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A PRELIMINARY REVISION OF THE GENUS NYMPHIDIUM (RHOPALOCERA, RIODINIDAE)

Part. I Introduction. *Mantus-Baoetia* Complex

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INTRODUCTION

For more than half a century, the standard work on the Riodinidae has been Seitz' *Grosschmetterlinge der Erde*, not especially for its quality but due to its comprehensiveness and illustrations. Since the appearance of "Seitz", workers in the riodinines have not been hesitant in pointing out its flaws. The most vocal of all was Stichel, who in practically all of his post-"Seitz" articles, never lost an opportunity to manifest his opinion. Unfortunately, Stichel rarely illustrated anything, and many of his descriptions were quite terse. Thus, for all but the specialist, the Seitz rendition has prevailed over the years.

No group of riodinines was more abused in "Seitz" than Stichel's subtribe Nymphidiidi[1], especially the genus *Nymphidium*. Since Hewitson, this genus has been a "catchall" for a number of riodinines, many of which bear only superficial resemblance to the type of the genus. Some taxa do not belong even to the same tribe! Stichel's work, while an improvement over "Seitz", was not exempt from errors. Since Stichel, most workers have been content to name species and subspecies with little consideration of the characters on the generic level, thus adding to the chaos existant, not only among the genera of the Nymphidiini, but among other riodinid groups as well.

This revision was undertaken as an attempt to clarify and rectify the aforementioned problems as much as possible. The hardest part was in deciding whether or not sufficient material had been examined in order to draw valid conclusions regarding the systematics of the group; in other words, whether the sample taken was a fair representation of the universe being described. There always remains the possibility that just one more trip to the Amazon or one more specimen dissected might reveal data which would alter the current conclusions. On the other hand, waiting until the whole spectrum of possibilities had been exhausted would be a never ending process, especially in South America, which is less well known than most other faunistic regions. Thus, this study and those that follow are offered as they are entitled, preliminary exercises which will be updated as more material becomes available.

[1]This subtribe currently consists of the genera *Nymphidium, Synargus, Juditha, Calosiasma* and *Audre*.

METHODS

Over the ten years during which I have been working with genus *Nymphidium* and its allies, I have studied the collections of a number of institutions, among which are the Allyn Museum of Entomology of the Florida State Museum, Sarasota, FL; National Museum of National History, Smithsonian Institution, Washington, D.C.; American Museum of Natural History, New York, N.Y.; Humboldt Museum, Berlin, DDR; Faculdad de Agronomia, Maracay, Venezuela; and Museu Nacional and Instituto Oswaldo Cruz, Rio de Janeiro, Brazil. I also built a working collection through my own collecting and through donation and loan of material from numerous individuals and institutions. For this revision approximately 2800 specimens and 421 male and female genitalia preparations were studied. Still, many gaps remain in the geographical distribution of some species, which will only be filled some time in the future, when more collecting in these remote areas is possible.

Field observations formed the basis for the phylogenetic conclusions on many species. In many cases the genitalia provided few clues regarding the relationship among phenotypes below the species group. I, therefore, made numerous observations in the field on habitat spacing and perching behavior among different *Nymphidium* phenotypes as well as other species of riodinines (Callaghan, 1983). I found that although spacing among perching sites and times varied considerably among various *Nymphidium*, these provided few clues as to species differentiation; among other groups, such as the *baoetia* complex, perching sites were distinct and well defined.

I have followed the terminology of Klots (1956) for the genitalia, and Miller (1970) for the wing venation.

Under the sections concerning the material examined, the localities are given by country. The Brazilian states are abbreviated as follows: Amaz - Amazonas; Pa - Para; Ro - Rondonia; Ba - Bahia; MT - Matto Grosso; Go - Goias; DF - Districto Federal (Brazilia); SP - São Paulo; RJ - Rio de Janeiro; ES - Espirito Santo; MG - Minas Gerais. I have not included the dates of capture, as in my experience, *Nymphidium* occur throughout the year.

The Genus ***Nymphidium*** Fabricius, 1807

Nymphidium Fabricius, 1807. Mag. f. Insecktenk. 6:286. Type species *Papilio caricae* Linnaeus, 1758 (Syst. Nat., ed. 10, 1: 484) by selection of Crotch, 1872 (Cist. Ent., 1: 66).

= *Limnas* Hübner, [1806]. Samml. exot. Schmett. 1: pl. [29]. Type species *Limnas leucosia* Hübner, [1806] (Samml. exot. Schmett. 1: pl. [29]) by monotypy. Invalid under I. C. Z. N. Opinion 171 (1946).

= *Heliochlaena* Hübner, 1821. Index. exot. Lepid.: [4]. Type species *Limnas leucosia* Hübner, [1806] (Samml. exot. Schmett. 1: pl. [29]) by monotypy.

=*Nymphidia* Boisduval and Leconte, [1833]. Hist. gen. icon. Lepid. Chenilles Amer. sept.: 130; missp. Rejected name; I. C. Z. N. Opinion 755 (1966).

=*Tyanitis* Westwood, [1851]. in Doubleday, Gen. diurn. Lepid., (2): 447, 448, 449 (published in synonymy).

=*Nymphopsis* Reuter, 1879.

=*Nymphidia* (sic) Grote, 1883, missp.

Description: A South and Central American genus of small to medium sized riodinine butterflies. The head is small and eyes naked. Palpi are heavily scaled, short, not protruding in front of the face when viewed dorsally in any species; terminal segment is one-fifth the length of the second. In over half the species the palpi are sexually dimorphic, those of the female being the longer. Antennae are thin, over half the length of the costa, gradually thickening to a club. The male forelegs are small, the tibia twice the length of the coxa; the coxa is wedge-shaped, the tibia branching off halfway down its length. The female forelegs have one spine each on the third and fourth tarsomeres. Two species, *N. mantus* and *N. cachrus*, have a third spine on the second tarsomere. Abdominal color is variable.

The wing venation and pattern are illustrated in Figure 1. The ground color of both wings is dark brown. A triangular field of white or yellow scaling extends into the discal area of the forewing from the anal margin (**H**), varying in size from almost absent (*derufata*) to covering the entire wing except, for the apex (*leucosia*). In many species, the brown costal margin contains red spots (**F**), up to three in the cell and one distad of the cell, alternating with three pairs of black lines (**G**). One species (*onaeum*) has a red spot near the base between Cu_2 and 2A. The brown costal area is often bordered by a series of black, slightly elongated marks (**D**). In the submarginal area a red line (**C**) is often encountered which may extend from the tornus to the costal margin below the apex. Along the distal margin between the veins are a series of black crescent spots (**B**), which are outlined by a fine line of blue scales. At the base of the fringe is a fine blue-white line (**A**). The fringe is brown except between M_3-Cu_1 and Cu_2-2A, where it is white. On the hindwing the features of the forewing are repeated, such as the red submarginal line, crescent spots, marginal lines and fringe. The discal area is traversed by a band of yellow to white scales from the anal to the costal margin and extending to the triangular area of the forewing. On the costal margin one or two black spots may be found. The wing shows little sexual dimorphism, in most cases the only difference being a lower wing ratio of length to width in the females, giving the appearance of a more rounded wingtip.

The genitalia are illustrated in Figure 2. In the male genitalia, the uncus (**UN**) is always bilobate, these lobes usually being rounded. In some of the primitive species, the uncus is narrow, stepped or with flanges. In *Nymphidium* there is a structure, the socii (**SC**) linking the falces (**FAL**) with the tegumen (**TG**). The valvae (**VAL**) are always truncated and with one exception (*cachrus*) are always turned inwards. On the inner side of each valve is a rounded, pubescent flap of tissue. Finally, there are extensions of the last abdominal segment, the rami (**R**), which are attached to the saccus (**SA**). This structure is in the form of a flat plate, rounded or with a pointed tip, in which case it is always skewed to the left when viewed dorsally. The rami are surrounded by long hairs, probably for the release of pheromones. The hairs can be extended much like the hair pencils of certain Danainae (Callaghan, 1983). In *Nymphidium*, the rami are never deeply bifurcated, as in other members of the Nymphidini.

In the female genitalia, two structures are of taxonomic importance. The ductus bursae (**DB**) is a tube-like structure with or without side flanges. The signa (**SG**), two tooth-like structures in the corpus bursae (**CB**), may be rounded, pointed and/or elongated. The ductus seminalis joins the ductus bursae on the lightly sclerotized portion just posteriad of the lightly sclerotized part.

