

BULLETIN OF THE ALLYN MUSEUM

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Sarasota, Florida 33580

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A. INTRODUCTION

Neotropical nymphalids include some of the most beautiful and interesting butterflies in the world. They have been collected extensively and numerous taxa have been described. However, many of the genera are in critical need of careful revision to permit accurate identification and biological studies.

Nymphalid genera presently being revised by the author include *Hamadryas*, *Ectima*, *Catonephele*, *Myscelia*, *Epiphile* and *Doxocopa*.

The genus *Hamadryas* was known as *Ageronia* for many years. It is a distinctive genus with adults having swelling of the bases or lower half of the subcostal and cubital veins; there are distinctive lateral rami on the terminal sternite of the abdomen of the males; the adults of most species make a clicking noise; many species have a complex mosaic pattern; and they alight head downward on tree trunks with the wings outspread flat. They are confined to the neotropical region. The larvae feed on Euphorbiaceae, especially *Dalechampia* and *Tragia*. They have two knob-like horns on the head and some barbed spines on the body. The pupae have parallel leaf-like appendages on each side of the head.

Hamadryas is a taxonomically confused genus which has been in great need of revision. Some of the species are quite closely related but the main confusion has resulted from lack of detailed study to find consistently valid distinguishing characters to accurately identify them. A second problem is that these popular and interesting butterflies have been described over a 200-year period by many taxonomists including Fruhstorfer, Bryk, and others who have created a plethora of synonyms based on invalid characters and minor variations. This has resulted in about 100 different names of species, subspecies and forms, of which nearly two-thirds are synonymized in this revision. A third problem is that many of the illustrations of *Hamadryas* in important books and field guides are erroneous. There are many errors of identification in Seitz (1914) and in Fruhstorfer, in Seitz (1916) which are corrected in the synonymy and text for each species and subspecies in this revision. Klots (1951, pl. 18) and Howe (1975, pl. 15) both identify figures of *H. februa ferentina* as *H. feronia*. The recent book by Pyle (1981) "Audubon Society Field Guide to North American Butterflies" has two photo-

graphs of *Hamadryas* and both are erroneously identified. *H. februa ferentina* is misidentified as *H. feronia* and *H. guatemalena marmorice* is misidentified as *H. fornax*.

In addition to these problems, the male and female genitalia, rami, and geographic distributions had not been sufficiently studied and the normal range of variation due to seasonal variation, latitude, humidity and aging had not been carefully considered.

Some species of *Hamadryas* are quite variable in color, size, intensity of markings and in size and shape of maculation. This has resulted in a large number of synonyms and difficulty in recognizing valid species and subspecies. Many of the described variations are intergrades between subspecies or waypoints in clines.

Some variations appear to be environmentally regulated phenotypic expression of certain characters. This is confirmed by the wide variation seen in a single day's collection in one habitat in a single species or subspecies. Characters typical of the northern subspecies in the United States and Mexico are missing in most of South America and again often recur in Argentina and southern Brazil. Characters such as dark dusting or smokiness of light spots, darker markings, and in some cases red markings, recur in the northern and southern ends of the distribution. In the southern area these characters do not appear to be as distinctive or clear cut geographically and there is more variation in a single population, or they are found only in females. In nearly all cases these southern variations have been named by Fruhstorfer and Bryk as subspecies but most are not recognized here as valid subspecies and are synonymized. The darker markings in the north and south temperate areas of their ranges could be caused by the effects of photoperiod and/or temperature. Darker specimens are also found in western Mexico and in tropical equatorial areas, especially on the Pacific slope of Ecuador and Peru.

Hamadryas are prominent butterflies due to the unusual clicking noise they make, their relative abundance, especially around human habitation, and the complex mosaic and other patterns. Some species have been given common names, e.g. "Yellow-skirted Calico" for *H. fornax*, which is a poor description of the mustard-orange coloration of the ventral hindwings. Common English names are not created nor used for each of the species in this revision. However, the various common names used locally for *Hamadryas* are of value in field studies and have been compiled. The common names used in the United States are "Crackers", and "Calicoes". The English names in Trinidad and other countries are "Clickers", "Clicks", "Tric-Tracs", "Clatters", and "Rattlets". The Germans use "Rasselchen". In Brazil, they are referred to as "Matracas", and in Mexico as "Tronadores". In Peru, the native Indians called them "Tabletas" or open books, due to their habit of alighting with wings outspread. In western Venezuela they are called "Cascabel" or rattlesnakes because of the sounds.

Specimens of *Hamadryas* were collected and sent to Europe early in the exploration of tropical America. Linnaeus described *Papilio feronia* in 1758 and *Papilio amphinome* in 1767. Cramer described the *Papilio arethusa* male in 1775 and the female as *Papilio laodamia* 1777. *Papilio chloe* was described by Stoll in 1787. The genus *Hamadryas* was founded by Hübner in 1806, and five additional generic names were proposed for the genus or parts of it. In the 19th century, species and subspecies of this group were described by Hübner, Godart, Bates, Boisduval, Staudinger, Godman & Salvin, Lucas, Ménétrés, Strecker, Felder and Doubleday. Many beautiful colored figures and plates were published. No complete revision of the genus was made in this century but several authors listed the known species, including Kirby (1871). The first attempt at a critical revision was by Godman & Salvin (1883) for Central American species. They split the genus into two genera, *Ageronia* and *Peridromia*. The only complete revision of the whole genus (*Ageronia*) was by Fruhstorfer in Seitz (1916), with some plates published in 1914. This was a valuable compilation of all known species and subspecies with colored plates and very brief descriptions. However, there are many errors, especially in naming the figures in the plates, and a very large number of taxa, especially subspecies, were described based on minor variation, intergrades, clinal variation, and females. This resulted in confusing and compounding the inherent problems of the difficult systematics of this genus. Bryk (1953) further confused the taxonomy by describing invalid subspecies based on minor variation. There have been several local or regional

studies such as Hayward (1964) who published a list, descriptions and plates of the species of *Hamadryas* in Argentina.

B. MATERIALS AND METHODS

This revision was accomplished by the author by conducting field studies and collecting *Hamadryas* in 20 Latin American and Caribbean countries, and especially studying the variation in individual populations. Interest in undertaking the revision was stimulated when the author collected five different "subspecies" of *H. februa* on one tree in one day in Mexico, four of which were named by Fruhstorfer.

The *Hamadryas* of the Allyn Museum, the Carnegie Museum and the Jenkins Collection were divided into identifiable populations without regard to the many existing names and more recent taxonomy. These were then identified after carefully analysing all of the original descriptions of species and other taxa and comparing with topotypical specimens. All type specimens available were used, but it became clear that comparison of the Fruhstorfer and other types in the British Museum would be necessary.

Studies were made of the wing coloration, wing patterns, wing venation, sexual dimorphism, male genitalia, female genitalia, terminal rami, and larvae. In addition, data were obtained on geographic distribution, dates of adult flight, altitude, habitats, and abundance. Field collection data by the author were of special value in determining the normal range of variation of a species or subspecies and the overlap and variation between subspecies, especially in newly collected specimens. Keys were made to the species based on wing pattern and coloration, and on male genitalia and rami. A preliminary key was made for the presently known larvae. Keys were made for differentiating subspecies within each species using wing pattern and coloration, since dissection of series of male genitalia and rami did not show valid subspecific characteristics.

Valid species and subspecies were distinguished based on characteristics given in the original descriptions and in the summary by Fruhstorfer, in Seitz (1916). However, many of these characteristics were found not to delineate valid populations of species and subspecies. Many of the described existing names were used to delimit new subspecific populations that were discovered using new characters that had not been found or used previously. The described names selected were used for populations from the same geographic area of the original descriptions. The new or redefined populations were carefully compared with the available type specimens mostly in the British Museum (Natural History) including the Fruhstorfer types. Thirty major museums and important private collections of *Hamadryas* were examined and identified, and the data on species, subspecies, numbers of males and females and collection dates were compiled. The geographical locations are compiled and mapped and other data are summarized in this revision. Full details on each specimen, including sex, date and museum in which it is found, are available from the author. Full details are included in this report only for new and rare species and subspecies.

Dissections and mounts were made of male genitalia and rami of which 65 were made by Dr. Lee D. Miller in 1967, and 35 were made by the author. Thirty female genitalia were dissected and put in glycerine vials by the author. All slides and vials are numbered and deposited with their corresponding specimens in the Allyn Museum, Carnegie Museum and the British Museum.

The distribution data in the maps are based on specimens (or photographs) determined by the author. Data from the literature are included as outlines, instead of solid black circles, triangles, or squares. A combined circle and triangle (or square) indicates intergrades between the subspecies at the intergrade zone.

Collections Examined

- AA - Allyn Museum of Entomology, Florida State Museum, Sarasota, Fla.
(L.D. Miller)
- AD - Alberto Diaz Francis Collection, Mexico City, Mexico

- 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)
 CM - Carnegie Museum of Natural History, Pittsburgh, Penn. (G. Ekis)
 DM - De la Maza Collection, Mexico City, Mexico
 FC - Museo de Zoologia Facultad de Ciencias, UNAM, Mexico City, Mexico (J. Llorente)
 FL - Florida State Museum, Gainesville, Fla.
 GS - Gordon B. Small Collection, Balboa, Panama
 JC - Dale and Joanne Jenkins Collection, Sarasota, Fla.
 KB - Keith S. Brown, Jr. Collection, Campinas, Brazil
 LA - Los Angeles Co. Museum Natural History, Los Angeles, Cal. (J.P. Donahue)
 MC - INPA Collection, Manaus, Brazil
 MH - Museo de Historia Natural de Ciudad de Mexico, Mexico City, Mexico
 MS - Mark Simon Collection, Miami, Fla.
 MZ - Museum of Comparative Zoology, Harvard University, Boston, Mass. (J. Weintraub & M.D. Bowers)
 NC - James Neidhofer Collection, Milwaukee, Wis. (in MM).
 PA - Philadelphia Academy of Sciences (in CM).
 RK - Roy O. Kendall Collection, San Antonio, Texas.
 SI - National Museum of Natural History, Smithsonian Institution, Washington, D.C. (J.F. Gates Clark)
 SH - Sergio Hernandez Collection, Colima, Mexico
 SR - Stuart J. Ramos Collection, Univ. Puerto Rico, Mayaguez, P.R.
 ST - Herman Strecker Collection (at Allyn Museum of Entomology), Sarasota, Fla. (in AA, property of Field Museum of Natural History, Chicago, Ill.)
 TA - Dept. of Entomology, Texas A&M University, Austin, Texas.
 TE - Thomas Emmel Collection, Gainesville, Fla. (in FL)
 TT - Thomas Turner Collection, Kingston, Jamaica
 UN - Universidad Nacional Mayor de San Marcos, Museo de Historia Natural "Javier Prado," Lima, Peru (identified by G. Lamas)
 VK - Harold L. King Collection, Sarasota, Fla.
 ZM - Museum fur Naturkunde der Humboldt, Universität zu Berlin, Zoologisches Museum (types checked by H. J. Hannemann)

Over 9,000 specimens of *Hamadryas* were studied and identified. The types of 53 species and subspecies were examined and photographed in color and the negatives and prints were deposited in the Allyn Museum. These studies resulted in recognition of 20 valid species and 21 subspecies, making a total of 41 taxa recognized of the 92 original validly described taxa in the genus. In this revision, five subspecies are described as new to science. Most of the subspecies recognized are readily determined, but a few show significant overlap or are not readily separable in intergrade areas. For example, *H. februa* which formerly was split into 11 different species and subspecies is presently divided into two weak subspecies. Several subspecies which appear to be the termini of extremes of stepped clines are recognized, but all described intermediate variations or intergrades have been synonymized.

C. BIONOMICS

1. Geographic Distribution and Habitat

Hamadryas are restricted to the American hemisphere, occurring in the tropical and subtropical regions where their euphorbiaceous (and possibly other) host plants occur. Some of the species are broadly distributed from southern United States in Texas and the Florida Keys to northern Argentina and southeastern Brazil. A few species also

occur in the West Indies.

Of the 20 species of the genus, eight occur in both Central and South America, four are restricted to Mexico and Central America, eight are found only in South America, of which six are restricted to the Amazon basin and two occur in southeastern South America. They have been reported from every Latin American country except Chile.

The adults are found in a wide variety of habitats. These include high evergreen tropical forest, semi-deciduous tropical forest, riverine or gallery forest, secondary and cut over tropical forest, populated areas, savanna, semi-arid and arid regions. Those species found in semi-arid and semi-desert regions are more usually found in river or stream valleys. These include *glauconome*, *honorina*, *atlantis* and often *guatemalena*. The species restricted to dense tropical forests include the rare *alicia*, *rosandra* and *albicornis*, and also *chloe* and *velutina*.

The adults are most common in open forest, forest openings, clearings and forest edges. The species frequenting forest margins, riverine gallery forests, secondary regrowth and partially cleared and populated areas, such as *februa*, *feronia* and *amphinome*, are most widespread and abundant.

The adults are usually found on the sunny side of tree trunks of almost any species and also stumps and logs, branches and sometimes on leaves, as well as man-made telephone poles and concrete posts. They are also found on houses and other buildings, cliff faces, rocks, partially dry stream beds, and on moist places on roads and paths, especially in forested or partly forested areas. Lone trees in fields or at the edge of forest openings or forest roads are often frequented.

2. Behavior

Hamadryas are highly attracted to rotting fruit, especially mangos, guanabana, oranges, bananas, mamey and breadfruit. They are attracted to garbage dumps and to rotting fruit baits. Fermenting sap is highly attractive and they may be common on trees that have been injured or cut, or on trees with sap oozes from borings of beetles. They are attracted to fermented sugar baits and may swarm around small sugar cane mills or presses. Mango groves are a favorite place to collect even when fruit are not in season. Grey or lichen mottled tree trunks are most commonly frequented and with experience, the most suitable trees can be selected or predicted. Some species are also highly attracted to feces. They have been observed on human, pig, and dog excrement but not on horse or cow manure. In a few instances, they have been observed to be attracted to a rotting carcass or to the dry remains of dead animals.

Hamadryas have never been reported to be attracted to flowers. However, the author observed one female *H. guatemalena marmarice* feeding on a yellow composite flower (similar to *Inula*). The wings were outstretched and beating while hovering with the proboscis in the flower for over one half minute. This occurred about noon in a shrubby field near Zihuatenejo, Mexico. *H. feronia* in captivity voluntarily fed on yellow wedelia flowers in a swimming pool cage in Florida. A picture of *H. feronia* in Trinidad "drinking from a flower" in Sandved & Brewer (1976) shows an obviously posed specimen sitting on a flower with wings at a 45° angle with drooping antennae and without the proboscis extended.

The adults spend most of the time resting on tree trunks and other places, but are readily disturbed by any activity or noise. When disturbed by a person, they frequently fly at the intruder and may alight on the body or on a net. They may appear to be playing a daring game by rapidly darting at the intruder several times, showing bright colors (if present) and making loud clicking sounds. They appear to be "territorial" and when another *Hamadryas* flies near or is in the area, they often engage in rapid vertical flights chasing each other and making loud crackling noise. They usually fly back to their resting place but may continue chasing other *Hamadryas* that are disturbed and join in the activity. This flight activity usually occurs during hot sunny periods from 0900-1500 hours when there is a population of *Hamadryas* in the area. It is not uncommon to find 8-10 of these butterflies on a single suitable tree.

Hamadryas adults often vigorously attack any intruder butterflies, humans or any

The adults of some species, especially of the *februa* species group have grey-brown mottled calico markings which often match the lichen and moss mottling of tree trunks. This provides good cryptic concealment, especially when combined with the habit of resting upside down with the wings flattened and outstretched so that almost no silhouette shows.

In addition to cryptic concealment, some of the species have bright coloration on the ventral surface of the hind wings (VHW). Those with red include *H. amphinome* and *H. belladonna*. Those with orange or bright mustard color are *H. fornax*, *H. alicia* and *H. rosandra*. The intermittent flash of these colors during fast, jerky and erratic flight and then disappearance of the color when they alight with outspread wings could provide protection by disruption. However, as mentioned previously, the occasional waving of the wings of *H. amphinome* while at rest exposes the red in what appears to be a warning action. The adults have been observed 10-20 meters high in trees when they displayed the red underwings. Since the larvae of *Hamadryas* feed on species of *Euphorbiaceae*, it is probable that they contain poisonous alkaloids or other substances known to be present in this family. The larval spines are said to be venomous by Jones (1883). The apparent warning behavior should be studied in relation to protection from predation. *H. amphinome* is the most abundant, widespread and one of the most semidomesticated species of the genus. However, the dorsal surface of the wings of blue, black, grey and a broken diagonal whitish band on the dorsal forewing DFW is not as concealing as the pattern of *H. fornax*. *H. fornax* has bright orange-mustard color on the VHW, is relatively uncommon, limited to local areas and is frequently found with torn or notched wings. While they fly readily and rapidly, I have rarely observed them to display the orange VHW while resting. *H. alicia* is found in dense tropical forest, is easily disturbed and flies rapidly, and is difficult to catch. Nothing is known of the habits of the similar but very rare *H. rosandra* which also occurs in dense forest. Most of the other species of *Hamadryas* do not have highly conspicuous hind wings. The VHW of *H. feronia farinulenta* and *H. guatemalena* are bright ochre to buff in color but do not appear to be of use as a disruptive color.

H. amphinome and *H. arinome* have very similar colors and patterns on the dorsal wing surfaces. However, the VHW of *H. amphinome* is chromatic (red color) while in *H. arinome* it is achromatic (black). Sargent (1976) states that the contrast between chromatic and achromatic patterns on the dorsal hindwing (DHW) in *Catocala* moths introduces the element of anomaly (the unexpected) into the predator-prey system. Anomaly acts to interfere with the predator counter-adaptation to startle effects and habituation. He suggests that this "dishabituation" phenomena provides a selective basis for the evolution of hindwing diversity or a distinctively different achromatic pattern. Also, he advances the idea that the classical allopatric model of speciation seems entirely inadequate and that the controversial concept of sympatric speciation is likely the cause of this phenomenon. He states that there is a general agreement that the achromatic *Catocala* are derived from chromatic species.

H. amphinome and *H. arinome* co-occur in many of the same habitats, at the same times and have similar habits, resting places, and similar predators. *H. arinome* occurs in much of the same range, but *H. amphinome* has a broader geographic range, is far more abundant and is more domesticated. This is a most interesting case of achromatism involving the VHW in *Hamadryas* as compared with the DHW in *Catocala*.

Ultraviolet reflection pictures were taken of various species of *Hamadryas* by Dr. Arthur Allyn. Species typical of very arid or desert areas such as *H. glauconome*, *H. honorina*, and the ventral wing of female *H. atlantis* show very high UV reflection in the white areas on the wings. However, species typical of dense forest such as *H. alicia* and *H. chloe* show little or no reflection except a few white spots on the ventral surface. *H. fornax* shows considerable UV reflectance on the DFW as does the female of *H. laodamia*.

Most of the species of the genus have well-developed eye-spots or ocelli on the DHW. There are two to four well-developed "eyes" on each hind wing. It is unknown

whether these ocelli play any part in protection from predators, as is postulated in other groups of butterflies.

Hamadryas is a highly specialized group of species that have structures at the base of the wings that are probably used for producing a sharp clicking sound when the butterflies are in flight. The clicking noise can be heard when flying when two or more are together playing or fighting, when they are disturbed, or when they fly around a person invading their "territory". It is not known whether the noise is a warning. The method of sound production has been the subject of much speculation and some study (Hampson, 1892, 1893; Perry, 1964; Swinton, 1877; Reverdin, 1914; Swihart, 1967; and others), but the method of sound production is still unproven.

4. Larvae and Food Plants.

The young larvae are gregarious in three of the known species. According to Jones (1883 & 1884), the spines of the larvae are venomous but the poison appears to be weak in its effects. He states that *amphinome* and *ferentina* larvae are very active and "always on the run". The slightest shake of a leaf or stem of the host plant makes the larvae fall to the ground.

The pupae are peculiarly sensitive to light, raising the front part of the body horizontally in the light, while it remains in a hanging position in darkness (Fruhstorfer, in Seitz, 1916).

The known food plants shown in Table 1 include eight species of the genus *Dalechampia* which is a member of the *Euphorbiaceae*, as well as *Tragia volubilis* of the same family. Other food plants have been reported but should be confirmed. These include *Inga setifera* and *Inga affinis* (Leguminosae), *Eupatorium* sp. (Compositae) from Brazil, and *Aristolochia triloba* (Aristolochiaceae) from Trinidad.

The genus *Dalechampia* includes scandent vines and shrubs in the family *Euphorbiaceae*. There are 88 species listed in Pax & Hoffman (1919b). In the neotropical region, the genus occurs from Cuba and northern Mexico south to southern Brazil and Argentina. Two species occur in Mexico, nine species in Central America, two in the West Indies, four in the Andes, six in the Amazon area and 65 species in southern Brazil which is the center for the genus. Fourteen species occur in Africa, the Mediterranean area, India and the East Indies. There are 122 species of the genus *Tragia* in the family *Euphorbiaceae*. Ten species occur in the United States as far north as Virginia to Colorado, three are in the West Indies and 11 species in Central America. There are about 40 species in the Americas, mostly in southern Brazil (Pax & Hoffman, 1919a).

D. SYSTEMATICS

Hamadryas is a relatively homogeneous group that different authors have given the status of Family, Tribe, Genus and Subgenus. The family *Ageroniidae* was formerly considered to be related to *Pieridae* because of an error in ascribing braced pupae. The family was also considered closely related to *Danaidea*, especially *Euploea*, because of the similarity of the forelegs and the claws of the middle and hind legs, and the posterior margin of the forewing of the male outwardly convex (*laodamia* species group).

The evolutionary affinities of the genus *Hamadryas* are not well understood. This was well stated by Fruhstorfer, in Seitz (1916). "The species belonging to this group have so many peculiarities that they are to be reckoned among the biologically and morphologically most interesting neotropical Rhopalocera. Besides they are structurally and anatomically so very sharply confined, that no closer affinities with the groups of day-butterflies surrounding them are traceable." Butler (1869) stated, "As Dr. Felder has shown, the nearest ally of *Ageronia* is the genus *Pandora*; it also seems to be related through *Peridromia* to *Symphaedra* and *Romaleosoma*."

The genus *Hamadryas* is in the family *Nymphalidae* and according to Miller and Brown (1981) in the subfamily *Limenitidinae* Behr and tribe *Ageroniini* Seitz. They consider *Hamadryini* Orfila as a synonym of this tribe. *Hamadryas* and *Ectima* are closely

related and belong in this tribe. They may also be included in another subfamily *Eurytalinae*. This will be studied in more detail while revising other closely related neotropical nymphalid genera.

The genus (*Ageronia*) was split into two genera by Godman & Salvin (1883). *Ageronia* Hübner [1819] they restricted to *chloe* (genotype), *ferentina*, *glauconome*, *atlantis*, and *lelaps*. This was based primarily on the forewing of the male with veins R_1 + R_2 arising separately from the radial sector. In the genus *Peridromia* Boisduval (1858) they included 13 species including *arethusa*, *amphinome*, *arete*, *ariensis*, *arinome*, *fornax*, *feronia*, *guatemalena*, *iphthime*, and *epinome*. This genus was based on the following "...in the male, the first two branches of the subcostal nervure anchylosed in a

Table 1. Host Plants of *Hamadryas* Larvae

<i>Euphorbiaceae</i>		
<i>Dalechampia cissifolia</i> Poepp.	<i>H. i. iphthime</i>	Aiello (1982)
<i>Dalechampia ficifolia</i> Lam.	<i>H. epinome</i>	Costa Lima (1936)
	<i>H. a. amphinome</i>	Müller (1886)
<i>Dalechampia tilifolia</i> Lam.	<i>H. februa ferentina</i>	Young (1974)
<i>Dalechampia (=heterophylla</i> Vahl.)		
<i>Dalechampia pruriens</i> (W. Buthn)	<i>H. februa ferentina</i>	Kaye (1921)
<i>Dalechampia scandens</i> (L.)	<i>H. g. guatemalena</i>	Muyshondt & Muyshondt (1975b)
<i>Dalechampia scandens</i>	<i>H. g. guatemalena</i>	DeVries (1982)
<i>Dalechampia scandens</i>	<i>H. februa ferentina</i>	DeVries (1982)
<i>Dalechampia scandens</i>	<i>H. februa ferentina</i>	Muyshondt & Muyshondt (1975a)
<i>Dalechampia scandens</i>	<i>H. g. glauconome</i>	Serrano (1982)
<i>Dalechampia scandens</i>	<i>H. fornax fornacalia</i>	Serrano (1982)
<i>Dalechampia scandens</i>	<i>H. amphinome mexicana</i>	Muyshondt & Muyshondt (1975c)
<i>Dalechampia scandens</i>	<i>H. amphinome mexicana</i>	DeVries (1982)
Undescr. sp.	<i>H. laodamia saurites</i>	DeVries (1982)
<i>Dalechampia stipulacea</i> Mull.	<i>H. epinome</i>	Costa Lima (1936)
<i>Dalechampia stipulacea</i>	<i>H. a. amphinome</i>	Müller (1886)
<i>Dalechampia triphylla</i> Lam.	<i>H. f. feronia</i>	d'Almeida (1922)
<i>Dalechampia triphylla</i>	<i>H. f. februa</i>	d'Almeida (1922)
<i>Dalechampia triphylla</i>	<i>H. epinome</i>	Costa Lima (1936)
<i>Dalechampia triphylla</i>	<i>H. a. amphinome</i>	Müller (1886)
<i>Dalechampia stenosepala</i> Mull.	<i>H. f. feronia</i>	Biezanko et al. (1957)
<i>Dalechampia</i> sp.	<i>H. arete</i>	Müller (1886)
<i>Dalechampia stenosepala</i>	<i>H. f. fornax</i>	Costa Lima (1936)
<i>Dalechampia stenosepala</i>	<i>H. epinome</i>	d'Almeida (1922)
<i>Dalechampia stenosepala</i>	<i>H. a. amphinome</i>	Costa Lima (1936)
<i>Dalechampia stenosepala</i>	<i>H. i. iphthime</i>	Müller (1886)
<i>Tragia volubilis</i> L.	<i>H. februa ferentina</i>	Riley (1975)
<i>Tragia volubilis</i> L.	<i>H. februa ferentina</i>	Costa Lima (1936)
		Kaye (1921)
		Muyshondt & Muyshondt (1975a)
<i>Leguminosae</i>		
<i>Inga setifera</i> D.C.	<i>H. f. februa</i>	Biezanko (1949)
<i>Inga affinis</i> D.C.	<i>H. epinome</i>	Biezanko (1949)
<i>Aristolochiaceae</i>		
<i>Aristolochia triloba</i>	<i>H. amphinome</i>	Kaye (1921)
		Barcant (1970)
<i>Compositae</i>		
<i>Eupatorium</i> sp.	<i>H. a. amphinome</i>	Costa Lima (1936)

common origin from the subcostal, and in which the lower discocellular has a double curve and meets the median halfway between the first and second branches." This would include both the subgenera *Hamadryas* and *Peridromia* mentioned below.

Splitting into two genera was not followed by Fruhstorfer, in Seitz (1916) nor by most authors and is not warranted.

Hamadryas is here divided into three species groups. These are somewhat equivalent to three genera or subgenera which have been recognized at various levels by previous authors. The species groups and the characters used for their separation are listed below:

Februa species group.

Includes *februa*, *amphichloe*, *glauconome*, *honorina*, *atlantis*, *chloe* and *albicornis*. (=Subgenus *Ageronia* Hübner [1819]).

Forewing of male with veins R_1 & R_2 arising separately from the radial sector before branching of R_3 at the distal end of the discal cell. Radial sector and $r-m_2$ veins not inflated or swollen. m_2-m_3 joins M_3 distad or near junction of M_3 and Cu_1 . Posterior margin of forewing of male anal cell straight. Male genitalia with forearm of gnathos flattened and broad (except *albicornis*). Dorsal hindwings with submarginal ocelli.

Type species: *Papilio chloe* Stoll [1787].

Feronia species group.

Includes *feronia*, *guatemalena*, *iphthime*, *epinome*, *foranax*, *amphinome*, *belladonna*, *arinome* (and perhaps *alicia* and *rosandra*). (=Subgenus *Hamadryas* Hübner [1806]).

Forewing of male with veins R_1 & R_2 arising at a single point usually on a single stalk and branching almost immediately (except *alicia* and *rosandra*). Radial sector to end of discal cell, $r-m_3$ and bases of M_1 , M_2 and m_2-m_3 inflated or swollen. m_2-m_3 joins M_3 basal to junction of M_3 and Cu_1 , and about halfway to Cu_2 . Posterior margin of forewing of male anal cell straight. Male genitalia with forearm of gnathos flattened and broad. Dorsal hindwings with submarginal ocelli or circles.

Type species: *Papilio amphinome* Linnaeus.

Laodamia species group.

Includes *laodamia*, *arete*, and *velutina*. (=Subgenus *Peridromia* Lacordaire [1833]).

Forewing of male with veins R_1 & R_2 arising on a single stalk and branched almost immediately. Radial sector to end of discal cell and $r-m_2$ inflated or swollen. m_2-m_3 joins M_3 basal to junction of M_3 and Cu_1 . Posterior margin of forewing of male anal cell outwardly convex. Male genitalia with forearm of gnathos elongate awl-shaped and narrowly attenuated. Posterior lateral margin of sternite with very large flat spines in *arete* and *velutina* (but not in *laodamia*). Dorsal hindwings without submarginal ocelli.

Type species: *Papilio arethusa* Cramer [1776].

It is possible that *alicia* and *rosandra* could be considered as another species group intermediate between the *februa* and *feronia* species groups since they have features in common with both groups. This intergradation between the groups argues against recognition of subgenera. However, the *laodamia* species group is much more distinct and could be considered as a separate subgenus from the rest of the species in the genus.

Adult:

The antennae are long and slender, usually black with white edges with about 48 segments of which nine form an elongate club. The eyes are usually large and smooth. The palpi are slightly hairy, moderately large with the terminal joint rather short. The prothoracic legs of the males are hairy and the tarsal joints only occasionally visible.

The females have three joints visible with short spines.

The bases or lower half of the subcostal and cubital veins are swollen. In males, the swelling may extend halfway across the discocellular veins on the forewings. R_1 and R_2 may arise separately or form a common stalk. The different subgenera and species have distinctive venation differences. The branching of the veins at the distal end of the discal cell and the proportions of the veins that close the cell are variable and are described for each species. The nomenclature proposed by Miller (1970) for veins and intraneural cells of the wings is used. The venation of the wing of *H. februa* is shown in fig. 1. The spaces between the veins, outside the discal cell, are named for the veins bounding them, eg. the space between veins M_1 and M_2 is denoted as M_1-M_2 . Cross veins are denoted in lower case letters, eg. the crossvein between M_1 and M_2 is denoted as m_1-m_2 .

The terminology for genitalia follows Klots (1970). The male genitalia are distinctive for all species except for *februa*, *amphichloe*, *glauconome*, and *honorina*. The gnathos arm in different species is elongate awl-shaped or slightly flattened, or broad and completely flat. The posterior margin of the vinculum varies from flat to posteriorly extended. The uncus may be heavily pubescent to smooth. Drawings of male genitalia are presented for each species.

A distinctive feature of the genus is the pair of unique lateral projections or rods one on each dorsal posterior angle of the terminal (eighth) sternite of males. These organs were named rami by Stichel (1899). They have also been called Godman & Salvin organs since these authors noted them (1883) and also the Reverdin organ [after Reverdin (1914)] who described them in detail and thought they functioned in making noise. The function of rami is presently thought to be enticing organs which disseminate pheromone sex attractants. They are valuable taxonomically and may have flat spines, spinules, and/or pubescence, different size, shape and length.

The female genitalia are also of value taxonomically. They were drawn for each species to study the major morphological differences between species. Two species are fully illustrated in figs. 189 and 190 to show the female genitalic structures.

While there are differences in many of the female genitalic structures between species, the most obvious and significant differences were found in the chitinized part of the ostium bursa or sterigma. These are shown for each species in figs. 191 and 192. These can be used to separate most of the species as well as to define species groups. Distinctive shapes, setal arrangements and lengths and shapes of the hypophyses were also observed. An unusual heavily chitinized ring was found at the juncture of the corpus bursa and the ductus bursa only in *H. iphthime* (fig. 190) and *H. velutina*. The ductus bursa may be relatively short or long, all straight, or bent to an extreme in *H. amphinome* in which it is looped over itself. The corpus bursa may be small or large depending on the presence of spermatophores. There are two parallel rows or bands of signa which are usually heavily chitinized with small teeth. In some species the bands end in enlarged chitinized patches especially in *H. glauconome*, *H. honorina*, *H. iphthime* and *H. epinome*. A pair of separate chitinized signa patches were found on the opposite side of the corpus bursa in some species especially in *H. chloe* and *H. guatemalena*. The female genitalia can be used effectively to differentiate species in *Hamadryas*.

The 20 species of *Hamadryas* can be recognized by the following keys to species of adult males and females and to male genitalia and sternal rami. The subspecies are separated by keys for each species based on wing pattern and color, since the male genitalia and sternal rami do not show significant subspecific differences. The females can be separated readily so that female genitalic characters are not required. No key was made for female genitalia but comparison of the differences in sterigma are shown in figs. 191 and 192.

Larvae:

The adult larvae are 35-40 mm in length. The head has several simple spines and two long horns ending in round clubs. The body is variable in markings and coloration.

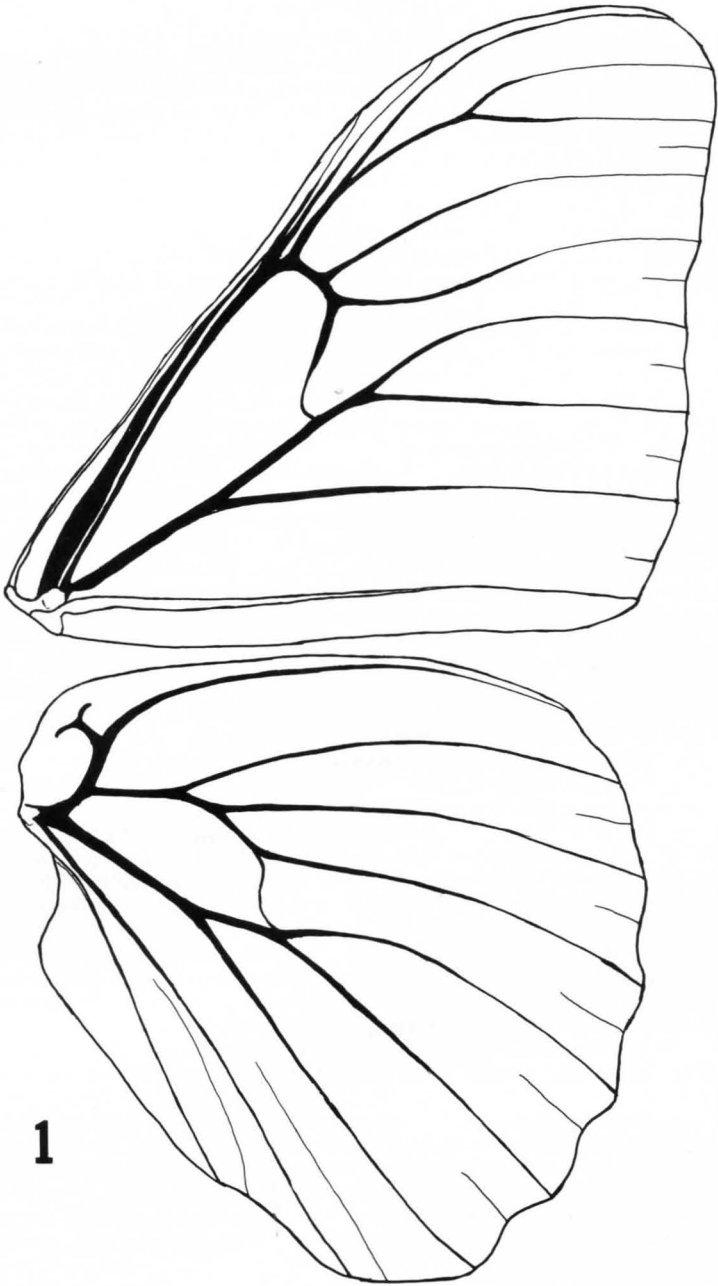


Figure 1. Venation of *Hamadryas*.

There are several rows of tubercles or spines, three rows of dorsal, three rows of lateral and three more below. Some of the tubercles may be enlarged or elongate and with spines or branches. Not every row of tubercles or spines is complete. The row of dorsal spines is of especial interest taxonomically since they vary with the different species. In many species the basic coloration of the larvae is black with various markings such as yellow lines, small light spots, or black-centered yellow rings.

A preliminary key to nine species and a summary on the dorsal spines is presented in Table 2. Much more study is required to present a complete key, and larvae of many of the species are unknown. However, in comparison with most neotropical nymphalid genera, *Hamadryas* larvae are comparatively well known with nearly half of the species described.

Pupae:

The pupae have two long leaf-like narrow horns, one on each side of the head. These may be straight, convergent, or divergent in the various species. They are suspended from the tip of the abdomen.

Table 2. Dorsal Spines on Larvae of *Hamadryas*

	T1	T2	T3	Dorsalia anteriora								Dorsalia posteriora		
				A1	A2	A3	A4	A5	A6	A7	A8	A7	A8	
<i>februa</i>				3	5	3	3	3	3	3			4	5
<i>iphthime</i>				S	S	S	S	S	S	S			4	5
<i>feronia</i>		S	S		S						S	S		
<i>arete</i>				S	S	W	W	W					4	5
<i>laodamia</i>				S	S	?	?	?					S	S
<i>epinome</i>		W	W	S	W	W	?	?	?				4	5
"				W	W	W	W	W	W	S	S			
<i>fornax</i>				W	W	W	W	?	?				3	5
<i>guatemalena</i>											3	6		
<i>amphinome</i>											5	5		

S = spine

Number = No. branches of spine

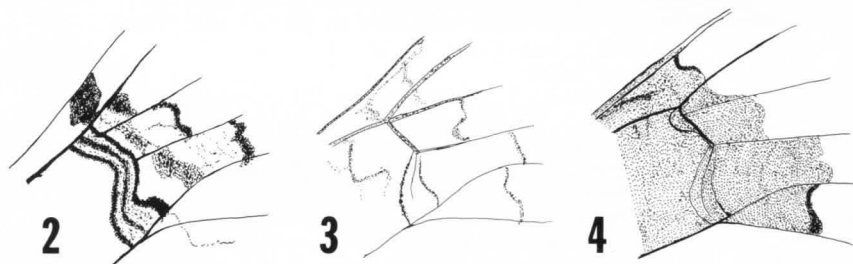
W = wart

KEY TO SPECIES OF ADULT MALES AND FEMALES

- 1a. Ventral surface of hind wing (VHW) brick red or red-orange. 2
- 1b. VHW not as above. 3
- 2a. Dorsal surface of forewing (DFW) with white (or smoky white) diagonal median band in both males and females. *amphinome*
- 2b. DFW of males with four smoky grey spots in a diagonal line in the median area; ventral surface of forewing (VFW) with four white spots in a diagonal line in the median area. DFW of females with wide white diagonal median band; VFW with prominent white subapical central white spot R_5M_1 (upper Amazon only). *belladonna*
- 3a. VHW mustard yellow color with small ($\frac{1}{8}$ intraneural space in diameter) or no submarginal ocelli in M_2-2A 4
- 3b. VHW not as above (if VHW is buff or brown, large prominent submarginal ocelli in M_2-2A). 6

- 4a. Dorsal surface of hind wing (DHW) with ocelli not containing central black patch or spot, ground color diffuse blue or blue-green (upper Amazon, rare). *alicia*
- 4b. DHW with ocelli containing central black patch or spot. 5
- 5a. DFW heavily mottled with numerous white spots; median cross bar of cell half reddish and half blue. *formax*
- 5b. DFW with three diagonal rows of dark grey spots; median cross bar of cell all cherry red; ground color of male light blue-green color; female purple-rose color, small size (upper Amazon, rare). *rosandra*
- 6a. No ocelli in the submargin of DHW; ground color black with iridescent blue markings in both sexes, female with wide white diagonal median band. 7
- 6b. Ocelli present in submargin of DHW. 9
- 7a. Male DFW with large black area surrounded by 5 or 6 large blue iridescent spots; DHW and VFW with large brown sex patches. Female with red markings in costal area of DHW; VHW with red bars or spots in anal cell. *laodamia*
- 7b. DFW with five or more rows of blue iridescent spots on male. VHW of female with no red bars or spots in anal cell. 8
- 8a. DFW of male with numerous small blue iridescent spots and no brown sex patch on DHW. Entire ventral surface iridescent steel blue. Female with no reddish markings on costal area of DHW. *velutina*
- 8b. DHW of male with costal brown sex patch. VFW usually with diagonal median iridescent blue stripe or spots. Female with red costal markings on DHW; DFW with white diagonal median band dissected with black veins and usually a separate white spot above marginal angle M_3-Cu_1 ; (S. Brazil and N. Argentina). *arete*
- 9a. VHW black with red submarginal spots; DFW with a white or grey diagonal median band; DHW with submarginal tear-shaped ocelli. *arinome*
- 9b. VHW without red submarginal spots. 10
- 10a. DFW with three rose-red bars or bands on proximal half, DHW with two red bars in proximal area; distal margin of hind wing (M_3-Cu_2) extended. *chloe*
- 10b. DFW without three rose-red bars or bands on proximal half. 11
- 11a. Antennae with extensive white distally with black tips. Base color of wing diffuse metallic blue-green; VHW white with two large and two small submarginal ocelli; distal margin of hind wing (M_3-Cu_2) extended (Upper Amazon, rare). *albicornis*
- 11b. Antennae without extensive white color, VHW with submarginal ocelli M_1-Cu_1 about same size, distal margin of hind wing not extended. 12
- 12a. Male DFW with white chalky postmedian diagonal band and markings (in distal third), males and females with ocelli on DHW extremely flattened baso-distally with a prominent wide flat black bar basally (no rust-red or pink scales in male). VFW with black submarginal ring with white center in Cu_1-Cu_2 ; female with conspicuous light and dark mosaic pattern with dark central longitudinal band on DFW (Yucatán Peninsula only). *honorina*
- 12b. If male DFW has white chalky postmedian area, then ocelli on DHW contain rust-red or pink scales and are not extremely flattened baso-distally with wide flat black bar basally. 13
- 13a. Ocelli on DHW with some rust red or pink scales. 14
- 13b. Ocelli on DHW without rust red or pink scales. 16
- 14a. DFW with distal cross bar ($r-m_2$) of discal cell wide (see fig. 2), darker colored and circumscribed with a black line. Male without large chalky cretaceous white area on distal $\frac{1}{3}$ or $\frac{1}{2}$ of DFW. VFW without submarginal ring in Cu_1-Cu_2 . (Widespread, abundant). *februa*
- 14b. DFW with distal cross bar ($r-m_2$) of discal cell narrow (figs. 3 & 4). Male usually with large chalky cretaceous white area on distal $\frac{1}{3}$ or $\frac{1}{2}$ of DFW. 15
- 15a. DFW of male with large chalky white patch in distal third beginning 2-5 mm beyond thin black distal cross bar ($r-m_2$) of discal cell (usually with a parallel thin line and/or a small loop at junction with R, see fig. 4); VFW of male and

- female with thick black submarginal ring with white center in Cu_1-Cu_2 . Female with whitish or smoky spots in apical third of DFW. (DFW of male in *H. glauconome grisea* without white patch, only a greyish brown post-median diagonal band)..... *glauconome*
- 15b. DFW of male with white chalky patch or maculae in distal third or half, with white beginning at median cross bar of cell or at distal cross bar (fig. 3). Female similar but whitish areas of DFW may be very smoky..... *amphichloe*
- 16a. VHW with submarginal ocelli black surrounded by two concentric thin yellow-brown circles; upper surface diffuse greenish-blue; male with distal third of VFW black; female VFW with five narrow black lines across discal cell (Mexico and Central America)..... *atlantis*
- 16b. Upper surface not diffuse greenish blue. VFW with numerous whitish maculations; VFW of male without distal third black; female without five diagonal dark stripes and bars on VFW..... 17
- 17a. DHW with ocelli in M_3-Cu_2 with black center containing a smaller white distal spot or lune; black center immediately surrounded by two concentric thin bluish circular or tear-shaped circles. The area between the circles grey or light brown (not black)..... 18
- 17b. DHW with ocellus black containing a white spot or lune; black center surrounded by a single blue circle, or ocelli a thick black ring surrounded internally and externally with thin concentric blue circles..... 19
- 18a. Median cross bar of discal cell of DFW a wavy grey or grey-blue band (Central America). In South America this bar copper color and not distally extended; cross bar on VFW usually red and tear-shaped. Overall pattern especially DHW with diffuse dark lines; ocelli on DHW M_3-Cu_2 circular or tear-shaped. VFW with row of dark red-brown subapical spots between R_4 and M_2 *iphthime*
- 18b. Median cross bar of cell on DFW partly copper or red-brown in color, anterior part of bar usually separated by a black line; posterior part of bar distally extended in a triangular or V-shaped marking, this area on VFW a dark line. Overall pattern with thinner more defined black wavy lines, ocelli on DHW M_3-Cu_2 dorso-ventrally compressed; subapical area of VFW black without red-brown spots R_4-M_2 (southern South America)..... *epinome*
- 19a. Ocelli on DHW with a single usually tear-shaped or circular light blue circle enclosing black area with a small white central spot or lune; VFW without subapical white spot in R_3-R_4 ; median margin with one large white spot M_2-M_3 ; DHW with costal area usually pinkish (widespread, abundant).... *feronia*
- 19b. Ocelli on DHW with thick black ring surrounded internally and externally with thin concentric blue circles; the center is usually brown, or light blue



Figures 2-4: characters for separation of *Hamadryas*. 2. Dorsal forewing of *Hamadryas februa* showing distal cross bar ($r-m_2$) of discal cell. 3. Dorsal forewing of *Hamadryas amphichloe* showing distal cross bar ($r-m_2$) of discal cell. 4. Dorsal forewing of *Hamadryas glauconome* showing distal cross bar ($r-m_2$) of discal cell.

