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NEOTROPICAL NYMPHALIDAE. III. REVISION OF CATONEPHELE

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A. INTRODUCTION

Revision of a series of genera of neotropical nymphalid butterflies is providing the basis for phylogenetic, biological and distributional studies, as well as allowing accurate identification of species and subspecies. Revisions published are *Hamadryas* Jenkins (1983) and *Myscelia* Jenkins (1984). Nine additional genera are under study.

The genus *Catonephele* contains eighteen taxa including eleven species and seven subspecies of medium-sized neotropical butterflies. The wings of the males all have a velvety black background with bright orange, broad bold markings. The females are very different with a blackish background with most species having narrow yellow stripes and many small yellow maculae. Female *C. sabrina* have a large diffuse rusty brown area on the forewings and *C. numilia* have black forewings with a yellow diagonal median cross band, and the hind wing black, or with a rust-orange or rust-mahogany discus. The ♀ wing pattern of *C. nyctimus* is almost identical with primitive ♀ *Myscelia* and some ♀ *Catonephele* were formerly included in *Myscelia*. The marked sexual dimorphism has resulted in several of the females being described with different names from the males with resulting synonyms. This was discovered by Bates (1864) who first correlated some males and females. An error by Röber, in Seitz (1914) showing a male specimen of *C. chromis* identified as *C. antinoe* resulted in six synonyms for *C. antinoe*.

The genus *Catonephele* is distinctive, but is very closely related to *Nessaea* which was formerly included in it, or together in a genus formerly known as *Epicalia*. The male genitalia and the critical hypandrium or subgenital plate are quite similar to *Myscelia* and *Nessaea*.

The larvae feed on *Dalechampia* and *Alchornea* in the family *Euphorbiaceae*. They are also reported on *Nectandra* (*Lauraceae*), *Citharexylum* (*Verbenaceae*) and *Lysiloma* (*Leguminosae*) which need to be confirmed.

While some species of *Catonephele* are fairly common, no common names have been heard in the field. The only common name known is the "Shoemaker" used by Barcant (1970) for this genus as well as for *Anaea*, *Prepona*, and *Historis*.

The most common species *C. acontius* male was named over 200 years ago in 1771 by Linnaeus and the female (as *media*) by Fabricius in 1775. *C. numilia* was named in 1775 by Cramer and the female (as *micalia*) in 1777. The genus was revised by Stichel (1899) and compiled by Röber, in Seitz (1914). Due to the striking wing colors and patterns, *Catonephele* have been illustrated frequently in both scientific and popular books.

B. MATERIALS AND METHODS

Catonephele were collected and studied in the field in 14 neotropical countries. Thirty museums and private collections were examined and the *Catonephele* were identified. Type specimens were studied in the British Museum of Natural History, London, the Museo de Historia Natural de Ciudad de México, and the Museo Nacional, Rio de Janeiro. The collection of Stichel in the BM was especially valuable since he revised the genus in 1899. Several of his ♂ genitalia preparations also were studied.

The characters used for delineating species and subspecies include wing patterns, wing coloration, wing venation, sexual dimorphism, "scent patches," male genitalia, hypandria and rami, female genitalia, and larvae. Series of adult specimens were collected in the field to study the range of variation in a locality especially in intergrade areas. Keys are presented for identification of species based on wing coloration and pattern of both males and females, and for male genitalia, hypandria and rami. Keys were made for differentiating subspecies using wing pattern and coloration. A preliminary key is presented for the known species of larvae.

Data have been compiled for each specimen examined including sex, date, geographic locality, altitude and museum in which it is found. Full data are presented only for rare or new species or subspecies. The exact localities are presented but other data on sex, dates and altitude are summarized for more common taxa. These details are available from the author.

The nomenclature of wing veins follows Miller (1970). The venation and nomenclature of *Catonephele* is shown in Fig. 1. The terminology for the male and female genitalia follows Klots (1970) and the hypandrium or subgenital plate including the lateral appendages or rami follows Tuxen (1956.)

Male genitalia and hypandria were dissected in 40 male specimens, and genitalia in 20 female specimens. They were preserved in small glycerine vials that were numbered and deposited with their corresponding specimens.

The distribution maps (Figs. 97-103) are based on specimens determined by the author. Combined circles, triangles or squares indicate intergrades between subspecies at intergrade or tension zones. An "X" after a locality name indicates intergrades.

Over 4,000 specimens of *Catonephele* were studied and identified and 12 different types were studied and compared with other specimens. Color photographs were made of the types and other critical specimens and the negatives and prints are deposited in the Allyn Museum. Holotypes of one new species and two subspecies described are in the Allyn Museum. Eighteen taxa are assigned to the genus which includes eleven species and seven subspecies. Seventeen taxa are included as synonyms of which ten are newly synonymized in this study.

COLLECTIONS EXAMINED

- AA - Allyn Museum of Entomology, Florida State Museum, Sarasota, Fla. (L.D. Miller)
- AD - Alberto Díaz Francés Collection, México City, México
- AK - Andrew King Collection, Turrialba, Costa Rica
- AM - American Museum of Natural History, New York City, N.Y. (F.H. Rindge)
- BM - British Museum (Natural History), London, England (R.I. Vane-Wright, P. Ackery)
- CA - California Academy of Science, San Francisco, Cal. (P.H. Arnaud)
- CB - California Insect Survey, University of California, Berkeley, Cal. (J. Powell)
- CM - Carnegie Museum of Natural History, Pittsburgh, Penn. (G. Ekis & C. Young)
- DM - De la Maza Collection, México City, México
- FC - Museo de Zoología Facultad de Ciencias, UNAM, México City, México (J. Llorente)
- FL - Division of Plant Industry, Florida Dept. Agriculture, Gainesville, Fla.
- GS - Gordon B. Small Collection, Balboa, Panamá
- JC - Dale and Joanne Jenkins Collection, Sarasota, Fla.

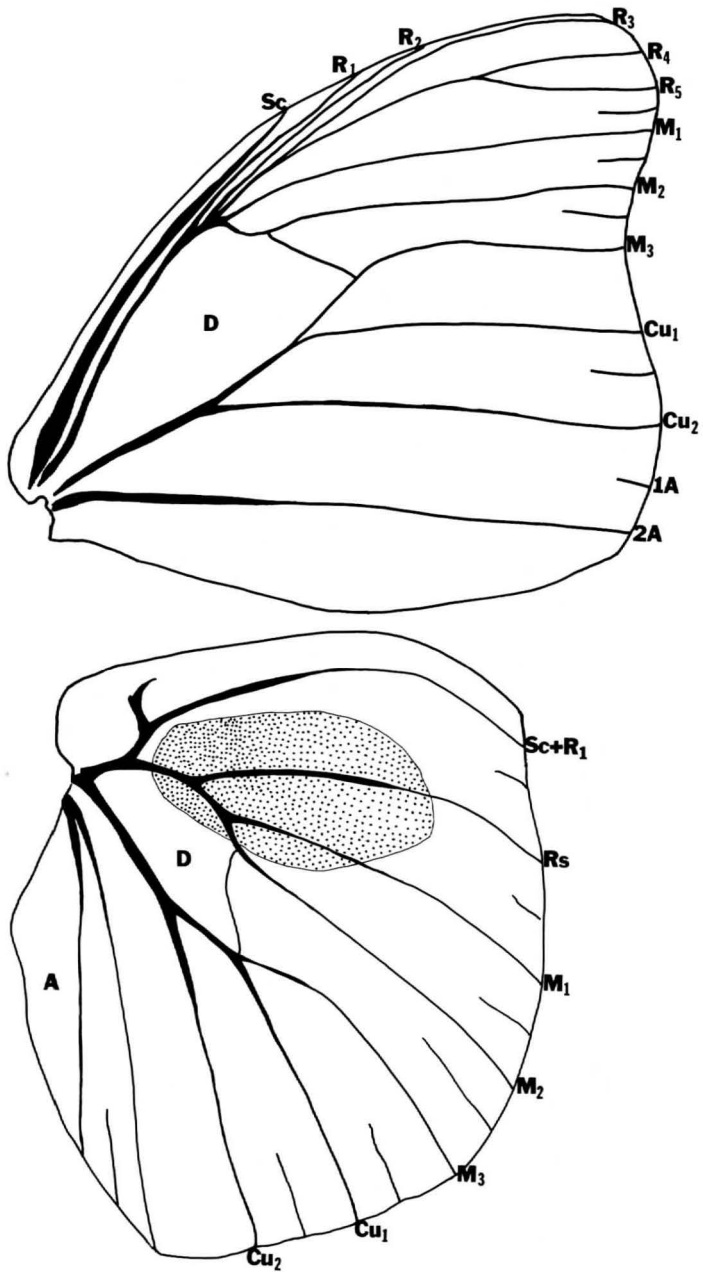


Figure 1. Venation of *Catonephele* showing nomenclature of veins according to Miller (1970).

- KB - Keith S. Brown Collection, Campinas, Brazil
 LA - Los Angeles Co. Museum Natural History, Los Angeles, Cal. (J.P. Donahue)
 MH - Museo de Historia Natural de Ciudad de México, México City, México
 MM - Milwaukee Public Museum, Milwaukee, Wis. (A.M. Young & S.S. Borkein)
 MN - Museo Nacional, Rio de Janeiro, Brazil (J. Cândido de Mello Carvalho)
 MZ - Museum of Comparative Zoology, Harvard University, Boston, Mass. (J. Weintraub and M.D. Bowers)
 NC - James Neidhofer Collection, Milwaukee, Wis. (in MM)
 PA - Philadelphia Academy of Sciences (in CM)
 SI - National Museum of Natural History, Smithsonian Institution, Washington, D.C. (J.F. Gates Clarke and R. Robbins)
 SH - Sergio Hernández Collection, Colima, México
 ST - Herman Strecker Collection (at Allyn Museum of Entomology), Sarasota, Fla. (in AA, property of Field Museum of Natural History, Chicago, Ill.)
 TE - Thomas Emmel Collection, Gainesville, Fla.
 UC - Universidad Central, Facultad de Agronomía, Maracay, Venezuela (F. Fernández)
 UN - Universidad Nacional Mayor de San Marcos, Museo de Historia Natural, Lima, Perú (G. Lamas)
 UP - Universidade Federal do Paraná, Curitiba, Brazil (O. Mielke)
 VK - Harold L. King Collection, Sarasota, Fla. (in FL)

C. BIONOMICS

Catonephele are restricted to the American tropical forest region. Some species are broadly distributed from México to southern Brazil and northern Argentina. Others are restricted to southeastern Brazil, the upper Amazon river basin or only in western México. None occur in the West Indies except Trinidad.

The adults are found in high evergreen tropical forest, semi-deciduous tropical forest, submontane forest, and riverine or gallery forest. They are found in shaded coffee plantations near uncut forest, but only sparingly in cut over or secondary forest. They occur mostly in unpopulated areas, but are also found near to and are attracted to primitive populated areas especially Indian homes in or at the margins of forests.

These butterflies rarely come into open areas except openings in forests from felled trees, forest roads and trails, and small human habitations. They are attracted to rotting fruit and readily enter fermenting banana baited traps near the ground or high in the forest. They are attracted to other decaying fruit such as pineapple, mamey, papaya, orange, mango, and also fermenting sugar cane and tree sap. They frequent garbage and refuse dumps and are attracted to pig and human feces. They alight and feed readily on these organic substances and walk around or sit flapping their wings as they imbibe. They alight on almost any surface, tree trunks and logs, the ground and sometimes on leaves. When the adults are feeding at baits they are rather easily captured, but often remain in the tree tops and are fairly fast fliers. I have never found them coming to river banks even in very dry season and have never seen them feeding on flowers.

The white eggs are deposited singly on the undersides of young or mature leaves usually toward the middle of the leaf. The newly emerged larvae eat the top of the eggshell and crawl to the edge of the leaf and feed around the terminal of a vein. They attach frass pellets with silk and hide at the extended vein and frass chain during the 1st and 2nd instars. During the 3rd, 4th, and 5th instars the larvae are usually on the upper surface of the leaves. They are covered with very sharp spines and have long spiny horns on the head. If disturbed, the larvae strike suddenly with back or side movement of the horns (Muyschondt, 1973, and Small, (pers. comm.).

When they pupate, the larvae weave a silk pad on the upper surface of the leaf and attach it to their anal prolegs. The pupae are attached at an angle from the leaf. If disturbed they make violent lateral swings or compress themselves, meanwhile making

a faint but audible squeaking sound.

Various species of *Catonephele* larvae have been observed and/or reared by Bates (1864), Müller (1886), Röber, in Seitz (1914), d'Almeida (1922), Muysshondt (1973), Ulrich (1980), and by Miers, Small, DeVries, and the present author (all unpub.). Their descriptions of larval behavior agree quite well.

Six species of *Catonephele* larvae have been described and I have been able to examine the larvae of four species. The mid-dorsal and subdorsal spine counts of these four species and *C. acontius* by Müller (1886) are included in Table 1, and a preliminary key is presented to these larvae. A picture of the larva of *C. orites* is shown in Fig. 2. *C. numilia penthia* larvae were described by Müller (1886), d'Almeida (1922) and Röber, in Seitz (1914) but the descriptions are not sufficiently detailed to be included.

Eggs and all five instars and pupae of *Catonephele numilia esite* were described in detail by Muysshondt (1973). The length is 23-42 mm, and the width 9-10 mm. The fifth instar larva has the head mostly reddish-orange except lateral black margins of the epicrania from the base of the black and green horns (7 mm) to the mouth parts. Long and thin spines are found around the margin of the epicrania and shorter spines occur between the horns. The body is all green mottled with white dots. Mid-dorsal scoli are orange with black spines and the rest is green with black spines.

The pupa shown in Fig. 3 has various shades of green, except for a brown margin on the wing case on the thoracic area, and small orange spiracula. The abdomen thickens gradually from cremaster to wing case, then about the same thickness to the thorax. It is separated from the abdomen dorsally by an indentation, then tapering gradually to a bifid head. The cremaster has a flat base armed with crochets that permit the pupa to "stand" on the silken pad. Egg hatching requires 4-5 days, larval development about 27 days and the pupal period is 8-11 days.

PRELIMINARY KEY TO KNOWN *CATONEPHELE* LARVAE

- 1a. Mid-dorsal scoli with two spines on A-1 to A-6; no anterior scoli on A-7; mid-dorsal posterior scoli on A-7 with three spines, subdorsal spine on A-1 single *chromis godmani*
- 1b. Mid-dorsal scoli with three spines on A-1 to A-6; anterior scoli on A-7 with three spines; subdorsal scoli on A-1 with two or three spines 2
- 2a. Mid-dorsal posterior scoli on A-7 with three spines; on A-8 with six spines *acontius*
- 2b. Mid-dorsal posterior scoli on A-7 with four spines; on A-8 with five spines 3
- 3a. Subdorsal scoli on T-2 and A-8 with four spines. Epicranial horns with long spines on terminal rosette *numilia esite*

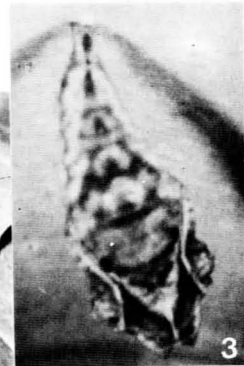
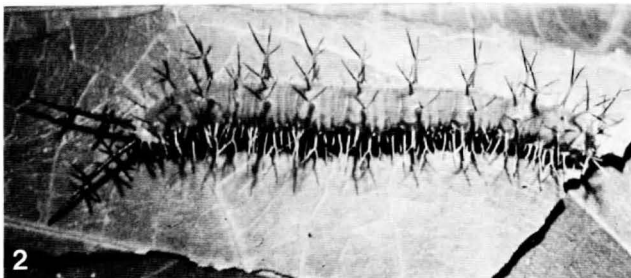


Figure 2. Larva of *Catonephele orites*, Canal Zone, Panamá.

Figure 3. Pupa of *Catonephele numilia esite*, Canal Zone, Panamá.

- 3b. Subdorsal scoli on T-2 and A-8 with three spines. Epicranial horns with short stubby spines on terminal rosette 4
 4a. Subdorsal scoli on A-1 with two spines *orites*
 4b. Subdorsal scoli on A-1 with three spines *nyctimus*

Table 1. Spines on Larvae of *Catonephele*

	Anterior											Posterior	
	T-1	T-2	T-3	A-1	A-2	A-3	A-4	A-5	A-6	A-7	A-8	A-7	A-8
Mid Dorsal													
<i>nyctimus</i>				3	3	3	3	3	3	3	0	4	5
<i>chromis godmani</i>				2	2	2	2	2	2	0	0	3	5
<i>numilia esite</i>				3	3	3	3	3	3	3	0	4	5
<i>orites</i>				3	3	3	3	3	3	3	0	4	5
<i>acontius</i>				3	3	3	3	3	3	3	0	3	6
Subdorsal													
<i>nyctimus</i>	2	3	6	3	3	3	3	3	3	3			
<i>chromis godmani</i>	2	3	6	1	3	3	3	3	3	3	3		
<i>numilia esite</i>	2	4	6	2-3	3	3	3	3	3	3	4		
<i>orites</i>	2	3	6	2	3	3	3	3	3	3	3		
<i>acontius</i>	2	3	(6)	2	3	3	3	3	3	3	3		

The food plants are usually *Dalechampia* and especially *Alchornea* in the *Euphorbiaceae*. They are also reported on *Nectandra* in the *Lauraceae*. The records of "tamarind" in *Leguminosae* and *Citharexylum* in the *Verbenaceae* are doubtful and need to be confirmed. The known larval host plant records are compiled in Table 2.

D. SYSTEMATICS

Catonephele is a distinct genus very closely related to *Nessaea* which was formerly combined with it in the genus *Epicalia*. It is also closely related to *Myscelia* which formerly included females of *Catonephele*, of which some are closely related.

The genus *Catonephele* is in the family *Nymphalidae*. It could be assigned to the Subfamily *Limenitidinae* Behr and the Tribe *Epicaliini* Guenée, but this needs more study, particularly concerning the presence and shape of the male hypandrium and larval characters. The tribe *Catonephelini* Orfila is presently considered to be a synonym of *Epicaliini*.

The genus is fairly homogenous with the males having a black velvety base color with prominent orange bands or maculae. The females are all similar with a complex pattern of yellow maculae and stripes on a black background (except *C. numilia*, which has a distinctive different pattern) and *C. sabrina* with extensive rust coloration on the dorsal forewing (DFW). The presence of "scent patches" on the dorsal hind wing (DHW) and long silky hairs on the ventral forewing (VFW) of the males of the *acontius* species group could be considered as a separate subgenus. However, the hypandria, male genitalia, wing venation and female pattern are similar to other species of the genus so that there is no validity for recognizing subgenera. The genus is here divided into four "species groups" based on differences in the male hypandria, the male genitalia, wing venation in the forewing, presence or absence of a scent patch, and long silky hairs on the VFW, and the female wing pattern and genitalia.

Acontius species group.

This includes *C. a. acontius*, *C. a. caeruleus* and *C. orites*. Basal "scent patch" is present on the DHW, the VFW has an extensive row of long silky hairs anterior to 2A; the hypandrium has prominent broad rami branched about 1/2 distance from tip to base

of hypandrium; DFW with R_3 branched $\frac{1}{4}$ distance to branch of R_4 . Wings of male with orange pattern not divided into separate maculae. Female fore and hindwing with two rows of yellow maculae or stripes, Lamella antevaginalis not extended posteriorly with a pair of elongate projections.

Nyctimus species group.

This includes *C. nyctimus*, *C. mexicana*, *C. salacia* and *C. cortesi*. Basal "scent patch" on DHW absent; no long silky hairs on VFW. Hypandrium with very small rami, branched about $\frac{1}{6}$ distance from tip to base of hypandrium. DFW with R_3 branched about $\frac{1}{5}$ - $\frac{1}{2}$ distance to branch of R_4 . Wings with orange pattern not divided into

Table 2. Host Plants of *Catonephele* Larvae

<i>Euphorbiaceae</i>		
<i>Dalechampia cissifolia</i> (?) Poepp.		Small (pers. comm.)
<i>C. nyctimus</i>		Small (pers. comm.)
<i>Dalechampia tilifolia</i> Lam.		Small (pers. comm.)
<i>C. nyctimus</i>		Muyshondt & Muyshont (1975)
<i>Dalechampia scandens</i> (L.)		Small (pers. comm.)
<i>C. mexicana</i>		Small (pers. comm.)
<i>Dalechampia scandens</i> (L.)		Small (pers. comm.)
<i>C. nyctimus</i>		Small (pers. comm.)
<i>Alchornea glandulosa</i>		Small (pers. comm.)
<i>C. chromis godmani</i>		Small (pers. comm.)
<i>Alchornea iricurana</i> Cas.	"Tapiaguacu"	Müller (1886)
<i>C. acontius caeruleus</i>		Müller (1886)
<i>Alchornea iricurana</i> Cas.	"Tapiaguacu"	Müller (1886)
<i>C. numilia penthia</i>		Müller (1886)
<i>Alchornea cordata</i> Mull. Arg.		Müller (1886)
<i>C. acontius caeruleus</i>		Müller (1886)
<i>Alchornea cordata</i> Mull. Arg.		Müller (1886)
<i>C. numilia penthia</i>		Müller (1886)
<i>Alchornea latifolia</i> Schwartz	"Tepeachote"	Muyshondt (1973)
<i>C. numilia esite</i>		Urich (1980)
<i>Alchornea triplinervia</i> (Spr.)		Urich (1980)
<i>C. numilia esite</i>		Urich (1980)
<i>Alchornea</i> sp.		Watson & Whalley (1975)
<i>C. numilia</i> ssp.		Watson & Whalley (1975)
<i>Leguminosae</i>		
<i>Lysiloma</i> sp.	"Tamarind"	Doubleday (1850)
<i>C. acontius</i>		Doubleday (1850)
<i>Verbenaceae</i>		
<i>Citharexylum</i> sp.		Watson & Whalley (1975)
<i>C. numilia</i>		Watson & Whalley (1975)
<i>Citharexylum fruticosum</i> (L.)	"Fiddlewood"	Barcant (1970)
<i>C. numilia esite</i>		Barcant (1970)
<i>Lauraceae</i>		
<i>Nectandra venulosa</i>	"Canelinha"	d'Araújo et al. (1968)
<i>C. numilia penthia</i>		d'Araújo et al. (1968)
<i>Nectandra venulosa</i>	"Canelinha"	d'Araújo et al. (1968)
<i>C. acontius</i>		d'Araújo et al. (1968)
<i>Nectandra</i> sp.	"Caneleira"	d'Araújo et al. (1968)
<i>C. sabrina</i>		d'Araújo et al. (1968)

separate maculae. Female fore and hind wings with two rows of yellow maculae or stripes. Lamella antevaginalis protruding exteriorly with a pair of elongate posterior projections.

Chromis species group.

This includes *C. c. chromis*, *C. c. godmani*, *C. salambria*, *C. sabrina* and *C. antinoe*. Basal "scent patch" on DHW absent; no long silky hairs on VFW. Hypandrium with prominent rami, branched about $\frac{1}{2}$ - $\frac{1}{2}$ distance from tip to base of hypandrium. DFW with R_3 branched about $\frac{1}{4}$ distance to branch of R_4 . Forewings with orange pattern divided into a broad basal band and a smaller subapical macula. Female fore and hindwing with two rows of yellow maculae or stripes. Lamella antevaginalis lobes not extending posterior to lamella postvaginalis.

Numilia species group.

This includes *C. n. numilia*, *C. n. esites*, *C. n. immaculata*, *C. n. penthia* and *C. n. neogermanica*. Basal "scent patch" on DHW absent; no long silky hairs on VFW. Hypandrium very constricted in basal $\frac{1}{4}$; rami very elongate, branched about $\frac{1}{4}$ distance from tip to base of hypandrium. DFW with R_3 branched about $\frac{1}{2}$ distance to branch of R_4 . Forewings with orange pattern divided into two rounded (or elliptic) maculae. Female with one yellow diagonal bar on forewing, hindwing without yellow maculae or stripes. Lamella antevaginalis with a pair of elongate posterior projections each with two teeth.

Description:

Adult. The eyes are smooth. The palpi are slightly hairy, projecting slightly beyond the head. The antenna is about $\frac{3}{4}$ the length of the body, composed of 39 segments, the terminal 12 form an elongate compressed slightly curved club.

The forelegs of the male are slightly hairy; the tarsus is the same length as the tibia, the middle and hind legs are rather long, covered with scales; the tarsi are armed with spines, with moderately curved claws.

Forewing with the costal margin arched, apex rounded or truncate, outer margin from nearly straight to deeply concave. R_1 & R_2 branch before end of cell; R_3 branches from $\frac{1}{5}$ to $\frac{1}{3}$ the distance to the branching of R_4 and R_5 ; r-m may be absent or present, the discal cell is closed by r- m_3 . The hindwing has a strongly arched costal margin, the humeral vein is bifid; the discal cell is closed by crossvein m_2 - m_3 .

The male genitalia has a prominent uncus with the gnathos arm as large as or less than half the size of the uncus. The vinculum is long and straight or curved. The saccus varies from short and bent to elongate and straight. The valva may be short and blunt to elongate with a chitinous tooth or lip at the crista. A prominent hypandrium (subgenital plate) varies from having a broad base with slight median constriction to heavily constricted, with small rami with no flat spines to enlarged rami heavily armed with flat spines, the rami may terminate with chitinous teeth.

The female genitalia has a lamella antevaginalis which may extend exteriorly with two elongate posterior projections or no projections. Chitinized sterigma are present and variable in shape which also shows characters for separating species. The papilla anale and corpus bursa are shown in Fig. 88.