Diagnosis: The wing pattern of *Nymphidium* is very similar to members of other genera of the Nymphidiidi, such as *Juditha, Synargus, Mycastor* and *Calociasma*. In fact, all of these genera at one time were included in *Nymphidium*. However, there are two striking genitalic characters which separated *Nymphidium* not only from the other members of the subtribe, but from other riodinids as well. The first of these are the socii which link the falces and the tegumen. In all other riodinids the falces are connected directly to the tegumen. The shape of the socii, that of a stylized number seven, is constant throughout the genus. The second characteristic is the shape of the rami. In many *Nymphidium* species, such as *mantus, baeotia, azanoides* and *cachrus*, the rami are asymmetrical, longer on the left side when viewed dorsally. Other species, such as *caricae, plinthbaphis* and *balbinus*, have rami with symmetrical, rounded tips. These characters again are unique for the genus, easily separating it from other genera of the subtribe, where the rami are deeply bifurcated, and from other riodinids in general, where it is usually lacking.

The species of *Nymphidium* can be grouped in accordance with the genitalia. This is especially true for those whose evolution has been more recent, such as the *caricae-lisimon* complex. The species which comprise the more recent groups often show few genitalic differences and must be separated by other criteria, such as behavior, habitat, intergradation and superficial characteristics. On the other extreme, a number of the more primitive species show little phenotypic variation over their ranges and have distinct genitalic morphology. Other groups lie between the two extremes.

In the analysis that follows, the groups that I consider to have the most primitive origins

will be treated first, followed by taxa more recently evolved. The revision of each group will be published separately. The taxa will be keyed according to superficial characters with genitalic attributes noted in the text. The last paper in the series will include in addition, a phylogeny and a checklist of the entire genus.

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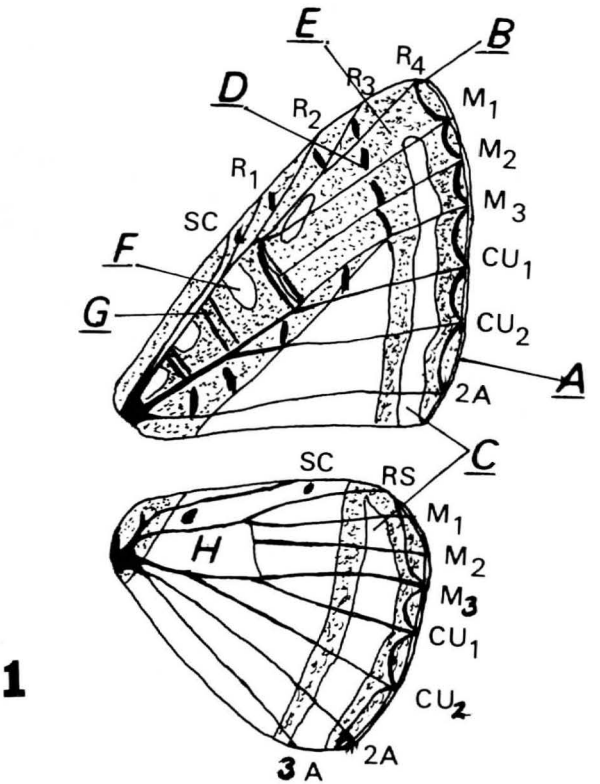
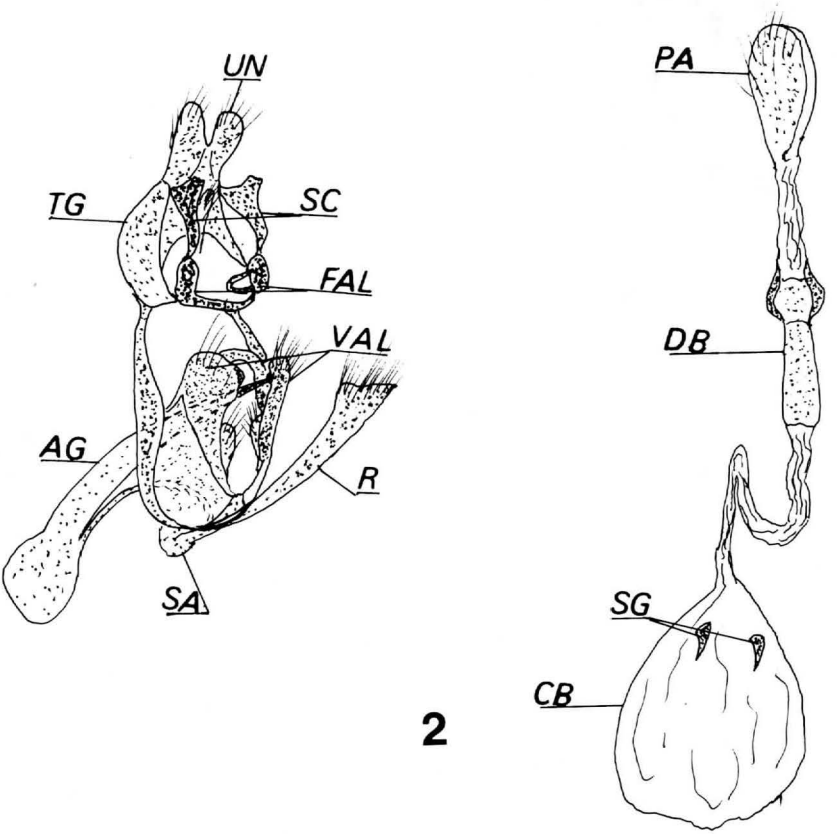


Figures 1-2: Structural features of *Nymphidium*. 1: wing venation and pattern of generalized *Nymphidium*, showing vein notation and pattern features. **A**= blue-white line at base of fringe; **B**= black crescent spots just basad of blue-white line; **C**= red submarginal line; **D**= black elongated marks outside cell end; **E**= costal part of brown ground color; **F**= red spots inside forewing cell; **G**= black lines alternating with red spots; **H**= pale scaling in median area of hingwing and part of forewing. 2, ♂ (left) and ♀ (right) genitalia of generalized *Nymphidium*, showing uncus (**UN**), tegumen (**TG**), socii (**SC**), falces (**FAL**), valva (**VAL**), rami (**R**), saccus (**SA**) and aedeagus (**AG**) of the ♂ and papillae anales (**PA**), ductus bursae (**DB**), signa (**SG**) and corpus bursae (**CB**) of the ♀. ⟶

Similar encouragement and help was rendered by Dr. Keith S. Brown, Jr., University of Campinas, Campinas, SP, who provided additional photographs of British Museum types. Still other type photographs were provided by Dr. R. I. Vane-Wright and Mr. P. R. Ackery of that institution. My thanks to Dr. H. J. Hannemann of the Humboldt Museum, Berlin, Germany, for the loan of some of the Stichel types, and to Dr. Gerardo Lamas for *Nymphidium* records and specimens from Museo de Historia Natural "Javier Prado," Lima, Peru. Material on loan or otherwise and the use of field observations are gratefully acknowledged from the following persons: Col. S. S. Nicolay, Virginia Beach, VA; Dr. Woodruff Benson, University of Campinas, Campinas, SP; the late Dr. Heinz Ebert, Rio Claro, SP; Rev. Robert C. Eisele, Salta, Argentina; Mr. Malcolm Barcant, formerly of Trinidad, W. I.; Dr. J. Bolling Sullivan, Beaufort, NC; Dr. Robert Robbins, NMNH, Smithsonian Institution; and Mr. Gordon B. Small, Jr., Balboa, Panama. Finally, I would like to thank Dr. Alfredo Rei do Rego Barros and Dra. Isolda Rocha of the Museu Nacional, Rio de Janeior, for their advice, encouragement and use of facilities of that institution, at which the author is "Pesquisador-Colaborador."

I. THE MANTUS-BAOETIA COMPLES

The *mantus-baoetia* complex consists of nine species. Superficially they may be separated



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from the other members of the genus *Nymphidium* by the elongated forewings and lack of red bands both dorsad and ventrad. The male genitalia differ in that the lobes of the uncus, instead of being simple, flat and rounded, have flanges, are pointed or stepped. The rami is in all cases pointed or skewed to the left side when viewed dorsally. The palpi are sexually dimorphic, with those of the female longer.

The complex may be divided into two parts. The first includes three distinct species, *Nymphidium mantus, olinda,* and *fulminans.* All may be clearly defined in terms of both superficial and genitalic characters. The remaining species are all closely related to *N. baeotia,* all showing similar genitalic morphology, but differing consistently in superficial characteristics, as well as behavioural patterns, such as the choice of perching localities.

The following key described the species in terms of superficial characters. Unless otherwise specified, reference is made to both wing surfaces.