(sometimes inner circle and center are whitish, esp. in rubbed specimens). VFW with white subapical spot in R_3 - R_4 ; median margin with two large white spots M_1 - M_3 . Usually large with broad rounded forewing. VHW dark buff brown; DHW with dark grey or blackish costal area (Mexico, Central America, rare if present in Brazil) *guatemalena*

KEY TO MALE GENITALIA AND STERNAL RAMI (GODMAN ORGANS)

- 1a. Forearm of gnathos elongate, narrowly attenuated, curved and slightly flattened; aedeagus over 5 mm in length, markedly curved. 2
- 1b. Forearm of gnathos broad and blunt or broadly attenuated, greatly flattened; aedeagus less than 5 mm in length (except *arinome*). 4
- 2a. Sternal rami (Godman Organs) with flat spines along entire length; no very large spines on lateral margin of sternite ventral to rami. *laodamia*
- 2b. Rami with spines mostly in apical area, few or none basally; very large spines (nearly $\frac{1}{2}$ length of rami) on lateral margin of sternite ventral to rami. 3
- 3a. Rami over 2.0 mm in length, pubescent with numerous flat spines only in enlarged terminal area; about 3-7 very large 1.0 mm spines on lateral margin of sternite ventral to rami. *velutina*
- 3b. Rami small (1.2 mm) with scattered setae and small spines on apical third; about 7 to 9 large flat spines on lateral margin of sternite ventral to rami. *arete*
- 4a. Vinculum without posterior median projection; rami short (1.0-1.64 mm); uncus with many hairs, tip of uncus toothed and beak-shaped. 5
- 4b. Vinculum with posterior median projection; rami usually over 1.6 mm in length. 7
- 5a. Forearm of gnathos short and hoof-shaped; valve over 2.2 mm in length; rami attenuate with long and short spines entire length. *atlantis*
- 5b. Forearm of gnathos long $\frac{3}{4}$ or more length of arm; valve less than 2.0 mm in length. 6
- 6a. Rami with scattered setae, spines limited to cluster on expanded apex; valve less than 1.8 mm in length; aedeagus less than 3.0 mm in length; uncus with ventral and dorsal hairs. *chloe*
- 6b. Rami pubescent with flat spines on apical half; valve 2.0 mm in length; aedeagus over 3.2 mm in length; prominent hairs on uncus over $\frac{1}{2}$ length of uncus. *albicornis*
- 7a. Saccus over 5.7 mm in length; aedeagus over 6.5 mm in length; rami 5.7-6.6 mm with scattered flat spines, also on lateral posterior margin of sternite. *arinome*
- 7b. Saccus less than 5.7 mm in length; aedeagus less than 5.0 mm in length. 8
- 8a. Valve less than 1.9 mm in length. *rosandra*
- 8b. Valve over 2.0 mm in length. 9
- 9a. Rami over 4.0 mm in length, pubescent basally with scattered spines; valve over 3.6 mm in length. *belladonna*
- 9b. Rami less than 3.8 mm in length; valve less than 3.3 mm in length. 10
- 10a. Elbow of gnathos gently curving, not forming a right angle. 11
- 10b. Elbow of gnathos forming a right angle. 12
- 11a. Uncus with many hairs on dorsal surface; posterior median projection of vinculum gently rounded; rami pubescent with flat spines only on expanded apex. *alicia*
- 11b. Uncus without hair; posterior median projection of vinculum prominent and extended; rami with a row of flat spines along entire length. *fornax*
- 12a. Saccus 3.4 mm or more in length; aedeagus 4.2 mm or more in length; entire rami and adjacent lateral margin of sternite with flat long spines. *amphinome*

- 12b. Saccus 3.0 mm or less in length; aedeagus 4.0 mm or less in length; rami and posterior margin of sternite with smaller spines, or missing in some areas. 13
- 13a. Dorsal surface of uncus with prominent hairs on over half the length. 14
- 13b. Dorsal surface of uncus barren or with few small or sparse hairs. 15
- 14a. Rami with spines along entire length, and on adjacent lateral margins of sternite; valve usually with prominent papilla or projection on dorsal margin; uncus densely covered with long hairs on dorsal surface. *feronia*
- 14b. Rami with large spines on distal $\frac{1}{3}$ and on flattened expanded apex, spines smaller proximally; valve with slightly expanded upper margin; uncus with numerous scattered hairs on dorsal surface. *guatemalena*
- 15a. Saccus 2.4 mm or more in length; aedeagus 3.4 mm or more in length. 16
- 15b. Saccus less than 2.3 mm in length; aedeagus less than 3.3 mm in length. 17
- 16a. Valve with enlarged dorsal margin or projection about $\frac{1}{2}$ to $\frac{2}{3}$ distance from base; rami with basal spines longer (over 0.25 mm in length). *iphthime*
- 16b. Valve with enlarged dorsal margin or projection about $\frac{1}{3}$ distance from base, rami with basal spines shorter (less than 0.2 mm in length). *epinome*
- 17a. Spines on rami present along entire length, spines usually present on lateral margin of sternite ventral to rami. *februa*
- 17b. Spines on rami larger in apical half especially at apex, absent or decreasing in size proximally, usually no spines at base or on sternite but larger setae may be present. 18
- 18a. Gnathos arm hoof shaped with chitinized sheath extending up the gnathos from gnathos arm. *honorina*
- 18b. Gnathos arm not hoof shaped, chitinized sheath above gnathos arm narrow *glauconome*
amphichloe

PRELIMINARY KEY TO MATURE *HAMADRYAS* LARVAE

- 1a. Dorsal spines present on abdominal segments A1-A8. 2
- 1b. Dorsal spines absent on segments A3-A6. 3
- 2a. Body black with light green spines; six thin yellow longitudinal stripes from thorax to apex of abdomen, located on either side of each row of spines; two orange spots at either side of abdominal median spine (some forms have fawn colored markings). *februa*
- 2b. Body black with body spines of different colors or shades as follows: A4 and A6 very light, A8 very dark, A1, A3 and A7 dark, A5, A2, A4 and A6 light *iphthime*
(= *sp. ign.* of Müller)
- 3a. Dorsal spines present only on segments A7 and A8 (larvae gregarious) 4
- 3b. Dorsal spines present either on segments A1 or A2 or both. 6
- 4a. Dorsal spines on segment A7 with 3 branches, segment A8 with 6 branches; prominent subdorsal spines on segments T2, T3, A2 and A8 appear "hairy" due to numerous dark accessory spines on shaft of scoli; ground color black with bright deep yellow markings. *guatemalena*
- 4b. Not as above. 5
- 5a. Dorsal spines on segment A7 and A8 each with 5 branches; subdorsal spines on T2, T3, A2, A7 and A8 with small secondary spines on shaft of scoli; ground color black with bright yellow dorsal design of bars and circles forming paired "OTO" markings; subspiracular bright orange spots very conspicuous. *amphinome*
- 5b. Dorsal spines on segment A7 with 3 branches, segment A8 with 5 branches; dorsal warts on segments A1-A4 (2nd instar larvae) with segments A4-A6 very bright color, with remaining segments dark except T2 and A 2 lighter than T1 and A8 (which separate it from *H. iphthime*). *fornax*

- 6a. Dorsal spines present on both segments A1, A2 as well as on A7 and A8. 7
 6b. Dorsal spines on either segment A1 or on A2 (not both) as well as on A7 and A8. 8
 7a. Larvae with three pairs of very long spines and four pairs of shorter spines on the central segments; larvae black with orange on the edge of the light-colored subdorsal line and suprastigmal line (spines on the dorsalia posteriora on A7 and A8 the same proportional lengths as in *H. laodamia* but other spine lengths different). *arete*
 7b. Dorsalia posteriora (Ds pst) on segment A8 only with spines the same proportional length as in *H. arete*. *laodamia*
 8a. Dorsal spines present on segments T2, T3, A2, A7 and A8; body completely covered with small brownish white color spots, somewhat violaceous in dorsal part; larger lateral spots are rose or somewhat violet color; tubercles are yellow and have spines but lack dorsal row (larvae may be dirty grey green with a narrow interrupted pale line low down on the side). *feronia*
 8b. Dorsal spines present on A1, A7 and A8; dorsal warts on segments A2 & A3 or A1-A6; body usually black, two yellowish dorsal and two lateral lines; two dark red spots laterally; intersegmental folds with ill-defined reddish transverse coloring; larvae solitary; spines missing on segments A2-A6, but with white warts on segment A2. *epinome*

The evolutionary development of the species and subspecies of *Hamadryas* is being studied. About 100 character states have been considered especially in relation to primitive and advanced states. The morphological characters listed in the keys to adult males, females, male genitalia and rami, larvae, as well as keys to subspecies were considered. A conventional phylogenetic chart has been constructed. A comparative analysis is being made of the value of a cladistic diagram using the methods of Hennig (1960) and more recent extensions and modifications of this methodology. In addition, an analysis is being made of dispersal and vicariance in the genus. These analyses will be published separately, following outgroup comparisons with other closely related genera under study.

The evolutionary development of the genus *Hamadryas* as presently perceived starts from an unknown ancestral form or forms and progresses into three major directions recognized as species groups. The three recognized species groups are characterized by the number of cross veins that are swollen, and especially differences in the branching of the subcostal and radial veins. There are also significant differences in the male genitalia and rami and in the female genitalia in the three groups.

The phylogenetic development is thought to proceed through a series of dichotomies from "primitive" (plesiotypic) to more "advanced" (apotypic) species. The most "primitive" species include *arete*, *velutina*, *alicia*, *rosandra*, *albicornis*, and *atlantis*. They are 1) relatively limited in geographic distribution to one or a few faunal life zone types, 2) occur in more limited habitats especially in primary tropical forest (or dry stream valleys), 3) are not semi-domesticated and do not usually occur in populated areas, 4) are rare or uncommon, 5) most do not produce clicking noise (so far as is known), 6) have none or only one subspecies (in addition to the nominate form), 7) show marked or definite sexual dimorphism, 8) are more shy and retiring, not aggressive and do not show "territoriality."

Species which are intermediate in phylogenetic development, are common to uncommon, with one or usually more subspecies include: *laodamia*, *arinome*, *formax*, *iphthime*, *chloe*, *amphichloe*, *glauconome* and *guatemalena*. *Laodamia*, *amphichloe* and *glauconome* show distinct sexual dimorphism and the rest are intermediate showing some sexual dimorphism, with *formax* and *guatemalena* showing least. *Belladonna*, *epinome* and *honorina* are also intermediate but have no subspecies, are relatively uncommon and show more sexual dimorphism.

The most advanced species including *februa*, *feronia* and *amphinome* are 1) widespread in geographic distribution, overlapping many faunal life zones, 2) occur in a wide variety of habitats, 3) are semi-domesticated occurring in man-created and populated areas, 4) are abundant, 5) commonly produce a clicking noise, 6) are quite variable and

have one or more subspecies, 7) show decreased or very little sexual dimorphism, and 8) show aggressive behavior and "territoriality." These species might be called more advanced, adaptable and successful apotypic populations and over 1,000 specimens have been examined for each species. *H. guatemalena* is also semi-domesticated and might be included in this group, but it presently has a limited geographic range.

Very interesting aberrations have been discovered, especially a stretched wing pattern found in several species. This information will be published separately.

ACKNOWLEDGEMENTS

In revising this genus I have been aided by many people and it is a pleasure to acknowledge their assistance. Dr. Lee D. Miller encouraged and assisted in many ways including review of manuscript. He also kindly provided genitalic dissections prepared when he planned much earlier to revise the genus. Jacqueline Y. Miller provided valuable criticism and helped in many ways, as did Mr. Stephen Steinhauser and Dr. Arthur C. Allyn, who also helped on photographic illustrations. Dr. Gerardo Lamas critically reviewed the manuscript and made many helpful suggestions especially on early literature references as well as providing data from his museum. Dr. F. M. Brown kindly made available an unpublished manuscript he prepared many years ago on Central American *Hamadryas*. Dr. K. S. Brown provided specimens and helpful suggestions. Museum curators have been very helpful in permitting study of their collections and to photograph or borrow critical specimens. These include Dr. J. F. Gates Clark (SI); Dr. F. H. Rindge (AM); Dr. Ginter Ekis (CM); Dr. R. I. Vane-Wright and P. Ackery (BM); Sr. J. de la Maza E. (DM); Dr. P. H. Arnaud (CA); M. D. Bowers and J. Weintraub (MZ); Ms. Susan S. Borkin (MM); J. P. Donahue (LA); and in addition the owners of private collections listed previously.

I am most indebted to my wife Joanne F. Jenkins who has accompanied me in numerous tropical countries and stealthily collected many *Hamadryas*, has helped make observations on their behavior, helped curate our collection, and provided excellent secretarial and artistic assistance.

Genus *Hamadryas* Hübner [1806]

- Hamadryas* Hübner [1806]. Samml. Exot. Schmett. 1:pl. [47]. Type species by monotypy *Papilio amphinome* Linnaeus (1767). Syst. Nat. ed. 12, 1:779-780.
- =*Apatura* [Illiger] (1807), Allgem Lit. ztg. Halle:1181. Type species by monotypy *Papilio amphinome* Linnaeus (1767). Syst. Nat. ed. 12, 1:779-780. Name placed on Official Index Rejected Names (I.C.Z.N. Opin. 232; 1954).
- =*Ageronia* Hübner [1819], Verz. Bekannt. Schmett. 3:42. Type species by designation of Scudder (1875), Proc. Amer. Acad. Arts. Sci. 10:104. *Papilio chloe* Stoll (1787) Aanhangs. Werk. Utitl. Kapellen Pieter Cramer:22.
- =*Philocala* Billberg (1820). Enum. Ins. Mus. Billberg:79. Type species by designation of Scudder (1875), Proc. Amer. Acad. Arts. Sci. 10:248. *Papilio amphinome* Linnaeus (1767). Syst. Nat. ed. 12, 1:779-780.
- =*Peridromia* Lacordaire (1833). Ann. Soc. Entomol. France 2:392. Type species by designation of Lamas (1980) J. Lepid. Soc. 34:85. *Papilio arethusa* Cramer (1776), Utitl. Kapellen 1:122.
- =*Peridromia* Boisduval [1836]. Hist. Nat. Ins. Spec. Gen. Lepid., 1:pl. 23. Type species by monotypy *Papilio arethusa* Cramer (1776). Utitl. Kapellen, 1:122. Is *Papilio laodamia* Cramer (1777) Utitl. Kapellen 2:49, pl. 130.
- =*Amphichlora* C. Felder (1861). Nova Acta Leopold Carol. 28:19. Type species by designation of Scudder (1875) Proc. Amer. Acad. Arts. Sci., 10:109. *Papilio feronia* Linnaeus (1758). Syst. Nat. Ed. 10, 1:473.

Hamadryas februa (Hübner) [1823]

Figs. 2, 169, 189, 191, 193

There has been a longstanding confusion over the priority of the names *februa* and *ferentina*. *Ageronia februa* was published by Hübner in [1823] according to Hemming (1933, 1:407). *Nymphalis ferentina* was published by Godart in *Encyclopédie Methodique* 9:428, n. 248 in [1821] according to Brown (1941). Cowan (1967) has shown that this page was published in [1824] so that the species name becomes *februa*. The type of *A. ferentina* is based on a figure labeled *Papilio feronia* Cramer (*nec* Linnaeus) 1782:140, pl. 362 which came from Surinam.

The taxonomy of *H. februa* is one of the most difficult of all *Hamadryas*. This is because it is highly variable in a single locality or habitat, and is abundant, aggressive and widespread from southern Texas to Argentina. Fruhstorfer (1916) recognized eleven different taxonomic entities under *Ageronia februa*. He described eight subspecies based on variable characters. After careful examination of his types and collection at the BM, and series of specimens from his type localities, none of his names could be substantiated. He did not recognize individual or seasonal variation. The present author has collected *H. ferentina* and four of his "subspecies" on one tree in one day in Mexico.

Detailed analysis of about 1,200 specimens showed no highly significant differences in specimens throughout the range. The color markings and maculation are quite variable. There is a tendency for darker specimens to occur in northwest Mexico and in Argentina and southern Brazil, but dark specimens also occur throughout the range. There did not appear to be any correlation with wet and dry season specimens. The only character of value found for separating subspecies appears to be the subapical rings on the VHW, in the key to subspecies. In addition, there is an interesting size variation in wing length with the smallest specimens from Trinidad (ave. 27.6 mm) and Venezuela and Colombia, to northern Mexico (over 40 mm) and to southern Brazil (40 mm), Ecuador (44 mm), Argentina (42 mm). Examination of male genitalia from different parts of the range also showed no significant variation.

The present taxonomic treatment of *H. februa* is not felt to be satisfactory. Two presently recognized subspecies are not well differentiated and are subject to some variation and rather extensive intergradation. Large series of specimens were studied in detail and compared with types and topotypical material as well as field collecting fresh specimens in many areas.

Some species of *Hamadryas* such as *februa* and *feronia* are typical of cut over disturbed and second growth areas. This is probably correlated with the *Dalechampia* and *Tragia* host plants being found in these areas. Man's activities in cutting forests and planting crops may have caused these species to become more abundant and widespread.

Description:

Male: Forewing with R_1 & R_2 arising separately, radial sector and $r-m_2$ not swollen, m_2-m_3 joining at or near to junction of M_3 and Cu_1 . DFW ground color brown or bluish with grey, white and black mottled calico pattern and a red wavy median discal cross bar; DHW with a wavy dark median line; postmedian ocelli with concentric circles; the outer, a thin blue ring, inwardly a brown ring, a thin blue ring, the interior with the proximal area a lune of reddish brown, the middle a large black lune followed distally with a bluish or brownish area with a white distal lune. VFW basal area grey, a somewhat reddish discal cross bar and diagonal rows of large grey maculae. VHW basal half grey, with a dark wavy median line, a row of ocelli similar to above but without blue rings and with larger white distal area.

Male genitalia: Vinculum with prominent median posterior projection; gnathos elbow forming a right angle, uncus with few scattered hairs, tip hooked and beaked; sacculus (1.72-2.28)1.90 mm; valve with expanded median enlargement and often a lip at

crista (2.0-2.80)2.39 mm, aedeagus (2.48-3.28)2.74 mm. Rami (1.60-2.28)1.83 mm, with scattered small flat spines extending from apex to base and also on the lateral posterior margin of the tergite.

Female: Similar to male but darker markings especially in the central longitudinal area.

Key to Subspecies of *H. februa*

- 1a. VHW with a small subapical ring (1.0-1.5 mm) in R_s-M_1 , or if larger a light brown open C-shape instead of a ring; $Sc + R_1-E_s$ usually lacking a subapical spot or ring. Texas to Amazon River. *ferentina*
- 1b. VHW with a larger dark subapical ring (2.0-4.0 mm) in R_s-M_1 , rarely C-shaped; a subapical dark ring or spot in $Sc + R_1-R_s$ becoming more conspicuous southward (in S. Brazil and Argentina). S. of Amazon River and Ecuador. *februa*

Hamadryas februa februa (Hübner) [1823]

Figs. 5-8, 193

Ageronia februa Hübner [1823]: V. 2, pl. [41], f. 1 & 2. TL -Unknown, "Amazon district or northern part of Brazil" according to Fruhstorfer, in Seitz, 1916:540. Syntypes -Probably lost.

=*Ageronia februa sabatia* Fruhstorfer, in Seitz, 1916:540. TL -Brazil, Mato Grosso, Cuiabá. Syntypes - BM 15-108, 1 ♂, 1 ♀ [**Syn. nov.**]

=*Ageronia atinia*, author not stated, [Fruhstorfer], in Seitz, 1914, pl. 105c, Lieferung 194.

=*Ageronia februa atinia* Fruhstorfer, in Seitz, 1916:540, Lieferung 228. TL -Brazil, Rio Grande do Sul and Santa Catarina. Syntypes - BM 15-108, 1 ♂, 1 ♀ (Examined) [**Syn. nov.**], (Figs. 5-8).

=*Ageronia februa sellasia* Fruhstorfer, in Seitz, 1916:540. TL - Paraguay. Syntypes - BM 15-108, 1 ♂, 1 ♀ (Examined) [**Syn. nov.**]

=*Ageronia ferox maina* Martin 1923:54. TL - Peru, Cuzco. Type - 1 ♂ HT in BM (Examined) [**Nomen nudum**]

Description:

As in *H. februa* except for differences listed for *H. f. februa* in key to subspecies. Average wing length ♂ 35 mm, ♀ 36 mm.

Distribution:

From the Amazon River and Ecuador south to northern Argentina, Paraguay and southern Brazil.

Taxonomy & Variation:

South American specimens of *februa* show much variability in size and color and some in pattern. A fairly large series of specimens freshly collected by the author in southern Brazil, Paraguay and northern Argentina were studied. The coloring and maculation are similar to Mexican specimens but can be separated as *H. f. februa* based on the submarginal rings on the VHW. The Fruhstorfer types of *atinia*, *sellasia* and *sabatia* were studied in the BM. Fairly large series from the type locality areas were also studied. No significant differences were observed between the Fruhstorfer described subspecies *atinia*, *sellasia*, and *sabatia* from these areas, nor were they separable from *H. f. februa*. Hayward (1964) maintained the names *atinia* and *sellasia* but could find no significant differences between them. He synonymized *sabatia* under *H. februa sellasia*.

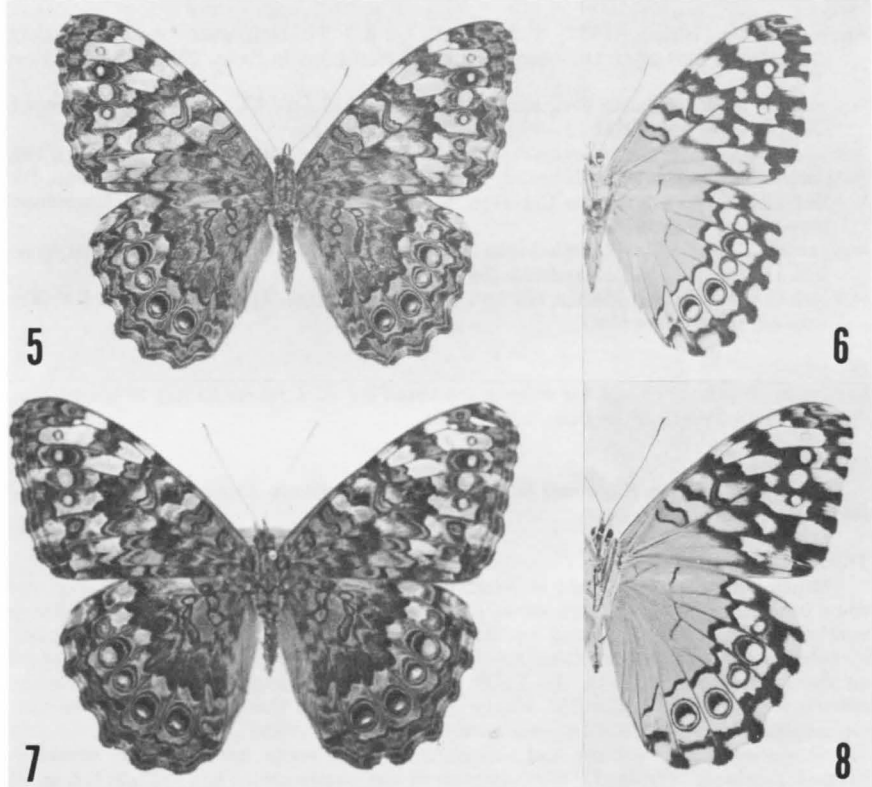
An attempt was made to separate *atinia* Fruhstorfer as a subspecies of *februa*. It is somewhat larger, darker, and the VHW has a prominent large subapical dark ring in

Rs-M₁ and a ring in Sc+R₁-Rs - especially in males. Examination of a large series and plotting their distribution showed that it is not a separable subspecies and that the characters are variable and not correlated with geographical area. It was concluded that there is a clinal distribution of the appearance of this ring from the very small or C-shaped ring from Mexico to a large dark ring and in addition a ring in SC+R₁-Rs especially in the extreme south of the range of the species. *Ageronia amphichloe* Boisduval from Guayaquil, Ecuador was included under *februa* by Fruhstorfer, in Seitz (1916). It is not *februa* and is discussed under *H. amphichloe*.

Ageronia ferox maina Fruhstorfer. Type ♂ from Cuzco, Peru in BM, labeled TYPE/Peru, Cuzco, Fruhstorfer/*ferox maina* Fruhst. (in handwriting) Fruhstorfer Coll. BM 1933-131. I have examined and photographed this type ♂ in the BM. It is a very light marked specimen of *H. f. februa* similar to the synonymized *Ageronia februa fundania* Fruhstorfer. The type of *maina* was cited by Martin (1923) but no description was published so that it is a *nomen nudum*.

Biology:

H. f. februa is a common widespread subspecies which occurs in a variety of habitats including partially cut over and second growth areas, forest edges, on isolated trees in fields, along roads and in populated areas. It occurs in riverine or gallery forests



Figures 5-8. *Hamadryas februa februa* (Hübner). ♂ Dorsal (5) ventral (6) surfaces. BRAZIL, Rio Grande do Sul & Santa Catarina. Syntype, *Ageronia februa atinia* Fruh. (BM). ♀ dorsal (7) ventral (8) surfaces. BRAZIL, Rio Grande do Sul. Syntype, *Ageronia februa atinia* Fruh. (BM).

along rivers, but is also found in dry areas. The adults are fairly aggressive in flight and make loud crackling noises when flying.

Adults have been collected in all months of the year. In the temperate part of the range in the southern hemisphere, they appear to be more common in summer in Oct.-April, however, I have collected them commonly in mid-winter in July in various localities in Argentina and Paraguay. They have been collected from sea level to over 1,000 m. elevation.

Immature Stages:

The egg, all five instars including four different forms of the fifth instar and the pupa have been described in Brazil by d'Almeida (1922). There is a brief note on the larva by Fruhstorfer, in Seitz (1916).

Host Plants:

<i>Dalechampia triphylla</i> Lam.	Euphorbiaceae	
In Brazil		d'Almeida (1922)
(?) <i>Inga setifera</i> D.C.	Leguminosae	
"Guaba" in Brazil		Biezanko (1949)

Dalechampia spp. is said to be the preferred food plant. The record of *Inga* may be due to an error and should not be accepted without confirmation.

Specimens Examined: 291 ♂, 132 ♀

ECUADOR: *Azuay*, Cuenca; *Guayas*, Guayaquil; PERU: *Cuzco*, Ahuayro, 2000 m; *Limatambo*; *Quillabamba*, 950-1050 m; *Boca Rio Blanco* 1800 m; *Rio Apurímac*, *Huánuco*, *Tingo Mariá*; *Upper Rio Huallaga*; *Ayacuco*, *Ninabamba*, 2300 m; *San Miguel*, 2860 m; *Junín*, *Satipo*; *Apurímac*, *Abancay*, 2500 m; *Rio Pampas*, *Puente Pampa*; *San Martín*, *Jepelacio*; *Tarapoto*; BOLIVIA: *Santa Cruz*, *Buenavista*; *Azuzaqui*; *Portachuelo*; *Prov. del Sara*, 450 m; *Puerto Suárez*, 150 m; *Santa Cruz de la Sierra*; *Chiquitos*; *La Paz*, *Chulumani*; *Yungas de la Paz*, 1500 m; *Tarija*, *Carapari*; BRAZIL: *Bahia*, *Cachimbo*; *Pernambuco*, *Pernambuco*; *Amazonas*, *Tefé*; *Pará*, *Óbidos*; *Aveiro*; *Santarém*; *Rio Grande*; *Jaboti*; *Itaituba*; *Minas Gerais*, *Paraopeba*; *Cantagalo*; *Passa Quatro*; *Rio Tíefe*, *Salto das Cruzes*; *Mato Grosso*, *Buriti*; *Barra do Bugres to Tangará*; *Nova Lima*; *Corumbá*; *Cuiabá*; *Fazenda Arapatanga*; *Urucum*; *Descalvados*; *Paraná*, *Igarassú*; *N. Paraná*; *Castro*; *Goiás*, *Serra Dourada*; *Rio Maranhão*; *Espírito Santo*, *Baixo Guandú*; *Linhares*; *Santa Catarina*, *Pinhal*; *Blumenau*; *Nova Teutonia*; *Cauna* (= *Santa Cruz do Timbó*); *Rio de Janeiro*, *Rio de Janeiro*; *Restinga Jacarepaguá*; *Itatiaia*, *Parque Nacional*; *Santo Antônio dos Brotos*; *São Paulo*, *São Paulo*; *Itaici*; *Santos*; *Rio Grande do Sul*, *São Leopoldo*; *Pelotas*; *Guarani*; *Ceará*, *Fortaleza*; PARAGUAY: *Pedro Juan Caballero*; *Central*, *Patiño Cué*; *Asunción*; *Nueva Italia*; *Caaguazú* *Yhú*; *San José*; *Arroyos y Esteros*, *Areguá*; *Guairá*, *Colonia Independencia*; *Villarica*; *Paraguarí*; *Sapucay*; *Encarnación*, *Trinidad*; *Itapúa*, *Encarnación*; *Boquerón*, *Estancia Cooper*; *San Pedro*, *Rio Jejui*; *Perens*; *Ayolas*; *Caazapá*, *Buena Vista*; *Hernandarias*, *Tacurupucú*; ARGENTINA: *Salta*, *Hipólito Yrigoyen*; *Pichanal*; *Mosconi*; *Agua Blanca*; *Orán*; *Corrientes*, *Ituzaingo*; *Misiones*, *Santo Tomás*; *Puerto Bemberg*.

***Hamadryas februa ferentina* (Godart), [1824] [Stat. rev.]**

Figs. 9-12, 193

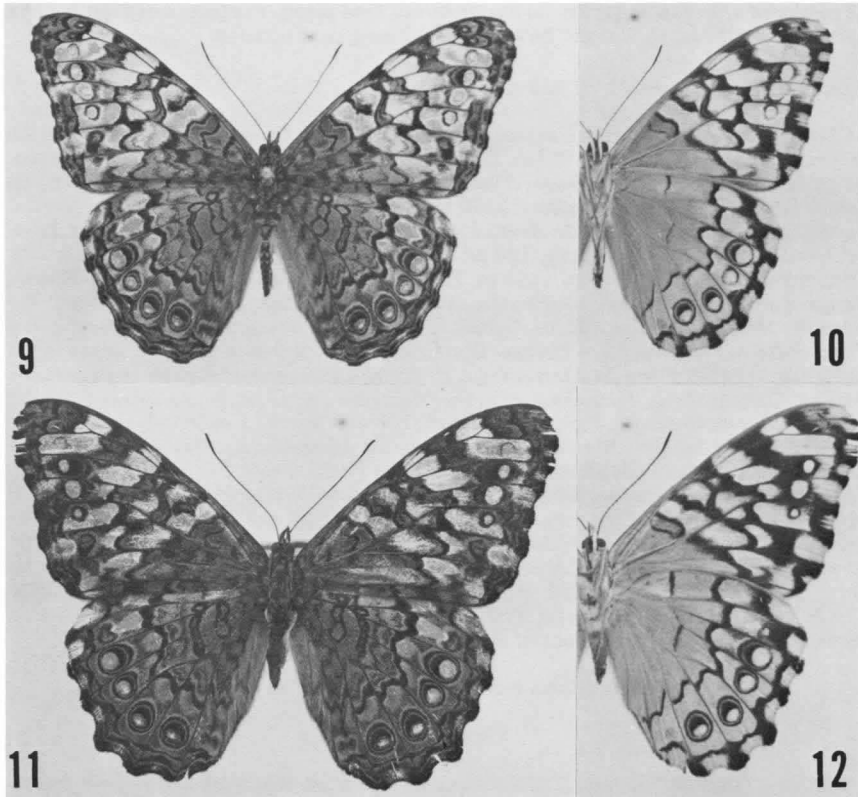
Nymphalis ferentina Godart, [1824]:428,n.248. (based on figure labeled *Papilio feronia* Cramer 1782:140, 249, pl. 362, figs. A, B. (nec Linnaeus, 1758). TL - "East Indies" according to Cramer (1782), Surinam according to Godart [1824]. Syntypes - Location unknown (coll. Baron Renyers)

= *Ageronia gudula*, Author not stated [Fruhstorfer], in Seitz, 1914: p. 105d, Lieferung 194.

- =*Ageronia februa gudula* Fruhstorfer, in Seitz 1916:539, Lieferung 228. TL - "Texas" on type label ("W. Mexico in description). Syntypes - BM 15-106, 1 ♀ (Examined) [Syn. nov.] (Figs. 11 & 12).
- =*Ageronia februa icilia* Fruhstorfer, in Seitz, 1916:540. TL - Trinidad, Belmont. Syntypes - BM 15-107, 1 ♂ (examined) [Syn. nov.]
- =*Ageronia februa* f. *sodalía* Fruhstorfer, in Seitz, 1916:540. TL - "E. & S. Mexico". Syntypes - BM 15-106, (abdomen missing) (Examined) [Syn. nov.]
- =*Ageronia februa hierone* Fruhstorfer, in Seitz, 1916:540. TL - Mexico, Yucatán. Syntypes (Not in BM nor Museum Zoology Berlin) [Syn. nov.]
- =*Ageronia februa fundania* Fruhstorfer, in Seitz, 1916:540. TL - Honduras, San Pedro Sula. Syntypes - BM 15-106, 1 ♂ (Examined) [Syn. nov.] (Figs. 9 & 10).
- =*Ageronia ferox fictitia* Brown, 1945:41 (*nec* Fruhstorfer)

Description:

As in *H. februa* except for differences listed for *H. februa ferentina* in the key to subspecies. Average wing length ♂ 35 mm, ♀ 37 mm.



Figures 9-12. *Hamadryas februa ferentina* (Godart). ♂ dorsal (9) ventral (10) surfaces. HONDURAS, Cortés, San Pedro Sula. Syntype. *Ageronia februa fundania* Fruh. (BM). ♀ dorsal (11) ventral (12) surfaces. "TEXAS." Syntype, *Ageronia februa gudula* Fruh. (BM).

Distribution:

H. februa ferentina occurs from southern Texas, northeastern and northwestern Mexico through Central America to Colombia, Trinidad, and the Guianas to the Amazon River. Intergradation occurs in the Amazon River and extends along the north east coast of Brazil to Recife.

Taxonomy and Variation:

Ferentina is highly variable and Fruhstorfer, in Seitz (1916) described five subspecies or forms. In Mexico and Central America the Fruhstorfer names *gudula*, *sodalia*, *hierone* and *fundania* apply to variations and color forms. I have collected all of these forms from the same tree on the same day in Mexico. Central American specimens tend to have lighter markings (*fundania*) but this is variable. *H. februa gudula* Fruhstorfer, in Seitz (1916) was described from western Mexico, but the specimen designated type in the British Museum is labeled "Texas." This name is included in the Checklist by Miller and Brown (1981) for North America north of Mexico. There is a dark marked population with brown markings found from Guerrero to Sonora, Mexico which might be considered to be a subspecies. However, there is so much variation it is not now recognized. It is probable that a separate subspecies existed in western Mexico but since the species is so aggressive and semi-domesticated it is no longer distinct. *Ageronia februa icilia* Fruhstorfer was described from Trinidad on the basis of small size, more uniform grey color, reduced black bands and submarginal band of VHW more red. Examination of the type in the BM shows that it is a small *ferentina* similar to specimens from Venezuela and Colombia. Series of specimens from Trinidad show much variability. No basis for a subspecies was found in comparing many characters including those given by Fruhstorfer (1916). Hayward (1964) mistakenly synonymized *icilia* under *H. februa sellasia*. Hoffman (1940) synonymized *ferentina*, *gudula*, *sodalia* and *hierone* under *februa* but some later authors have recognized these as subspecies.

Biology:

H. februa ferentina is one of the most abundant and widespread subspecies of *Hamadryas*. It occurs in many types of habitats including second growth and cultivated areas, populated areas, forest edges, on isolated trees in fields, along roads and in citrus groves. Adults are found in very dry areas, especially in stream valleys but are not usually found in deep tropical forests. The adults are often aggressive, especially when occurring in numbers, and make crackling noise in flight. It is a common subspecies in collections probably because it is abundant, widespread, occurs in populated areas, and is relatively easy to catch on tree trunks or flying at and frequently alighting on persons. The adults are attracted to rotting fruit baits especially bananas.

This subspecies has been collected every month of the year throughout most of its range. It is most commonly collected in many areas in the rainy season from July to October. It occurs from sea level to over 1500 m elevation but is usually more common at lower altitudes.

Immature Stages:

The egg, all five larval instars, prepupa and pupa have been carefully described in El Salvador by Muysshondt & Muysshondt (1975a). The pupa was illustrated from Mexico by Comstock and Vazquez (1960).

Host Plants:

<i>Dalechampia heteromorpha</i>	Euphorbiaceae	Young (1974)
In Costa Rica		
<i>Dalechampia scandens</i> L.	Euphorbiaceae	Muysshondt & Muysshondt (1975a)
In El Salvador		

In Costa Rica	Euphorbiaceae	DeVries (1982)
<i>Dalechampia pruriens</i> (W. Buthn)	Euphorbiaceae	
In Trinidad		Kaye (1921)
<i>Tragia volubilis</i> L.	Euphorbiaceae	
"Vine nettle" in Trinidad		Kaye (1921)
<i>Tragia volubilis</i> L.	Euphorbiaceae	
In El Salvador		Muyshondt & Muyshondt (1975a)

Euphorbiaceae frequently contain poisonous or caustic properties. The larvae of this species are brightly marked with yellow on black background, and later instars crawl exposed on leaves indicating predator deterrent protection (Muyshondt & Muyshondt, 1975a).

Specimens Examined: 590 ♂, 170 ♀

MEXICO: *Sonora*, Álamos; *Jalisco*, Chamela; Ocotlán, Guadalajara; *Sinaloa*, Culiacán; Venado; Mazatlán; Concordia; *Nayarit*, Laguna María del Oro; Compostela; Tepic; Acaponeta; *Michoacán*, Santelma; *Guerrero*, El Treinta, 200 m; Coyuca de Benítez; Acapulco; Acahuizotla; Playón; Iguala; Tierra Colorada, Rio Papagayo; Petatlán; Ometepe; Zihuatenejo; *Oaxaca*, Temascal; Candelaria-Loxicha; Chiltepec; Palomares; Salina Cruz; Chimalapa; Comaltepec; Tuxtepec; Yetla; Metata; *Colima*, Colima; Tecomán; San Francisco; *Nuevo León*, Monterrey; *Tamaulipas*, El Nacimiento; Rio Frio; Rancho Pico del Oro; Sierra Cucharas; Cuidad Mante; San Francisco; Gómez Farias; Paso del Abra; *Veracruz*, Jalapa; Tuxpan; Catemaco; Córdoba; Presidio; Misantla; El Carrizal; Uxpanapa; Tierra Blanca; Papantla; Coatzacoalcos; Dos Amates; San Martín; Temascal; Tezonapa; Rio Blanco; Chinameca; Mundo Nuevo; Santiago Tuxtla; *San Luis Potosí*, Pujal; Cuidad Valles; Tamazunchale; El Bonito; El Naranjo; El Salto; "Sierra Madre," *Chiapas*, Cuauhtémoc; San Quintín; Las Delicias; Tuxtla Gutiérrez; Pinolá; 70 km S. Comitán; Chorreadero; Pueblo Nuevo; Comalapa; Tres Picos; Tonalá; Paraiso; Palenque; Campet; Tapachula; La Granja; Musté, San Jerónimo, 450 m; Lopez Mateos; Bonanza; *Campeche*, Candelaria; San Dimas; 40 km E of Escarcega; *Tabasco*, Tepescuintle; Tenosique; *Yucatán*, Chichén Itzá; Pisté; Mérida; Dolores Otero; Acanceh; Cordelera Mayapán; Valladolid; Balancanéh; *Quintana Roo*, X-Can; Boc Halal; "Chumlah", Coba; BELIZE: *Toledo*, Rio Temash; *Corozal*, Corozal; GUATEMALA: *Alta Verapaz*, San Cristóbal; Tamahú; Valle Polochic; Baléu; *Baja Verapaz*, Panimá; *Escuintla*, Escuintla; *Suchitepéquez*, Variedades, *El Petén*, Sayaxché; El Cambio, Petexbatún; *Sololá*, Mocá; *Chimaltenango*, San Pedro Yepocapa; *Zacapa*, Zacapa, *Retalhuleu*, Retalhuleu; *Izabal*, Izabal; *Guatemala*, Amatitlán; EL SALVADOR: *San Salvador*, San Salvador; Ilopango; Apopa; *La Libertad*, La Libertad; Zaragoza; Los Chorros; *San Vicente*, Cojutepeque; "Las Granadillas"; HONDURAS: *Francisco Morazán*, Tegucigalpa; *Cortés*, San Pedro Sula; *Colón*, Trujillo; NICARAGUA: *Managua*, Managua; Boaco; *Carazo*, Diriamba; Granada; COSTA RICA: *Puntarenas*, Putarenas; Puriscal Mts.; Palmar Norte; San Vito; *San José*, Cerro la Carpintera; *Alajuela*, Buenos Aires; Atenas; *Limón*, Guápiles; *Guanacaste*, Avangarez; Cañas, Finca Taboga; PANAMÁ: *Chiriquí*, Cerro Galera de Chorchá; Santa Cruz; La Concepción; *Bocas del Toro*, Rio Teribe; Almirante; *Panamá*, Arraiján; Cerro Campana; El Llano; Taboga Isl.; El Amanecer; *Colón*, Piña; *Canal Zone*, Barro Colorado Isl.; Los Rios; Balboa; Farfán, Palo Seco; Cocoli; Corozal; Madden Forest; Patilla Pt; *Darién*, Puerto Indio; Caña; Sabana; COLOMBIA: *Magdalena*, Minca; Santa Marta Mts.; Bonda; Aracataca; *Valle*, Buenaventura; Cali, Cañas Gordas, Juntas; *Cundinamarca*, Las Mesitas; Viotá; Bogotá; San Miguel; Fusagasugá; *César*, Manaure; VENEZUELA, *Aragua*, Rancho Grande; Maracay; El Limón 450 m; Portachuelo 1100 m; *Distrito Federal*, Caracas; Puerto la Cruz; *Mérida*, Mérida; El Vigía; *Nueva Esparta*, Isla Margarita, Sucre, Cumaná; Patao; Güiría; *Monagas*, Caripito; *Bolívar*, Cuidad Bolívar; *Carabobo*, San Esteban; Yuma; *Delta Amacuro*, Tucupita; Rio Acure; Barrancas; *Zúlia*, Cerrasquero;

Machiques; *Táchira*, La Fria; TRINIDAD: Port of Spain; St. George; Saint Ann's Ridge; Belmont; GUYANA: *Rupununi*, Annai; *Mazaruni-Potaro*; Essequibo River; FRENCH GUIANA: No locality; BRAZIL: No locality.

***Hamadryas amphichloe* (Boisduval), 1870**

Figs. 3, 170, 191, 194

H. amphichloe has been considered *incertae sedis* for the last 100 years because of the poor description by Boisduval (1870) which states (in translation), "We possess another form being allied with *oenoe*, which was brought along from Guayaquil, *Ageronia amphichloe* but sufficiently distinct from *oenoe* by the ocelli of the hindwings which have a double iris." Fruhstorfer (1916) stated, "Boisduval's diagnosis is entirely insufficient...I most unwillingly abolish, however, names of old authors and therefore I follow Kirby uniting it as variety 3 b with *februa* Hubner in his Catalogue (p. 649)." Fruhstorfer considered it as one of his eleven taxa of *februa*. I have collected many *Hamadryas* in the type locality Guayaquil area, especially 20 km north along the Guayas River at Nopales, Ecuador. Both *H. ferox tegyra* Fruh. and *H. februa februa* would fit the description of *amphichloe* and were quite common in the area. Examination of the Boisduval male type of *Ageronia amphichloe* in the BM, however, showed that it is the same as *H. ferox tegyra* Fruhstorfer. Since *amphichloe* was described prior to *Ageronia ferox* Staudinger (1888) it replaces *ferox* as the species name. The nominate form includes *H. ferox tegyra* Fruhstorfer as a synonym. *H. amphichloe* extends from the Florida Keys and the West Indies, to Peru and Ecuador, Colombia and Venezuela and perhaps in Panamá. The records from Mexico and Guatemala may or may not be valid and need to be confirmed. This has been one of the more difficult species to identify. The new characters given in the adult species key readily separate the species from the closely related *H. glauconome* and *H. februa*.

The species is divided into three distinct and geographically isolated or disjunct subspecies and a new subspecies in Peru and Ecuador. While they can be readily distinguished by wing pattern differences given in the key, the male genitalia are not identical but cannot be readily distinguished from *H. februa* and *H. glauconome*. In three subspecies there is no geographical overlap or known intergradation and the subspecies are quite isolated. A splitter could justifiably call them distinct species. The differences however are not great and the females are very closely related. Fruhstorfer's collection in the BM also has a male specimen labeled: TYPE/*Ageronia ferox maina* Fruhst./Cuzco, Peru. This name was published by Martin (1923) but the species was never described in publication so that it becomes a *nomen nudum*. Examination of the type shows it to be a very white marked *H. f. februa* similar to Fruhstorfer's light marked *Ageronia februa fundania* from Central America (now synonymized under *H. februa ferentina*).

Description:

Male: Forewing with R_1 & R_2 arising independently, radial sector, $r-m_2$ not swollen, m_2-m_3 joining at or near to junction of M_3 and Cu_1 . DFW base color grey or blue grey with a wavy grey discal cross bar which may have some copper color; followed distally by large white cretaceous patches or maculations, $r-m_2$ a thin dark or black line, DHW with postmedian ocelli similar to *H. februa*. VFW similar to *H. februa* (except in *H. a. amphichloe* there is a black subapical ring in Cu_1-Cu_2). VHW grey-buff basally, a thin postmedian irregular line, followed by ocelli similar to *H. februa*. A distinct submarginal wavy thin dark brown or black line proximally borders the irregular brown submarginal wavy band.

Male genitalia: Vinculum with prominent median posterior projection; gnathos forming a right angle; dorsal surface of uncus with few scattered hairs, tip beaked and hooked; saccus (1.92-2.12) 2.0 mm; valvae (2.08-2.40) 2.27 mm; aedeagus (2.64-2.88) 2.80 mm. Rami (1.60-2.0) 1.70 mm with scattered flat spines mostly in apical half, usually no

spines basally or on posterior lateral margin of sternite.

Female: Always darker, usually larger, the cretaceous white areas of the male replaced by white to dark grey markings on the DFW. The calico pattern is much darker and bolder, the dark markings broader and more diffused than the males.

Key to Subspecies of *H. amphichloe*

- 1a. Male DFW with dark smoky grey basal third or half; VFW with submarginal dark circular ring with white center in Cu_1-Cu_2 ; DHW very dark, submarginal ocelli containing a very small white spot or short thin white line distally. Female very dark, VFW with dark circular ring with white center in Cu_1-Cu_2 (Ecuador and Peru)..... 2
- 1b. Male DFW with basal third light blue grey or buff-grey, VFW with submarginal dark area, but not a dark ring with white center in Cu_1-Cu_2 (rarely in *diasia*); DHW not dark, but light brownish or grey brown, submarginal ocelli with larger white spots. Female VFW without submarginal ring in Cu_1-Cu_2 3
- 2a. Male DFW with white cretaceous area limited to a diagonal broad band from end of discal cell ($r-m_2$) to dark submedian area. VFW with a fairly large dark area basal to submarginal ocellus in M_1-M_2 . Female not always distinguishable from *lamasi*; DFW with submarginal ocellus with two concentric dark rings in Cu_1-Cu_2 (Pacific slope of Ecuador and N.W. Peru)..... *amphichloe*
- 2b. Male DFW with extensive white cretaceous area from discal median cross bar to dark submarginal area. VFW without large dark area basal to submarginal ocellus in M_1-M_2 . Female DFW may have single dark submarginal ring in Cu_1-Cu_2 . (Amazon slope and high altitude in N. Peru & Ecuador)..... *lamasi*
- 3a. Male DFW ground color pale bluish purple, area distal to median cross bar of discal cell with extensive white cretaceous maculae, divided into diagonal rows of white maculae by pale bluish rows or bands. Female VHW ground color buffish brown. (Panamá to Venezuela)..... *ferox*
- 3b. Male DFW with ground color usually grey brown occasionally bluish grey; areas distal to median cross bar of discal cell with extensive cretaceous white maculae often dusted with grey, divided into diagonal rows by extensive dark grey (rarely blue-grey) broad bands, VFW usually with a dark submarginal marking in Cu_1-Cu_2 , rarely a ring with small white central spot. Female VHW ground color light grey, occasionally buff grey. (Florida and West Indies)..... *diasia*

Hamadryas amphichloe amphichloe (Boisduval), 1870 [Stat. rev.]

Figs. 13-16, 194

Ageronia amphichloe Boisduval, 1870:27. TL - Ecuador, Guayaquil. Syntype - BM, 1 ♂ labeled "type". (Examined) (Figs. 13 & 14).

=*Ageronia ferox tegyra* Fruhstorfer, in Seitz, 1916:541. TL - Ecuador (no locality). Syntypes - "Type in Berlin Museum" (Note on specimen in BM). Type is not in Berlin Museum according to Dr. H. J. Hannemann. [Syn. nov.]

=*Ageronia februa amphichloe* Fruhstorfer, in Seitz, 1916:540 (*nec* Boisduval), 1870 [Misdet.].

Description:

As in *H. amphichloe* except for characters listed for *H. a. amphichloe* in the key to subspecies. Average wing length ♂ 32 mm., ♀ 35 mm.

Distribution:

Hamadryas a. amphichloe the nominate subspecies is limited to Ecuador and Peru. It occurs on the Pacific coastal slope from sea level to higher altitudes in the Andes mountains.

Taxonomy and Variation:

This subspecies is relatively common in its localized area. The whiter specimens from the Amazon eastern slope and higher in the Andes are a new subspecies distinct from the Pacific slope and coastal lowland population.

