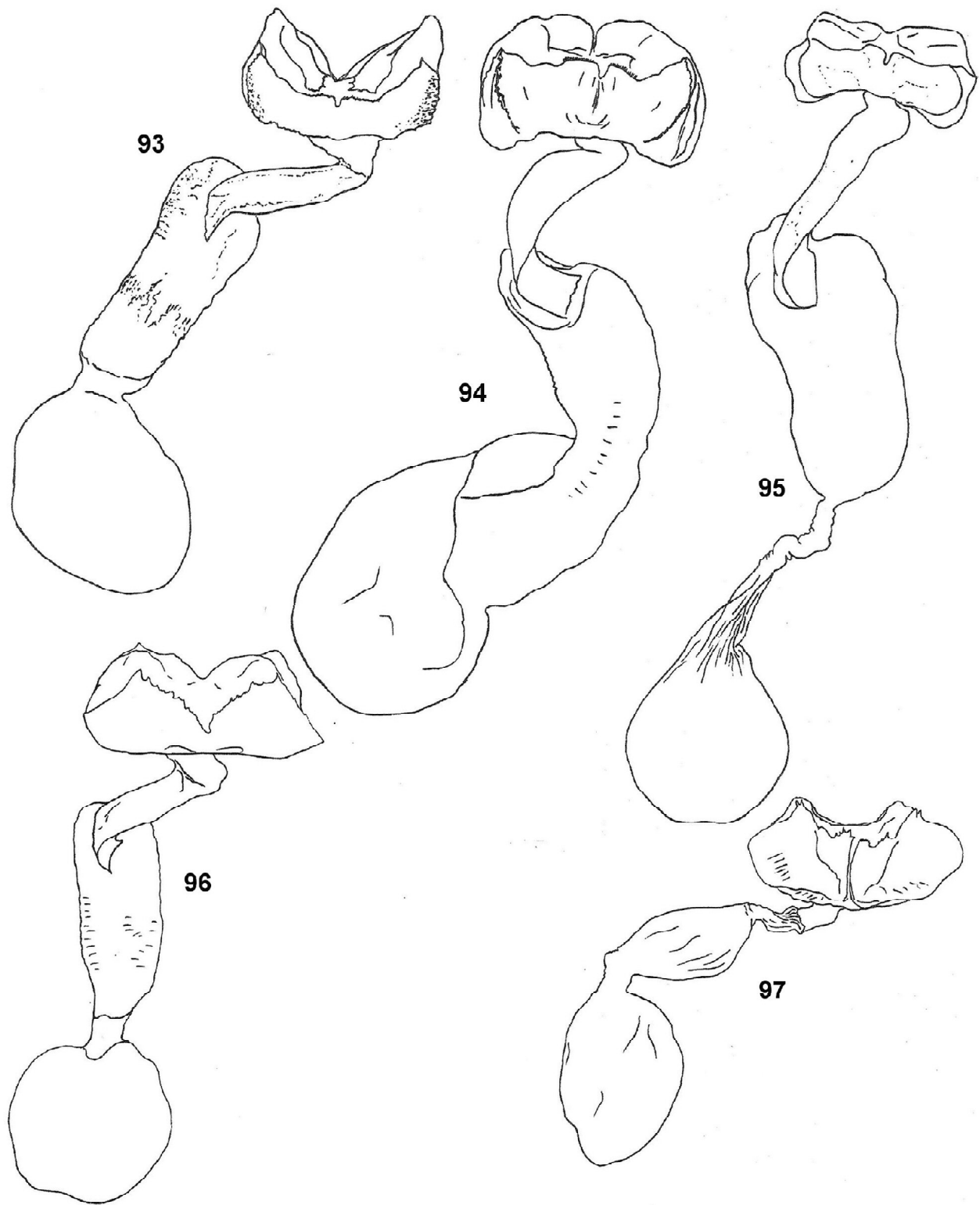


Figure 93-97. Female genitalia (ventral view) of *Bungalotis* (from BRAZIL: Rondônia, unless noted otherwise). **93)** *B. midas* (GTA #7189). **94)** *B. astylos* (GTA #7191). **95)** *B. milleri*, MEXICO (GTA #7219). **96)** *Bungalotis* sp. (“*midas*” group), GUATEMALA (GTA #7190). **97)** *B. quadratum*, TRINIDAD (GTA #7195).

***Dyscophellus erythras* (Mabille, 1888)**

(Fig. 50-55, 99, 108, 127)

No appreciable variation is seen among males of *D. erythras* from Rondônia (mean FW length = 24.1 mm [23.7-24.8, n = 4]). Of the two females examined (FW length = 27.2, 29.1 mm), one is pale fulvous and the other is considerably darker red-brown. Genitalia of males from Rondônia (Fig. 99) are as illustrated by Bell (1940, as *Discophellus tarquinius* Bell, 1940), but exhibit a longer and narrower harpe with a shorter dorsal lobe than those illustrated by Evans (1952). From their original descriptions (Mabille 1888, Bell 1940), *Telegonus erythras* and *Discophellus tarquinius* seem to be synonymous. The differences in their genitalia as illustrated by Bell (1940) and Evans (1952) apparently are a function of Evans' diagrammatic figure. Female genitalia (Fig. 108) (based on the two females from Rondônia) are typical overall for the genus. The lamella postvaginalis slopes laterad from a shallow U-shaped central indentation. The lamella antevaginalis is represented by two large lateral plates without serrations or spines and a central portion that is rectangular. The sclerotized antrum narrows abruptly to a membranous tube that has a pair of small and weakly sclerotized plates just before opening into the side of a moderately broad ductus bursae leading to a bulbous corpus bursae.

Dyscophellus erythras is uncommon near Cacauplândia, with records in August, October, and November (Fig. 127). The species is known from northern South America to Peru and western Brazil (Evans 1952, Lamas 1994).

***Dyscophellus mielkei* Austin, new species**

(Fig. 47-48, 101, 127)

Description. Male: mean FW length = 23.3 mm (22.3-24.4, n = 6); forewing with costal fold, apex pointed, produced, termen slightly convex; hindwing costal margin shorter than forewing anal margin, termen relatively straight, very slightly angled at vein CuA_2 to short tornal lobe; dorsum relatively bright cinnamon-brown; forewing grading to brown at outer margin, brown broadest at apex; black macules as follows: postbasal and doubled postmedial macules in CuA_2 -2A, curved macule above postmedial macules in CuA_1 - CuA_2 , very thin curved line in M_3 - CuA_1 , three vague subapical macules, macule or short bar near distal end of discal cell; fringes brown. Hindwing with broad black costal margin including relatively distinct gray vein $Sc+R_1$ and area anterior to it proximad; relatively distinct to obsolete black macules at distal end of discal cell and as curved submarginal row, most prominent between M_1 and CuA_1 ; fringes very pale brown, darker at vein tips.

Ventral forewing brown, cinnamon-brown overscaling in discal cell (where heaviest), bases of cells M_3 - CuA_1 , CuA_1 - CuA_2 , and along costa with sparse to moderate dusting of same color to outer margin; black macules of dorsum vague. Ventral hindwing cinnamon-brown basad grading to brown with cinnamon-brown overscaling at outer margin, brown broadest at apex; medial and postmedial macular series more prominent and complete than on dorsum; submarginal macule in CuA_1 - CuA_2 with whitish center as are paired submarginal and medial macules in CuA_2 -2A, brown macules in other cells may or may not be present.

Head and palpi cinnamon-brown, cheeks grading to pale yellow behind red-brown eyes, antennae black on dorsum, yellow at base of club and on sides of apiculus, yellow ringed with black on venter, nudum yellow-brown with 35 segments; thorax and legs cinnamon-brown, tibiae smooth with dense, hair-like tufts on back, mid-tibia with single pair of spurs, hind tibia with two pairs of spurs; abdomen cinnamon-brown cephalad on dorsum and on venter, posterior dorsum browner.

Male genitalia (Fig. 101): uncus evenly curved from tegumen to long and narrow caudal end, no lateral processes, similar to that of *Dyscophellus sebalus*; valva with relatively evenly curved costa-ampulla grading gradually into harpe; dorsal edge of harpe finely serrate to blunt caudal end; aedeagus about length of valva, curved slightly upward, cornuti as two sets of fine spikes.

Female: unknown.

Types. Holotype male with the following labels: white, printed - / BRASIL: Rondonia / 65 km S Ariquemes / linha C-20, 7 km E / B-65, Fazenda / Rancho Grande / 16 November 1992 / leg. G. T. Austin / at paper lures / 1630-1700 /; white, printed and hand printed - / Genitalia Vial / GTA - 6702 /, red, printed - /