KEY TO THE MANTUS-BAOETIA COMPLEX

1a. Dorsal surface with blue scaling 2
1b. Dorsal surface without blue scaling 3
2a. Blue scaling, brilliant sky-blue, and extensive on costa, around white triangular area of forewing and apex of hindwing ..... *mantus*
2b. Blue scaling light, silverish, limited to apex of white triangular area on forewing and submargin of hindwing ..... *olinda*
3a. Crescent spots on hindwing deeply arched, dentate; butterfly large, forewing length 17 mm ..... *fulminans*
3b. Crescent spots all more or less the same size; maximum forewing length 14 mm ... 4
4a. Ground color wings light tan-brown, triangular field white, narrow, elongate, and indistinct in male. Female with triangular area of forewing blunt and indistinct with white fringe on hindwing margin ..... *latibrunis*
4b. Ground color dark brown 5
5a. Triangular field in both sexes light, yellow, and narrow; females with white lateral margin on hindwings ..... *aurum*
5b. Triangular field white; females with white lateral margin on hindwing 6
6a. Triangular field broad with sharp apex on forewing, and occupying the entire discal area of hindwing in both sexes ..... *nivea*
6b. Triangular field narrower, apex pointed, distinct, irregular in shape 7
7a. Forewing more rounded, triangular field very narrow and diffuse; marginal ground color lighter ..... *baoetia*
7b. Forewing more attentuate, triangular field irrorate; ground color margin warm brown ... 8
8a. Irregular tan-orange scaling distad of white triangular field on ventral surface of both wings ..... *manicorensis*
8b. Without irregular orange scaling distad of white triangular field ventrad ..... *minuta*

Nymphidium mantus (Cramer, 1775)

Papilio mantus, Cramer, 1775: 74-75; pl. 47 figs. F, G
Papilio manthus (sic) Fr. Weber, 1797: pl. 43, fig. 11, missp.
Napaea mante (sic) J. Hubner, 1825: 76, missp.
Nymphidium mantus f. thryptica Stichel, 1911, p. 384

DESCRIPTION: *Male* (Figs. **3, 4**): Head, thorax dorsally dark brown, vertically with light bluish-white scaling. Abdomen dorsally dark brown, except for the first three segments, which are white; ventral surface white. Forewing, elongate dark brown, costa from base to beyond cell blue with 3 - 4 black marks. Four irregular subapical black marks. Cell with three linear black marks outlined by blue, with one below cell. Triangular white area elongate, extending from inner margin to M_2, and outlined with blue scaling which extends to the distal margin between M_3 and Cu_1. Submarginal row of triangular black spots outlined in blue, and a black line along base of fringe. Hindwing triangular, sharply

angular at tornus, dark brown with white band 2 - 3 mm wide from inner margin to costa, where it broadens nearly to apex. Submarginal triangular spots elongated, dentate, nearly obliterated by blue scaling from apex to Cu_1. Margin with band of white scaling, and black line at base of white fringe. Ventral surface with same marking as dorsal, and suffused with white scaling. Forewing length 11.8 mm.

Female (Figs. **5, 6**): Identical to male, except that forewings are shorter giving appearance of rounded wingtip. No abdominal, color or wing fringe differences.

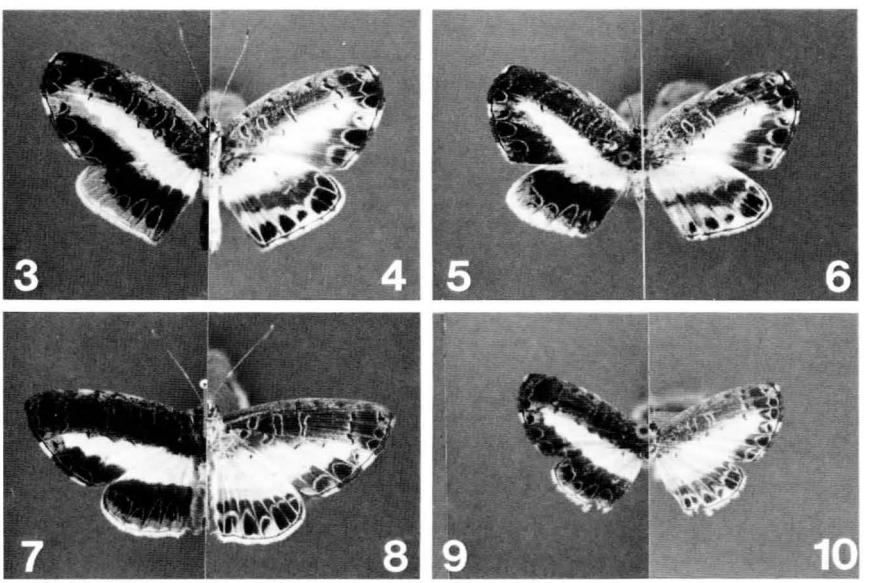
GENITALIA: Male genitalia (Figs. **37 A, B**) with lobes of uncus broadened, flattened with small point between them. Tips of valvae pointed inward, heavily sclerotized. Rami elongated on one side, with shortened point on other. Female genitalia with ostium bursae a simple, flattened tube, connected to a pair of narrow, pointed blades which come together in a point. Signa small, blunt. (Fig. **37 C**)

TYPE MATERIAL: The type of *N. mantus* may be lost.

DISCUSSION: There is no possibility of confusing *mantus* with any other Riodinid or (*Nymphidium*). The iridescent blue scaling on the wings is found in no other member of this genus. I have encountered no consistent differences between populations of *mantus* from Panama to Southern Brazil. Form "thryptica" Stichel, 1911, with a red spot at the anal angle, is found in small numbers in nearly all the populations examined.

N. mantus inhabits forest areas, flying in the early afternoon along trails and other slightly open places. The males prefer perching in deeper moist woods than most other *Nymphidium*. They always rest under leaves less than 2 meters above the ground with a tip of the wing protruding beyond the edge of the leaf. Males are more active than females, and their habit of congregating at a rendezvous area makes them more likely to be caught and thus more common in the collections. Out of a series of 117 *mantus* examined from Linhares, Espirito Santo, 5 were females.

DISTRIBUTION: This butterfly is most common in southern Brazil along the coast, especially in Espirito Santo and Bahia, where up to 30 individuals may be captured in



Figures **3-10**: *Nymphidium*. **3-6**: *N. mantus* (Cramer), ♂ upper (**3**) and under (**4**) surfaces; **5-6**, ♀ upper (**5**), and under (**6**) surfaces. **7-8**: *N. olinda* Bates, ♂ upper (**7**) and under (**8**) surfaces. **9-10**, ♀ upper (**9**) and (**10**) surfaces.

a single day. In the Amazon basin and north to Panama, however, I have found it quite rare. (Distribution Map 1)

MATERIAL EXAMINED: BRAZIL: Santarém, Mujo, Pa. 3 ♂; Manicore, Amaz. 4 ♂; Teffe, Amaz. 7 ♂; São Paulo Olivenca, Amaz. 1 ♂; Ypiranga, 23 ♂, 1 ♀; Santarem, Pa. 2 ♂; Miume, Pernambuco, 100 ♂; Xerem, Rio de Janeiro, 1 ♂; João Pessoa, Paraiba, 2 ♂; Recife, Pernambuco, 1 ♂: B. São João, R.J., 1 ♀; Linhares 112 ♂, 5 ♀; Santa Cruz, 4 ♂, 1 ♀; Aqua Preta, Ilheos, Ba. 3 ♂; Barra de Itapemirim, E.S. 10 ♂; Manaus, Amaz., 2 ♂; Belem, Pa., 4 ♂; Obidos, Pa., 1 ♂; Manicore, Amaz., 6 ♂; COLOMBIA: Caqueta, Montanita, 2 ♂; Anchicaya, Valle, 1 ♂; Barrancabermeja, Santander, 2 ♂; CAYENNE: "Cayenne", 1 ♂; TRINIDAD: "Trinidad", 4 ♂; PANAMA: Canal Zone, Margarita, 4 ♂; VENEZUELA: Alto Orinoco, 1 ♂; PERU: Boca Rio La Torre, 300m, MD, 2 ♂; GUYANA: Aroaima, CK, Esseguebu River, 3 ♂.

Nymphidium olinda Bates, 1865

Nymphidium olinda Bates, 1865: 204.
N. olinda Seitz, 1917 (not Bates, 1865): 173; fig. 139b (=*derufata* Lathy, 1932)
N. baeotia Barcant, 1970 (not Hewitson, 1852): 234; pl. 23, fig. 40

ORIGINAL DESCRIPTION: "This butterfly looks like *N. mantus* with reduced blue on the wings. The costal and outer margins of both wings show a dusting of silvery blue scaling, being more pronounced on the hindwing. The fringe of the hindwing is white, and the forewing alternate brown and white. The crescent spots on the submargins are elongated as in *mantus*, and show the same pattern. The white area on the forewing is likewise about the same extent as in *mantus*. The first segments of the abdomen are white and the rest brown."