KEY TO MALE CATONEPHELE

- 1a. VFW with long silky black or brown hairs anterior to A_2 ; DHW with a basal "scent patch".....2
- 1b. VFW without extensive row of long silky hairs; DHW without a basal "scent patch".....3

- 2a. DHW with basal "scent patch" grey; VFW with brown silky long hairs; white subapical area narrow and defined not extending to M₁; DFW with postmedian orange band broader and proximal border strongly angled (Central America to Colombia).....*orites*
- 2b. DHW with basal "scent patch" brown; VFW with black silky long hairs; the white subapical area more diffuse and extending posterior to M₁; DFW with postmedian orange area narrower and more rounded at apex; proximal border not usually strongly angled (South America).....*acontius*
- 3a. Dorsal surface of wings with six large orange maculae; DFW without large elongate orange area extending to posterior margin.....*numilia*
- 3b. Dorsal surface of wings without six large orange maculae; DFW with elongate orange area extending to posterior margin; DHW with orange diagonal band extending to costal margin..... 4
- 4a. DFW with a single elongate median orange band, without a separate subapical orange macula..... 5
- 4b. DFW with a separate subapical orange macula in addition to elongate median orange area..... 8
- 5a. DFW not angular falcate and without apical red patch; ventral hindwing (VHW) dark brown with a contrasting light buff submedian diagonal band with straight margins.....*salacia*
- 5b. DFW angular falcate area with apical red patch; VHW with marbled or mottled buff and brown with no contrasting light buff submedian diagonal band..... 6
- 6a. DFW with broad orange band rarely broadening posteriorly to posterior margin (5.0-7.5 mm wide); DHW band narrower; VFW with wide orange band, from Cu, posteriorly the orange band is narrower but the distal part of band is greyish-tan..... 7
- 6b. DFW with broad orange band broadening posteriorly to posterior margin (7.5-9.0 mm wide); DHW band wider; VFW with wide yellow-orange band extending to posterior border of wing; no greyish tan in distal part of band (Western México).....*cortesi*
- 7a. VFW with discal cell brownish ochre with dark ochre-brown markings especially parallel to radius; proximal margin of yellow-orange band bordered by well-defined undulating dark brown shading (México to Costa Rica).....*mexicana*
- 7b. VFW with discal cell buff-brown without or limited light brown markings; proximal margin of yellow-orange band not bordered by dark brown shading (Panamá to Guyana and Ecuador).....*nyctimus*
- 8a. DFW with nearly circular, subapical orange macula; elongate postmedial orange patch constricted by one-half posteriorly at Cu₂.....*antinoe*
- 8b. DFW subapical orange macula flattened disc-shaped; elongate postmedial orange patch broad and not or slightly constricted posteriorly at Cu₂..... 9
- 9a. DFW with falcate apical area diffuse reddish at distal end of subapical orange disc; smaller (30-36 mm) (Southeast Brazil).....*sabrina*
- 9b. DFW without diffuse reddish apical area, larger (35-42 mm)..... 10
- 10a. Basal third of VHW light brown or tan, bordered by an incurved very dark brown contrasting distal two thirds; VFW with dark purplish and blue costal area extending to or nearly to base.....*chromis*
- 10b. VHW without incurved contrasting areas, anterior area with a median buff band; VFW with dark purplish costal area in distal half of wing only, basal costal area is yellowish.....*salambria*

KEY TO FEMALE *CATONEPHELE*

- 1a. DFW with a single irregular yellow diagonal median band; DHW discus black, orange or reddish mahogany without submedian and postmedian diagonal yellow bands.....*numilia*
- 1b. DFW with two rows of yellow (or white) longitudinal maculae or stripes,

- DHW with submedian and postmedian yellow diagonal bands.....2
- 2a. DFW with distal $\frac{1}{3}$ a broad diffuse chestnut brown area; no distal yellow or white maculae (southeastern Brazil).....*sabrina*
- 2b. DFW without broad diffuse chestnut brown area; distal yellow or white maculae present.....3
- 3a. VHW with a striking yellow or light buff incurving submedian band, bordered externally by contrasting dark reddish brown.....4
- 3b. VHW without yellow or light buff incurving submedian band, not bordered externally by dark contrasting area.....5
- 4a. VHW with proximal margin of yellowish incurving submedian band bordered by narrow reddish line; postmedian circular ocelli present from M_1 to Cu_2*chromis*
- 4b. VHW with proximal margin of yellowish incurving submedian band bordered by a thick red line expanded to a large reddish macula in $Sc + R_1$ to R_5 ; no postmedian circular ocelli, but dark maculae present only in M_1 - M_2 and Cu_1 - Cu_2*salambria*
- 5a. VHW with black or dark brown postmedian ocelli present in light colored postmedian row of maculae.....6
- 5b. VHW without black postmedian ocelli.....8
- 6a. DFW with red submedian costal macula and a small subapical red spot; VHW with a row of postmedian small dark brown circular ocelli; VHW maculae and bands light buff or yellow.....*antinoe*
- 6b. DFW without red submedian costal spot; VHW with a row of postmedian black ocelli spots; VHW maculae and bands whitish or light grey.....7
- 7a. DHW usually with a relatively broader submedian yellow diagonal band; VHW usually with a relatively broader whitish submedian diagonal band; DFW without a reddish subapical macula (Central America to Colombia).....*orites*
- 7b. DHW usually with relatively narrower yellow diagonal band; VHW usually with a relatively broader whitish submedian band; DFW usually with reddish subapical macula.....*acontius*
- 8a. DFW not angular falcate and without large reddish apical area; ventral surface light buff brown with whitish or straw-colored maculae, VHW yellow or light buff submedian band well defined with nearly straight margins.....*salacia*
- 8b. DFW angular falcate with large reddish apical area; ventral surface mottled reddish brown; VHW yellowish white submedian band irregular and mottled.....9
- 9a. DHW basal yellow band broad > 3.5 to 4.0 mm; postmedian row of yellow squarish maculae wider 2.5 mm (western México).....*cortesi*
- 9b. DHW basal yellow band narrower < 3.5 mm usually 2.0 to 3.0 mm; postmedian row of yellow narrower, maculae more rectangular 2.0 mm wide (México to Costa Rica).....*mexicana*
Distinguishable by characters of the lamella antevaginalis, see Figs. 87-88 (Panamá to Guyana and Ecuador).....*nyctimus*

KEY TO CATONEPHELE MALE GENITALIA AND HYPANDRIA

- 1a. Hypandrium divided into separate rami no more than $\frac{1}{4}$ of length; few or no flat spine-like setae on rami; no large tooth on chitinized process on valvae.....2
- 1b. Hypandrium divided into separate rami at least $\frac{1}{3}$ or more of length; usually with many flat spine-like setae on rami.....5
- 2a. Rami with one or a few flat spine-like setae; valvae elongate and somewhat pointed; gnathos arm small, $\frac{1}{3}$ length of uncus.....*salacia*
- 2b. Rami without flat spine-like setae; valvae short and rounded; gnathos arm $\frac{1}{3}$ length of uncus.....3
- 3a. Rami pointed but without incurving chitinous tooth or spine; gnathos arm long narrow and gently curving, aedeagus nearly straight; saccus narrow elongate.....*nyctimus*
- 3b. Rami with one or more incurving chitinous teeth at tip; gnathos arm thicker

- than uncus.....4
- 4a. Rami with a single incurved chitinous jointed tooth at tip; thick gnathos arm broad and angled; aedeagus curved, saccus short and blunt.....*mexicana*
- 4b. Rami with a large incurved chitinous tooth and a second chitinous tooth at tip; gnathos arm thick but not heavily angled.....*cortesi*
- 5a. Hypandrium divided into separate rami about $\frac{1}{2}$ or $\frac{3}{4}$ of length; hypandrium greatly constricted at about $\frac{1}{4}$ to $\frac{1}{2}$ from center of base.....6
- 5b. Hypandrium divided into separate rami about $\frac{1}{3}$ of length; hypandrium may be constricted at about middle of length.....7
- 6a. Hypandrium split into rami about $\frac{3}{4}$ of length; base squarish, constricted about $\frac{1}{4}$ of length from center of base; valvae with a broad chitinized projection at crista.....*numilia*
- 6b. Hypandrium split into rami about $\frac{1}{2}$ of length and constricted about $\frac{1}{3}$ of length from center of base, valvae without chitinized projection at crista.....*sabrina*
- 7a. Valvae with chitinized tooth at crista.....8
- 7b. Valvae without chitinized tooth at crista.....9
- 8a. Hypandrium greatly constricted about middle of length; rami elongate not attenuated.....*antinoe*
- 8b. Hypandrium attenuated distally; rami attenuated distally.....*chromis*
- 9a. Valvae not attenuated to a point; saccus elongate, about twice length of uncus.....*salambria*
- 9b. Valvae attenuated to a point, saccus about length of uncus.....10
- 10a. Hypandrium greatly constricted at middle; rami with elongate flat spines along entire inner margins.....*orites*
- 10b. Hypandrium only slightly constricted at middle, rami with elongate flat spines near apex, none or a few short flat spines along inner margin.....*acontius*

PHYLOGENY

The phylogeny of *Catonephele* is especially interesting since it is a sister group to *Nessaea*, which has been the subject of a cladistic study by Vane-Wright (1979). A phylogenetic study of *Catonephele* is being undertaken with a direct comparison with the phylogeny proposed by Vane-Wright, but also taking into consideration additional factors in *Nessaea* including male genitalia, hypandria and rami, female genitalia, and recognition of subspecies which were not considered by Vane-Wright. These results will be published separately when it is also possible to make outgroup comparisons with other closely related genera being revised.

Some character states presently considered to be "primitive" include: 1. The wings of the male with orange pattern entire not separated into separate maculae; 2. Rami of hypandrium divided from $\frac{1}{2}$ to $\frac{3}{4}$ distance from tip of rami to base of hypandrium; 3. Basal "scent patch" present on DHW, and 4. VFW with extensive row of long silky hairs anterior to A_2 . All species show sexual dimorphism, but the ♀ pattern of *C. nyctimus* is very similar to the pattern of ♀ *Myscelia orsis*. Both the *nyctimus* and *acontius* species groups are thought to be the most primitive, with the *numilia* group being most advanced.

An evolutionary sequence which appears plausible is *C. salacia* (Amazon), *C. nyctimus* (Ecuador and Northern South American), *C. mexicana* (Panamá to México), and *C. cortesi* (western México). This geographic progression (Fig. 4) from the Amazon basin to western México also shows the rami losing flat spines and a progression from no terminal tooth to one and finally two incurved teeth on the rami. There is also a progression of shortening of the valva to a very blunt valva in *C. cortesi*.

Another evolutionary sequence might be traced from *C. acontius* through *C. antinoe*, to *C. salambria*, *C. chromis*, and *C. sabrina* and finally to *C. numilia*. The male color pattern changes from an entire elongate orange bar, to narrowing to a subapical macula, to a separate subapical macula, to two separate maculae. There are also several sequences in the hypandria, rami and male genitalia. The females are all rather similar except the most "advanced" *C. sabrina* and *C. numilia* which have a distinctive pattern

and orange or reddish mahogany markings which may be mimicry related.

In the proposed *nyctimus* and *acontius* evolutionary series, the most primitive species are considered to originate in the Amazon basin and spread to the periphery and into Central America and México. In *C. numilia*, consideration should be given to the possibility that this species originated in the Amazon Basin and the most primitive subspecies are in the periphery (Fig. 103). This would make *C. n. immaculata* in N. W. México and *C. n. penthia* in S. W. Brazil more "primitive" with female DHW discus black. The development of the orange discus markings in *C. n. numilia* and mahogany discus in *C. n. neogermanica* would be more "advanced." This is different from the rest of the genus with the more primitive species remaining in the Amazon basin and the different species and subspecies originating in the periphery correlated with geographic spread.

Mimicry of females to *Heliconius* has been hypothesized by Hall and Brown and Mielke. Their comments are as follows:

Hall (unpub.) on ♀ *C. sabrina*, and ♀ *C. numilia*:

"Although those dimorphic females are not greatly similar to any other butterflies, I believe them to be transitional mimics which are gradually developing the coloration of *Heliconius*; this theory seems to be borne out by the presence of a red band on the hindwings in the female of *C. numilia* and the commencement of a red band on the forewings in the female of *C. sabrina*."

Catonephele females also resemble *Heliconius charitonia* and Brown and Mielke (1967) state that there is an unresolved problem of mimicry in that *Catonephele acontius* females which occur in the Brasilia region of Brazil mimic *H. charitonia* which

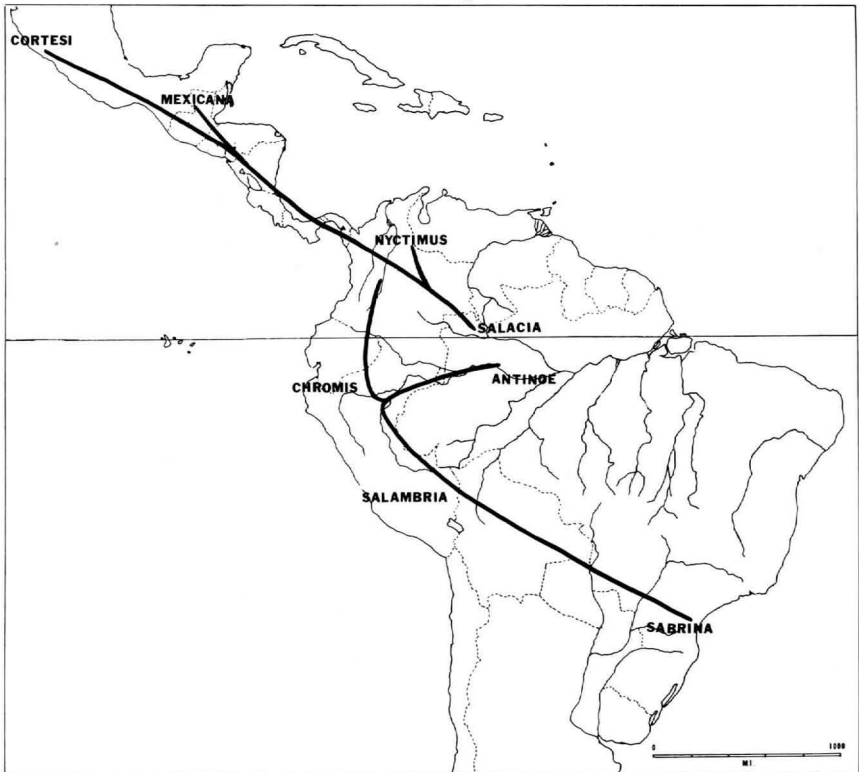


Figure 4. Phylogenetic evolution and geographic spread of some *Catonephele*.

do not occur in that region. If the female *C. acontius* does indeed mimic *H. charitonia*, this mimicry could have developed in Central America and Ecuador where they both occur and *C. acontius* could have spread eastward. Conversely, the range of *H. charitonia* could have diminished.

The possible mimicry of *Catonephele* females provides an interesting subject for more research.

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Many persons have helped collecting and observing in the field, especially Gordon B. Small who kindly supplied pictures, specimens and descriptions of larvae including the pupa (Fig. 3). Dra. Annette Aiello photographed *C. orites* larva (Fig. 2).

I am most indebted to my wife Joanne F. Jenkins, who collected many *Catonephele* in various countries, for helping curate our collection, for providing excellent secretarial assistance, and for inking all drawings.

Genus *Catonephele* Hübner [1819]

Catonephele Hübner [1819] Verz. bek. Schmett. 40. Type-species *eupalemaena* Hübner (Hemming, 1943:27).

=*Epicalia* Doubleday, 1844. List Spec. lep. ins. Coll. Brit. Mus. 90. Type-species *Papilio antiochus* Fabricius (Hemming, 1943:27). Junior subjective synonym.

=*Epicalia* Boisduval, 1870:40 (nec. Doubleday) Consid. Lep. Guat. 40. Type-species *Papilio numilia* Cramer (Hemming, 1943:27). Junior homonym of *Epicalia* Doubleday, 1944, and subjective synonym of *Catonephele* Hübner [1819]. Type of *Catonephele* and *Epicalia* Doubleday is *Papilio acontius* Linnaeus 1771.

Catonephele salacia (Hewitson), 1852

Figs. 5-8, 75, 86, 97

Epicalia salacia Hewitson, 1852. Exot. Butt. I. [77], pl. [39] t. 1, fig. 2; t. 2, figs. 1, 2, & 3. TL: "River Amazon." Lectotype: BM 15-146, 1 ♂ Rh. 9298. Here designated. (Figs. 5-6).

Description. Male. Black velvety base color with a broad, smooth bordered orange band extending from the anal margin of DHW to subapical area of DFW. The subapical margin of DFW expanded but not falcate, no subapical red area. Ventral surface with a broad straw yellow to buff band extending from the anal margin of VHW to the DFW sub-apical area. The distal area beyond the band is reddish brown and the proximal area is variable light brown. The male genitalia has an expanded saccus, and the hypandrium is strongly constricted with small short rami with 1 or 2 flat long spines at the apex.

Female. Black with two longitudinal rows of yellow stripes and maculae; DHW with a postmedian yellow row of maculae; and an anal distal reddish brown area; DFW with a subapical distal reddish macula. VHW with submedian and postmedian straw-colored

or light tan cross bands. VFW with two rows of large light tan maculae.

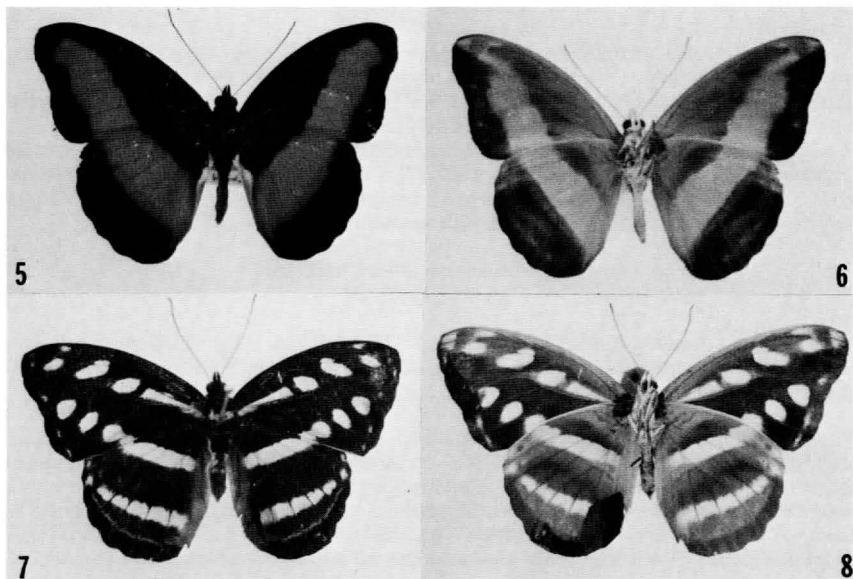
Average wing length ♂ (26-31)28 mm, ♀ (28-31)30 mm.

Distribution: Occurs from southern Colombia, eastern Ecuador and Perú and the Amazon basin area of Brazil. It is found only on the eastern side of the Andes and is not known to overlap the range of *C. nyctimus*.

Taxonomy and Variation: *C. salacia* is a distinct species related to *C. nyctimus* but readily distinguishable. Both sexes of *C. nyctimus* have the DFW with angular, truncate, subapical areas well marked with rufous red. Male *C. nyctimus* has an orange diagonal band strongly indented and constricted at M_1 while ♂ *salacia* has the band with relatively smooth margins and no strong constriction. The ♂ *salacia* has a VHW with a wide submedian buff band not present in *C. nyctimus*. The hypandria and genitalia are also distinctive as shown in Figs. 75 and 76.

There is very little variation except in size. The darkness of the brown outer areas of the ventral wing surface appears to fade with time in older specimens. Series of specimens I collected recently in Ecuador and Perú were much darker than older museum specimens. There was no observable variation related to geographic distribution. I designate the ♂ Specimen Rh. 9298 in the BM as lectotype. A ♀, Rh. 9299 is the paralectotype Figs. (7-8).

Biology: *C. salacia* is relatively uncommon and is found in tall evergreen and semi-deciduous tropical forest. It is a species typical of the Amazon river basin. It occurs in forest openings where trees have been felled and along forest roads. The adults are attracted to rotting bananas and other decaying fruit. They are attracted to and will enter fruit-baited traps. They were active from 0900 to 1300 in eastern Ecuador where six males were collected. They have been collected from July to November and January,



Figures 5-8. *Catonephele salacia* (Hewitson). ♂ dorsal (5) ventral (6) surfaces. BRAZIL, "Amazon Sup." Lectotype *Epicalia salacia* Hewitson (BM). ♀ dorsal (7) ventral (8) surfaces. BRAZIL, "Amazon Sup.", Paralectotype *Epicalia salacia* (Hewitson) (BM).

with no records from February to June. They occur from about 100 m to about 900 m elevation.

The immature stages and food plants are unknown.

Specimens Examined: 84 ♂ 31 ♀

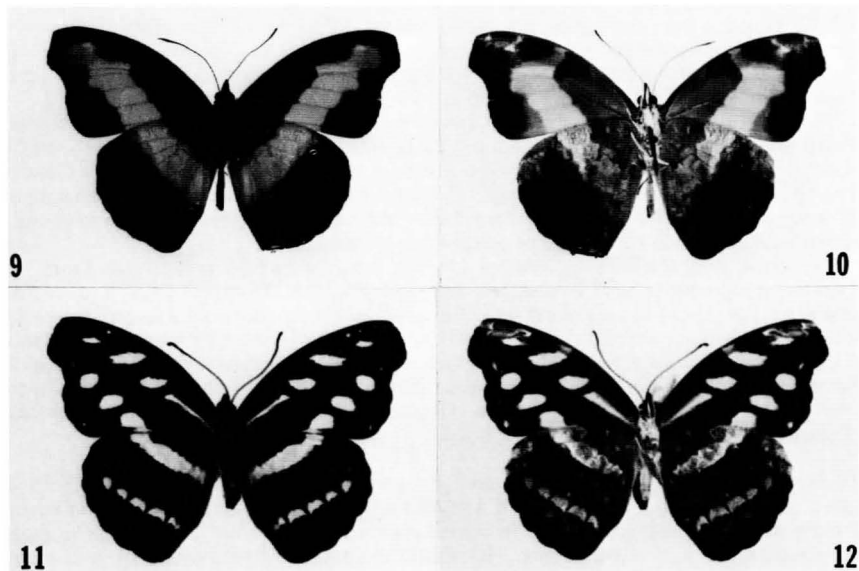
COLOMBIA: *César*, Manaure 900 m; Putumayo, Umbria; Florida, PERÚ: *Loreto*, Iquitos, Rio Cachiyacu; *Pebas*; Caballococha; Upper Rio Marañón; Explorama, Mazán; *Amazonas*, Rio Santiago; *Pasco*, Rio Pachitea; *San Martín*, Juanjui; Achinamiza; *Madre de Dios*, Tambopata; Boca Rio La Torre; *Junín*, Rio Perené; BRAZIL: *Amazonas*, São Paulo de Olivença; Tefé, Rio Itacoai; Rio Solimões; Arima, Rio Purús; Humaitá; Guajará; Manaus; Manicoré; Tabatinga; Benjamin Constant; Juruá; *Rondônia*, Calama, Rio Machado; Jarú; *Acre*, Rio Juruá; *Pará*, Rio Trombetas, Oriximiná; *Roraima*, Bôa Vista; ECUADOR: *Napo* Puerto Misahualli; Tena.

Catonephele nyctimus (Westwood) [1850] [Stat. rev.]

Figs. 9-12, 76, 87, 98

Epicalia nyctimus Westwood [1850]. Gen. Diurn. Lep. 2:257, no. 1 (Illus. Hewitson) (1852). Ex. Butt. 1. *Epicalia* [40] t. 2, figs. 5 & 6. TL: "México," Ecuador, Guayaquil; "Venezuela." Syntypes: BM 15-145. 1 ♂ Rh. 9293 (Examined) [Stat. rev.]

This species is fairly common and occurs from Guyana and Ecuador to Panamá. It is related to *C. salacia* in the upper Amazon valley and to the presently described *C. mexicana* from México to Costa Rica, and to *C. cortesi* in western México. *C. cortesi* has a very similar wing pattern to *C. nyctimus* but has wider bands, however the hypandrium is remarkably different. Godman & Salvin (1883) state that *C. nyctimus* "Specimens from all parts of this wide area are remarkably uniform in their markings



Figures 9-12. *Catonephele nyctimus* (Westwood). ♂ dorsal (9) ventral (10) surfaces. ECUADOR, *Esmeraldas*. Tonchigue (MM). ♀ dorsal (11) ventral (12) surfaces. PANAMÁ, *Panamá*, Cerro Campana (AA).

and show no differences worthy of note.”

Description: Male. Black velvety base color with an irregular orange band from the anal margin of DHW to subapical area of DFW. A prominent red area is present in the falcate subapical area of DFW. VFW with an orange postmedian band, with reddish brown distally, discal cell buff brown without or with limited brown marking; proximal margin of yellow-orange band not bordered by dark brown shading. VHW mottled brown with mottled buff submedian band. Hypandrium posteriorly constricted with short, small pointed rami, with no curved spines at tip.

Female. Black with two longitudinal rows of yellow stripes and maculae; DFW with large red area in subapical falcate tip, DHW with a yellow postmedian band of maculae and reddish anal area. VFW with light yellow maculae. VHW mottled brown with mottled obscured submedian and postmedian bands. Lamella antevaginalis with two short posterior elongations arising from a broad base (base 4 x length of projection).

Average wing length is ♂ (24-30)/27 mm, ♀ (28-31)/29 mm.

Distribution: Occurs from Guyana to Panamá south to western Ecuador and northwestern Perú. It is found from Colombia to Perú mostly on the western slope of the Andes but extends east of the Andes in Venezuela to Guyana.

Taxonomy and Variation: The *nyctimus* species group shows marked differences in the male genitalia, the hypandria, and the female genitalia, and species are recognized by these characters. There is less distinctive differences in the wing patterns and color.

C. nyctimus was described by Westwood in 1850 from specimens from Ecuador, Venezuela and México. A specimen in the BM labeled Type Rh. 9293 "*Epicalia nyctimus* Westw." was studied and photographed. The type description states it is from Guayaquil, Ecuador. This specimen is one of the syntypes of Westwood, but the VFW discal cell is darker than other Ecuadorian specimens studied, and appears more like Mexican specimens. Since *C. nyctimus* is composed of two distinct species it is necessary to designate a type specimen. I will study the genitalia and hypandrium and will designate a lectotype from South America of *C. nyctimus* from the type series in the BM. The population extending from northern Perú to Venezuela, Guyana and Panamá is *C. nyctimus* and a newly described species *C. mexicana* extends from Costa Rica to northeastern México.

There is some variation in color but the darkness probably reflects the age and wear. Fresh males are jet black with a purplish tinge with bright orange bands which vary in width and with fairly straight edges to irregular and jagged edges especially distally. The VHW markings are quite variable. The females vary in darkness and in the amount of rust-red in the DFW apical area and DHW anal area. None of the variation of these characters appear to be related to geographic distribution.

The male genitalia of *C. nyctimus* has an elongate curved saccus not short and angular, the gnathos arm is elongate and tapering, not enlarged thick and heavily chitinized, the valva is very short and blunt, not more elongate (valva length to anellus 2 X diameter), the aedeaus is straight and elongate, not shorter and heavily curved as in *C. mexicana*. The rami on the hypandrium terminate rather straight and not heavily incurved and tooth-like as in *C. mexicana*. The female genitalia show differences in the sterigma and associated structures. Genitalic differences are the most critical characters for separating the two species.

Biology: Occurs in semi-deciduous and evergreen tropical forest, but appears to be more common in secondary growth and disturbed areas. It is more common on the Pacific slopes of the Andes and in mountains up to 1,900 m. It is found in forest openings, roads and forest edges. The adults are attracted to fermenting and rotten bananas and other fruit and fermenting sugar cane. The observed flight period was from 0900 to 1400.

Adults have been collected from sea level to 1,900 m in every month of the year, more commonly from October to January in some areas.

Immature Stages: The 1st and 5th instars have been described by Small (pers. comm.) and the 5th instar and pupa descriptions are summarized from his field notes. The eggs are oviposited on the underside of medium age leaves. The 1st instar larvae are on a frass chain and the 3rd instar larvae are on the upper side of the leaf. Length 29-35 mm. Head whitish green to bluish white, and bordered by brown; epicranial horns (10mm) in length, orange with whorls of 2, 4 and 4 spines, terminating in a small rosette, back of head light tan. Body dark green dorsally covered with small white or yellow tubercles. Mid-dorsal row of scoli light orange at base of spines, subdorsal row of scoli longer; supra-spiracular and subspiracular rows of lighter scoli not orange at base of spines.