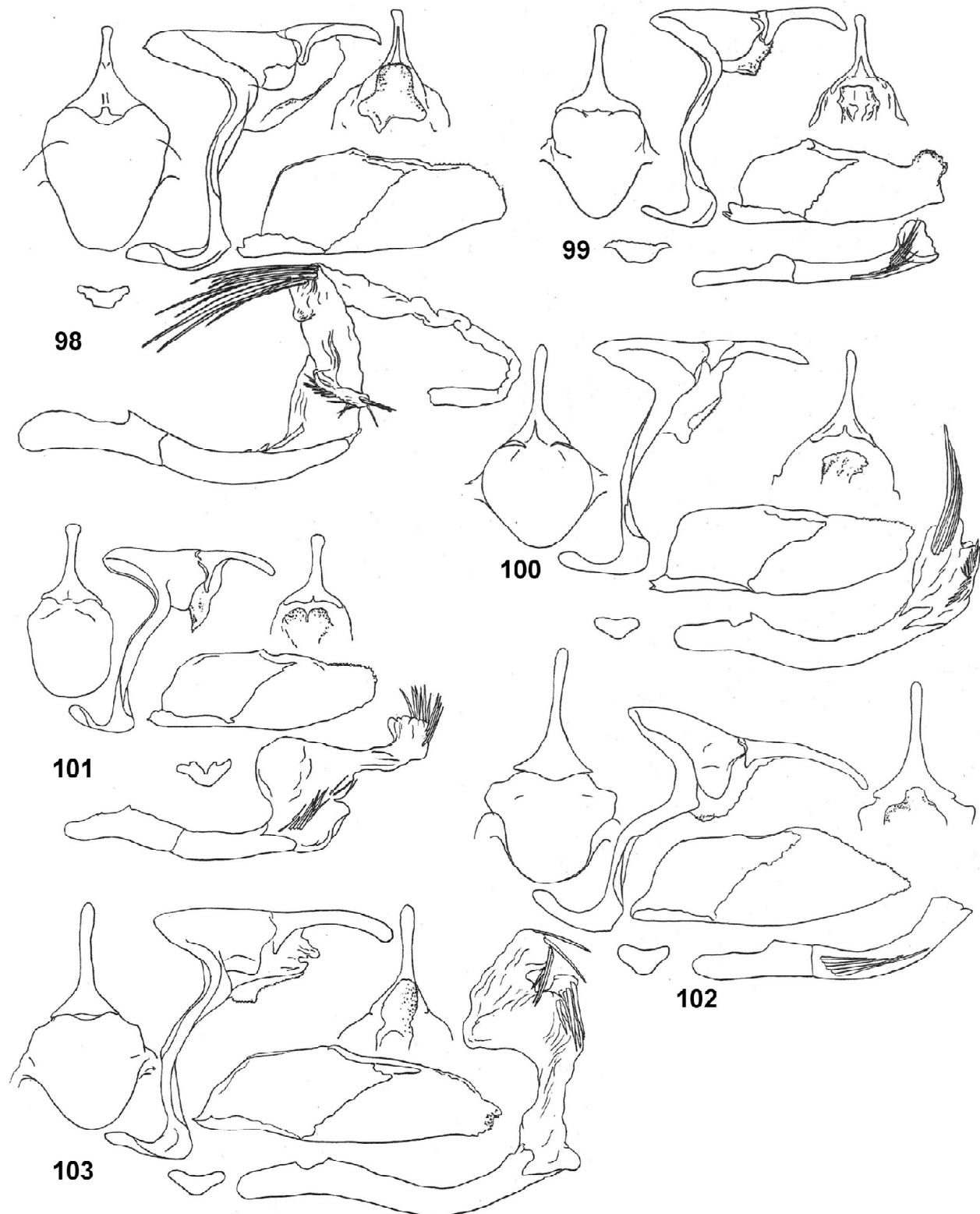


Figure 98-103. Male genitalia of *Dyscophellus* (from BRAZIL: Rondônia, unless noted otherwise). Structures shown are lateral, dorsal, and ventral views of tegumen, uncus, gnathos, and associated structures; lateral internal view of right valva; lateral view of aedeagus and associated structures; and ventral view of transtilla and juxta. **98)** *D. porcius porcius* (GTA #3419). **99)** *D. erythras* (GTA #1787). **100)** *D. diaphorus* (GTA #3916). **101)** *D. mielkei* (GTA #2879). **102)** *D. ramon* (GTA #3363), COSTA RICA. **103)** *D. porsena* (GTA #3204).

HOLOTYPE / *Dyscophellus mielkei* / Austin /. Deposited at the Departamento de Zoologia, Universidade Federal do Paraná, Curitiba, Brazil. Paratypes (all same location and collector as holotype) - 14 Aug 1993, associated with *Eciton burchelli*, 1700-1730 (1 male); 13 Oct 1994, at paper lures, 1700-1730 (1 male); 9 Nov 1992, associated with *Eciton burchelli*, 1730-1800 (1 male); 13 Nov 1992, at paper lures, 1700-1730 (1 male); 13 Nov 1992, at paper lures, 1630-1700 (1 male); 19 Nov 1992, at paper lures, 1700-1730 (1 male).

Type locality. BRAZIL: Rondônia; 62km south of Ariquemes, Linha C-20, 7km (by road) east of route B-65, Fazenda Rancho Grande, elevation 180m. This is approximately 5km northeast of Cacaulândia in typical lowland tropical rainforest.

Etymology. It is my great pleasure to name this species after a friend and colleague, Olaf H. H. Mielke, who knows more about neotropical HesperIIDae than anyone.

Distribution and phenology. This species is known only from the types taken in August, October, and November (Fig. 127).

Diagnosis and discussion. *Dyscophellus mielkei* will key to *D. erythras* in Evans (1952). *Dyscophellus erythras* superficially is very similar in both size and markings, but is redder in contrast to the more yellowish cinnamon-brown of *D. mielkei*. Male genitalia of *D. mielkei* are very different from those of *D. erythras* that have a broad dorsal process on the harpe.

The new species is also similar to *D. ramusis*, but is smaller in size and has a less clearly pale vein Sc+R₁ on the dorsal hindwing. *Dyscophellus mielkei* is much redder brown than the sympatric *Dyscophellus porsena*, and nearer to the color of Central American *D. ramon*, but that species is larger in size and has a prominently white vein Sc+R₁. The valva of *D. mielkei* is relatively broad and with a broad and blunt caudal end to the harpe. The harpe is distinctly narrow caudad on *D. porsena* and *D. ramon* (Fig. 102-103) and has irregular caudal processes on *D. ramusis*.

***Dyscophellus diaphorus* (Mabille and Boulet, 1912)**

(Fig. 34, 37, 100, 127)

Males of *D. diaphorus* from Rondônia (mean FW length = 28.1 mm [27.2-28.9, n = 8]) vary from bright fulvous to red-brown with variable brown scaling on the margins. None are nearly as bright as the individual illustrated by Seitz (1907-1924). The macules on the ventral hindwing vary from all being entirely brown to all having white centers. Male genitalia of material from Rondônia (Fig. 100) do not seem to differ from those illustrated by Evans (1952). A possible female of *D. diaphorus* from Costa Rica was discussed above under *D. porcius*.

Dyscophellus diaphorus is uncommon in central Rondônia, with records from June to August in the dry season (Fig. 127). The species has been otherwise recorded in northern South America (Evans 1952).

***Dyscophellus porsena* Bell, 1934, reinstated status**

(Fig. 69, 72, 103, 127)

Dyscophellus porsena Bell, 1934

Dyscophellus ramusis astrapaeus (Hewitson, 1876): Evans, 1952

The dorsal color of male *D. porsena* (mean FW length = 27.7 mm [26.7-29.0, n = 7]) in Rondônia varies from brown to red-brown. The macules on the ventral hindwing vary as do those of *D. diaphorus*. Male genitalia are as illustrated by Bell (1934).

The relationships of the taxa included by Evans (1952) and Mielke (2004, 2005) as subspecies (or synonyms) of *Papilio ramusis*, including *Eudamus astrapaeus* Hewitson, 1876, *Netrocoryne damias* Plötz, 1882, *Dyscophellus porsena* Bell, 1934, and *Dyscophellus ramusis ramon*, need to be examined. The morphologies of the valvae of these taxa, as indicated by descriptions and figures (Bell 1934, Hayward 1948, Evans 1952), show differences as great as those between unquestionably recognized species within