GENITALIA: Male genitalia (Fig. **37 D, E**): with uncus bifurcated and narrow. Valvae as illustrated. Rami elongated, pointed, with 3 - 4 long, thick spines, one at the point and others coming off the dorsal surface. Female, signa small and pointed (Fig. **37 F**).

TYPE MATERIAL: The type is in the British Museum of Natural History.

DISCUSSION: Because *olinda* was never illustrated, much confusion has resulted. Seitz' (1917) illustration (139b) and description (p. 713) of "*olinda*" is in fact that of *derufata* Lathy. Barcant (1970) calls Trinidad specimens of *olinda*, *Nymphidium baoetia*. However, *N. olinda* (Figs. **7 - 10**) can be easily separated from other *Nymphidium* by the grey-blue scaling, which is more extensive than on any other *Nymphidium* except *mantus* (Fig. **3**). *N. olinda* is always rare, being found singly in the deep forest floor in the afternoon. They always rest under leaves with wings outspread, usually with only a tip appearing beyond the edge of the leaf, as do *N. mantus*.

DISTRIBUTION: *Nymphidium olinda* ranges from Costa Rica to Trinidad and the Guianas, then south throughout the entire Amazon drainage (Map **1**).

MATERIAL EXAMINED: BRASIL: Itaituba, Rio Tapajoz, Pa. 1 ♀; Manicore, Amaz. 2 ♂; TRINIDAD: "Trinidad 2 ♂; PANAMA: Canal Zone, Gamboa, 1 ♂, 1 ♀; Coco, 1 ♂; Barra Colorado Island 1 ♀; VENEZUELA: Curiapo Delta, Amacuru 2 ♂; ECUADOR: Upper Rio Napo, 2 ♂.

Nymphidium fulminans fulminans Bates, 1868

N. fulminans Bates, 1868, p. 400, 452
fulminans Seitz, 1917, not Bates, 1868 = *derufata* Lathy, 1932.

ORIGINAL DESCRIPTION: "Male 1.9" allied to *N. lysimon* (Stoll Suppl. Cramer, pl. 39 f.1): differs in the wings being free from red streaks, and in the marginal grey arched lines assuming very elongated acute-angular forms. Above dark brown, center of both wings traversed by a very oblique white belt, which begins with the fringe in the middle of the forewing outer border, passes at a distance from the cell, and gradually widens to the abdominal edge of the hindwing. In the forewing cell and below the median nervule,

are the usual grey lines, forming parallelogramical figures, and there is a row of shorter marks between the cell and the apex, and along the upper edge of the white belt. The marginal arched lines do not differ on the forewing from those of *lisimon*; on the hindwing they are so much elongated as to form acute-angular figures, the third from the anal angle being much larger than the others. Beneath the same, but paler, the brown markings mixed with grey. Fringe on hindwing above dark brown. Abdomen white in middle.

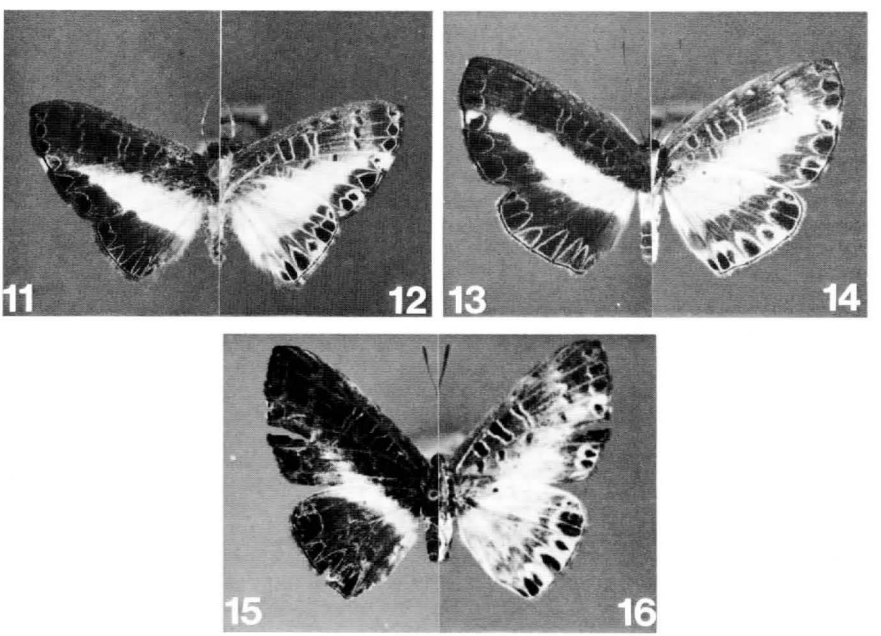
Females same color and markings as the male, but wings elongated and similar in shape to those of *N. mantus* Cram. (Pap. t. 47 f. F, G). The white on the hindwing narrow, similar to that of *N. mantus*. Hab. banks of Tapajos and Villa Nova (Villa Bella) Amaz."

GENITALIA: With uncus lobes of male genitalia narrow (Fig. **37 G, H**), stepped down laterally; tips of valvae blunt, turned inwards; at the base of each valve is a broadly bifurcated protrusion. Rami elongated and slightly pointed to one side (Female, Fig. **37 I**). Ostium bursae has the lateral halves short and cup-shaped. Signa blunt.

TYPE MATERIAL: The type is in the British Museum of Natural History.

DISCUSSION: This species has always generated a good deal of confusion. Seitz' (1917) figure (139b) and description are of *derufata* Lathy. Seitz followed Stichel's designation of *fulminans* Bates as a subspecies of *olinda* Bates. Stichel placed *fulminans* under *olinda* in the *Genera Insectorum* (1911) with no explanation. He later (1923) merely stated that he had seen a specimen from Amazonas. All of this leads me to conclude that neither Seitz nor Stichel was acquainted with Bates' type. The butterfly is also quite rare in collections, as its main habitat, between the Tapajos and Madeira rivers, south to Rondonia, has not been well collected.

The key characters for this species are the elongated, tooth-like blue crescent lines on the hindwing and its fairly large size (Figs. **11 - 14**) (average forewing length of males is 17 mm). It is not conspecific with *olinda*, as may be seen through a comparison of the genitalia.



Figures **11-16**: *Nymphidium*. **11-12** *N. fulminans fulminans* Bates, ♂ upper (**11**) and under (**12**) surfaces; **13-14**, ♀ upper (**13**) and (**14**) surfaces. *N. fulminans sardinata*, new subspecies, Holotype ♂ upper (**15**) and under (**16**) surfaces.

This butterfly is a deep forest flier, preferring the cooler sunny spots in the forest to woods' edge locations for perching. I have never found it in numbers, as with other *Nymphidium*; in its habitat, one or two may be encountered in a day's collecting.

DISTRIBUTION: The nominate subspecies ranges from the western Amazon basin south to Rondonia and east to the Rio Tapajos (Map **1**).

MATERIAL EXAMINED: BRASIL: Maues, Amaz., 1 ♂ 1 ♀; São Paulo de Olivenca, Amaz., 1 ♂; Manicore, Amaz., 1 ♂; Reserva Campinas, Manaus, Amaz., 1 ♀; Jaru, Rondonia, 3 ♂; PERU: Balsapuerto, 1 ♂.

Nymphidium fulminans sardinata Callaghan, new subspecies

DESCRIPTION: Differs from the nominate subspecies in that the white triangular area of the forewing is nearly completely obliterated by black scaling and that of the hindwing reduced to a narrow, diffused bar 2 mm wide (Fig. **15**). Forewing length of the holotype is greater than, 20 mm. Genitalia identical to those of the nominate subspecies.

TYPE MATERIAL: Holotype bears a red label printed "Colombia", *C. Sardinata*, 100 m, Antiochia [Barrano]; July 19, 1982; leg. C. Callaghan. This unique type will be deposited in the Allyn Museum of Entomology, Sarasota, Florida. FWL 21.4 mm.

DISCUSSION: The capture of *N. fulminans* near Cienega de Sardinata, on the western banks of the Magdalena River, southwest of Barrancabermeja, came as a surprise because of the distance outside the normal range of this species. The specimen was discovered while it was perching under a leaf on a ridge at the above locality. The habitat is low lying tropical forest; "humid tropical forest", according to the system of Holdredge (1947). Unfortunately, this area is in the process of becoming grassland for cattle raising, so the future of this subspecies is uncertain.

DISTRIBUTION: *N. f. sardinata* is known only from the type locality. It probably ranges through the central Magdalena valley in Colombia (Map **1**).