Pupa dark green with sparse small white dots with greyish white and brown streaks with red striations.

Larvae matured from egg to pupae in 12-15 days and the pupal period to emergence was seven to nine days.

Food Plants:

Dalechampia cissifolia (?) Poepp. Euphorbiaceae

Dalechampia tilifolia Lam. "

Dalechampia scandens (L.) "

In Panama

Small (pers. comm.)

Specimens Examined: 205 ♂ 108 ♀

PANAMÁ: *Chiriquí*, Chiriquí; Bugaba; David; Boquete, Puerto Armuelles *Panamá*, Cerro Campana; Arraijan; *Veraguas*, Veraguas; Colobre; *Canal Zone*, Fort San Lorenzo; Balboa; Gatún; Barro Colorado; Los Frijoles; Fort Randolph; Pedro Miguel; Madden Forest; Matachin; Las Cascadas; *Colón*, Piña, *Darién*, Cana; COLOMBIA: *Tolima*, Rio Chili, Santa Rosa; El Sapo 650 m; *Santander*, Rio Carare; Pico de Armas 1,000 m; La Borrascosa; Rio Opón; *Cundinamarca*, Bogotá; Cananche; Viotá; *Risaralda*, Santa Rita; *César*, Manauare; *Boyacá*, Muzo; *Antioquia*, Naré; *Valle*, Juntas; Rio Dagua; *Magdalena*, Minca; VENEZUELA: *Aragua*, El Limón, Maracay; Choroní; Rancho Grande; *Merida*, Mérida; *Lara*, Terepaima; *Carabobo*, Puerto Cabello; San Esteban; Montalbán; Las Quiguas; Yuma, 550 m. Rio Borburata; Miranda; La Araguatá, *Táchira*, La Morita; *Sucre*, Cumaná; Cariaquito; *Falcón*, Curimagua; *Barinas*, Quebrada Seca; *Trujillo*, Cuiras 900 m; *Distrito Federal*, El Valle; Caracas; *Amazonas*; Macu; *Zulia*, La Kasmera; Los Encantos; *Yaracuy*, Marín a Aroa; Yaritagua; GUYANA: *Mazaruni-Potaro*, Tumatumari, ECUADOR: *Pichincha*, Santo Domingo de los Colorados; Rio Toachi, Rio Palenque; *Los Rios*, Limón; Hacienda Ave María; Quevedo; *Chimborazo*, Chimbo 300 m; Dos Puentes 500 m; Huigra; *Zamora-Chinchipe*, Zamora; *Manabí*, Palmar 200 m; *Esmeraldas*, Tonchingue; *Guayas*, Bucay; Guayaquil (Westwood, 1850); *El Oro*, Zaruma; Portovelo 1900 m; *Bolívar*, La Chima; PERÚ: *Tumbes*, Matapalo, La Tatora; BRAZIL: No locality 2 ♂ Krueger Coll. (LA).

Catonephele mexicana [Sp. nov.] Jenkins and R. de la Maza

Figs. 13-16, 77, 88, 98

Epicalia nyctimus Westwood [1850]. Gen. Diurn. Lep. 2:257 no. 1 [in partim]. TL: "Mexico," Ecuador, Guayaquil, "Venezuela." Syntypes: BM 15-145, 1 ♂ Rh. 9293 from Ecuador, Balzapamba or Guayaquil? (Examined).

Epicalia nyctimus Westwood (Godman & Salvin, 1883) (partim).

Catonephele nyctimus (Westwood). Röber, in Seitz, 1914 (partim).

Description: Male. Black velvety base color with an irregular orange band from the anal margin to DHW to subapical area of DFW. A prominent red area is present in falcate subapical area of DFW. VFW with an orange postmedian band with reddish brown and mottled light area distally; discal cell brownish-ochre with dark ochre-brown markings

especially parallel to radius; proximal margin of yellow-orange band bordered by well-defined undulating dark brown shading. VHW mottled brown with mottled buff, submedian band. Male genitalia with very short bent saccus, gnathos arm very thick and relatively short; valva posterior to anellus 2 X diameter; aedeagus strongly curved. Hypandrium with rami terminating in an incurved tooth.

Female. Same as *C. nyctimus*. Lamella antevaginalis with two elongate narrow posterior projections arising from a narrow base (narrower than length of projection). Average wing length ♂ (21-30)36 mm, ♀ (25-31)28 mm.

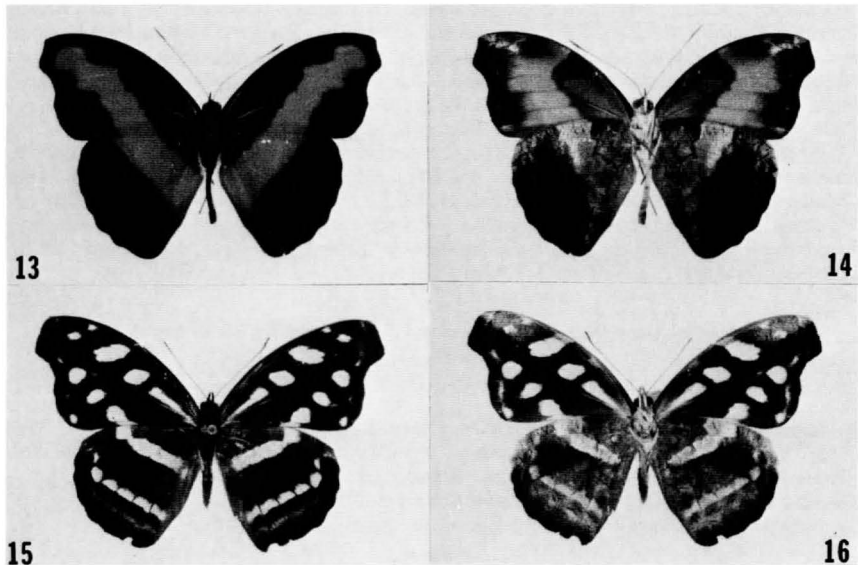
Described from 20 specimens, 13 ♂ and 7 ♀.

HOLOTYPE: MÉXICO: *Oaxaca*, Tuxtepec to Palomares, km 130, 1 ♂, 9 Aug. 1977, coll. D. & J. Jenkins (JC). PARATYPES: MÉXICO, *Oaxaca*, Chiltepec, 5 ♂ 1 ♀, Jun. Jul. Sep. Nov. (JC); Tuxtepec to Palomares km 130, 1 ♂ Aug. (JC); Sierra Juárez 1 ♂ 1 ♀ Jun. Aug. (JC); Temascal 1 ♂ Aug. (JC); Chimalapa 1 ♂ Sep. (MM); *Veracruz*, Fortín de las Flores 2 ♀ May (JC); Catemaco 1 ♂ 2 ♀ Sep. Nov. (MM); Orizaba 1 ♂ June (LA); Córdoba 1 ♂ 1 ♀ Mar. Apr. (LA).

The holotype and six paratypes are deposited in the Allyn Museum, two paratypes in the British Museum, four paratypes in the Los Angeles County Museum, three paratypes in the Milwaukee Museum, two paratypes in the de la Maza collection and four paratypes in the Jenkins Collection.

Distribution: Occurs from northeastern México from Gómez Farías, Tamaulipas south to Costa Rica.

Taxonomy and Variation: *C. mexicana* is similar to *C. nyctimus* superficially. The males can be determined on the basis of dark brown ochre in the VFW discal cell and bordering the proximal margin of the orange band. This is most marked in Mexican and less in Costa Rican specimens. No external differences were found to separate the females.



Figures 13-16. *Catonephele mexicana* Jenkins and R. de la Maza E. ♂ dorsal (13) ventral (14) surfaces. Holotype. MÉXICO, *Oaxaca*, Tuxtepec to Palomares, km. 130. (JC). ♀ dorsal (15) ventral (16) surfaces. Paratype. MÉXICO, *Oaxaca*, La Esperanza (JC).

Male genitalia and hypandria were observed to differ somewhat over the range of *C. mexicana*. Specimens from Fortín de las Flores, Veracruz, Chiltepec and Comaltepec, Oaxaca in México and two specimens from Santa Tecla, San Salvador, El Salvador showed less sclerotization of the tegumen. Male genitalia examined from Turrialba, Cartago, and Palmar Norte, Puntarenas, Costa Rica were more heavily sclerotized and the saccus more angular as in Fig. 77. Roberto and Javier de la Maza studied Mexican and Guatemalan males and also noted this in specimens from San Vito, Puntarenas, Costa Rica. They suggest dividing *C. mexicana* into two subspecies on the basis of genitalic differences. There is variation of genitalia correlated with geographic range but I could not find any other characters to substantiate this, so that no subspecies are presently recognized in this revision. This complexity needs more study and perhaps larval rearing would help determine the proper taxonomic status.

Biology: This species appears to be more abundant than *C. nyctimus* and has been collected in more different habitats. It occurs in evergreen and deciduous tropical forest and in cut over and second growth areas. The adults are found in forest openings, forest edges and roads. They are attracted to decaying and fermenting fruit such as bananas, mangoes, mamey, and fermenting sugar cane stalks. While they commonly alight on vegetation I have never seen them feeding on flowers.

The adults have been collected every month of the year but are most common during the rainy seasons. They occur from sea level to elevations of nearly 2,000 m.

Immature Stages: The larva has been found in El Salvador by Muysshondt & Muysshondt (1975) but it was not described.

Food Plants:

Dalechampia scandens (L.)
El Salvador

Euphorbiaceae
Muysshondt & Muysshondt (1975)

Specimens Examined: 204 ♂ 131 ♀

MÉXICO: *Tamaulipas*, Gómez Farías; *Veracruz*, Tezonapa; Córdoba; Catemaco; Dos Amates; Jalapa, Las Choapas; Orizaba; Motzorongo; San José del Carmen; Tuxpan; Presidio, Espinal; Fortín de las Flores; Patla, San Andrés Tuxtla; Teocela; Misantla; Mirador; Atoyac; Tierra Blanca; *San Luis Potosí*; Ciudad Valles; Quinta Chilla; Tamazunchale; Rancho Santa María; Matlapa; *Oaxaca*, La Esperanza; Valle Nacional; Temascal; Comaltepec; Chiltepec; Tuxtepec to Palomares, km. 130; Metates; Jacatepec; Vista Hermosa; Naranjal; Rancho San Carlos; Tuxtepec; Puerto Eligio; *Tabasco*, Tepescuintla; Teapa; *Chiapas*, Ocozocuahtla; Malpaso; Santa Rosa; San Jeronimo; Santa Anita; Palestino; San Quintín, Lago de Montebello; Tapachula; Palenque; Huixtla; *Quintana Roo*, XCan; BELIZE: *Toledo*, Punta Gorda; *Stann Creek*, Middlesex, Stann Creek; GUATEMALA: *El Petén*, Sayaxché; *Alta Verapaz*, Tamahú; Baleu; Gubilguitz; Telemán; San Juan; *Baja Verapaz*, Panimá; San Jeronimo; *Quetzaltenango*, Coatepeque; *Escuintla*, Zapote; *Izabal*, Quiriguá; *Santa Rosa*; Guazacapan; *San Marcos*, El Tumbador; EL SALVADOR: *San Salvador* Santa Tecla; *La Libertad*, Los Chorrros; *Sonsonate*, San Isidro; HONDURAS: *Cortés*, San Pedro Sula; Potrerillos; *Atlántida*, Lancetilla; NICARAGUA: *Rio San Juan*, Chontales; *Zelaya*, Rio Wanks; Guina; Bluefields; Rama; COSTA RICA: *Cartago*, Turrialba; Pejivalle; *Alajuela*, San Mateo; *San Juan*, Puriscal; Rio Surubres; *Puntarenas*, San Vito, Palmar; Golfito; Aranjuez; *Limón*, Sixaola; Rio Banano; Guapiles; La Florida, Limón; Tortuguero.

Catonephele cortesi R. de la Maza, 1982
Figs. 17-20, 78, 89, 98

Catonephele cortesi R. G. & R. de la Maza. 1982. Rev. Soc. Mex. Lepid. 7(1): 5 figs. 6-9.
TL: MÉXICO, Guerrero, Acahuizotla, 750 m. Holotype: HT ♂ in Mus. Hist. Nat.,

also 9 ♂ 7 ♀ paratypes (Examined).

Description: Male. Velvety black with irregular broad orange band from anal margin of DHW to subapical area of DFW where a prominent red area is present. The orange band in the middle of the DHW is 4-6 mm in width in *C. nyctimus* and 6.5 to 8.5 mm in width in *C. cortesi*. The DFW orange band broadens posteriorly in *C. cortesi* to 7.5-9.0 mm and in *C. nyctimus* remains narrower (5.0-7.5 mm). The underside is similar to *C. nyctimus* except the width of the VFW orange band in the posterior area of the wing is broader and is unicolored (not greyish tan in distal part). In the male genitalia the gnathos arm is thicker but not heavily angled. The hypandrium has rami with an apical large incurved chitinous tooth and a second incurved chitinous tooth at the tip.

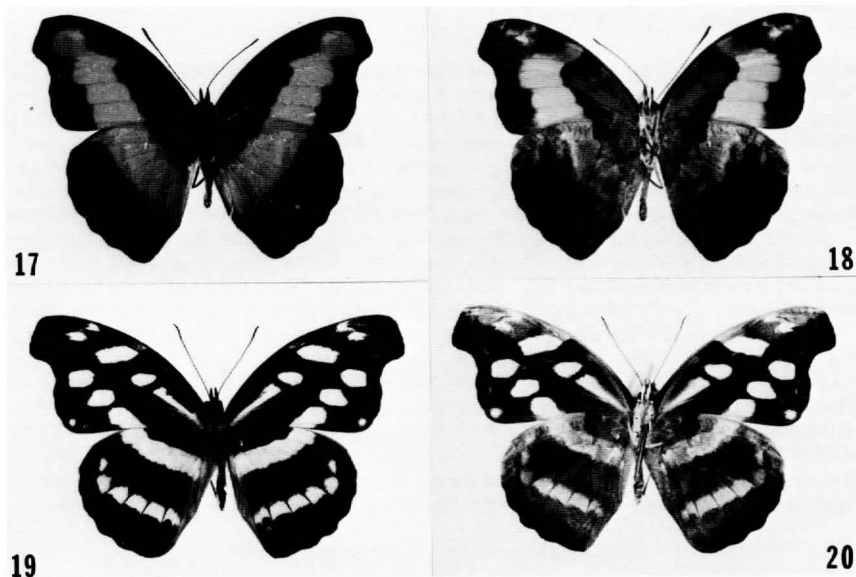
Female. As in *C. nyctimus* but the DHW basal yellow band is broader >3.5 to 4.0 mm compared to *C. nyctimus* (2.0-3.0 mm); postmedian row of yellow maculae squarish instead of rectangular, and wider (2.5 vs. 2.0 mm).

Average wing length ♂ is (26-30)/28 mm, ♀ (30-32)/31 mm.

Distribution: Occurs in the western coastal area of México from Nayarit south to Oaxaca.

Taxonomy and Variation: This species was described recently by R. de la Maza (loc. cit.) based primarily on the very distinct chitinous teeth on the rami of the male hypandrium. The orange bands on the male are wider and other differences as noted in the description. There is some variation in the size of the male wings (26-30 mm) and in the width of the orange bands.

Biology: The adults are relatively rare and restricted in range. They occur in semi-deciduous tropical forest and also in the lower levels of mesophytic montane forest. They are also found in dense grassy scrub. The adults fly at the edges of the forest and



Figures 17-20. *Catonephele cortesi* R.G. & R. de la Maza. ♂ dorsal (17) ventral (18) surfaces. MEXICO, Oaxaca, Candelaria-Loxicha (JC). ♀ dorsal (19) ventral (20) surfaces. MEXICO, Guerrero, Acahuizotla (AA).

into open and cut-over areas. I have collected them at stream edges and in forest roads at Acahuizotla, and near El Faisanal in Guerrero, and at Candelaria-Loxicha in Oaxaca. They have been collected from early in the morning 0830 to 1300 hours.

The adults have been collected at elevations from 500 m to 1,500 m and in March and May and from August to January.

Immature Stages: Nothing is known about the immature stages or food plants.

Specimens Examined: 32 ♂ 12 ♀

MÉXICO: *Nayarit*, Lima de Abajo, de la Maza (1982); La Bajada 4 ♂ Sept. (FC); Singayta 3 ♀ Sept. (FC); *Jalisco*, de la Maza (1982); *Colima*, Colima 1 ♂ 1 ♀ (AM); *Michoacán*, Coahuayana 1 ♂ Aug. (AA); *Guerrero*, Acahuizotla 750 m. 8 ♂ Aug.-Dec. (AA); 3 ♂ 2 ♀ (AD); Sep. 2 ♂ 1 ♀ (JC); 4 ♂ Jan. (DM); 2 ♀ Mar. Nov. (AA); 3 ♂ Jan. Oct. (AD); El Faisanal 1100 m 1 ♂ Dec. (DM); 1 ♂ (JC); Coyuca 20 m, 2 ♂ Mar. Sep. (AA); *Oaxaca*, Candelaria-Loxicha 500 m, 1 ♂ Aug. (JC); 1 ♂ 1 ♀ May Nov. (DM); No locality 1 ♂ 1 ♀ (AM); Portillo del Rayo 1 ♂ (AD); Chacalapilla 500 m 1 ♂ 1 ♀ Dec. (DM); San Gabriel Mixtepec 1 ♀ Dec. (DM).

Catonephele acontius (Linnaeus) 1771

The *acontius* species group is a widespread and common one, and is differentiated into two species, *C. orites* and *C. acontius*, which latter is divided into two closely related subspecies.

Description: Male. Wings blackish velvet-like base color with a broad orange diagonal postmedian band on both fore and hind wings. The DHW has an anterior brownish "sex patch." The VFW has a row of long black silky hairs. The forewing usually extends beyond the hindwing, has a strongly curved costal margin, expanded apex and concave distal margin. The lower wing surfaces are dark brownish with a small or extensive white subapical costal patch. The male genitalia has a short saccus, a prominent gnathos arm and the valva is relatively short and pointed. The hypandrium is divided into two rami about $\frac{1}{3}$ - $\frac{1}{2}$ of the length from the base, and slightly constricted in the middle.

Female. Black with two transverse rows of yellow stripes and maculae and an additional row of postmedian yellow maculae on the DHW. There are reddish subapical maculae on the DFW and on the outer anal area of the DHW.

Key to Subspecies of *Catonephele acontius*

Males.

- 1a. VFW with light bluish macula in discal cell proximal to black median cross band followed distally by a prominent light bluish-white cross band to M_2 and extensive whitish distally. Rami of hypandrium with flat spines only in apical area, none on inner margin of rami. S. Perú to S.E. Brazil.....*caeruleus*
- 1b. VFW without light bluish macula in discal cell proximal to black median macula, followed distally by narrow light band, followed by grey with light distal area. Rami of hypandrium with flat spines in apical area, with several short flat spines on inner margin of rami.....*acontius*

Females.

- 1a. Forewing with extended apex at M_1 , with two bright rust red maculae between R_5 and M_2 in apical and subapical area.....*caeruleus*
- 1b. Forewing with extended apex at M_1 with one bright rust red macula between R_5 and M_2 in subapical area only.....*acontius*

Catonephele acontius acontius (Linnaeus) 1771 [Stat. rev.]
Figs. 21-24, 79, 90, 99

Papilio acontius Linnaeus, 1771. Mant. Plant. p. 537. TL: "China" [Error] Type: Based only on d'Aubenton 1765, pl. 68, figs. 3 & 4; Lectotype ♂ designated by Hemming, 1964:96 is d'Aubenton 1765: pl. 68, fig. 3 [Stat. rev.]

=*Papilio antiochus* Fabricius, 1775. Syst. Ent. 480, No. 164, TL: "China" [Error], Type: ♂ Based on same fig. as above. Unnecessary *nomen novum* for *Papilio acontius* Linnaeus, 1771. Junior homonym of *Papilio antiochus* Linnaeus 1767. Lectotype by Hemming same as *acontius*.

=*Papilio medea* Fabricius, 1775. Syst. Ent. 508, No. 273. ♀. TL: "India" [=Surinam]. Syntypes: ♀ BM, Banks Coll.

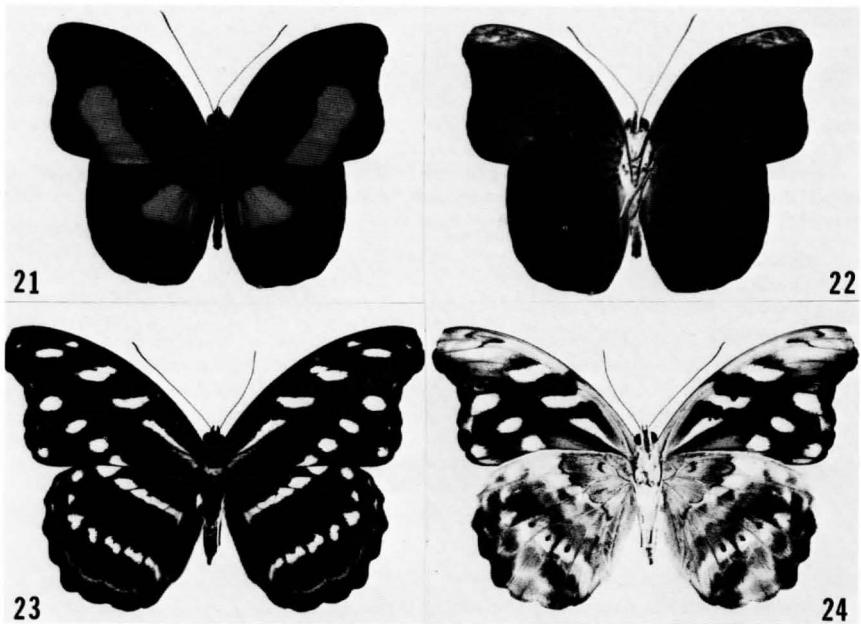
=*Papilio chione* Cramer, 1776, Pap. Exot. 1:142, 152, pl. 90, figs. E, F. ♀. TL: "Surinam." Syntypes: ♀ BM?

=*Papilio eupalemon*, Cramer [1777]. Pap. Exot. 2, 148, 74, t. 143, figs. B, C. ♂. TL: "Surinam." Syntypes: BM?

=*Catonephele eupalemaena* Hübner [1819]: 40. ♂. Unnecessary *nomen novum* for *Papilio eupalemon*. It is a junior subjective synonym of *C. antiochus*. Lectotype by Hemming is same as for *acontius* and *antiochus*.

=*Catonephele acontius exquisitus* Stichel, 1899. Berl. Ent. Zeit. 43:416. TL: Brazil, Amazonas Superior, São Paulo [de Olivença]. Syntypes: BM or Mus. Zool. Berlin (2 ♂ 1 ♀). [Syn. nov.]

Description: As in *C. acontius* except for differences for *C. a. acontius* listed in the key to subspecies. Average wing length ♂ (23-35)31 mm, ♀ (28-40)35 mm.



Figures 21-24. *Catonephele acontius acontius* (Linnaeus). ♂ dorsal (21) ventral (22) surfaces. ECUADOR, Napo, Tena (JC). ♀ dorsal (23), ventral (24) surfaces. PERÚ, Huánuco, Tingo María (JC).

Distribution: This relatively abundant subspecies is widespread from Venezuela and the Guianas, part of Colombia and Ecuador south to Perú and Central Brazil. Intergrades occur in S.E. Perú and Ecuador.

Taxonomy and Variation: *C. acontius* was described in 1771 and there have been several synonyms described. The very different female was also described as *medea* and *chione*. *C. orites* Stichel is a distinct closely related species based on wing markings, brown instead of black silky hairs on VFW, grey "scent patches" not brown, and the genitalia and hypandrium are distinct.

C. acontius exquisitus Stichel (1899) was described as a subspecies based on specimens being larger from the Upper Amazon; also the males have a strongly curved costal margin on the DFW, strikingly expanded apex and very concave distal margin, and the hindwings with an almost straight costal margin and an undulated border of the hindwings. Study of large series from the type locality of *exquisitus* at São Paulo de Olivença, Brazil show much variation with most specimens showing typical characters of *C. a. acontius*. In other localities the same variation is found, however, there is perhaps a greater tendency for examples of *exquisitus* characters to occur from Venezuela to Perú and less in the eastern half of the range. No distinct differences were found in the females except the amount of dark shading on the VHW which was not related to geographic distribution. The variation in shape of the forewing in males cannot now be explained by geographic area or season and *exquisitus* is considered to be a synonym.

Intergrades with *C. a. caeruleus* occur in Madre de Dios, Perú and in Napo, and Zamora-Chinchipec, Ecuador and Caquetá, Colombia (which may be a locality error) with both typical *C. a. acontius* and some characteristics of *C. a. caeruleus* in a few specimens.

Biology: *C. a. acontius* is a widespread common species that occurs in evergreen and deciduous tropical forest and in secondary regrowth forest. It occurs in openings in the forest such as roads, where trees have been felled, and forest edges as well as in undisturbed deep forest. The adult males and females are readily attracted to almost any kind of rotting fruit and enter bait traps readily. They fly rapidly but are easily collected in the vicinity of rotting fruit. The females usually are found in the same places as the males and are nearly as abundant.

The adults have been found from near sea level to 900 m and have been collected every month of the year.

Immature Stages: Bates (1864) states "...the larva is light green, with steel-blue head, and is armed with branched spines, two of which on the head are of great length and verticillate: the pupa is light green, varied with pink, and has the back of the thorax deeply excavated and irregular in outline. In form and armature the larva agrees with those of the *Callithea*." A larva was illustrated by Stoll (1787) p. 8, t. 1, fig. 8.

Food Plants: The most common food plant is *Alchornea* in Brazil. The following plants are recorded as food plants of *C. acontius* but there is uncertainty to which subspecies they are correlated.