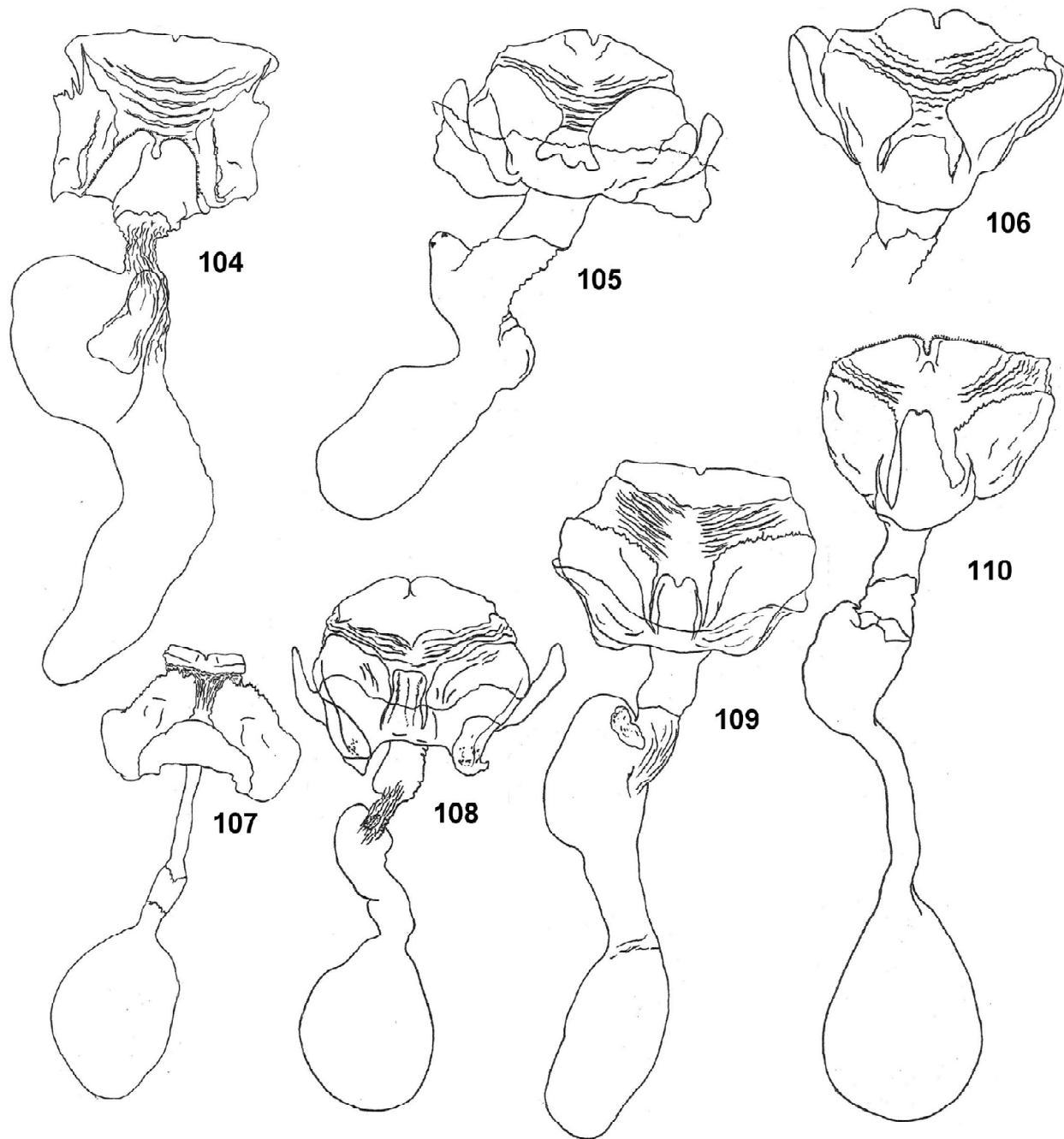


Figure 104-110. Female genitalia (ventral view) of *Dyscophellus* and *Sarmientoia* (from BRAZIL: Rondônia, unless noted otherwise). **104** *D. phraxanor*, ECUADOR (GTA #7210). **105** *D. porcius porcius*, COSTA RICA (GTA #7201). **106** *Dyscophellus* sp. (*D. sebalus*?), COSTA RICA (GTA #7205). **107** *S. similis* (GTA #7224). **108** *D. erythras* (GTA #7206). **109** *D. ramon*, COSTA RICA (GTA #7208). **110** *Dyscophellus* sp. (*D. diaphorus*?), COSTA RICA (GTA #7209).

Dyscophellus. Wing shape and colors differ (Evans 1952) and both *D. ramon* and *D. damias* have been treated as full species (e.g., Bridges 1988, Warren 2000). Evans (1952) provisionally included *D. porsena* as a synonym of *D. r. astrapaeus*. This is incorrect since not only do the genitalia differ from that taxon, its color is different: “ochreous brown” (Evans 1952) for *D. r. astrapaeus* and “rusty-red” (Bell 1934) for *D. porsena*. Also, *D. porsena* occurs in Peru and western Brazil, within the distribution of *D. ramusis* and away from that of *D. r. astrapaeus* in northern South America (Evans 1952, Mielke 1973, Cock and

Alston-Smith 1990). For these reasons, *D. porsena* is here raised from synonymy and recognized as a species-level taxon.

Also, examination of material from Central America reaffirms that *D. ramon* (Fig. 63, 66, 70, 73) is a distinct species as it has been treated by some authors (e.g., Freeman 1976, de la Maza and de la Maza 1985, Bridges 1988, de la Maza et al. 1991, Warren 2000; see also Janzen et al. 2005). Its male genitalia (Fig. 102) are quite different from those of *D. ramusis* (see figure in Evans 1952). The female genitalia are also illustrated (Fig. 109). Accordingly, *Dyscophellus ramon* Evans, 1952, new status, is here formally raised to species-level status.

Dyscophellus porsena is uncommon in the vicinity of Cacaulândia, with records in February, April to June, and November (Fig. 127). The species was known only from Peru (Bell 1934).

GENUS *Pseudonascus* Austin, new genus

Type species: *Papilio paullinae* Sepp, [1842]

Description. Male: medium-sized (FW length = 21-23 mm), wing shape similar to *Nascus*, but forewing less produced with rounded apex and narrow costal fold (39% of forewing length), termen slightly convex anteriorly and then vaguely concave posterior to CuA_2 ; hindwing rounded, weakly lobed at tornus; dorsal color brown with ochreous overscaling based on forewing and extending nearly to termen on hindwing, pale ochre macules (some translucent) of forewing include three contiguous on disk (discal cell, M_3-CuA_1 , CuA_1-CuA_2), one on costa anterior to macule in discal cell, and four subapical; venter similar to dorsum, ochreous scaling less extensive, anal margin on forewing paler, with vague discal dark smudges on hindwing; palpi not particularly robust, quadrate in dorsal view, rounded in lateral view, third segment extending prominently beyond scaling of second segment; antennae 57% of forewing length curved to apiculus shorter than club length, nudum of 19-22 segments; legs with moderately dense and short hair-like scales on posterior edge, mid-tibia not spined and with single pair of spurs, hind tibia with two pairs of spurs; ventral hindwing with rounded groove lined with pale yellow scales on basal 1/2 of wing along vein 2A, groove gradually expanding and becoming shallower towards termen, anterior edge of groove with short hair tuft, long recumbent hair-like scales above groove on dorsal surface.

Male genitalia (Fig. 117): tegumen short and quadrate (especially in dorsal view) without caudal processes; uncus hooked downward, cephalic end extending above the plane of caudal end of tegumen, gradually tapering in dorsal view, undivided; gnathos short, relatively well-developed, divided; valva short and stout, harpe tapering to blunt caudal end; aedeagus longer than valva, moderately robust, slightly curved; cornuti consisting of three bundles of large spikes and a series of smaller spikes.

Female: dark brown with ochreous overscaling less extensive than on male, larger than male (FW length = 22-26 mm), wings more rounded, forewing less produced, hindwing quadrate, produced at vein CuA_1 , no costal fold on forewing or groove on ventral hindwing, macules on forewing white (some translucent), discal macules diagonal, aligned in costal cell, discal cell, CuA_1-CuA_2 , and CuA_2-2A , four subapical macules, no or minute macule in M_3-CuA_1 .

Female genitalia (Fig. 124): lamella postvaginalis broad and relatively short, shallow V-shaped notch at center of caudal edge; central portion of lamella antevaginalis U-shaped, the arms broad, caudal edge of each with sharply pointed tooth-like projection on outer edge exceeding caudal margin of lamella postvaginalis; antrum broad with internal sclerotization; ductus bursae broad, oblong, narrowing slightly before oblong corpus bursae.

Distribution. *Pseudonascus* occurs from Mexico to Bolivia and Brazil (Godman and Salvin 1879-1901; Draudt 1921-1924; Hoffmann 1941; Evans 1952; Steinhauser 1975; de Jong 1983; de la Maza and de la Maza 1985; Cock and Alston-Smith 1990; de la Maza et al. 1991; Mielke and Casagrande 1991, 1997; Lamas 1994; Robbins et al. 1996; Warren 2000; Vieira 2004).

Etymology. The name reflects the misplacement of the type species of *Pseudonascus* in *Nascus*.

Diagnosis and discussion. *Papilio paullinae* clearly does not belong in the genus *Nascus* (type species *Papilio phocus* Cramer, 1777), yet it possesses certain similarities to this and other genera of Evans'

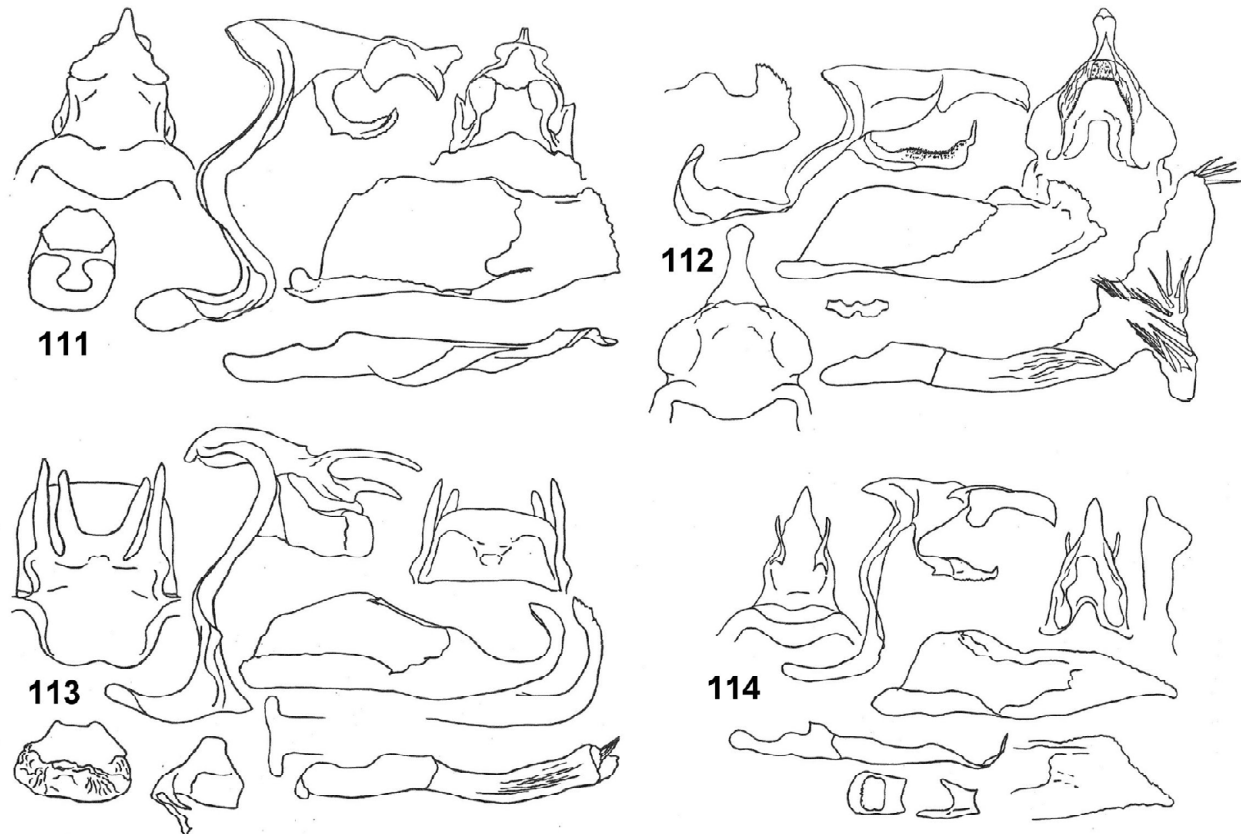


Figure 111-114. Male genitalia of *Salatis*, *Euriphellus*, *Sarmientoia*, and *Nicephellus* (from BRAZIL: Rondônia). Structures shown are lateral, dorsal, and ventral views of tegumen, uncus, gnathos, and associated structures; lateral internal view of right valva; lateral view of aedeagus and associated structures; and ventral view of transtilla and juxta. **111)** *Salatis salatis* (GTA #3487). **112)** *E. euribates euribates* (GTA #1801), including flattened view of caudal end of valva. **113)** *Sarmientoia similis* (GTA #7226), including flattened view of caudal end of valva, lateral view of juxta, and dorsal view of cephalad end of aedeagus. **114)** *N. nicephorus* (GTA #3137), including dorsal and flattened views of caudal end of valva and lateral view of juxta.