Nymphidium baoetia Hewitson, 1852

N. baoetia Hewitson, 1852: pl. Nymphidium 1, fig. 5
N. boeotia (sic) Bates, 1863, missp.
N. baeotis (sic) Mengel, 1905, missp.

ORIGINAL DESCRIPTION: "Upper side of male red-brown with a narrow central triangular band of white, indistinct on the anterior wing and common to both. Anterior wing with the usual spots near the base, and a transverse row of similar spots near the apex. Both wings with a black row of black lunular spots edged with white. Underside the same, but lighter. Female with the band of white broader and more clearly defined. The margin of the posterior wing white. Exp. 1 in Hab. River Amazon."

GENITALIA (Figs. **37 J-M**): Male with uncus bilobed, rounded, with a small pointed flange on the dorsal surface of each lobe. Tips of the valvae pointed inward with a small sclerotized, elongated flange running diagonally across tip. Rami with small setose point on one side. Female (Fig. **37 M**) with flanges on ostium bursae short with caudal portion rounded and cup-shaped. Signa extremely elongated.

TYPE MATERIAL: Hewitson's type of *baoetia* is apparently lost. Therefore, as a neotype for *baoetia* I have selected a male from Manicore. The specimen bears labels, "Brasil, Manicore, Amazonas, Aug. 17, 1976, leg. C. Callaghan" and a red label, "Neotype/*baoetia* Hewitson/Callaghan". The specimen (Fig. **19**) has the narrow band mentioned in Hewitson's description and shown in his illustration (*Nymphidium* I, fig. 5). This specimen will be placed in the Museu Nacional, Rio de Janeiro, Brasil.

DISCUSSION: There are few more confusing species than *baoetia*, even though it is extremely wide ranging and is common in collections. *N. baoetia* males (Figs. **19, 20**) may be separated from *N. minuta* Druce by the narrow, indistinct white triangular area on the forewing. The ground color is also lighter than *minuta*, but not as light as *latibrunis* Callaghan. The females (Figs. **21, 22**) are more difficult to separate from *minuta* as they

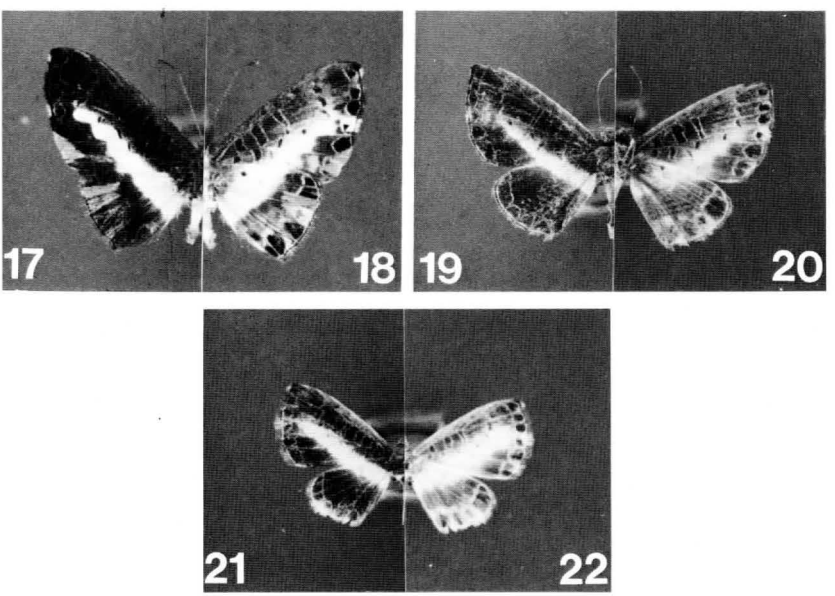
both have a blunt, white triangular area on the forewing and a variable white fringe on the hindwing. Superficially, the best way to separate them is through the generally smaller size of the *baoetia* females.

N. baoetia and *N. minuta* are found sympatrically over much of their range through the Amazon basin. However, there are certain areas which are inhabited exclusively by one or the other. I have also found the males of each perching in different locations in the same habitat. These factors lead me to suggest that the two are not conspecific. However, only a study of their comparative biology will tell for sure.

The males are encountered locally, perching just inside the forest edge in groups of up to 20 individuals. Females are rarer, but may be encountered in the forests flying from leaf to leaf near the ground searching for oviposition sites and sometimes in the company of perching males. Both sexes have been observed only during the afternoon hours. FWL 12.5 mm.

DISTRIBUTION: *N. baoetia* ranges throughout the Amazon drainage in Brazil to Venezuela. (Map 2)

MATERIAL EXAMINED: BRAZIL: Itaituba, Pa. 3 ♂; Manaus, Amaz. 3 ♂; Cuiaba-Santarem, Pa. km 1270 6 ♂, 2 ♀; Cuiaba-Santarem Pa. km 1164 1 ♂; Manicore, Amaz. 18 ♂, 3 ♀; Jaru, Ro. 13 ♂, 4 ♀; Rio Cumina, Pa. 3 ♂; F. Taperina, Pa. 1 ♂, 5 ♀; Arquemedes, Ro., Rio Nahumda 2 ♂; Belem, Pa. 1 ♂; Manaus, Amaz. 2 ♂; Fazenda São João, MT 2 ♂; Vilhera, Ro. 1 ♂; Serra do Navio 2 ♂; Estr Para-Marahão km 28 2 ♂, 3 ♀; São P. Olivenca, Amaz. 2 ♀; Benjamin Constant, Amaz. 1 ♀; Utinga, Belem 6 ♂, 5 ♀; VENEZUELA: Caripito 1 ♂.



Figures 17-22: *Nymphidium*. 17-18: *N. manicorensis*, new species, Holotype ♂ upper (17) and under (18) surfaces. 19-22: *N. baoetia* Hewitson; 19-20: Neotype ♂, upper (19) and under (20) surfaces; 21-22: ♀, upper (21) and under (22) surfaces.

Nymphidium minuta Druce, 1904

N. minuta, Druce 1904, p. 487
form *robiginosum* Stichel, 1929

ORIGINAL DESCRIPTION: "*Male*: Head, antennae, collar, tegulae and thorax black; abdomen white, the three anal segments black. Primaries white, broadly bordered with black on the costa and outer margin; a marginal row of bluish-white rings extends from the apex to the anal angle; the fringe alternately white and black. Secondaries white, the base and outer margin black; the marginal white rings the same as on the primaries. Underside very similar to the upperside, but whiter, and the markings round the outer margins much plainer. Expanse 1 inch. Habitat British Guiana: Bartica."

GENITALIA: Male genitalia (Figs. **37 Q, R**) identical to *baoetia*, except that the valvae are more robust and have a larger sclerotized flange on the tip. The female genitalia likewise similar to *baoetia*, but with the flanges on the ductus bursae slightly larger (Fig. **37 S**), with caudal portion elongated.

TYPE MATERIAL: Druces' types are a worn male and a female in the British Museum, with a type label reading "*minuta* Druce" and a syntype label "det. P. Ackery." The ♀ holotype matches extensive material in my collection with the wide, blunt white triangular area in the forewing and the dark brown ground color. Forewing 13.4 mm.

DISCUSSION: The males of *minuta* (Fig. **23**) may be separated from those of *baoetia* by the wider white triangular area with a wavy, distal edge, sharply contrasting with the dark brown costal and marginal areas. The two fly together in Para, Mato Grosso and Rondonia. Its habits are the same as *baoetia*. The females (Fig. **25**) have a wide, blunt triangular area on the forewing and a variable white margin on the hindwing.

In 1929, H. Stichel published the description of *Nymphidium baoetia robiginosum*, as a *baoetia* with a "light rose red area adjoining the white band, which approaches reddish gold in color" on both wings. While at the Berlin Museum, I examined Stichel's type. The insect is identical to several in my collection, sporting variable weak orange scaling distad of the white triangular area on the dorsal surface of both wings. As this characteristic is found rarely among most populations of *minua*, I have placed the name *robiginosum* as a form of the *minuta* Bates.

Material from the foothills of the Andes from Colombia to Peru has a darker ground color than that from the Central Amazon basin.

DISTRIBUTION: *Nymphidium minuta* inhabits the forested lowland areas of the Guianas, south to Para and Mato Grosso, then west to the foothills of the Andes. (Map **2**).