Biology:

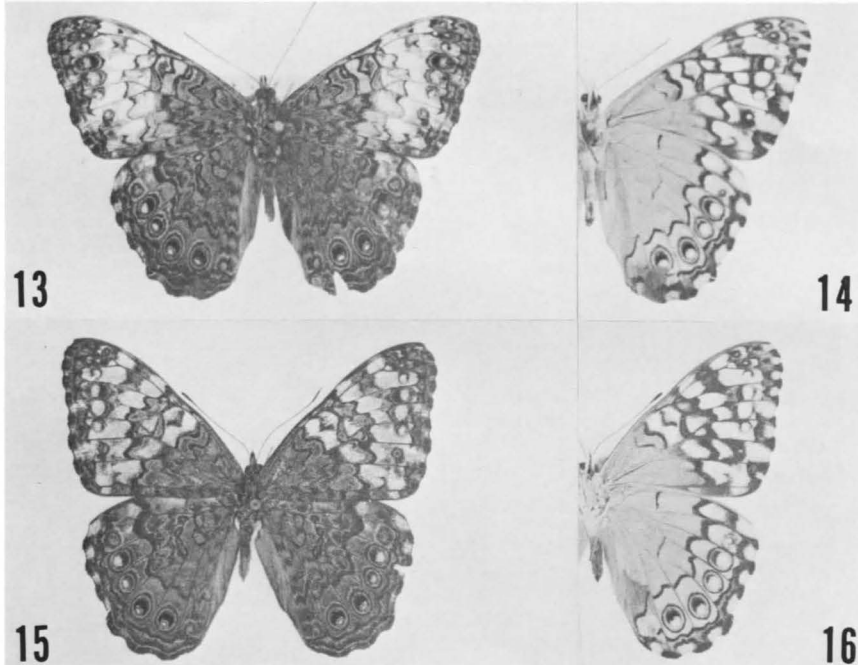
I have collected this subspecies commonly near Guayaquil where it flew at me and made loud clicking sounds. At a golf course at Nopales, Ecuador where the adults were common, British people called them "clickers" and confirmed that they were common in other nearby areas. In these areas near sea level the adults were observed on willow and non-thorny legume trees and when disturbed they would fly upward on the trunks and branches but were not difficult to collect.

They have been collected from near sea level to 1,850 m altitude, from February to September.

The immature stages and host plants have not been reported.

Specimens Examined: 62 ♂, 42 ♀

ECUADOR: Loja, Loja, 1 ♂, 3 ♀ SI; 1 ♂ BM; Vilcabamba 1600 m. 1 ♂ May, AA; *El Oro*, Santa Rosa, 100 m. 2 ♀, Jun. BM, Portovelo 650 m., 2 ♂ Jul., AA; Arenillas, 1 ♂,



Figures 13-16. *Hamadryas amphichloe amphichloe* (Boisd.) ♂ dorsal (13) ventral (14) surfaces. ECUADOR, Guayas, Guayaquil. Syntype, *Ageronia amphichloe* Boisd. (BM). ♀ dorsal (15) ventral (16) surfaces. ECUADOR, Guayas, Nopales (JC).

BM; El Oro, 3 ♂ Jun., CM; *Manabi*, Cojimies, 12 ♂, 4 ♀ May-Sep. CM; Bahía de Carques, 1 ♂, May, NC; *Zamora-Chinchi*, Zamora, 1 ♂ 1 ♀ BM; "Pampas S. of Oría" 1 ♀, BM; "S. Ecuador" 4 ♀, BM; *Esmeraldas*, Tonchingue, 2 ♂ May, NC; *Guayas*, Guayaquil, 1 ♂, 1 ♀ Mar. CA; 1 ♀ Jun. AA; 2 ♀ ST; 1 ♀ BM; 1 ♂ 3 ♀ SI; 6 ♂ 1 ♀ MZ; San Eduardo 1 ♂ 3 ♀ SI; Las Vergoles 1 ♂ 1 ♀ Feb. AA; El Triunfo 1 ♀ AA, Nopales 14 ♂ 2 ♀ JC; PERU: Cajamarca, Viña 1850 m, 1 ♂ 2 ♀ BM; Durán 1 ♂ Aug. CM; Huanjango 600-1200 m, 1 ♀ BM; La Florida 1 ♀, Feb., SM; Hacienda La Viña 1100 m, 1 ♀ Oct., SM; *Piura*, Máncora, 50 km N. Lobitos, 1 ♂, 1 ♀ Aug. BM; Paso de Porculla, 700 m, 1 ♂ Apr. SM; La Beatita, 960 m, 1 ♀ Dec., SM; Rio Quiroz, Painas, 600 m, 4 ♂ Nov., SM; *Tumbes*, Quebrada Angostura, Hualtaco, 80 m 2 ♂ Jun, SM; Matapalo, La Totorá, 100 m, 1 ♂ Jun., SM; Plateros, 1 ♀ Apr., SM; "N. Peru, W. Slopes of Andes," 1300 m 1 ♂ 3 ♀, BM; "N. Peru," 1 ♂ 1 ♀ BM.

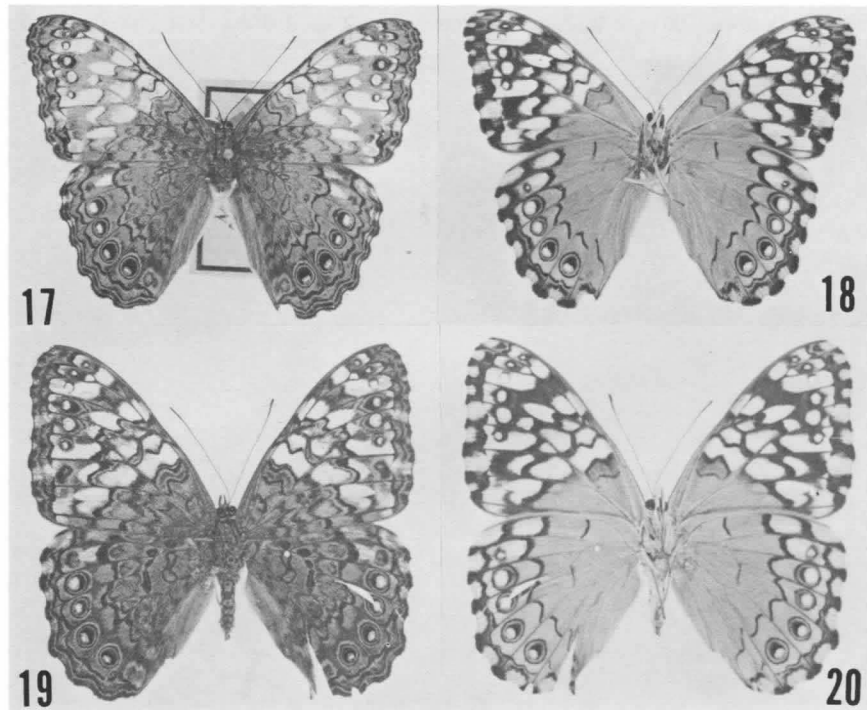
Hamadryas amphichloe ferox (Staudinger) [1886] [Stat. rev.]

Figs. 17-20, 194

Ageronia ferox Staudinger [1886]:127. TL - Colombia, Cauca Valley. Type - HT 1 specimen (sex?) in Museum Zoology Berlin, "K 39, Coll. V. Schenck."

=*Amphichlora poseidon* Clark, 1905:7, pl. 1, f. 1. TL - Venezuela, Isla Margarita, El Valle. Type - Location unknown (Excellent photograph of ♂ type in SI, examined) [Syn. nov.].

=*Ageronia februa* author not stated, in Seitz, 1914: pl. 105e, Lieferung 194. (♀ only nec



Figures 17-20. *Hamadryas amphichloe ferox* (Staud.) ♂ dorsal (17) ventral (18) surfaces. "MEXICO" ? Syntype, *Ageronia ferox fictitia* Fruh. (BM). ♀ dorsal (19) ventral (20) surfaces. VENEZUELA, *Monagas*, Barrancas (AA).

Hubner [1823]; pl. 105e, "februa ♂" and "februa U" are actually ♀ *H. amphichloe ferox* [Misdet.]

=*Ageronia fictitia* ♀ Author not stated, in Seitz, 1914; pl. 105e.

=*Ageronia ferox ferox* (Staudinger) Fruhstorfer, in Seitz, 1916:541. [Stat. rev.]

=*Ageronia ferox fictitia* Fruhstorfer, in Seitz, 1916:541. TL - Mexico. Type - BM 1 ♂ HT (Examined) [Syn. nov.] (Figs. 17 & 18).

Description:

As in *H. amphichloe* except for differences listed for *H. amphichloe ferox* in the key to subspecies. Average wing length ♂ 30 mm, ♀ 32 mm.

Distribution:

The subspecies *H. amphichloe ferox* is relatively rare, found mostly in Venezuela and Colombia. If it actually occurs in Panamá and Guatemala it is very rare, or perhaps extirpated.

Taxonomy and Variation:

H. amphichloe ferox has been misidentified frequently, especially the females.

Amphichlora poseidon Clark (1905), collected at Isla Margarita, Venezuela is a synonym of *H. amphichloe ferox* based on a good photograph of the type in the SI collection and plate 1, figs. 1 and 2 in Clark (1905) and the original description which is quite adequate. It is possible that the Clark type is the unmarked male specimen from Isla Margarita in the BM which is typical of *H. a. ferox*. The subspecies *Ageronia ferox fictitia* Author not stated, in Seitz (1914) plate 105e, and Fruhstorfer, in Seitz (1916), is according to the plate, typical *H. amphichloe ferox* and examination of the specimen marked type in the BM confirms this. The Fruhstorfer specimen of the type *fictitia* has a label "Mexico" (no locality given) but there are no other Mexican specimens known, and Hoffman (1940) did not have any records. The Mexico and Guatemala records need to be confirmed by recently collected specimens with known valid data. The description of *ferox* by Fruhstorfer, in Seitz (1916) shows that he did not recognize *H. amphichloe* from *H. glauconome* and *H. februa*. He misidentified plate 105d *februa* ♂ and *februa* U which is a figure of a female specimen of *H. amphichloe ferox*. A record of *Ageronia ferox* for the United States is based on a misidentified ♂ specimen of *H. iphthime* in the Holland Collection (CM) with a label "Texas or N.M."

Biology:

H. amphichloe ferox was collected by the author near Machiques, Venezuela in a mango grove. Two adult ♂♂ were collected on tree trunks of mango and on fence posts. They were observed from 1100 to 1300 hrs. in Apr. 1982. Their habits are very similar to *H. februa ferentina*. The males can be readily distinguished in the field by their much whiter wing markings than *ferentina*. There were three *ferox* in a population of at least 100 *H. f. feronia* and ten *H. februa ferentina* and two *H. a. amphinome* in a mango grove of about three hectares. Clark (1905) states that *poseidon* "was collected in the damper spots on the border of the forest and does not seem to frequent the open so much as *A. ferentina*."

Specimens have been collected in January, April, May, June and August.

The immature stages and food plants are unknown. Most of the records of *H. a. ferox* are from sea level and at lower elevations. The record from Mérida, Venezuela may be from a higher altitude.

Specimens Examined: 43 ♂, 7 ♀

?MEXICO: No locality, HT 1 ♂, BM (TL of *H. ferox fictitia*); ?GUATEMALA: No locality, 1 ♂ SI; PANAMÁ: No locality, 1 ♂ ST; COLOMBIA: *Atlántico*, Cuatro Bocas, 200 m, 1 ♂, 1 ♀ Jan., SI; Barranquilla, 2 ♂ AM; *Caldas*, Guamocó, 2 ♂ AM; César, Manaure 1 ♂ BM; *Magdalena*, Pueblo Viejo 1 ♂, BM; VENEZUELA: *Monagas*,

Barrancas 10 ♂, 2 ♀ AA; Jusepín, 1 ♂ Oct. SM; *Delta Amacuro*, Tucupito 1 ♂ AA; *Zúlia*, Zúlia 1 ♂ AM; Machiques 2 ♂ Apr. JC; No locality 1 ♂ ST; Mision El Rosario 1 ♀ SM; *Distrito Federal*, Caracas, 2 ♂ May-June, BM; *Nueva Esparta*, Isla Margarita 1 ♂ BM; *Mérida*, Mérida 1 ♂, 1 ♀ BM; *Bolívar*, Ciudad Bolívar 11 ♂, 2 ♀ Jun.-Aug., BM; *Aragua*, Portachuelo, 1100 m, 1 ♂ Dec, SM; *Monagas*, Maturín 1 ♂ Jul. LA; Additional records: *Nueva Esparta*, Isla Margarita, El Valle 1 ♂, Clark (1905).

***Hamadryas amphichloe diasia* (Fruhstorfer) 1916 [Comb. nov.]**

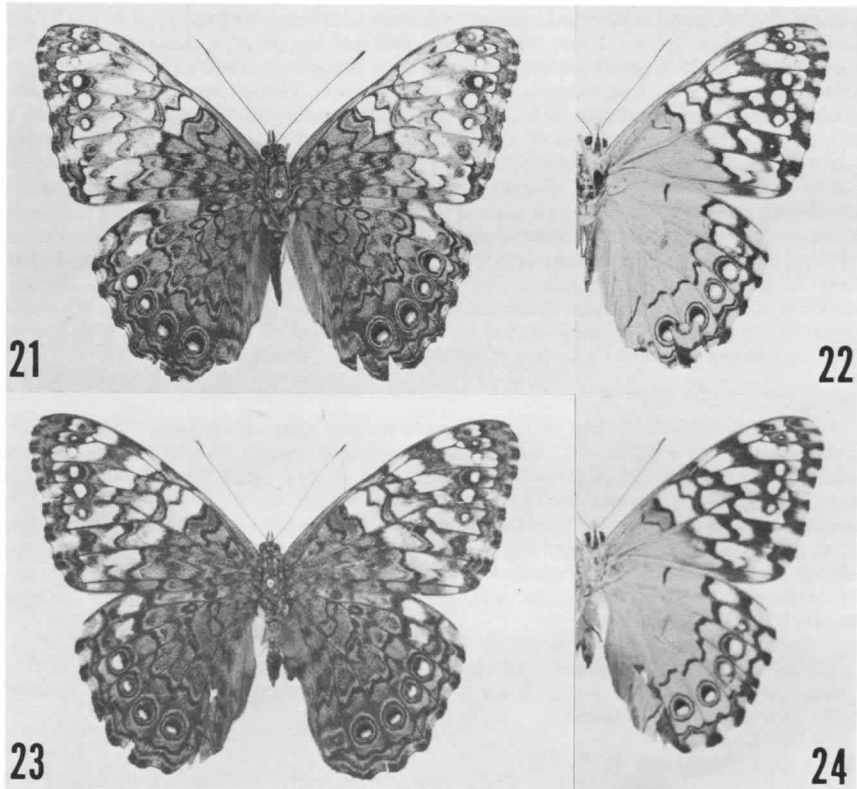
Figs. 21-24, 194

Ageronia ferox diasia Fruhstorfer, in Seitz, 1916:541. TL - Puerto Rico and Haiti. Syntypes - Not in BM or Museum Zoology Berlin.

=*Ageronia februa antillana* Hall, 1925:187. TL - Hispaniola. Syntypes - BM 1 ♂, 1 ♀ (Examined), Also Booth Museum, 7 ♂, 3 ♀ Santo Domingo (Figs. 21-24)

=*Ageronia ferentina diasia* (Fruhstorfer) Bates, 1936:228 (Cuba).

=*Hamadryas februa diasia* (Fruhstorfer) Brown & Heineman, 1972:152 (Jamaica).



Figures 21-24. *Hamadryas amphichloe diasia* (Fruh.). ♂ dorsal (21) ventral (22) surfaces. DOMINICAN REPUBLIC, Puerto Plata. Syntype, *Ageronia februa antillana* Hall (BM). ♀ dorsal (23) ventral (24) surfaces. DOMINICAN REPUBLIC, La Cumbra 1600 ft. Syntype, *Ageronia februa antillana* Hall (BM).

Description:

As in *H. amphichloe* except for differences listed for *H. amphichloe diasia* in the key to subspecies. Average wing length ♂ 36 mm, ♀ 37 mm.

Distribution:

H. amphichloe diasia (Fruhstorfer, 1916) is a valid well-recognized subspecies extending from the Florida Keys in the United States to Cuba, Jamaica, Haiti, Dominican Republic, Puerto Rico and perhaps other smaller islands of the West Indies. Specimens examined from Jamaica and Puerto Rico appear fresh and not migrants and are almost certainly native. It is probably native in Oriente, Cuba. It is not known whether the two specimens from the Florida Keys in the United States are migrants or from an established or temporarily established colony.

Taxonomy and Variation:

Hall (1925) described *Ageronia februa antillana* from Hispaniola, but examination of these types in the BM and long series from Haiti and Dominican Republic and comparison with a series of specimens from Puerto Rico and Jamaica show that they are all *H. amphichloe diasia* and that *antillana* Hall is a synonym. This agrees with Comstock (1944) who compared Hispaniola and Puerto Rico specimens and saw no reason to retain *antillana* Hall. Dr. Stuart Ramos kindly loaned me his series of specimens to study from Puerto Rico and Dominican Republic.

In Cuba, Bates (1936) called this subspecies *Ageronia ferentina diasia* (Fruhstorfer) and Brown and Heineman (1972) determined Jamaica specimens as *Hamadryas februa diasia* (Fruhstorfer) due to the difficulty in identifying *H. ferox* from *H. februa*.

Biology:

Adults were quite common in Dominican Republic especially on trees in the yards of private homes in Santiago de los Caballeros. They were quite common on trees in open fields and in bright sun and were active flying around chasing each other with loud crackling noise. They were aggressive and flew at the author and were relatively easy to collect. Near Santo Domingo they were fairly common on trees near streams in a botanic garden. However, in Jamaica the subspecies is very rare and the habits appear to be different. I observed a male on a mango tree trunk near Kingston to fly away rapidly with no noise and it did not return.

Adults have been collected every month of the year and there does not appear to be an increase in population at any time of the year on the basis of specimens in museums and private collections. There are no known reports on the immature stages and food plants. Adults have been collected from sea level to about 1,000 m in altitude.

Specimens Examined: 145 ♂, 99 ♀

UNITED STATES: *Florida*, Plantation Key (Photograph examined), Lepid.Soc. Season Summary (1979); Key Largo, Tavernier (observed in field); CUBA: *Oriente*, Santiago de Cuba; Torquino River; Querci; JAMAICA: Port Antonio; Lumsden; Half Way Tree; *St. Mary*, Bucksmore; *Kingston*, Kingston; *St. James*; *St. Thomas*; *St. Andrew*; *St. Catherine*; HAITI: Pétionville; Bois Caradeux; Arcahaie; Cap Haitien; Mt. Joli; Port-au-Prince; DOMINICAN REPUBLIC: Puerto Plata; Santo Domingo; Montecristi; Barahan; Santiago de Caballeros; *Rancho Arriba Prov.*, Peravia; *Guayacanes Prov.*, San Pedro de Macoris; Engombe; *La Romano Prov.*, Cumayasa; Jarabacoa; *Duarte Prov.*, Hatillo; La Vega; Bonao; PUERTO RICO: Guanica Forest; Isla Guayacán; Paraguera; Mona Island; Lajas; Cartagena Lagoon; Juan Díaz; Desengaño; Aibonito.

***Hamadryas amphichloe lamasi* [Subsp. nov.]**

Figs. 25-28, 194

Description:

Male. Forewing with $R_1 + R_2$ arising independently, radial sector and $r-m_2$ not swollen, m_2-m_3 joining at or near to junction of $M_3 + Cu_1$. DFW base color dark grey with a wavy grey and slightly copper colored discal cross bar, followed distally by a large white cretaceous area extending to a submarginal wavy line; $r-m_2$ a thin dark or black line. DHW very dark with submarginal ocelli containing a small white distal spot or thin line. VFW without large dark area basad to ocellus in M_1-M_2 , submarginal ocellus in Cu_1-Cu_2 with a dark circular ring with white center. Average wing length 32 mm.

Male genitalia. Same as *H. a. amphichloe* except smaller size.

Female. Very dark markings on upper wing surfaces. DFW may have single or double dark submarginal ring in Cu_1-Cu_2 . Average wing length 35 mm.

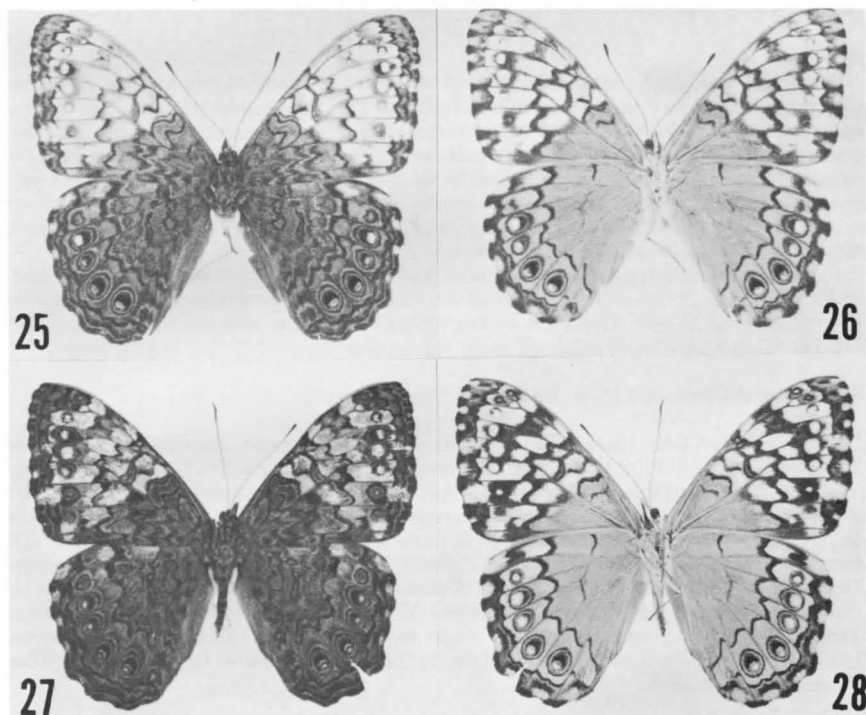
Described from eleven specimens, nine ♂ and two ♀ from Ecuador and Peru.

HOLOTYPE ♂: PERU: *Cajamarca*, Llanguat, 1,800-2,000 m, Jun (CM)

PARATYPES: PERU: *Amazonas*, 170 km E. of Olmos, 1 ♂ Jan. (CA); *Chachapoyas* 1,800 m, 2 ♂ (BM); *San Juan, Bagua Grande*, 1000 m, 2 ♂ Jun. (SM); *Cajamarca, Jaén-La Corona*, 750-1700 m, 2 ♂ Dec. (SM); ECUADOR: *Napo, Rio Coca* 300 m, 1 ♂ 2 ♀ Jul. 1971. Coll. Lafebre, (AA);

Additional Records: ?PERU: *Loreto*, Iquitos, 1 ♂ (BM); ?ECUADOR: *Pastaza*, Nashiño, 1 ♀ (BM).

The holotype ♂ will be deposited in the Carnegie Museum; 1 ♂ and 2 ♀ paratypes will be deposited in the Allyn Museum; 4 ♂ in the Museo de Historia Natural, Univ. Nacional Mayor de San Marcos, Lima, Peru; 2 ♂ in the British Museum and 1 ♂ in the California Academy of Science.



Figures 25-28. *Hamadryas amphichloe lamasi* Jenkins. ♂ dorsal (25) ventral (26) surfaces. PERU, *Cajamarca*, Llanguat. Holotype (CM). ♀ dorsal (27) ventral (28) surfaces. ECUADOR, *Napo*, Rio Coca. Paratype (AA).

Distribution:

This new subspecies is limited to the higher mountains of the Andes and in southern Ecuador and northern Peru and the Amazon eastern slope of the Andes. The older record from Iquitos, Peru should be considered doubtful since this was a central site for buying specimens from a larger area. More collecting of this new subspecies is required to determine its exact range, especially on the eastern slope of the Andes and into the Amazon basin.

Biology:

Specimens of this subspecies at higher altitudes at Llangat, Peru at 1,800 to 2,000 m lit exclusively upon trunks of thorny trees. The adults were usually in colonies of 4-12 specimens. When alarmed they would alight higher up in the tree and the thorny branches provided good protection.

Adults have been collected in December, January, June and July at altitudes from 300-2,000 m.

The immature stages and host plants have not been reported.

This butterfly is named for Dr. Gerardo Lamas, who had also recognized this new subspecies, and who has contributed greatly to the study of neotropical lepidoptera, especially in Peru.

Hamadryas glauconome (Bates), 1864

Figs. 4, 171, 191, 195

Hamadryas glauconome is a relatively uncommon species found from Mexico to Costa Rica. It was divided into five taxonomic categories by Fruhstorfer (1916) and included *Ageronia glauconome honorina* here recognized as a distinct species with characters given in Table 3 to separate it from *glauconome*.

H. g. glauconome males have a distinctive cretaceous white patch on the DFW that is extensive and almost unbroken in the southern part of the range and becomes more interrupted and patchy further north in Mexico. A new distinctive subspecies of this species occurs in northwestern Mexico from Jalisco to Sonora that has no cretaceous white patch on the DFW. It was erroneously called *Ageronia lelaps* by Fruhstorfer (1916).

Key to subspecies of *H. glauconome*

Males

- 1a. DFW with cretaceous or chalky white patch in distal third beginning 2-5 mm beyond thin black distal cross bar (r-m₁) of discal cell and extending to submarginal area, white area may be dusted with bluish grey scales, especially in a diagonal band central in the patch; M₁-M₂ with subapical circular whitish ocellus surrounded by a black ring or black proximal lune, rarely with concentric outer dark ring; VHW subapical ocellus usually present in SC + R₁-Rs, usually prominent larger dark ring in round subapical ocellus in Rs-M₁..... *glauconome*
- 1b. DFW with no cretaceous or chalky white patch in distal third, a postmedian diagonal row of 5 or 6 small dusky whitish maculae heavily suffused with brown scales, with a subapical diagonal area of two similar maculae, making the DFW mostly grey brown, M₁-M₂ with subapical brown ocellus surrounded by two concentric black rings, the outer may not be complete; VHW with smaller usually C-shaped ocellus in Rs-M₁; no subapical ocellus or only a small flat oval in Sc+R₁-Rs. N. Guerrero to Sonora..... *grisea*

The females tend to have similar characters as the males of the subspecies (except

for cretaceous white patch). In *grisea* the DFW and VFW have a broader postmedian diagonal grey black band.

***Hamadryas glauconome glauconome* (Bates) 1864 [Stat. rev.]**

Figs. 29-32, 195

Ageronia glauconome Bates, 1864:114-115. TL - Guatemala [Dept. Verapaz (low forest)]. Syntypes - BM, Type No. Rh. 9258, 1 ♂ (Examined) (Figs. 29 & 30).

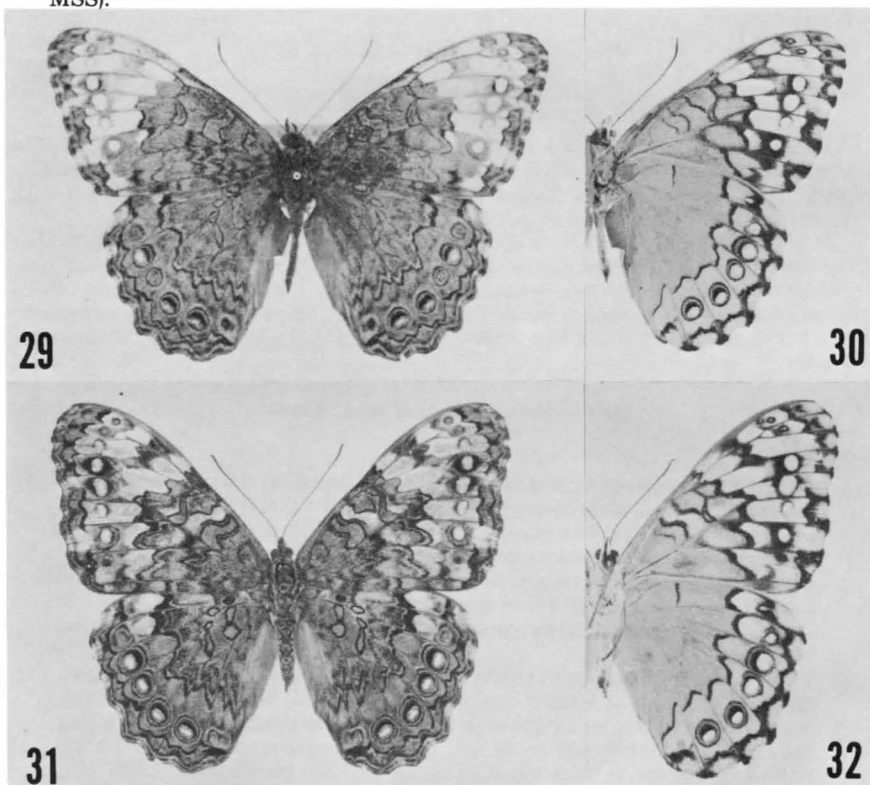
=*Ageronia oenoe* Boisduval 1870:26-27. TL - Costa Rica (Type has "Yukatan" label, with notation "Locality probably Costa Rica, see original description"). Syntypes - BM 1 ♂ (Examined). Description based on 2 syntypes, one from Costa Rica, the other from Yucatán. [Syn. nov.]

=*Ageronia ferentina* var. *a. glauconome* (Bates) Kirby 1871:215.

=*Ageronia glauconome* ♀ Author not stated, in Seitz, 1914, pl. 105b. Lieferung 194.

=*Ageronia glauconome megala* Fruhstorfer, in Seitz, 1916:540 (text states pl. 105b as "*glauconome* ♀" is *megala*). This is a male as is the type. TL - S. Mexico. Syntypes - BM 1 ♂ (Examined). [Syn. nov.]

=*Ageronia aenoe* (Boisduval) Doubleday, 1847:83. (*Lapsus calami*) (quotes Boisduval MSS).



Figures 29-32. *Hamadryas glauconome glauconome* (Bates). ♂ dorsal (29) ventral (30) surfaces. GUATEMALA, Vera Paz. Syntype, *Ageronia glauconome* Bates (BM). ♀ dorsal (31) ventral (32) surfaces. MEXICO, Veracruz, Jalapa (JC).

Description:

Male. Forewing with R_1 and R_2 arising independently; radial sector $r-m_2$ not swollen, m_2-m_3 joining at or near to junction of M_3 and Cu_1 . Wing length (24.0-42.0) 36.0 mm; DFW base color bluish-grey to somewhat bluish purple, large chalky white patch in distal third beginning 2-5 mm beyond thin black distal cross bar ($r-m_1$) of discal cell (often with a thin black line forming a small loop at junction with R). M_1-M_2 with subapical round ocellus; DHW with submarginal ocelli circular, laterally flattened, or flattened baso-distally, containing red-brown or brown scales, VFW with prominent submarginal black ring with white center in Cu_1-Cu_2 ; VHW usually with small subapical ocellus in $SC+R_1-R_s$, submarginal ocellus in R_s-M_1 a complete single ring, DHW with a submarginal black ring and white center in Cu_1-Cu_2 ; VHW with submarginal ocelli circular or laterally compressed, single submarginal band reddish brown. Wing length 35 mm.

Male genitalia. Vinculum with posterior median projection, gnathos arm broad and flattened, elbow of gnathos forming a right angle; uncus with few scattered small setae, saccus (2.08-2.12) 2.15 mm; valve with median enlargement on dorsal surface (2.40-2.72) 2.59 mm; aedeagus (2.88-3.00) 2.93 mm. Rami (1.88-2.40) 2.11 mm, pubescent, with scattered flat spines only on distal third or half. Posterior lateral margin of tergite with setae. No flat spines.

Female: Larger than δ with more distinct calico pattern similar to *H. februa*. VFW postmedian area with prominent white markings, Cu_1-Cu_2 with submarginal black ring with white center. Average wing length 36 mm.

Distribution:

H. g. glauconome occurs in eastern Mexico from Nuevo León south and on the Pacific side from Colima southward through Central America (not including the Yucatán Peninsula) to Costa Rica and perhaps Panamá. In the Strecker Collection a male under a label Panamá includes another male with a label "Cent. Am." Both are *H. g. glauconome*, but the Panamá label may be erroneous since no other Panamá records are known.

Taxonomy and Variation:

The amount of cretaceous white area of the DFW of the δ is highly variable in a single locality, but there are more white and bluish purple markings in the area from southern Mexico to Panamá. In Mexico, specimens tend to have more dark grey markings and more disruption of the cretaceous white patch.

Ageronia oenoe Boisduval was described from Costa Rica, but the type in the BM has a locality label "Yukatan"/"Locality probably Costa Rica, see original description/." Study of this type shows that it is typical *H. g. glauconome* probably from Mexico but not Yucatán. *Ageronia glauconome megala* Fruhstorfer is illustrated as *Ageronia glauconome* ♀ in Seitz (1914) plate 105b. I have examined the type in the BM and it is actually a male *H. g. glauconome* the same as the plate.

Biology:

H. glauconome is found in dry, sometimes desert areas especially in stream valleys. The adults are very well camouflaged when they are on lichen-covered or light tree trunks, due to the extensive mottled whitish grey color, especially of the males. They also are found on rocks and on moist sand. They have been collected on banana plants in a banana plantation and on mango tree trunks. The adults were also collected in a shaded stream valley where they occurred on the buttresses of large fig trees in Colima, Mexico. They were fairly common on mango tree trunks in a populated area, and at the overflow of a well in a very dry stream valley at Rancho Viejo, Mexico. They may be found near farm habitations in their habitats but are not usually found in human populated areas. The adults are readily disturbed and relatively difficult to catch. They were not observed to fly at the author but flew directly to other tree trunks often at some distance and rarely returned to the original site.

They are found at altitudes up to 1,000 m and have been collected in all months of the year.

Immature Stages:

Mature larvae were collected in Guatemala in a dry stream valley in November in Guatemala by Miguel Serrano. They were reared to adults but the larvae were not described.

Host Plants:

Dalechampia scandens
In Guatemala

Euphorbiaceae

Serrano (1982)

Specimens Examined: 240 ♂, 81 ♀

MEXICO: *Nuevo León*, Monterrey; Cola de Caballo; *Tamaulipas*, Chamal; Rancho Pico del Oro; Gómez Farías; Paso del Abra; El Nacimiento; Río Frío; El Barretel; Ciudad Victoria; Río Purificación; Ocampo Road, 14 km W Hwy 85; Cañón de Novillo; Soto la Marina; Tangola Bay; San Francisco; Altamira; El Limón; Cuidad Mante; *San Luis Potosí*, Lleras; El Pujal; Micos; Cuidad Valles; El Salto; *Veracruz*, Jalapa; El Carrizal; S. Victoria 100 km; Santiago Tuxtla; Paso San Juan; Córdoba; Palo Gacho; Rinconada; Mirador; Tierra Blanca; Presidio; Fortín de las Flores; Coatepec; *Jalisco*, Tenacatita X, *Colima*, Comala 700 m X; Colima; La Salada 330 m X; *Morelos*, Rancho Viejo X, Las Estacas; Huajintlán; *Puebla*, Patla; *Guerrero*, "Sierra de Guerrero"; Naranjo 1000 m X; Chilpancingo; La Sabana; Acapulco; Iguala; Acahuizotla; Tlalchapa; El Treinta 220 m; Mexcala; Petatlán; Dos Arroyos 330 m; Coyuca; *Oaxaca*, Tuxtepec; Teotitlán; La Esperanza; Salina Cruz; Tehuantepec; *Chiapas*, Las Delicias; Comitán; Sumidero; Ocotal; Motozintla; Paraiso; Chorreadero; Ocozocuahtla; GUATEMALA: *Jutiapa*, El Toro; Central Valleys; *Santa Rosa*, Guazacapán; *Zacapa*, *Zacapa*; *Alta Verapaz*, Chiacam; *Zacapa*, Gualán; Polochi Valley; San Cristóbal; EL SALVADOR: La Libertad, Aguacaliente; Quetzaltepec; Metapán; Mina Montecristo; San Salvador; La Unión; HONDURAS: *Choluteca*, Choluteca; NICARAGUA: *Boaco*, Camoapa; *Managua*, Managua; Las Jinotepes; *Masaya*, Masaya; *Granada*, Granada; *Río San Juan*, Río San Juan; Chontales; *Matagalpa*, Matagalpa; COSTA RICA: *Guanacaste*, Finca Taboga; Santa Rosa; *Heredia*, Puerto Viejo; Finca La Selva; *Guanacaste*, Manzanillo; *Alajuela*, Atenas; PANAMA: "No locality."

Hamadryas glauconome grisea [Subsp. nov.]

Figs. 33-36, 195

=*Ageronia lelaps* Author not stated, in Seitz, 1914: pl. 105e ♂ Lieferung 194 (*nec* Godman & Salvin, 1883) [Misdet.]

=*Ageronia lelaps* ♀ Fruhstorfer, in Seitz, 1916:541 (English ed.) Lieferung 228 (*nec* Godman & Salvin, 1883) [Misdet.]

Description:

Male. Forewing with $R_1 + R_2$ arising independently, radial sector, $r-m_2$ not swollen, m_2-m_3 joining at or near to junction of M_3 & Cu_1 . Average wing length 34 mm. DFW base color dark grey or greyish brown (no bluish or purplish), with complex mosaic of black lines and markings extending to a wavy postmedian line. Instead of a large chalky white area as in *H. g. glauconome*, there is only a postmedian diagonal row of 5 or 6 smaller dusky whitish maculations heavily suffused with brown; distally there is a wide area of dark grey-brown with two subapical dusky whitish maculae heavily suffused with brown. Submarginal ocelli in M_1-M_2 and in Cu_1-Cu_2 have double black concentric rings. Distal cross bar $r-m_1$ of cell not a single black line or with small anterior loop as usual in *H. g. glauconome*, but two separate lines. DHW all dark grey or grey brown

with a wavy dark postmedian line, submarginal ocelli similar to *H. g. glauconome* but more red-brown scales in basal part of ocelli. VFW similar to *H. g. glauconome* but much darker areas especially between postmedial row of white maculae and subapical white maculae. Submarginal black ring in Cu_1 - Cu_2 with white center about $\frac{1}{2}$ size in *H. g. glauconome*. VHW with basal $\frac{2}{3}$ whitish grey similar to outer $\frac{1}{3}$. In *H. g. glauconome* basal $\frac{2}{3}$ is usually dark grey contrasting more sharply with white outer $\frac{1}{3}$; submarginal ocellus in $Rs-M_1$ usually smaller and often C-shaped. Average wing length 34 mm.

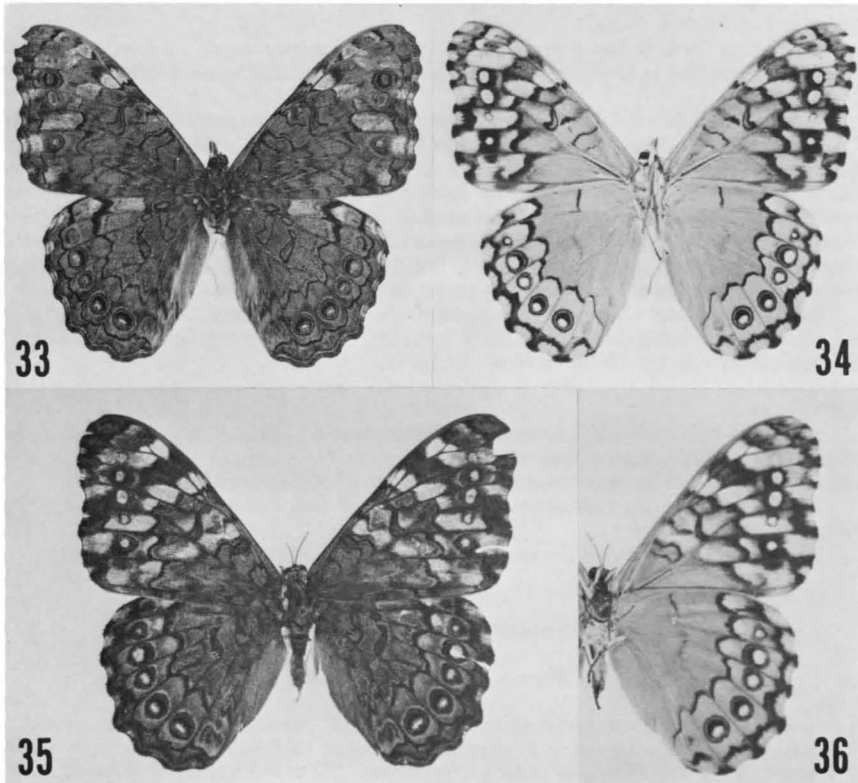
Male genitalia. Vinculum with prominent median posterior projection; gnathos arm broad and flattened, gnathos elbow forming a right angle; uncus with few scattered fine setae, tip hooked and beaked; valve with median enlargement on dorsal surface. Rami pubescent with scattered flat spines only on distal quarter. Posterior lateral margin of tergite with setae, no flat spines.

Female. The female is similar to *H. g. glauconome* except that on the DFW and VFW the space between the smaller postmedian diagonal row of light maculae and subapical maculae is larger and darker. Wing length 36 mm.

Described from six specimens, five ♂ and one ♀, from western Mexico.

HOLOTYPE ♂: MEXICO, "Sinaloa", no specific locality; 1 ♂, ♂ genitalia slide no M5490, D. W. Jenkins (SI).

PARATYPES: MEXICO, Sonora, Alamos, Jul. 25-Aug. 5, 1940, 1 ♀ R. P. Allen (CA); Sinaloa, Venado 2 ♂ (SI); no specific locality 1 ♂ (SI); Jalisco, Guadalajara, Sept.,



Figures 33-36. *Hamadryas glauconome grisea* Jenkins. ♂ dorsal (33) ventral (34) surfaces. MEXICO, Sinaloa. Holotype (SI). ♀ dorsal (35) ventral (36) surfaces. MEXICO, Sonora, Álamos. Paratype (SI).

Butler, 1 ♂ labelled "*lelaps* G&S", ♂ genitalia slide no. 5488, D. W. Jenkins (BM).
 Deposition of type material: Holotype 1 ♂, and 3 ♂ paratypes will be deposited in the National Museum of Natural History, Smithsonian Institution; 1 ♀ paratype in the California Academy of Science, San Francisco, and 1 ♂ paratype in the British Museum (Natural History), London.

Intergrades with *H. g. glauconome*: MEXICO: Colima, Colima 4 ♂, 1 ♀ Nov. 1982, D. W. Jenkins (JC); Madrid 5 ♂, 5 ♀ Nov. 1982, D. W. Jenkins (JC); La Salada, 2 ♀ Apr. 1969, R. Wind (AA); Guerrero, Naranjo 1000 m, Aug. 1906, coll. Wm. Schaus (SI); Morelos, Rancho Viejo, 6 ♂ 3 ♀ Oct. 1977, Nov. 1982, D. W. Jenkins (JC); Cañon de Lobos, Feb. 1976, J. Llorente (FC); Jalisco, Tenacatita, 1 ♂ Mar. (AM).

Distribution:

H. glauconome grisea is a new subspecies found in northwestern Mexico from Jalisco to Sinaloa and Sonora. There is intergradation with *H. g. glauconome* in Colima, northern Guerrero, Jalisco and Morelos. It is found in dry areas, the same as the nominate subspecies.

Taxonomy and Variation:

A male *H. glauconome grisea* is well illustrated in Vol. 5: pl. 105e, Author not stated, in Seitz (1914) Lieferung 194. *Ageronia lelaps* Fruhstorfer, in Seitz 1916, 5:541 is described as follows:

"*A. lelaps* G. & S. has a preponderantly greenish-grey upper surface, except the ocelli being pupilled in blackish instead of blue. Very rare; known only from Mexico and Guatemala."

Godman and Salvin 1883:270 described *Ageronia lelaps* from Ventanas, Mexico. In 1901: Suppl. 2:698 they synonymized *lelaps* as the female of *A. atlantis*. I have examined and photographed the holotype and it is a ♀ *A. atlantis lelaps*. Fruhstorfer either missed or disregarded this synonymy since he resurrected the name *A. lelaps* for an undescribed butterfly completely unrelated to *H. atlantis*. A specimen of *grisea* from Guadalajara, Mexico (Butler) in the BM has a label "*lelaps* G&S". While it looks like the specimen illustrated by Fruhstorfer it is not from his collection and neither the plate nor the specimen show any "greenish-grey" as found in *H. atlantis*.

Intergrades from Colima, Guerrero and Morelos have varying amounts of whitish coloration in the distal third of the DFW in males. The females are dark and have dusty greyish maculae in the distal third of the DFW.

Biology:

Adults of this subspecies have similar habitats and habits as *H. g. glauconome*. Intergrades in Colima were collected by the author in dry sunny stream valleys, shaded stream valleys, in a banana plantation, and on the buttresses of large fig trees.

Specimens have been collected in Apr.-May and July-November at altitudes from near sea level to 330 m.

There are no reports on the immature stages or host plants.

Hamadryas honorina (Fruhstorfer) 1916 [Stat. rev.]

Figs. 4, 37-40, 172, 191, 195

Ageronia julitta Author not stated, in Seitz, 1914: pl. 105e Lieferung 194 (see text).

Ageronia glauconome honorina Fruhstorfer, in Seitz, 1916:540 (in English ed.) Lieferung 228. TL - Peninsula of Yucatán. Syntypes - BM 1 ♂ (Examined) (Figs. 37 & 38).

= *Ageronia glauconome* form *julitta* Fruhstorfer, in Seitz, 1916:540 (in English ed.) Lieferung 228. TL - Peninsula of Yucatán.) Syntypes - BM 1 ♀ (as *honorina* fa. *julitta*) (Examined) [Syn. nov.] (Figs. 39 & 40).

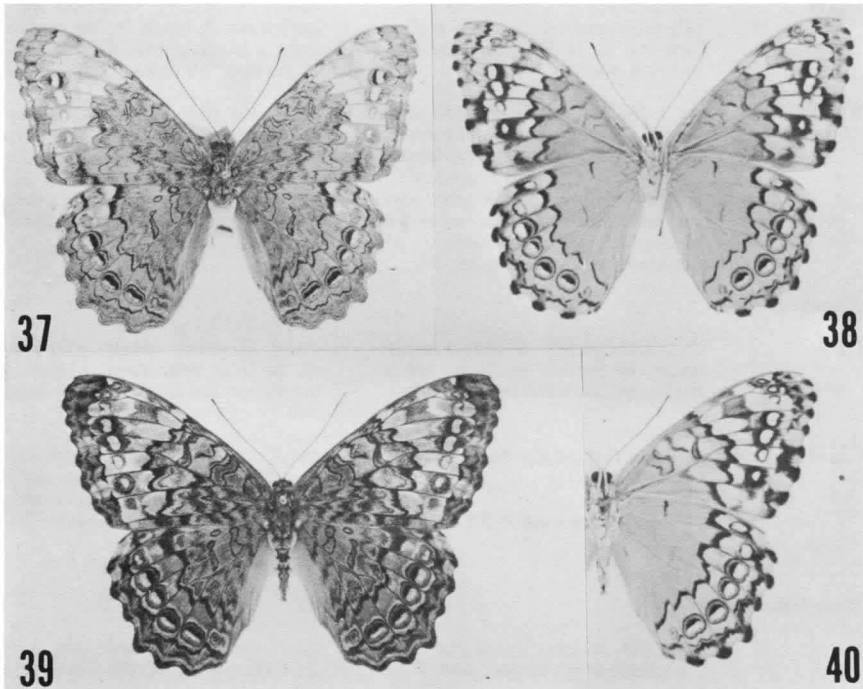
Description:

Male. Forewing with R_1 and R_2 arising independently, radial sector $r-m_2$ not swollen, m_2-m_3 joining at or near to junction of M_3 and Cu_1 . Wing length (22.0-30.0)28.0 mm. DFW basal $\frac{2}{3}$ grey with darker dusting, no bluish purple, a postmedian whitish diagonal irregular band. M_1-M_2 with subapical ocellus with black vertical bar basally and flattened baso-distally. DHW with submarginal ocelli extremely flattened baso-distally with prominent wide flat black bar basally, no rust red or pink scales in ocelli; VFW with a black submarginal ring with white center in Cu_1-Cu_2 ; VHW with distinct often flattened subapical ocellus in $Sc+R_1-Rs$, submarginal ocellus in $Rs-M_1$, a complete single or double ring, submarginal area from M_3+2A with a fine wavy black line and a thicker line distally.