(1952) group "D". Superficially, the species is similar to *Nascus* in pattern and has similar sexual dimorphism. The forewing is less produced and more rounded than that of *Nascus*, the hindwing is not as elongate and is more rounded at the tornus, and the costal fold is of similar proportional length (38-43% forewing length on *Nascus*). The antennae of *Pseudonascus* are proportionally longer than are those of *Nascus* (antennae of *Nascus* 50-53% of forewing length) and the nudum is shorter (25-27 segments on *Nascus*). *Nascus* has a similar tuft on the edge of the groove on the ventral hindwing, but this is further from the wing base than it is on *Pseudonascus*. The tibiae of *Pseudonascus* are less densely "haired" than those of *Nascus* and the palpi are more quadrate in dorsal view (more or less rounded on *Nascus*), shorter in lateral view (elongate and gradually curving on *Nascus*), and with the third segment more protruding (only extending a short distance beyond the scales of the second segment on *Nascus*).

Female genitalia perhaps indicate alliance of *Pseudonascus* to *Nascus* as their general form is similar to *Nascus*, but they lack the rosette at the terminal end of the antrum, the antrum joins directly with the caudal end of the ductus bursae, and the lamellae are broader than long. Male genitalia of *Pseudonascus* are notably different from those of *Nascus* with their short and quadrate tegumen lacking caudal processes, the bent uncus, the relatively well-developed and divided gnathos, and the blunt valvae.

***Pseudonascus paullinae* (Sepp, [1842]), new combination**

(Fig. 62, 65, 68, 71, 117, 124, 130)

Papilio paullinae Sepp, [1842]*Nascus paullinae* (Sepp, [1842]): Evans, 1952

Pseudonascus paullinae shows little variation in color and pattern in central Rondônia, but some individuals have more broadly rounded wings than others (male mean FW length = 22.3 mm [20.7-23.4, n = 10]; female mean FW length = 24.5 mm [21.6-26.2, n = 3]). The genitalia (Fig. 117, 124) were described above in the generic description. Those of both sexes from Rondônia do not differ from those of individuals examined from Central America.

Pseudonascus paullinae is common at Cacaúlândia, with records for most of the year (none in January and March; Fig. 130). This species ranges from southern Mexico to Bolivia and Brazil (Hoffmann 1941, Evans 1952, de la Maza and de la Maza 1985, Warren 2000).

GENUS *Nascus* E. Y. Watson, 1893

Six species of these mostly large butterflies were recognized by Evans (1952) and Mielke (2004, 2005); they occur from Mexico to Argentina, Paraguay, and southern Brazil (Godman and Salvin 1879-1901; Draudt 1921-1924; Williams and Bell 1934; Hoffmann 1941; Evans 1952; Mielke 1968, 1973; Biezanko and Mielke 1973; Steinhäuser 1975; Freeman 1976; de Jong 1983; de la Maza and de la Maza 1985; Cock and Alston-Smith 1990; de la Maza and White 1990; de la Maza et al. 1991; Brown 1992; de la Maza and Gutiérrez 1992; Lamas 1994; Austin et al. 1996; Robbins et al. 1996; Mielke and Casagrande 1997; Warren 2000; Pozo et al. 2003; Luis et al. 2004; Nuñez Bustos 2006; Anderson 2007). Evans (1952) stated that *Nascus* was a compact group, but based his observations on superficial characters and apparently did not give much or any weight to their genital morphology. With the removal of *Papilio paullinae*, *Nascus* becomes even more compact and probably monophyletic (but *Nascus prax* Evans, 1952, has not been critically examined and may also belong elsewhere). The male genitalia of *Nascus* as currently conceived have a slender (lateral view) and oval (dorsal view) tegumen with a pair of lateral caudal processes that more or less parallel the tapering uncus; an entire and weakly developed or an undeveloped gnathos; valvae with a small lobe at the caudal end of the ampulla; harpes with serrated edges, no dorsal processes, but often caudal processes; a robust aedeagus as long as or longer than the valvae; and cornuti as three bundles of spikes. Species-level differences include the length of the tegumen processes and the configuration of the harpe. Female genitalia are characterized by a notched lamella postvaginalis, a lamella antevaginalis with a variously notched central portion overlaying the ostium bursae, a membranous tube joining the side of a broad ductus bursae as a cup-like rosette of sclerotization, and a globular or oval corpus bursae. Species differ in the structure of the lamellae, especially the shape of the central portion of the lamella antevaginalis.

Three species of *Nascus* were found near Cacaúlândia.

***Nascus phocus* (Cramer, 1777)**

(Fig. 76, 79, 82-85, 118, 123, 130)

Males of *N. phocus* from Rondônia (mean FW length = 28.5 mm [26.9-31.0, n = 10]) vary in the color of the dorsal hindwing from olive to olive-tan and in the widths of the dark bands and brown margin on the ventral hindwing. Individuals from the dry season (July-August; Fig. 76, 79) tend to be paler (more tan) than those from the wet season (November-December; Fig. 82, 85). Genitalia of males (Fig. 118) are constant and do not seem to differ from those previously illustrated (Godman and Salvin 1879-1901; Hayward 1933, 1948; Evans 1952) nor from a tan phenotype seen from Central America and Mexico. Female genitalia (based on a single specimen from Costa Rica, Fig. 123) have a flaring lamella postvaginalis with a shallow V-shaped central notch on its caudal edge. The lamella antevaginalis has a prominent central portion overlaying the ostium bursae which has a pair of long and slender finger-like projections nearly reaching the caudal edge of the lamella postvaginalis.

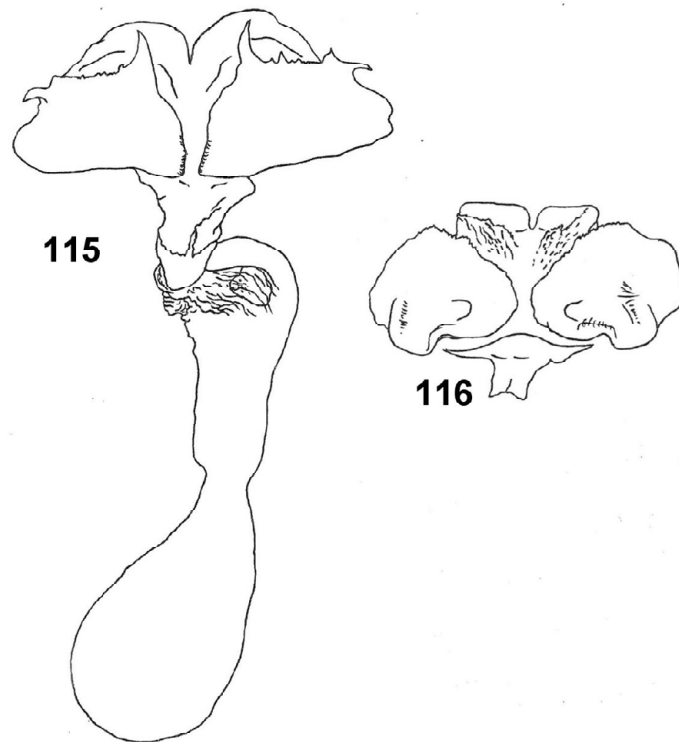


Figure 115-116. Female genitalia (ventral view) of *Euriphellus* and *Nicephellus* (from BRAZIL: Rondônia). **115)** *E. euribates euribates* (GTA #7221). **116)** *N. nicephorus* (GTA #4309).

Nascus phocus is the most common *Nascus* in central Rondônia, with records for April and June through December; these are mostly in August and November (Fig. 130). The species is wide ranging from central Mexico to San Luis Potosi (also known from Tamaulipas; *vide* A. D. Warren, pers. comm. 2006) to Argentina, Paraguay, and southern Brazil (Hoffmann 1941, Evans 1952, Mielke 1968, Biezanko and Mielke 1973, de la Maza and de la Maza 1985, Cock and Alston-Smith 1990, de la Maza and White 1990, Brown 1992, de la Maza and Gutiérrez 1992, Mielke and Casagrande 1997, Warren 2000, Pozo et al. 2003, Luis et al. 2004, Darrault and Schlindwein 2005, Nuñez Bustos 2006, Anderson 2007).