<i>Lysiloma</i> sp. ("tamarind")	<i>Leguminosae</i>	Doubleday (1850)
<i>Nectandra venulosa</i> "Canelinha"		
In Brazil	<i>Lauraceae</i>	d'Araújo et al. (1968)
" <i>Tapia guassu</i> "		
In Brazil	<i>Euphorbiaceae</i>	d'Araújo et al. (1968)

Specimens Examined: 330 ♂ 290 ♀

VENEZUELA: *Zulia*, Misión El Rosario; La Fría; *Barinas*, Ticoporo; Cachica mos: 100

m; *Amazonas*, Mt. Duida; Unión Río Orinoco and Río Ugueto; *Táchira*, La Morita; Chorro del Indio; Agua Clara; Río Frío; San Joaquín de Navay; *Carabobo*, Aguirre; *Bolívar*, Río Caura; Cucaíne; Río Suapure; La Vuelta; El Manaco 60 km. SE El Dorado; El Dorado, km. 82; Río Caura, Salto Para; El Bochínche; Kanarakuni; Guayaraca; GUYANA: *Mazaruni-Potaro*, Kartabo; Tumatumari; Potaro River; Kamarung; Bartica; Aunai; Kamakusa; Carimang River; *E. Demerara-Berbice*, Rockstone; Wismar; Demerara River; *Rupunini*, Anunderbari; SURINAM: *Paramaribo*, Paramaribo; *Marowijne*, Albina; *Suriname*, Geldersland; GUYANE: *Guyane*, St. Laurent; St. Jean; Bas Maroni; Pariacabo; Mana River; COLOMBIA: *Boyacá*, Tunja; *Santander*, La Sevilla, Río Opón; *Cundinamarca*, Bogotá, Cananche; Caquetá; *Meta*, Villavicencio; *Amazonas*, Leticia; *Putumayo*, Mocoa; ECUADOR: *Zamora-Chinchipe*, Zamora; Zumbi X; *Bolívar*, Balzapamba; *Oriente*, Río Bombaine; *Napo*, Río Coca X; Puerto Misahualli; Tena; Limoncocha; *Tungurahua*, Río Topo, Baños; Hacienda La Mascota; Santa Inez; *Pastaza*, Puyo; Mera; Río Suno; Sarayacu, *Marona-Santiago*, Macas; *Loja*, Loja; PERÚ: *Loreto*, Caballococha; Muniches; Iquitos; Pucallpa, Mishana; Pebas, Yurimaguas; Boquerón del Padre Abad; Río Nanay; *Huánuco*, Tingo María; *San Martín*, Moyobamba; Tarapoto; Rioja; *Junín*, Chanchamayo; Río Perené; Satipo; San Ramon; Sanibeni; *Puno*, Chirimayo; Inambari; Ipoki; *Pasco*: Pozuzo; Pilcopata; Río Pachitea; *Ayachucho*, Candalosa, La Mar; *Madre de Dios*, Sierra Pantiacolla, Shintuya X; Puerto Maldonado X; BRAZIL: *Amazonas*, Caradas; São Joaquín; Río Papuri; Borba; Río Jurubari; Jauareté; São Paulo de Olivença; Ypiranga; Tefé; Maués; Manaus; Río Javari; Río Uaupés; Río Madeira; Manicoré; Tonantins; Manacapuru; Huitanaã; Nova Olinda; *Pará*, Obidos, Itaituba; Mujo; Santarém; Belém; Río Cuminá; Utinga; Ilhemy dos Mineiros; Sierra Norte; *Amapá*, Serra do Navio; *Pernambuco*, Ipojuca; *Roraima*, Río Surubaí; Boa Vista; *Bahia*, San Salvador; Uruçuca; São João de Paraíso; *Maranhão*; Mt. Aurora; São Luís; Sumaré; Santa Lucia; Imperatriz; *Rondônia*, Cachoeira do Samuel; Pimenta Bueno; Jaru; *Mato Grosso*, Posto Jacaré, Río Xingú.

***Catonephele acontius caeruleus* [Subsp. nov.]**

Figs. 25-28, 79, 90, 99

Description: Male. Wings blackish velvet with broad orange diagonal postmedian band. DHW with anterior brownish "sex patch." VFW with long black silky hairs. Forewing extends beyond hindwing and has strongly curved costal margin, expanded apex and concave distal margin. VFW with a median black diagonal cross band; postmedian area with extensive white, with light bluish postmedian cross band distal to black median band, and a light blue macula proximal to black cross band. Hypandrium with rami blunt with flat spines only in the apical area.

Female. Same as *C. a. acontius* except presence of bright rust red markings in both apical and subapical area of DFW.

Average wing length ♂ (24-32)30 mm, ♀ (31-38)34 mm.

HOLOTYPE: BOLIVIA: no specific locality 1 ♂ (AA).

PARATYPES: BRAZIL, *Espírito Santo*, Linhares, 9 ♂ 7 ♀, July Aug. 1972. Coll. P. C. Elias (AA); *Santa Catarina*, Joinville, 2 ♂, 13 Mar. 1984, coll. D. W. Jenkins (JC); São Bento do Sul, 2 ♂ 6 ♀ 10 Mar. 1984, coll. D. W. Jenkins (JC). No specific locality 1 ♂, 7 Oct. 1962 (MM); *Minas Gerais*, Parque Rio Doce, 1 ♂ Jul. (AA); Km. 500 Belo Horizonte-Brasília Hwy. Apr. 1 ♂ (AA); PARAGUAY, *Caaguazú*, Pedro Juan Caballero, Feb. 69 1 ♂ 1 ♀ (MM); BOLIVIA: *Santa Cruz*, Ichilo, 1 ♀ Mar. 1947 (AA).

Deposition of type material; Holotype ♂ and 9 ♂ 6 ♀ paratypes in the Allyn Museum; 1 ♂ 1 ♀ in Museu Nacional, Rio de Janeiro, Brazil; 1 ♂ 1 ♀ paratypes in Universidade Federal do Paraná, Curitiba, Brazil; 3 ♂ and 1 ♀ paratypes in Milwaukee Museum, and 3 ♂ and 6 ♀ paratypes in the Jenkins Collection.

Distribution: Occurs from Espírito Santo south to Rio Grande do Sul, Brazil, east to Bolivia, and is present with intergrades in Madre de Dios in southeastern Perú, with a few records in Ecuador and one in Colombia (?). The exact northern boundary in Brazil

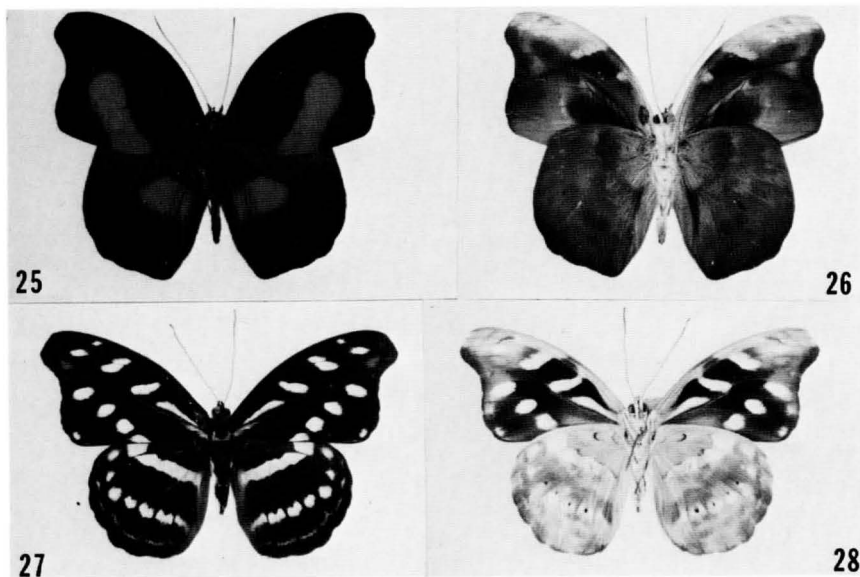
from Espírito Santo through Mato Grosso to Bolivia is not exactly known, but the approximate range is indicated on Fig. 99. Specimens in these areas need to be rechecked in museums.

Taxonomy and Variation: This subspecies has the flat spines of the inner surface of the rami missing, while small flat spines are present in *C. a. acontius*, and large flat spines are present in *C. orites*. There are extensive whitish markings in the area distal to the median dark band on the VFW (more than in *C. a. acontius*). The most distinctive character is the light blue macula proximal to the black cross band in the discal cell, and also the very prominent light blue cross band (extending to M_2) distal to the black cross band. There is some variation in the amount of white in the apical third of the VFW. There is also some variation in the amount of apical and subapical bright rust red markings on the DFW of the females. The apical maculae are very prominent in specimens from Bolivia and Espírito Santo, Brazil and variable in Santa Catarina, Brazil. All of these characters are subject to variation in rubbed or older specimens.

The presence of intergrades at Madre de Dios, Perú is expected, but typical specimens of *C. a. caeruleus* with intergrades and typical *C. a. acontius* in two localities in Ecuador and one specimen in Caquetá, Colombia is unexplained. The hypandrium of a male from Madre de Dios had the inner margin of the rami without flat spines the same as in Santa Catarina, Brazil.

Biology: Occurs in tropical evergreen forest in openings along forest trails and lumber roads. The adult males and females are attracted to fermenting bananas and are attracted to and enter bait traps. They occur at altitudes from near sea level to about 1,000 m. They have been collected every month of the year.

Immature Stages: The second to fifth larval instars and pupa have been described (as *C. acontius*) by Müller (1886) but the branches of the larval scoli were not reported so that it is not included in the key or in Table 1.



Figures 25-28. *Catonephele acontius caeruleus* Jenkins. ♂ dorsal (25) ventral (26) surfaces. Holotype. BOLIVIA, no specific locality (AA). ♀ dorsal (27), ventral (28) surfaces. Paratype. BRAZIL, Santa Catarina (MM).

Food Plants:

Alchornea iricurana Cas.
In Brazil

Euphorbiaceae
"Maria molle" Müller (1886);
d'Araújo et al. (1968)

Alchornea cordata Mull. Arg.
In Brazil

Euphorbiaceae
"Maria molle" Müller (1886);
d'Araújo et al. (1968)

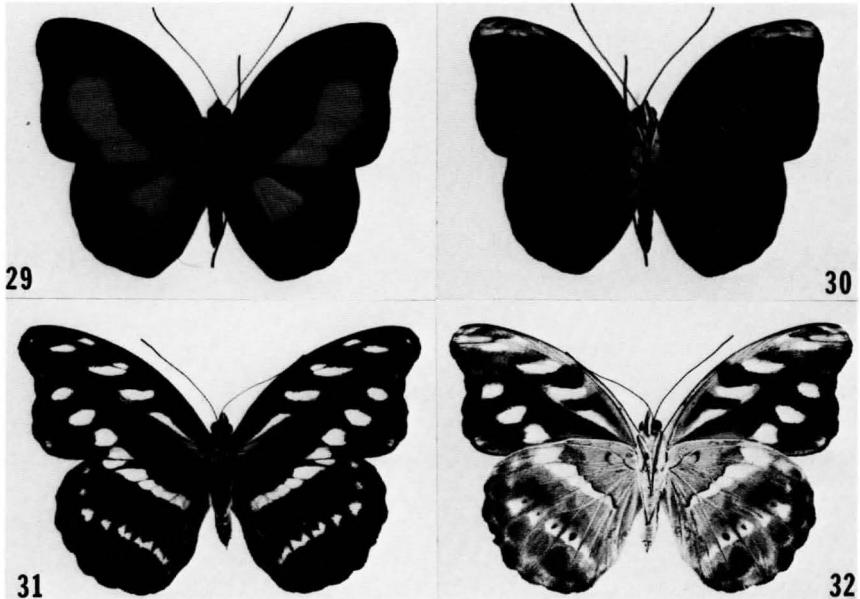
Specimens Examined: 185 ♂ 140 ♀

BOLIVIA: *Santa Cruz*, Sara; Buenavista; Cuatro Ojos; Rio Yapacani; Rio Surutu; *La Paz*, Mapiri; Guanay; *Cochabamba*; Rio Casarsama; Rio Chapare; Rio Ichilo; PARAGUAY: *Paraguari*, Sapucay; *Caaguazú*, Yhu; San José; *Guairá*, Pedro Juan Caballero; BRAZIL: *Mato Grosso*, Corumbá, Caceres; Barra do Bugres; Buriti; Rio Arinos; Rondonópolis; Barra do Garças, São Felix; *Goiás*; Goiás, Leopoldo Bulhões; Rio Verde; Jatai; *São Paulo*, Rio Ypiranga; Araras; *Paraná*, Graciosa; Alexandra; *Santa Catarina*, Brusque; St. Catharines; Canavieiras; Joinville; Timbó; Blumenau; *Rio de Janeiro*, Cavalão; Xerém; Rio de Janeiro; Rio Teresópolis; Petrópolis; *Espírito Santo*, Linhares; São Mateus; Santa Teresa; Conceição da Barra; *Minas Gerais*, Belo Horizonte to Belém; Parque Rio Doce; *Distrito Federal*, Parque do Gama; Sobradinho woods; *Rio Grande do Sul*, Santa Cruz.

Catonephele orites Stichel, 1899

Figs. 29-32, 80, 91, 99

Catonephele orites Stichel, 1899. Berl. Ent. Zeit. 43:415-416. TL: Colombia, [Boyacá] Muzo. Syntypes: 3 ♂ 5 ♀, probably Mus. Zool. Berlin.



Figures 29-32. *Catonephele orites* Stichel. ♂ dorsal (29) ventral (30) surfaces. COSTA RICA, *Limón*, Tortuguero (LA). ♀ dorsal (31) ventral (32) surfaces. PANAMÁ, *Canal Zone*, Piña (AA).

Description: Male. Similar to *C. acontius* but with DHW with "scent patch" grey; VFW with long brown silky hairs; white subapical area narrow and well-defined, not extending to M₁; DFW with postmedian orange band broader and proximal border more strongly angled than *C. acontius*. Hypandrium divided into separate rami about $\frac{1}{3}$ of length from base; greatly constricted at middle; rami with elongate flat spines extending along entire inner margins and at apex.

Female. Similar to *C. acontius* but DHW with relatively broader submedian yellow diagonal band; DFW without a reddish subapical macula.

Average wing length ♂ (26-33)31 mm, ♀ (30-38)34 mm.

Distribution: Occurs from Costa Rica to central Colombia and in northwestern Ecuador. There are also specimens from Guerrero, México and San Pedro Sula, Honduras which may be valid but need corroboration. It is possible that *C. orites* had a more extensive range and these records may be relicts or remnants. However, it is very probably due to errors in locality labels.

Taxonomy and Variation: *C. orites* has the male genitalia and hypandria different from *C. acontius* as noted in the key to male genitalia. The long silky hairs on the VFW are brown instead of black; there is a narrow white apical area from the R₁-R₃ instead of broadly diffused. The DHW has a grey instead of brown "scent patch." The inner border of the orange band on the DFW is strongly angled or bent and the front end is very knobbed and has rectilinear instead of rounded forward end. This is a species closely related to and probably derived from *C. acontius*. There is some variation in the width of the orange band on the DFW and underneath both wings the color varies from dark brown to brown-black. The females are nearly the same as *aconitius* but the DHW usually has a relatively broader submedian yellow band, but this is not always true, the same with the white submedian band on the VHW. The DFW in female *orites* has no red subapical macula while it is nearly always present in ♀ *aconitius*. There is some variation in the number of black postmedian ocelli on the VHW in *orites*.

Biology: *C. orites* is relatively uncommon and occurs in a somewhat restricted area from Costa Rica to N.W. Ecuador. It occurs in tropical evergreen and deciduous forest and in secondary regrowth areas, especially in forest openings. The adults are attracted to rotting fruit.

The adults have been collected from near sea level to 1200 m. They have been collected in nearly every month of the year with more in February and September.

Immature Stages: The first instar larvae are on a frass chain of older leaves and on the upper side of young leaves. The 2nd, 3rd, 4th, and 5th larval instars and the pupa have been described by Small (pers. comm.). The 5th instar description is summarized from his field notes.

Length 42 mm. Head metallic blue-black; epicranial horns 15 mm, long, orange and black with two whorls of four spines with small terminal rosette. Body blue green, mid dorsal and subdorsal rows of scoli orange with black spines. Thorax has a prominent orange subdorsal chalaza, with two single scoli on T-1; scoli to A-8 are orange at base. Lateral row of scoli are orange; the sublateral and supraventral row are pale whitish or cream colored mottled with orange brown, feet and prolegs cream colored.

There is no change of color in the prepupal stage. Larvae required 27 days from first instar to pupa and from 12-15 days in the pupal stage to emergence of adults.

Host Plants: Not identified, probably not *Alchornea* (no glands at base of leaf.) Five 1st to 5th instar larvae found on young and old leaves (Small, pers. comm.).

Specimens Examined: 31 ♂ 26 ♀

?MÉXICO: Guerrero, No locality (BM); ? HONDURAS: Cortés, San Pedro Sula (BM);

COSTA RICA: *Limón*, 29 km. W. Tortuguero 40 m, 3 ♂ 3 ♀ Aug. LA: Rio Babano 1 ♂ NM; Puerto Limón 1 ♂ SI: Rio Sixola 1 ♀ SI: *Heredia*, Finca la Selva, La Virgen 4 ♀ Feb. Sep. AM: Sarapiquí 1 ♀ TE: PANAMÁ: *Canal Zone*, Piña 200 m 7 ♂ 5 ♀ Jan. Feb. Jul. Aug. AA; Gamboa 1 ♀ Aug. AA; Lion Hill 1 ♀ BM; Barro Colorado 5 ♂ 2 ♀ Feb. Mar. AM; *Veraguas*, Veraguas 1 ♂ BM; Calobre 1 ♀ BM; *Colón*, Santa Rita Mts. 4 ♀ Dec. Feb. VK; *Darién*, Cana 1 ♂ GS; COLOMBIA: *Cundinamarca*, Bogotá 1 ♂ AA; 2 ♂ 1 ♀ SI: 1 ♂ BM; *Santander*, Barrancabermeja, Oseras 1 ♀ 1 ♂ AA; *Boyacá*, Muzo, 3 ♂ 5 ♀ Stichel (1898); *Antioquia*, Frontino 1 ♂ BM; ECUADOR: *Manabí* Palmar; 1 ♂ Apr. AA; *Esmeraldas*, Cachabí 1 ♂ BM.

Catonephele antinoe (Godart) [1824]

Figs. 33-36, 81, 92, 100

Nymphalis antinoe Godart [1824]. Enc. Meth. 9:410, n.197. TL: "Brazil," Amazon. Syntypes: Paris.

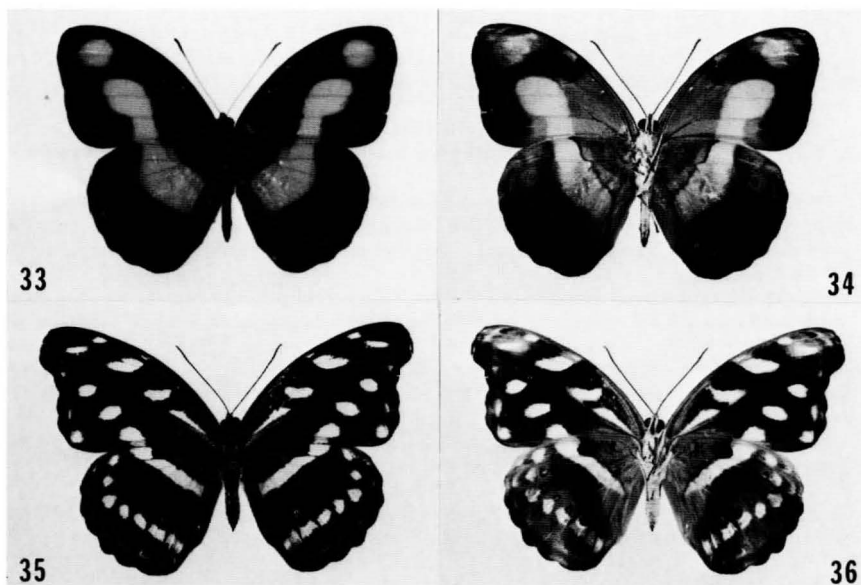
=*Catonephele boyi* Röber, 1923. Stett. Ent. Zeit. 84:94. TL: Brazil, [Pará], Santarem. Holotype: 1 ♂ Location unknown. [Syn. nov.].

=*Catonephele beccarii* Verity, 1934. Mem. Soc. Ent. Ital. 13:77, figs. 1 & 2. TL: Guyana [East Bourbice-Courentyne] Berbice, Marlissa. Holotype: 1 ♂ Zool. Museum Florence, Italy. [Syn. nov.].

=*Catonephele aloisi legionensis* Fernandez, 1928. Asoc. España Prog. Cien. IV: 124-125. TL: Perú [Loreto], Iquitos. Syntypes: Mus. Hist. Nat., Madrid. [Syn. nov.].

=*Catonephele boyi* ab. *erichi* Krüger, 1933. Int. Ent. Zeit. 27:177. TL: Brazil [Amazonas], São Paulo de Olivença. Syntypes: ♂ Coll. Krüger, Leipzig. [Syn. nov.].

=*Catonephele orbifera* Fiedler, 1933. Int. Ent. Zeit. 27: 33, 289. TL: Perú, [Loreto], Mishuayacu. Holotype: 1 ♂ Coll. R. Schmiedl, No. 20/398, Coll. Julius Arp, 1 ♀ No. 20/399 from Mishuayacu, MN Coll. [Examined] [Syn. nov.].



Figures 33-36. *Catonephele antinoe* (Godart). ♂ dorsal (33) ventral (34) surfaces. PERU, Loreto, Iquitos (JC). ♀ dorsal (35) ventral (36) surfaces. PERÚ, Huánuco, Tingo María (JC).

Description: Male. Base color velvety black. DFW with an orange band extending from M_3 to middle of anal margin, constricted in half in posterior half of band. A subapical nearly circular large orange macula present. DHW with very wide orange band in proximal half. VFW with pale orange discal cell and about $\frac{1}{4}$ distally, followed by dark brown and extending distal to cell. There is a roundish tan subapical macula. VHW tan in basal half with brown in distal half with a row of postmedian ocelli. Male genitalia has a relatively long saccus, and a valva with an apical tooth. Hypandrium strongly constricted at middle, rami large with many flat spines on entire inner margins of rami.

Female. Base color black with two rows of longitudinal yellow stripes and a postmedian yellow band on DHW. DFW with a red submedian costal macula and a small subapical red spot. DHW with reddish brown in anal area distally from postmedian band, extending into thin submarginal line. VFW with reddish brown costal area basal to postmedian yellow macula.

Average wing length ♂ (27-33)32 mm, ♀ (28-36)34 mm.

Distribution: *C. antinoe* is widely distributed in most of the Amazon basin extending from the Guianas and Venezuela to eastern Colombia, Perú, Bolivia and Brazil, especially along the Amazon river and major tributaries.

Taxonomy and Variation: This species is relatively common and was described by Godart in [1824]. There is no observed subspeciation or variation correlated with geographic distribution. However, five new names including four new species names have been described since the publication of Röber, in Seitz (1914). Unfortunately this widely used book shows a misidentified figure (pl. 98, d. fig. 3) labeled ♂ *antinoe*. It is actually a ♂ *chromis*. The ♂ *antinoe* is distinctively different and this has resulted in the descriptions of *C. boyi* Röber (1923), *C. orbifera* Fiedler (*loc. cit.*) *C. beccarii* Verity (*loc. cit.*) and *C. aloisi legionensis* Fernández (*loc. cit.*). These descriptions each compare the new taxa with *C. sabrina* and *C. salacia* and others, but not with true *C. antinoe*. *C. aloisi legionensis* Fernández (*loc. cit.*) was described as a new subspecies of *C. aloisi* which appears to never have been published (or is a composite name). After careful study and consideration throughout the range of the species, all of these names are here synonymized.

I have studied the type ♂ of *C. orbifera* in the Museu Nacional in Rio de Janeiro. It is a large typical male of *C. antinoe*. There is also a ♀ with no. 20/399 from the same locality in the same collection-Julius Arp. It is not marked type but was mentioned in the original description by Fiedler (*loc. cit.*).

There is very little variation in either male or female *antinoe*. The only significant variation observed was the partial joining or connecting of the male DFW orange median band to the subapical orange circular macula. This was described as *C. boyi* ab. *erichi* Krüger (*loc. cit.*) from Brazil, São Paulo de Olivença. I have also observed this aberration in 2 ♂ from near Manaus, Brazil in AM, and 1 ♂ labeled only "Amazons" in AM. This is not a valid taxon and is synonymized.

Biology: This species is found mostly at lower altitudes in tropical evergreen and semi-deciduous tropical forest. It is most common in riverine wet forest and is found in forest openings, roads and paths and at the edges of forests along streams. I have collected both males and females attracted to rotting or fermenting fruit, at bait traps in several localities, and at a garbage dump at Explorama Camp 65 km NE of Iquitos, Perú.

All records of collections are from relatively low altitudes, the highest elevation appears to be about 700 m in Perú. Adults have been collected from February to April and June to November with most in June to August.

Immature Stages: Nothing on the life history or food plants of this species is known to be reported.

Specimens Examined: 115 ♂ 60 ♀

VENEZUELA: *Delta Amacuro*, Barrancas; Rio Acure; *Amazonas*, Ocamo; Puerto Ayacucho; *Bolívar*, Rio Suapure; El Barroso; Rio Cuchivera; Rio Guaniamo; *Táchira*, La Morita; San Jaquín de Navay; *Barinas*, Barinas, Ticoporo; *Cojedes*, Santo Domingo; TRINIDAD: Forest Reserve (Barcant, 1970); GUYANA: No locality; East Berbice; *Courentyne*, Berbice; Marlissa (Verity, 1934); SURINAM: No locality; GUYANE: *Guyane*, Maroni River; Cayenne; COLOMBIA: *Amazonas*, Letícia; PERÚ: *Loreto*, Iquitos; Mazán; Pebas; Rio Nanay; Caballococha; Pucallpa; Mishuayacu; *Junín*, Rio Shuaro; Puno, Rio Tambopata; *Madre de Dios*, Boca Rio la Torre; Tambopata; *Huánuco*, Tingo María; BOLIVIA: *Chuquisaca*, Las Juntas; *Cochabamba*, Yungas de Palmar 2,000 m; BRAZIL: *Amazonas*, São Paulo de Olivença; Borba; Foz de Jutai; Tefé; Rio Purus, Nova Olinda; Lago Acará; Caiçara; Manacaparu; Manaus; Tonantins, Itacoatiara; Igarapé; Manicoré; Cucuí, Maués; Eirunepé; Benjamin Constant; *Pará*, Obidos; Fordlandia; Boa Vista, Tapajós; Santarém; Taperinha; *Rondônia*, Jarú, Porto Velha; Vilhena; Santo Antônio; Cachoeira do Samuel; *Mato Grosso*, Corumbá; Porto Kuluene; Alto Xingú; *Maranhão*, Montes Aureos; *Amapá*, Ilha Ucatopi; Vista Nova; Serra do Novio; *Acre*, Alto Juruá, Xapuri; *Roraima*, Boa Vista.

***Catonephele sabrina* (Hewitson) 1852**

Figs. 37-40, 82, 93, 101

Epicalia sabrina Hewitson, 1852. Exot. Butt. I: [77] pl. [39], t. 1, f. 1, t. 2, f. 4. TL: Brazil, Minas Gerais. Lectotype: BM 15-147, Rh. 9297, ♂ (labelled as HT) Here designated. (Examined). (Figs. 37 & 38).

=*Myscelia samaria* Hewitson, 1852. Exot. Butt. 1: [78] pl. [39], t. 2, f. 3. TL: "Brazil," Rio de Janeiro. Lectotype: BM 15-147, Rh. 9300. ♀. Here designated. (Examined) (Figs. 39 & 40).

Description: Male. Black velvety base color. DFW with a large orange postmedian band extending forward to M_3 ; a diagonal oval orange macula in the subapical area with much red distally in the falcate subapical region. VFW with yellow orange area in basal $\frac{1}{8}$ with purplish-black distally and extending forward in the anterior part of the discal area narrowing to the base. There are pale blue submedian and postmedian bar-like maculae in this dark area. The subapical area is buff-colored. The VHW is tan anteriorly becoming brownish with diffuse wavy brown bands. Hypandrium split into rami $\frac{1}{2}$ length from tapering base; rami with long flat spine-like setae on distal half.