Male genitalia. Vinculum with prominent median posterior projection; gnathos arm broad and hoof-shaped gnathos elbow forming a right angle; uncus with few scattered fine setae, tip hooked and beaked; saccus (1.72-1.80)1.76 mm; valve with slight median enlargement at crista but without a lip (2.08-2.40)2.25 mm; aedeagus (2.40-2.84)2.55 mm. Rami (1.48-1.88)1.69 mm pubescent with scattered flat spines only on the distal one-third.

Female. DFW with distinct black or dark longitudinal band from base to apex, composed of intensified dark pattern elements, a diagonal row of whitish markings (distal cross bar ($r-m_2$) may be broad as in *H. februa*); DHW with very large baso-distally flattened submarginal ocelli with very prominent broad black basal bar with thin brown band basally. Ventral surfaces similar to male.

Since *glauconome* and *honorina* are closely related and have previously been con-



Figures 37-40. *Hamadryas honorina* (Fruh.) ♂ dorsal (37) ventral (38) surfaces. MEXICO, Yucatán. Syntype, *Ageronia glauconome honorina* Fruh. (BM. ♀ dorsal (39) ventral (40) surfaces. MEXICO, Yucatán. Syntypes, *Ageronia honorina* forma *julitta* Fruh. (BM).

sidered as subspecies of *glauconome*, Table 3 is presented to show the characters used to separate the species. The measurements of the genitalia and rami are also smaller in *honorina*.

Distribution:

H. honorina is known only from the peninsula of Yucatán. However, there are no presently available specimens between Yucatán and Quintana Roo and the range of *H. glauconome* in Veracruz and Chiapas.

Table 3. Comparison of *H. glauconome* and *H. honorina*

	<i>glauconome</i>	<i>honorina</i>
<i>Male</i>		
DFW & DHW	base color bluish grey to bluish purple; dark markings relatively broad and diffuse, not finely defined; wing length longer (24.0-42.0)36.0 mm.	base color light grey with dark dusting, no bluish purple; dark markings thin, finely defined; wing length smaller (22.0-30.0)28.0 mm.
DFW	apical $\frac{1}{2}$ white chalky (<i>glauconome</i>) or with darker dusting throughout this area (<i>grisea</i>)	postmedian diagonal white band distally suffused with dark dusting in specific cloudy areas.
DHW	ocelli round or slightly baso-distally compressed; black in ocellus forming a half circle, definite reddish color.	ocelli strongly baso-distally compressed; black in the ocellus only a black proximal bar, little or no reddish color.
VHW	Sc + R ₁ -R _s usually a small subapical ocellus (may be absent in <i>grisea</i>). R _s -M ₁ usually a larger and completely dark ringed or C-shaped ocellus; submarginal zig-zag band wide reddish brown to black, no separate single or double fine black lines M ₃ -2A	Sc-R ₁ -R _s with distinct subapical flattened ocellus; R _s -M ₁ ocellus complete and larger, frequently double ringed; submarginal zig-zag bands with separate proximal single or double fine black lines M ₃ -2A.
<i>Female</i>		
DFW	diagonal stripe absent, rarely some darkened pattern areas may produce weak broken stripe.	very distinct dark diagonal stripe from near apex extending posterior to discal cell to anal cell.
DHW	ocelli not strongly baso-distally compressed average wing length 36 mm.	ocelli very strongly baso-distally compressed; black in the ocelli flattened, prominent & nearly forming a black postmedial band on wing. average wing length 32 mm.
<i>Male Genitalia</i>		
	genitalia larger, aedeagus ave. 2.93 mm; rami larger, ave. 2.11 mm	genitalia smaller, aedeagus ave. 2.55 mm, rami smaller, ave. 1.69 mm.
	gnathos arm not hoof-shaped, chitinized sheath above gnathos arm narrow	gnathos arm hoof-shaped, chitinized sheath extending up the gnathos from gnathos arm.

Taxonomy and Variation:

The correctness of the name *honorina* can be argued. The name *H. julitta* is based on the female figure in plate 105e with unstated author in Seitz, Vol. 5 published as *Lieferung* 194, 30 Jun. 1914 (German edition). However, the text by Fruhstorfer was not published until 16 Dec. 1916, and *Ageronia glauconome honorina* subsp. nov. Fruhstorfer was published in the text based only on the male. I have examined the type ♂ in the BM and it is a typical male *honorina*. Fruhstorfer on the same page (below *honorina*) published *Ageronia glauconome julitta* forma nov. based only on the female. I have examined the type ♀ in the BM and it is typical *H. honorina* (labeled *A. glauconome* fa. *julitta* Fruh.). It is clear that Fruhstorfer meant to publish this as a new form only, which would not be a valid species name, but the previously published plate, if considered a valid binomial name could constitute publication as a species without a known author. This could be given priority and would have to be ascribed to Seitz or [Fruhstorfer]. The dates, pages and interpretation of Griffin (1936) are followed for dating the Lieferungen.

Biology:

The habitat of *H. honorina* is similar to *H. glauconome* in dry country. A male specimen was collected from a dry carcass of a cow by Tom Turner (personal communication). Adults have been collected mostly during the rainy season from June to October with more collected during July and August. There is one record of a male collected in Chichén Itzá in April. The species occurs at sea level and at lower altitudes as far as presently known.

There are no known reports on the immature stages and food plants.

Specimens Examined: 52 ♂, 38 ♀

MEXICO: *Yucatán*, 1 ♂ 1 ♀ Aug. MM; Jul-Sep. 3 ♂ 1 ♀ TE; Pisté 28 ♂ 21 ♀ AA; Balancancho, Jul. 3 ♂ DM; Mérida, Aug. 1 ♂, 3 ♀, Jul. ♀ AA; 1 ♀ Aug. AM; Uxmal 1 ♂ Aug. JC; 2 ♂ SI; 1 ♀ SI; 1 ♂ BM; Ixamal 1 ♀ SI; 1 ♀ DM; Dolores Otero, Jul. 4 ♂ AM; Uman, Aug. 1 ♂ UT; Chuminopolis Jul. 1 ♀ 1 ♂ AM; Chichén Itzá, Apr. 1 ♂ AM; Cordelera Mayapán, June 1 ♀ AM; *Quintana Roo*, Polyuc, Sept. 1 ♂, 2 ♀; X-Can, Aug. 2 ♀ AA, 2 ♀ AD; No locality, Aug. 1 ♂ BM.

***Hamadryas atlantis* (Bates) 1864**

Figs. 173, 191, 196

H. atlantis is an unusual and distinctive species occurring from Mexico to southern Honduras. The species is limited in distribution in Mexico and occurs north of the Isthmus of Tehuantepec only on the Pacific slope and in valleys in the Mexican plateau as in Morelos, and as far north as Álamos in Sonora.

H. atlantis has venation at the distal end of the cell similar to *H. chloe* and ocelli with a double ring as in *H. guatemalena* and *H. ipthime*. The wing pattern of the DFW in the distal third appears stretched and has broad and diffused markings. The VFW of the male has the distal third a broad black stretched band with apical white spots. It appears possible that *H. atlantis* may have resulted from stabilization of a population of the "stretched wing pattern" aberration. It is interesting that a "stretched wing pattern" aberration of an extreme type was found in a female from Malinalco, Oaxaca, Mexico.

A new subspecies of *atlantis* was discovered in the northwestern part of the range of the species, with an intergrade in the Isthmus of Tehuantepec.

Description:

Male. Forewing with $R_1 + R_2$ arising separately, radial sector and $r-m_2$ not swollen,

m_2 - m_3 joining distal or near to junction of M_3 and Cu_1 . DFW dark brown and dark green or bluish pattern which may be smeared or washed. A subapical dark ocellus is present in M_1 - M_2 . DHW has a similar mosaic pattern with postmedian row of ocelli with concentric circular thin rings of greenish, a wider brown ring, another thin greenish ring containing brown with a central eye with the basal half black and a distal light blue lune. VFW grey with diagonal lines in basal half, distal half a large black area with five or six marginal grey markings. VHW grey with brown lines. Submarginal ocelli a thin brown circle, a grey ring, with blackish blue interior with a broad light blue lune.

Male genitalia: Vinculum with posterior median margin straight without any projection; the gnathos arm is short and flattened, appearing hoof-shaped, the gnathos is relatively narrow and elongate; uncus tip toothed and beak-shaped, with many hairs on the dorsal surface; saccus 2.0 mm in *lelaps*, 3.36 mm in *atlantis*, valve (2.0-2.48)2.34 mm; aedeagus nearly straight (2.80-4.04)3.42 mm. Rami relatively short (1.24-1.64)1.44 mm with alternately longer flat spines along entire length of rami. Apex of rami attenuate not expanded. Posterior lateral margin of sternite with flat spines only at base of rami, smaller spines ventrally.

Female. Upper surface similar to male except DFW has a subapical row of diagonal greyish or whitish markings and some postmedial grey or white in the costal area. VFW basal half similar to the male, outer half without a large black area as in male, but about 4 dark broad diagonal bands across wing. VHW similar to male.

Key to Subspecies of *H. atlantis*

Males.

- 1a. Apical half of DFW dark with thick dark bluish lines and pattern; distinct black maculae present proximal to subapical ocelli; saccus 2.0 mm. *lelaps*
- 1b. Apical half of DFW (distal to end of discal cell) with light bluish smears or wash with no distinct pattern; blackish maculae nearly absent or narrow dark markings proximal to subapical ocelli; saccus 3.36 mm. *atlantis*

Females.

- 1a. DFW with postmedian diagonal row of maculae dark grey heavily dusted with black scales; subapical diagonal row of small maculae whitish with dark dusting only in R_2 - M_1 (except rubbed specimens); ocellus in M_1 - M_2 with dark grey ring; VFW with wide black postmedian and subapical diagonal bands, resulting in diagonal rows of smaller rounded white maculae. *lelaps*
- 1b. DFW with postmedian diagonal row of whitish maculae with some dark dusting; broad subapical diagonal white band; ocellus in M_1 - M_2 in center of distinct white elliptical or rectangular area; VFW with black postmedian and subapical diagonal lines resulting in a broad white postmedian and subapical diagonal band. *atlantis*

Hamadryas atlantis atlantis (Bates) 1864 [Stat. rev.]

Figs. 41-44, 196

Ageronia atlantis Bates, 1864:115-116. TL - Guatemala, Chuacús, about 3000 ft. Type - BM Type No. Rh. 9260, 1 ♀ HT (Examined) (Figs. 43 & 44).

Ageronia atlantis Bates, Godman & Salvin, 1883, 1:269, 2:Tab 26, figs. 5-8.

Description:

As in *H. atlantis* except for the differences listed for *H. a. atlantis* in the key to subspecies. Average wing length ♂ 33 mm, ♀ 40 mm.

Distribution:

From the Isthmus of Tehuantepec, Mexico to southern Honduras.

Taxonomy and Variation:

The nominate subspecies is readily distinguishable from *H. a. lelaps* especially in the females. The exact zone of intergradation between the subspecies is not fully defined. A single male from Yautepec, Morelos, Mexico appears to be an intergrade with mostly *H. a. atlantis* characters. An intergrade specimen labeled Jalapa, Mexico is an old male specimen collected by Mrs. Bissel in the Holland Coll. in the CM. It probably is from Jalapa, Tabasco. If it is from Jalapa, Veracruz, it would be well out of the range of *H. atlantis*.

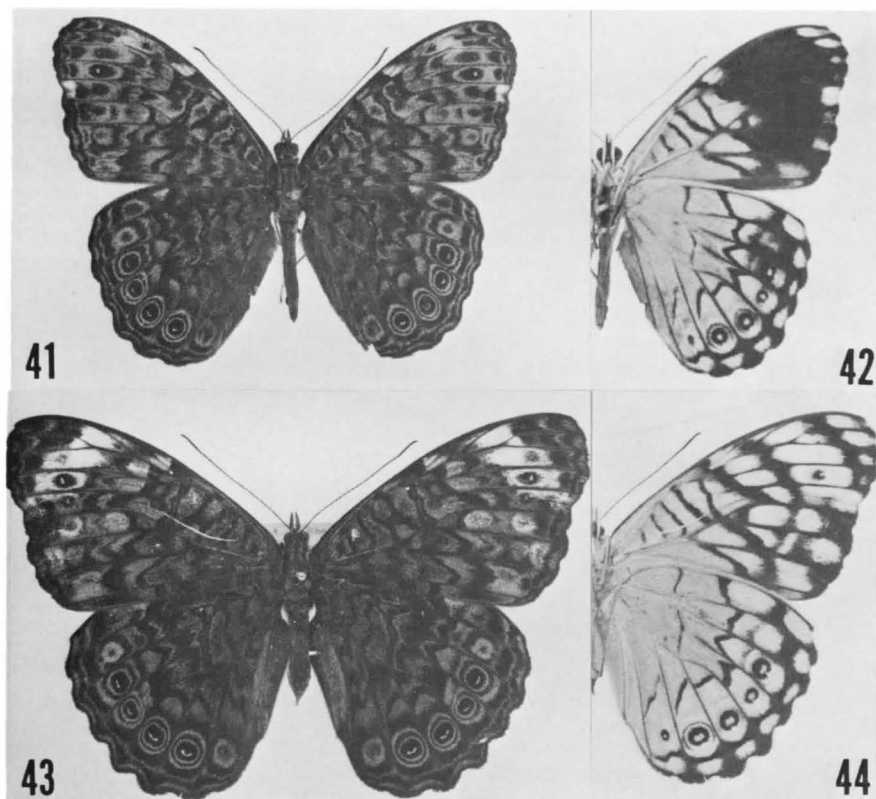
Biology:

Found in dry areas especially in dry stream valleys, but specimens were collected by the author in Chiapas and at Las Animas, Oaxaca in dry areas away from stream valleys. They were on tree trunks and large rocks. The species is relatively restricted and uncommon.

The adults are not aggressive and are silent and furtive. They have been collected from May to August, mostly in June and July at elevations from sea level to 1,300 m.

There are no known reports on the immature stages or food plants.

Specimens Examined: 37 ♂, 14 ♀



Figures 41-44. *Hamadryas atlantis atlantis* (Bates). ♂ dorsal (41) ventral (42) surfaces. GUATEMALA, Santa Rosa, Guazacapán (AA). ♀ dorsal (43) ventral (44) surfaces. GUATEMALA, Baja Verapaz, Chuacús. Holotype, *Ageronia atlantis* Bates (BM).

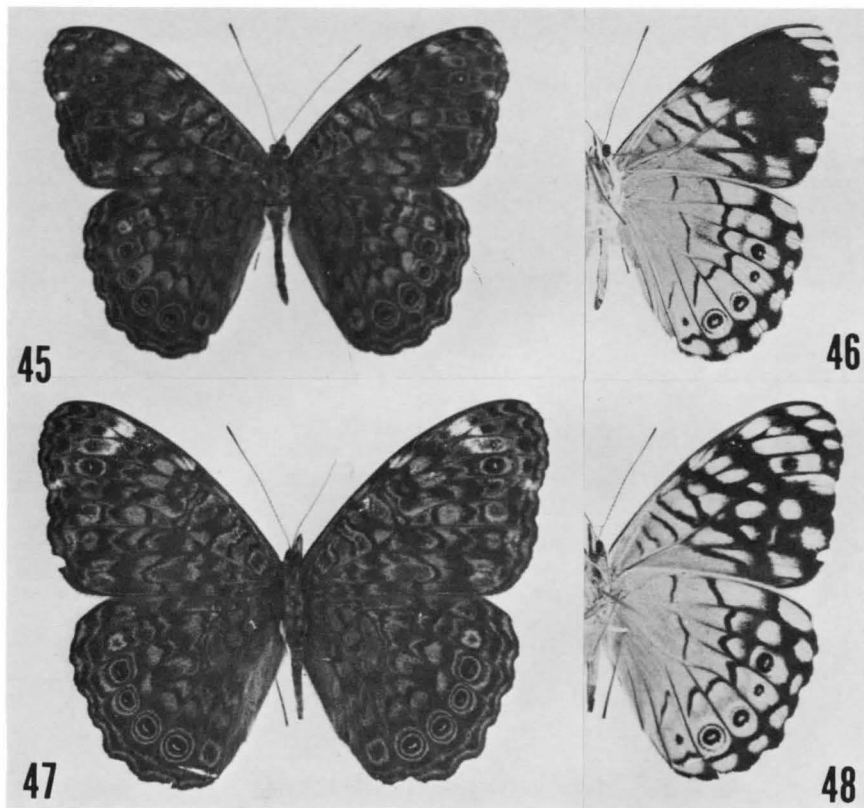
MEXICO: *Chiapas*, Comitán, Jun., Jul. 3 ♂, AM; May, Aug. 7 ♂ AA; Las Delicias, Jun, 4 ♂ 1 ♀ AM; Jul, 1 ♂ 2 ♀ AA; San Carlos, Jul, 1 ♀ AA; Tapachula, Aug. 1 ♂ AA; Chorreadero, 22 km S. Tuxtla Gutiérrez, 2,000 ft., May, Jul., 3 ♂ 1 ♀ AA; San Cristóbal de las Casas, 1 ♂ JC; Rancho Santa Ana, Jun, 1 ♀ AM; no locality 7 ♂ 4 ♀; El Sumidero 1 ♂ AD; *Oaxaca*, Las Animas, Rt. 190, 1 ♀ JC; Salina Cruz 1 ♂; *Morelos*, Yautepec, Jun 1 ♂ AA; GUATEMALA: *Baja Verâpaz*, Chuacús on Rio Motagua 1,000 m, 1 ♀ HT, BM; 1 ♀ AM; *Alta Verapaz*, Rio Polochic, 1 ♂ AM; *Santa Rosa*, Guazacapán, Oct. 4 ♂ 1 ♀ AA; *Zacapa*, Zacapa, 1,300 m, Aug. 2 ♂ SI; *Quetzaltenango*, Quetzaltenango, BM; Volcán de Santa Mariá, BM: Central Valleys BM; HONDURAS: *Cortés*, San Pedro Sula ; *Choluteca*, Cantarranas, Aug 1 ♀ BM.

Hamadryas atlantis lelaps (Godman and Salvin) 1883 [Stat. rev.]

Figs. 45-48, 196

Ageronia lelaps Godman & Salvin, 1883 1:270. (♀ only). TL - Mexico, Durango, Ventanas. Type - BM Type Rh. 9259, 1 ♀ HT (Examined)

Ageronia lelaps Godman & Salvin, 1901, 2:689. ♀ synonymized with *A. atlantis* [Stat. rev.]



Figures 45-48. *Hamadryas atlantis lelaps* (Godman & Salvin). ♂ dorsal (45) ventral (46) surfaces. MEXICO, *Sinaloa*, 75 km NW Mazatlan (JC). ♀ dorsal (47) ventral (48) surfaces. MEXICO, *Morelos*, Huajintlán (AA).

Description:

As in *H. atlantis* except for the differences listed for *H. atlantis lelaps* in the key to subspecies. Average wing length ♂ 36 mm; ♀ 38 mm.

Taxonomy and Variation:

Ageronia lelaps was described from a single badly rubbed female. "Our specimen is not in very good condition, and we look anxiously forward for more perfect examples, including the male." (Godman & Salvin, 1883). Examination of the rubbed holotype female in the BM caused some confusion since an unusual amount of greyish white was present, more typical of *H. a. atlantis*. However, the subspecies were recognized after examination of two badly rubbed females of *H. a. lelaps* from Guerrero. These proved to be identical with the holotype. Since recognition of the subspecies was delayed until after visiting some museums, the exact area of intergradation was not determined.

Fruhstorfer, in Seitz, (1916) made a serious error in not recognizing the synonymy of *A. lelaps* by Godman and Salvin (1901). He misidentified *lelaps* and showed a color figure of a male *H. glauconome grisea* Jenkins which is unrelated to *A. atlantis* or *A. lelaps*. He states "*A. lelaps* G.&S. (105e) has a preponderantly greenish-grey upper surface, except the ocelli being pupilled in blackish instead of blue. Very rare known from Mexico to Guatemala" (Fruhstorfer, in Seitz, 1916).

Biology:

H. atlantis lelaps is a relatively restricted subspecies, but it is usually not rare where it occurs. I have found adults most frequently in stream valleys in dry regions on tree trunks or rocks. When disturbed the adults usually fly rapidly to another tree at some distance, or more frequently dart into scrubby undergrowth and alight on a tree trunk or branch of a shrub. They may also alight on rocks or on the ground. Once disturbed they rarely were observed to return to the same location as do many other species of *Hamadryas*. I have observed males and females sipping water in wet muddy areas along a small stream covered with vegetation in a very dry area at Cañon de Lobos, Mexico. North of Mazatlán, Sinaloa, Mexico I collected many adults at decaying banana baits in a stream valley.

The adults are not aggressive and have rarely been observed to fly at an intruder, are more silent and furtive than most species, and are therefore more difficult to collect. I have never heard them make the typical crackling noise of *Hamadryas*.

Adults have been collected from May to November but they appear to be more common during the rainy season from July to September. They occur from sea level to over 1000 m in elevation.

There are no known reports on the immature stages or food plants.

Specimens Examined: 100 ♂, 47 ♀

MEXICO: *Sinaloa*, Elota; Culiacán; Venado; Mazatlán; 70 km. NE Mazatlán; Naranjo; *Sonora*, Álamos; *Durango*, Ventanas 700 m; *Jalisco*, Autlán; Chapala; Cocula; Guadalajara; *Colima*, Colima; Madrid; La Salada; *Nayarit*, No locality; *Michoacán*, No locality; *Morelos*, Morelos; Yautepec; Jojutla; Tepoztlán; San Roque; Huajintlán; Rancho Viejo; Cañon de Lobos; Cuatla; Cuernavaca; *Veracruz*, Catemaco; *Guerrero*, Iguala; Agua de Obispo; Chilpancingo; Balsas; Acahuzotla; Buenavista; Tierra Colorada; Taxco; Acapulco; Colotlipa, 1,020 m; Mezcala; "Coastal area;" Naranjo 1,000 m; *Tabasco*, Jalapa X; *Mexico*, Malinalco; *Oaxaca*, Totolapan; Las Animas; Isthmus of Tehuantepec; Salina Cruz.

***Hamadryas chloe* (Stoll) [1787]**

Figs. 174, 191, 197

The taxonomy of *H. chloe* is difficult. Fruhstorfer (1916) recognized eight different

taxonomic entities and an additional subspecies has been described by Röber (1927). Careful study of the available 449 specimens and types in all of the museums visited and field collecting of this relatively uncommon but variable species results in recognition of four subspecies. A well-marked nominate subspecies *H. c. chloe* Cr. from the Amazon basin, extends from French Guiana to Colombia and Peru to southern Brazil. Another distinct subspecies *H. chloe daphnis* Stgr. occurs from Peru through Bolivia, southern Brazil and northern Argentina. There are a large number of variable transition intergrades in the borderline zone between the two subspecies which is partly the cause of the profusion of names. A third subspecies *H. chloe rhea* occurs in eastern Brazil. In addition, an unusual subspecies of limited distribution *H. chloe obidona* Fruhstorfer is recognized. The main characters separating the four subspecies are shown in the key to subspecies. There is no observable significant variation in structure of the male genitalia in the various subspecies.

More detailed study of *H. chloe* is required to more carefully delineate the variation and the zones of intergradation. More study of larger series of the aberration population of *obidona* is required.

Description:

Male. Forewing with R_1 & R_2 arising separately, radial sector and $r-m_2$ not swollen, m_2-m_3 joining distal to junction of M_3-Cu_1 . DFW ground color blue or brown with a mosaic of black, grey, blue and white markings, with three red discal bars, subapical area white to dark grey, DHW with similar mosaic with two red discal markings. Submedian row of ocelli with large oval or tear-shaped thin blue circle containing black with a large or small concentric blue circle or oval containing black and sometimes a white lune. VFW with mottled mosaic of black, brown, grey and white with three discal red markings. VHW with grey brown basal color with red markings, ocelli similar to DHW, posterior margin distally expanded with irregular wavy extensions.

Male genitalia. Vinculum without any median posterior projection; gnathos arm elongate but broad and flattened and pointed, elbow of gnathos curving to right angled; uncus with prominent long hairs both dorsally and ventrally from base to apex, tip hooked and beaked, saccus (18.0-2.16)2.00 mm; valve without any median projection at crista (1.60-1.80)1.70 mm; aedeagus (2.48-2.76)2.65 mm. Rami pubescent or with fine seta, flat spines only on expanded apex (1.08-1.36)1.26 mm. Posterior lateral margin of sternite with small setae, no flat spines.

Female. Similar to male but with more marked pattern especially lighter maculations, often more smeared or washed.

Key to Subspecies of *H. chloe*

Males

1. Base color DFW and DHW steel blue, distal half with diffuse pattern, DFW with no subapical light spots; DHW ocelli with diffuse distal blue area or flat blue ring; VFW and VHW with diffuse red brown spots in subapical areas, VHW with four diffuse red median spots. Lower Amazon and French Guiana. *obidona*
- 1b. Not as above. 2
- 2a. VHW with median row of black spots, no red spots. E. Brazil. *rhea*
- 2b. VHW with median row of four or more prominent red spots. 3
- 3a. DFW and DHW base color deep rich dark blue or light blue; DFW with subapical band or maculae in area from costal margin to M_1 , dark smoky grey, rarely whitish; DHW ocelli in M_3-Cu_2 large elongated black, tear-shaped with blue outline, inner black area with *small* distal flat or oval blue ring with black center or small white spot; ocelli in $Rs-M_3$ with no or very small inner blue flat ring; VFW with a row of subapical red-brown spots; VHW with red-brown pairs of spots in submarginal area. *chloe*
- 3b. DFW and DHW base color brown, with blue border or outlines of spots and ocelli; DFW subapical band of two prominent white squarish maculae, or

white dusted with grey; DHW ocelli in M_3-Cu_2 large black tear-shaped with blue outline, containing a *large* nearly circular blue or brown ring, filled with black or dark brown, with a distal white lune; ocelli in $Rs-M_3$ with circular or flattened ring; VFW with no red-brown spots in subapical area; VHW with no red-brown pairs of spots (rarely faintly brown spots)..... *daphnis*

Females

- 1a. DFW and DHW with magenta base color, distal half with heavily diffused pattern; DHW ocelli with diffused margin, small distal flat ring with prominent white spots..... *obidona*
 1b. Not as above..... 2
 2a. VHW with median row of black spots (no red)..... *rhea*
 2b. VHW with median row of red spots..... 3
 3a. Wings with some magenta base color and same pattern as *chloe* ♂ but with more contrast in pattern on ventral surfaces..... *chloe*
 3b. Wings with brown or dark blue base color, same pattern as *daphnis* ♂ but more contrast in pattern on ventral surface..... *daphnis*

Hamadryas chloe chloe (Stoll) [1787]

Figs. 49-52, 197

Papilio chloe Stoll. Suppl. Cramer [1787] 5(22):182, pl. 5. f. 1, 1a. TL - Surinam. Type - Location unknown (Coll. L. F. Holthuisen).

=*Ageronia nais* Author not stated, in Seitz, 1914:pl. 105a, Lieferung 194 [Syn. nov.]

=*Ageronia chloe nais* Fruhstorfer, in Seitz, 1916:541, Lieferung 228. TL - Peru, Tarapoto. Syntypes - BM 15-111, 1 ♂ (Examined) [Syn. nov.] (Figs. 49 & 50).

=*Ageronia chloe colombicola* Röber, 1927: 99. TL - S. Colombia, Canungucho [=Cananguchal] (500 m., Mar.). Syntypes - BM 15-111, Rh. 2961, 1 ♂ (Examined); Berlin Museum Zoology, "K 39/40, 1 'HT' ♂ Mar.-June 1926." [Syn. nov.]

Description:

As in *H. chloe* except characters listed for *H. c. chloe* in the key to subspecies. Average wing length ♂ 26 mm, ♀ 27 mm.

Distribution:

H. c. chloe occurs primarily in the Amazon basin and extends from the Guianas to central Colombia, Ecuador, Peru, part of Bolivia and part of Brazil. It has been collected more commonly in the foothills of the eastern Andes in Colombia to Peru.

A specimen of *H. chloe* labelled "Honduras" in the Carnegie Museum Collection is a male intergrade which is almost certainly mis-labeled and probably comes from Peru, Bolivia or southern Brazil. The male genitalia of this specimen is similar to those from other parts of the range of recognized subspecies and intergrades which cannot be distinguished on genitalic characters.

Taxonomy and Variation:

Papilio chloe was described by Stoll based on figures 1 and 1a in plate 5 and a description published in [1787]. The index on page 182 of the same publication was published in 1790. Some authorities think that the plate and description were not binomial and that the index was the first binomial use so that the date would be 1790. This should be referred to the Commission on Zoological Nomenclature to clarify their decision 516.

H. c. chloe is highly variable in a single locality as well as over its range, especially in intergrade areas. Unfortunately, it has not been possible to examine the type of *chloe* from Surinam, but a recent specimen from Guyana was studied and compared with

chloe from other areas.

The type male of *Ageronia chloe nais* Fruhstorfer from Tarapoto, Peru in the BM was studied. It is a typical *H. c. chloe* in nearly all details. Unfortunately in Seitz 1914, pl. 105a, *nais* ♂ is poorly illustrated with too much light blue and the blue inner ring of the ocelli on the DHW is too large compared to the type. The illustration of *nais* U in this plate is actually ♂ *obidona* with the "stretched wing pattern."

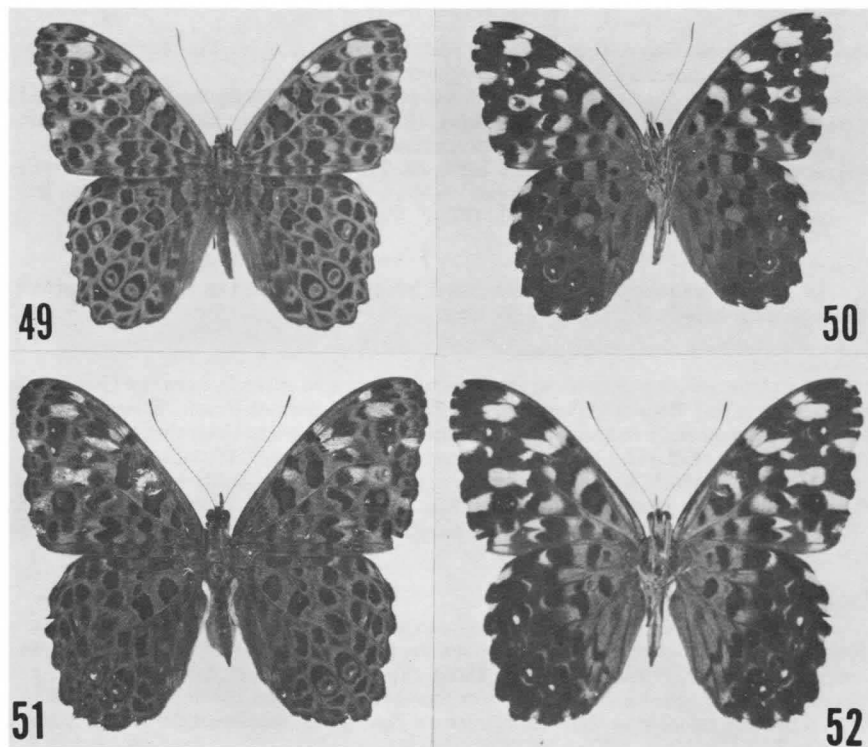
Ageronia chloe colombicola Röber was described from Canungucho [=Cananguchal] Colombia. I have examined a ♂ syntype in the BM and it is typical *H. c. chloe*, almost identical with the ♂ *nais* syntype.

The taxonomy of *H. c. chloe* is made most difficult because of the many intergrades with *H. c. daphnis* especially in Peru and Brazil.

Biology:

H. c. chloe is nearly always found in deep tropical forest and is not known to come into the open except forest paths or near the forest edge. It is usually found on tree trunks, but I have collected adults in a dark overgrown banana grove at Explorama Camp near Iquitos, Peru. The adults are attracted to rotting fruit and human feces baits in the forest, especially on the forest floor. It is quite wary and a fast flyer and is usually difficult to catch. It has not been heard to produce a clicking sound.

The subspecies occurs throughout the year, but there is a peak in the population, according to museum collections and field collecting, from April to July, and a smaller



Figures 49-52. *Hamadryas chloe chloe* (Stoll). ♂ dorsal (49) ventral (50) surfaces. PERU, *San Martín*, Tarapoto. Syntype, *Ageronia chloe nais* Fruh. (BM). ♀ dorsal (51) ventral (52) surfaces. COLOMBIA, Amazonas, Florida (BM).

peak from September to November. Adults have been collected mostly at lower altitudes and up to over 1,000 m elevation.

There are no available reports on the description of the immature stages or foodplants.

Specimens Examined: 170 ♂, 49 ♀

"HONDURAS": No locality; Holland Coll. 1885, Locality probably wrong; COLOMBIA: *Cundinamarca*, Bogotá; *Meta*, Villavicencio; *Putumayo*, Umbria; Mocoa; *Tolima*, Rio Chili; *Amazonas*, Florida; Cananguchal, 500 m; *Boyacá*, Minas de Muzo; ECUADOR: *Napo*, Curaray; Rio Latas; Rio Coca 300 m; Lumbaqui; Rio Misahualli; Archidona; *Pastaza*, Sarayacu; *Morona-Santiago*, Macas, Oriente; GUYANA: *Berbice*, New River Triangle, Camp Jaguar; "SURINAM": Type locality; PERU: *Loreto*, Iquitos; Mazán; Pebas; San Roque; Lago Yarina-Coche; Balsapuerto; Rio Ucayali; *Ucayali*, Pucallpa X; Boquerón del Padre Abad; *Amazonas*, Chachapoyas X; Rio Santiago; *San Martín*, Achinamiza; Tarapoto; Rio Chambirayacu; Moyobamba; Rioja; Shapaja, 250 m; Lamas & Urcopata; Jepelacio; Juanjui; *Huánuco*, Rio Llullapichis; Pariguanas; Rio Pachitea; Bosque Nac. Imparía; Tingo Maria; *Junín*, Rio San Pedro; Chanchamayo; La Merced; Satipo; Rio Perené; *Pasco*, Rio Churchurras; Rio Palcazu; *Madre de Diós*, Boca Rio La Torre; BRAZIL: *Pará*, Belém, Santarém X; Bragança; *Amazonas*, Manaus; Marure; Lower Rio Madeira, Santa Maria; *Maranhão*, São Luis; Montes Aureos, *Rondônia*, Jaru; *Mato Grosso*, Diamantino, Chapada; Fazenda Araputanga; Barra do Bugres to Tangará.

Hamadryas chloe daphnis (Staudinger) [1886]

Figs. 53-56, 197

Ageronia daphnis Staudinger, [1886]: 128, t. 255, f. 1 & 2. TL - Peru, Chanchamayo.

Syntypes - Museum Zoology Berlin (Staudinger Coll.), K 39 [18]85 leg. Thamm, leg. Gier, 3 ♂ Syntypes.

Ageronia chloe daphnis (Staudinger) Fruhstorfer, 1907:16.

=*Ageronia chloe nomia* Fruhstorfer, in Seitz, 1916:541. TL - Bolivia, Mapiri. Syntypes - BM 15-115 (no abdomen) (Examined) [Syn. nov.]

=*Ageronia chloe xenia* Fruhstorfer, in Seitz, 1916:541. TL - Bolivia, Buenavista (750 m., Aug.). Syntypes - BM 15-111, 1 ♂ (Examined) [Syn. nov.] (Figs. 53 & 54).

Description:

As in *H. chloe* with additional characters for *H. chloe daphnis* listed in the key to subspecies. Average wing length ♂ 29 mm, ♀ 30 mm.

Distribution:

H. chloe daphnis occurs in Peru, Bolivia, northern Argentina and southern Brazil. There are many intergrades in Peru and southern Brazil with *H. c. chloe*.

Taxonomy and Variation:

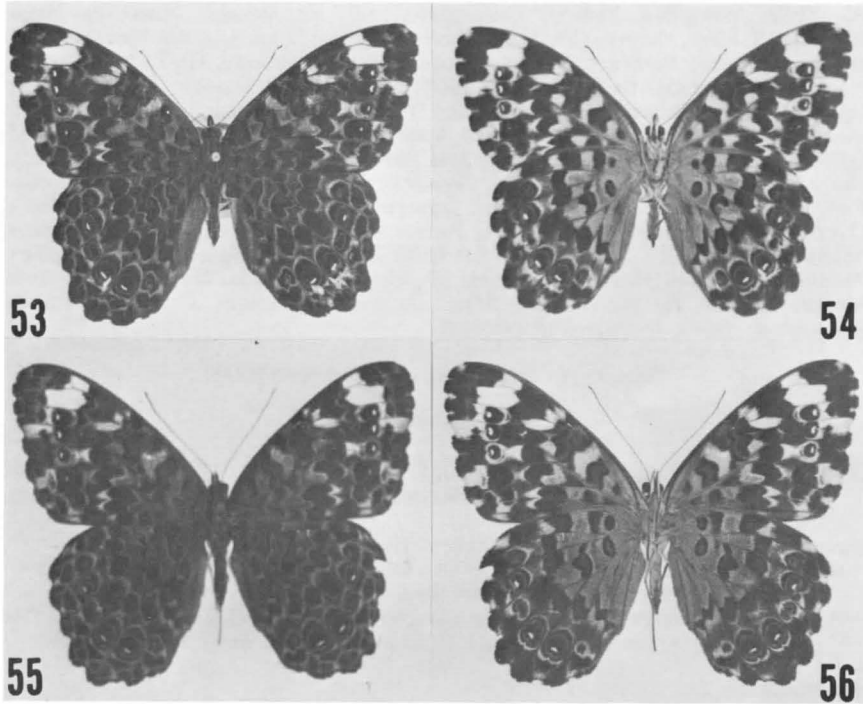
The Fruhstorfer "subspecies" *H. chloe nomia* and *H. chloe xenia* differ only in the relative amounts of white or grey dusting of the preapical white spots. The type specimens in the BM and series of specimens from type locality areas for *nomia* and *xenia* have been examined and they are considered to be synonyms of *H. chloe daphnis*.

Biology:

Adults occur in heavy forest the same as *H. c. chloe* and have similar habits. They occur throughout the year, with most specimens collected from March to July. There is a small population peak, in September to December. Adults have been collected at altitudes from near sea level to over 1,600 m elevation.

Specimens Examined: 146 ♂, 16 ♀

PERU: *Puno*, Rio Yahuar Mayo 400 m; *Junín*, Rio Perené; *Madre de Dios*, Puerto Maldonado; BOLIVIA: *Cochabamba*, Cochabamba; *Beni*, Villa Bella; *La Paz*, Rio Chimate; Guanay; *Cazahualac*; *Santa Cruz*, Rio Surutú; Buenavista; Province del Sara; Portachuelo; Azuzaqui 400 m; Rio Yapacani; Las Juntas; ARGENTINA: "N. Argentina", BRAZIL: *Mato Grosso*, Nioaque; Buriti; Corumbá; Cuiabá; Chapada; *Goiás*, Pujol; *Distrito Federal*, Brasília; *Bahia*, Santo Antônio da Barra; *Paraná*, Castro; *São Paulo*, São Paulo; Jaboticabal; *Rio de Janeiro*, Rio de Janeiro; *Santa Catarina*.



Figures 53-56. *Hamadryas chloe daphnis* (Staudinger). ♂ dorsal (53) ventral (54) surfaces. BOLIVIA, *Santa Cruz*, Buenavista. Syntype *Ageronia chloe xenia* Fruh. (BM). ♀ dorsal (55) ventral (56) surfaces. BOLIVIA, *Santa Cruz*, Buenavista (CM).

Hamadryas chloe rhea (Fruhstorfer) 1907

Figs. 57-60, 197

Ageronia chloe rhea Fruhstorfer, 1907:15. TL - Brazil, Minas Gerais, Espírito Santo.

Syntypes - BM 15-110, 1 ♂ (Examined) (Figs. 59 & 60).

=*Ageronia chloe daphnicia* Fruhstorfer, in Seitz. 1916:541. TL - Brazil, Pernambuco.

Syntypes - Not in BM, nor in Berlin Museum Zoology [Syn. nov.]

Description:

As in *H. chloe* except differences for *H. c. rhea* listed in the key to subspecies. Average wing length ♂ 26 mm; ♀ 28 mm.

Distribution:

H. c. rhea may not be a valid subspecies but it is presently recognized. It does not appear to have a distinct geographic range based on the small number of specimens examined. It is presently known from Surinam and from Pernambuco, Bahia, and Espirito Santo, in the eastern coastal region of Brazil.

Taxonomy and Variation:

The "types" of *H. c. rhea* in the BM were examined and they appear to be a distinct subspecies. However, many intergrades with *chloe* and *daphnis* have been observed.

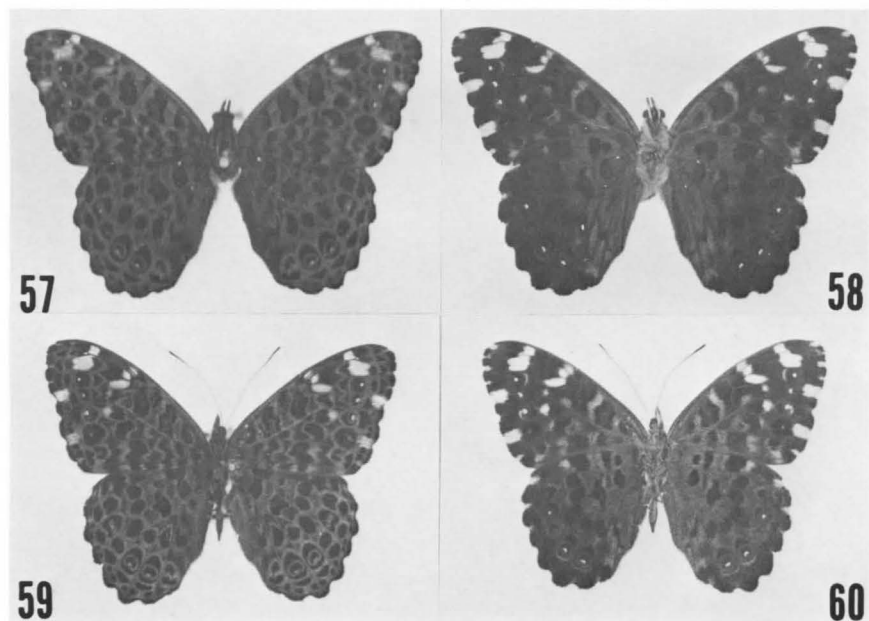
H. chloe daphnicia Fruhstorfer was described from Pernambuco, Brazil. The description "Habitus smaller than in *rhea* still more finely spotted in black than *rhea*, exhibiting besides purer white preapical spots on the forewings. Pernambuco. Type in the Coll. Staudinger." This appears to be the subspecies *rhea*, which may be an intergrade between *chloe* and *daphnis*. Two specimens from Pernambuco (Milwaukee Public Museum) have whitish subapical spots on the DFW heavily dusted with grey. The DHW ocelli inner rings are intermediate in size, with white distal marks in the female. There are slightly reddish apical spots on the VFW. These appear to be *rhea* intergrades most closely related to *H. c. chloe*.

Biology:

The only specimen with a date was collected in April. It is known from lower elevations. The immature stages and food plants are unknown.

Specimens Examined: 6 ♂, 3 ♀

SURINAM: *Brokopondo*, Berg en Dal, Apr., 2 ♀ BM; BRAZIL: *Pernambuco*, Pernambuco, 1 ♂ BM; *Bahia*, Bahia, 3 ♂ 1 ♀ BM; *Espirito Santo* (Syntype) 1 ♂ BM; No data,



Figures 57-60. *Hamadryas chloe rhea* (Fruh.). ♂ dorsal (57) ventral (58) surfaces. BRAZIL, "Bahia." (BM). ♂ dorsal (59) ventral (60) surfaces. BRAZIL, *Minas Gerais*, Espirito Santo. Syntype, *Ageronia chloe rhea* Fruh. (BM).

Felder Coll. 1 ♂ BM.

Hamadryas chloe obidona [Fruhstorfer] 1914

Figs. 61-64, 197

Ageronia obidona ♂ Author not stated [Fruhstorfer], in Seitz, 1914: pl. 105a, Lieferung 194.

=*Ageronia nais* U. Author not stated [Fruhstorfer], in Seitz, 1914: pl. 105a [Syn. nov.]

=*Ageronia chloe obidona* Fruhstorfer, in Seitz, 1916:541. Lieferung 228. TL - Brazil, Óbidos. Syntypes - BM 15-110, 1 ♂, 1 ♀ (Examined) (Figs. 61-64).

Description:

As in *H. chloe* except differences listed in the key to the subspecies. Average wing length ♂ 28 mm, ♀ 29 mm.

Distribution:

The presently known distribution of *H. c. obidona* is from Cayenne, French Guiana to the lower Amazon from Óbidos and Itaitube to Jubuti and Itacoatiara in Amazonas, Brazil.



Figures 61-64. *Hamadryas chloe obidona* (Fruh.). ♂ dorsal (61) ventral (62) surfaces. BRAZIL, Pará, Óbidos. Syntype, *Ageronia chloe obidona* Fruh. (BM). ♀ dorsal (63) ventral (64) surfaces. BRAZIL, Pará, Óbidos. Syntype, *Ageronia chloe obidona* Fruh. (BM).

Taxonomy and Variation:

Examination of the type ♂ and ♀ of *Ageronia chloe obidona* Fruhstorfer in the BM shows that they have the "stretched wing pattern". These were originally thought to be an aberration, but additional specimens from Obidos and other areas show this to be a probable subspecies with its own geographic distribution. It appears to be a stabilized "stretched wing pattern" population that has caused a new population. However, all specimens from a single locality are not entirely this extreme aberration. The Fruhstorfer (1916) description and plate 105a of *Ageronia obidona* [Fruhstorfer] in Seitz (1914) fits *H. c. chloe* but the ventral view in plate 105a of *H. c. nais* from Tarapoto, Peru shows a typical "stretched wing pattern" aberration in an intergrade. It is possible that this may occur elsewhere as a rare aberration. A specimen from Peru has slight *obidona* characters but it is not included in the "subspecies" *obidona*. More study and laboratory rearing is needed to clarify this interesting aberration.

Biology:

Adults have been collected in November, December, February and April.
No reports are available on the immature stages or food plants.

Specimens Examined: 25 ♂, 21 ♀

BRAZIL: Pará, Obidos, 11 ♂ 13 ♀ BM; 2 ♂ LA; 1 ♂ JC; Itaituba, 3 ♂ 5 ♀; Amazonas, Jubuti, Apr. 2 ♂ 1 ♀ BM; Itacoatiara, Feb., Nov. 1 ♂ 1 ♀ MM; FRENCH GUIANA: Guyane, Cayenne, Dec. 5 ♂ 1 ♀ BM.

Hamadryas albicornis (Staudinger) [1885]

Figs. 65-68, 175, 191, 198

Ageronia albicornis Staudinger (1885): pl. 44; [1886]:127. TL - Peru, Pebas. Syntypes - Zoology Museum Berlin, 2 ♂, 2 ♀ syntypes, leg. Hhl. (Types checked by H. J. Hanemann).

Description:

Male. Forewing with R_1 & R_2 arising separately, radial sector and $r-m_2$ not swollen, m_2-m_3 joining at or slightly distal to junction of M_3 and Cu_1 . Antennae with large subapical white markings. DFW with steel-blue ground color with black and grey markings, a dark red median discal bar. DHW similar but no red marking, a row of submarginal ocelli, with ocelli in M_1-M_2 and Cu_1-Cu_2 ring shaped; the outer wing margin is distally expanded (M_3-2A) as in *H. chloe*. VFW with three diagonal rows of white markings on brownish background, a red median discal marking present. VHW with white ground color, a broken irregular postmedian band and ringed ocelli as above. Average wing length 33 mm.

Male genitalia. Vinculum with no median posterior projection; gnathos arm very long ($\frac{3}{4}$ length of arm) and attenuated; uncus with many long hairs with tip toothed and beak shaped; saccus 2.44 mm, valve 2.04 mm, aedeagus curved 3.32 mm. Rami short 1.04 mm, with 7-9 flat spines on distal half. No spines on posterior lateral margin of sternite ventral to rami.