***Nascus solon solon* (Plötz, 1882)**

(Fig. 64, 67, 74-75, 120-121, 130)

Rondonian males of *N. solon* (mean FW length = 29.0 mm [28.1-30.6, n = 10]) vary on the dorsum from olive to yellow-olive and in the width of the dark band on the ventral hindwing that may be partially separate from the dark brown margin or fully incorporated within it. Medial markings on that wing are absent or, usually, as vague dark macules in Sc+R₁-Rs and occasionally in the discal cell. The pale macules in cells M₁-M₂ and M₂-M₃ on the forewing are variably present; the latter or both may be absent. The small macule in the upper part of cell CuA₂-2A is also often absent. The single female seen from Rondônia (FW length = 36.1 mm) has five subapical macules on the forewing as is apparently typical of this subspecies (Evans 1952). The dorsum of this female is virtually identical to that of the female of *N. broteas* from Rondônia except for the number of subapical macules (*N. broteas* has four). The forewing of *N. solon* is more pointed (less rounded). The venter is also similar to that of *N. broteas*, but the discal band is not completely separated from the dark margin as it is on *N. broteas*.

The genitalia of Rondonian males of *N. solon* (Fig. 120) are as illustrated for this species by Williams and Bell (1934, as *N. broteas*) and Evans (1952). The genitalia of the single female from Rondônia (Fig. 121) have a quadrate lamella postvaginalis with a narrow and shallow V-shaped central indentation. The central portion of the lamella antevaginalis is short with a pair of broad and pointed lateral lobes. Both male and female genitalia are identical to those of *Nascus solon corilla* Evans, 1952, from Costa Rica (pers. obs.).

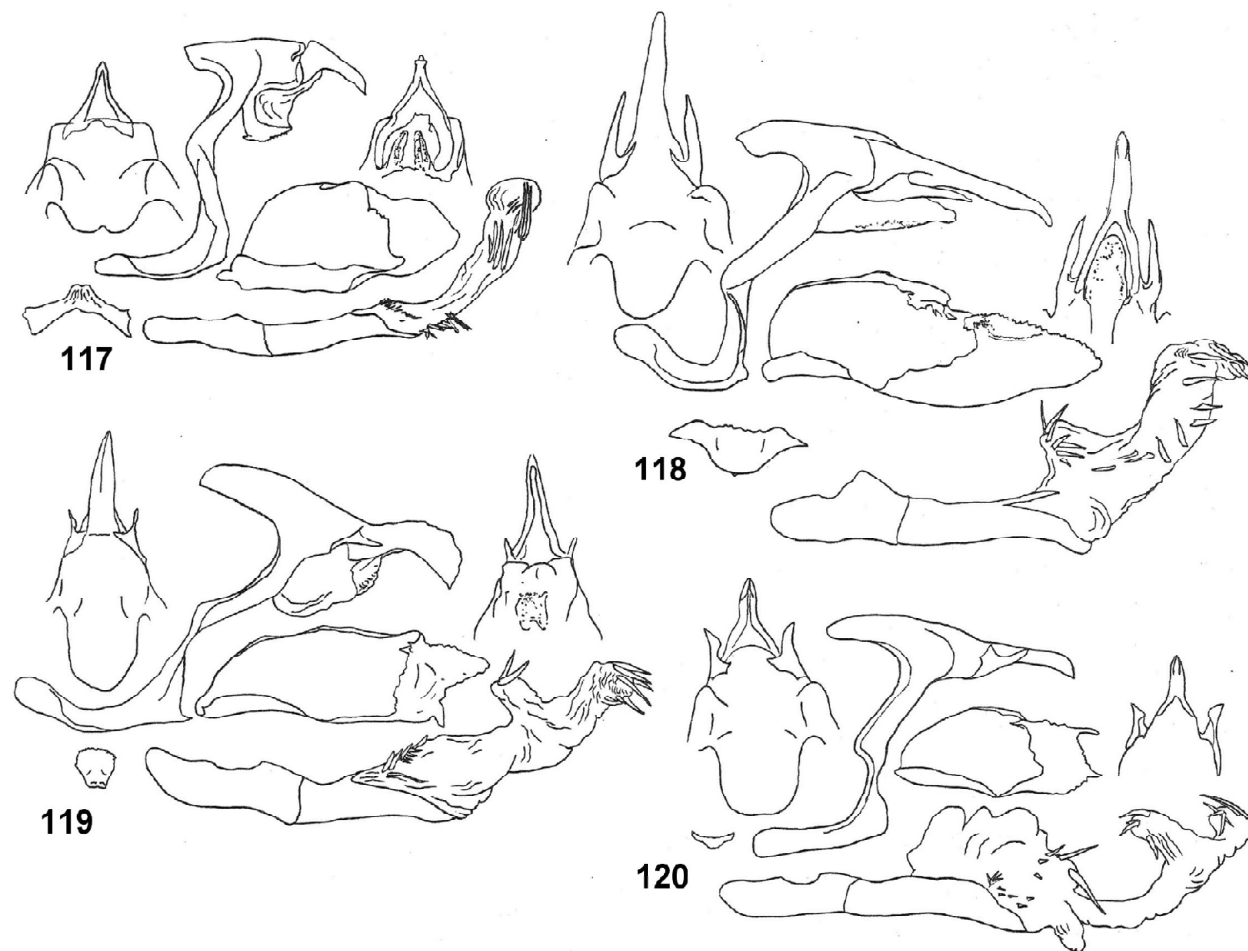


Figure 117-120. Male genitalia of *Pseudonascus* and *Nascus* (from BRAZIL: Rondônia). Structures shown are lateral, dorsal, and ventral views of tegumen, uncus, gnathos, and associated structures; lateral internal view of right valva; lateral view of aedeagus and associated structures; and ventral view of transtilla and juxta. **117)** *P. paullinae* (GTA #2460). **118)** *N. phocus* (GTA #3534). **119)** *N. broteas* (GTA #7211). **120)** *N. solon solon* (GTA #1725).

Nascus solon is common in central Rondônia, with records for May through August and October through December; most records are in the early wet season (Fig. 130). The species has been reported from southern Mexico south into the immediate Amazonian drainage of Brazil and Peru (Hoffmann 1941, Evans 1952, de la Maza and de la Maza 1985, Lamas 1994, Warren 2000, Luis et al. 2004).

***Nascus broteas* (Cramer, 1780)**

(Fig. 77-78, 80-81, 119, 122, 130)

Males of *N. broteas* from Rondônia (mean FW length = 31.8 mm [29.9-31.8, n = 6]; see figures in Cock and Alston-Smith 1990) exhibit some variation in the width of the dark bands and margin on the ventral hindwing. Most (8 of 9) have five subapical macules, one has only four. The two females seen (FW length = 36.1 mm, n = 1) are superficially very similar to *N. solon* (see above). Male genitalia (Fig. 119) are more or less as illustrated by Evans (1952); those shown by Williams and Bell (1934) as *Nascus broteas* are of *N. solon*. Female genitalia (Fig. 122) have a narrow and quadrate lamella postvaginalis with a deep V-shaped central notch on its caudal edge. The central portion of the lamella antevaginalis is rectangular, has a central U-shaped notch on its caudal edge, overlays nearly the entire ostium bursae, and nearly reaches the caudal edge of the lamella postvaginalis.

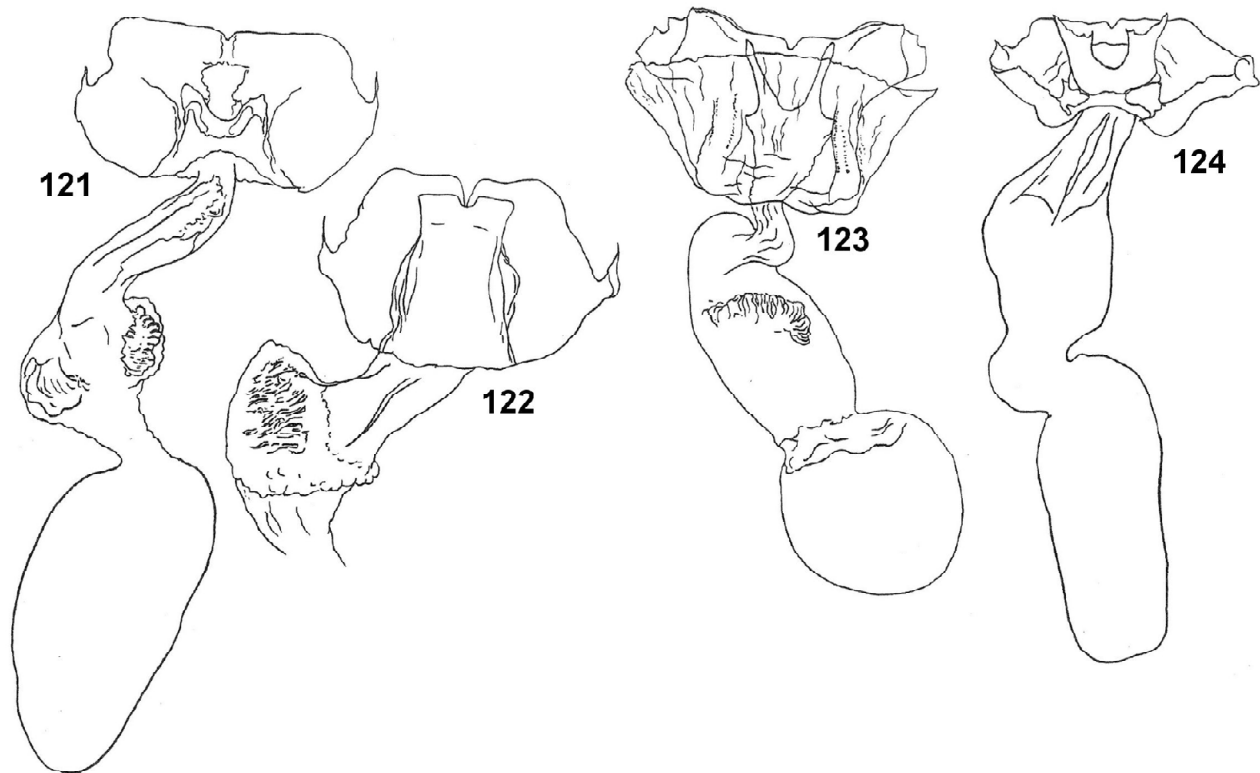


Figure 121-124. Female genitalia (ventral view) of *Pseudonascus* and *Nascus* (from BRAZIL: Rondônia, unless otherwise noted). **121)** *N. salon salon* (GTA #7229). **122)** *N. broteas* (GTA #7228). **123)** *N. phocus*, COSTA RICA (GTA #7230). **124)** *P. paullinae* (GTA #7233).