MATERIAL EXAMINED: BRAZIL: Utinga, Pa, 2 ♂, 11 ♀; Sa. de Navio, Amapa, 1 ♂, 2 ♀; Guama, Belem, Pa. 2 ♂; Ponte Nova Xingu, Pa. 1 ♂; Monte Cristo, Tapajos, Pa. 1 ♂; Cuiaba-Santarem km 1666 8 ♂, km 1270 3 ♂; Fazenda São João, Arinos, MT 2 ♂; Manaus, Amaz. 8 ♂, 2 ♀; Itaituba, Pa. 6 ♂, 2 ♀; Riozinho, Ro. 1 ♀; Jaru, Ro. 3 ♂; Barra de Bugres, MT 1 ♂; Pimenta Bueno, Ro. 2 ♂; Santarem, Pa. 1 ♀. COLOMBIA: Leticia, Amaz. 5 ♂, 1 ♀; Mitu, Vaupes 2 ♂; Montanita, Caqueta, 1 ♂; Villagarson, Putumayo, 3 ♂; Villavicencio, Meta 1 ♂, 2 ♀. PERU: Rio Micon, 1 ♂; Rio Namay, 1 ♂, 1 ♀; Balsa Puerto, 3 ♂, 8 ♀, Rio Santiago, 3 ♂. GUYANA: Wismar 13 ♂, 3 ♀. TRINIDAD: Tabaquite, 2 ♂, 2 ♀.

Nymphidium aurum, Callaghan, new species

DESCRIPTION: *Male* (Figs. **27, 28**): Head and thorax brown, ventral surfaces and appendages slightly lighter. Abdomen with first four segments and ventral surface white. Other segments brown. Wings with ground color brown. Forewing with an elongated triangular area of yellow-cream scales, extending from the base through the discal area, its apex reaching between Cu_1 and M_3. Three elongated marks in the cell are present along with a row of four spots along the costa and a row of five distad of M_3. These two rows connected distad by four elongated subapical spots. Along the submargin is a row of crescent spots outlined in blue-white, bordered distad by a line along the base of the fringe. Fringe brown except between Cu_1 and Cu_2 where it is white. Hindwing with a cream-yellow

band 2 mm wide crossing the discal area from costal to anal margin. Crescent lines between the veins and the marginal lines as on the forewing. Underside like upper, only lighter; a small black dot found distad of brown area on the costal margin.

Female (Figs. **29, 30**): Forewings more rounded than male, triangular area slightly broader, more rectangular in shape. Hindwing as in male, only with an infusion of white scaling along the margin, nearly obliterating the marginal crescent spots.

Forewing length: Holotype Male, 13 mm; female, 11.5 mm.

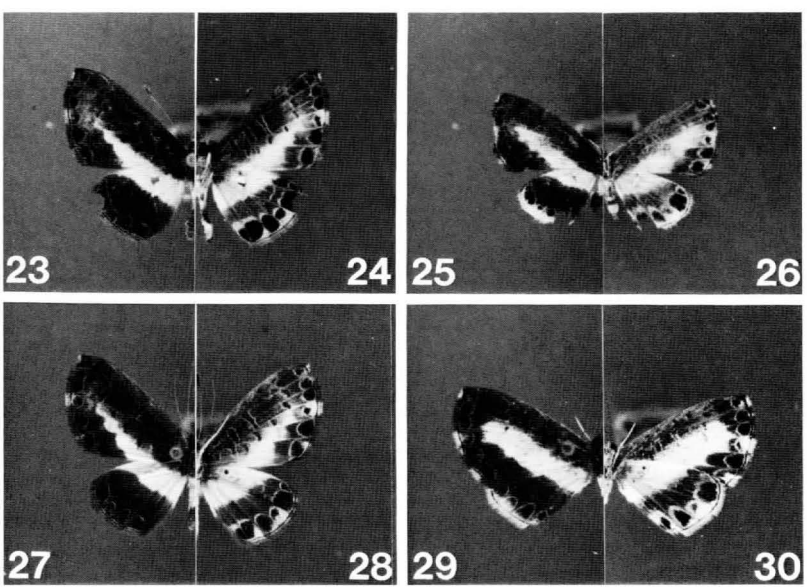
GENITALIA: Male as described under *baoetia* (Figs. **37 T, U**). Female (Fig. **37 V**) with flange on ostium bursae elongated; otherwise like *baoetia*.

TYPE MATERIAL: Holotype, BRAZIL: Manacupuru Rd., Manaus, Amaz., C. J. Callaghan (Fig. **11**); Paratypes, same as holotype, 7 ♂; Rio Nahumunda, Pa, 2 ♂; Manaus-Caraerei, Amaz. km 64, 3 ♂, 1 ♀; Rio Cumina, Pa, 1 ♂; Cuiaba-Santarem, km 1666, 6 ♂, 3 ♀; GUYANA: Wismar, 15 ♂; Bartica, 1 ♂.

Holotype will be deposited in the Museu Nacional, Rio de Janeiro. Paratypes will be deposited in the Allyn Museum of Entomology, Sarasota, Florida. FWL 12.3 mm.

DISCUSSION: I deliberated for a long time as to whether or not *aurum* constituted a valid species. In terms of the genitalia and general markings, it is indistinguishable from *baoetia*. In fact with the time in the drawer, the yellow color fades to nearly white; therefore, I suspect that there are *aurum* in many museum collections masquerading as *baoetia*. Observations in the field, however, suggest that they are in fact separate entities. In Manaus I found that while both *aurum* and *baoetia* were present in the same habitat, *aurum* males perch in shadier locals. Over much of their ranges, they are sympatric, with no evidence to date of intermediate forms.

To the north and south *aurum* disappears and only *baoetia* is found. However, only



Figures **23-30**: *Nymphidium*. **23-26**. *N. minuta* Druce, ♂ (**23-24**) upper (**23**) and under (**24**) surfaces; and ♀ (**25-26**) upper (**25**) and under (**26**) surfaces. **27-30**: *N. aurum*, new species, Holotype ♂ (**27-28**), upper (**27**) and under (**28**) surfaces; and ♀ (**29-30**) upper (**29**) and under (**30**) surfaces.

studies of their comparative biology will determine their true relationships.

DISTRIBUTION: *Nymphidium aurum* ranges through the central Amazon in Brazil basin from western Para to Manaus (Map 3), and north to the Guyanas.

Nymphidium latibrunis Callaghan, new species

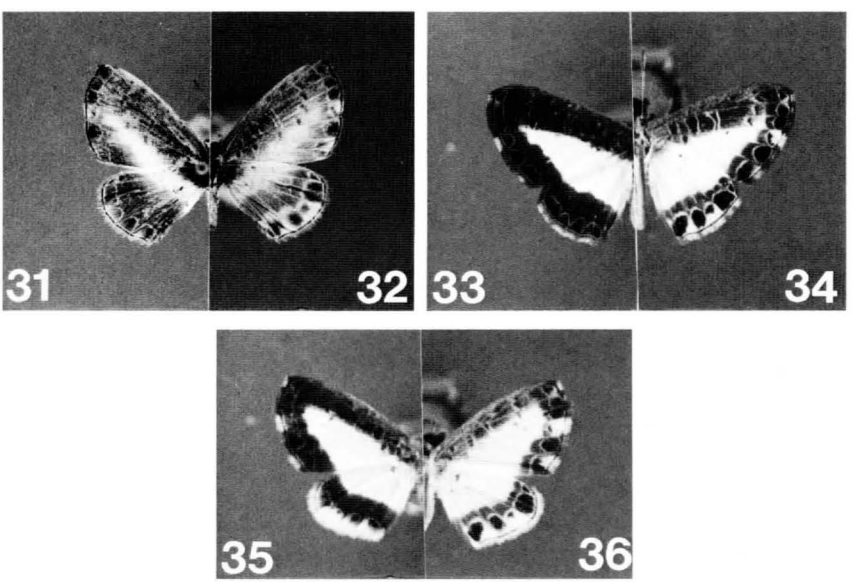
DESCRIPTION: Male (Figs. **31, 32**) with head, thorax dark brown. First four abdominal segments and ventral surface of abdomen white; dorsal surface of remaining abdominal segments brown. Wings dorsally light brown, with a slight orange tinge distally. Marginal black crescent spots outline in white, with a white line along the base of the fringe. Fringe light brown, with a white spot between M_3 and Cu_1 on the forewing. White triangular area of the forewing long and ill-defined extending from the inner margin to M_3 and continuing across the discal area of the secondaries to the inner margin. Four subapical, three costal and five small marks below the cell present on forewing. Three elongated black marks bordered wtih white in cell of forewing and two below it.

Female with similar markings and color as in male, only slightly paler, with more rounded wingtips, a wider triangular band (3 mm wide), and white scaling on the margin of the hingwing. The undersides of both sexes reflect the markings of the dorsal surface but are paler with a greater infusion of white scaling; a small dark brown spot is found on the costa of the hindwing.

GENITALIA: Male (Figs. **37 N, O**) as described under *baoetia*. Female (Figs. **37 P**), ostium bursae with slightly elongated flanges laterally, as in *baoetia*.