Female. Similar to male but paler maculae and lighter color. Average wing length 35 mm.

Distribution:

H. albicornis has been found to date only in the upper Amazon region in S. Colombia, N. Peru and western Brazil. In all collections examined I have found only thirteen male and four female specimens.

Taxonomy and Variation:

This is one of the rarest species in the genus. It is a distinctive species based on readily recognizable wing markings and male genitalia, most closely related to *H. chloe*. The hind wings are posteriorly expanded but not as much as *H. chloe*. The VHW has white ground color with a broken irregular post median band and no sub-basal and median red spots, while *H. chloe* has a dark brown ground color and red spots present (except *H. c. rhea*). The VFW has one red bar in the discal cell instead of three red bars on the VFW as in *H. chloe*. The antennae have much larger subapical white markings than *H. chloe*.

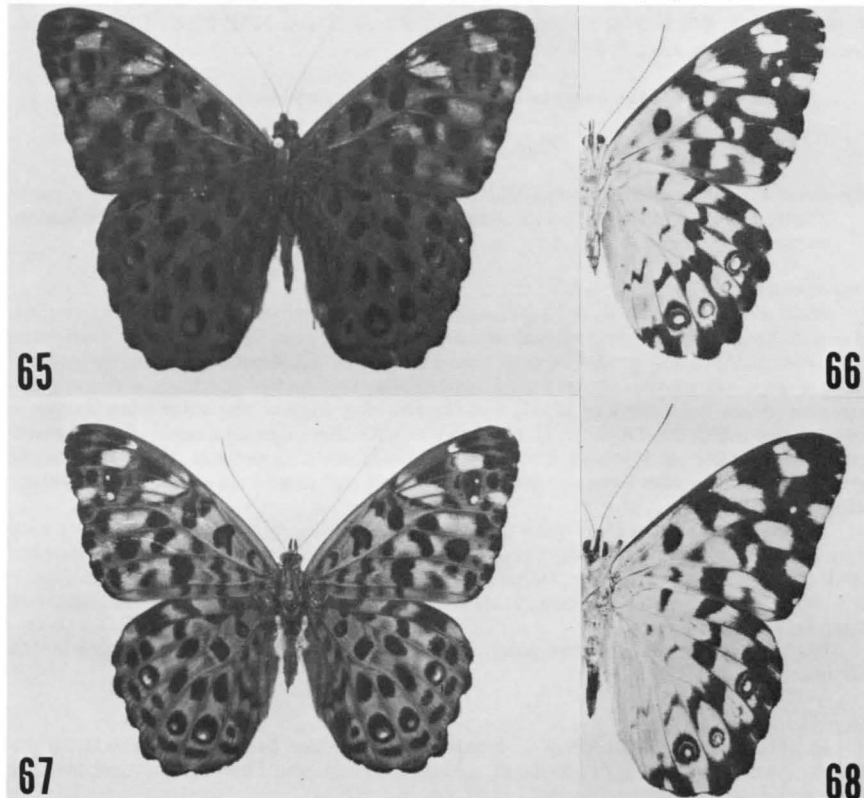
Biology:

This species has been found only in deep tropical rain forest and has been collected from excrement spread on leaves on the forest floor. It has not been heard to make a crackling sound when flying, the same as *H. chloe*. Adults have been collected mostly from lower altitudes to about 1,000 m elevation.

The only recorded collection date is in November. Nothing is known of the life history and food plants.

Specimens Examined: 13 ♂ 4 ♀

COLOMBIA: *Putumayo*, Umbria 1 ♂ 1 ♀ AM; PERU: *Loreto*, Iquitos, 1 ♂ ST, 1 ♂



Figures 65-68. *Hamadryas albicornis* (Staudinger). ♂ dorsal (65) ventral (66) surfaces. PERU, *Loreto*, Pebas (BM). ♀ dorsal (67) ventral (68). PERU, *Loreto*, Pebas (BM).

CM: Pebas, 4 ♂ 1 ♀ Nov., BM; Iquitos, Rio Cachyacu, 1 ♀ BM; Rio Haullago, 1 ♂ 1 ♀ AM: *San Martín*, Japelacio, 1 ♂ SI: BRAZIL: *Amazonas*, Tonantins, 1 ♂ BM; No locality, 3 ♂ BM.

Hamadryas feronia (Linnaeus) 1758

Figs. 176, 191, 199

H. feronia is an abundant widespread species extending from southern Texas to Argentina and southern Brazil. It was described by Linnaeus in 1758 and has been ascribed to six different genera by various authors in over two centuries. Fruhstorfer (1916) recognized seven different taxonomic entities including his five new subspecies. Bryk (1953) also described a new subspecies based on similar minor differences in shades of coloring.

A careful study was made of over 1300 specimens from the entire range and the author collected *feronia* in twelve countries. Male genitalia were studied from various areas. Individual variation of specimens collected from a single locality in one day may vary from intense blue to pale blue-brown or greenish and the white spots on the DFW from white to dark grey covered with melanic dusting.

Detailed comparison of the colors, pattern, and male genitalia do not show any consistent differences that would merit splitting into eight described nomenclatorial entities including three species and five subspecies. It can be split into two poorly defined subspecies including *feronia* the nominate form from the Guianas and Colombia and the entire Amazon basin area. The Central American and Mexican form *farinulenta*, with brownish or dark buff color below appears distinct and extends into South America. It should be pointed out that the amount of buff coloration is variable and sometimes a matter of opinion. Also the other characters of size of whitish maculae and dark or black lines or spaces between the maculae are not firm characters and are subject to variation. A strong case could be made for not recognizing any valid subspecies of *feronia*.

H. feronia farinulenta has been confused frequently with *H. guatemalena*. Godman and Salvin (1883) did not recognize *H. feronia* in Central America and considered all specimens north of Panamá as *H. guatemalena*.

Description:

Male. Forewing with R_1 & R_2 arising together or with a single stalk. Radial sector, $r-m_2$ and the bases of m_2-m_3 + M_2 are inflated; m_2-m_3 joins the cubital stalk $\frac{1}{4}$ - $\frac{1}{3}$ the distance from the junction of Cu_1 & M_3 to Cu_2 . DFW with a mosaic pattern of grey, black and bluish spots and markings and a wavy red discal cross bar. DHW with mosaic pattern in basal half, a postmedian ocelli with rounded or oval blue ring containing black with a central blue grey or whitish spot or lune. VFW with basal greyish to ochre area, a red wavy median discal bar, basal color blackish with three irregular diagonal rows of greyish maculations. VHW grey to ochre basal half, margin dark brown to black with interspersed white markings, ocelli large dark circles containing grey or white.

Male genitalia. Vinculum with prominent median posterior projection; gnathos arm very broad and flattened with large hoof-shaped structure above arm, elbow of gnathos forming a right angle; saccus (2.16-2.64)2.44 mm; valve with a median projection at crista (2.68-3.20)2.84 mm; aedeagus (3.28-3.84)3.43 mm. Rami elongate (1.72-3.20)2.52 mm with small flat spines along entire length. Posterior lateral margin of sternite with several flat spines ventral to rami.

Female. Similar but larger and more rounded wings.

Key to Subspecies of *H. feronia*

- 1a. VHW in both sexes usually whitish color; DFW usually more intense and

darker blue, black lines usually wider and blacker; median and postmedian preapical diagonal rows of maculae white with dark grey or blackish dusting

- *feronia*
 1b. VHW brownish buff to ochre color; DFW with increased size of median diagonal row of postmedian and preapical whitish to grey maculae; decreased width of black lines and areas between maculae, especially preapical diagonal bands. *farinulenta*

Hamadryas feronia feronia (Linnaeus) 1758

Figs. 69-72, 199

Papilio feronia Linnaeus, 1758:473 (Figure in Clerck 1764:pl. 31, fig. 1). TL - "India," probably Surinam. Type - Location not known (Uppsala, Linnean Soc., London?).

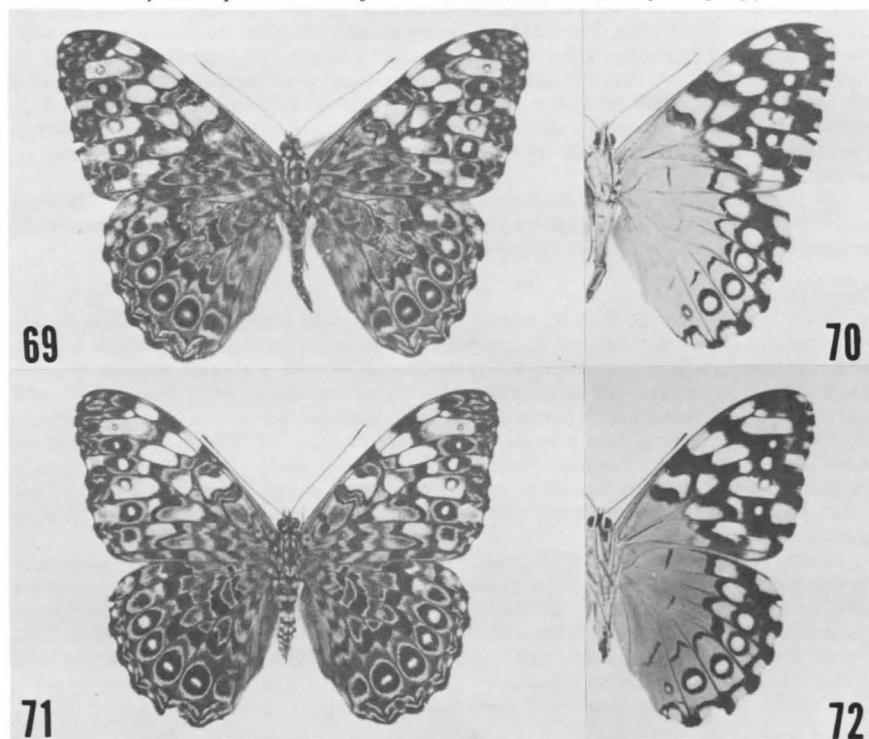
=*Ageronia feronia catablymata* Fruhstorfer, in Seitz, 1916:542. TL - Central Brazil. Syn -

types - Not in BM nor Berlin Museum Zoology [Syn. nov.].

=*Ageronia feronia obumbrata* Fruhstorfer, in Seitz, 1916:542. TL - Paraguay (No specific locality). Syntypes - BM 15-115 1 ♂ (Examined) [Syn. nov.] (Figs. 69 & 70).

Hamadryas feronia (L.) Hemming, 1933:197. (Erroneously selected as type species of genus *Hamadryas* by monotypy).

=*Peridromia feronia peruviana* Bryk 1953:114. TL - Peru, Roque. Syntypes - Stock-



Figures 69-72. *Hamadryas feronia feronia* (Linnaeus). ♂ dorsal (69) ventral (70) surfaces. "PARAGUAY." Syntype, *Ageronia feronia obumbrata* Fruh. (BM). ♀ dorsal (71) ventral (72) surfaces. PERU, Huanúco, Tingo María (JC).

holm (2 ♂) [Syn. nov.].

Description:

As in *H. feronia* except specific differences for *H. f. feronia* listed in the key to subspecies. Average wing length ♂ 36 mm, ♀ 38 mm.

Distribution:

H. f. feronia occurs from the Guianas to part of Venezuela, and in the eastern slopes and in the Andes Mountains in Colombia, Ecuador and Peru, and throughout the Amazon basin. There is intergradation on the margin of the basin in central Bolivia, Paraguay and southern Brazil with *H. feronia farinulenta* or perhaps with a poorly defined darker subspecies. There is a single female specimen from St. Lucia island in the British Museum, but it is not certain that this is a valid record. If it is, it would probably be a migrant. It appears to be *H. f. feronia* instead of the more expected *H. feronia farinulenta* occurring in Trinidad.

Taxonomy and Variation:

Some specimens from southern South America may be somewhat darker which Fruhstorfer named *obumbrata* from Paraguay with a transition to *catablymata* from Central Brazil. Bryk (1953) described *Peridromia feronia* spp. *peruviana* based on pale dark brownish instead of brownish black markings and the ocellus bluish instead of more violet grey. These characters are only normal variation and are of no real taxonomic significance. A transition to a lighter marked form *nobilita* Fruhstorfer, from Venezuela and Colombia was also named. All of these forms can be found in nearly any locality in South America but there may be a tendency for darkening southward. However, very dark specimens especially dark blue occur north in the Guianas. It has not been possible to recognize any of these variations as valid subspecies and they are therefore synonymized.

Biology:

This subspecies is widespread and very common and has similar habits to *H. februa*. The adults are found on tree trunks especially at forest edges, in cut over second growth, in populated areas, and in somewhat open country, particularly on isolated trees. They are often aggressive and will fly at intruders. In a cemetery in an opening in a tropical forest at Parika, Guyana many adults repeatedly and sequentially flew at the author. They frequently fly fast chasing each other with loud crackling noise. They also occur on road surfaces, on vegetation and on rotting fruit.

They have been collected throughout the year and occur from sea level to nearly 1,000 m altitude.

Immature stages:

The egg, all five instars of larvae, including two color forms of mature larvae, and the pupae have been described in detail by d'Almeida (1922) from Brazil. This has been quoted by Hayward (1964) and summarized by Riley (1975).

Host Plants:

<i>Dalechampia triphylla</i> Lam.	Euphorbiaceae	
In Brazil		d'Almeida (1922)
<i>Dalechampia triphylla stenose-</i> <i>pala</i>	Euphorbiaceae	
In Uruguay		Biezanko et al. (1957)

Specimens Examined: 291 ♂, 183 ♀

SAINT LUCIA: 1 ♂ BM (presented in 1838 by William Muter, Esq.); GUYANA: W.

Demerara, Parika; *E. Demerara*, Georgetown; *Mazaruni-Potaro*, Bartica; Kamarang; *Berbice*, Camp Jaguar; Essequibo R. 65 km. S; SURINAM: *Marowijne*, Rio Tapanahoni; Geldersland; FRENCH GUIANA: *Guyane*, Cayenne; Nouveau Chantier; VENEZUELA: Amazonas, Boca Mavaca; *Mérida*, Rio Mucujún; El Vigia X; *Carabobo*, Las Quiguas X; *Bolívar*, Alto Río Cuara, Kanarakuni; *Zúlia*, Machiques X; *Táchira*, La Fria X; COLOMBIA: *Valle*, Cali X; Corinto; *Amazonas*, Leticia; Florida, Río Putumayo; *Meta*, Villavicencio; *Atlántico*, Cartagena; PERU: *Loreto*, Iquitos X; Pebas; Explorama (55 km NE Iquitos); Lago Yarina Coche; *Junín*, Chanchamayo; Río Colorado; San Ramón; Río Perené; La Merced; Satipo; *Huánuco*, Río Pachitea 320 m; Las Palmas 100 m; Tingo María; *San Martín*; Moyobamba; Roque; *Morropón*, Morropón; *Cuzco*, Río Urubamba, Sangobatea; *Madre de Dios*, Boca Río La Torre 300 m; ECUADOR: *Los Rios*, Hacienda Ave María; *Napo*, Río Coca; Lumbaqui; *El Oro*, El Oro; *Guayas*, El Triunfo; Bolívar, Balzapamba; *Chimborazo*, Dos Puentes; BOLIVIA: *Beni*, Reys; *La Paz*, Apolobamba, Balzapamba; *Santa Cruz*, Province del Sara; PARAGUAY: *Paraguarí*, Sapucay; *Pedro Juan Caballero*, Pedro Juan Caballero; BRAZIL: *Bahia*, Salvador; Ilha Gande; *Amazonas*, Manaus; Lago Puraquequara; Manicoré; Lower Río Madeira; Río Purús; *Hiutanaã*; Tefé; Arima; Maués; São Paulo de Olivença; Benjamin Constant; Manacapurú; *Pernambuco*, Pernambuco; *Espírito Santo*, Linhares; *Pará*, Santarém; Obidos; Belém; Río Tapajós, Aveiro, Cantagalo, Itaituba; *Goias*, Campinas; *Amapa*, Oucatopi Island; *Rondônia*, Jaru; Porto Velho; *Rio de Janeiro*, Rio de Janeiro; *Tijuca*; Corcovado; Petrópolis; Gávea; *Mato Grosso*, Buriti; São Vicente; Corumbá; *Minas Gerais*, Parque Rio Doce; Viçosa, Cachimbo; *Santa Catarina*, Brusque; Blumenau; *Espírito Santo*; Baixo Guandú; *São Paulo*, Itaiç, Araras, Bauru.

Hamadryas feronia farinulenta (Fruhstorfer) 1916

Figs. 73-76, 199

- ?*Ageronia feronia* var. *mandragora* (Ménétriés) 1855:16. Nomen novum for *Nymphalis feronia* Godart [1824]. TL - Brazil, Minas Gerais. Syntypes - Probably in Leningrad (2 ♂ syntypes) [partim]
- Ageronia feronia farinulenta* Fruhstorfer, in Seitz, 1916:542. TL - Honduras, San Pedro Sula, 1 ♂ Mexico, 1 ♀ (both labelled types). Syntypes - BM 15-113 1 ♂, 1 ♀ (Examined) (Figs. 73-76).
- =*Peridromia feronia* Godman & Salvin, 1883:273 (partim, nec Linnaeus, 1758).
- =*Peridromia guatemalena* Godman & Salvin, 1883: 273 (partim, nec Linnaeus, 1758)
- =*Ageronia feronia nobilita* Fruhstorfer, in Seitz, 1916:543. TL - Panamá, Chiriquí, 1 ♂ Venezuela 1 ♀ (both labeled types). Syntypes - BM 15-113, 1 ♂, 1 ♀ (Examined) [Syn. nov.]
- =*Ageronia feronia insularis* Fruhstorfer, in Seitz, 1916:542. TL - Trinidad, Belmont. Syntypes - BM 15-113, 1 ♂ 1 ♀ (Examined) [Syn. nov.]
- =*Ageronia feronia mandragora* (Ménétriés) Fruhstorfer, in Seitz, 1916:542. TL - Espirito Santo. Syntypes - BM 15-115 1 ♂, 1 ♀ (types show Fruhstorfer to be author of *mandragora*, see text)! (Examined)

Description:

As in *H. feronia* except specific differences for *H. feronia farinulenta* listed in key to subspecies. Average wing length ♂ 35 mm, ♀ 38 mm.

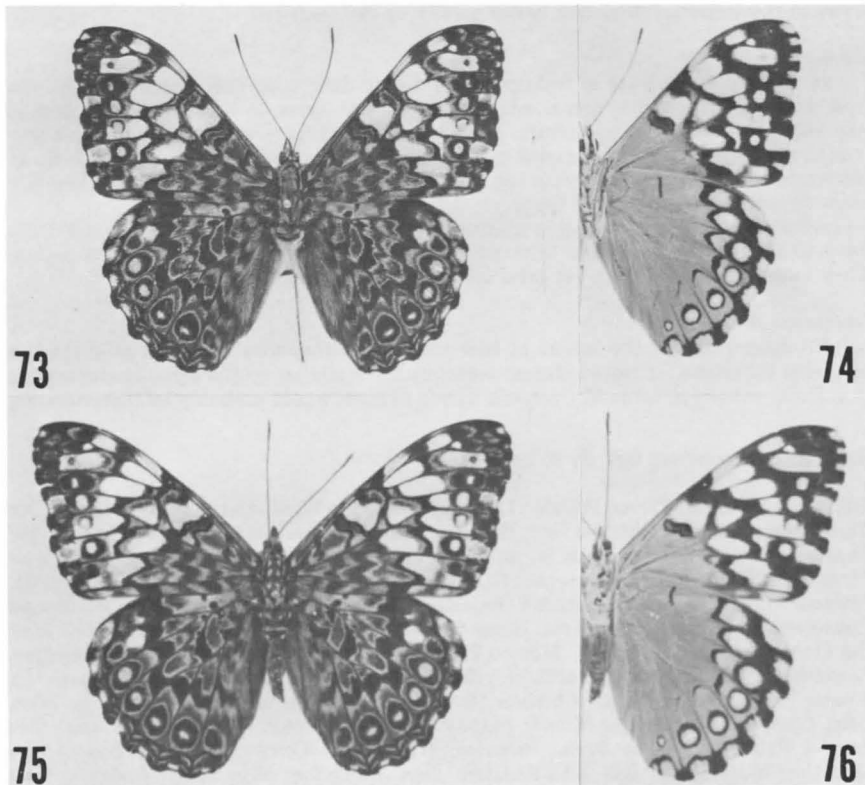
Distribution:

H. feronia farinulenta occurs from southern Texas and Mexico through Central America to the Orinoco River in Venezuela, and in Trinidad. It extends southward on the western slope of the Andes mountains in Colombia, Ecuador, and Peru. It extends into Central Bolivia, Paraguay and southeastern Brazil in the form of intergrades or perhaps a poorly defined subspecies. It is surprising that this intergradation appears to extend eastward from Iquitos, Peru down the Amazon River in the middle of the range

of *H. f. feronia*.

Taxonomy and Variation:

As mentioned previously the subspecies determinations are based on relatively poor characters subject to opinion. *Ageronia feronia nobilita* Fruhstorfer was described, "As *nobilita* I denominate those Venezuelan and Colombian specimens that are conspicuous for their more extensive and prominent white spotting on the forewings and exhibiting in both sexes an intensive and lighter blue spotting than *feronia* from Cayenne and the Amazon." I have examined the types of *nobilita* from Chiriquí, Panamá and Venezuela in the BM. These light specimens could have been selected from many areas of the range and are part of the normal variation of *H. feronia farinulenta*.



Figures 73-76. *Hamadryas feronia farinulenta* (Fruh.) ♂ dorsal (73) ventral (74) surfaces. HONDURAS, Cortés, San Pedro Sula. Syntype, *Ageronia feronia farinulenta* Fruh. (BM). ♀ dorsal (75) ventral (76) surfaces. "MEXICO." Syntype, *Ageronia feronia farinulenta* Fruh. (BM).

Ageronia feronia var. *mandragora* (Ménétriés) 1855 was described from Brazil. Fruhstorfer, in Seitz, (1916) stated, "The under surface is sometimes just as abundantly hued in yellow as in the Central American areal form. This deviation in the colouring was depicted already in 1857 [sic.] as *mandragora* Men." In the BM there is a specimen labeled: "TYPE/*mandragora* Fruhst./Espírito Santo, Brazil, ex. coll. Fruhstorfer." It would appear that Fruhstorfer planned to describe this as a new species (*nec* Ménétriés). This *mandragora* sensu Fruhstorfer specimen and description would appear to be the same as *farinulenta* and to be an extension of this subspecies. Since *mandragora* was described in 1855 it would cause *farinulenta* to become a synonym. However, I have not seen the type, or original description, only the listing of var. *mandragora* Ménétriés (1855). In S. Brazil there appears to be intergrades and often darker specimens described as *catablymata* Fruhstorfer. It is not presently possible without studying the type of *mandragora* Ménétriés to synonymize *farinulenta* from Mexico with *mandragora* from Brazil.

I have examined the types of *H. feronia insularis* Fruhstorfer from Belmont, Trinidad in the BM. This is a poorly defined smaller and frequently light blue form from Trinidad. This subspecies cannot be recognized since similar small specimens commonly occur in Venezuela and Colombia. The small size of these specimens reminds one of the quite small *H. februa icilia*, also described from Trinidad. It does not appear worthwhile to recognize a subspecies based mainly on reduced size.

Biology:

H. feronia farinulenta is widespread and abundant occurring in open forest, cut over and second growth areas, edges of forest, on trees in stream valleys and in populated areas on trees and roads. The adults are fast fliers and quickly fly from tree trunks and aggressively chase each other making loud crackling noise. They also fly at intruders and often alight on a person. They are attracted to decaying fruit and readily come to rotten banana baited traps.

Adults have been collected in all months of the year but are most abundant from June to September, especially in those areas with a rainy season during that period. They have been found from sea level to 1,200 m elevation.

Immature Stages:

No description of the larvae of this abundant subspecies has been published in available literature. It would almost certainly have similar or the same characters as the closely related or same *H. f. feronia*. The food plant would probably be *Dalechampia*.

Specimens Examined: 601 ♂, 257 ♀

UNITED STATES: *Texas*, Hidalgo Co. Loop 37, 10 km W. of Mission; Pharr; MEXICO: *Tamaulipas*, Rancho Pico del Oro; El Salto; Galeana; *San Luis Potosí*, Valles; El Sol; Tamazunchale 130 m; El Pujal 30 m; *Veracruz*, Fortín de las Flores; Córdoba; Juárez; Jicaltepec; Dos Amates; Tuxtepec; Catemaco; Nanchital; Jalapa; Tezonapa; Presidio; Mirador; Las Choapas; Minatitlán, Pajaritos; Capoaçang; Mundo Nuevo.; Chinameca; Coatepec; San Juan Evangelista; Santa Rosa; Motzorongo; Paso San Juan; San José del Carmen; *Distrito Federal*, Mexico City; *Oaxaca*, Chiltepec; Temascal; Palomares; Comaltepec 200 m; Sierra Juárez; Soyolapan; Tuxtepec; Jesús Carranza; *Tabasco*, La Venta; Tenosique; *Yucatán*, Chichén Itzá; *Guerrero*, Acahuizotla; Zihuatenejo; *Mexcala*; *Chiapas*, La Granja; Musté; Mapastepec; Bonampak; Corozal, Trinitaria; Dos Lagos; Palestina; Santa Rosa; Palenque; Tapachula; Comalpa; San Jerónimo; San Quintín; Motozintla; EL SALVADOR: *San Salvador*, Ilopango; *Usulután*, San Agustín; BELIZE, *Cayo*, Camp Sibún 200 m; *Toledo*, Rio Grande; Punta Gorda; *Corozal*, Corozal; *Stann Creek*, Middlesex; GUATEMALA: *El Petén*, Sayaxché; *Alta Verapaz*, Tamahú; *Santa Rosa*, Guazacapán; *Izabal*, Tenedores; Quiriguá; *Suchitepequez*, Variedades; *Escuintla*, Santo Tomás; HONDURAS: *Cortés*, Lago Yojoa; San Pedro Sula; *Atlántida*, La Ceiba; Montecristo; Tela; *Colón*, Trujillo; *Francisco Morazán*,

Tegucigalpa; NICARAGUA: *Comarca del Cabo*, San Ramón; *Jinotega*, Jinotega; *Zelaya*, Rio Wanks; *Rio San Juan*, Chontales; COSTA RICA: *Alajuela*, Grecia; San Mateo; Alajuela; Atenas; *Limón*, La Florida; Guápiles; Siquirres; Santa Clara; *San José*, Orotina; La Fuente; Puriscal; San Mateo; San José; Hac. El Rodeo; *Heredia*, Puerto Viejo; *Cartago*, Turrialba; *Puntarenas*, San Vito; Palmar Norte; Palmar Sur; Pasco Real; *Guanacaste*, Finca Taboga; PANAMÁ: *Chiriquí*, Cerro Galera de Chorchá; Santa Clara 1200 m; David; Santa Cruz; Río Tolé; *Bocas del Toro*, Río Teribe 200 m; *Panamá*, Arraiján; Cerro Campana; El Llano 330 m; Taboga Isl.; El Amanecer; *Canal Zone*, Los Ríos; Gamboa; Farfán; Barro Colorado; Cocoli; Albrook Field; Piña; Madden Forest; *Darién*, Puerto Indio; Caña 400 m; Bayano Dam; COLOMBIA: *Caldas*, Guamoco; *Meta*, Villavicencio; *Magdalena*, Minca 700 m; Santa Marta; *Santander*, Barrancabermeja; Bonda; La Lechera, La Borrascosa, Río Quiritá; VENEZUELA: *Trujillo*, Valera; *Distrito Federal*, Caracas, La Guaira; El Valle; *Miranda*, Santa Lucía 330 m; *Sucre*, Maraval; Cariacuito; *Carabobo*, San Esteban; *Bolívar*, Suapure; Cuidad Bolívar; *Delta Amacuro*, Tucupita; Barrancas; *Lara*, La Pastura; Barquisimeto 570 m; *Monagas*, Jusepín; TRINIDAD: *St. George*; *St. Ann's*; Hololo Mt. road; Tunapuna; Maracas Falls; Port of Spain; Carenage; ECUADOR: *Pichincha*, Estacion Río Palenque; Pichincha; Río Toachi; Alluriquin 620 m; *Bolívar*, Río La Chima; *Manabí*, Palmar; Imbabura; Hacienda Paramba; *Esmeraldas*; Tonchigue; *Macas*, Oriente, *Azuay*, Cuenca; *Guayas*, Nopales; *Los Ríos*, Hacienda Ave Maria; Río Cayápas; *Zamora*, Zamora; PERU: *Junín*, Río Chuchurras; Perené; Río Colorado, *Piura*; Morropón; *San Martín*, Jepelacio; *Loreto*, Morotta; Iquitos; BOLIVIA: *Santa Cruz*, Ichilo; Azuzaqui; BRAZIL: *Amazonas*, Maués.

Hamadryas guatemalena (Bates) 1864

Figs. 177, 191, 200

H. guatemalena occurs from southern Texas and northwestern Mexico to Costa Rica and probably in South America. It is possible that it may have had a wider distribution at one time, since there are specimens labeled Tefé, Brazil and Espirito Santo, Brazil.

Three subspecies are presently recognized, but the South American form is in some doubt. This species has been misidentified frequently with *H. feronia* especially in Central America.

Description:

Male. Forewing with R_1 & R_2 arising together or with a single stalk. Radial sector $r-m_2$ and the bases of m_2-m_3 and M_2 are inflated. m_2-m_3 joins the cubital stalk $\frac{1}{4}$ distance from junction of Cu_1 & M_3 to Cu_2 .

DFW with a mosaic pattern of grey, black and bluish spots and markings and a wavy red discal cross bar. DHW with mosaic pattern with large black doughnut-like ring with a concentric thin blue ring internally and externally, central area of ring brownish with some grey. VFW dark with white spots and markings and a wavy red medial discal bar. VHW with basal half dark buff to ochre, postmedian ocelli black rings with white center.

Male genitalia. Vinculum with prominent median posterior projection; gnathos arm broad and flattened, elbow of gnathos forming a right angle; dorsal surface of uncus with prominent hairs on about one half of length; saccus (2.6-3.0)2.80 mm; valve (2.8-3.0)2.87 mm; aedeagus curved (3.6-4.0)3.80 mm. Rami elongate (2.84-3.08)2.95 mm with flat spines only on distal one-third and on flattened expanded apex. Posterior lateral margin of sternite without flat spines ventral to rami.

Female. Similar but usually larger and more rounded.

Key to Subspecies of *H. guatemalena*

1a. DFW with median, postmedian and subapical rows of diagonal white

- maculae heavily dusted with dark scales, maculae often smaller; VFW with black or dark spaces between maculae usually wider; DHW with central part of ocelli usually brown; VHW variable in color but usually darker—dark buff to dark ochre. *marmorice*
- 1b. DFW with rows of diagonal white maculae, white or rarely with some dark scales, maculae usually larger; VFW with black or dark spaces between maculae usually comparatively narrower; DHW with central part of ocelli usually with some white; VHW variable in color, but usually lighter pale buff to ochre. 2
- 2a. DFW with rows of diagonal white maculae large, areas between narrower; VFW white marking in M_2 - M_3 may extend to margin with some black or dark interruption; DHW with central area of ocelli mainly white; VHW light yellowish buff (Brazil only). *elata*
- 2b. DFW with rows of diagonal white maculae comparatively smaller; VFW with black or dark areas between maculae wider than *elata*, VFW white marking in M_2 - M_3 usually with black bands; DHW with central area variable often with some white; VHW buff to ochre. *guatemalena*

Hamadryas guatemalena guatemalena (Bates) 1864

Figs. 77-80, 200

Ageronia guatemalena Bates, 1864:115. TL - Guatemala, Central valleys. Syntypes - BM Type RH 9261, 1 ♂ (Examined) Figs. 77 & 78).

=*Ageronia feronia* var. a. *guatemalena* (Bates) Kirby, 1871:215.

=*Ageronia guatemalena eupolema* Fruhstorfer, in Seitz, 1916:542. TL - Mexico, Yucatán. Type - "Type in Berlin Museum" stated in BM Coll. (in Staudinger Coll.) (Not in Berlin Museum Zoology according to H. J. Hannemann). [Syn. nov.].

=*Peridromia guatemalena* Godman & Salvin, 1883:273. (*partim, nec* Bates)

=*Peridromia feronia* Godman & Salvin, 1883:273 (*partim, nec* Linnaeus, 1758).

Description:

As in *H. guatemalena* except for characters listed for *H. g. guatemalena* in the key to subspecies. Average wing length ♂ 38 mm, ♀ 40 mm.

Distribution:

H. g. guatemalena (Bates) occurs from Yucatán to Costa Rica with the type locality in the central valleys of Guatemala.

Taxonomy and Variation:

I have studied a Bates type ♂ of *H. guatemalena* in the BM and it is comparable with series of males from Guatemala and Yucatán to Costa Rica. *H. guatemalena eupolema* is based on specimens with the upper forewings with white or light grey areas, and distal to the discal cell there are about five light spots and 2-3 subapical spots. These areas often become slightly lighter in the northeastern part of the range in the Yucatán peninsula but this is variable throughout the range and is not considered to be a valid subspecies. In the Chiapas area there is an intergrade zone with *H. guatemalena marmorice* Fruhstorfer.

Biology:

H. g. guatemalena occurs in forests, especially partially cut over areas, at forest edges, forest roads, in stream valleys and even on trees around houses in the country. They are readily attracted to fruit baits.

The adults alight on tree trunks with wings outspread. When disturbed they fly upward and alight higher on the tree trunk. They often fly aggressively at intruders and make a loud crackling sound when flying.

Adults have been collected throughout the year. They appear to be more common in July-October in the northern part of the range and from December-April, and July-September in the southern part of the range. They have been collected from sea level to over 1,000 m altitude.

Immature Stages:

The egg, all five instars of the larvae, the prepupa and pupa have been described in detail by Muysshondt & Muysshondt (1975b) from El Salvador. The sculptured eggs are laid singly and the larvae are solitary, slow moving, and passive. The species is heavily parasitized by tachinid flies during the larval stage.

Food Plants:

Dalechampia scandens (L)
In El Salvador

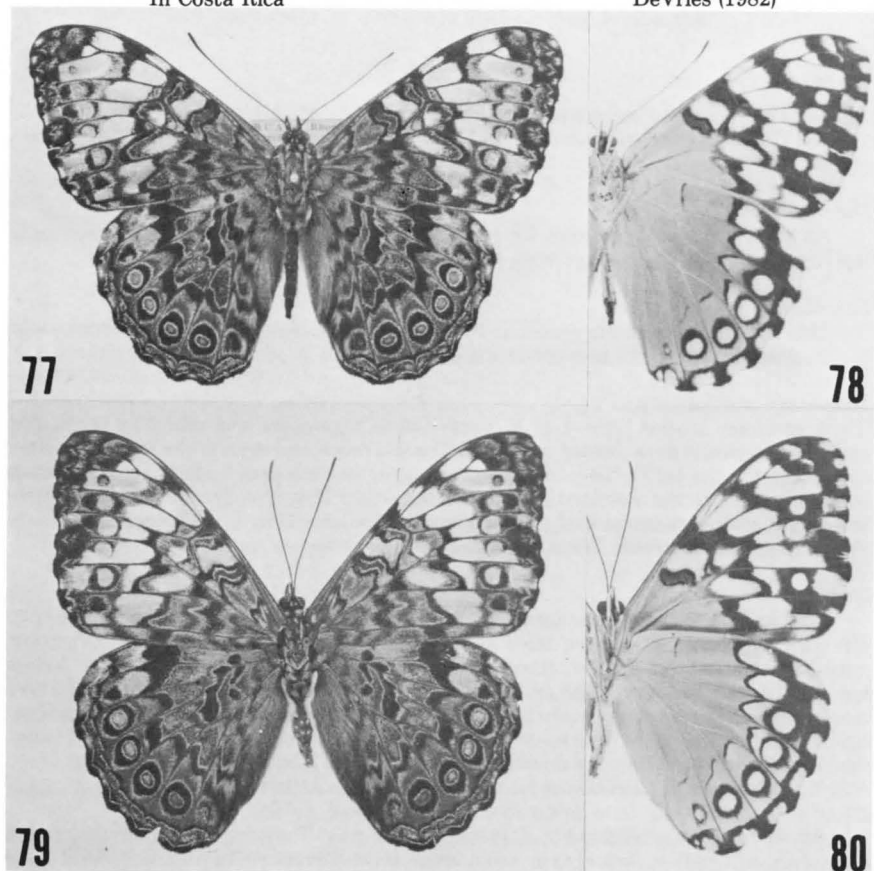
Euphorbiaceae

Muysshondt & Muysshondt (1975b)

Dalechampia scandens (L)
In Costa Rica

Euphorbiaceae

DeVries (1982)



Figures 77-80. *Hamadryas guatemalena guatemalena* (Bates). ♂ dorsal (77) ventral (78) surfaces. GUATEMALA, "Central Valleys." Syntype, *Ageronia guatemalena* Bates (BM). ♀ dorsal (79) ventral (80) surfaces. EL SALVADOR, *La Libertad*, La Libertad (AA).

Specimens Examined: 87 ♂ 50 ♀

MEXICO: *Yucatán*, Valladolid; Balancankeh; Chichén Itzá; Pisté; Mérida; Cabah; Holca; X-Can; Dolores Otero; Sacalúm; *Quintana Roo*, Bac Halal; Polyuc; *Campeche*, Xeuch; Campe; Campeche; *Chiapas*, Huixtla; San Quintín; Cerro Cimetepec; Las Delicias; GUATEMALA: *Alta Verapaz*, Tamahú; Polochic Valley; San Cristóbal; Tactic; *Baja Verapaz*, San Jerónimo; Chuacús; *Escuintla*, Monte Limón; Escuintla; *Guatemala*, Antigua; *El Petén*, El Progreso; Santa Amelia; *Santa Rosa*, Guazacapán; *Retalhuleu*, Retalhuleu; EL SALVADOR: *San Salvador*, San Salvador; Apopa; Santa Tecla 900 m; *La Libertad*; Quetzaltepeque 500 m; Zaragoza; *La Libertad*; *La Unión*, La Unión; Sierra Tomba, 1000 m; Chauhapa; *Santa Ana*, Santa Ana; HONDURAS: *Cortés*, San Pedro Sula; *Francisco Morazán*, Tegucigalpa; *Comayagua*, La Libertad; NICARAGUA: *Managua*, Managua; Granada; *Matagalpa*, Matagalpa; COSTA RICA: *Alajuela*, Atenas, Grecias; *Cartago*, Turrialba; *San José*, Orotina; 10 km from Cañas; *Guanacaste*, Finca Taboga; Parque Santa Rosa, *Heredia*, Puerto Viejo.

***Hamadryas guatemalena marmorice* (Fruhstorfer) 1916**

Figs. 81-84, 200

Ageronia guatemalena marmorice Fruhstorfer, in Seitz, 1916:542. TL - Mexico, Orizaba and Guadalajara. Syntypes - BM 15-116, 1 ♂, Orizaba, Mexico (Examined) Figs. 81 & 82).

Description:

As in *H. guatemalena* except for characters listed for *H. guatemalena marmorice* in the key to subspecies. Average wing length ♂ 40 mm, ♀ 42 mm.

Distribution:

This subspecies occurs in southern Texas and eastern Mexico, and from Sonora south to Chiapas, Mexico where intergradation occurs with *H. g. guatemalena*.

Taxonomy and Variation:

A specimen labeled type ♂ of *H. guatemalena marmorice* was examined in the BM and it is a typically dark dusted specimen. There is much variation in the amount of dark coloration. On the DFW there are areas with grey to dark grey usually heavily dusted with dark scales in the maculae distal to the discal cell. They are even darker in the northern part of the range in the west coastal areas in Sinaloa and in the east coastal region in Veracruz and Tamaulipas. Worn and older specimens appear lighter.

Biology:

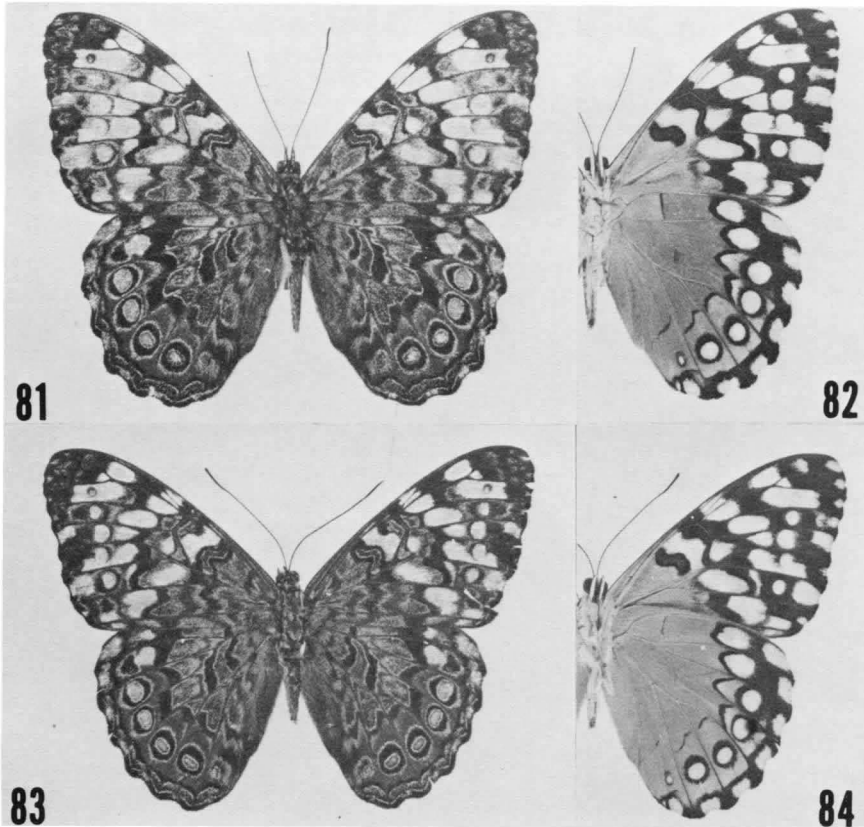
This subspecies occurs in light or cut over forests, at forest edges, forest roads, in stream valleys and on isolated trees especially mangos in agricultural areas. They are semi-domesticated and occur on trees in cities, at garbage dumps and at hog pens. Adults are readily attracted to rotting fruit and fruit baits. They usually fly upward on a tree trunk when disturbed. They make loud crackling sounds when flying at or with other butterflies or at an intruder. The author observed a female hovering with outstretched wings feeding on a yellow composite flower similar to *Inula* in Zihuatenejo, Mexico. This is the only known record of *Hamadryas* feeding on a flower in nature despite a posed picture of *H. amphinome* feeding on a flower (Sandved & Brewer, 1976).

Adults have been collected in all months of the year. They are most commonly found from July to October, but also in some areas from November to January. Adults are found from sea level to over 1,000 m elevation.

The immature stages and the host plants have not been reported for this subspecies, but they are probably similar to the nominate subspecies.

Specimens Examined: 133 ♂, 61 ♀

UNITED STATES: *Texas*, Hidalgo Co., Bentsen State Park; MEXICO: *Tamaulipas*, Ciudad Mante; Tampico, Rancho Pico de Oro; El Nacimiento, Río Frio; Altamira; 100 km S. Ciudad Victoria; 45 km N. of C. Victoria; Chamal; Encino; Gómez Farías; *Sonora*, Álamos; San José; *Sinaloa*, Mazatlán; 70 km NE Mazatlán; Rosario; Venado; *Nayarit*, Laguna Santa María del Oro 670 m; Mecatán; Singayta; Compostela; Tepic; Acaponeta; *Jalisco*, Guadalajara; Puerto Vallarta; *Colima*, Juárez; Madrid; Colima; *Michoacán*, Santelma; Coahuayana; *San Luis Potosí*, Tamazunchale; Quinta Chilla; Media Luna near Río Verde; El Naranjo; *Morelos*, Rancho Viejo; *Guerrero*, La Venta 100 m; El Treinta 220 m; Río Papagayo, Tierra Colorada; Iguala; Coyuca; Acapulco; El Playón; Zihuatenejo; Acahuizotla; Petatlán; *Veracruz*, Tezonapa; Orizaba; Córdoba; Catemaco; Dos Amates; Santa Rosa; Jalapa; Coatepec; Tuxtepec; Pureza; *Oaxaca*, Comaltepec; Candelaria; Soyolapán; Juárez; Sierra Juárez; Comaltepec; Tuxtepec; Chiltepec; Candelaria-Loxicha; Temascal; Salina Cruz X; *Chiapas*, Musté, Paraiso; Sayula; Pinolá; San Carlos; Ocozocuautila X; Mapastepec.



Figures 81-84. *Hamadryas guatemalena marmorice* (Fruh.). ♂ dorsal (81) ventral (82) surfaces. MEXICO, *Veracruz*, Orizaba. Syntype, *Ageronia guatemalena marmorice* Fruh. (BM). ♀ dorsal (83) ventral (84) surfaces. MEXICO, *Guerrero*, Petatlán (JC).

Hamadryas guatemalena elata (Fruhstorfer) 1907

Figs. 85-88, 200

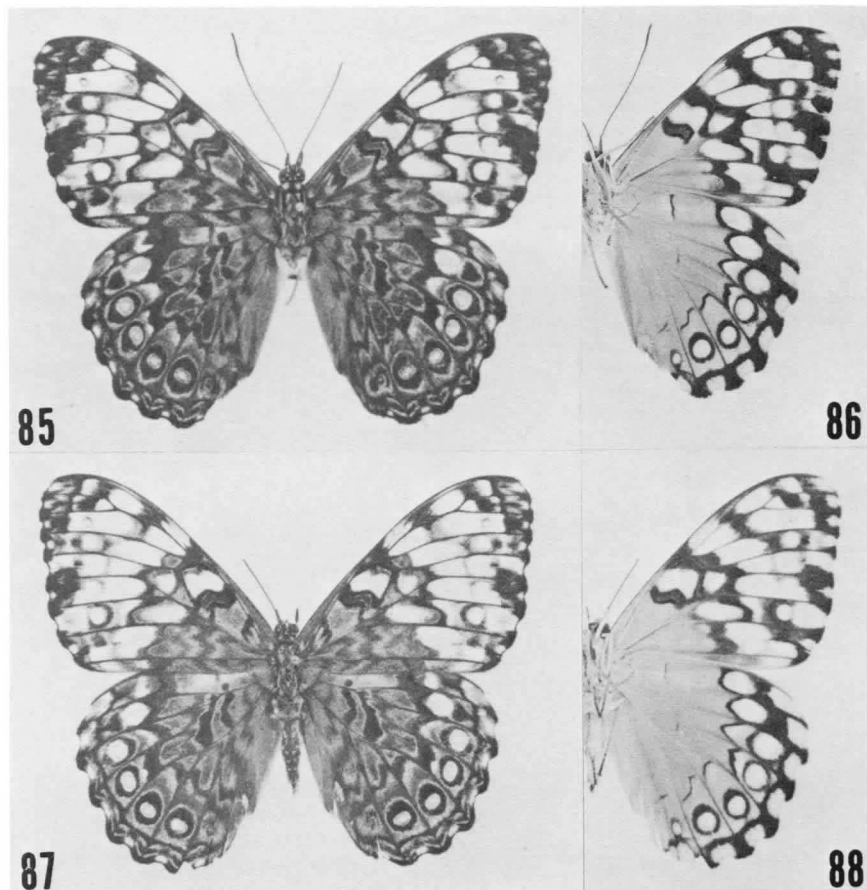
Ageronia guatemalena elata Fruhstorfer, 1907:16. also in Seitz, 1914, pl. 105d, and 1916:542. TL - Brazil, Espirito Santo. Syntypes - BM 1 ♂ & 2 ♀ Type series (Examined) (Figs. 85-88).

Description:

As in *H. guatemalena* except for the characters for *H. guatemalena elata* listed in the key to subspecies. Average wing length ♂ 38 mm, ♀ 38 mm.

Distribution:

Known only from Espirito Santo, Brazil and perhaps from Tefé, Brazil.