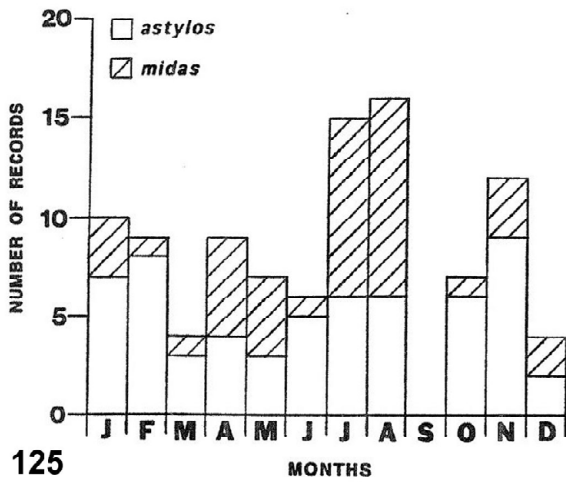
Nascus broteas is uncommon near Cacaúlândia, with records for June through November (Fig. 130). The species is known from Mexico (north to San Luis Potosi) to Argentina, Paraguay, and southern Brazil (Evans 1952, Freeman 1976, Cock and Alston-Smith 1990, de la Maza and White 1990, Warren 2000, Nuñez Bustos 2006).

Key to the genera of “night” skippers in Rondônia, Brazil (modified after Evans 1952)

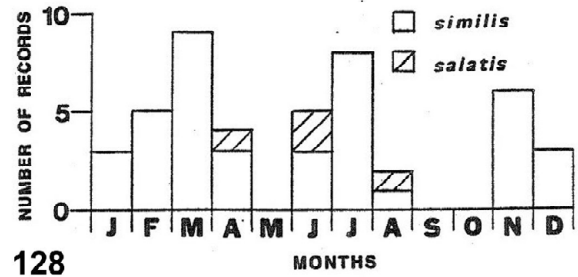
1. Palpi with third segment short, not or barely extending beyond scales of second segment; forewing of male with discal macules absent or widely spaced (except *Euriphellus*); forewing of female with discal macules (if present) widely spaced (except *Euriphellus*) or, if arranged as diagonal band, macule in CuA_2-2A not prominently offset distad and more or less perpendicular to anal margin **2**
- Palpi with third segment extending beyond scales of second segment; forewing of male with three large discal macules closely spaced; forewing of female with discal macules forming diagonal band having macule in CuA_2-2A offset distad and not perpendicular to anal margin **7**

- 2(1). Antenna bent at proximal end of nudum **3**
- Antenna bent well distad of proximal end of nudum **5**

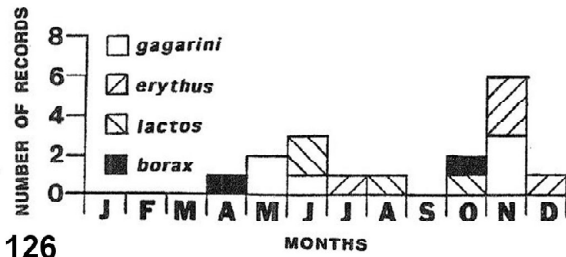
- 3(2). Antenna constricted at proximal end of nudum, nudum with more than 30 segments; ampulla of male genitalia with style ***Bungalotis* Watson**
- Antenna not constricted, nudum with fewer than 30 segments; ampulla of male genitalia without style **4**



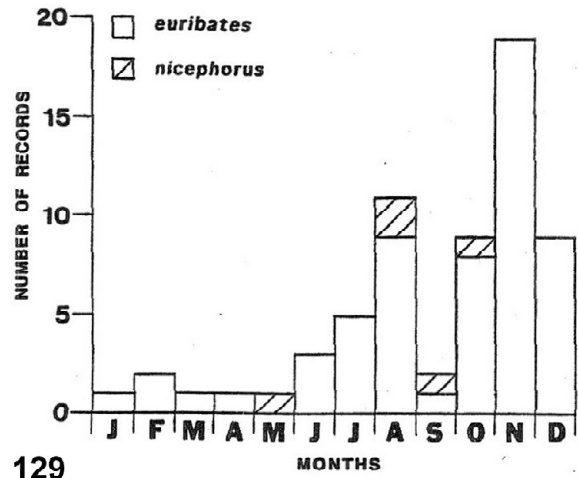
125



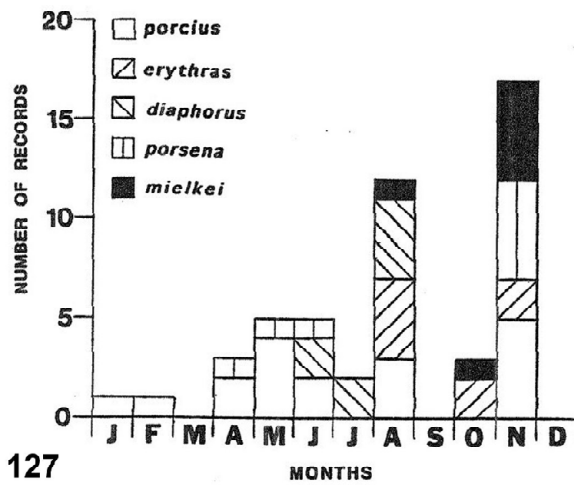
128



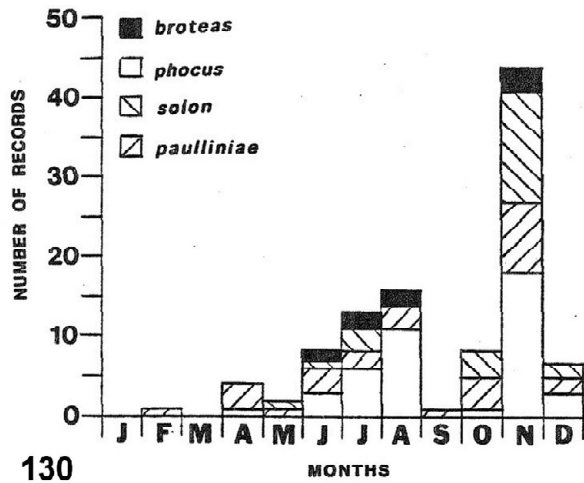
126



129



127



130

Figure 125-130. Phenology of some night skippers from central Rondônia, Brazil. 125-126) *Bungalotis* species. 127) *Dyscophellus* species. 128) *Salatis salatis* and *Sarmientoia similis*. 129) *Nicephellus nicephorus* and *Euriphellus euribates*. 130) *Pseudonascus paullinae* and *Nascus* species.

- 4(3). Forewing with prominent macule in discal cell and three subapical macules; harpe of male genitalia long, thin, and recurved dorsad ***Sarmientoia* Berg**
 — Forewing without prominent macule in discal cell and one subapical macule; harpe of male genitalia short, broad, and not recurved ***Salatis* Evans**
- 5(2). Wings of both sexes broadly rounded; mid-tibia spined; tegumen of male genitalia with thin processes extending caudad ***Nicephellus*, n. gen.**
 — Wings of both sexes not broadly rounded, forewing more or less produced; mid-tibia without spines; tegumen of male genitalia without caudal processes **6**
- 6(5). Forewing of both sexes with three closely spaced discal macules; saccus of male genitalia long, robust, and bent dorsad; gnathos well-developed ***Euriphellus*, n. gen.**
 — Forewing of male with at most one discal macule; forewing of female with discal macules widely spaced; saccus of male genitalia short, thin, and curved slightly dorsad; gnathos weakly developed ***Dyscophellus* Godman and Salvin**
- 7(1). Forewing produced apically, hindwing with prominent tornal lobe; tegumen of male genitalia with caudal processes, uncus elongate and curved ventrad ***Nascus* Watson**
 — Forewing not produced apically, hindwing without prominent tornal lobe; tegumen of male genitalia without caudal processes, uncus short and bent ventrad ***Pseudonascus*, n. gen.**

Discussion

The overall similarity of the female genitalia of several genera treated here (*Bungalotis*, *Nicephellus*, *Euriphellus*, *Dyscophellus*, *Pseudonascus*, *Nascus*) suggests a monophyletic grouping (see also Warren 2006). On all of these, the ductus bursae is expanded and, except for *Pseudonascus*, the antrum joins the ductus bursae cephalad of its caudal end; this character is shared also by *Cephise* Evans, 1952 (see Burns 1996, Austin and Mielke 2000). Only *Sarmientoia* (females of *Salatis* not seen) differs from this pattern by having a more “conventionally” slender ductus bursae.

The seasonal distribution of records from Rondônia indicates that most species have a significant flight during the dry season (May to September), especially during its latter portion (July-August), and again in the early wet season (November), although several of the species are present as adults (at least in low numbers) throughout most of the year (Fig. 125-130). Two intrageneric patterns appear. Among *Bungalotis*, both *B. midas* and *B. astylos* are common during the dry season. *Bungalotis astylos* remains common in the early wet season while *B. midas* appears to be much rarer. In *Nascus*, *N. phocus* is commonly recorded in both the dry and wet seasons; *N. solon* is commonly recorded only in the early wet season.