TYPE MATERIAL: The holotype male bears a label reading, "ECUADOR, Limoncocha, Rio Napo, S. N., collector" 3 - xii - 72 and a red label indicating, "Type *latibrunis* Callaghan." The type will be deposited in the collection of the Allyn Museum of Entomology, Sarasota, Florida. FWL 13.3 mm

Paratypes are: BRAZIL: Serra do Navio, Amapa, 8 ♀ ; São Paulo de Olivenca, Amaz.



Figures **31-36**: *Nymphidium*. **31-32**: *N. latibrunis*, new species: Holotype ♂ **(31-32)** upper **(31)** and under **(32)** surfaces. **33-36**: *N. niveum* Talbot: ♂ **(33-34)** upper **(33)** and under **(34)** surfaces; ♀ **(35-36)** upper **(35)** and under **(36)** surfaces.

1 ♂; Manicore, Amaz., 7 ♂; Rio Aruri Grande, Pa., 2 ♂; Cuiaba-Santarem Hy., km 1666, 1 ♂; ECUADOR: Limoncocha, Rio Napo, 3 ♂.

DISCUSSION: In spite of the similarities with *baoetia*, *N. latibrunis* is a valid species. The males are encountered in distinct perching areas, mainly treefalls in the forest, and, in my experience, do not mix with *baoetia* even though the two are often sympatric. I have not encountered any indication of intergrade between *latibrunis* and other closely related species.

DISTRIBUTION: *Nymphidium latibrunis* is found rarely in small colonies from Amapa, Brazil, across the Amazon basin to Ecuador (Map 3).

Nymphidium niveum Talbot, 1928

N. baoetia nivea Talbot, 1928: 217.

ORIGINAL DESCRIPTION: "Seitz; *Nymphidium baoetia minuta*; Macrolep, v, p. 713 (1917). The type of *minuta* Druce is from British Guiana and is a true *baoetia*. Two ♀ taken by Miss C. E. Longfield at Loc. F (Melfeira; 10 miles south of Diamantina, 2,000 feet, May 23 to July 3, 1927). Also in the Hill Museum from Cuiaba, 3 ♂, 2 ♀, types."

Length of forewing is 12.5 mm.

GENITALIA: Male similar to *N. minuta*, except that the valvae (Fig. **38 W, X**) are more robust and the flange on the tip of the valva is more pronounced. Female with ostium bursae as a small tube attached to rounded cup-shaped process with two rounded lateral flanges similar to *N. minuta* (Fig. **38 Y**).

TYPE MATERIAL: The syntypes are in the British Museum (Natural History).

DISCUSSION: *N. niveum* may be separated easily from *N. baoetia* and *N. minuta* by the considerably wider white triangular area both in males and females (Figs. **33, 35**). *N. niveum* is allopatric with *N. minuta* in Mato Grosso, but the two may fly together in some other places; however, I have not seen any material which I could call clearly intergrades between the two. Therefore, I prefer to leave them as separate species for the time being.

This species is local, but common, flying inside the edges of the gallery forests which line the streams in central western Brazil. Its habits are the same as for *minuta*.

DISTRIBUTION: *N. niveum* ranges from central Goias to central Mato Grosso in Brazil (Map 2).

MATERIAL EXAMINED: BRAZIL: Serra Dourada, GO, 700 m, 12 ♂ 13 ♀; Buriti, Chapada do Gumerais, MT, 9 ♂ 5 ♀; Rosario Oeste, MT, 1 ♂; Virapuru, MT, 1 ♀; São Vicente, MT, 1 ♂ 1 ♀; Poloni, SP, 500 m, 3 ♂ 2 ♀; Alto Rio Paraguay, MT, 2 ♂.

Nymphidium manicorensis Callaghan, new species

DESCRIPTION: *Male* (Figs. **17, 18**) with head dark brown; thorax dark brown dorsad, gray ventrad; appendages gray. Abdomen with first three segments and ventral surface white, rest dark brown. Dorsal surface of wings dark brown, forewing with pointed apex. White triangular area of forewing long and narrow, reaching from inner margin to just beyond M_3, 2 mm wide, edges wavy, indented along the veins. Black submarginal crescent spots outlined in blue with a white line along the base of the fringe. Four subapical elongated black marks and three discocellular lines present, with an additional two below the cell, all outlined in white. Three small black spots are along the costa and three along the basal edge of the white triangular area. Hindwing with white triangular area continuing from costa to inner margin, slightly wider than on forewing. Black crescent spots slightly elongated between Cu_1 and Cu_2 and Cu_1 and M_3. Ventral surface reflects the markings of the dorsal surface, only infused with white scaling. There is a black spot on the costa of the hindwing, and in the brown limbal area is some irregular light orange scaling. The female is unknown to me. Forewing length is 14.2 mm.

GENITALIA: Male like *baoetia*, but lacking the flange on dorsal side of the lobes of

the uncus (Fig. **38 Z**).

TYPE MATERIAL: The holotype (Fig. **17, 18**) and a ♂ paratype bear labels, "Brasil, Manicore, Amazonas, Aug. 16, 1978, leg. C. Callaghan" and, respectively, red or blue labels stating, "Holotype (or Paratype)/ manicorensis/ Curtis J. Callaghan". A second paratype is from Ecuador, Limoncocha. Rio Napo, 700m. The Holotype will be placed in the Museu Nacional, Rio de Janeiro, Brazil.

DISCUSSION: *Nymphidium manicorensis* can be separated from the other members of the *baoetia* group by the light orange scaling on the ventral surface of the hindwings and by the slightly more pointed wingtip. The genitalia are distinct enough to warrant status as a separate species. Although it is sympatric with *latibrunis* and *baoetia* at Manicore, its preferred perching localities were "sunflecks", illuminated areas on the forest floor, as opposed to the treefalls and more open woods edge localities preferred by the other two species. The males captured were observed in the early afternoon.

DISTRIBUTION: N. manicorensis ranges from the western Amazon drainage from Brazil to Ecuador (Map **2**). The species appears to be quite rare and local.

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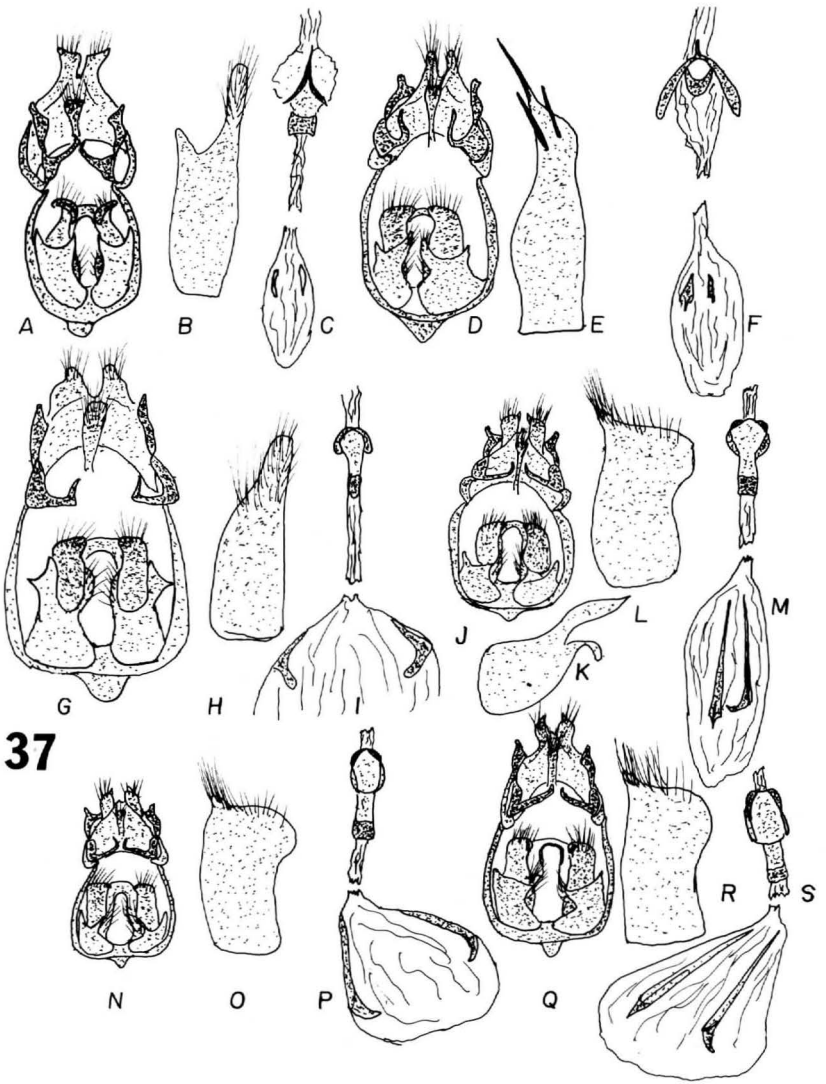
APPENDIX: A CORRECTION

In the *Revista de la Sociedad Mexicana de Lepidopterologia*, 7(2): 55-64 (1982), I published the descriptions of three new genera of riodinids from Mexico and Central America. Following the article's publication, Dr. Lee Miller called my attention to the fact that the name for one of these genera, *Pseudonympha*, is a nomenclatorially valid name only for a genus of African satyrids described by Wallengren, 1857. The name *Pseudonympha* Callaghan is, therefore, a junior homonym of *Pseudonympha* Wallengren.