Figures 85-88. *Hamadryas guatemalena elata* (Fruh.) ♂ dorsal (85) ventral (86) surfaces. BRAZIL, *Espirito Santo*. Syntype *Ageronia guatemalena elata* Fruh. (BM). ♀ dorsal (87) ventral (88) surfaces. BRAZIL, *Espirito Santo*. Syntype *Ageronia guatemalena elata* Fruh. (BM).

Taxonomy and Variation:

H. guatemalena elata may be a relict subspecies in South America, perhaps in restricted habitats where it is very rare. It was described as, "whitish, instead of livid-colored apical part of the forewings. Under surface: the black spotting appears reduced whereby the white maculae gain in space and the yellowish colouring of the hindwings grow paler," (Fruhstorfer, in Seitz, 1916). It was described from Espírito Santo, Brazil, based on 1 ♂ and 2 ♀ collected by Julius Michaelis. A female was figured in Seitz (1914)5:pl. 105d. I have examined these types in the BM. They have yellowish buff on the VHF. However, the characters given in the key to subspecies are somewhat variable and three or four specimens are insufficient to determine the range of variability. I have also examined a male in the Carnegie Collection, from Tefé, Brazil (misidentified as *A. alicia*) which fits the description and compares well with the types. If the data on this rubbed specimen (collected by H. W. Bates in the E. T. Owen Coll. and a part of the Ehrmann collection) and the Espírito Santo specimens can be considered valid, this may be a valid subspecies of *guatemalena*. This subspecies needs to be verified with recent specimens with known valid data if it still exists.

Biology:

There is nothing known of the biology or life history of this rare and perhaps doubtful subspecies.

Specimens Examined: 2 ♂, 2 ♀

BRAZIL: *Espirito Santo*, Espírito Santo (Vila Velha), syntypes, 1 ♂, 2 ♀, BM; Amazonas, Tefé, 1 ♂ CM.

Hamadryas iphthime (Bates) 1864

Figs. 178, 190, 191, 201

H. iphthime Bates is a distinct, relatively uncommon species that has been misidentified probably more often than any other *Hamadryas*. It is distributed from central Texas to southern Brazil. It is apparently absent from most of the Amazon basin area except at Itaituba and the periphery, and has a distribution somewhat similar to *H. foranax*.

H. iphthime has been split into four or five taxonomic entities despite its relatively constant markings and coloration. Comparison of specimens in museum collections and field collecting in many countries has resulted in recognition of two well-defined subspecies with characteristics shown in the accompanying key.

Description:

Male. Forewing with R_1 & R_2 arising together or with a single stalk. Radial sector, $r-m_2$ and the bases of m_2-m_3 and M_2 are inflated. M_2-m_3 joins the cubital stalk $\frac{1}{4}$ to $\frac{1}{5}$ distance from junction of Cu_1 & M_3 to Cu_2 . DFW with mottled calico pattern of light blue, grey, white and black with much white in wide diagonal postmedian band. Median discal bar blue (and in *H. i. iphthime* reddish). DHW mottled as in DFW, submarginal ocelli with concentric rings, the thin outer blue, inner brown, another thin light blue with interior of black or dark brown, with a white central disc or lune. VFW with about three diagonal rows of whitish grey blotches, a dark tear-shaped median discal bar (red in *H. i. iphthime*); and a reddish-brown subapical area. VHW dark tan to ochre, a submarginal irregular reddish brown band; postmedian ocelli white inside of a black circle.

Male genitalia. Vinculum with prominent expanded median posterior projection; gnathos arm broad and flattened, elbow of gnathos forming a right angle; dorsal surface of uncus with a few sparse small hairs; saccus (2.48-2.92)2.8 mm, valve with dorsal median projection about $\frac{1}{2}$ - $\frac{2}{3}$ distance from base (2.24-2.86)2.44 mm; aedeagus (2.24-2.86)2.44 mm. Rami (2.40-3.76)3.08 mm with scattered flat spines from apex to base and

extending slightly to posterior lateral margin of tergite.

Female. Similar to male but usually larger and the markings and pattern may be more diffuse.

Key to Subspecies of *H. ipthime*

- 1a. DFW with discal cross bar with rufous red or copper color, usually surrounded by bluish; diagonal median and postmedian rows of maculae smaller more greyish and dusted with dark scales; bluish or brownish dark areas between maculae relatively broader; VFW with discal cross bar tear-shaped with red marking (red may be reduced or absent in S. Brazil, especially females); in Cu_2-2A white area completely divided into two maculae; VHW base color light or dark grey to buff, rarely dark buff. *iphthime*
- 1b. DFW with discal bar grey, blue and rarely with some brownish; prominent large white diagonal median and postmedian rows of maculae; bluish or brownish dark areas between maculae relatively narrow; VFW with discal cross bar, usually black or dark brown but without red tear-shaped marking; in Cu_2-2A white area in distal third usually not completely divided into two maculae; VHW buff to ochre color. *joannae*

Hamadryas ipthime ipthime (Bates) 1864 [Partim]

Figs. 89-92, 201

Ageronia ipthime Bates, 1864:116. TL - Colombia and Guatemala. Syntypes 2 ♂♂ (Examined) [Colombian specimen designated lectotype].

Ageronia ipthime gervasia Fruhstorfer, in Seitz, 1916:543. TL - Brazil, Rio Grande do Sul. Syntypes - BM 1 ♂ 1 ♀ (Examined) [Syn. nov.] (Figs. 89 & 90).

=*Ageronia ipthime aterina* Fruhstorfer, in Seitz, 1916:543. TL - Bolivia, Chimate. Syntypes - BM 15-117, 1 ♂ (Examined) [Syn. nov.] (Figs. 91 & 92).

=*Peridromia epinome* ssp. *lindmani* Bryk, 1953:115. TL - Brazil, Mato Grosso. Type - Stockholm, HT 1 ♂, Paratype 1 ♂ [Syn. nov.].

=*Ageronia* sp. ign. n. sp. Müller 1886:30-33. TL - Brazil, No locality. Type - Location unknown. (Probably a synonym, based on larvae and pupae only.)

Description:

As in *H. ipthime* except for characters for *H. i. ipthime* listed in the key to subspecies. Average wing length ♂ 34 mm, ♀ 38 mm.

Distribution:

H. i. ipthime occurs from the border of Costa Rica and Panamá to Guyana and around the periphery of the Amazon basin (except Itaituba) in Colombia, Peru, Bolivia and southern Brazil from Bahia to Rio Grande do Sul.

Taxonomy and Variation:

Ageronia ipthime Bates was described from specimens from Guatemala and Bogota, Colombia. Since the type description p. 116 mentions a "rufous streak" in the median cross bar of the discal cell of the forewing this applies only to the Colombian specimen. I have studied this specimen in the BM and designate it lectotype. The Guatemala specimen labeled "type" is not included as *H. i. ipthime* and belongs to an undescribed population from Central America and becomes a synonym of *H. i. joannae*.

The syntype ♂ and ♀ of *H. ipthime gervasia* from Rio Grande do Sul, Brazil in the BM were compared with specimens from Panamá and were not found to be separable. The ♂ has a typical red tear-shaped cross bar in the discal cell of the VFW. As noted in the key to subspecies, some specimens from south Brazil may have the red marking of the discal cross bar of the VFW reduced or missing, showing closer relation-

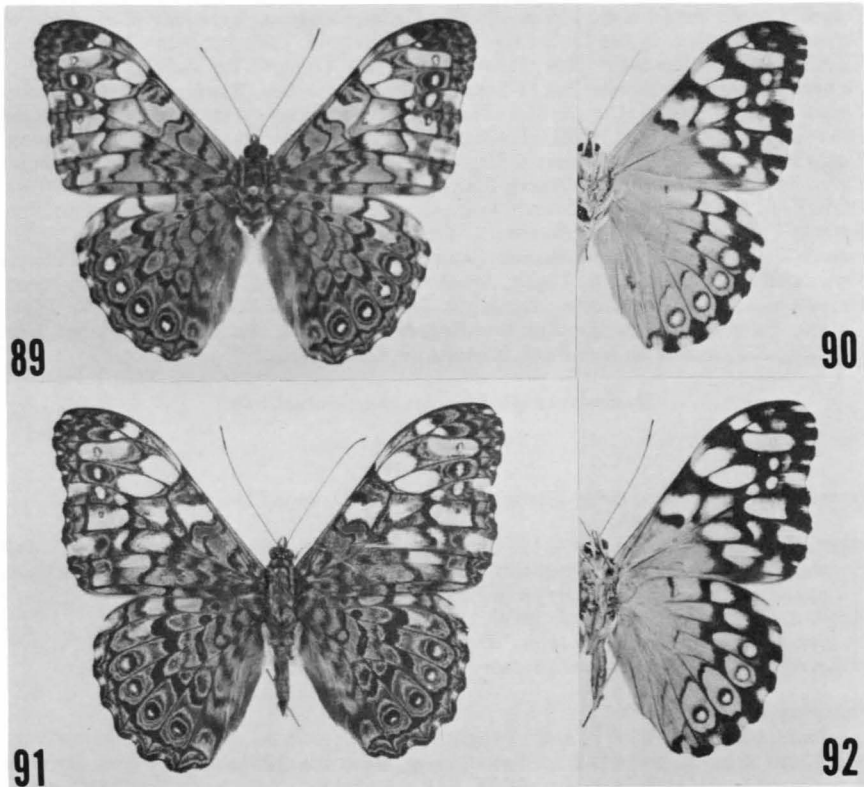
ship to *H. epinome* and *H. iphthime joannae*.

I have examined a syntype male in the BM of *Ageronia iphthime aternia* Fruhstorfer, in Seitz (1916). It was described as having "large white spots on forewings with deeper and darker bluish-grey places on the upper surface. Bolivia." This difference is not distinctive and the type and other Bolivian specimens are not separable from *H. i. iphthime*. *Ageronia sp. ign.* Müller (1886) was described from larvae and pupae and stated to be close to *A. epinome* Felder. *H. i. iphthime* is common in this Brazilian area and it fits the larval description by Mabilde (cited in Seitz, 1916). More rearing must be undertaken to positively identify these larvae. While the holotype of *Peridromia epinome lindmani* Bryk (1953) has not been examined, from translation of the original description it appears to be *H. i. iphthime*. Dr. Gerardo Lamas has photographed the holotype and states that it agrees with *H. i. iphthime* (Lamas, 1982).

Biology:

H. i. iphthime has been collected in openings and roads in deep tropical forest, semi-deciduous tropical forest, in partially cut over areas, and in fruit orchards. I have also collected it at Tingo Maria, Peru feeding on rotting chirimoya fruit and at Itaipu, Paraguay on a garbage dump. It has also been collected at an ultraviolet light.

Adults have been collected throughout the year and more commonly from May to



Figures 89-92. *Hamadryas iphthime iphthime*. (BATES). ♂ dorsal (89) ventral (90) surfaces. BRAZIL, Rio Grande do Sul. Syntype, *Ageronia iphthime gervasia* Fruh. (BM). ♂ dorsal (91) ventral (92) surfaces. BOLIVIA, La Paz, Chimate. Syntype, *Ageronia iphthime aternia* Fruh. (BM).

September. They occur from sea level to over 1,000 m elevation.

Immature Stages:

The egg, all five instars and the pupae have been described in detail from Brazil as *Ageronia sp. ign.* (n. sp.) by Müller (1886). The sculptured eggs are laid singly and the larvae are solitary. This is tentatively assigned to *H. i. iphthime* until more rearing is undertaken and the synonymy can be fully proven. Aiello (1982) reared the mature larvae and bred adults in Panamá.

Food Plant:

<i>Dalechampia sp.</i>	Euphorbiaceae	Costa Lima (1936)
<i>Dalechampia cissifolia</i> Poepp.	Euphorbiaceae	
Panamá		Aiello (1982)

Specimens Examined: 239 ♂, 75 ♀

COSTA RICA: *Puntarenas*, Golfito; PANAMÁ: *Chiriquí*, Cerro La Galera; Bugaba; *Bocas del Toro*, Rio Teribe; *Panamá*, Chepo; Cerro Jefe; Cerro Azul 700 m; Cerro Campana; Rio Bayano; *Canal Zone*, Gatún; Barro Colorado; Fort Kobbe; Lion Hill; Madden Forest; Cocoli; Piña Forest 200 m; *Darién*, Caña; *Veraguas*, Veraguas; COLOMBIA: *Boyacá*, Muzo; *Tolima*, Rio Chili; *Cundinamarca*, Bogotá; Canache; *Meta*, Villavicencio; VENEZUELA: *Carabobo*, San Esteban; Bolívar; Caicara; La Salvación; *Distrito Federal*, Caracas; *Miranda*, Santa Lucía; *Zúlia*, El Tucuco, Sierra de Perijá; *Sucre*, Patao; Güiria; GUYANA: *Berbice*, New River Triangle; Camp Jaguar; *Mazaruni-Potaro*, Essequibo River; PERU: *Loreto*, Iquitos; *Junín*, Satipo; Rio Perené; *Huánuco*, Tingo María; *San Martín*, Lamas & Urcopata; Jepelacio; Rioja; Juanjui; Rio Huallaga; *Puno*, Rio Huacamayo, La Unión; *Madre de Dios*, Boca Rio de la Torre, 300 m; BOLIVIA: *Santa Cruz*, Rio Surutú; Portachuelo; Buenavista; Prov. del Sara; *La Paz*, Sorata; Chimate; BRAZIL: *Rondônia*, Jarú; *Santa Catarina*; St. Catherines"; Blumenau; *Rio de Janeiro*, Rio de Janeiro; Santo Antônio dos Brotos; Jacarepagua, 1000 m; Teresópolis; *São Paulo*, São Paulo; Araçatuba; Anhangai; *Espírito Santo*, Linhares; Baixo Guandú; *Bahia*, Bahia; Itamarajú; Itanhem; *Minas Gerais*, Cachimbo; *Mato Grosso*, Fazenda Araputanga; Barra do Bugres to Tangará; São Vicente; Nioaque; Diamantino; *Rio Grande do Sul*; *Pará*, Itaitube on Rio Tapajós.

***Hamadryas iphthime joannae* [Subsp. nov.]**

Figs. 93-96, 201

Hamadryas iphthime joannae Jenkins. TL - Mexico, Oaxaca, Chiltepec. Types - 1 ♂ HT, 7 ♂ & 5 ♀ paratypes.

Ageronia iphthime Bates, 1864:116 [in partim]. TL - Guatemala, Polochic Valley and Bogotá, Colombia. Syntypes BM Rh. 9262, 15-118, 2 ♂ ♂ (Examined) [Colombian specimen designated lectotype of *H. i. iphthime*].

Ageronia iphthime (Bates) Boisduval, 1870:26 [*Lapsus calami*].

=*Ageronia feronia* var. b. *iphthime* (Bates) Kirby 1871:215.

=*Ageronia iphthime iphthime* (Bates) Fruhstorfer, in Seitz, 1916:543 [Stat. rev.]

Description:

Male. DFW with R_1 & R_2 arising together or with a single stalk. Radial sector, $r-m_2$ and bases of m_2-m_3 and M_2 are inflated. m_2-m_3 joins the cubital stalk $\frac{1}{4}$ to $\frac{1}{3}$ distance from juncture of Cu_1 & M_3 to Cu_2 . DFW with mottled calico pattern of light blue, grey, white and black with much white in median and wide diagonal postmedian bands and subapical white maculae. Median discal bar grey, blue or rarely with some brownish but not rufous red or copper color. Bluish or brownish dark areas or bands between white maculae relatively narrow. VFW with discal cross bar black or dark brown, but never

with red tear-shaped marking. In Cu₂-2A, white area usually not completely divided into two maculae. VHW buff to ochre base color, average wing length 34 mm.

Male genitalia. As in *H. iphthime*.

Female. Similar to male but usually somewhat larger and the markings and pattern may be more diffuse. Average wing length 36 mm.

Described from seven male and six female specimens collected by D. and J. Jenkins.

HOLOTYPE ♂: MEXICO, *Oaxaca*, Chiltepec, Aug. 1977 (JC);

PARATYPES: MEXICO, *Oaxaca*, Chiltepec, 2 ♂ 2 ♀ Jun. Aug. 1977 (JC);

Temascal, 3 ♂ 2 ♀ Aug. 1977 (JC; Tuxtepec to Palomares km 150, 2 ♀ Aug. 1977 (JC); *Veracruz*, 30 km SW Tuxpan, 1 ♂ Nov. 1975 (JC).

Deposition of type material: Holotype ♂, 2 ♂ and 2 ♀ paratypes deposited in the Allyn Museum; 1 ♂ 1 ♀ paratypes in the British Museum, London, and 3 ♂ and 3 ♀ in the Jenkins Collection, Sarasota, Florida.

Distribution:

H. iphthime joannae occurs from southern Texas to southern Costa Rica. The northernmost record of Burnet Co., Texas is based on a nearly perfect male examined by the author from the Wm. C. Wood Coll. in the AM collection. It was taken in August and is surely a migrant since the nearest records are at Tamazunchale and Tuxpan, Mexico, about 1,000 km south. A specimen of *H. i. iphthime* labeled "Texas or N.M." in the Holland collection was misidentified as *A. ferox* (CM). There is some intergradation with *H. i. iphthime* in southern Costa Rica and in northern Panamá.



Figures 93-96. *Hamadryas iphthime joannae* Jenkins. ♂ dorsal (93) ventral (94) surfaces. MEXICO, *Oaxaca*, Chiltepec. Holotype (AA). ♀ dorsal (95) ventral (96) surfaces. MEXICO, *Oaxaca*, Temascal. Paratype (JC).

Taxonomy and Variation:

The male syntypes of *Ageronia iphthime* described by Bates were examined in the Godman and Salvin collection in the BM. They are from Bogotá, Colombia and Polochic Valley, Guatemala. They belong to two distinct subspecies. The original description states that they are from Guatemala and New Granada (Colombia). The type description, p. 116, clearly states "there is a rufous streak and large dingy-white spot within the cell." The rufous red in the median cross bar of the discal cell occurs only in the specimens from Colombia. This is typical of the South American population extending to N. Panamá. I designate a male from Bogotá, Colombia in the Godman and Salvin Collection as lectotype of *H. iphthime iphthime* Bates. It also has a red tear-shaped discal cross bar on the VFW and all characters listed in the subspecies key for *H. i. iphthime*. The specimen from Guatemala without a rufous cross bar is from an undescribed subspecies from Texas to Costa Rica. Godman and Salvin (1883) p. 224 ascribe *iphthime* Bates to "Colombia to the valley of the Upper Amazon, where Mr. E. Bartlett found it on the Ucayali," cited from Bates (1864). Also in three localities in Panamá and to Mexico and Guatemala. Godman and Salvin (1883) also state that Mr. Bates described the species from their Guatemala specimens, but the original description includes both Guatemala and Colombia.

The name *Ageronia iphime* was used by Boisduval (1870), but since he attributed this to Bates, it is a misspelling of *iphthime* Bates.

Biology:

H. iphthime joannae has been collected in openings and roads in heavy tropical forest, in openings in cut over semi-deciduous tropical forest and in stream valley forests. I have collected them feeding on rotting fruit (decaying mamey) and at fruit baits. It is not as common as *H. i. iphthime* and is relatively restricted in occurrence, from sea level to 1,150 m in altitude.

It has been collected during the wet season from May to November, being more common during July and August.

The immature stages and food plants have not been reported.

This subspecies is named for my wife Joanne F. Jenkins who collected part of the type series and who has contributed greatly in studying *Hamadryas* in the field.

Specimens Examined: 104 ♂, 44 ♀

UNITED STATES: *Texas*, Burnet Co.; "Texas or New Mexico"; MEXICO: *Veracruz*, Jalapa; *Fórtín de las Flores*; 30 km s.w. Tuxpan; Ojo del Agua; Mirador; Catemaco; Misantla; Cenocintepec; Dos Amates; Presidio; Rinconada; Los Tuxtlas; Tezonapa; Orizaba; El Vigía; Tierra Blanca; Atoyac; Córdoba; Zongolica; *San Luis Potosí*, El Sol, Tamazunchale; *Tabasco*, No locality; *Puebla*, Puebla; *Guerrero*, No locality; *Oaxaca*, Chiltepec; La Esperanza; Temascal; Palomares; Comaltepec 200 m; Juárez; Tuxtepec; *Chiapas*, San Carlos; Mapastepec; Musté; San Jerónimo; Ocozocuahtla, Bonampak; Yaxchilan; Malpaso; *Quintana Roo*, X-Can; GUATEMALA: *Alta Verapaz*, Valle del Río Polochic; Choctún; *Baja Verapaz*, Chejel; *Escuintla*, Santo Tomás; *Izabal*, Cayuga; Quiriguá Viejo; BELIZE: *Stann Creek*, Middlesex; *Cayo District*, Camp Sibún; W. Belize; HONDURAS: *Francisco Morazán*, Tegucigalpa; *Cortés*, San Pedro Sula; El Jaral; COSTA RICA: *Puntarenas*, San Vito 1,150 m; Palmar Norte; *Limón*, Bribri.

Hamadryas epinome (Felder & Felder) [1867]

Figs. 97-100, 179, 192, 202

Ageronia epinome Felder & Felder [1867]:3:409. TL - Brazil, Santa Catarina. Syntype - "Museo Berolinensi et Holmiensi" (Stockholm, Not in BM or Berlin Museum Zoology).

=*Ageronia feronia* var. *C. epinome* (Felder) Kirby, 1871:216.

=*Ageronia fallax* Staudinger [1886]:127. TL - Brazil, São Paulo; Rio de Janeiro; Santa Catarina, Blumenau. Syntypes - Berlin Museum Zoology, K40, 4 ♂ and 1 ♀ (according to H. J. Hannemann).

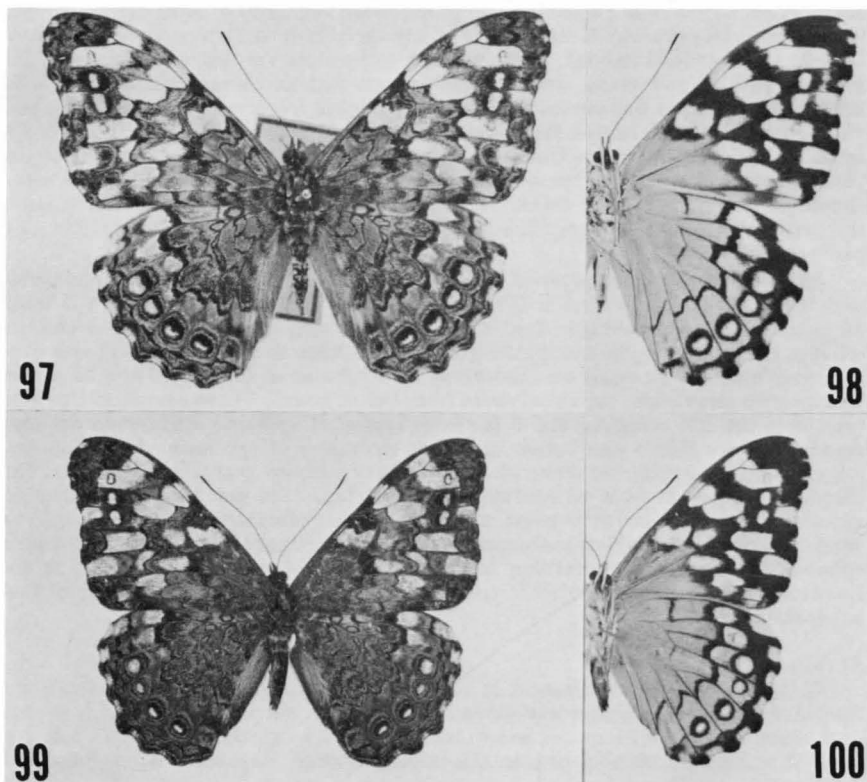
=*Ageronia epinome florentia* Fruhstorfer, in Seitz, 1916:543. TL - Brazil, Bahia. Syntypes - BM 15-118, 1 ♂ (Examined) [Syn. nov.] (Figs. 97 & 98).

=*Peridromia epinome argentina* Bryk, 1953:115. TL - Argentina, Posadas. Syntypes - Stockholm HT 1 ♀, Syntype series, 4 ♂ 1 ♀ [Syn. nov.].

Description:

Male. Forewing with R_1 & R_2 arising together or with a single stalk. Radial sector, $r-m_2$ and the bases of m_2-m_3 and M_2 are inflated. m_2-m_3 joins the cubital stalk $\frac{1}{4}$ distance from junction of Cu_1 & M_3 to Cu_2 . DFW similar to *H. iphthime*, pattern is more finely sculptured, and discal cross bar is copper-colored and extended distally into a v-shaped marking. DHW similar to *H. iphthime* but postmedian ocelli are baso-distally compressed and have broad black basal interior with a smaller white distal lune. VFW with grey or buff basal third, the remainder black with large whitish maculae in three diagonal irregular rows, discal cross bar black with no red tear-shape. VHW basal half grey or buff with brown and black marking, ocelli black rings with thickened basal ring. Average wing length 35 mm.

Male genitalia. Vinculum with prominent expanded median posterior projection;



Figures 97-100. *Hamadryas epinome* (Felder & Felder). ♂ dorsal (97) ventral (98) surfaces. BRAZIL, "Bahia". Syntype, *Ageronia epinome florentia* Fruh. (BM). ♀ dorsal (99) ventral (100) surfaces. ARGENTINA, Corrientes, Ituzaingó (JC).

gnathos arm broad and flattened, elbow of gnathos forming a right angle; dorsal surface of uncus with a few small or sparse hairs to barren; saccus (2.72-2.80)2.76 mm; valve with dorsal median enlargement about $\frac{1}{4}$ of length from base (2.32-2.48)2.36 mm; aedeagus (3.76-3.80)3.78 mm. Rami (2.32-2.60)2.46 mm with scattered flat spines from apex to base and extending about half way down the lateral posterior margin of the sternite. The apical spines are elongate and the basal spines are shorter.

Female. Similar to male but DFW in some females is heavily patterned with a very dark longitudinal central row of dark markings; other females have much less pattern. Average wing length 36 mm.

Distribution:

H. epinome is a species apparently restricted to northern Argentina, eastern and southern Brazil, Paraguay, Bolivia, Peru and probably Uruguay. Two ♂ specimens from San Pedro Sula, Honduras, 1 ♂ from Port of Spain, Trinidad, 1 ♂ from Mexico, and 1 ♂ from Chiriquí, Panamá would appear to be errors in locality labels. However, it cannot be ruled out that the species may formerly have been more widespread geographically, especially since it probably occurs in two isolated localities in Peru.

Taxonomy and Variation:

H. epinome is distinct from *H. i. ipthime* Fruhstorfer which occurs in much of the same area in S. Brazil, but there is a tendency toward similarity of some characters, but without complete overlap. *H. epinome* is highly variable in pattern and coloration from the same locality and habitat. There appears to be more very dark specimens in the western part of the range than in the eastern and northern part, but no valid subspecific variation was observed. There is a series of five large very dark males and two lighter males collected in February and July from Salta, Argentina in the AA collection, with dark specimens from other parts of the range collected throughout the year. It is unknown whether these dark forms are seasonal. The variation in *H. epinome* should be studied in greater detail. Study of 267 specimens available did not support the separation of any geographical subspecies, but indicates great variability and perhaps distinct forms.

Subspecies have been proposed such as *Ageronia epinome fallax* Staudinger (1886) with more brownish-grey from S. Brazil and Paraguay. I have examined two ♀♀ labeled *fallax* from the Staudinger Coll. in the CM collection. One is *H. epinome* and the other is *H. i. ipthime*. Hayward (1964) designated *fallax* as a synonym of *H. epinome*. *Ageronia epinome florentia* was described by Fruhstorfer, in Seitz (1916) as a subspecies with large white subapical spots from Bahia, Brazil. I have examined this syntype ♂ in the BM collection and it is nearly typical *H. epinome*. *Peridromia epinome argentina* Bryk (1953) was based on darker coloration of specimens from Posadas, Argentina. I have collected series of *H. epinome* across the river from Posadas at Encarnación, Paraguay, and at nearby Ituzaingó, Argentina and they are typical *H. epinome*. None of these forms merit subspecific status since they can all be found in a single population at one time and occur throughout the range of the species. *Peridromia epinome lindmani* Bryk according to translation of the original description is not *epinome* but is a synonym of *H. i. ipthime* and is discussed as a synonym of that subspecies.

Biology:

H. epinome is fairly common in some localities and occurs in semi-deciduous forests, in riverine gallery forests, along forest borders, woodland paths and in grown-over areas. In the southernmost known locality at Salta Grande, Argentina I collected males in rather open eucalyptus plantations. At Ituzaingó, Argentina and at Itaipú and Encarnación, Paraguay, I collected adults in riverine-gallery forests with *H. f. feronia*. They occupied darker more heavily forested areas than *feronia* and were not aggressive in flight, even remaining hidden in dense undergrowth. They sometimes make crackling noise when flying.

The adults have been collected throughout the year including in December and January in midsummer in the extreme southern part of its range. They have been collected from sea level to over 1,000 m in elevation.

Immature Stages:

The egg, all five instars of larvae including three different forms of the fifth instar, and the pupae have been described in detail in Brazil by d'Almeida (1922).

The egg, all five instars, and the pupae have been studied in Brazil by Müller (1886) who stated that they are almost exactly the same as *Ageronia* sp. *ign.* (n. sp.) which he described. (This is very probably *H. i. iphthime.*) The only real difference between the two taxa is that in *H. epinome* dorsal spines are missing on larval segments A2-A8, but with white warts or protuberances on segments A2, and the pupal horns are also somewhat shorter.

Food Plants:

<i>Dalechampia</i> spp. In Brazil	Euphorbiaceae	Müller (1886)
<i>Dalechampia triphylla</i> Lam. In Brazil	Euphorbiaceae	d'Almeida (1922) Costa Lima (1936)
<i>Dalechampia ficifolia</i> Lam. In Brazil	Euphorbiaceae	Costa Lima (1936)
<i>Dalechampia stipulacea</i> Mull. In Brazil	Euphorbiaceae	Costa Lima (1936)
<i>Inga affinis</i> D.C. In Brazil	Leguminosae	Biezanko (1949)

The records by Costa Lima (1936) are probably based on the studies by d'Almeida (1922). The record on *Inga* is probably an error in determination.

Specimens Examined: 210 ♂, 57 ♀

MEXICO: No specific locality (Locality probably in error);

HONDURAS: *Cortés*, San Pedro Sula (Locality probably in error);

PANAMA: *Chiriquí* (Locality probably in error);

TRINIDAD: *St. George*, Port of Spain (Locality probably in error);

PERU: *Junín*, Chanchamayo; *San Martín*, Tarapoto; BOLIVIA: *Santa Cruz*, Bueyes, Province del Sara; "Bolivia"; PARAGUAY: *Guairá*, Pedro Juan Caballero; Villarrica; Colonia Independencia; *Caaguazú*, San José; *Caaguazú*; *Asunción*, Trinidad; *Itapua*, Encarnación; *Alto Paraná*, Tacurupucú; *Central*, Patiño Cué; *Hernandarias*, Itaipú; *Arroyos y Esteros*, Aregua; *Paraguari*, Sapucay; *San Pedro*, Rio Jejuy; *Guairá*, Villarica; ARGENTINA: *Salta*, Arundel; *Agua Blanca*, Vespucio; *Misiones*, Santa Ana; *Puerto Bemberg*; *Panambi*; "Misiones", *Corrientes*, Ituzaingó; *Entre Rios*, Concordia; *Salto Grande*; "Bemberg Mts."; BRAZIL: *Goiás*, Goiás; *Bahia*, Bahia, *Mato Grosso*, Corumbá; *Minas Gerais*, Passa Quatro, Sul de Minas; Poços de Caldas; Belo Horizonte; *Diamantina*; *Paraná*, Foz de Iguazu; *Cauna*; *Curitiba*; *Castro*; *Londrina*; *Ponta Grossa*; *Espírito Santo*, Baixo Guandú; *Santa Leopoldina*; *São Paulo*, Santos, *Araçatuba*; *Araras*; *Itaquaquecetuba*; *São Paulo*; *Anhangai*; *Rio de Janeiro*, Rio de Janeiro; *Guanabara*, Leblon; *Nova Friburgo*; *Teresópolis*; *Tijuca*; *Petrópolis*; *Santa Catarina*; *Blumenau*; "Santa Catarina" *Nova Teutônia*; *Maçaranduba*; *Rio Grande do Sul*, *Santa Rosa*; *Pelotas* X.

Hamadryas fornax (Hübner) [1823]

Figs. 180, 192, 203

H. fornax is a distinctive and relatively uncommon species that occurs from Mexico to Argentina. It occurs in the periphery but is absent from the main Amazon and Orinoco basins. This unusual distribution is unique in *Hamadryas* and no explanation is known.

It has been split into two poorly distinguishable subspecies by Fruhstorfer, in Seitz (1916) who states that *Ageronia fornax fornacalia* "is larger in the habitus, the discal spots of the forewings more extensive, the hindwings darker than in *fornax*." Examination of the type specimens of *H. fornax fornacalia* in the BM and all available specimens do not confirm the characters stated by Fruhstorfer. A valid character for separation of the subspecies is that *H. fornax fornacalia* has a dark yellowish tan to brownish mustard or ochre color in the proximal area of the discal cell to the red median cross bar on the VFW. This was noted for 90% of Mexican and Central American specimens by F. M. Brown (unpub. mss). In *H. f. fornax* this area is usually white or greyish white, rarely a pale yellowish tan. There is an intergrade area in Venezuela and Colombia.

Description:

Male. Forewing with R_1 & R_2 arising together or with a single stalk. Radial sector $r-m_2$ and the bases of m_2-m_3 are inflated. m_2-m_3 joins the cubital stalk $\frac{1}{5}$ distance from junction of Cu_1 & M_3 to Cu_2 . DFW with marked mosaic pattern of black, blue, brown with a broad median and postmedian diagonal area of white and grey markings. Discal median band black, red and blue. DHW with similar mosaic pattern, postmedian ocelli blue tear-shaped with brown interior and central eye of black proximally and light blue or white distally. VFW blackish brown with three diagonal rows of white markings and a red median discal bar. VHW dark mustard with black and white margin. Two larger ocelli present from R_s to M_2 and three small submarginal ocelli.

Male genitalia. Vinculum with expanded median posterior projection; gnathos arm broad and flattened; elbow of gnathos forming a right angle; uncus barren without hairs; saccus (3.16-3.6)3.44; valve with lip at crista (2.56-2.72)2.64 mm; aedeagus curved (4.20-4.64)4.50 mm. Rami elongate (2.64-2.96)2.80 mm with row of flat spines along entire length. Posterior lateral margin of sternite ventral to rami without flat spines.

Female. Similar to male, but is sometimes somewhat larger and the forewings more rounded.

Key to Subspecies of *H. fornax*

- 1a. VFW with proximal area of discal cell to median red cross bar orange-mustard or orange ochre to dark yellowish tan; VHW with mustard color in M_1-M_2 between the postmedian small or inconspicuous "V" and the circular submedian ocellus. *fornacalia*
- 1b. VFW with proximal area of discal cell to median cross bar white or greyish white, rarely pale yellowish tan; VHW with white or grey in M_1-M_2 between the postmedian prominent "V" and the circular submedian ocellus (this may be mustard color or with small amount of white in the intergrade area in Col. and Ven., and also in S. Brazil and N. Argentina). *fornax*

***Hamadryas fornax fornax* (Hübner) [1823]**

Figs. 101-104, 203

Ageronia fornax Hübner [1823]:2pl. [40] figs. 1 & 2. TL - Not stated. Type - probably lost.

Description:

As in *H. fornax* except for characters listed for *H. f. fornax* in the key to subspecies. Average wing length ♂ 36 mm, ♀ 37 mm.

Distribution:

This subspecies occurs on the periphery of the Orinoco and Amazon basins from Venezuela to Colombia, Ecuador, Peru, Bolivia, N. Argentina, Paraguay and S. Brazil.

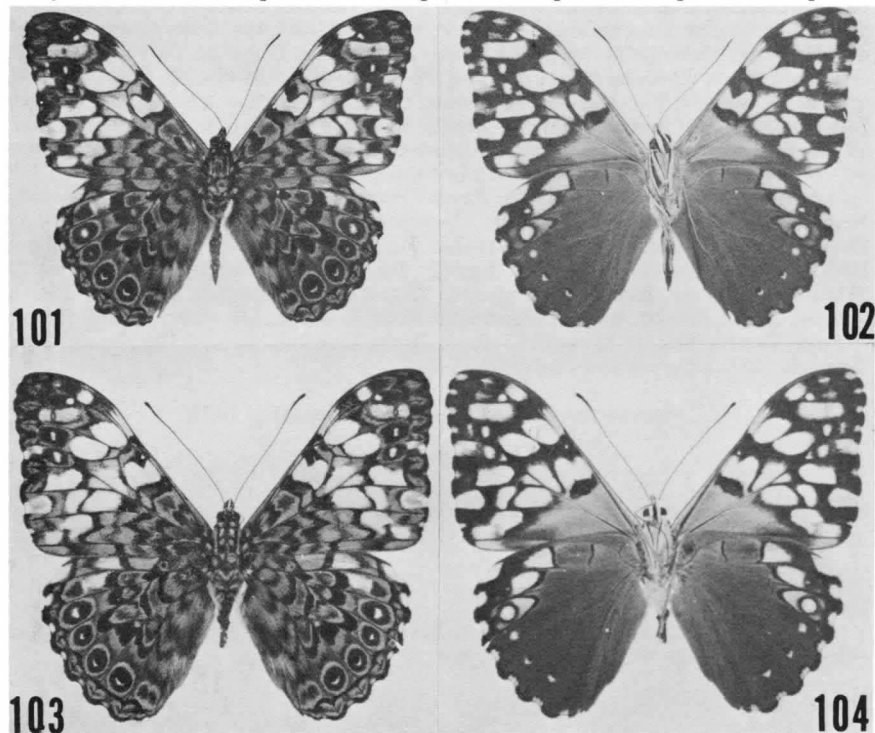
Taxonomy and Variation:

There is little variability except for normal dark coloration in some specimens, which may occur in any area.

Biology:

H. f. fornax is relatively uncommon and is restricted to sporadic localities. It is most usually found on tree trunks in forested river valleys and sometimes on trees left standing in cut over areas such as banana plantations. The author also collected it on isolated tree trunks in open grassy fields near Caracas, Venezuela and in a heavily populated stream valley in Ituzaingó, Argentina. The adults are fast flying and somewhat aggressive and rather difficult to catch. They are observed chasing each other and are often heard making crackling noises.

Many specimens of *H. fornax* with torn or missing pieces of wing have been observed in collections. The yellow mustard color underwing may attract lizards or other predators when they are resting, since they wave the wing on rare occasions and show this colored area. Triangular notches probably due to bird beaks are rarely found in the wings. Another possible reason for finding damaged adults in collections is since it is fairly uncommon, most specimens are kept and not replaced with perfect examples.



Figures 101-104. *Hamadryas fornax fornax* (Hübner). ♂ dorsal (101) ventral (102) surfaces. PERU, Huanúco, Tingo María (JC), ♀ dorsal (103) ventral (104) surfaces. PERU, Huanúco, Tingo María (JC).

Specimens have been collected throughout the year but in the southern part of the range from Bolivia to Argentina and Brazil they are most common in summer from October to May. In the northern part of the range in Colombia to Peru they were more often found in April to July. They have been collected from sea level to 1800 m in elevation.

Immature Stages:

The egg, all five instars and the pupae have been described in detail by Müller (1886). He states that the females deposit the sculptured eggs in a string, one on top of each other, with up to 10 eggs per string. The larvae have gregarious habits. The pupae are dimorphic, there are both light and dark forms.

Host Plants:

<i>Dalechampia</i> spp.	Euphorbiaceae	
In Brazil		d'Almeida (1922)
<i>Dalechampia</i> spp.	Euphorbiaceae	
In Brazil		Costa Lima (1936)

Specimens Examined: 197 ♂, 18 ♀

VENEZUELA: *Aragua*, Portachuelo X, 1100 m; *Táchira*, La Grita, 1200 m; ECUADOR: *Morona-Santiago*, Macas, 1,070 m; Oriente, 1,200 m; Río Upano; *Chimborazo*, Chimbo; Riobamba; *El Oro*, Piñas (Pires) 1,000 m; *Manabí*, Palmar; *Zamora-Chinchipe*, Zumba; *Tungurahua*, La Merced; Baños; PERU: *Ayacucho*, Ayacucho; Candalosa; *Cuzco*, Marcapata; Cosñipata Valley; *Puno*, Santo Domingo, Carabaya 1500 m; Inambari; *Piura*, Ayabaca Mts.; *Huánuco*, Tingo María; *Junín*, Shanki, Chanchamayo; Satipo; La Merced; San Ramon; *Amazonas*, Chachapoyas; *San Martín*, Moyobamba; Río Huallaga; San Luis de Shuaro; Jepelacio; *Pasco*, Oxapampa; Pozuzo; *Tumbes*, Puesto Campo Verde, 700 m; Cajamarca, Jaén 800 m; San Ignacio, 1,100-1,300 m; Jaén-La Corona 750-1,700 m; ARGENTINA: *Salta*, Serranía de las Pavas; Agua Blanca 450 m; *Corrientes*, Ituzaingó; BOLIVIA: *Santa Cruz*, Río Surutú; Province del Sara; Río Negro, Calidad; Buenavista; Bueyes; *Cochabamba*, Yungas del Espíritu Santo; El Palmar; Cochabamba; Charaplaya; *La Paz*, Mapiiri; Chulumani; Apolobamba; PARAGUAY: *Central*, Asunción; *Itapúa*; *Encarnación*; Encarnación, Sierra de Trinidad; *Paraguarí*, Sapucay; *Caaguazú*, Yhú; *Guairá*, Villarrica; BRAZIL: *Rio de Janeiro*, Rio de Janeiro; Itatiaia; Petrópolis; Nova Friburgo; *São Paulo*; Bauru; Pinhal; *Paraná*, Castro; Foz de Iguaçu; Caviuna; *Santa Catarina*, Cauna; Blumenau; Nova Teutônia; *Minas Gerais*; *Rio Grande do Sul*.

***Hamadryas fornax fornacalia* (Fruhstorfer) 1907**

Figs. 105-108, 203

Ageronia fornax fornacalia Fruhstorfer, 1907:16. TL - Mexico, Guatemala, Colombia, Chiriquí, S. Peru, S. Brazil. Syntypes - BM 1 ♀ Guatemala, 1 ♂ Mexico (Examined) (Figs. 105-108).

Description:

As in *H. fornax* except for characters listed for *H. fornax fornacalia* in the key to subspecies. Average wing length ♂ 35 mm, ♀ 36 mm.

Distribution:

This subspecies occurs from near Tampico in eastern Mexico to the northern part of Colombia and Venezuela.

Although *H. fornax* has been reported from Texas by Strecker (1875) and many other later authors including Klots (1951) and Howe (1975), I have seen no specimens in

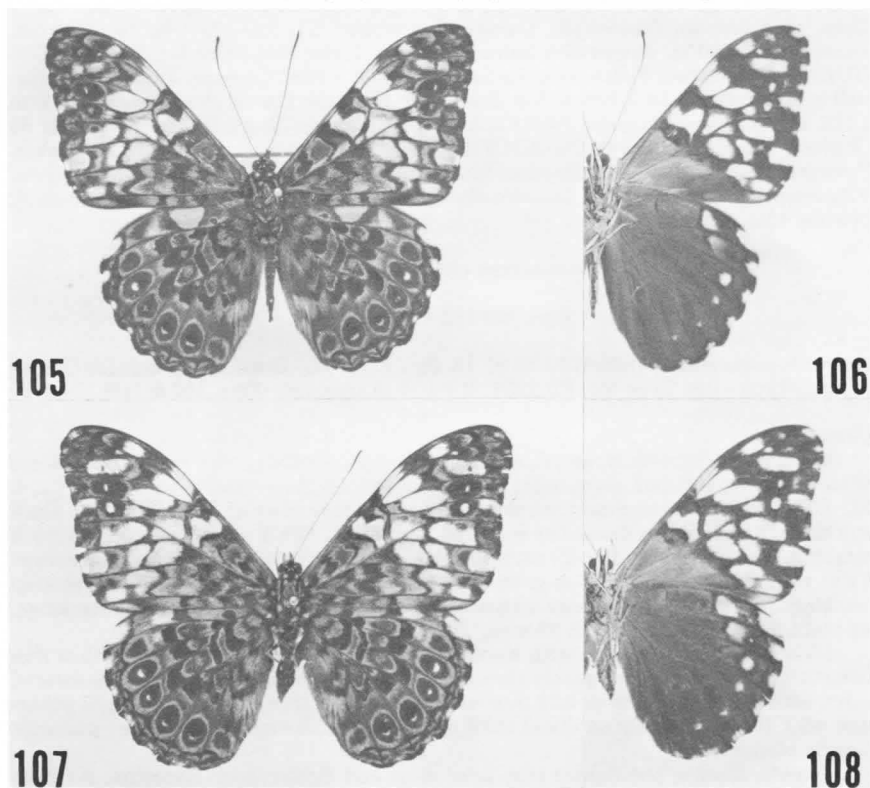
any collections. McGuire and Rickard (1974) report it from Benston-Rio Grande Valley State Park, Texas. I have examined this specimen and it is actually *H. guatemalena marmorice* Fruhstorfer. This same subspecies was figured erroneously as *H. fornax* by Pyle (1981). Holland (1898) states "*A. fornax* is reported only from the hotter parts of Texas." In the Holland collection at CM, a specimen labeled *Ageronia fornax* Hübner "Texas or N.M." is a misidentified ♂ of *H. i. iphthime*, which occurs in South America. Since *H. fornax* is relatively uncommon, I doubt the records of *H. fornax* in Texas until a valid specimen is seen or any recent specimen is obtained. The nearest record is near Tampico, Mexico, about 400 km to the south.

Taxonomy and Variation:

There is not much variation except size and darkness of pattern. There is intergradation with the nominate subspecies in Venezuela and central Colombia. Hayward (1964) synonymized *fornacalia* under *H. fornax* but was apparently unaware of the subspecies differences.

Biology:

This subspecies was collected on tree trunks in partly forested river valleys. Adults were flying around large trees that have been left in areas cut over for planting coffee and bananas. The adults fly rapidly often flying into the air chasing each other and



Figures 105-108. *Hamadryas fornax fornacalia* (Fruh.). ♂ dorsal (105) ventral (106) surfaces. MEXICO." Syntype, *Ageronia fornax fornacalia* Fruh. (BM). ♀ dorsal (107) ventral (108) surfaces. "GUATEMALA." Syntype, *Ageronia fornax fornacalia* Fruh. (BM).

making crackling noise. They are attracted to an intruder but are more wary than *H. feronia* and are more difficult to catch.

Specimens have been collected every month of the year, but are most abundant in the rainy season from May to September in much of the range. They have been found from sea level to 1650 m in altitude.

Immature Stages:

Two greenish larvae were collected on vines at about 1 meter above the ground surface at the edge of a road in an evergreen tropical forest. The larvae were reared to adults but were not described (Serrano, 1982).

Host Plants:

<i>Dalechampia scandens</i> (L)	Euphorbiaceae	
In El Salvador		Serrano (1982)

Specimens Examined: 136 ♂, 40 ♀

MEXICO: Veracruz, Córdoba; Misantla; Atoyac; Fortín de las Flores; Teocelo; Jalapa; Presidio; Orizaba; Tierra Blanca; Tuxpango; Coatepec; Motzorongo; Oaxaca, Soyolapán; La Esperanza; Chiapas, Ocozocuautila; Musté; GUATEMALA: Escuintla, Palín; Alta Verapaz, Tamahú; Chimaltenango, Panajabal; Baja Verapaz, Pantíc; Santa Rosa, Guazacapán; Guatemala, Ciudad Guatemala; EL SALVADOR: La Libertad, Tamanique 1,000 m; Nueva San Salvador; Santa Tecla; San Salvador, Apopa; HONDURAS: Cortés, San Pedro Sula; La Lima; COSTA RICA: Cartago, Juan Viñas; Turrialba; Irazú; Guayaba 1,500 m; San Jose, Hdo. El Rodeo 900 m; Puntarenas, San Vito 1,150 m; Alajuela, Alajuela; PANAMA: Chiriquí, Potrerillos 1,100 m; El Volcán de Chiriquí; Bugaba (Bogava); COLOMBIA: Valle, Rio Dagua; Juntas; Cali; Antioquia, Frontino; Tolima, Rio Chili; Boyaca, Muzo; Cundinamarca, Cananche; Bogatá; Meta, Villavicencio; VENEZUELA: Distrito Federal, Caracas X; Aragua, Rancho Grande X; Mérida, Mts. of Mérida X.