Acknowledgments

I thank Olaf H. H. Mielke and Vitor Becker for making studies of Rondonian butterflies possible. Mielke critically reviewed an early draft of the manuscript and made useful comments; he and Stephen R. Steinhauser freely shared their extensive knowledge of neotropical hesperiids. Lee D. and Jacqueline Y. Miller, Andrew D. Warren, and an anonymous reviewer critically reviewed the manuscript and made useful suggestions. Paul Skelley also made comments and assisted with editorial matters. Ann and Ray Albright, Giovanni Bongiorno, Robert Borth, Jim P. Brock, Joe E. Eger, Osorino Gomes, Peggy Powell, Eric Quitner, J. D. Turner, Andrew D. Warren, and Frank and Anna West assisted in the field. Victoria Mason arranged for the loan of the female *Bungalotis quadratum* from the Peabody Museum of Natural History, New Haven, Connecticut. Thanks are also given to Andrei Sourakov who photographed specimens, arranged the plates, and provided figure 13, and to Chris Eliazar who scanned the line drawings. Thomas C. Emmel has provided encouragement and support since inception of investigations in Rondônia. The Schmitz family at Fazenda Rancho Grande made field studies in Rondônia comfortable. The Conselho Nacional de Desenvolvimento Científico e Tecnológico kindly issued the authorization permits from the

Ministério da Ciência e Tecnologia for our studies in Rondônia in collaboration with EMBRAPA/CPAC and the Universidade Federal do Paraná.

Literature Cited

- Anderson, R. A. 2007.** A list of HesperIIDae collected in Nicaragua, 1973-1976. *Bulletin of the Allyn Museum* 147: 1-19.
- Austin, G. T. 1993.** A review of the *Phanus vitreus* group (Lepidoptera: HesperIIDae: Pyrginae). *Tropical Lepidoptera* 4 (supplement 2): 21-36.
- Austin, G. T. 1994.** HesperIIDae of central Rondônia, Brazil: Comments on *Haemactis*, with description of a new species (Lepidoptera: HesperIIDae: Pyrginae). *Tropical Lepidoptera* 5: 97-100.
- Austin, G. T. 1995.** HesperIIDae of Rondônia, Brazil: Comments on *Drephalys*, with descriptions of two new species (Lepidoptera: HesperIIDae: Pyrginae). *Tropical Lepidoptera* 6: 123-128.
- Austin, G. T. 1996.** HesperIIDae of central Rondônia, Brazil: Three new species of *Narcosius* Steinhauser. *Journal of the Lepidopterists' Society* 50: 53-59.
- Austin, G. T. 1997.** HesperIIDae of Rondônia, Brazil: *Eracon* and a new related genus, with descriptions of two new species (Lepidoptera: HesperIIDae: Pyrginae). *Tropical Lepidoptera* 8: 22-28.
- Austin, G. T. 1998.** HesperIIDae of Rondônia, Brazil: *Ridens* and the "proteus" group of *Urbanus*, with descriptions of new species (Pyrginae). *Journal of the Lepidopterists' Society* 52: 166-176.
- Austin, G. T. 2000.** HesperIIDae of Rondônia, Brazil: "*Antigonus*" genus group (Pyrginae), with taxonomic comments and descriptions of new species from Brazil and Guatemala. *Journal of the Lepidopterists' Society* 54: 1-28.
- Austin, G. T., J. P. Brock, and O. H. H. Mielke. 1993.** Ants, birds, and skippers. *Tropical Lepidoptera* 4 (supplement 2): 1-11.
- Austin, G. T., T. C. Emmel, and O. H. H. Mielke. in press.** The tropical rainforest butterfly fauna of Rondônia, Brazil: Species composition and richness. *Memoirs of the McGuire Center for Lepidoptera and Biodiversity* 1.
- Austin, G. T., N. M. Haddad, C. Mendez, T. D. Sisk, D. D. Murphy, A. E. Launer, and P. R. Ehrlich. 1996.** Preliminary annotated checklist of the butterflies of Tikal National Park and vicinity, Guatemala (Lepidoptera). *Tropical Lepidoptera* 7: 21-37.
- Austin, G. T., and O. H. H. Mielke. 1997.** HesperIIDae of Rondônia, Brazil: *Aguna* (Pyrginae), with a partial revision and descriptions of new species from Ecuador, Panama, and Brazil. *Revista Brasileira de Zoologia* 14: 889-965.
- Austin, G. T., and O. H. H. Mielke. 2000.** HesperIIDae of Rondônia, Brazil: *Cephise* Evans (Pyrginae), with descriptions of new species from Mexico and Brazil. *Revista Brasileira de Zoologia* 17: 757-788.
- Austin, G. T., O. H. H. Mielke, and S. R. Steinhauser. 1997.** HesperIIDae of Rondônia, Brazil: *Entheus* (Hübner), with descriptions of four new species (Lepidoptera: Pyrginae). *Tropical Lepidoptera* 8: 5-18.
- Austin, G. T., and S. R. Steinhauser. 1996.** HesperIIDae of central Rondônia, Brazil: *Celaenorrhinus* Hübner (Pyrginae), with descriptions of three new species and taxonomic comments. *Insecta Mundi* 10: 25-44.
- Bell, E. L. 1934.** New American HesperIIDae (Lepidoptera, Rhopalocera). *Bulletin of the Brooklyn Entomological Society* 29: 89-96.
- Bell, E. L. 1940.** A new genus and some new species of HesperIIDae from Peru, in the Bessler collection (Lepidoptera: Rhopalocera). *American Museum Novitates* 1094: 1-7.
- Biezanko, C. M., and O. H. H. Mielke. 1973.** Contribuição au estudo faunístico dos HesperIIDae americanos. IV. Espécies do Rio Grande do Sul, Brasil, com notas taxonômicas e descrições de espécies novas. (Lepidoptera). *Acta Biologica Paranaense* 2: 51-102.
- Bridges, C. A. 1988.** Catalogue of HesperIIDae (Lepidoptera: Rhopalocera). Published by the author; Urbana. 443 p.
- Brown, K. S., Jr. 1992.** Borboletas da Serra do Japi: diversidade, habitats, recursos alimentares e variação temporal. p. 142-187. *In*: L. P. Morellato (Org.). *História Natural da Serra do Japi, Ecologia e Preservação de uma Área Florestal no Sudeste do Brasil*. Editora UNICAMP/FAPESP; Campinas. 321 p.

- Brown, K. S., Jr., and O. H. H. Mielke. 1967.** Lepidoptera of the central Brazil Plateau. I. Preliminary list of Rhopalocera (continued): Lycaenidae, Pieridae, Papilionidae, Hesperidae. *Journal of the Lepidopterists' Society* 21: 145-168.
- Burns, J. M. 1996.** Genitalia and the proper genus: *Codattractus* gets *mysie* and *uvydidia* - in a compact *cyda* group - as well as a *hysterectomy*, while *Cephise* gets part of *Polythrix* (Hesperidae: Pyrginae). *Journal of the Lepidopterists' Society* 50: 173-216.
- Cock, M. J., and S. Alston-Smith. 1990.** The skipper butterflies (Hesperidae) of Trinidad. Part 6: Pyrgine, genera group D. *Living World* 1989/1990: 25-35.
- Darrault, R. O., and C. Schlindwein. 2005.** Limited fruit production in *Hancornia speciosa* (Apocynaceae) and pollination by nocturnal and diurnal insects. *Biotropica* 37: 381-388.
- Davis, F. L. 1928.** Notes on the butterflies of British Honduras. Old Royalty Book Publishers; London. 101 p.
- DeVries, P. J. 1983.** Checklist of butterflies. p. 654-678. *In*: D. H. Janzen (ed.). *Costa Rican Natural History*. University of Chicago Press; Chicago. 816 p.
- DeVries, P. J., G. T. Austin, and N. M. Martin. in press.** Diel activity and reproductive isolation in a diverse assemblage of neotropical skippers (Lepidoptera: Hesperidae). *Biological Journal of the Linnean Society*.
- Draudt, M. 1921-1924.** Die amerikanischen Tagfalter. Lycaenidae and Grypocera. p. 836-1011. *In*: A. Seitz. *Die Gross-Schmetterlinge der Erde*. Alfred Kernen; Stuttgart. Vol. 5. 1030 p.
- Emmel, T. C. 1989.** The incredible butterfly diversity of the Rondonian rain forest in Brazil: A phenomenon soon to disappear. *News of the Lepidopterists' Society* 1989(4): 53-55.
- Emmel, T. C., and G. T. Austin. 1990.** The tropical rainforest butterfly fauna of Rondonia, Brazil: Species diversity and conservation. *Tropical Lepidoptera* 1: 1-12.
- Evans, W. H. 1952.** A Catalogue of the American Hesperidae in the British Museum. Part II (Groups B, C, D), Pyrginae. Section I. British Museum (Natural History); London. 178 p.
- Freeman, H. A. 1976.** New Hesperidae records for Mexico. *Journal of the Lepidopterists' Society* 30: 62-67.
- Freeman, H. A. 1977.** Six new species of Hesperidae from Mexico. *Journal of the Lepidopterists' Society* 31: 89-99.
- Godman, F. D., and O. Salvin. 1879-1901.** *Biologia Centrali-Americana. Zoologia, Lepidoptera-Rhopalocera*. Deleau; London. 1229 p.
- Hayward, K. J. 1933.** Lepidópteros argentinos. Familia Hesperidae. *Revista de la Sociedad Entomológica Argentina* 5: 149-188.
- Hayward, K. J. 1948.** *Insecta, Lepidoptera (Rhopalocera), familia Hesperidarum, subfamiliae Pyrrhopyginarum et Pyrginarum*. Vol. 1. *In*: H. R. Descole (ed.). *Genera et Species Animalium Argentinorum*. Guillermo Kraft; Buenos Aires. 389 p.
- Hoffmann, C. C. 1941.** Catalogo sistematico y zoogeografico de los Lepidopteros Mexicanos. Segunda Parte. Hesperioidea. *Anales del Instituto de Biología, Universidad Nacional de México* 12: 237-294.
- Janzen, D. H., M. Hajibabaei, J. M. Burns, W. Hallwachs, E. Remigio, and P. D. N. Hebert. 2005.** Wedding biodiversity inventory of a large and complex Lepidoptera fauna with DNA barcoding. *Philosophical Transactions of the Royal Society of London* 360B: 1835-1845.
- Janzen, D., and W. Hallwachs. 2005.** Dynamic database for an inventory of the macrocaterpillar fauna, and its food plants and parasitoids, of Area de Conservacion Guanacaste (ACG), northwestern Costa Rica. <http://janzen.sas.upenn.edu>
- Jong, R. de. 1983.** Annotated list of the Hesperidae (Lepidoptera) of Surinam, with descriptions of new taxa. *Tijdschrift voor Entomologie* 126: 233-268.
- Lamas, G. 1994.** List of butterflies from Tambopata (Explorer's Inn Reserve). p. 162-177. *In*: R. B. Foster, J. L. Carr, and A. B. Forsyth (eds.). *The Tambopata-Candamo Reserved Zone of Southeastern Perú: A Biological Assessment. Rapid Assessment Program, RAP Working Papers 6*. Conservation International; Washington, DC. 184 p.
- Lamas, G. 2003.** *Las Mariposas de Machu Picchu*. PROFONANPE; Lima. 221 p.
- Lamas, G., R. K. Robbins, and D. J. Harvey. 1991.** A preliminary survey of the butterfly fauna of Pakitza, Parque Nacional del Manu, Peru, with an estimate of its species richness. *Publicaciones del Museo Historia Natural, UNMSM* 40: 1-19.