Female. DFW with base color black with yellow maculae and stripes only in basal half; most of distal outer $\frac{1}{8}$ with broad diffuse chestnut-brown area, anterior apical area black. DHW black with yellow submedian diagonal band and a postmedian row of yellow narrow curved maculae. VFW with distal $\frac{1}{2}$ diffuse tan, buff and reddish; basal $\frac{1}{8}$ with yellow maculae. VHW with basal $\frac{1}{2}$ pale buff, with incurving area of dark reddish brown; a row of black postmedian ocelli.

Average wing length ♂ (31-36)34 mm, ♀ (31-38)36 mm.

Distribution: *C. sabrina* occurs in a rather restricted area in southeastern Brazil from Espírito Santo to Rio Grande do Sul especially in the coastal zone. Two ♂ specimens from Ecuador are certainly mislabeled.

Taxonomy and Variation: This species is relatively uncommon partly because of its restricted range. The type specimen labelled "holotype ♂ *sabrina*" in the BM was studied and it is typical of the general population. I designate this specimen as lectotype. There is some variation in the width and basal constriction on the DFW orange band of the ♂. The very distinctive female with a large DFW postmedian area of rust-brown is unusual in the genus. There is some variation in the presence or absence of a yellow postmedian macula in M_3 -Cu, and there may be one or two dark subapical spots in the rust-brown postmedian area of the DFW. The type of ♀ *samaria* in the BM was studied and it compares well with other females of *C. sabrina* and is a synonym. I

designate this specimen as lectotype of *C. samaria*.

Biology: Occurs in evergreen and semideciduous tropical forest areas especially in coastal areas at relatively low altitudes compared with closely related species which occur in the Andes Mountains. Most localities are at low altitudes but up to 1,500 m. Adults have been collected throughout the year with most records from January to April and July to October based on the limited records available. In the Joinville area in S. Brazil the larvae occur in March and especially April with the main brood of adults in May, but some occur every month.

Immature Stages: The larvae have been reared by Herbert Miers (pers. comm.)

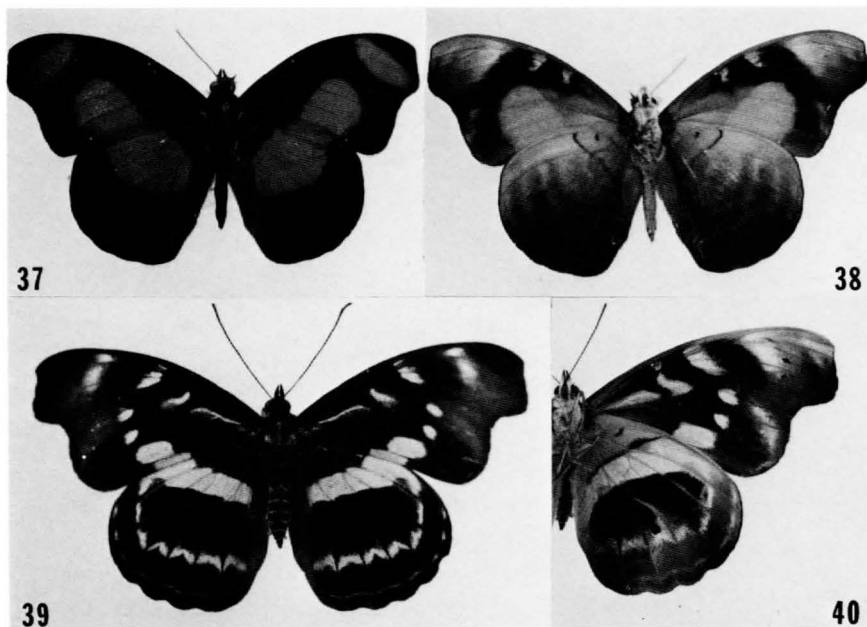
Food Plants: Larvae are reported to occur on "caneleira."

Nectandra sp.

d'Araújo et al. (1968)

Specimens Examined: 66 ♂ 55 ♀

ECUADOR: No locality (Frank Johnson Coll.) 2 ♂ AM; (certainly mislabeled); BRAZIL: No locality 10 ♂ 11 ♀ BM; 3 ♂ LA; 1 ♀ AA; *Espírito Santo*, NL, 1 ♂ 1 ♀ BM; *Rio de Janeiro*, Petrópolis 1500 m 1 ♂ 1 ♀ Mar. AA; 1 ♂ BM; 6 ♂ 1 ♀ Jan.-May. Sep. KB; 1 ♂ Aug. UP; Itatiaia Resende 6 ♂ Jan.-May KB; Nova Friburgo 1 ♂ BM; 1 ♀ Jan. MM; Teresópolis 3 ♀ MN; *Paraná*, Castro 2 ♂ 1 ♀ BM; 1 ♂ SI; Curitiba 1 ♀ UP; Ortigueira, 1 ♂ Feb. UP; *São Paulo* Itaici 1 ♂ Feb. MM; Alto Paraná 1 ♀ BM; *Minas Gerais* No locality 1 ♂ ST; 1 ♂ BM; Serra dos Cochás 1 ♂ BM; Poços do Caldas 6 ♂ Apr. MN; *Santa Catarina*, Blumenau 3 ♂ 2 ♀ MZ; 1 ♂ 4 ♀ MN; 1 ♀ Sep. AA; 1 ♂



Figures 37-40. *Catonephele sabrina* (Hewitson). ♂ dorsal (37) ventral (38) surfaces. BRAZIL, Minas Gerais. Lectotype *Epicalia sabrina* Hewitson (BM). ♀ dorsal (39) ventral (40) surfaces. BRAZIL, Rio de Janeiro. Lectotype *Epicalia samaria* Hewitson (BM).

1 ♀ AM; Taiózinho 1 ♂ Apr.; Joinville 1 ♀ MN, 10 ♂ 11 ♀ Feb. Mar. JC; 2 ♂ 3 ♀ Jul. Sep. Oct. UP; Mafra 1 ♂ MN; São Bento do Sul 1 ♀ JC; *Rio Grande do Sul*, No locality 1 ♂ 3 ♀ BM; 1 ♀ Apr. AA; 1 ♀ SI; 1 ♂ 1 ♀ UP, São Laurenço 1 ♀ MN.

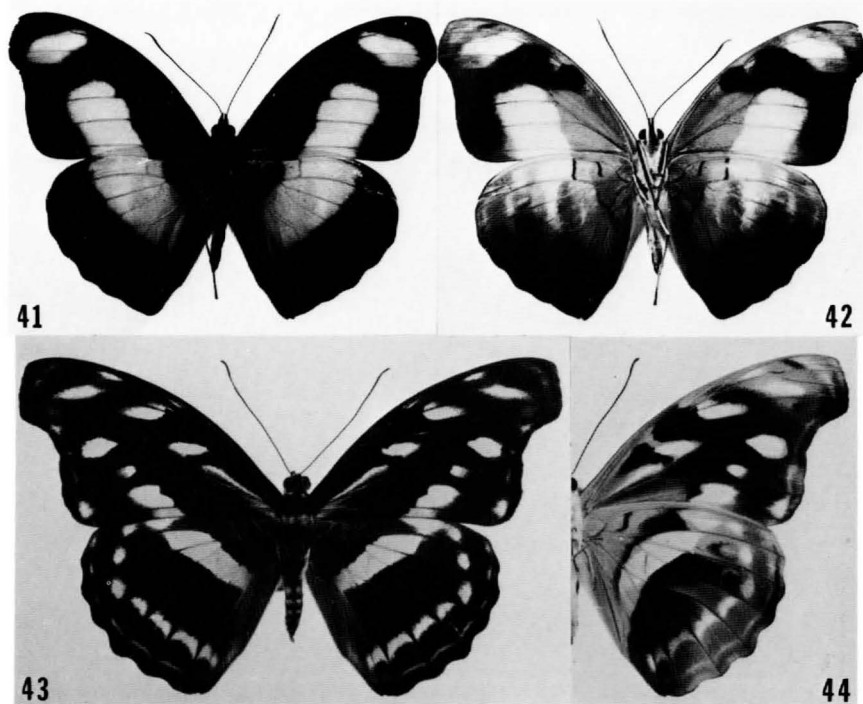
Catonephele salambria (C. & R. Felder), 1861

Figs. 41-44, 83, 94, 101

Epicalia salambria C. & R. Felder, 1861. Wien. Ent. Mon. 5: p. 106, n. 88. TL: [Colombia] "Cordillerae Bogotanae" Syntypes: ♂ (not in BM).

Description: Male. Black velvety base color. DFW with large orange postmedian band extending forward to M_3 ; a diagonal oval orange macula in the subapical area without any red distally. VFW with yellow-orange in basal $\frac{1}{4}$ extending to costal area in basal half with purplish black in distal area extending forward in costal area only in distal half of wing. Subapical area is buff colored. VHW with light buff gradually shading to light brown. There is no incurved very dark brown area as in *C. chromis* ♂. A dark postmedian ocellus occurs only in M_1 - M_2 . Hypandrium divided into separate rami $\frac{1}{4}$ of length. Rami with one or a few flat spine-like setae. Valvae elongate, somewhat pointed; gnathos arm small, $\frac{1}{3}$ length of uncus.

Female. Black with two longitudinal maculae or stripes. DHW with yellow submedian and postmedian bands. VHW with inner margin of yellowish incurving submedian band bordered by a thick red line expanded to a large reddish macula in $Sc + R_1$ to R_5 ; no postmedian circular ocelli, but maculae present only in M_1 - M_2 and Cu_1 - Cu_2 .



Figures 41-44. *Catonephele salambria* C&R Felder. ♂ dorsal (41) ventral (42) surfaces. PERÚ, Huánuco, Tingo María (JC). ♀ dorsal (43), ventral (44) surfaces. PERÚ, Junín, Chanchamayo (BM).

Average wing length ♂ (35-42)40, ♀ (42-44)43 mm.

Distribution: *C. salambria* is distributed through the Andean mountains from southwestern Venezuela through Colombia, Ecuador, Perú, and Bolivia from about 500 to 1500 m elevation.

Taxonomy and Variation: *C. salambria* is relatively uncommon. It is closely related but quite distinct from *C. chromis* which also extends down the Andes from Venezuela to Bolivia.

There is a mystery about several older specimens of *C. salambria* from México and Central America. Three typical male specimens labeled "México" are in the PA collection from Philadelphia now in the CM, one male from Gerónimo, Costa Rica is in the SI, and two females from Colón, Panamá have been identified. *C. salambria* has not been reported from Central America or México in any recent collections. The closest distribution records now known are from central Colombia. It is impossible to state whether this mountain species formerly occurred or is very rare in México and Central America, or whether the five specimens in three different collections are mislabeled. *C. chromis* has a similar distribution from Bolivia to Venezuela and also occurs in Panamá and Costa Rica and was originally described from "Honduras." There is also an older specimen of *C. chromis* labeled "México" in the CM. Mountain inhabiting species may be very local and rare in relict outposts or may be extirpated from them with widespread destruction of habitat. The record at Iquitos, Perú from 1937 in AA is very doubtful since it is out of the range, and Iquitos was an exporting locality where specimens were brought from many localities.

Biology: There is little known about the biology of this species. It occurs in tropical forest in mountainous areas. I have collected it only at Tingo María, Perú on forest roads and at the edge of forests.

Adults have been collected from about 500 to 1,500 m or higher elevation, mostly in localities from 750 to 1200 m. They occur mostly in January to April and from July to November, but may occur throughout the year.

Immature Stages: Nothing has been reported on the immature stages and food plants of this species.

Specimens Examined: ♂ 90 ♀ 14

?MEXICO: No locality 3 ♂ AES coll. (PA Coll.) CM (?); ?COSTA RICA: "Geronimo" 1 ♂ SI (?), ?PANAMA: *Colón*, Colón 2 ♀ AM (?); COLOMBIA: *Boyacá*, Muzo 2 ♂ Apr. LA; 1 ♂ AA; Rio Minero 2 ♂ BM, *Cundinamarca*, Bogotá 4 ♂ BM; 2 ♂ MZ; 3 ♂ ST; 16 ♂ Apr. AM; Guayabetel 1,400 m. 1 ♀ Jan. AM; *Meta*, Villavicencio 1 ♂ MZ; 1 ♂ BM; Peperital 1 ♂ BM; Buena Vista 1 ♂ BM; *Tolima*, Honda 1 ♀ BM; VENEZUELA, *Táchira*, Minda (Lamas); *Zulia*, Sierra Perijá 1 ♂ Dec. UC; ECUADOR: *Bolívar*, Balzapamba 1 ♀ AA (?); *Tungurahua*, El Rosario 1250 m, 1 ♂ BM; Puyo 1,100 m 1 ♂ Mar. AA; Hacienda La Mascota 1,500 m. 1 ♀ CM; *Santiago-Zamora*, Zamora 1,000 m, 1 ♂ Oct. AA; 3 ♂ BM; *Napo*, Upper Rio Napo, 2 ♂ BM, 1 ♂ AM; 2-4°S - 78° W, 875 m, 1 ♂ Nov. AM; *Morona-Santiago*, Gualaquiza 1 ♂ BM; PERÚ: *Loreto*, Iquitos 1 ♂ SEP. AA; (Probably error); *Huánuco*, Tingo María 700 m, 1 ♂ Mar. AA, 6 ♂ 2 ♀ Jul. JC; 2 ♂ Mar. Nov. MM; Pozuzo 2 ♂ BM; *Pasco*, Pichis Road, 1 ♂ BM; *Puno*, Carabaya, 1 ♂ AM; S. Domingo 4 ♂ BM; Oroya, Inambari 1 ♂ BM; *Junín*, S. L. de Shuaro 2 ♂ UN; Chanchamayo 1 ♂ SI; 1 ♂ UP; 1 ♀ AM; 3 ♂ 2 ♀ BM; San Ramon 1,000 m, 3 ♂ 2 ♀; La Merced 1 ♂ MN; *Apurímac*; Rio Piene 1 ♂ AM; *Madre de Dios*, Shintuya, Sierra de Dios, 1,000 m, 2 ♂ Jul. AA. BOLIVIA: *La Paz*, Rio Zongo 750 m, 1 ♂ 1 ♀ SI; 1 ♂ AM; Chulumani 1 ♂ BM; Yungas 1 ♂ BM; *Cochabamba*, Cochabamba 4 ♂ BM; Chapare 1 ♂ MA; 1 ♂ UC.

Catonephele chromis (Doubleday) [1848]

C. chromis is a mountain species which occurs in the Cordilleran mountains of Costa Rica and Panamá (perhaps Honduras?) south in the Andes mountain range from Venezuela to Bolivia. It is relatively uncommon in collections especially the subspecies *godmani* in Central America. This subspecies intergrades with the nominate subspecies in northwest Colombia. The female is dimorphic with yellow or white wing markings. (The white form was described as ab. *columbana* by Stichel).

Description: Male. Black velvety base color. DFW with large orange postmedian band extending forward to M_3 , a diagonal oval orange macula in the subapical area without any red marking distally. VFW with yellow-orange in basal $\frac{1}{4}$, with purplish-black in the distal area extending forward in the anterior part of the discal area narrowing to the base. There are pale blue submedian and postmedian bar-like maculae in this dark area. VHW light brown or tan in basal $\frac{1}{2}$ with an incurving thin submedian line; the distal $\frac{1}{2}$ is contrasting dark chocolate brown with an incurved border. Male genitalia with relatively larger and rounded saccus; gnathos arm thick and long. The hypandrium is slightly constricted at middle and tapering to relatively small rami with flat spine-like setae on over half of the inner margin of the rami.

Female. Dorsal surface of wings black with yellow (or white) maculae and stripes, almost identical to ♀ *C. salambria*. VHW with proximal margin of yellowish incurving submedian band bordered by a narrow reddish line; postmedian circular ocelli present from M_1 to Cu_2 .

Key to Subspecies of *C. chromis*

Males.

- 1a. DFW with orange band quite broad; orange area above Cu_1 much reduced with fuzzy border; apical orange bar larger and thicker. DHW with broad orange area with outer edge convex. VFW with outer margin of orange area extending straight posteriorly with no constriction in Cu_2-2A ; VHW with a white irregular thin postmedian band from M_1-Cu_2 . (Central America to N. Colombia).....*godmani*
- 1b. DFW with orange diagonal bar narrower, often constricted at base; orange area above Cu_1 prominent with well-defined border; apical orange bar narrower usually crescentic or curving; DHW with orange area narrower with outer edge straight. VFW with outer margin of orange area incurving constricted in Cu_2-2A ; VHW with a white postmedian marking obvious in M_3-Cu_1*chromis*

Females.

- 1a. DFW with large prominent subapical red macula. DHW with basal yellow cross bar and postmedian band of maculae narrow. VFW with submedian maculae in discal cell not connected. VHW with postmedian band of thin maculae, median ocellus in M_3-Cu_1 , not enclosed with whitish or yellow.....*godmani*
- 1b. DFW with none or small red subapical red macula. DHW with basal yellow cross bar and postmedian band of macula broad. VFW with submedian maculae in discal cell connected. VHW with postmedian band of broad maculae; median ocellus in M_3-Cu_1 , often enclosed with whitish or yellowish.....*chromis*
- 1c. Dimorphic female with all white maculae on DFW (except two yellow median maculae posterior to Cu_2).....*chromis*

Catonephele chromis chromis (Doubleday) [1848] [Stat. rev.]

Figs. 45-50, 84, 95, 102

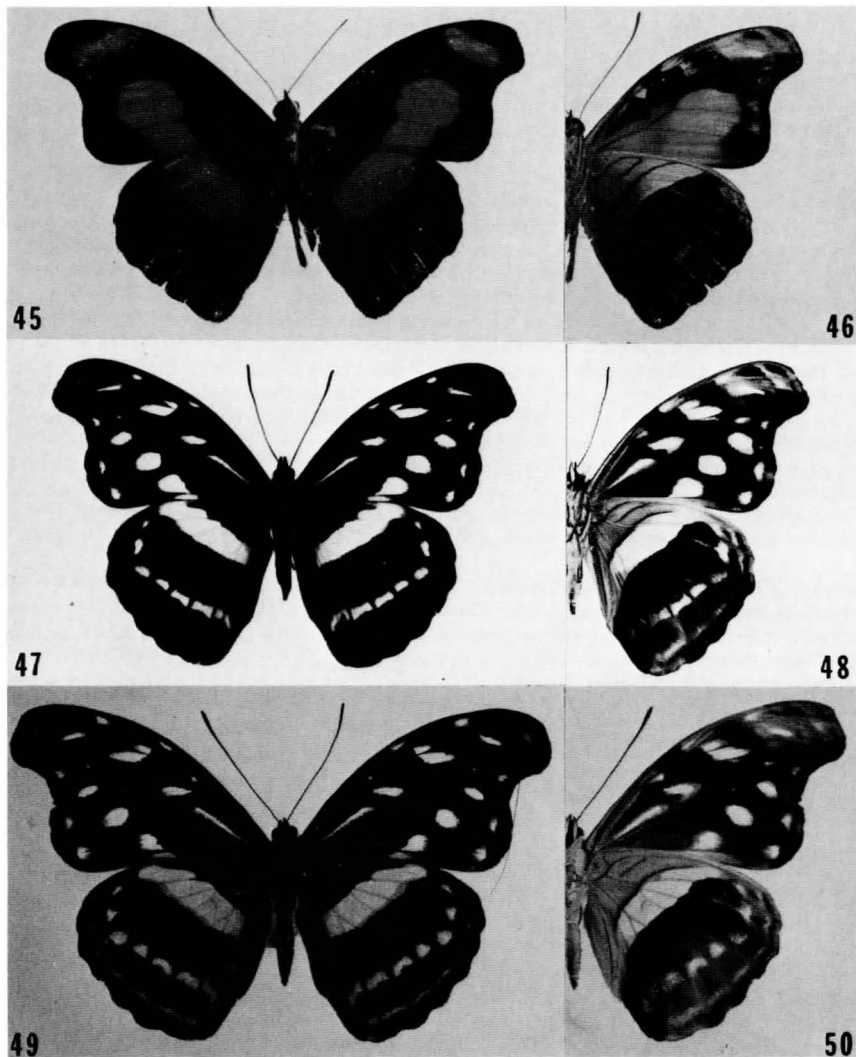
Myscelia chromis Doubleday [1848]: Gen. Diurn. Lep. 222, pl. 27, fig. 1. TL: "Honduras" (misabeled). Lectotype: BM 15-148, Rh. 9302. 1 ♀ Here designated.

(Examined) [Stat. rev.]

=*Epicalia pierretii* Doubleday [1848]. Gen. Diurn. Lep. Pl. 29, f. 4. TL: Bolivia. Holotype: RM, Rh. 9301, 1 ♂ HT. (Examined) (Fig. 45-46).

=*Catonephele chromis* ab. ♀ *columbana* Stichel, 1901. Berl. Ent. Zeit. Bd. 46: 1-4, pl. 2, f. 2. TL: Colombia. Holotype: ♀ not found in BM (Is dimorphic white female). [Syn. nov.]

Description: As in *C. chromis* except for the differences listed for *C. c. chromis* in the



Figures 45-50. *Catonephele chromis chromis* (Doubledaw). ♂ dorsal (45) ventral (46) surfaces. BOLIVIA, no specific locality. Holotype. *Epicalia pierretii* Doubleday (BM). ♀ (yellow) dorsal (47) ventral (48) surfaces. BOLIVIA, La Paz, Rio Zongo (BM). ♀ (white) dorsal (49) ventral (50) surfaces. COLOMBIA, no specific locality (BM).

key to subspecies.

Average wing length ♂ (35-41)39 mm, ♀ (38-44)42 mm.

Distribution: Occurs from Venezuela through the Andes south to central Bolivia. There are three specimens outside of this range at Puerto Ayacucho, Venezuela and at Benjamin Constant, Brazil. These are doubtful records; however, the specimen from Itajahy, in Santa Catarina, Brazil in the Moeck Coll. (MM) is certainly mislabeled.

Taxonomy and Variation: The taxonomy of *C. chromis* is quite confused. *C. chromis* was described by Doubleday in [1848] pl. 27, fig. 1, (shows more red on DFW than type), based on a female from "Honduras." He described *C. pierretii* at the same time (pl. 29, f. 4) based on a male from Bolivia. Stichel described *C. godmani* in 1901 as a separate species based on specimens from Costa Rica, Panamá, and Colombia and expressed doubt about the Honduras locality label. He also described a white marked ♀ as *C. chromis* ab. *columbana* in 1901. I have carefully examined the types of *C. chromis*, *C. pierretii*, and series of 300 specimens from Costa Rica (and México) to Bolivia. Examination of male genitalia and hypandria from Costa Rica, Colombia, Venezuela and Bolivia show no significant differences. The rubbed female type of *C. chromis* from "Honduras" appears to be an intergrade probably from N. Colombia, showing some characters of the Central American, but mostly South American populations. Unfortunately this ♀ must be designated as the lectotype. *C. c. godmani* is considered to be a well marked subspecies of *C. chromis* and represents the Central American population. There are several intergrades in northern Colombia.

C. chromis ab. *columbana* is a white marked dimorphic female of *C. chromis chromis*, which occurs from Colombia to Bolivia. Almost half of the females identified in various collections are white. This is not considered to be an aberration but a dimorphic form of the female and the name is not recognized.

C. pierretii Doubleday [1848] from Bolivia was thought to be a separate subspecies at the southern end of the range, but careful study of a series of specimens show that the characters of *C. pierretii* such as a basally narrowed orange band commonly occurs in localities with *C. c. chromis*. It is not a valid taxon and it is therefore synonymized.

Biology: This subspecies occurs mostly in the Andean mountains from north central Venezuela to Bolivia at altitudes from about 200 to 2,000 m. It occurs in semi-deciduous and perennial tropical forest and may occur in lower montane rain forest. It is found in forest openings and roads or trails and at forest edges.

Adults have been collected in nearly all months of the year but there are more records from March to July and September to November

Immature Stages: There are no data reported on the immature stages nor host plants, but would probably be similar to that reported for *C. c. godmani* in Panama by Small (pers. comm.)

Specimens Examined: 158 ♂ 68 ♀

?MÉXICO: No locality ♂ CM; PANAMÁ: *Darién*, Cana X; VENEZUELA: *Aragua*, Rancho Grande X; *Maracay*; *Choroni* 1400 m; *Lara*, Terepaima; *Distrito Federal*, Caracas; *Mérida*, Mts. of Mérida; *Jají*; *Amazonas*, Puerto Ayacucho; COLOMBIA: *Antioquia*, Mesopotamia; *Risaralda*, Pereira; *Cundinamarca*, Bogotá; *Guayabetel*; *Quebrada Tasajeras*; *Meta*, Manzanares 1,400 m; *Villavicencio*; *Rio Negro*; *Valle*, Cali 1,000 m; *Rio Dagua*; *Rio Aguacatel*; *Caldas*, Manizales; *Boyacá*, Muzo; *Tolima*, La Marina, *Rio Ambeima*; ECUADOR: *Bolívar*, Balzapamba (?); *Morona-Santiago*, Gualaquiza; *Pastaza*, Mera; *Sarayacu*; *Tungurahua*, Baños; *La Merced* 1,300 m; *Hacienda La Mascota*; *Pichincha*, Tandapi; PERÚ: *Amazonas*, Huambo; *Chachapoyas*; *Huánuco*, Cushi; *Pozuzo*; *Pasco*, Huancabamba; *Junín*, La Merced; *Chanchamayo*; *Shuaro*; *Satipo*; *Puno*, Carabaya; *Inambari*; *Chirimayo*; *Oroya*; *Inca Mines*; *Cuzco*,

Marcapata; Cuzco; Rio Cosñipata, Buenos Aires; BOLIVIA: *Cochabamba*, Cochabamba; Chapare; El Palmar 1,100 m; San Jacinto; *La Paz*, La Paz; Coroico; Rio Zongo; Yungas; BRAZIL: *Amazonas*, Itajahy, Moeck Coll. (T. Kaney) (MM); Benjamin Constant 1 ♂ Sep. (AA).

***Catonephele chromis godmani* Stichel, 1901 [Stat. rev.]**

Figs. 51-54, 84, 95, 102

Catonephele godmani Stichel, 1901: Berl. Ent. Zeit. Bd. 46:1-4, pl. 1, f. 2 and pl. 2, f. 3.