Hamadryas alicia (Bates) 1865

Figs. 109-112, 181, 192, 204

Ageronia alicia Bates, 1865:312-313, pl. 13, figs. 1, 1a. TL - Brazil, São Paulo [de Olivença]. Type - BM Type No. Rh 9263, HT 1 ♂ (Examined) (Figs. 109 & 110).

Description:

Male. Forewing with R₁ and R₂ arising separately. Radial sector, r-m₂ and the bases of m₂-m₃ are not inflated. m₂-m₃ joins the cubital stalk slightly basal to junction of Cu₁ & M₃. DFW bluish smeared or washed pattern with three rows of grey areas and black markings, a red median discal bar bordered with black. DHW smeared blue with black marking, tear-shaped blue ocelli with blackish and blue interior with light blue center. VFW yellowish basal area, with greyish-black and three diagonal rows of whitish-grey markings. VHW mustard-orange with deep brown or black border with white markings, no ocelli. Average wing length 39 mm.

Male genitalia. Vinculum with rounded posterior median projection; gnathos arm flattened, elbow of gnathos gently curving, not forming an angle; uncus with scattered hairs; saccus 3.44 mm; valve 2.88 mm; aedeagus rather straight 4.2 mm. Rami pubescent with flat spines only on distal third and at apex (2.4 mm). No spines or posterior margin of sternite.

Female. Similar but lighter blue base color and lighter grey markings. Average wing length 42 mm.

Distribution:

H. alicia occurs in a relatively restricted area of the upper Amazon headwaters

region, in southern Colombia, eastern Ecuador, northeastern Peru and western Brazil.

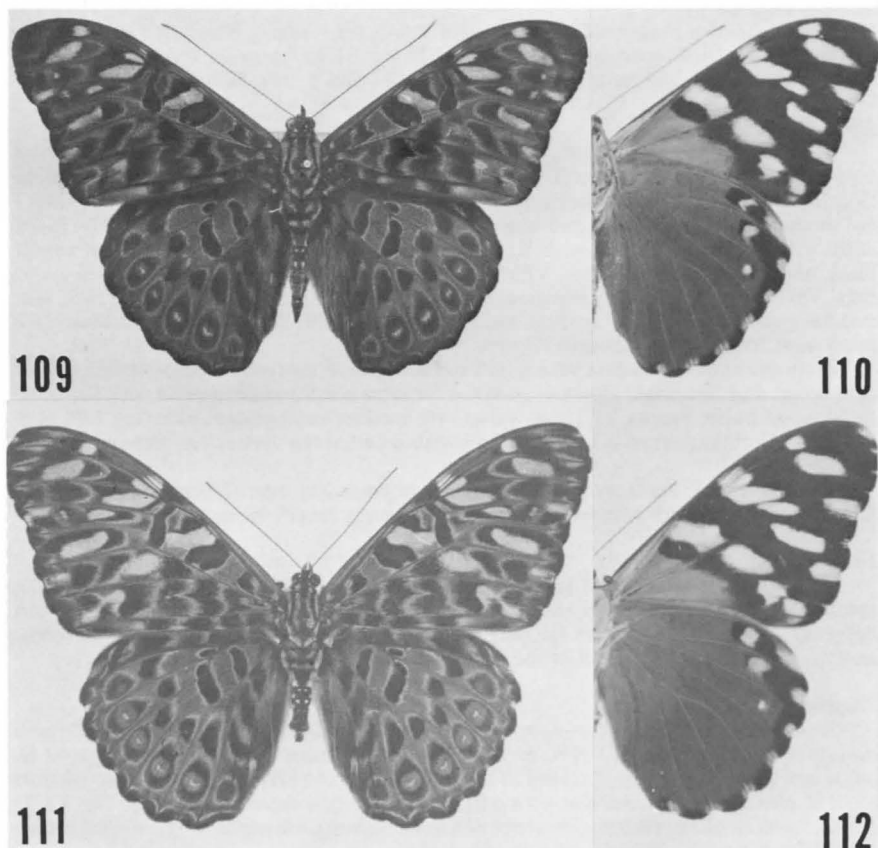
Taxonomy and Variation:

Bates' male holotype (in the Godman-Salvin coll.) in the BM was examined and compared with specimens throughout the range. There is no significant variation from the type. The species is relatively rare, only 71 specimens have been available for examination.

It is most closely related to the extremely rare *H. rosandra* with both species having mustard-yellow VHW. *Alicia* is about $\frac{1}{8}$ larger, has a very different wing pattern, and has little sexual dimorphism in color. The male genitalia are distinctive in both species.

Biology:

The adults occur only in heavy tropical evergreen forest and do not come out into open areas. They are very fast flying and difficult to catch. Bates (1865) saw several but was able to catch only one specimen. They are attracted to excrement bait, especially on the forest floor. Adults have been collected on banana bait at Mishana (near Iquitos)



Figures 109-112. *Hamadryas alicia* (Bates). ♂ dorsal (109) ventral (110) surfaces. BRAZIL, Amazonas, São Paulo [de Olivença]. Holotype, *Ageronia alicia* Bates (BM). ♀ dorsal (111) ventral (112) surfaces. BRAZIL, Amazonas, São Paulo de Olivença (CM).

in a "Charaxes trap" according to Lamas (1982). *H. alicia* has not been heard to produce rattling or cracking sounds, the same as other species found in heavy forest as *H. chloe*, *H. velutina* and *arete*.

Specimens Examined: 53 ♂, 18 ♀

COLOMBIA: *Putumayo*: Umbria, 7 ♂ AM, 4 ♂ SI; Florida, Feb. 6 ♂ BM; ECUADOR: *Napo*, Rio Napo, 1 ♂, BM. PERU: *Loreto*, Iquitos, 1 ♂ AM; 1 ♀ SI; 2 ♂ 1 ♀ SC; 14 ♂, 2 ♀ BM; Mar. June, Nov; Rio Cachiyacu, 2 ♂ BM; Rio Nanay, Estación Biol. Callicebus SM: Nauta, 1 ♂ BM; Pebas, Oct.-Dec., June, 1 ♂ 3 ♀ BM; Rio Marañón 1 ♀ BM: "Peru", no locality, 1 ♂ AM. BRAZIL: *Amazonas*, São Paulo de Olivença, Feb.-May 4 ♂, 5 ♀ CM; Mar. 1 ♀ JC; Aug.-Sep. 1 ♂ 1 ♀ AA: 4 ♂ 1 ♀ BM; 1 ♂ 1 ♀ MZ: São Felipe (=Eirunepé) 1 ♂ BM: "Amazon" 2 ♂ SI.

Hamadryas rosandra (Fruhstorfer) 1916

Figs. 113-116, 182, 203

Ageronia rosandra Fruhstorfer, in Seitz, 1916:543. TL - Brazil, São Paulo de Olivença. Syntypes - (In Staudinger Coll.) Not in BM nor Berlin Museum Zoology (1 ♂ and 3 ♀ topotypical specimens examined in the CM and 1 ♂ in MZ).

Description:

Male. Forewing with R_1 & R_2 arising separately. Radial sector, $r-m_2$ and the bases of m_2-m_3 are inflated. m_2-m_3 joins the cubital stalk $\frac{2}{3}$ distance from junction of Cu_1 & M_3 to Cu_2 . DFW blue with black markings and three diagonal rows of dark grey areas with a red median discal bar; DHW dull blue with black & red markings, surrounded by black ocelli with large black circle with light blue circle inside, with proximal half of center black and distal half light blue. VFW black with three diagonal bands of white markings. VHW orange mustard, marginal area black with interspersed white blotches. One submarginal large anterior ocellus and three small ocelli. Three anterior median dark markings. Average wing length 29 mm.

Male genitalia. Vinculum with slight rounded posterior median projection; gnathos arm broad and flattened, elbow of gnathos forming a right angle; uncus with few scattered small hairs; saccus 2.20 mm; valve with median enlargement at crista 1.88 mm; aedeagus slightly curved 3.24 mm. Rami with small setae, flat spines present only at end.

Female. Upper surface markings similar to male but overall rosy-magenta color. DHW ocelli with more whitish center. Average wing length 30 mm.

Distribution:

This species is the rarest and has the most restricted range of any species in the genus *Hamadryas*. Only five specimens, 2 ♂ and 3 ♀, were available for study and determination. It is known so far only from the type locality, São Paulo de Olivença, and from Manacapurú, Brazil in the mid-Amazon River area.

Taxonomy and Variation:

H. rosandra is a distinctive species related to *H. alicia* and *H. fornax* with yellowish orange or mustard-colored VHW. *H. rosandra* has the basic pattern and coloring of *H. alicia* but is over $\frac{1}{2}$ smaller. Instead of having ocelli on the DHW elongated tear-shaped as in *H. alicia*, they are rounded with a light blue or white lune-shaped pupil. The VHW differs from *H. alicia* with the presence of a postmedian dark patch in M_1-M_2 and brown and white subapical ocelli usually found in *H. fornax*.

There is some variation in the presence of dark encirclement of the white subapical ocellus in M_1-M_2 . There is marked sexual dimorphism. The male base color is light steely blue, while the female is a rose-magenta color and the DFW of the female has more pro-

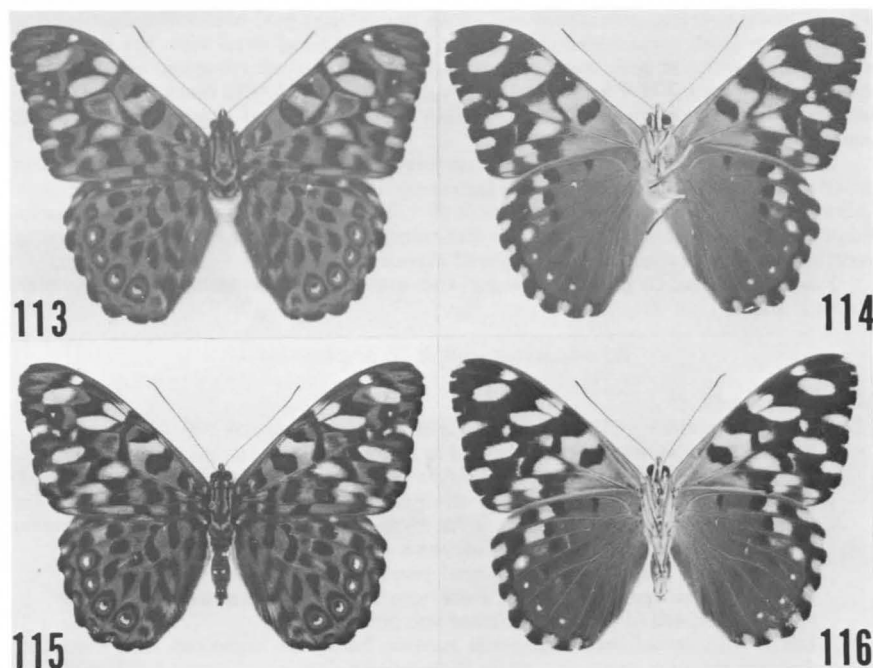
minent light greyish white spots.

Biology:

Nothing has been reported on the ecology of this species except that it occurs in deep tropical forest and has been collected in Feb., Apr., May and July. They occur at elevations less than 100 m. The immature stages and host plants are not known to have been reported.

Specimens Examined: 2 ♂, 3 ♀

BRAZIL: Amazonas, São Paulo de Olivença, 1 ♂ 2 ♀, Feb., Apr., May, CM; 1 ♂ MZ; Manacapurú, Amazon R. 1 ♀ Jul., CM.



Figures 113-116. *Hamadryas rosandra* (Fruh.) ♂ dorsal (113) ventral (114) surfaces. BRAZIL, Amazonas, São Paulo de Olivença (CM). ♀ dorsal (115) ventral (116) surfaces. BRAZIL, Amazonas, São Paulo de Olivença (CM).

***Hamadryas amphinome* (Linnaeus) 1767**

Figs. 183, 191, 205

H. amphinome is the most abundant and widespread species of the genus. It occurs from northern Mexico (one Texas record) and Cuba to Argentina. This species and the related *H. belladona* are the only ones with extensive red color on the VHW.

The species is rather variable and four distinct subspecies can be recognized by characters given in the subspecies key. The nominate subspecies occurs in South America east of the Andes mountains with an area of intergradation in the Andean area of Colombia. *H. amphinome mexicana* occurs in Texas and Mexico, to the Pacific slope

of Colombia and on the island of Cuba. It is closely related but distinct from *H. amphinome fumosa* which occurs on the Pacific slope of Ecuador and Peru and in S. W. Colombia. A very distinct new subspecies occurs on the Pacific slope of Mexico with orange-muddy colored VHW instead of red color. Fruhstorfer, in Seitz (1916) recognized five subspecies and Oberthür (1912) described an aberration which Fruhstorfer did not include.

Description:

Male. Forewing with R_1 & R_2 arising together or with a single stalk. Radial sector, $r-m_2$ and the bases of m_2-m_3 are inflated. m_2-m_3 joins the cubital stalk $\frac{1}{2}-\frac{3}{8}$ distance from junction of Cu_1 & M_3 to Cu_2 .

DFW with mosaic pattern of pale blue (or green) and black, with a white or grey diagonal median band composed of a series of elongate markings. DHW with basal half with a mosaic pattern, postmedial ocelli with tear-shaped oval blue outline, containing black with a small central round blue spot. VFW with red basal area, the remainder black with a white or grey median diagonal band with small subapical and marginal white or blue spots. VHW bright red to orange-red in basal $\frac{1}{4}$ with black veins or indentations, sometimes with a black submedian limbal band and submedian red spots; usually with marginal blue spots.

Male genitalia. Vinculum with prominent median posterior projection; gnathos arm broad and flattened, elbow of gnathos forming a right angle; saccus (3.44-5.60)4.50 mm; valve with median enlargement at crista (2.48-3.20)2.9 mm; aedeagus (4.52-4.88)4.6 mm. Rami (2.0-2.68)2.38 mm with numerous flat spines extending in a row from terminus to ventral part of posterior lateral margin of sternite.

Female. Similar to male but larger and usually broader white or grey median diagonal band.

Key to Subspecies of *H. amphinome*

Male and Female.

- 1a. VHW base color yellow-orange to light muddy brown (no red); large postmedian white spot in $SC+R_1-R_s$, and in $Rs-M_1$, followed by a small subapical white spot, and a small spot in M_1-M_2 ; a postmedian thin dark incurved line across M_3-Cu_1 ; VFW with a large elongate white spot in R_s-M_1 and a wide white median bar across discal cell (W. Mexico)..... *mazai*
- 1b. VHW base color red or rusty red, with postmedian and subapical spots bluish (rarely grey); no thin incurved postmedian line across M_3-Cu_1 ; VFW without white spot or smaller white spot in R_s-M_1 , a narrow median bar across discal cell (if wide, it is diffuse and pinkish)..... 2
- 2a. DFW with broad white diagonal median band not dissected into more distinct macular segments, no or little smoky dusting of band; VFW with distal segment in Cu_1-Cu_2 notched posteriorly but not divided; one subapical white spot in radial area; second spot in $Rs-M_1$ small pale blue or absent; about $\frac{1}{2}$ of wing brick red to bright red, black veins heavily dissect red area, black limbal band may isolate 2 or 3 submarginal red spots (South America east of Andes)..... *amphinome*
- 2b. DFW with narrower whitish to grey or smoky diagonal median band, more dissected into macular segments; VFW with distal segment in Cu_1-Cu_2 usually divided into two distinct segments; two subapical white spots in radial area, second spot in R_s-M_1 white; VHW usually $\frac{3}{4}$ brick red or rusty red, partial black limbal band less prominent and may isolate 1 or 2 submarginal red spots..... 3
- 3a. DFW with whitish to some smoky dusting of fairly broad diagonal median band; VFW and VHW with fairly prominent whitish marginal spots (Texas to Colombia)..... *mexicana*
- 3b. DFW with dark smoky diagonal median band, relatively narrow and heavily

dissected into more distinct segments; VFW and VHW with smaller less prominent bluish or whitish marginal spots, smaller size (Colombia to W. Peru, west of Andes)..... *fumosa*

Hamadryas amphinome amphinome (Linnaeus) 1767

Figs. 117-120, 205

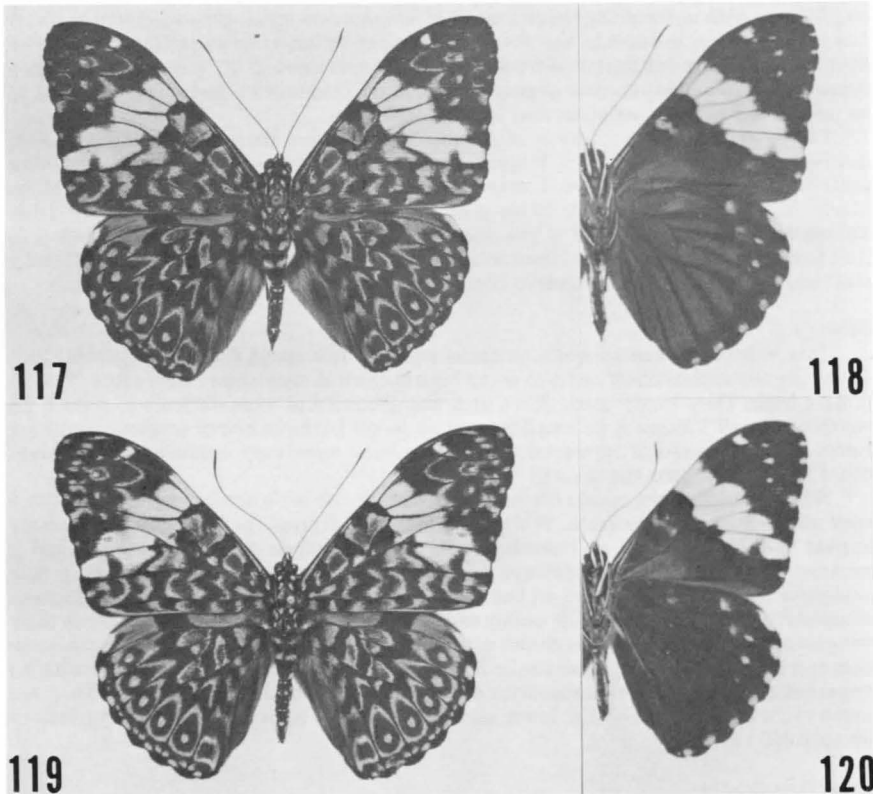
Papilio amphinome Linnaeus, 1767; 1:779-780. TL - America meridionali (Probably Surinam). Syntypes - May be in Uppsala or Linnaean Soc. London.

=*Hamadryas decora amphinome* (L) Hübner (1806-1816).

=*Ageronia amphinome* ab. *nysa* Oberthür, 1912:311, pl. 99, fig. 953. TL - Colombia, Bogotá. Type - BM 15-124, HT 1 ♂ (Examined) [Syn. nov.].

=*Ageronia amphinome morsina* Fruhstorfer, in Seitz 1916:544, Lieferung 228. TL - Colombia, no specific locality. Syntypes - BM 15-124, 1 ♂ (Examined) [Syn. nov.] (Figs. 119 & 120).

=*Ageronia amphinome aegina* Fruhstorfer, in Seitz, 1916:544. Lieferung 228. TL - Brazil, Espírito Santo, and also Bahia, Paraná, Blumenau & Rio Grande do Sul. Syn-



Figures 117-120. *Hamadryas amphinome amphinome* (Linnaeus). ♂ dorsal (117) ventral (118) surfaces. PERU, Loreto, 70 km N.E. Iquitos, Explorama (JC). ♂ dorsal (119) ventral (120) surfaces. "COLOMBIA." Syntype, *Ageronia amphinome morsina* Fruh. (BM).

types - BM 1 ♂ from Bahia, Brazil, 1 ♀ from Espirito Santo, Brazil (Examined)
[Syn nov.]

=*Peridromia regina* Fruhstorfer, in Seitz, 1916, pl. 104b. Lieferung 237 (Is *aegina* in Fruhstorfer, in Seitz, 1916:544) [Lapsus calami].

=*Peridromia amphinome* Fruhstorfer, in Seitz, 1916, pl. 104b, Lieferung 237.

Description:

As in *H. amphinome* except for characters listed for *H. a. amphinome* in the key to subspecies. Average wing length ♂ 38 mm, ♀ 40 mm.

Distribution:

H. a. amphinome occurs from the eastern slopes of the Andes mountains in Colombia, Ecuador and Peru and throughout the rest of South America including the Orinoco and Amazon and Rio de la Plata basins south to Buenos Aires, Argentina.

Taxonomy and Variation:

I have examined the male syntype in the BM of *H. amphinome morsina* Fruhstorfer from Colombia and it is one of the intergrades between *H. a. amphinome* and *H. amphinome mexicana*. In southern Brazil and Argentina there is some variation in *H. a. amphinome* with some of the characters of *H. amphinome mexicana* and *H. amphinome fumosa* appearing in some of the specimens. Examination of large series of specimens does not show any consistent differences. I have examined ♂ & ♀ specimens labeled types of *Ageronia amphinome aegina* described by Fruhstorfer and it is considered to be part of the normal variation and is a synonym.

I have examined the holotype of *Ageronia amphinome* ab. *nysa* Oberthür (1912) in the BM. It was described from Bogotá, Colombia, and it is a typical "stretched wing pattern" mutation or recessive. I have seen a similar aberration in the collection of Sr. Mario Rojas in Tingo María, Peru. Another mutation with much blue color from Yahuar Mayo, Peru was found in the Joicy collection in the BM. It was interesting to find four old specimens in the Hewitson Collection in the BM that had been artificially stained or painted purple in certain blue areas.

Biology:

This subspecies can be quite common and is a fast rapid flier. In Argentina and Paraguay the author observed it to occur high in trees in deciduous forest often 20 to 25 meters high. They rarely came down near the ground and were difficult to collect. In southern Brazil I found it on smaller trees on forest paths in heavy tropical evergreen forest. In W. Venezuela intergrades with *mexicana* were very common on palm and other tree trunks near the ground.

When disturbed the adults often fly high into the air with much crackling noise and may alight fairly high in trees. While sitting on tree trunks the butterflies frequently appear to intently watch an intruder below and wave their wings in a slow flapping manner. They often move sideways around the tree in small jumps and may lean sideways. The bright brick-red on the lower wings is obvious in flight but disappears completely when it alights with outspread wings. While at rest they often wave their wings and the red color which shows momentarily or at intervals attracts much attention and may be a warning. The adults have been collected throughout the year with no apparent difference in abundance with seasons north or south of the equator. They are much more commonly found at lower altitudes but have been collected at elevations of up to 1,250 m.

Immature Stages

The egg, all five instars of larvae and the pupae have been described by Müller (1886) from Brazil. He also described light and dark forms of pupae. Eggs are laid in pendant strings of up to 15 eggs in a string. The larvae are gregarious. The egg, all five instars of larvae and pupae have also been described from Brazil by d'Almeida (1922).

Variations in the pupae were also observed. Riley (1975) has summarized larval descriptions.

Food Plants:

<i>Dalechampia triphylla</i> Lam.	Euphorbiaceae	
<i>Dalechampia ficifolia</i> Lam.	Euphorbiaceae	
<i>Dalechampia stipulaecea</i> Mull.	Euphorbiaceae	
In Brazil		Müller (1886)
<i>Dalechampia</i> spp.	Euphorbiaceae	
In Brazil		d'Almeida (1922)
(?) <i>Eupatorium</i> spp.	Compositae	
In Brazil		Costa Lima (1936)
(?) <i>Aristolochia</i> sp.	Aristolochiaceae	Kaye (1921) (quoted Sir N. Lamont in 1918)
In Trinidad		Barcant (1970) (probably copied from Kay, 1921)
(?) <i>Aristolochia trilobata</i>	Aristolochiaceae	
In Trinidad		

The identifications of *Eupatorium* and *Aristolochia* are probably erroneous and must be confirmed before accepting them as valid host plants.

Specimens Examined: 562 ♂, 265 ♀

PANAMÁ: *Canal Zone*, Farfán; COLOMBIA: *Tolima*, Rio Frio, Payandé; *Cundinamarca*, Bogotá, Mts. Bogotá; *Tómeegas*; *Norte de Santander*, Cúcuta; *Meta*, Villavicencio; *Magdalena*, Minca; Santa Marta; Bonda; *Amazonas*, Florida; Rio Putumayo; *Boyacá*, Muzo; Tamara X; VENEZUELA: *Amazonas*, La Cumbre; *Monagas*, Caripito; *Delta Amacuro*, Barrancas; Los Castillos; *Monagas*, Jusepín; *Aragua*, Rancho Grande; Portachuelo, 1100 m; *Mérida*, Mts. of Mérida; *Distrito Federal*, Puerto la Cruz; Bolívar, km 107 El Dorado-Santa Elena; alto Rio Caura, Cuchime; *Carabobo*, Yuma; San Esteban; *Yaracuy*, Aroa; *Sucre*, Güiría, Patao; Cariaquito; TRINIDAD: Port-of-Spain; Fondes Amandes; St. Ann's; GUYANA: Wakenaam Island; FRENCH GUIANA: Cayenne; SURINAM: Albina; ECUADOR: *Azuay*, Cuenca; *Macas*, Oriente; *Napo*, Misahualli, El Chaco; Rio Coca; *Morona-Santiago*, Rio Upano; PERU: *Loreto*, Pebas; Iquitos 70 km NE; *Ucayali*, Pucallpa; Mid Rio Ucayali; Boquerón del Padre Abad; Lago Yarina-Cocha; *Huánuco*, Rio Pichis; Tingo María; *Puno*, Yahuar mayo; *Pasco*, Chuchurras; *Junín*, Satipo; Chanchamayo; *San Martín*, Juanjui; Jepelacio; *Amazonas*, Muyo; *Cuzco*, Rio Urubamba, Sangobatea; *Madre de Diós*; Boca Rio La Torre, 300 m; BOLIVIA: *Santa Cruz*; Buenavista; Ichilo; Rio Surutú; Santa Cruz de la Sierra; Cuatro Ojos; Province del Sara; Mineros; Portachuelo; *La Paz*, Rio Beni, Muchanes (Muschay); PARAGUAY: *Caaguazú*, Yhú; San José; *Hernandarias*, Tacurupucú; *Guirá*, Paso Yobay; *Paraguari*, Sapucay; *Caazapá*, Buena Vista; Central, Nueva Italia; *Asunción*, Trinidad; Asunción; BRAZIL: *Amazonas*, Tefé; Rio Solimões; Manaus; Ypiranga, Rio Purús; Rio Negro; São Paulo de Olivença; Tonatins; Huitanaã; Rio Purús; Santo Antônio de Javari; Rio Uaupés; Vila Amapá; *Pará*, Óbidos; Santarém; Itaituba, Rio Tapajós; Belém; Juruti; *Maranhão*, *Pernambuco*, Recife; São Luis; *Paraná*, Castro; Iguaçu; *Paraná*; *Bahia*, Bahia; Cachimbo; Itamarajú; *Espírito Santo*, Linhares; Baixo Guandú; *Rio de Janeiro*, Asilo; Teresópolis; Corcovado; Restinga Jacarepaguá; Mendes; Petrópolis; Rio de Janeiro; *Ceará*, São Benedito; *Santa Catarina*, Brusque; Blumenau; Maçaranduba; Cauna; *Goiás*, Maranhão; Barreiras; Valle São Jacinto, *Minas Gerais*, Parque Rio Doce; Cantagalo; Viçosa; *Mato Grosso*, Barra do Bugres to Tangará; Cuiabá; Chapada; *Pernambuco*; Diamantino; *Paraíba*, João Pessoa; *São Paulo*, São Paulo; Araçatuba; Anhangá; *Rio de Janeiro*; Bauru; Cosmópolis; Itaícu; ARGENTINA: *Misiones*, Puerto Aguirre; *Corrientes*, Ituzaingó; *Salta*, Mosconi.

Hamadryas amphinome mexicana (Lucas) 1853

Figs. 121-124, 205

Peridromia mexicana Lucas, 1853:311. TL - Mexico, no locality. Syntypes - Location unknown.

=*Peridromia amphinome* Godman & Salvin, 1883:271 (partim, nec Linnaeus, 1767).

=*Ageronia amphinome mexicana* (Lucas) Fruhstorfer, in Seitz, 1916:543.

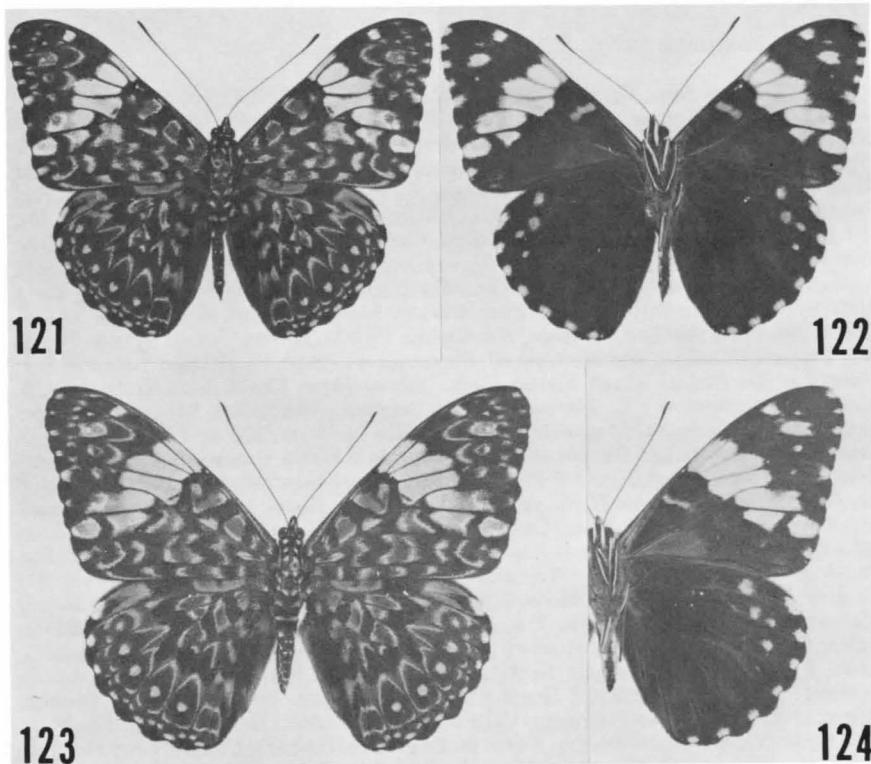
Description:

As in *H. amphinome* except specific characters for *H. amphinome mexicana* listed in the key to subspecies. Average wing length ♂ 35 mm, ♀ 38 mm.

Distribution:

This subspecies occurs from southern Texas south through Mexico (except the Pacific slope) and Central America to northwestern Colombia, in the Andes mountains where there is intergradation with *H. a. amphinome*. On the Pacific slope near Cali, Colombia there is intergradation with *H. amphinome fumosa*.

In Cuba, *amphinome* was first reported by H. W. Bates (1865); in 1934 Torre y Callejas (1954) reported it to be common near Havana, and M. Bates (1936) reported a male from Sábicu, Cuba which I observed in the MZ Collection. I have determined 17



Figures 121-124. *Hamadryas amphinome mexicana* (Lucas). ♂ dorsal (121) ventral (122) surfaces. MEXICO, Oaxaca, Chiltepec (JC). ♀ dorsal (123) ventral (124) surfaces. MEXICO, Oaxaca, Palomares. (JC).

♂♂ and 14 ♀♀ in various collections that are typical *H. amphinome mexicana* from Cuba. Most of these were perfect specimens showing that the species is native or was temporarily established. More than six males and four females were collected in one day at Pinar del Rio in 1935. It is unknown whether this species has been looked for recently in Cuba. It is probable that it emigrated or was introduced from Yucatán to the western end of Cuba and became colonized.

Taxonomy and Variation:

Godman & Salvin (1883) did not recognize *Peridromia mexicana* Lucas. While noting the characters given by Lucas, they were not able to segregate *mexicana* from *fumosa* and variable *amphinome* in the southern part of the range. Lucas (1853) stated that the band of the DFW is straighter and narrower in *mexicana* and is distinctly cut up by veins and powdered with grey scales; there is a second subapical greyish spot, which on the VFW is a white spot, and the VHW is paler red or rusty red in coloration.

Biology:

The subspecies occurs in heavily forested areas or in heavy regrowth areas near forests. It is also found on tree trunks at forest edges or along forest roads. When disturbed the adults often fly rapidly to higher parts of the trees. The adults appear to actively watch an intruder below and wave the wings exposing the red color on the lower hind wings perhaps as a warning. They may move sideways around the tree disappearing from view or may stay above and react to any movement of a person below. After a period of time they often fly lower and alight, but remain wary and just out of reach. They will follow a stone or object downward as it falls after being thrown. They fly at and pursue other butterflies, especially their own species, accompanied by loud crackling noise and display of the red lower hind wings.

They are found throughout the year everywhere in their range, but are most common in July-October in Mexico and most of Central America. They also occur in January to May in Panamá and Colombia in the southern part of the range. The adults have been collected from sea level to 1,200 to 1,800 m in elevation.

Immature Stages:

The egg, all five instars of larvae, the prepupa and pupa have been described in detail from El Salvador by Muyschondt and Muyschondt (1975c). The smooth eggs are laid in strings and the larvae are gregarious, gaudy colored, emit a disagreeable scent, and wiggle convulsively at the least disturbance.

Food Plants:

<i>Dalechampia scandens</i> (L)	Euphorbiaceae	
In El Salvador		Muyschondt & Muyschondt (1975c)
In Costa Rica	Euphorbiaceae	DeVries (1982)

Specimens Examined: 425 ♂, 245 ♀

UNITED STATES: *Texas*, Hidalgo Co.; CUBA: *La Habana*; El Cerro; *Pinar del Rio*, Pinar del Rio; Rangel; Sábicú; MEXICO: *San Luis Potosí*, Tamazunchale; *Veracruz*, Catemaco; Presidio; La Gloria; Cardel; Jalapa; Dos Amates; Los Tuxtlas; Santa Rosa; Tuxtepec; Misantla; Córdoba; Mundo Nuevo; Cuichapa; Tezonapa; Motzorongo; *Oaxaca*, Chiltepec; Palomares; Temazcal; Comaltepec; Chimalapa; Cozolapa; Soyolapán el Bajo; El Naranjal-Chiltepec; Zanatepec; *Chiapas*, Las Delicias; San Quintín; Chajul; Sigale; Pinolá; Palenque; Cuauhtemoc; Yaxchilan; Mapastepec; Musté; San Jerónimo; Ocozocauhtla; *Tabasco*, Tepescuintle; *Yucatán*, Pisté; Petén; *Quintana Roo*, X-Can; BELIZE, *Rio Grande*, *Stann Creek*, Middlesex; *W. Belize*, *Rio Hondo*; GUATEMALA: *Alta Verapaz*, Polochic Valley; Tamahú; Baléu; San Cristóbal; Suchitepéquez; *Escuintla*, Escuintla; El Salto; *El Petén*, Sayaxché; *Santa Rosa*, Guazacapán; *Retalhuleu*,

Retalhuleu; Izabal, Quiriquá; Suchitepéquez, Variedades; Escuintla, Santo Tomás; EL SALVADOR: *La Libertad*, Los Chorros; *La Libertad*; *San Salvador*, San Salvador; *Nueva San Salvador*, Santa Tecla; *Santa Ana*, Hda. Las Marias, Cerro Verde; HONDURAS: *Cortés*, Lago Yojoa; San Pedro Sula; El Jaral; NICARAGUA: *Matagalpa*, Matagalpa, *Rio San Juan*, Chontales; *Zelaya*, Edén; *Masaya*, Masaya; *San Ramón*, Rio Wanks; *Managua*, Managua, *Chinandega*, Corcuera; COSTA RICA: *Alajuela*, San Mateo; *Cartago*, Juan Viñas; Turrialba; *Guanacaste*, Santa Rosa Nat. Pk.; *Puntarenas*, Palmar Norte; San Vito; *Limón*, Santa Clara; Guápiles; *San José*, Hacienda El Rodeo; *Heredia*, La Virgen; PANAMA: *Chiriquí*, Cerro la Guerra; Santa Cruz; Santa Clara; Chiriquí; David; *Veraguas*, Ballena; *Veraguas*; *Herrera*, Chepo; *Panamá*, El Llano; Isla Taboga; *Canal Zone*, Piña Forest 200 m; Balboa; Summit; Albrook; Farfán; Gamboa; Barro Colorado; Gatún; Cocoli; Ft. Kobbe; La Pita; *Darién*, Bayano Dam; Caña; COLOMBIA: *Boyacá*, N. of Tunja X; *Santander*, El Jordán; Rio Suárez; Head Rio Carara; Landázuri; *Antioquia*, Casabe; *Norte Santander*, Cúcuta X; *Magdalena*, Minca; Onaca; Santa Marta; *Meta*, Villavicencio; *Cundinamarca*, Bogotá; *Valle*, Rio Dagua; *Táchira*, La Fria X, *Mérida*, El Vigía X; *Zúlia*, Machiques X.

***Hamadryas amphinome mazai* [Subsp. nov.]**

Figs. 125-128, 205

= *Ageronia amphinome mexicana* Lucas (Hoffman, 1940) (partim).

Description:

Male. Forewing with R_1 & R_2 arising together or with a single stalk. Radial sector, $r-m_2$ and the bases of m_2-m_3 are inflated. m_2-m_3 joins the cubital stalk $\frac{1}{8}$ - $\frac{1}{2}$ distance from junction of Cu_1 & M_3 to Cu_2 .

DFW with mosaic pattern of pale blue and black with a greyish diagonal median band composed of a series of elongate markings. DHW with basal half with a mosaic pattern, postmedial ocelli with tear-shaped oval blue outline, containing black with a small central round blue spot.

VFW with small subapical white markings present in R_4-R_5 , subapical large white marking in R_5-M_1 (twice as large as in *mexicana*); median white bar across discal cell wide; postmedian white spot in M_3-Cu_1 , usually present in fork; distal white spots partly joined or close in M_3-Cu_1 ; VHW base color orange muddy brown, not reddish; postmedian large white spots in $Sc+R_1$ and $Rs-M_1$, and smaller white spots in subapical area and another in M_1-M_2 ; in M_3-Cu_1 , a distinct postmedian black incurved dark thin line; subapical ocellar areas each usually contain a small white spot. Average wing length 36 mm.

Female. VFW same as male but no white spot in M_3-Cu_1 ; VHW same base color as male, in M_3-Cu_1 variable but not different from *mexicana*. Wing length 40 mm.

Distribution:

This subspecies is found on the Pacific slope of Mexico from Sinaloa to Guerrero.

Taxonomy and Variation:

The orange muddy color of the VHW is very distinctive. This is a very distinct subspecies that is more closely related to *fumosa* than *mexicana* in some characters. There is some variation in the presence of white submarginal spots on the VHW, especially in intergrades in Zacatecas, in Zacatecas state, Cuernavaca in Morelos, and in Candelaria-Loxicha in Oaxaca.

Biology:

The adults have been found in forested areas including tropical forest in river valleys. I have collected adults on buttresses of large fig trees, on the trunks of large mango trees, and on fruit trees in cities in Colima, Mexico. In Guerrero I collected

adults in a forested canyon and on large trees in a heavily grazed river valley. They have the same habits as *mexicana*, and are active from 0900 to 1700 hours. They are attracted to rotting banana and other fruit.

Adults are found throughout the year, with most specimens collected from June to November. They occur from sea level to over 1,500 m in elevation.

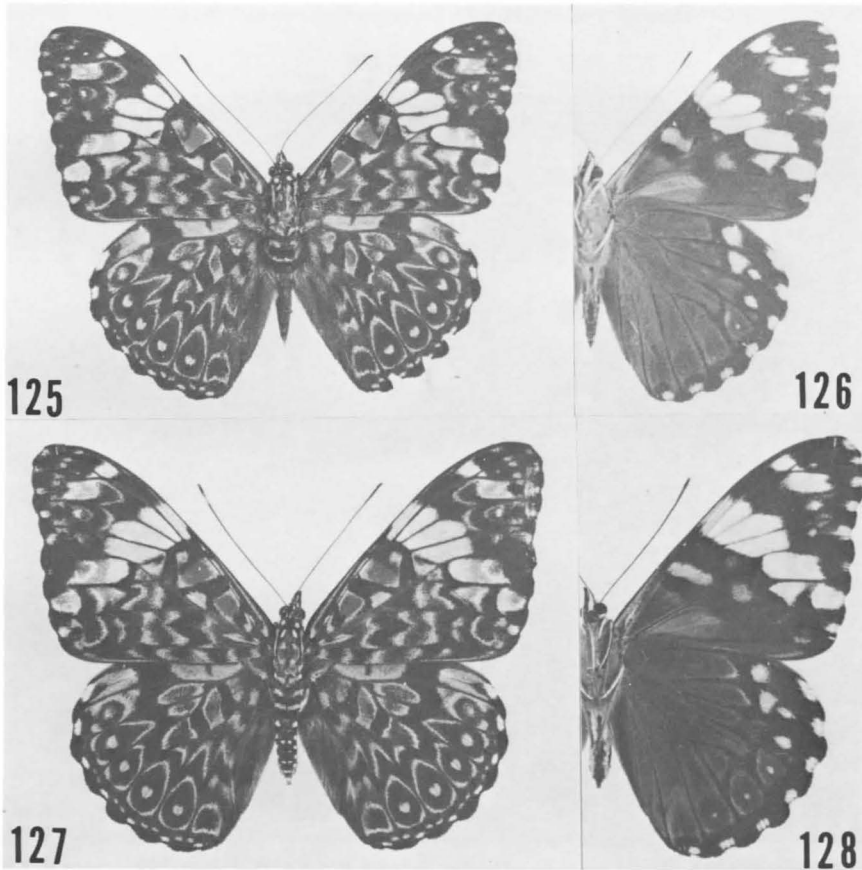
The immature stages and food plants have not been reported for the subspecies.

This new subspecies is named for the De la Maza family who have made outstanding contributions to the knowledge of lepidoptera of Mexico and who helped by providing specimens.

Described from 44 specimens, 28 ♂ and 16 ♀ from western Mexico.

HOLOTYPE: ♂ MEXICO, *Colima*, Colima, 1 ♂, 14 Nov. 1982, coll. D. W. Jenkins, JC;

PARATYPES: MEXICO, *Colima*, Colima, 2 ♂ 3 ♀, 14 Nov. 1982, coll. D. W. Jenkins, JC; Madrid 2 ♂, 15 Nov. 1982, coll. D. W. Jenkins, JC; *Nayarit*, Mecatán, 2 ♀, 12 Sep. 1972, coll. J. Llorente FC; 5 ♀ coll. J. Llorente JC; Singayta, 3 ♂ 2 ♀ 14 Sep.



Figures 125-128. *Hamadryas amphinome mazai* Jenkins. ♂ dorsal (125) ventral (126) surfaces. MEXICO, *Colima*, Colima. Holotype (AA), ♀ dorsal (127) ventral (128) surfaces. MEXICO, *Nayarit*, Mecatán. Paratype (JC).

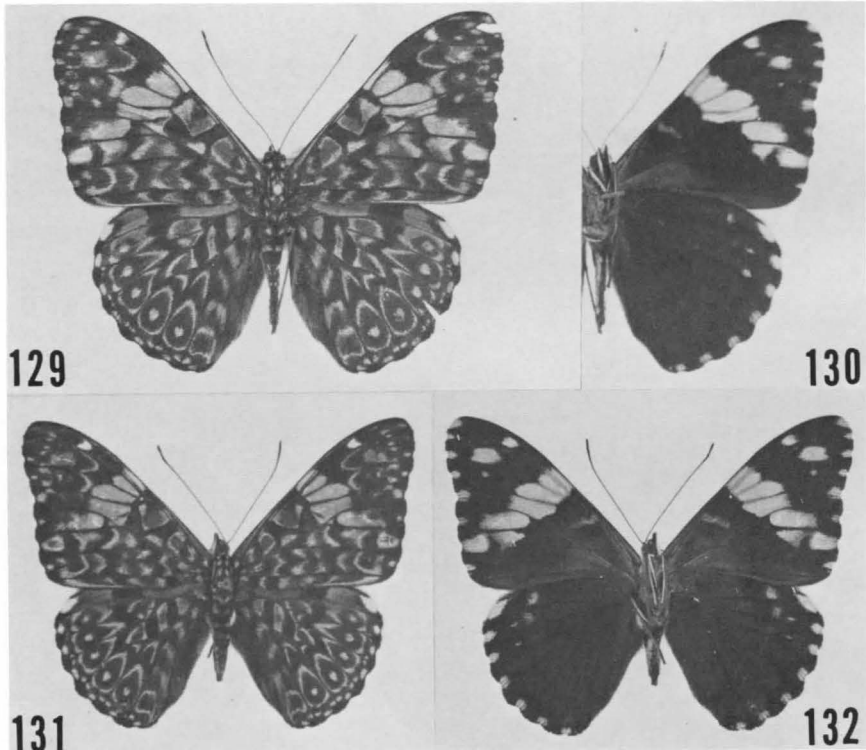
1978, coll. J. Llorente FC; *Michoacán*, Coahuayana, 2 ♂ Aug. 1950, T. Escalante AA: *Guerrero*, Zihuatenejo, coll. D. & J. Jenkins, JC; Acahuzotla, 1 ♂ Sep. 1949, 1 ♀ July 1949, coll. T. Escalante AA: 1 ♂ coll. D. & J. Jenkins, JC; 1 ♀, coll. J. De la Maza DM: Nueva Delhi, 5 ♂ coll. De la Maza, DM, 1 ♂ JC; El Faisanal-Paraiso, 3 ♂ 1 ♀, coll. De la Maza DM; *Oaxaca*, Candelaria-Loxicha, 3 ♂ 2 ♀, Nov. 1967, coll. E. C. Welling, AA: 11 Aug. 1977, coll. D. & J. Jenkins.

Deposition of type material: Holotype ♂ and 9 ♂ and 6 ♀ paratypes in Allyn Museum of Entomology; 3 ♂ 4 ♀ in Museo de Zoología, Facultad de Ciencias UNAM, Mexico City; 9 ♂ & 1 ♀ in De la Maza collection; 4 ♂ and 4 ♀ in Jenkins Collection; 1 ♂ and 1 ♀ in British Museum Collection; and 1 ♂ in Carnegie Museum Collection.

Additional Specimens: 20 ♂, 11 ♀ MEXICO: *Sinaloa*, Condordia; Venado; *Nayarit*, Compostela; Jalisco, Cumbre de Autlán; *Colima*, Colima; Madrid; *Guerrero*, Acahuzotla; Acapulco; Chilpancingo; Rio Papagayo; *Oaxaca*, Candelaria-Loxicha X; *Morelos*, Cuernavaca X; *Zacatecas*, Zacatecas X.

***Hamadryas amphinome fumosa* (Fruhstorfer) 1916**

Figs. 129-132, 205



Figures 129-132. *Hamadryas amphinome fumosa* (Fruh.). ♂ dorsal (129) ventral (130) surfaces. COLOMBIA, *Valle del Cauca*, Rio Dagua. Syntype, *Ageronia amphinome fumosa* Fruh. (BM). ♀ dorsal (131) ventral (132) surfaces. ECUADOR, *Pichincha*, Pichincha (JC).

Ageronia amphinome fumosa Fruhstorfer, in Seitz, 1916:549, Lieferung 228. TL - Colombia, Rio Dagua. Syntypes - BM 15-124, 1 ♂ (Examined) (Figs. 129 & 130).
= *Peridromia fumosa* [Fruhstorfer], in Seitz, 1916:104b, Lieferung 237.

Description:

As in *H. amphinome* except for differences listed for *H. amphinome fumosa* in the key to subspecies. Average wing length ♂ 35 mm, ♀ 38 mm.

Distribution:

The subspecies extends from the upper Rio Cauca in southwestern Colombia through the Pacific slope of the Andes and coastal area of Ecuador and the northwestern corner of Peru.