To rectify this situation, I propose the name *Pseudonymphidia* as a replacement name for *Pseudonympha* Callaghan. The type species is *Emesis clearista* Butler, 1871, and the genus is characterized as *Pseudonympha* Callaghan (1982), preoccupied.



Figures 37: genital structures of *Nymphidium*; **A**, *N. mantus*, ♂ genitalia; **B**, same, rami; **C**, same, ♀ genitalia; **D**, *N. olinda*, ♂ genitalia; **E**, same, rami; **F**, same, ♀ genitalia; **G**, *N. fulminans*, ♂ genitalia; **H**, same, rami; **I**, same, ♀ genitalia; **J**, *N. baoetia*, ♂ genitalia; **K**, same, aedeagus; **L**, same, rami; **M**, same, ♀ genitalia; **N**, *N. latibrunis*, ♂ genitalia; **O**, same, rami; **P**, same, ♀ genitalia; **Q**, *N. minuita*, ♂ genitalia; **R**, same, rami; **S**, same, ♀ genitalia.

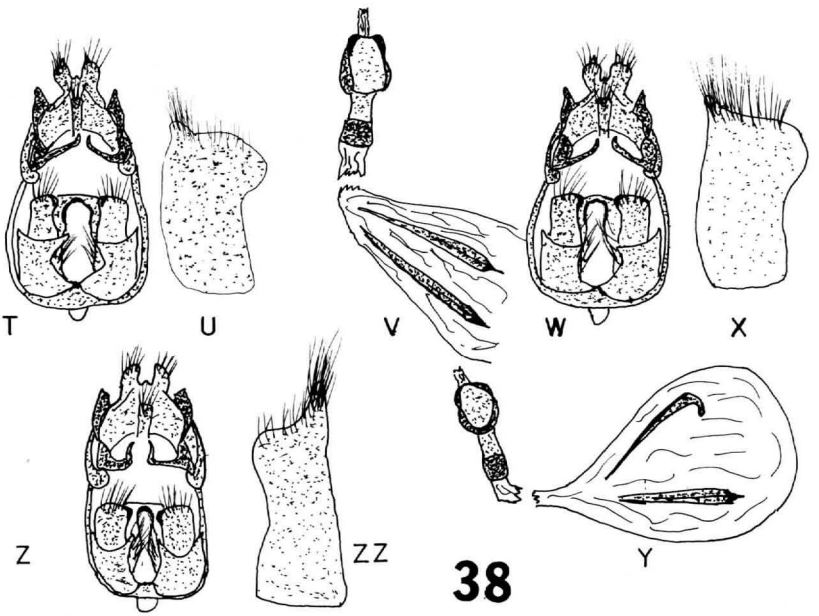
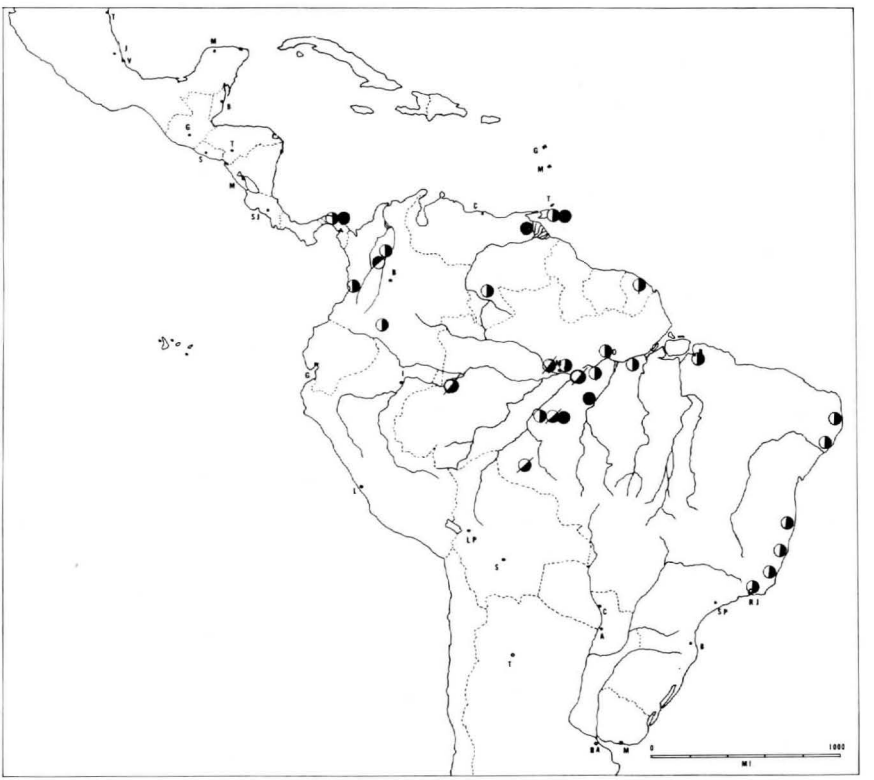
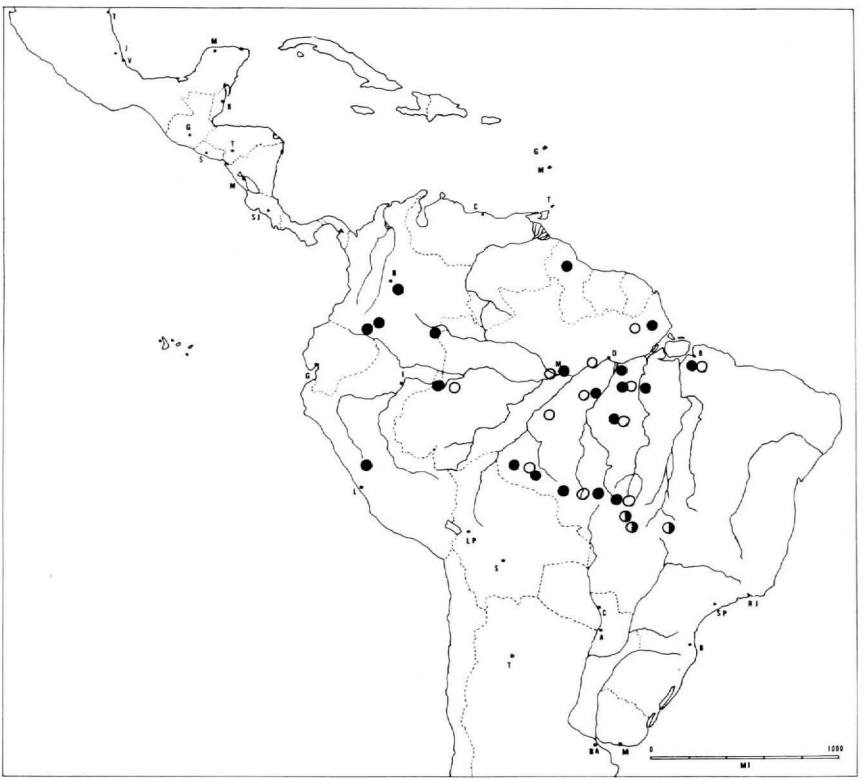


Figure 38: genital structures of *Nymphidium*: **T**, *N. aurum*, ♂ genitalia; **U**, same, rami; **V**, same, ♀ genitalia; **W**, *N. niveum*, ♂ genitalia; **X**, same, rami; **Y**, same, ♀ genitalia; **Z**, *N. manicorensis*, ♂ genitalia; **ZZ**, same, rami.



Map 1: distribution of the *Nymphidium mantus-baoetia* complex; ◑ = *mantus*; ● = *olinda*; ◪ = *fulminans*.



Map 2: distribution of the *Nymphidium mantus-baoetia* complex; ● = *minuta*; ○ = *baoetia*; ◑ = *niveum*.

Map 3: distribution of the *Nymphidium mantus-baoetia* complex; ● = *aurum*; ○ = *robiginosum*; ◐ = *latibrunis*.

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