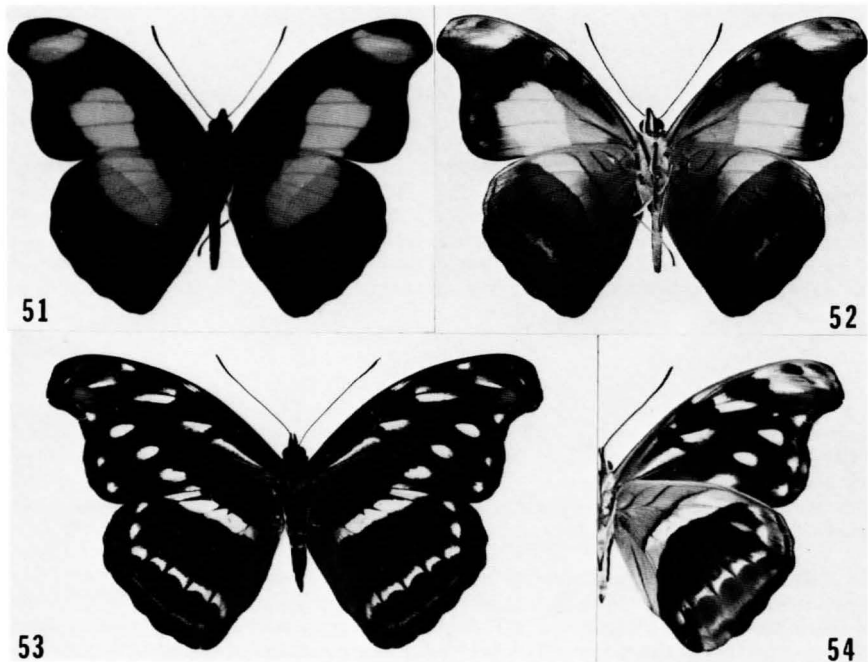
TL: Costa Rica [Cartago], Irazú; "Panamá"; Colombia [Magdalena] Santa Marta, San José. Syntypes: ♂ and ♀, not found in BM [Stat. rev.]

=*Epicalia chromis* Godman & Salvin, 1883: 243 (nec. Doubleday [1848]).

Description: As in *C. chromis* except for the differences listed for *C. chromis godmani* in the key to subspecies. Average wing length ♂ (35-40) 37 mm, ♀ (40-43) 41 mm.

Distribution: Occurs from Costa Rica to northern Colombia and northwestern Venezuela with intergrades in northeastern Colombia. The 1848 record of "Honduras" is perhaps doubtful and the record from México in CM is an error in labeling.

Taxonomy and Variation: This is a valid subspecies but not a separate species as described by Stichel (1901). There are intergrades in several areas in Colombia with the nominate subspecies. There are no observed variations but the specimens available for



Figures 51-54. *Catonephele chromis godmani* Stichel. ♂ dorsal (51) ventral (52) surfaces. PANAMÁ, Chiriquí (ST). ♀ dorsal (53) ventral (54) surfaces. COSTA RICA, Alajuela, San Jeronimo (SI).

study were limited.

Biology: Occurs in tropical evergreen and semi-deciduous forest, in forest openings, forest roads and trails and forest edges. Adults are attracted to banana baits and other fermenting fruit. They occur from over 200 to 1,450 m. They have been collected nearly throughout the year.

Immature Stages: The egg, 1st to 5th instar and pupae have been described by Small (pers. comm.). The description of the egg and 5th instar has been summarized from his field notes.

The eggs are deposited on low plants with green or slightly reddish undersides. The egg is white, somewhat elongated with a depression at the top surrounded by about 14 slightly protruding longitudinal ridges.

Larva length 27 mm (preserved). Head greenish white with bases of epicranial horns (13 mm in length) black. Ocelli black, spines on side of head below epicranial horn black, other spines yellow. Epicranial horns green, tipped with yellow, two whorls of four spines, with small terminal rosette. Body light green with numerous small tubercles; bases and scoli of mid-dorsal and subdorsal rows pale orange; scoli spines black tipped. Scoli on T-1 black with green bases. Feet and prolegs light green. Pupa is green with white frosting, light chocolate colored markings laterally and ventrally.

The larval maturation to pupa required at least 24 or more days. A pupa collected in the field emerged on the ninth day after being found.

Host Plants:

Alchornea glandulosa(?)

Euphorbiaceae

In Panamá

Small (pers. comm.)

Specimens Examined: 47 ♂ 27 ♀

MÉXICO: "México" CM (Osten Sacken, labelled *C. pierretii*) is intergrade (Error?); HONDURAS: "Honduras" ♀ BM (Error, probably from Colombia); COSTA RICA: *Alajuela*, San Jeronimo; *Cartago*, Cartago; Birricitis; Cachí; Irazú; *Puntarenas*, Tule; San Vito 1200 m; *San Jose*, Asserí; *Limón*, Rio Sucio; PANAMÁ: *Chiriquí*; Chiriquí; Cerro Colorado 1450 m; *Colón*, Colón; COLOMBIA: *César*, San José in Sierra Nevada de Santa Marta; *Magdalena*, Sierra San Lorenzo X; *Antioquia*, Frontino X; *Norte de Santander*, Ocaña, Puebla Nueva X; Bogotá; Guayabetel; *Meta*, Manzanares; *Valle del Cauca*; Cali, 1000 m; VENEZUELA: Táchira; Borotá; Chorro del Indio; *Mérida*, Santo Domingo, *Lara*, Terepaima; Humocaro; Humuquena; Cabudare; *Barinas*, La Chimenea.

Catonephele numilia (Cramer, 1776)

The geographic range of *C. numilia* extends from México to southern Brazil and Argentina. It is quite common and somewhat variable. It occurs in five subspecies, three of which are well marked and distinctive. The subspecies in western México and southeastern Brazil are somewhat similar but are not as well differentiated from other subspecies. Intergradation occurs in the tension or border zones between the subspecies. The male genitalia and hypandria do not vary significantly throughout the range of the species.

Description: Male. Base color velvety black. DFW with a large orange central round or wide ellipsoid macula and a subapical broad ellipsoid orange macula. DHW with a large orange submedian macula in basal $\frac{1}{5}$. This gives the appearance of six orange macula on the upper surface of the wings. DHW with light blue apical markings, blue on posterior margin variable, VFW with dull orange in basal $\frac{2}{5}$, with black area distally and anteriorly in median area, with subapical buff area. VHW with wavy brown markings, lighter basally. Hypandrium strongly constricted in basal $\frac{1}{4}$; rami about $\frac{3}{4}$ length of hypandrium, with long flat spines on inner margins.

Female. Base color black with a yellow diagonal median band, and subapical red macula at base of falcate projection. DHW with black, orange or mahogany brownish-red discus; a postmedian and submarginal rows of thin bluish or yellowish dash line. VFW with a pale yellow diagonal band. VHW with buff and reddish brown markings with a row of black postmedian ocelli.

Key to Subspecies of *C. numilia*

Males.

- 1a. DFW with median orange macula roughly circular, not extending anterior to M_3 , nor into discal cell. DHW without three or more light blue submarginal maculae2
- 1b. DFW with median orange macula irregularly ellipsoid extending anterior to M_3 , about half way through discal cell. DHW may have three or no light blue submarginal maculae3
- 2a. DHW with a short band of light blue maculae and shading at posterior angle of wing; outer area of $Rs-M_1$ broadly shaded with apical and subapical light blue. DFW with distal orange macula with distal margin without diffuse reddish extending to margin of wing; VHW with median dark line across $Sc+R_1$ to Rs not strongly angled outward to Rs *esite*
- 2b. DHW without any light blue maculae and shading at posterior angle of wing (a thin blue submarginal line may be present), distal area of $Rs-M_1$ with a submarginal macula of light blue. DFW with distal orange macula with distal margin with diffuse reddish extending to margin of wing. VHW with median dark line between $Sc+R_1$ to Rs strongly angled distally to Rs (western México to San Salvador)*immaculata*
- 3a. DHW with three or more prominent light blue submarginal maculae on posterior border and much light blue shading in $Sc+R_1$ to M_1 . Distal orange maculae rarely with distal reddish color. Larger size wing length 35-38 mm (Amazon basin)*numilia*
- 3b. DHW with subdued or missing light blue submarginal maculae on posterior border and subdued light blue shading in $Sc+R_1$ to M_1 . Distal orange maculae may have diffuse reddish at distal end. Smaller size wing length 30-36 mm. (S. Brazil S. Bolivia, Paraguay and Argentina)4
- 4a. DHW without blue submarginal maculae or very faint; subdued bluish in $Sc+R_1$ to M_1 ; DFW with orange maculae smaller; distal maculae with extensive reddish to margin of wing. Size smaller 30-33 mm*neogermanica*
- 4b. DHW with usually three small or subdued blue maculae. Distal macula of DFW rarely with reddish to margin. Intermediate between *numilia* and *neogermanica* in most characters*penthia*

Females.

- 1a. DHW with orange or rust red or mahogany discus with a postmedian row of black maculae2
- 1b. DHW with black discus3
- 2a. DHW with orange discus with a row of large elongate black postmedian maculae; DFW with yellow broad median diagonal area*numilia*
- 2b. DHW with mahogany brownish-red discus with a row of black postmedian maculae; DFW with narrow yellow median diagonal band*neogermanica*
- 3a. DFW with yellow median band usually terminating less sharply; the band composed of three distinct maculae; no postmedian yellow spot in R_3-R_4 ; DHW with submarginal band yellowish*penthia*
- 3b. DFW with yellow median band terminating in a sharp wedge; a postmedian yellow spot usually present in R_5-M_1 ; DHW with submarginal band bluish or greenish yellow4
- 4a. VHW with basal dark line from $Sc+R_1$ usually extending proximally or vertically*esite*

4b. VHW with basal dark line from Sc+R₁, usually extending distally*immaculata*

***Catonephele numilia numilia* (Cramer) 1776**

Figs. 55-58, 85, 96, 103

Papilio numilia Cramer, 1776. Pap. Exot. 1:128, 154, tab. 81, figs. E & F. TL: Surinam.

Type: ♂ not seen in BM.

=*Papilio micalia* Cramer 1777. Pap. Exot. 2:18, 149, tab. 108, figs. C & D. TL: West Indies [?]. Syntypes: ♀ Coll. Baron Rengers. Junior homonym of *Papilio micalia* Cramer, 1776.

Description: As in *C. numilia* except for differences listed for *C. n. numilia* in the keys to males and females for subspecies. Average wing length ♂ (32-38)35 mm, ♀ (36-42)40 mm.

Distribution: Occurs from Guyane to central Colombia, eastern Ecuador, south in Perú and Bolivia.

Taxonomy and Variation: The males are rather similar with little variation. The females vary somewhat in the size of the dark postmedian markings on the DHW. Intergrades with *C. n. esite* occur in Trinidad, Bogotá and Villavicencio, Colombia and Sadzayacu and Palmar, Ecuador. These intergrades are most readily observed in the females in which the DHW discus area may be mostly dark with slight orange marking, or mostly orange. The males show some intergradation in the blue submarginal markings on the DHW. There is a male *C. n. numilia* obviously mislabeled "Honduras" in the CM.

Two aberrations were found in the Museu Nacional, Rio de Janeiro. A male had the left subapical macula not orange, but all red and much smaller. Another aberration in a



Figures 55-58. *Catonephele numilia numilia* (Cramer). ♂ dorsal (55) ventral (56) surfaces. PERÚ, Huanuco, Tingo María (JC). ♀ dorsal (57) ventral (58) surfaces. PERÚ, Huánuco, Tingo María (JC).

male on the right wing had a small jagged orange subapical macula, and the median orange macula was about one-half normal size.

Biology: Occurs in heavy evergreen tropical forest, in semi-deciduous tropical forest, and in cut-over regrowth areas. The adults fly in forest openings, trails, and roads in forest and at the edges of forests and along stream margins. They fly mostly in the tree tops but are attracted to rotting and fermenting fruit such as bananas, pineapple, mango, papaya, and oranges. The males are more common (3:1) than the females and may be locally common. The adults are found from near sea level to an altitude of over 1,500 m. They have been collected every month of the year.

Immature Stages: The egg, three instars of larvae and the pupa were described by Urich (1980) from an intergrade area in Trinidad. The larval spines were not described so that it cannot be compared accurately with other *Catonephele* larvae.

Food Plants:

<i>Alchornea triplinervia</i> (Spr.) Trinidad	<i>Euphorbiaceae</i>	Urich (1980)
<i>Citharexylum fruticosum</i> (L.) Trinidad	<i>Verbenaceae</i>	Barcant (1970)
(This record needs confirmation.)		

Specimens Examined: 310 ♂ 107 ♀

VENEZUELA: *Bolívar*: El Dorado km. 107; 3N65W; Kanarakuni; *Amazonas*: Cerra Yavita; COLOMBIA: *Meta*, Restrepo; Villavicencio X; *Cundinamarca*, Bogotá; TRINIDAD: *St. George West*; Maupertuis X; St. Annes Valley X; "Rio Caraciola" X; SURINAM: No locality; GUYANE: *Guyane*, Maroni; St. Jean de Maroni; St. Laurent; ECUADOR: *Morona-Santiago*, Macas; *Napo*, Sarzayacu; Rio Coca; Puerto Misahualli; Tena; *Santiago-Zamora*, Zamora 1000 m; Zumbi 700 m; *Tungurahua*, La Merced; Baños; *Oriente*, Sadzayacu X; PERÚ: *Loreto*, Rio Nanay, Mishana; Rio Napo; Libertad; Iquitos; Pebas; Pucallpa; Caballococha; Rio Cachiyacu; *Huánuco*, Tingo María; Pozuzo; *San Martín*, Tarapoto; Juanjui; Rioja; *Junín*, Satipo; Chanchamayo; La Merced; Vítoc; Bartrá; Shuaro; Shanki; San Ramon; *Ayacucho*, Candalosa; *Puno*, Inambari; Carabaya; *Madre de Dios*, Boca Rio la Torre; Puerto Maldonado; *Cuzco*, Rio Colorado; BOLIVIA: *La Paz*, Rio Mapiri; Muchanes; Guanay; San Agustín; Chimate; Rio Zongo; Santa Cruz, Prov. Sara; *Cochabamba*; El Palmar; BRAZIL: *Amazonas*, Jauretê; Tabatinga; Benjamin Constant; Borba; Caçadua; São Paulo de Olivença; Tefé; Tonantins; Manaus; Maués; Fonte Boa; Ipiranga; Paranaquara; Rio Uaupés; Manicoré; *Pará*, Itaituba; Santarém; Trombetas; Obidos; Utinga; *Mato Grosso*, Cuiabá; Burity; Tangará; Xingú; *Rondônia*; Jaru; Porto Velho; Pimenta Bueno; Cachoeira do Samuel; Acre, Xapuri.

Catonephele numilia esite (R. Felder), 1869

Figs. 59-62, 85, 96, 103

Epicalia esite R. Felder, 1869. Verh. Zool. Bot. Ges. 472, no. 23. TL: México [Veracruz], Potrero. Syntypes: ♂ BM or Vienna.

=*Catonephele numilia penthiana* Staudinger [1886], Exot. Tagf. 1:113-114. TL: Panamá, Chiriquí. Syntypes: ♂ Zoologisches Museum, Berlin.

Description: As in *C. numilia* except for differences listed for *C. numilia esite* in the key to males and females for subspecies. Average wing length ♂ (31-37)35 mm, ♀ (36-41)39 mm.

Distribution: This subspecies has been found from northeastern México from near Tampico south through Central America to the Pacific slope of Ecuador and through northern Colombia to Venezuela, Trinidad and Guyana.

Taxonomy and Variation: *C. numilia esite* is a distinct and well marked subspecies which does not show much variation throughout its range except for intergrades with *C. n. numilia* (and *C. n. immaculata*). At the tension zone or interface area between the two subspecies, the females especially show intergradation as mentioned for *C. n. numilia*. There is some variation in the amount of light blue markings on the DHW of the males and the bluish to greenish submarginal lines on the DHW of females.

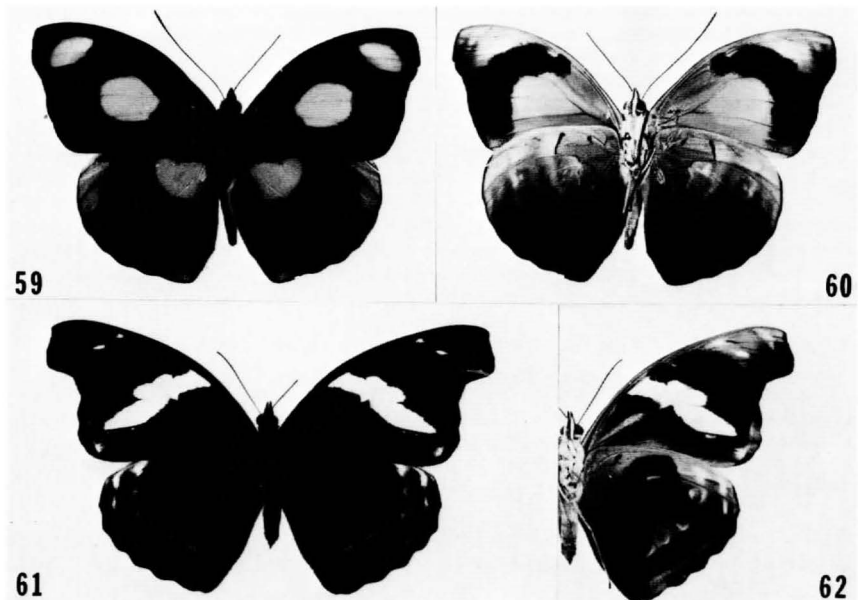
Catonephele numilia penthiana Staudinger [1886] was described to name the Central American form that resembled *C. n. penthia* if Godman and Salvin had not named it. Staudinger was unaware of *Epicalia esite* described by R. Felder (1869). Stichel (1899) synonymized *penthiana* without any comment. Röber, in Seitz, (1914) did not refer to *penthiana*.

Biology: The adults are found in evergreen tropical forest and semideciduous tropical forest and in moist riverine forests. They are also found in shaded coffee plantations and to a limited extent in secondary cut-over forest if it is relatively mature with large trees.

The adults can be seen in the forest canopy where the males chase each other in the tree tops and into forest openings such as the space where trees have fallen, forest roads and trails, and at the edges of forests.

Both males and females are strongly attracted to rotting or fermenting fruits of various kinds including oranges. They are also attracted to garbage and refuse and to human and other animal excrement. They alight and walk around flapping their wings even when sucking the food. They are attracted to fermenting bananas and other fruit in bait traps and readily enter them. They are also attracted to fermenting sap from injured trees. I have never seen them at flowers.

Females were observed to oviposit by Muyschondt (1973) in El Salvador. They would fly around a selected tree a few times and alight on the underside of a mature leaf and deposit one egg near its middle, and immediately resume flying and repeat 8-10 times



Figures 59-62. *Catonephele numilia esite* (R. Felder). ♂ dorsal (59) ventral (60) surfaces. MÉXICO, Veracruz, Fortín de las Flores (JC). ♀ dorsal (61) ventral (62) surfaces. MÉXICO, Veracruz, Fortín de las Flores (JC).

before departing. Oviposition occurred from 1000 to 1400 hours, throughout the year, but mostly in the rainy season from May to October. They are found from near sea level to over 1,500 m.

Immature Stages: The egg, all five larval instars and the pupa were studied in detail by Muysshondt (1973) and photographs were published.

Food Plants:

Alchornea latifolia Schwartz
El Salvador

Euphorbiaceae

Muysshondt (1973)

Specimens Examined: 378 ♂, 209 ♀

MÉXICO, Veracruz, Coatepec; Teocelo; Santa Rosa; Catemaco; Jalapa; Motzorongo; Córdoba; Orizaba; Dos Amates; Fortín de las Flores; El Chepo; Moloacán; Tehuacán; Tezonapa; Franca Vieja; Pajaritos; Citlatipetl; Presidio; Tuxtlas; Potrero; Misantla; Omealca; Zongolica; Poza Rica; Mirador; Morelos, Cuernavaca; Coatlán; Puebla; San Luis Potosí, Quinta Chilla; Ciudad Valles; Oaxaca, La Esperanza; Temascal; Chimalapa; Comaltepec; Soyolapan; Candelaria X; Jacatepec; Chiltepec; Yetla; Portillo del Rayo X; Metata; Tabasco, Tepescuintle; Chiapas, Yaxchilán; Ocozocuatla; Malpaso; Toquián X; San Quintín; Mapastepec X; Palestina; San Jeronimo; Palenque; BELIZE: Corozal, Rio Hondo; Stann Creek, Middlesex; Cayo, Cayo; GUATEMALA: Santa Rosa, Barberena; Guazacapan; Alta Verapaz; Gubilguitz; Polochic Valley; Tukurú; Quetzaltenango; Las Mercedes; Suchitepéquez, San Miguel Panan; Guatemala, Ciudad Guatemala; El Petén Sayaxché; EL SALVADOR: San Salvador, San Salvador; Ilopango; Nueva San Salvador, Santa Tecla; La Libertad, Tamanique; HONDURAS: Cortés, San Pedro Sula; NICARAGUA: Rio San Juan, Chontales; COSTA RICA: Cartago, Irazú; Turrialba; Cachí; San José, San Isidro; Puntarenas, Peninsula de Osa, Rincón; Alajuela, San Mateo; Heredia, La Virgen; PANAMA: Chiriquí, Chiriquí; Boquete; Bugaba; Potrerillos; Veraguas, Calobre; Canal Zone, Barro Colorado Isl.; Madden Forest, Piña; Panamá, Cerro Campana; Bayano; COLOMBIA: Cundinamarca, Bogotá X; La Palma; Santander; Cananche; Guayabetal; Tolima, El Santuario; Quindío; César, Manaure; Boyaca, Muzo; Tunja; Magdalena, San Lorenzo; Santander, Cúcuta; Rio Opón; Pico de Armas; Barrancabermeja; Bella Vista; Costa Rica; Landázuri; Antioquia, Rio Cocorná; Zaragoza; Valle, Cali; Rio Dagua; Caldas, Guamocó; Meta, Villavicencio X; VENEZUELA: Zulia, Misión El Rosario; Sierra Perijá; Kasmera; Táchira, La Morita; La Fría; San Cristóbal; Chorro del Indio; Aragua; Portachuelo; Rancho Grande; El Limón; Choroní; Amazonas, Cerro Duida; Carabobo, Las Quiguas; Miranda, Los Encantos; Barinas, Ticoporo, Barinitas; GUYANA: Mazaruni-Potaro, Bartica; ECUADOR: Bolívar, Rio La Chima; Oriente, Sadzayacu (?); Los Rios, Quevedo; El Oro, Piñas 1600 m; Tungurahua, Rio Topo (?); Hacienda La Mascota 1500 m; Chimborazo, Dos Puentes; Manabí, Palmar X; TRINIDAD: St. George West, Maupertuis X; St. Annes Valley X.

Catonephele numilia immaculata [Ssp. nov.]

Figs. 63-66, 85, 96, 103

Description: Male. Base color velvety black. DFW with a large orange central round somewhat ellipsoid macula and a subapical ellipsoid orange macula extended with diffuse red to the margin of wing at M_1 . DHW with a large orange submedian macula in basal $\frac{1}{2}$. No light blue maculae or shading at posterior angle of wing (a thin blue submarginal line may be present); distal area of $Rs-M$, with submarginal blue macula only, or with a separate small distal blue area. VFW with dull orange in basal $\frac{1}{2}$ with black area distally and anteriorly in median area, with subapical buff area. VHW with a median dark line between $Sc+R_1$ to R_s strongly angled distally to R_s . VHW with wavy brown markings. Male genitalia and hypandrium the same as *C. n. numilia*.

Female. DFW base color black with a yellow diagonal median band and subapical red

maculae at base of falcate projection. DHW black with postmedian and submarginal thin rows of blue lines. VHW with a small basal dark line from Sc+R₁ extending distally at an angle, other markings similar to *C. n. esite*.

Average wing length ♂ (27-35)32 mm, ♀ (35-39)37 mm.

Described from 14 specimens, 11 ♂ and 3 ♀.

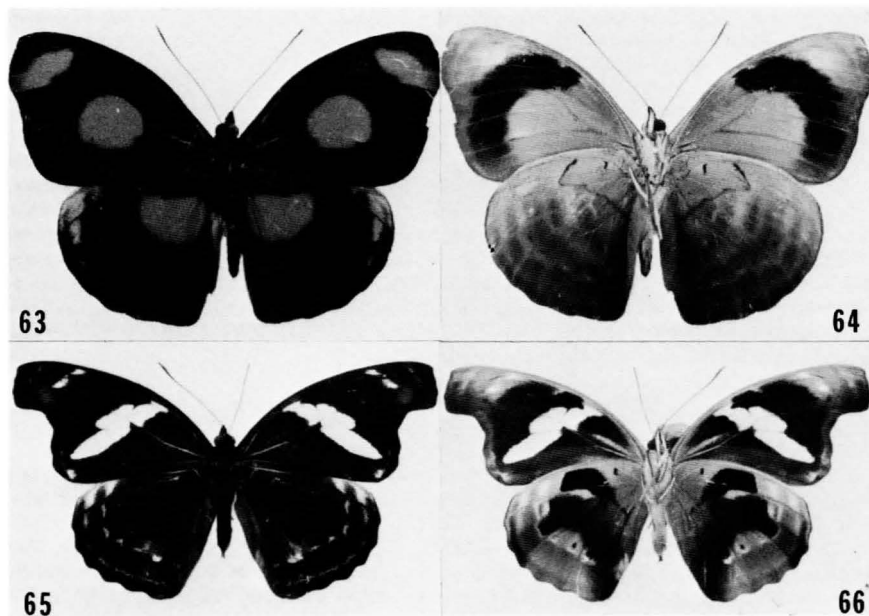
HOLOTYPE: MÉXICO: Guerrero, Atoyac, Nueva Delhi, 1 ♂ 11 Nov. 1982, coll. D. W. Jenkins (JC).

PARATYPES: MÉXICO: Guerrero, Nueva Delhi, 5 ♂ 1 ♀ 11 Nov. 1982, coll. D. W. Jenkins (JC); El Paraiso 1 ♂ 1 ♀, coll. J. De la Maza (DM); 2 ♂ 2 ♀ coll. J. Llorente (FC); Acahuizotla 1 ♂ Oct. 1955, T. Escalante (AA); 1 ♂ A. Díaz (AD); Chiapas, no specific locality, 2 ♂ Jul. 1 ♀ Aug. 1963 (MM).

Deposition of type material: Holotype ♂ and 3 ♂ and 1 ♀ paratypes in the Allyn Museum, 2 ♂ and 1 ♀ paratypes in the Milwaukee Museum, 1 ♂ paratype in the British Museum, 1 ♂ and 1 ♀ paratypes in the de la Maza collection, 1 ♂ paratype in the Alberto Díaz Francés collection, and 3 ♂ paratypes in the Jenkins collection.

Distribution: Occurs in western México on the Pacific slope from Central Guerrero to Chiapas, México. Intergrades occur in Oaxaca and Chiapas and in San Salvador and Santa Tecla, El Salvador.

Taxonomy and Variation: *C. n. immaculata* from western México compares rather closely to *C. n. neogermanica* from southeastern Brazil. Both are relatively weak subspecies with similar markings in the male. Both have missing blue markings in the posterior marginal area and reduced in the distal area of Rs-M₁; and both have the DFW with diffuse red extending from the subapical ellipsoid orange macula to the extended margin of wing at M₁. This can be either parallel evolution, relicts at the extreme margins after development of *C. n. numilia* and *C. n. esite* between them, or the



Figures 63-66. *Catonephele numilia immaculata* Jenkins. ♂ dorsal (63) ventral (64) surfaces. Holotype, MÉXICO, Guerrero, Nueva Delhi (JC). ♀ dorsal (65) ventral (66) surfaces. Paratype. EL SALVADOR, San Salvador, San Salvador (MM).

possibility of response to decreased temperature or day length.