- Lamas, G., R. K. Robbins, and D. J. Harvey. 1996.** Mariposas del alto Río Napo, Loreto, Perú (Lepidoptera: Papilionoidea y Hesperioidea). *Revista Peruana de Entomología* 39: 63-74.
- Lindsey, A. W., E. L. Bell, and R. C. Williams, Jr. 1931.** The Hesperioidea of North America. *Denison University Bulletin* 26: 1-142.
- Luis Martínez, A. J., J. Llorente Bousquets, A. D. Warren, and I. Vargas Fernández. 2004.** Lepidópteros: papilionoideos y hesperioideos. p. 335-355. *In:* A. J. Garcia-Mendoza, M. J. Ordóñez, and M. Briones-Salas (eds.). *Biodiversidad de Oaxaca*. Instituto Biología, UNAM; Mexico City. 605 p.
- Mabille, P. 1888.** Descriptions de Lépidoptères (Hespérides) nouveaux. *Le Naturaliste* (2)2(31): 169-171.
- Maza, J. de la, and R. G. de la Maza. 1985.** La fauna de mariposas de Boca del Chajul, Chiapas, Mexico (Rhopalocera). Parte I. *Revista de la Sociedad Mexicana de Lepidopterología* 9: 23-44.
- Maza, E. de la, J., A. White L., and R. de la Maza E. 1991.** La fauna de mariposas de México. Parte II. Hesperioidea (Lepidoptera: Rhopalocera). *Revista de la Sociedad Mexicana de Lepidopterología* 14: 3-44.
- Maza, R. G. de la, and D. Gutiérrez. 1992.** Rhopalóceros de Quintana Roo, su distribución, origen y evolución. *Revista de la Sociedad Mexicana de Lepidopterología* 15: 1-44.
- Maza E. de la, R. G., and A. White L. 1990.** Rhopalocera de la Huasteca Potosina, su distribución, composición, origen y evolución. *Revista de la Sociedad Mexicana de Lepidopterología* 13: 29-87.
- Meerman, J. C., and T. Boomsma. 1993.** Checklist of the butterflies of the Shipstern Nature Reserve. *Occasional Papers of the Belize Natural History Society* 2: 37-46.
- Mielke, O. H. H. 1967a.** Notas sobre o gênero *Sarmiéntoia* com descrição de 4 espécies novas (Lepidoptera, HesperIIDae). *Boletim da Universidade Federal do Paraná, (Zoologia)* 2: 311-328.
- Mielke, O. H. H. 1967b.** Lepidópteros do Planalto Central brasileiro. IV: Notas complementares sobre os HesperIIDae da região e descrição de cinco espécies novas (Lepidoptera: HesperIIDae). *Revista Brasileira de Biologia* 27: 125-134.
- Mielke, O. H. H. 1968.** Contribuição ao estudo faunístico dos <<HesperIIDae>> brasileiros. I. Resultados de uma excursão a Foz do Iguaçu, Paraná, Brasil, com notas taxonômicas (Lepidoptera). *Atas da Sociedade de Biologia de Rio de Janeiro* 12: 73-78.
- Mielke, O. H. H. 1973.** Contribuição ao estudo faunístico dos HesperIIDae americanos. III. Espécies coletadas em duas excursões ao Pará e Amapá, Brasil (Lepidoptera). *Acta Biologica Paranaense* 2: 17-40.
- Mielke, O. H. H. 2004.** HesperIIDae. p. 25-86. *In:* G. Lamas (ed.). *Atlas of Neotropical Lepidoptera. Checklist: Part 4A. Hesperioidea-Papilionoidea*. Scientific Publishers; Gainesville, Florida. 439 p.
- Mielke, O. H. H. 2005.** Catalogue of the American Hesperioidea: HesperIIDae (Lepidoptera). Vol. 2. Pyrginae 1: Eudamini. *Sociedade Brasileira de Zoologia; Curitiba*. 359 p.
- Mielke, O. H. H., and M. N. Casagrande. 1991.** Lepidoptera: Papilionoidea e Hesperioidea coletados na Ilha de Maracá, Alto Alegre, Roraima, Parte do Projeto Maracá, com uma lista complementar de HesperIIDae de Roraima. *Acta Amazonica* 21: 175-210.
- Mielke, O. H. H., and M. N. Casagrande. 1997.** Papilionoidea e Hesperioidea (Lepidoptera) do parque estadual do Morro do Diabo, Teodora, São Paulo, Brazil. *Revista Brasileira de Zoologia* 14: 967-1001.
- Miller, J. C., D. H. Janzen, and W. Hallwachs. 2006.** 100 Caterpillars: Portraits from the Tropical Forests of Costa Rica. *Belknap; Cambridge, Massachusetts*. 272 p.
- Moss, A. M. 1949.** Biological notes on some <<HesperIIDae>> of Para and the Amazon. (Lep. Rhop.). *Acta Zoologica Lilloana* 7: 27-80.
- Murray, D. L. 1996.** A survey of the butterfly fauna of Jatun Sacha, Ecuador (Lepidoptera: Hesperioidea and Papilionoidea). *Journal of Research on the Lepidoptera* 35: 42-60.
- Nuñez Bustos, E. E. 2006.** Inventory of Rhopaloceran Lepidopterans (diurnal butterflies) of Yacutinga Wildlife Refuge (General Belgrano Department, Misiones Province, Argentina). http://www.yacutinga.com/html/vz/i_ing/estacion_biologica
- Pinheiro, C. E. G., and E. O. Emery. 2006.** As borboletas (Lepidoptera: Papilionoidea e Hesperioidea) da Área de Proteção Ambiental do Gama e Cabeça de Veado (Distrito Federal, Brasil). *Biota Neotropica* 6(no. 3). <http://www.biotaneotropica.org.br/v6n3/pt/abstract?inventory+bn1506032006>
- Pozo, C., A. Luis-Martínez, S. U. Tescum, N. S. Suárez, and A. M. Martínez. 2003.** Butterflies (Papilionoidea and Hesperioidea) of Calakmul, Campeche, México. *Southwestern Naturalist* 48: 505-525.

- Robbins, R. K., G. Lamas, O. H. H. Mielke, D. J. Harvey, and M. M. Casagrande. 1996.** Taxonomic composition and ecological structure of the species-rich butterfly community at Pakitza, Parque Nacional del Manu, Perú. p. 217-252. *In*: D. E. Wilson and A. Sandoval (eds.). Manu, The Biodiversity of Southeastern Peru. Smithsonian Institution; Washington, DC. 679 p.
- Seitz, A. 1907-1924.** Die Gross-Schmetterlinge der Erde. Die amerikanische Tagfalter. A. Kernen; Stuttgart, vol. 5. 1030 p.
- Skinner, H., and R. C. Williams, Jr. 1923.** On the male genitalia of the Hesperidae of North America. Transactions of the American Entomological Society 49: 129-153.
- Steinhauser, S. R. 1975.** An annotated list of the Hesperidae of El Salvador. Bulletin of the Allyn Museum 29: 1-34.
- Vieira, R. S. 2004.** Efeito da Fragmentação Florestal sobre Borboletas (Lepidoptera, Hesperidae) Associadas à Formiga-de-Correição *Eciton burchelli* (Hymenoptera, Formicidae, Ecitoninae). Tese, Universidade Federal do São Carlos; São Paulo, Brazil. 166 p.
- Warren, A. D. 2000.** Hesperioidea (Lepidoptera). p. 535-580. *In*: J. E. Llorente Bousquets, E. González Soriano and N. Papavero (eds.), Biodiversidad, Taxonomía y Biogeografía de Artrópodos de México: Hacia una Síntesis de su Conocimiento. Vol. II. Instituto Biología, UNAM and CONABIO; Mexico City. 676 p.
- Warren, A. D. 2006.** The Higher Classification of Hesperidae (Lepidoptera: Hesperioidea). PhD Dissertation, Oregon State University. 458 p.
- Williams, R. C., Jr., and E. L. Bell. 1934.** Studies in the American Hesperioidea. Paper III. (Lepidoptera). On the synonymy of some species. Transactions of the American Entomological Society 60: 121-132.

Accepted December 3, 2007