There is variation in the amount of blue in the distal marginal area of R_s-M_1 . There are also seven of ten male specimens with a median orange projection toward Cu_2 from the large orange circular macula on the DFW.

Intergrades have a slight amount of blue on the posterior marginal area of the DHW, but all other characters are typical *C. n. immaculata*. Most specimens in the known intergrade areas are typical *C. n. esite*.

Biology: The holotype and some paratypes were collected at a flooded refuse site at a native farm house surrounded by tropical forest. The adult males and a female were attracted to the odor from decaying organic material. Other specimens were collected on fermenting banana baits (platanos) suspended from a low branch, and at baits near a stream margin.

The detailed observations of larval development and adult emergence by Muysshondt (1973) reported under *C. n. esite* refer in part, as intergrades, to this new subspecies. Some of his reared specimens were examined and they are typical (or small) intergrades with some being typical *C. n. immaculata*.

Adults have been collected from about 500 to 1300 m in El Salvador and at similar altitudes in México, and in March, and from July to November.

Immature Stages: The egg, all five larval instars and the pupae of intergrades were studied by Muysshondt (1973) and photographs were published.

Food Plants:

Alchornea latifolia Schwartz
El Salvador

Euphorbiaceae

Muysshondt (1973)

Specimens Examined: 37 ♂ 15 ♀

MÉXICO: Guerrero, Nueva Delhi 6 ♂ 1 ♀ Nov. JC; El Paraiso 1 ♂ 1 ♀ DM; 20 ♂ 10 ♀ FC; Acahuizotla 1 ♂ Oct. AA; 1 ♂ AD; Chiapas, Tapachula 1 ♂ AD; no specific locality 2 ♂ Jul. 1 ♀ Aug. MM; Comitán X 1 ♂ Sep. MM; EL SALVADOR: Nueva San Salvador, Santa Tecla X 900 m. 1 ♂ Mar. 1 ♂ Aug. AA; San Salvador X, 2 ♂ 2 ♀ Aug. Sep. MM.

Catonephele numilia penthia (Hewitson) 1852

Figs. 67-70, 85, 96, 103

Epicalia penthia Hewitson, 1852. Exot. Butt. [82] pl. 40, fig. 7. TL: Brazil, Rio de Janeiro; Lectotype: BM 15-151, Rh. 9303 1 ♀. Here designated. (Figs. 69-70). = *Nymphalis micalia* Godart [1824] (nec. Cramer). Encycl. Meth. 9:415, no. 205 (*pro parte*)

Description: As in *C. numilia* except for differences listed for *C. numilia penthia* in the key to males and females for subspecies. Average wing length ♂ (31-36)34 mm, ♀ (35-39)37 mm.

Distribution: This subspecies is found in eastern and southeastern Brazil from Pernambuco to Santa Catarina. It is more commonly found in the coastal region but extends inward to the border of Paraguay in Paraná, and to Brazilia.

Taxonomy and Variation: It is interesting that at the north and south ends of the distribution of *C. n. numilia* males and females of *C. n. esite* in the north are very similar to *C. n. penthia* in the south. The ♀ DHW discus is black, and the yellow cross bar of the ♀ DFW is elongate and narrow in both. It is unknown whether this is parallel evolution or whether *C. n. numilia* intervened and separated the populations.

The female type specimen in the BM was compared with other *C. n. penthia* and is

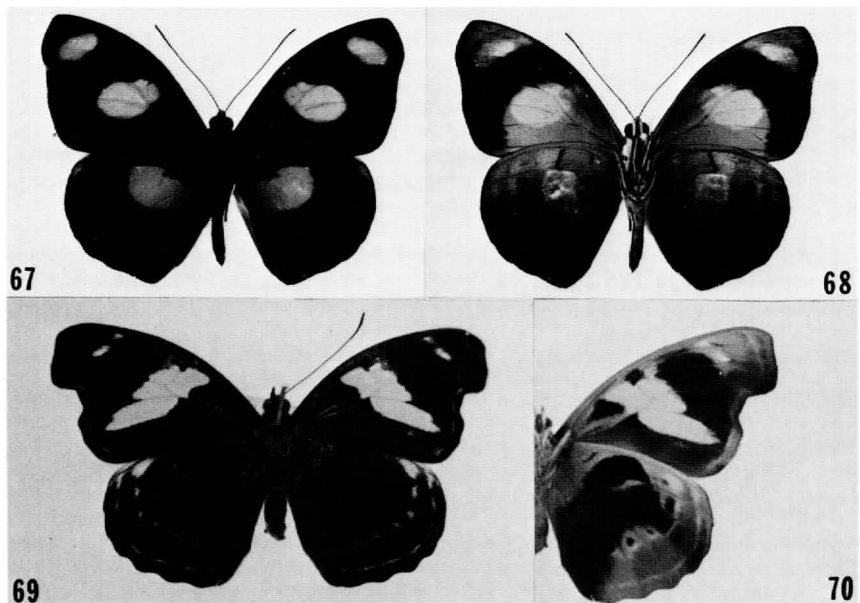
typical of the population. It has a black discus on the DHW with no reddish coloring. I designate this ♀ specimen as lectotype.

Intergrades occur with *C. n. neogermanica* on the borders of the distributions. This was determined by study of the color of the DHW discus of the female. At the tension zone both black and dark mahogany colors occur or a blending of color in some specimens. These were found at Brasilia, Iguacu, Joinvile, and São Bento do Sul. Examination of a series I collected at Joinvile showed about 95% with the black discus of *penithia*, the rest were completely or partially dark mahogany. The relationship between *penithia*, *neogermanica* and *numilia* should be studied further, especially rearing from known females in the Joinvile area. Male subspecies differences were also used but they were not as critical in identifying intergrades as females.

Biology: While relatively limited in distribution this subspecies is locally common in evergreen tropical forest and semi-deciduous forest especially at higher altitudes. The adults are found in forest edges, openings, and forest trails and roads. Both males and females are attracted to rotting fruit, sap exudate on tree trunks, and they entered traps baited with fermenting bananas. The adults fly rapidly and are difficult to catch unless they are at a food bait.

This subspecies has been collected from near sea level to about 800 m elevation or higher. They occur every month of the year, being most common in summer from November to April. D'Almeida (1922) states that egg laying occurs in December and February to April and adults are most common from February to May.

Immature Stages: The egg, all five larval instars and the pupa have been described in detail by d'Almeida (1922) and Müller 1886 described larval stages 2-5 and the pupa. Röber, in Seitz (1914) briefly described the last larval instar and pupa, probably based on the above authors.



Figures 67-70. *Catonephele numilia penithia* (Hewitson). ♂ dorsal (67) ventral (68) surfaces. BRAZIL, Santa Catarina, São Bento do Sul (JC). ♀ dorsal (69) ventral (70) surfaces. BRAZIL, Rio de Janeiro. Lectotype, *Epicalia penithia* Hewitson (BM).

Food Plants:

<i>Alchornea iricurana</i> Cas.	<i>Euphorbiaceae</i>	Müller (1886)
Brazil		
<i>Alchornea cordata</i> Mull. Arg.	<i>Euphorbiaceae</i>	Müller (1886)
Brazil		
<i>Nectandra venulosa</i>	<i>Lauraceae</i>	d'Araújo et al. (1968)
Brazil		
(This record should be confirmed.)		

Specimens Examined: 187 ♂ 126 ♀

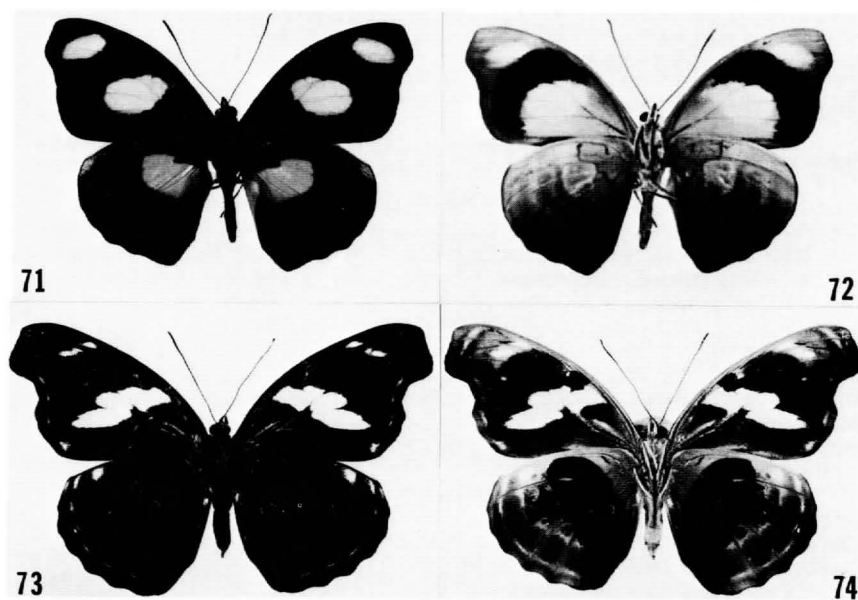
BRAZIL: *Espírito Santo*, Linhares; Baixo Guandú; Itaguaçu; Conceição da Barra; Santa Teresa; Colatina; Nova Venécia; Pedro Canario; *Rio de Janeiro*, Rio Teresópolis, Rio de Janeiro; Jacarepaguá; Corcovado; Petrópolis; Parque Nacional Tijuca; Gavea; Guapí; Paineiras; Xerém; Angra dos Reis; Nova Iguaçu; *São Paulo*, São Paulo; Taipas; Araras; Bauru; Itanhaem; Porto Cabral; Sumaré; Amparo; Loreto; *Paraná*, Castro; Foz de Iguaçu; Sete Quedas; Curitiba; Alexandra; Ortigueira; Prainha; Mundo Novo; Queimadas; *Santa Catarina*, Brusque; St. Catharines; Joinvile X; Timbó; *Mato Grosso*, Matozinhas; *Minas Gerais*, Cabeceira do Córrego Leitão; São Laurenço; *Distrito Federal*, Sobradinho; Brasília; *Pernambuco*, Ipojuca; *Bahia*, Urucuca (Ilhéus); *Goiás*, Chapada dos Veadeiros X.

Catonephele numilia neogermanica Stichel, 1899

Figs. 71-74, 85, 96, 103

Catonephele numilia neogermanica Stichel, 1899. Berl. Ent. Zeit. 43:416. TL: Paraguay [San Pedro], Nova Germania. Lectotype: BM 1 ♂. Here designated.

Catonephele penthia ab. *fulva* Röber, in Seitz, 1914. Gross Schmett. der Erde 5:480.



Figures 71-74. *Catonephele numilia neogermanica* (Stichel). ♂ dorsal (71) ventral (72) surfaces. PARAGUAY, *Pedro Juan Caballero*, Pedro Juan Caballero (MM). ♀ dorsal (73) ventral (74) surfaces. BRAZIL, *Paraná* (MM).

TL: Brazil, Rio de Janeiro. Syntypes: unknown [Syn. nov.].

Description: As in *C. numilia* except for differences listed for *C. numilia neogermanica* in the key to males and females for subspecies. Average wing length ♂ (31-35)33 mm ♀ (34-39)37 mm.

Distribution: Occurs from Minas Gerais and Espírito Santo to Paraná and Santa Catarina, Brazil, Paraguay and Misiones, Argentina. It is found in what appears to be a large intergrade zone between the range of *C. n. numilia* and *C. n. penthia* and also to the southern border of *C. n. penthia*.

Taxonomy and Variation: *C. n. neogermanica* is not well differentiated in the male, but a ♀ mahogany red color of the discus of the DHW is distinctive. This subspecies may be an intergrade population, extending over a fairly wide range, but with some distinctive characters not found in either *C. n. numilia* or *C. n. penthia*. It is therefore recognized as a separate but not well-marked subspecies. The exact range and intergradation should be studied in more detail, and especially larval rearing, as mentioned under *C. n. penthia*.

The syntypes described by Stichel now in the BM were studied and they compare well with the general population of *C. n. neogermanica*. I designate the ♂ syntype specimen in the BM from Nova Germania as lectotype. An interesting aberration was found in a specimen from Joinville in the UP collection. A male had a normal orange macula on the right DHW and no orange macula on the left.

Biology: The subspecies occurs in the same type of habitats as *C. n. penthia* and has the same habits. It occurs from near sea level to about 800 m. There are not enough records of adult occurrence to determine the flight period, but it appears to be found more often in February to April. I found adults in April in São Bento do Sul and Joinville, Brazil.

Immature Stages: The life history of this subspecies has not been reported, but it is not entirely certain that the *C. n. penthia* reared by d'Almeida (1922) did not include *neogermanica* since I found both subspecies in the d'Almeida collection in the UP.

Host Plants: None definitely recorded.

Specimens Examined: 21 ♂ 17 ♀

PARAGUAY: No locality 2 ♂ SI; 1 ♀ AA; *Caaguazú*, Yhu 1 ♂ BM; San José 1 ♂ 1 ♀ BM; *Paraguari*, Sapucay 1 ♂ 9 ♀ BM; *Pedro Juan Caballero*, Pedro Juan Caballero 1 ♂ Feb. MM; *San Pedro*, Nueva Germania 2 ♂ 2 ♀ syntypes BM; *Guairá*, Villarrica 1 ♂ CM; BRAZIL: *Paraná*, Alto Paraná 3 ♂ AM; Rolândia 1 ♂ Mar. AA; Londrina 1 ♀ Feb. UP; Foz de Iguaçu X 5 ♀ Feb. UP; *Minas Gerais*, 1 ♂ BM; Nova Lima 1 ♂ Apr. AA; Cabeceira do Córrego Leitão 1 ♀ Jun. UP; Parque Rio Doce 1 ♂ 1 ♀ Jul AA; Paraopeba 1 ♂ 1 ♀ May KB; *Distrito Federal* 1 ♀ Aug. (Brown and Mielke, 1967); Sobradinho 3 ♂ 1 ♀ Aug. Feb. *Santa Catarina*, Trombudo Alto 1 ♀ Apr. AA; Rio do Sul 1 ♀ Apr. AA; Joinville X 2 ♂ 2 ♀ Feb. & Apr. JC; São Bento do Sul X Apr. 2 ♂ JC; *São Paulo*, Itaici 1 ♂ Jan. MM; Mirassol X 1 ♀ Sep. KB; Loreto 2 ♀ MN; Rio Preto 1 ♀ MN; Amparo 1 ♀ MN; Sumaré MN; ARGENTINA: *Misiones* (Hayward, 1964).

NOMINA NUDA

Epicalia lygistus Bois. Ms. Westwood, 1850, TL: Colombia, Bogotá.

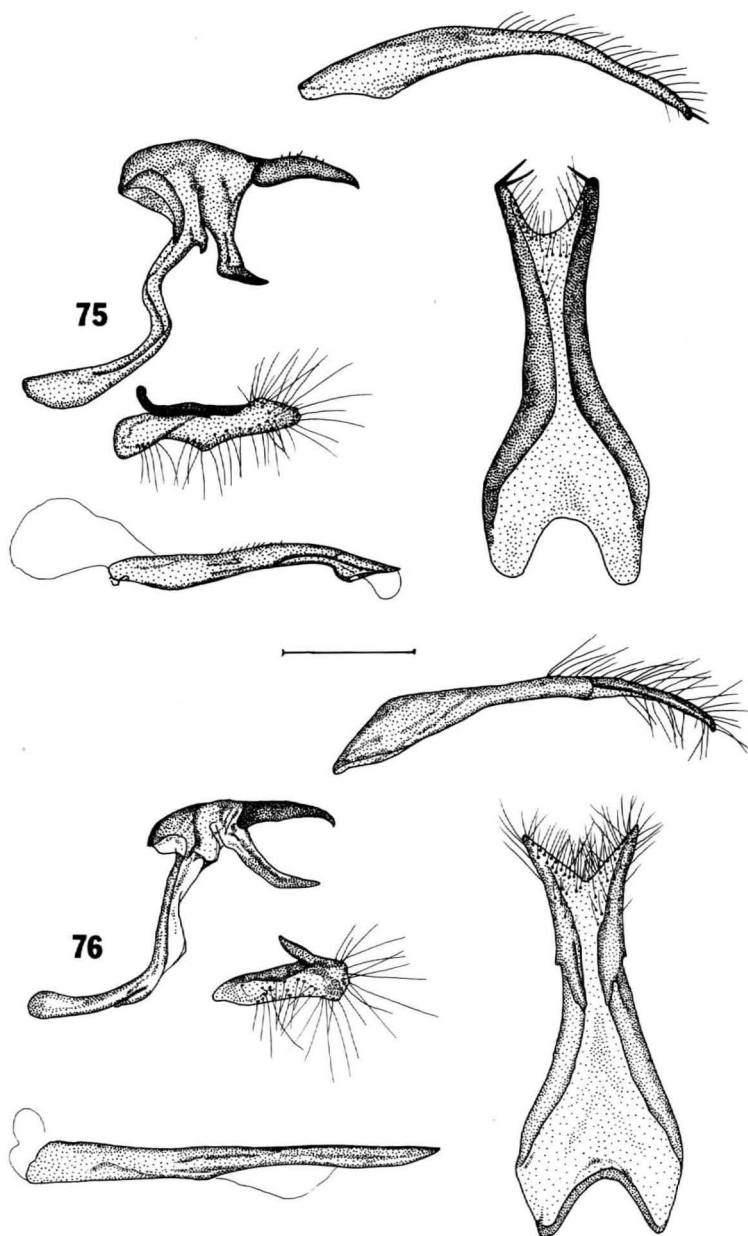
Epicalia cerambus Bois. Ms. Westwood, 1850, TL: Mexico.

Epicalia corinnete Bois. Ms. Westwood, 1850, TL: Perú.

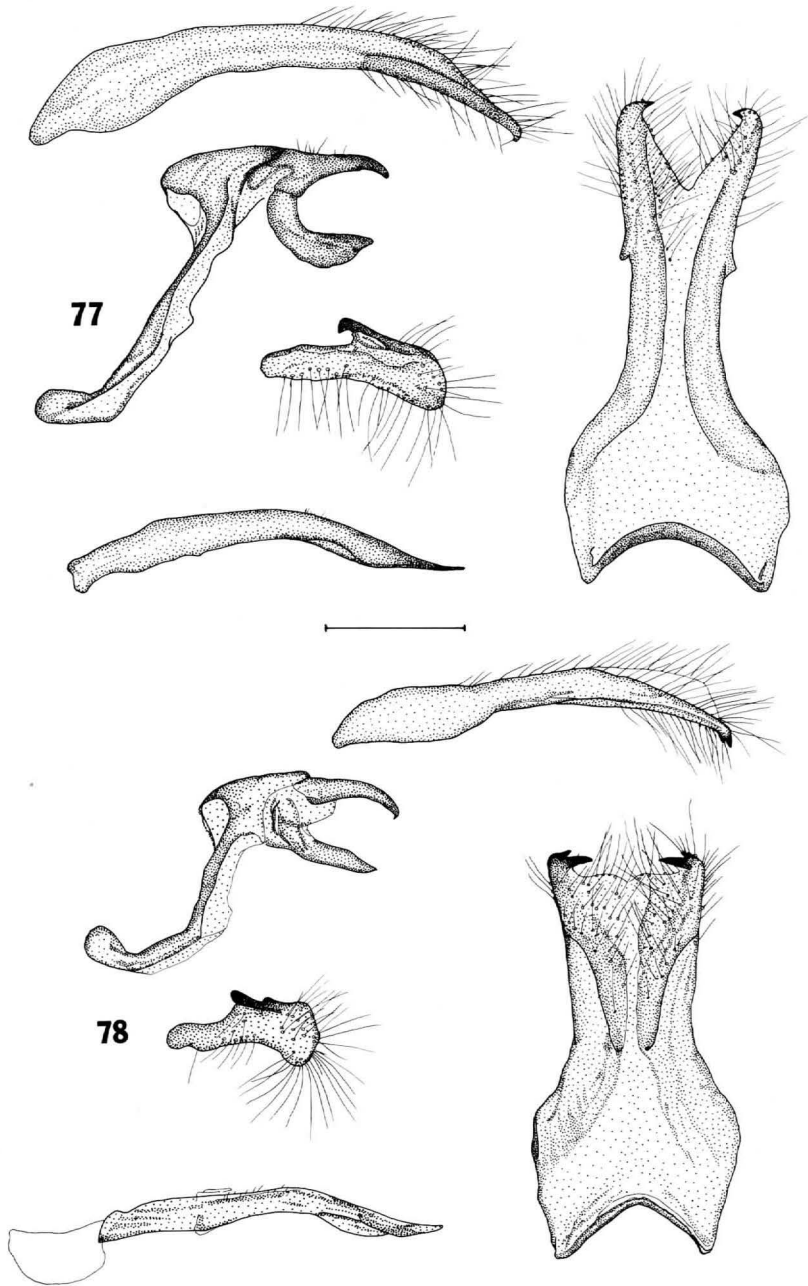
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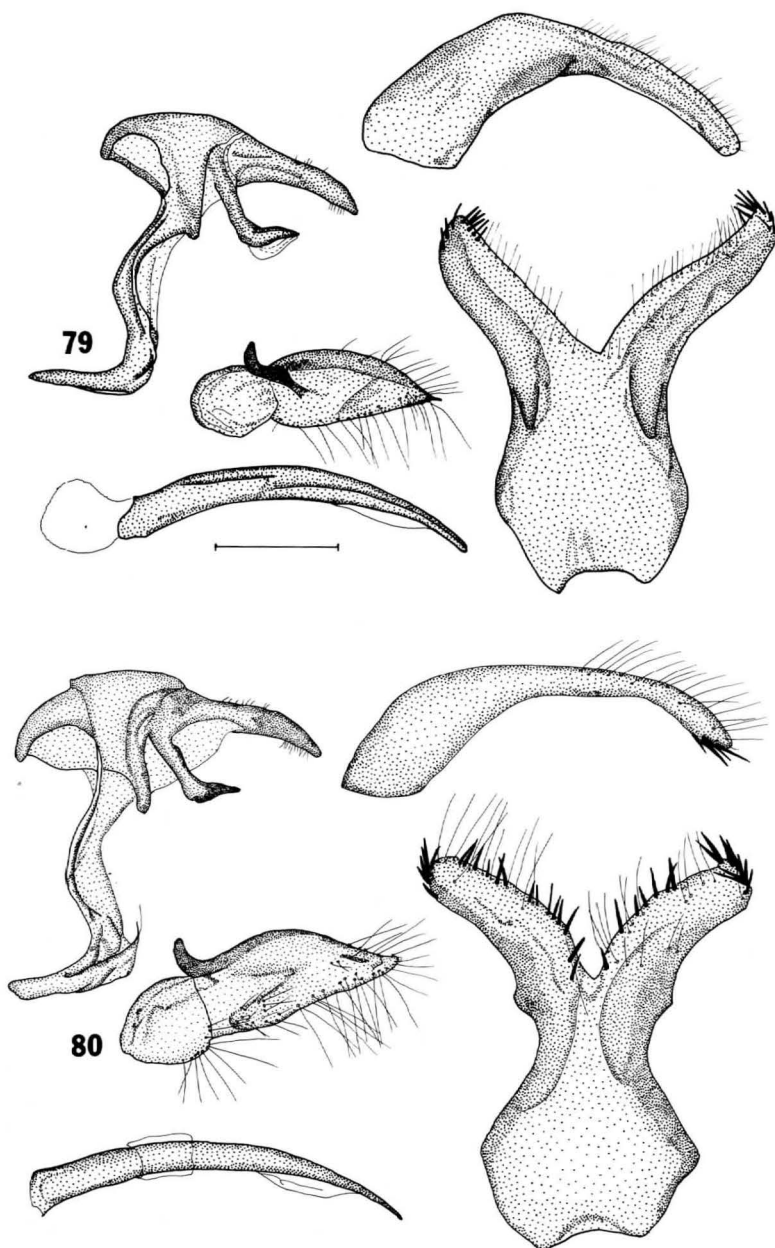
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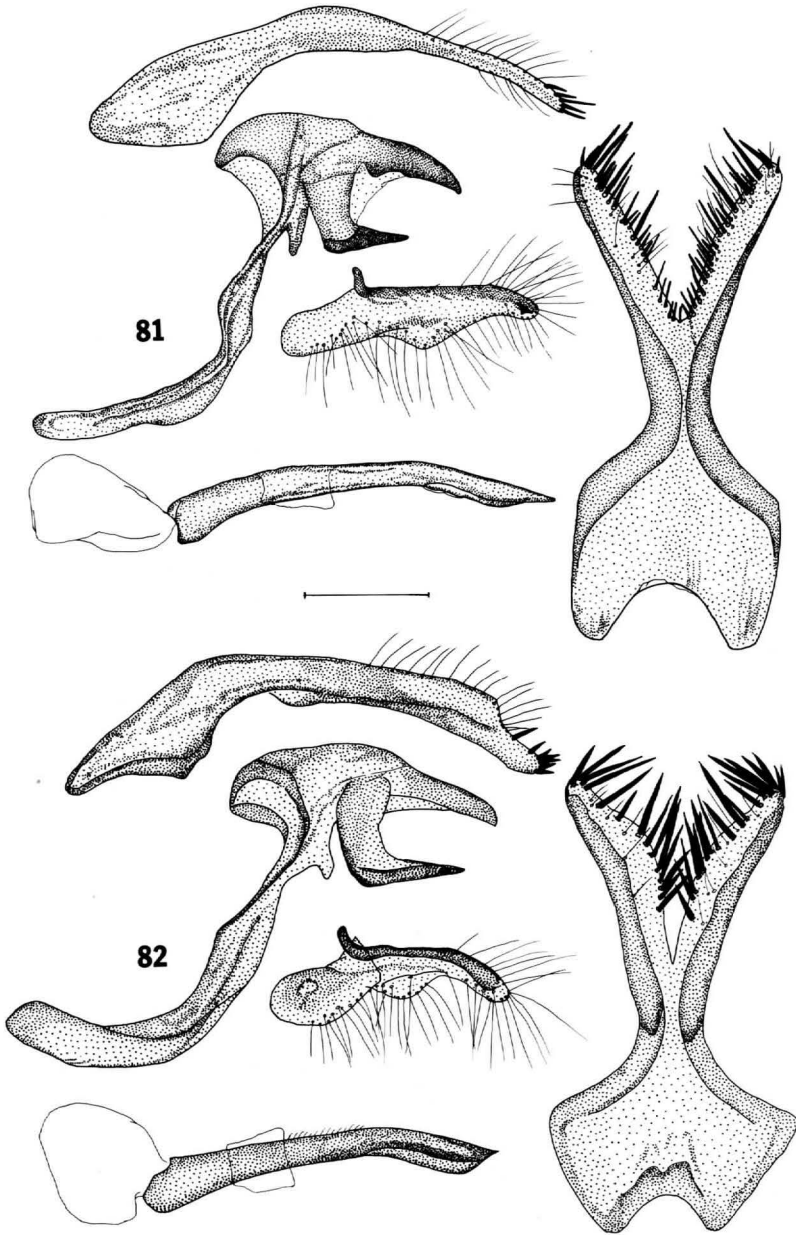
Figures 75-76. ♂ genitalia and hypandria of *Catonephele*. 75, *Catonephele salacia*, 76, *Catonephele nyctimus*.



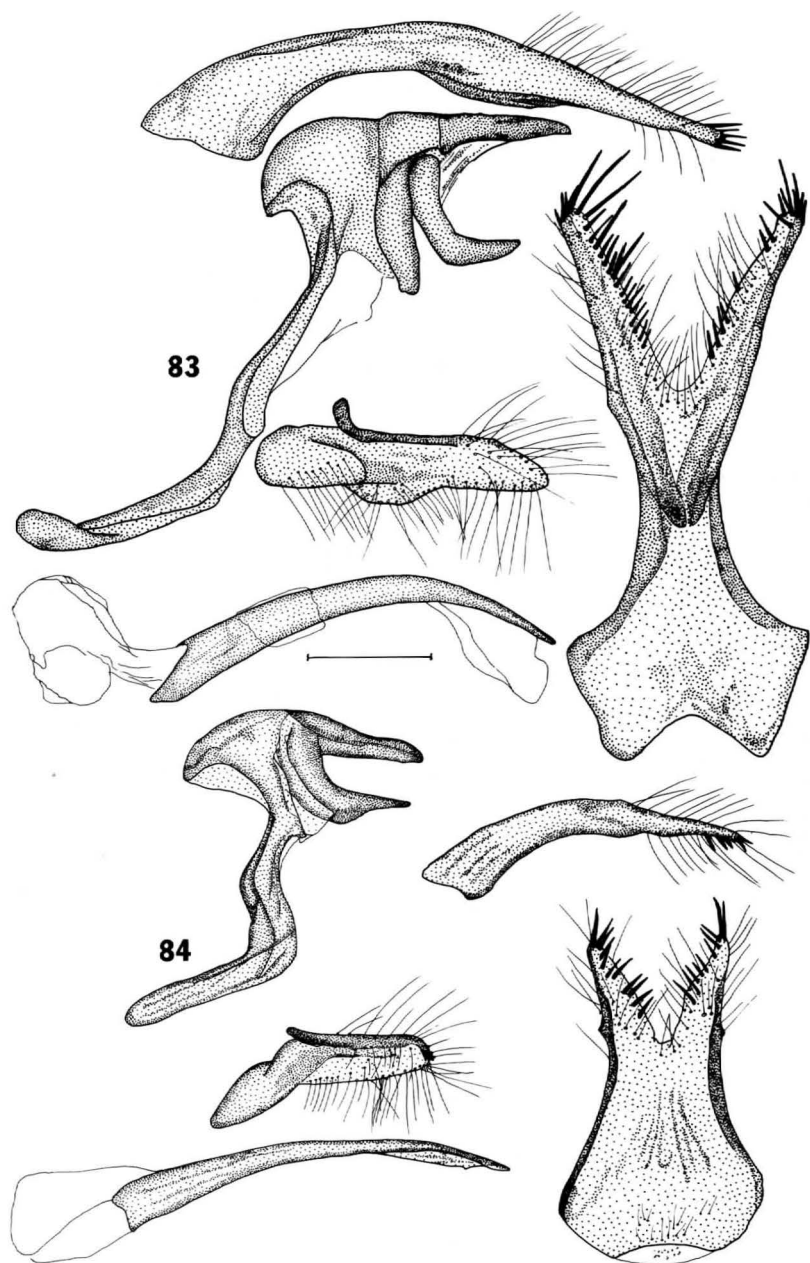
Figures 77-78. ♂ genitalia and hypandria of *Catonephele*. 77, *Catonephele mexicana*. 78, *Catonephele cortesi*.



Figures 79-80. ♂ genitalia and hypandria of *Catonephele*. 79, *Catonephele acoutius*. 80, *Catonephele orites*.



Figures 81-82. ♂ genitalia and hypandria of *Catonephele*. 81, *Catonephele antinoe*. 82, *Catonephele sabrina*.



Figures 83-84. ♂ genitalia and hypandria of *Catonephele*. 83, *Catonephele salambria*.
84, *Catonephele chromis*.

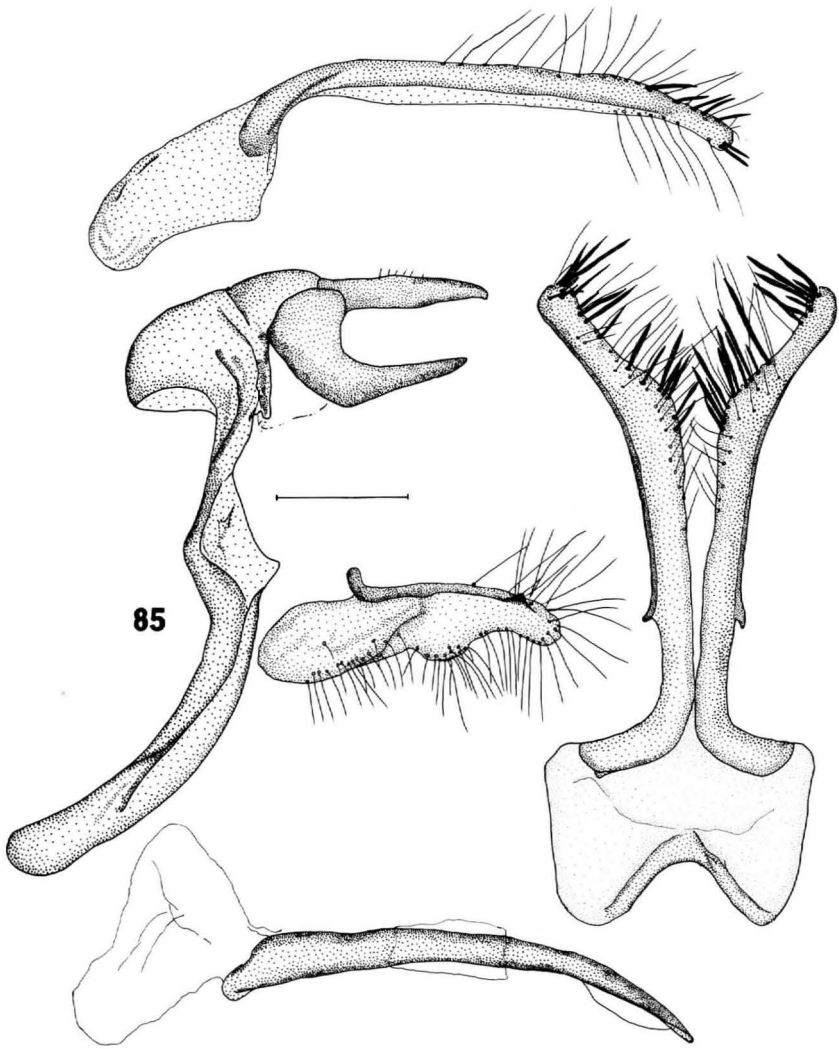
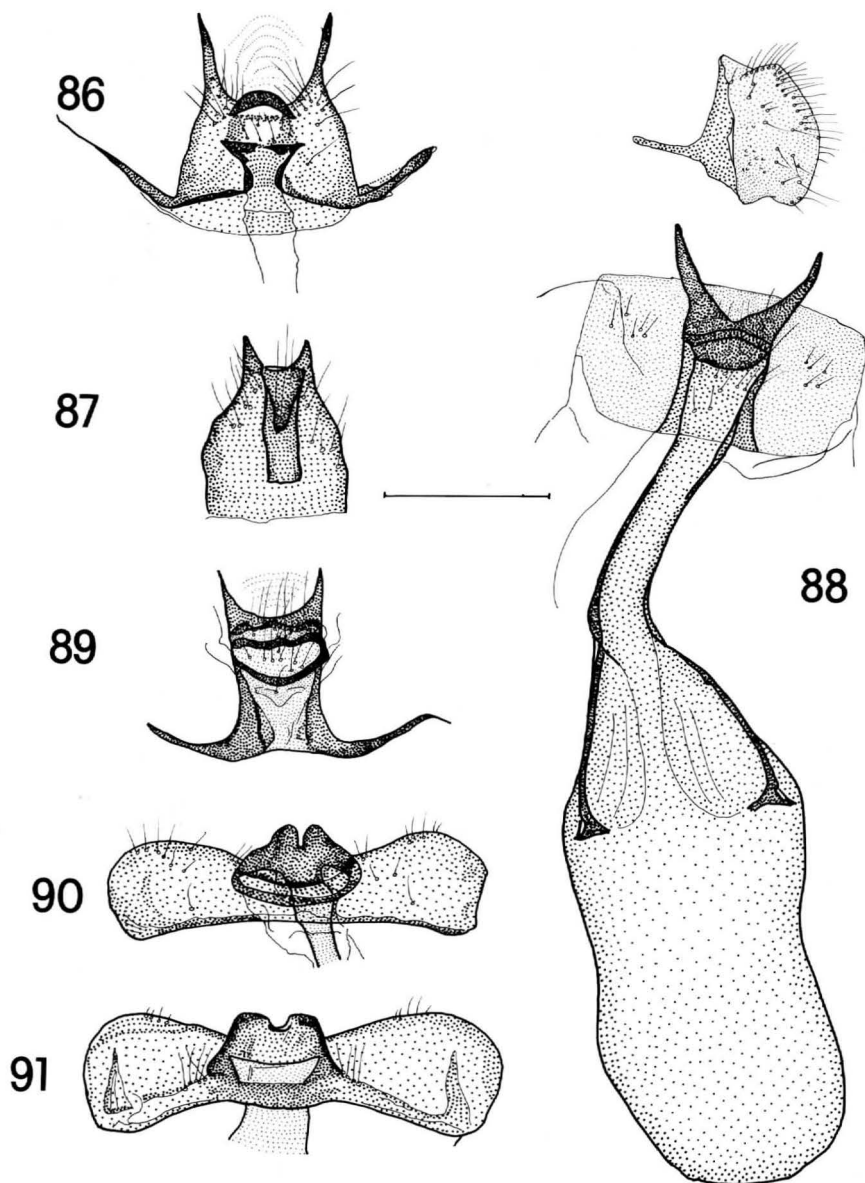
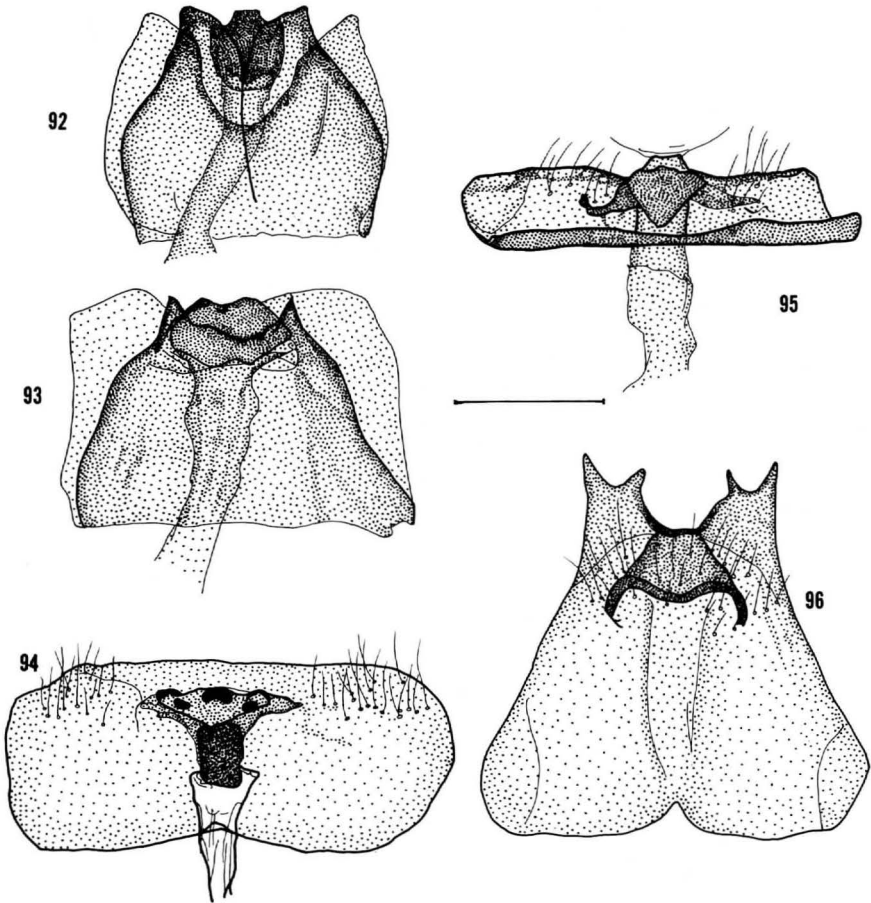


Figure 85. ♂ genitalia and hypandria of *Catonephele numilia*.



Figures 86-91. Sterigma and associated structures of ♀ genitalia of *Catonephele*. 86, *Catonephele salacia*. 87, *Catonephele nyctimus*. 88, *Catonephele mexicana* (also shows papilla anale and corpus bursa). 89, *Catonephele cortesi*. 90, *Catonephele acontius*. 91, *Catonephele orites*.



Figures 92-96. Sterigma and associated structures of ♀ genitalia of *Catonephele*. 92, *Catonephele antinoe*. 93, *Catonephele sabrina*. 94, *Catonephele salambria*. 95, *Catonephele chromis*. 96, *Catonephele numilia*.

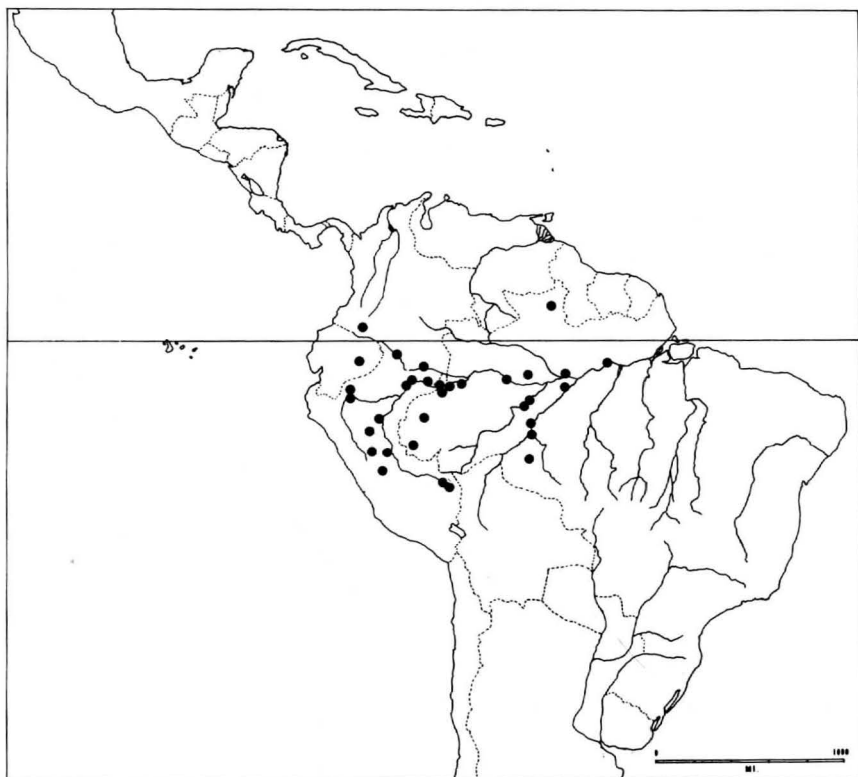


Figure 97. Distribution of *Catonephele salacia*.

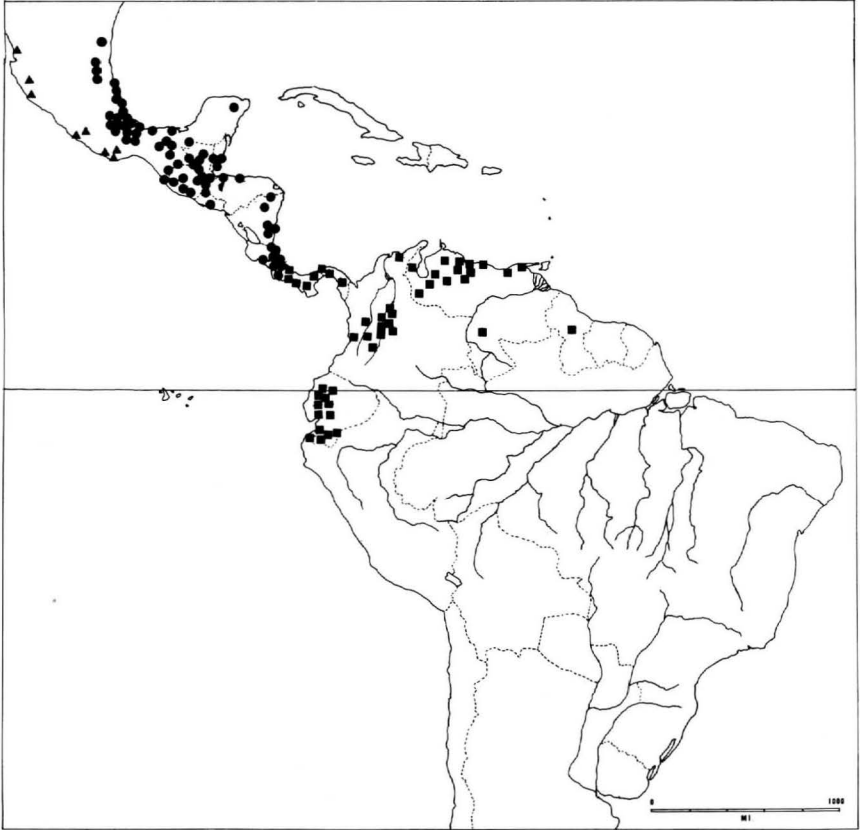


Figure 98. Distribution of *Catonephele nyctimus* ■ ; *Catonephele mexicana* ● ; and *Catonephele cortesi* ▲ .

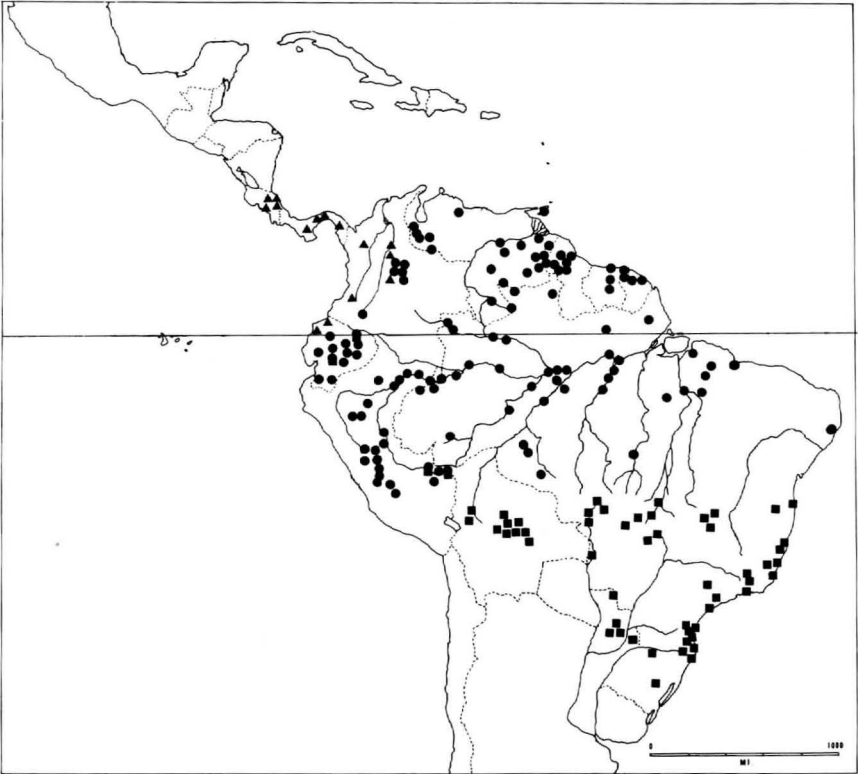


Figure 99. Distribution of *Catonephele orites* and subspecies of *Catonephele acontius*, ▲ = *orites*; ● = *a. acontius*; ■ = *a. caeruleus*.

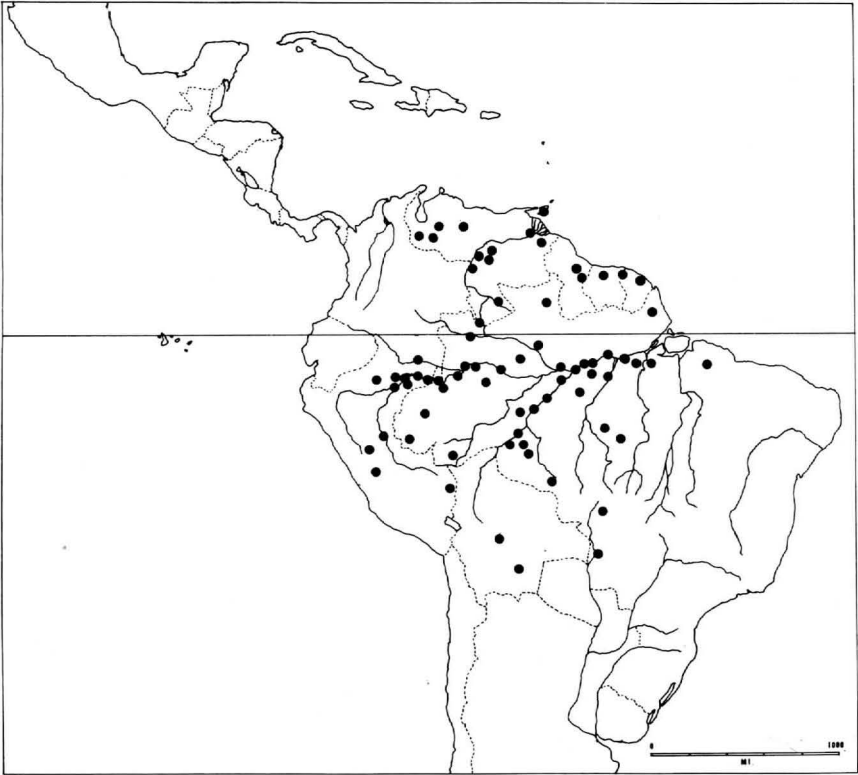


Figure 100. Distribution of *Catonephele antinoe*.

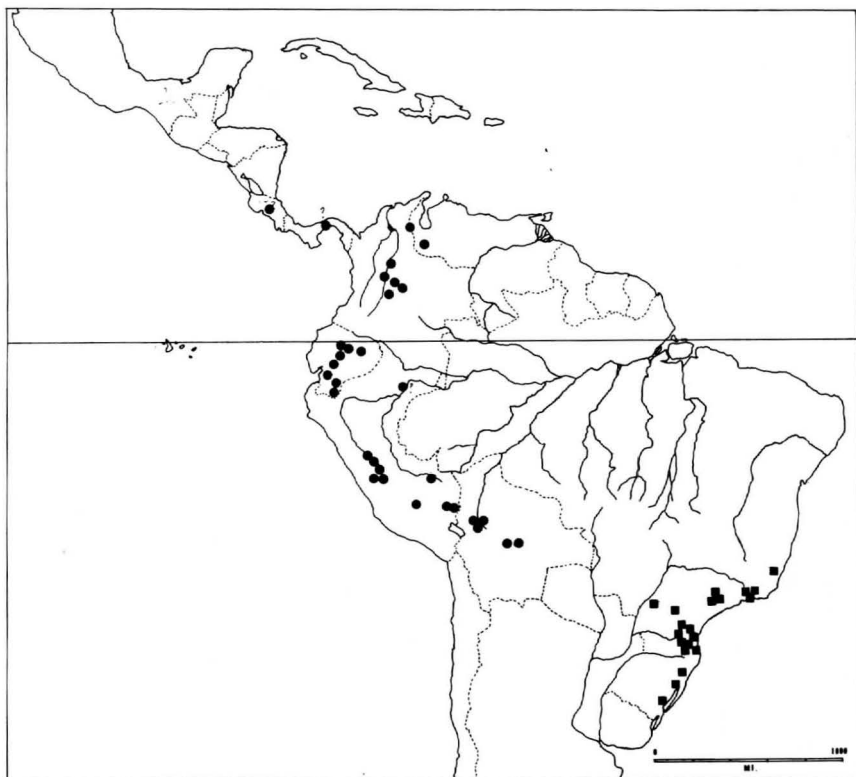


Figure 101. Distribution of *Catonephele sabrina* ■ and *Catonephele salambria* ●.



Figure 102. Distribution of subspecies of *Catonephele chromis*. ● = *c. chromis*; ■ = *c. godmani*.

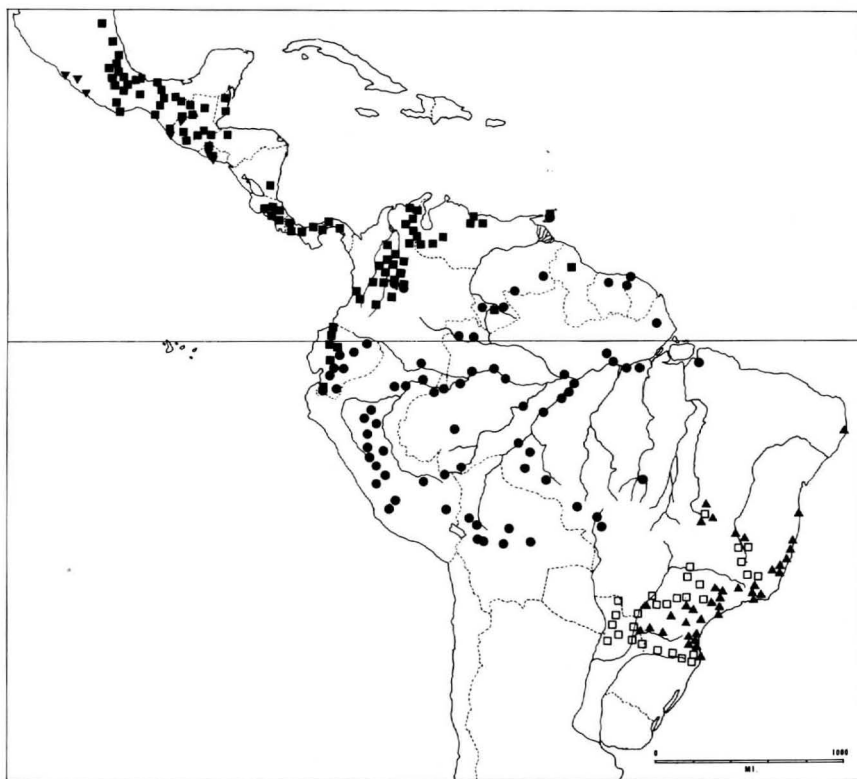


Figure 103. Distribution of subspecies of *Catonephele numilia*. ● = *n. numilia*; ■ = *n. esite*; ▼ = *n. immaculata*; ▲ = *n. penthia*; □ = *n. neogermanica*.

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