Taxonomy and Variation:

The male type of *H. amphinome fumosa* was examined in the BM and it is typical of specimens in S. Colombia and Ecuador on the west slope of the Andes. There is some intergradation with *H. amphinome mexicana* near Cali, Colombia. There is intergradation with *H. a. amphinome* in western Bolivia. This may be part of the observed variation in the southern part of the range of *H. a. amphinome* showing a few characters of *mexicana* and *fumosa*.

Biology:

This subspecies was abundant in western Ecuador. One or more adults were observed or collected by the author on the sides of nearly every indian house examined in the tropical forests in the Pichincha area, the Daule-Peripa river basins, and the Santiago de los Colorados region. They appear to have become partially adapted to relatively primitive indian civilization. The adults were not as readily disturbed by the activities of persons, did not fly high in trees, but only to another part of the house or to a nearby tree. They were very easy to catch, especially near rotting fruit or refuse. They made crackling sounds in flight. At a palm nut oil extraction farm the palm refuse was fed to hogs in a wallow. *H. amphinome fumosa* were concentrated and were more abundant than any *Hamadryas* I have observed elsewhere.

The adults have been collected in largest numbers from January to May with some in July and October. They are usually found at lower altitudes but have been collected up to 1,200-1,800 m.

The immature stages and food plants are not known to have been reported for this subspecies.

Specimens Examined: 94 ♂, 45 ♀

COLOMBIA: *Cauca*, Popayán; *Cundinamarca*, Cananche; *César*, Manaure; *Tolima*, El Santuário; *Valle del Cauca*, Rio Dagua X; Tome; Juntas; ECUADOR: *Bolívar*, Balzapamba; Rio La Chima; *El Oro*, El Oro; *Manabí*, Cojimies; Palmar; La Crespa; *Los Rios*, Rio Palenque; Playas de Montalvo; Hacienda Ave Maria; Quevedo; *Esmeraldas*, Tonchigue, Esmeraldas; *Chimborazo*, Dos Puentes; *Guayas*, Naranjal; El Triunfo; Guayaquil; *Pichincha*, Rio Toachi, Alluriquin, Pichincha; Santo Domingo de los Colorados; Rio Palenque; *Morona-Santiago*, Macas, Oriente; PERU: *Tumbes*, Matapalo, La Totorá, 100 m; BOLIVIA: *La Paz*, Mapiri X.

Hamadryas belladonna (Bates) 1865

Figs. 133-136, 184, 191, 206

Ageronia belladonna Bates 1865:313, pl. 13, fig. 3. TL - Brazil, São Paulo [de Olivença].
Syntypes - BM type No. Rh 9264, 1 ♂ (Examined) (Figs. 133 & 134).
= *Peridromia belladonna* [Fruhstorfer], in Seitz, 1916: pl. 104C, Lieferung 237.

Description:

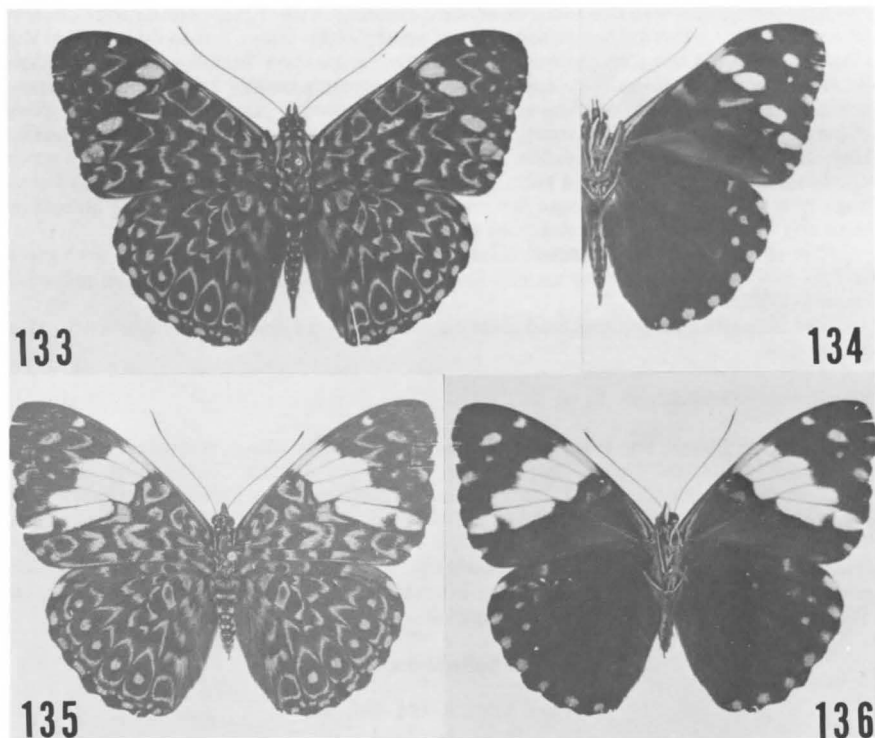
Male. Forewing with R_1 & R_2 arising together or with a single stalk. Radial sector $r-m_2$ and the bases of m_2-m_3 are inflated. m_2-m_3 joins the cubital stalk $\frac{2}{3}$ distance from junction of Cu_1 & M_3 to Cu_2 . DFW same as *H. amphinome* but median diagonal band is reduced to four diagonal grey spots. DHW same as *H. amphinome*. VFW reddish basal area, mostly black with median diagonal row of four white or grey oval areas and smaller subapical and marginal spots. VHW same as *H. amphinome*. Average wing length 35 mm.

Male genitalia. Vinculum with very elongated and attenuated median posterior projection; gnathos arm broad and flattened, elbow of gnathos forming a right angle; uncus with few sparse small hairs; saccus 3.88 mm; valve with some median enlargement at crista 3.60 mm; aedeagus 4.0 mm. Rami elongate 4.0 mm, pubescent and with flat spines along entire length. Posterior lateral margin of sternite with 10-12 median large flat spines ventral to rami.

Female. Upper wings same as *H. amphinome*, but with white diagonal band of white elongate markings. Ventral surface of wings same as *H. amphinome mexicana* with two white subapical spots and orange red markings on VHW. Average wing length 35 mm.

Distribution:

This species is found in the Amazon river basin from southern Colombia and eastern Peru to the central Amazon valley in central and northwestern Brazil.



Figures 133-136. *Hamadryas belladonna* (Bates). ♂ dorsal (133) ventral (134) surfaces. BRAZIL, Amazonas, São Paulo de Olivença. Syntype *Ageronia belladonna* Bates (BM). ♀ dorsal (135) ventral (136) surfaces. No locality data (AA).

Taxonomy and Variations:

I have examined a male syntype in the BM from São Paulo de Olivença, Brazil. There were four males in the type series described by Bates. It is similar to *H. amphinome fumosa* but on the DFW the median diagonal band is reduced to four grey spots in a diagonal row. However, in *H. amphinome* the two sexes are very similar, while in *H. belladonna* the sexes are dimorphic and the female has a broad snow-white diagonal median band and is described here for the first time. The identification of female *H. belladonna* from *H. a. amphinome* in the range of *H. belladonna* is difficult. I have seen only two females of *H. belladonna*. They have a prominent white subapical central white spot R_3 & M_2 on the VFW missing in *H. a. amphinome*. The white diagonal median band is broad and has relatively regular proximal edges with the white extending to the base of the fork of M_3 - Cu_1 and the white area of Cu_1 - Cu_2 extending to this fork, instead of to more distal along Cu_1 , as in *H. a. amphinome*.

Biology:

H. belladonna is relatively common in its rather restricted range. It occurs on tree trunks in sunny areas in forests and on tree trunks at the borders of forests. The adults are attracted to excrement bait (Fruhstorfer, in Seitz, 1916) and to washing places in thickets of foliage plants. They produce a loud crackling or rattling sound when flying. Specimens have been collected from January to May and from July to November, and up to 1600 m in altitude.

There are no known reports on the immature stages or host plants.

Specimens Examined: 133 ♂, 2 ♀

COLOMBIA: *Putumayo*, Umbria; *Amazonas*, Florida, Rio Putumayo; PERU: *Loreto*, Iquitos; *Pebas*; *Balsapuerto*; Lower Rio Ucayali; Rio Pacaya; Rio Huánuco; *Pasco*, Rio Pichis 300 m; Pichis Road 1600 m; Rio Palcazu; Chuchurras; *San Martín*, Jepelacio; BRAZIL: *Amazonas*, São Paulo de Olivença; Benjamin Constant; Rio Quichito; *Pará*, or *Amazonas*, Itaituba.

Hamadryas arinome (Lucas) 1853

Figs. 185, 192, 207

H. arinome occurs from Costa Rica to Bolivia, N. Argentina and S. Brazil. It is relatively uncommon except in the Amazon River basin where it may be locally common. It is similar to *H. amphinome* but lacks the red coloration of the VHW, except for small red submarginal ocelli. *H. arinome* is quite variable. There is a distinct nominate subspecies in the Amazon River basin and the Guyanas. There is another distinct subspecies population *ariensis*, from Costa Rica and down the Andes to Bolivia. The species extends to Paraguay, N. Argentina, and S. E. Brazil as another but less distinct subspecies *obnubila*. Fruhstorfer (1916) recognized six different taxa in this species.

Description:

Male. Forewing with R_1 & R_2 arising together or with a single stalk. Radial sector, $r-m_2$ and the bases of m_2 - m_3 are inflated. m_2 - m_3 joins the cubital stalk $\frac{3}{4}$ - $\frac{1}{4}$ distance from junction of Cu_1 & M_3 to Cu_2 . Dorsal surface of wings similar to *H. amphinome* but often brighter blue (or green) and blacker markings. VFW black with diagonal band of white or yellowish submarginal ocellar area markings, red bar in anal area in ssp. *ariensis*.

Male genitalia. Vinculum with very elongated attenuated median posterior projection; gnathos arm broad and flattened; uncus with few barely visible small hairs, saccus very long (5.72-6.60)6.09 mm; valve large (3.52-4.08)3.75 mm; aedeagus very long slightly curving (6.56-7.55)7.02 mm. Rami very long (3.84-4.88)4.58 mm with flat spines scattered along entire length. Posterior lateral margin of sternite with many fairly large flat spines ventral to the rami.

Female. Similar but larger with more rounded wings; diagonal median band of DFW larger and whiter, usually with less dark dusting.

Key to Subspecies of *H. arinome*

Males and Females

- 1a. VFW with relatively broad white diagonal median band, distal white marking with small notch, no subapical white spot; DFW diagonal white band with no dark dusting; VHW with no red bar along anal angle; usually two basal costal red spots (if third present, usually smaller); wing size relatively large. *arinome*
- 1b. Not as above. 2
- 2a. VFW with relatively narrow, white diagonal median band, distal white marking deeply notched or divided into two cells; subapical white spot present (in Panamá, Costa Rica); DFW diagonal white band with some dark dusting (esp. in ♂). VHW usually with red bar along anal angle; three prominent basal costal red spots, most distal spot usually large and elongate; submarginal red spots always prominent, marginal white spots usually present *ariensis*
- 2b. VFW with distal white marking of diagonal median band divided into two; prominent subapical white spot; DFW white diagonal band suffused with dark dusting (esp. in ♂); VHW with two basal costal red spots with prominent dark bar at end of second spot; submarginal red spots may be diffuse to nearly missing, marginal white spots not present. *obnubila*

Hamadryas arinome arinome (Lucas) 1853

Figs. 137-140, 207

- Peridromia arinome* Lucas, 1853:312. TL - "Cayenne." Syntypes - Location unknown.
 = *Ageronia anomala* Strecker, 1876:121. TL - "High up the Amazon." Type - Strecker
 Coll. 4 ♂ in AA, 1 ♂ lectotype, designated (Examined)
 = *Ageronia arinome anomala* (Strecker) Fruhstorfer, in Seitz, 1916:544, Lieferung 228.
 = *Ageronia arinome sterope* Fruhstorfer, in Seitz, 1916:544, Lieferung 228. TL - Brazil,
 Obidos. Syntypes - BM 15-127, 1 ♀ (Examined) (Figs. 139 & 140).
 = *Ageronia arinome arene* Fruhstorfer, in Seitz, 1916:544, Lieferung 228. TL - Eastern
 Peru. Type (Not found in BM nor Berlin Museum Zoology).
 = *Peridromia arene* Fruhstorfer, in Seitz, 1916, pl. 104b, Lieferung 237.
 = *Peridromia arinome* Fruhstorfer, in Seitz, 1916, pl. 104e, Lieferung 237.

Description:

As in *H. arinome* except for characters listed for *H. a. arinome* in key to subspecies. Average wing length ♂ 40 mm, ♀ 42 mm.

Distribution:

H. a. arinome occurs in Colombia, the Guianas, Ecuador, Peru and Bolivia, and in the Amazon basin. It appears to be absent from a large eastern area of Brazil. There are intergrades with *H. arinome ariensis* in Venezuela, Colombia, and Bolivia.

Taxonomy and Variation:

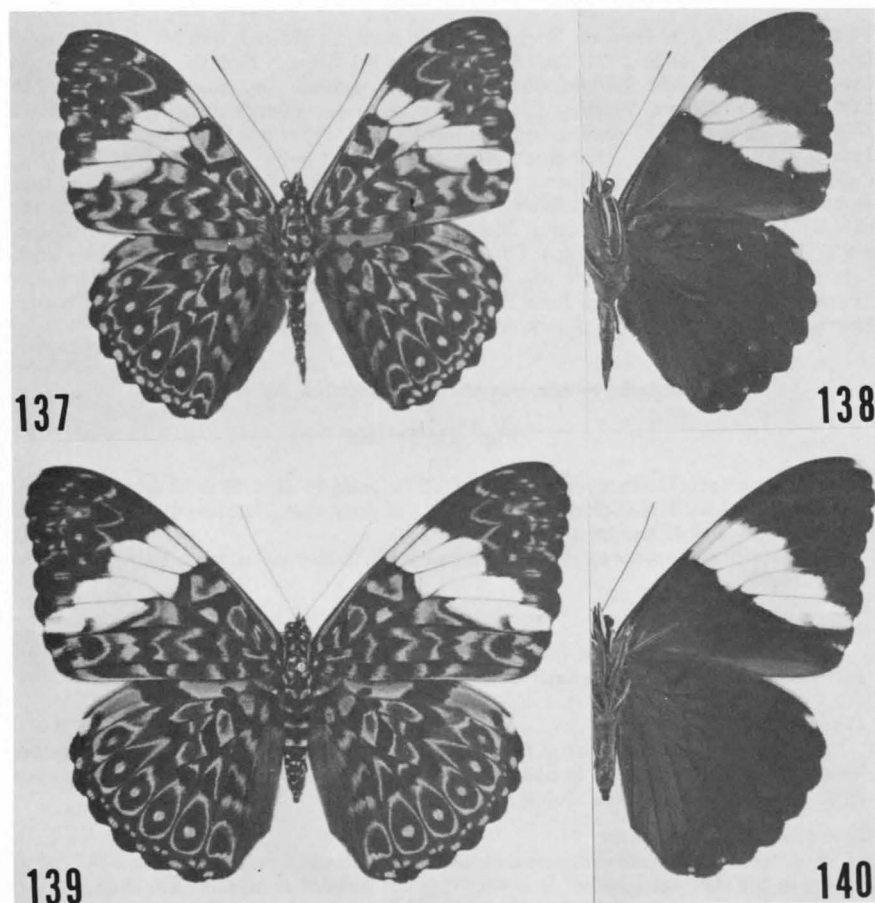
Ageronia anomala was described by Strecker in 1876. In the Strecker Collection at the AA there are four male specimens labeled by Strecker as *Ageronia arinome* of which two are from Pebas, Peru. There are no specimens designated *A. anomala* which from the description is *H. a. arinome*. Apparently Strecker realized his *anomala* was a synonym of *arinome* but never published or noted it in the collection. Dr. Lee Miller and I have designated one of the four males as the lectotype of *A. anomala*. It is a synonym

of *H. a. arinome*. At the Harvard collection a specimen was labeled *Ageronia anomala* Strecker and had a label that it was identified by Strecker as *anomala* and that it was different from *arinome*. The specimen had very large orange-red submarginal spots on the VHW but otherwise is *H. arinome arinome*. Hayward (1973) synonymized *anomala* as a synonym of *Hamadryas arinome*. He did not recognize any subspecies of *arinome*.

The subspecies *sterope* from Óbidos, Brazil and *arene* from eastern Peru are clearly synonyms of *H. a. arinome*. Examination of the "type" ♀ of *sterope* in the BM and series of specimens from the type areas of *arene* show the minor variations on which Fruhstorfer based these subspecies, but these variations occur throughout the range and they are synonymized. They were also considered to be synonyms by Hayward (1964, 1973).

Biology:

The habitat of *H. a. arinome* is similar to *H. amphinome*. Adults occur in deep forest, in partly cut over areas, margins of forests, and forest trails. They are seen on



Figures 137-140. *Hamadryas arinome arinome* (Lucas). ♂ dorsal (137) ventral (138) surfaces. PERU, Huanúco, Tingo María (JC). ♀ dorsal (139) ventral (140) surfaces. BRAZIL, Pará, Óbidos. Syntype, *Ageronia arinome sterope* Fruh. (BM).

tree trunks, especially with sap oozes. When disturbed they usually fly higher in the trees or occasionally fly away and may alight on the ground, especially at the margins of wet places in roads. I have seen 12 adults on one tree with sap oozes at Tingo María, Peru. The adults are aggressive and will fly at an intruder. They alight on tree trunks upside down with wings outspread and then fold the wings upright and may walk sideways around a tree away from an intruder below. They are not as visible as *H. arinome* since they do not alternately flash VHW red areas. They are attracted to fermenting fruit and baits.

Adults have been collected throughout the year with more collected from November-May. They have been found from sea level to over 1,000 m elevation.

There are no known reports on the immature stages or host plants. I observed a female laying eggs on the leaves of an unidentified vine in heavy tropical forest at Explorama Camp, on the Amazon River near Iquitos, Peru.

Specimens Examined: 257 ♂, 125 ♀

FRENCH GUIANA: *Guyane*, St. Laurent; St. Jean du Maroni; Bas Maroni; Nouveau Chantier; "SURINAM"; GUYANA: Upper Kutari River; "British Guiana"; Groete Creek; VENEZUELA: *Bolívar*, Alto Rio Caura, Cuchime; *Amazonas*, Mt. Duida; COLOMBIA: *Putumayo*, Florida, Rio Putumayo; *Meta*, Villavicencio X; ECUADOR: *Napo*, Rio Pano; PERU: *Loreto*, Iquitos; Rio Mazán; Upper Rio Maraón; Quistococha 120 m; Mid Rio Ucuyali; Mishana; Pebas; Upper Rio Huallaga; Rio Nanay, Est. Biol. Callicebus; *Huánuco*, Tingo María; *Pasco*, Pozuzo; *Junín*, La Merced, Satipo, San Luis de Shuaro; Chanchamayo; *San Martín*, Juanjui; *Ayacucho*, Candalosa; *Pasco*, Oxapampa?; BRAZIL: *Amazonas*, Manaus, Rio Negro; Puraquequara; Madeira River; Manacapuru; Tefé; São Paulo de Olivença; Tonantins; Guiana; Maués; Boca do Acre, Rio Purus; Lower Rio Madeira, Manicoré; Rio Purus, Huitanaã; Labrea; *Pará*, Óbidos; Itaituba; "Pará"; Santarém; *Rondônia*, Jaru; BOLIVIA: *Santa Cruz*, Rio Ichilo; Santa Cruz de la Sierra X; GUATEMALA: 1 ♂ (not *arinensis*) Locality record doubtful (In AA).

***Hamadryas arinome arinensis* (Godman & Salvin) 1883**

Figs. 141-144, 207

Peridromia arinensis Godman & Salvin, 1883: 272 (plate 26. figs. 11 & 12 as *arinome*). TL - Panamá, Lion Hill (Colombia, Frontino 1 ♂ Syntype) (Examined). Syntypes - BM Rh 9268, 1 ♂ (Examined) (Figs. 141 & 142).

=*Ageronia arinome ariensis* (Godman & Salvin) Fruhstorfer, in Seitz, 1916:544 [**Lapsus calami**].

Description:

As in *H. arinome* except for characters listed for *H. arinome arinensis* in the key to subspecies. Average wing length ♂ 38 mm, ♀ 38 mm.

Distribution:

H. arinome arinensis occurs from Costa Rica, Panamá, Colombia and western Venezuela south in western Ecuador and Peru to central Bolivia, with intergrades with *H. a. arinome* in Venezuela, Colombia and Bolivia.

Taxonomy and Variation:

The "holotype" male of *Ageronia arinensis* from Panamá in the Godman & Salvin collection in the BM was studied. It is very distinct from *H. a. arinome* but is closer to *H. arinome obnubila*. A small dark male specimen labeled "Yucatán" in the CM collection is *H. arinome obnubila* (found in S. Brazil) and is almost certainly mislabeled. An additional male specimen labeled "Guatemala" in the AA collection is *H. a. arinome* and is also almost certainly mislabeled.

Biology:

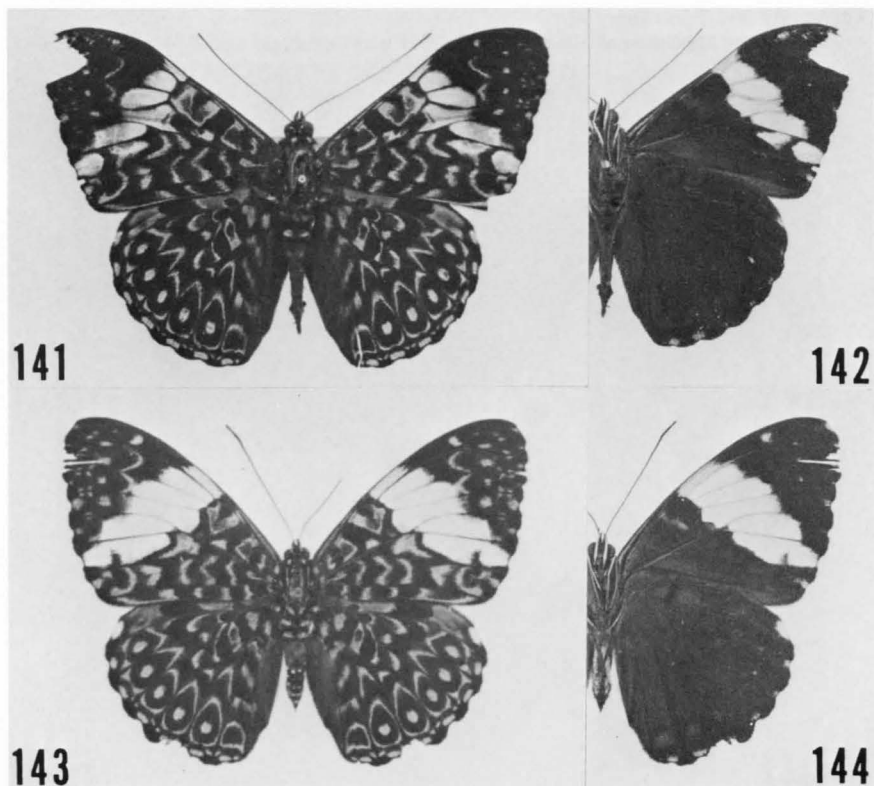
This subspecies occurs in forest areas, at the edges of forests, and in forest roads and trails. It is quite local in its distribution, especially in the northern part of its range. The adults are found on trees with sap oozes and at rotting fruit.

The adults have been collected every month of the year. There are insufficient records to determine if there are any periods of greater abundance. They have been collected from near sea level to an altitude of over 1000 m.

There are no known published reports on the immature stages or host plants.

Specimens Examined: 82 ♂, 19 ♀

COSTA RICA: *Limón*, Puerto Viejo; Puerto Limón, Guápiles; Bribri; Tortuguero; PANAMÁ: *Canal Zone*, Piña; Fort Sherman; Gatún; COLOMBIA: *Antioquia*, Casabe; Frontino; *Santander*, La Soledad; La Lechera; La Lindera; *Cundinamarca*, Bogotá; *Boyacá*, Tunja; *Caldas*, Guamocó; VENEZUELA: *Táchira*, Las Cruces, Colón; La Morita, 300 m; La Fria X, ECUADOR: *Esmeraldas*, Esmeraldas; *Azuay*, Cuenca; PERU: *San Martín*, Juanjui; *Pasco*, Rio Pachitea; *Junín*, Rio Sanibeni, Satipo; *Huánuco*, Tingo María; BOLIVIA: *Santa Cruz*, Cuatro Ojos; Province del Sara; Rio Yapacani 600 m; Rio Surutú 350 m; Buenavista 400 m.



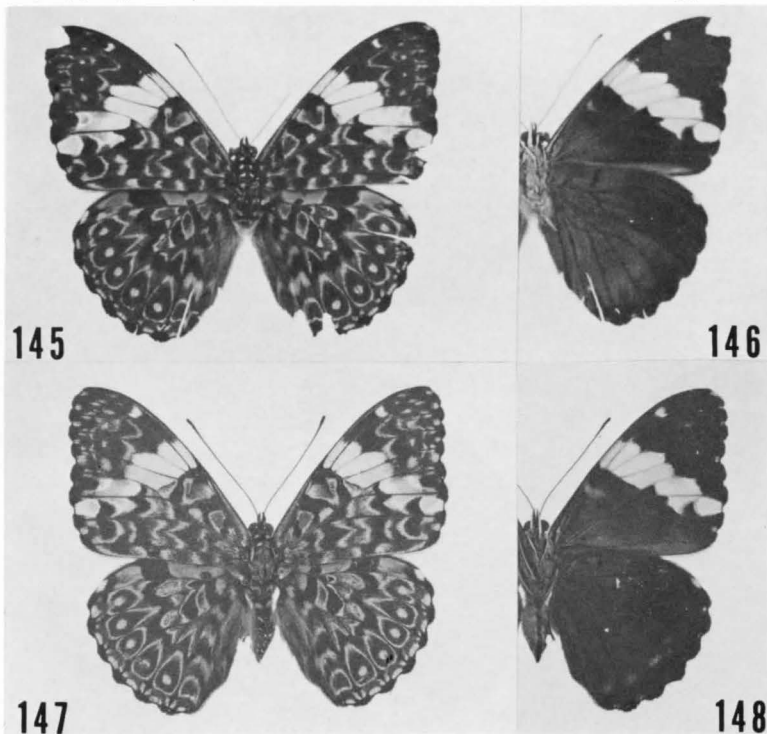
Figures 141-144. *Hamadryas arinome arienis* (Godman & Salvin). ♂ dorsal (141) ventral (142) surfaces. PANAMÁ, "Lion Hill." Syntype, *Peridromia arienis* Godman & Salvin (BM). ♀ dorsal (143) ventral (144) surfaces. PANAMÁ, *Canal Zone*, Gatun (JC).

Hamadryas arinome obnubila (Fruhstorfer) 1916

Figs. 145-148, 207

Ageronia arinome obnubila Fruhstorfer, in Seitz, 1916:544. TL - Brazil, Espírito Santo.

Type - BM 15-128. 1 specimen, abdomen missing (Examined) (Figs. 145 & 146).

=*Ageronia arinome obnubila* (Fruhstorfer) Hayward, 1964:88 [*Lapsus calami*].*Description:*As in *H. arinome* except for characters listed for *H. arinome obnubila* in the key to subspecies. Average wing length ♂ 38 mm, ♀ 38 mm.*Distribution:*The subspecies *obnubila* Fruhstorfer occurs in southeastern Brazil, Paraguay, and northern Argentina with an intergrade with *arinensis* in Bolivia. A very small dark old specimen labeled "Yucatán" Mexico (Gammer Coll.) from the F. W. Klages Coll., Ehrmann Coll. now in the Carnegie Museum Collection, is a typical but very small specimen of *H. arinome obnubila*. This is certainly a mislabeled specimen and is not recognized as a valid locality record.*Taxonomy and Variation:*A syntype specimen of *obnubila* in the BM was examined and it is typical of series

Figures 145-148. *Hamadryas arinome obnubila* (Fruh.) ♂ dorsal (145) ventral (146) surfaces. BRAZIL, Espírito Santo. Holotype, *Ageronia arinome obnubila* Fruh. (BM). ♀ dorsal (147) ventral (148) surfaces. BRAZIL, Espírito Santo, Linhares (AA).

of specimens of this region. There is some variation in the presence or absence of submarginal red spots on the VHW. Hayward (1964) designated *obnubilia* [sic.] as a synonym of *H. arinome*.

Biology:

Specimens have been collected from May to September. Most of the localities where it occurs are at low altitudes but they have been collected in areas 200 to 600 m in elevation.

There are no known published reports on the immature stages or host plants.

Specimens Examined: 17 ♂, 8 ♀

BRAZIL: *Bahia*, Itamarajú, 2 ♂, Sept. AA; *Espírito Santo*, Linhares, 4 ♂ 3 ♀, May, KB; 8 ♂ 5 ♀, Jun.-Aug., Oct. AA; No specific locality, "TYPE" - no abdomen, BM; *Minas Gerais*, Palma, 1 ♂ BM; *Mato Grosso* 1 ♂ BM; *Rio de Janeiro*, Checara Gondola; Rio Gavea; Rio de Janeiro, 1 ♂ BM; Corcovado; PARAGUAY, No locality (Hayward, 1973); ARGENTINA, *Misiones* (Hayward, 1973).

***Hamadryas laodamia* (Cramer) 1777**

Figs. 186, 192, 208

Hamadryas laodamia has been known commonly as *H. arethusa* Cramer. In 1775 (Vol. 1, pl. 77, fig. e-f, p. 122) Cramer described the male as *Papilio arethusa*. Denis & Schiffermüller (1775) used the same name for another *Papilio*. The International Commission on Zoological Nomenclature (1958) Opinion 516 gave precedence to the Denis & Schiffermüller name so that *arethusa* Cramer, 1775 became a junior homonym.

Cramer in 1776, Vol. 1, page 151 in the index of plates, used *Papilio arethuza* which is a *lapsus calami*. This name could be used following dates given in Cowan (1967) and Heppner (1982). However, Cramer (by Stoll, 1782) in Vol. IV in the supplement p. 8 again used *Papilio arethusa* showing that the original spelling was correct and that *arethuza* was a *lapsus calami*. This interpretation could be argued and may require an action of the International Commission on Zoological Nomenclature.

The next available name is *Papilio laodamia* Cramer (1777) based on the female of the same species also from Surinam.

The range of *H. laodamia* is from Mexico to southern Brazil and Argentina. There are two distinctive subspecies, the nominate form occurs from Venezuela and Colombia to Bolivia and to northern Argentina, and southern Brazil. The subspecies *saurites* occurs from middle Mexico to Colombia and Venezuela where a zone of intergradation occurs. In the extreme south of the range of *laodamia* there is a slight amount of variation with some *saurites* characters appearing to a degree such as dark shining wing color and the ♀ VHW with more red markings.

Description:

Male. Forewing with R_1 & R_2 with a single stalk. Radial sector and $r-m_2$ are inflated. m_2-m_3 joins cubital stalk $\frac{1}{3}$ distance from junction of Cu_1 & M_3 to Cu_2 . DFW black with a mosaic of bright blue spots and markings, median area black with few larger spots. DHW with brown basal area (sex patch) and remainder black with blue spots. VFW black with broad brown posterior patch. VHW with red submarginal and anal spots and an anal bar, and three red basal spots.

Male genitalia. Vinculum with posterior median projection; forearm of gnathos elongate, awl-shaped narrowly attenuated, curved and slightly flattened; uncus barren with no hairs; saccus (3.52-5.31)5.08 mm; valve with a median lip or projection at crista (2.72-3.04)2.85 mm; aedeagus very curved (5.23-7.47)7.0 mm. Rami short (0.84-1.72)1.45 mm with flat spines along entire length. Posterior lateral margin of sternite with four or five medium sized flat spines ventral to rami.

Female. Upper wings similar to male except for a diagonal median white or yellowish band. DHW with reddish basal markings and no brown sex patch. VFW black with white or yellowish diagonal median band. VHW black with red submarginal and anal spots and three red basal spots.

Key to Subspecies of *H. laodamia*

Males.

- 1a. Wings very black, sometimes iridescent blackish purple; VFW with apical area black; VHW with two to four submarginal red spots; relatively smaller in size. *saurites*
- 1b. Wings smoky black or dark brown, rarely iridescent (except S. Brazil); VFW with apical area lighter in color; VHW with submarginal red spots larger and more intensely circled by black. *laodamia*

Females.

- 1a. DFW yellowish to yellow median diagonal band, narrower usually ending in a point; VFW dark black, often shining black, VHW with two (or one) red submarginal spots costad from M_2 *saurites*
- 1b. DFW with white to light yellowish broader median diagonal band; VFW usually dull black with lighter apical area; VHW with no red submarginal spots costad from M_2 (except S & E Brazil). *laodamia*

***Hamadryas laodamia laodamia* (Cramer) 1777 [Stat. rev.]**

Figs. 149-152, 208

Papilio arethusa Cramer, 1775: Vol. 1, p. 122, pl. 77, figs. e-f. ♂. This is the male of *laodamia*, but is a junior homonym of *Papilio arethusa* [Denis & Schiffermüller] 1775 by action of the International Commission on Zoological Nomenclature 1958: Opinion 516. TL - Surinam. Type - Location unknown (Coll. N. L. Burmannus).

=*Papilio arethusa* Cramer, 1776: Vol. 1, p. 151 [**Lapsus calami**]

Papilio laodamia Cramer, 1777, Vol. 2, p. 49, 149, pl. 130, Fig. a ♀ TL - Surinam. Type - Location unknown.

=*Ageronia arete* Doubleday 1847:83, t. 10, f. 3 (♀ only *nec* Cramer). TL - Brazil. Syntypes - Location unknown. (Not found in BM) [♀ **Misdet.**]

=*Ageronia arethusa thearida* Fruhstorfer, in Seitz, 1916:545 (English ed.), Lieferung 228. TL - Peru, Pozuzo ("Bolivia"). Syntypes - "Type in Coll. Fruhstorfer", Not found in BM nor Berlin Museum Zoology [**Syn. nov.**]

=*Ageronia arete ortygia* Fruhstorfer, in Seitz, 1916:545 (♀ only *nec* Cramer). TL - Brazil, Bahia (Salvador). Syntypes - BM 15-130, 1 ♀ (Examined) [♀ **Misdet.**]

=*Peridromia thearidas* Fruhstorfer, in Seitz, 1916: pl. 104b. Lieferung 237. [**Lapsus calami**].

Description:

As in *H. laodamia* except for characters listed for *H. l. laodamia* in the key to subspecies. Average wing length ♂ 37 mm, ♀ 38 mm.

Distribution:

H. l. laodamia occurs from the Guianas to the Andes in Colombia and south to Bolivia and southern Brazil, with an outlier record at Concepcion del Uruguay in Entre Rios, Argentina about 1,200 km from the nearest other known record. Intergrades with *H. laodamia saurites* occur in northern Venezuela and northwestern Colombia.

Taxonomy and Variation:

Ageronia arethusa thearida Fruhstorfer was described as a subspecies from Pozuzo, Peru, based on larger size, more light blue spots on the wings, and more promi-

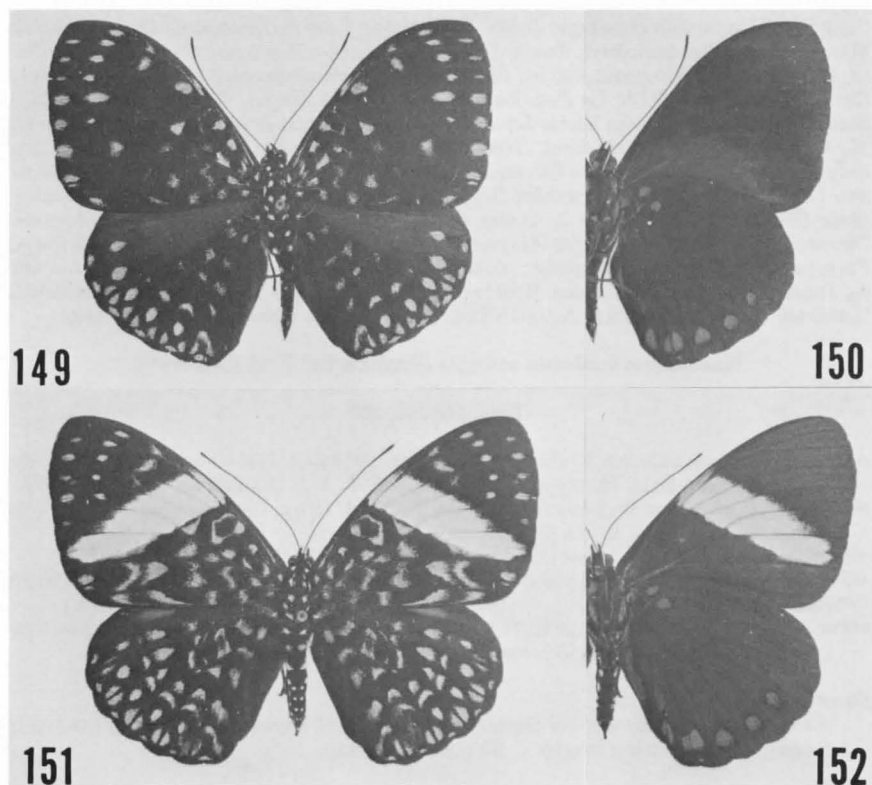
nent red submarginal spots on the VHW. These characters are variable and study of the figure in Fruhstorfer, in Seitz (1916) pl. 104b and series of specimens from the type locality region show that *thearida* is typical *H. l. laodamia*.

The syntypes of *Ageronia arete ortygia* Fruhstorfer were examined in the BM. The female type from Bahia, Brazil is a ♀ *H. l. laodamia*. The female of *Ageronia arete* Doubleday (1847) 83, t. 10, f. 3 is also a ♀ *H. l. laodamia*. These are readily identified by the red longitudinal bars or stripes in the anal cell of the VHW absent in *arete*. It is interesting that some specimens of ♀♀ from SE Brazil are smaller and have additional red markings anterior to C_2 on the VHW and yellower and narrower median diagonal bands on the VFW similar in part to *H. laodamia saurites*. Some males also have some *saurites* markings but it is variable. These *saurites* type characters are geographically intermingled with *laodamia* characters and both occur in the same locality so that no separate subspecies was recognized for this region.

Ageronia arethusia form *palliolata* Fruhstorfer, in Seitz (1916) is the misidentified normal ♀ of *H. velutina* which I corroborated by collecting a pair of *H. velutina* in copula in Peru. This is further discussed under *H. velutina*.

Biology:

This subspecies is relatively uncommon, but may be locally common in some localities. It occurs in forested and cut over areas, at the edge of forests, and in forest



Figures 149-152. *Hamadryas laodamia laodamia* (Cramer). ♂ dorsal (149) ventral (150) surfaces. PERU, Huanúco, Tingo María (JC). ♀ dorsal (151) ventral (152) surfaces. PERU, Huanúco, Tingo María (JC).

roads. Adults may be found on tree trunks, especially ones injured by beetle boring with fermented sap flows, on concrete posts, and on rotting fruit and fruit baits. They are rarely aggressive in flight and have not been observed to fly at a person. They usually remain out of reach, but may move down a tree trunk after a period of time. They will also follow a thrown stone downward as it falls. They sit quietly on a tree trunk and occasionally wave their wings. They are fast fliers but I have not heard them produce crackling sounds.

Adults have been collected in all months of the year and appear to be most common from March to July. They are found from sea level to over 1,450 m in altitude.

There are no known reports on the immature stages or host plants, but there is a brief reference to the immature stage of *arethusia* in Brazil by Müller (1886).

Specimens Examined: 257 ♂ 78 ♀

COLOMBIA: *Cundinamarca*, Bogotá; *Santander*, El Centro; Landázuri; *Meta*, Villavicencio; *Valle del Cauca*, Cali; *Putumayo*, Umbria; SURINAM: "No locality"; FRENCH GUIANA: "No specific locality" (Cramer, 1777); ECUADOR: *Morona-Santiago*, Macas; Oriente; *Napo*, Rio Misahualli; Rio Napo; *Los Rios*, Quevedo; *Azuay*, Cuenca; *Manabí*, La Unión; *Esmeraldas*, Esmeraldas X; PERU: *Loreto*, Iquitos; Yurimaguas; Rio Santiago; Achinamiza; Pebas; Cabalococha; *San Martín*, Juanjui, Rioja; Jepelacio; Tarapota; Moyobamba; *Huánuco*; Tingo María; Rio Lullapichis; Panguana; Upper Rio Huallaga; *Junín*, Satipo; San Luis de Shuaro; Chanchamayo; La Merced; *Puno*, Rio Inambari; *Passo*, Pozuzo; *Ayacucho*; Rio Apurímac, Luisiana; *Cuzco*, Quillabamba; Pilcopata, 600 m; Rio Urubamba, Sangobatea; *Madre de Dios*; Boca Rio La Torre; BOLIVIA: *La Paz*, La Paz 1200 m; Rio Mapiri, Guanay; Apolobamba; Sorata; *Santa Cruz*, Buena Vista; Ichilo 400 m; Santa Cruz; Prov. del Sara; Rio Surutú; Mineros X; Cuatro Ojos; *Beni*, Itinez; BRAZIL: *Amazonas*, Tefé; Rio Solimões; Manaus; Maués; São Paulo de Olivença; Itacoatiara; *Pará*, Óbidos; Cameté; *Maranhão*, Sao Luis; *Goiás*, Goiás; Maranhão; Rondônia, Aliança, Santo Antônio; *Bahia*, Bahia; *Mato Grosso*, Cuiabá; Buriti X; Barra do Bugres a Tangará; Sao Vicente; Chapada; Diamantino X; Campo Grande; *Alagoas*, Maceio, *Minas Gerais*, Parque do Rio Doce; Paraopeba; *São Paulo*, Araçatuba; Anhangá; Mendes; São Paulo; *Rio de Janeiro*, Rio de Janeiro; Santo Antônio dos Brotos; Teresópolis; *Espírito Santo*, Baixo Guandú; Linhares; Santa Leopoldina; ARGENTINA: *Entre Rios*, Concepción del Uruguay.

Hamadryas laodamia saurites (Fruhstorfer) 1916 [Stat. rev.]

Figs. 153-156, 208

- Ageronia arethusia saurites* Fruhstorfer, in Seitz, 1916:544, Lieferung 228. TL - Honduras, San Pedro Sula. Syntypes - BM 15-129 1 ♂, 1 ♀ (Examined) (Figs. 153-156).
 = *Peridromia arethusia* Fruhstorfer, in Seitz, 1916: pl. 104 a, Lieferung 237. (♀ *saurites* is labeled "*arethusia* ♀" in plate)
 = *Peridromia arethusia* (Cramer) Godman & Salvin, 1883; 270-271 (*partim*).
 = *Peridromia arete* Lucas, 1853:310 (*nec* Doubleday), TL - none. Syntypes - Paris [Misdet.]
 = *Peridromia arete* Boisduval 1870:27 (*nec* Doubleday). TL - Mexico and Honduras. Syntypes (Not found in BM) [Misdet.]

Description:

As in *H. laodamia* except for characters listed for *H. laodamia saurites* in the key to subspecies. Average wing length ♂ 33 mm; ♀ 36 mm.

Distribution:

H. laodamia saurites occurs from middle Mexico through Central America to Colombia and northern Venezuela to Trinidad. There is a zone of intergradation in northwestern Colombia and northern Venezuela.

Taxonomy and Variation:

The ♂ and ♀ syntypes of *Ageronia arethusa saurites* Fruhstorfer were examined in the BM and they are typical of series of specimens in Mexico and Central America.

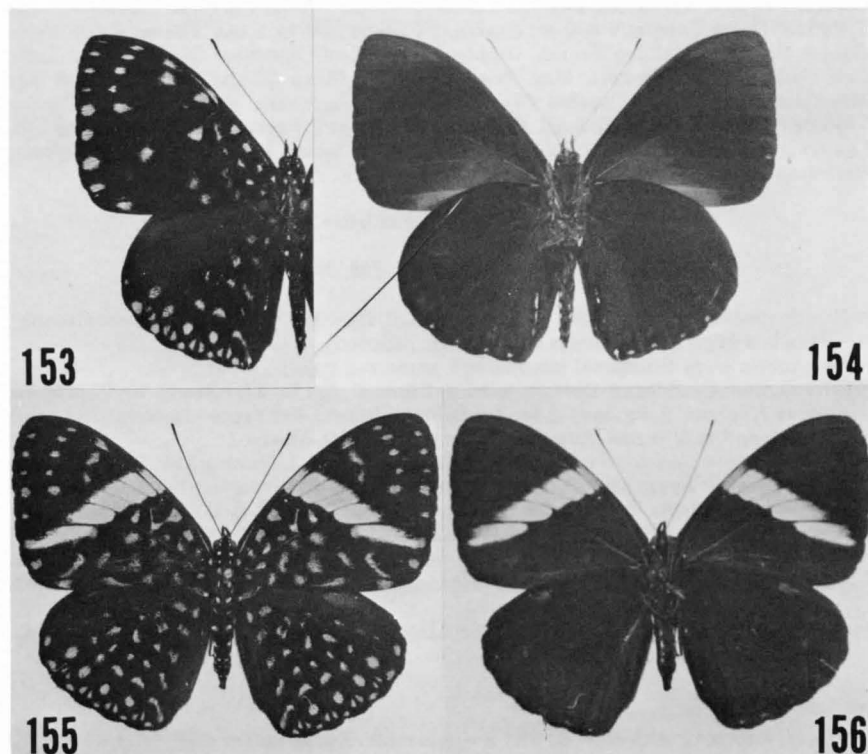
Specimens with some *saurites* characters especially in females occur at Óbidos and Bahia, Brazil and also Linhares in Espírito Santo and at São Paulo. These characters are variable and may or may not be present in specimens from the same locality.

There has been confusion with the very distinct *H. arete*, especially the females. This is also due to Doubleday describing *arete* from Brazil when Boisduval's earlier unpublished name *arete* was meant for Central American *laodamia*.

Biology:

The adults are found in tropical forest and occur in forested and cut over areas, mostly on tree trunks and sometimes on roads. They are attracted to rotting fruit and fruit baits. They have the same habits as *H. l. laodamia*. I have not heard them make cracking noises in flight, but Lee Miller and S. Swihart (personal communication) report hearing them produce noise.

Specimens have been collected throughout the year and appear to be most common from June to October in the Central America and Mexico region and have been collected more often in October to February in northern South America and Trinidad. They have been found from sea level to over 1,200 m.



Figures 153-156. *Hamadryas laodamia saurites* (Fruh.) ♂ dorsal (153) ventral (154) surfaces. HONDURAS, Cortés, San Pedro Sula. Syntype, *Ageronia arethusa saurites* Fruh. (BM). ♀ dorsal (155) ventral (156) surfaces. HONDURAS, Cortés, San Pedro Sula. Syntype, *Ageronia arethusa saurites* Fruh. (BM).

There is no known description of the immature stages.

Food Plants:

Dalechampia scandens (L)

In Costa Rica

Euphorbiaceae

DeVries (1982)

Specimens Examined 186 ♂, 105 ♀

MEXICO: Veracruz, Tierra Blanca; Dos Amates; Los Tuxtlas; Córdoba; Presidio; San Juan Evangelista; El Chapo; Catemaco; Playa Azul; Jalapa; Santa Rosa; Motzorongo; Tezonapa; Poza Rica; Oaxaca, Chiltepec; Tuxtepec; Chimalapa; Comaltepec; Temascal; La Esperanza; Palomares; Soyolapán; Rio Jaltepec; Tabasco, El Manglar; Teapa; Tepescuintle; Chiapas, San Quintín; Mapastepec; Bonampak; Palestina; Palenque; Pichucalco; San Jerónimo; Pueblo Nuevo; Yaxchilán; Juárez; Santa Rosa; BELIZE: Middlesex, Stann Creek Dist.; Rio Hondo; W. Belize; Toledo, Rio Grande; GUATEMALA: Santa Rosa, Guazacapán; Baja Verapaz, San Jerónimo; Alta Verapaz, Tamahú; El Petén, Sayaxché, Escuintla, Escuintla, El Salto; Izabal, Cayuga; HONDURAS: Cortés, San Pedro Sula; El Jaral; NICARAGUA: Rio San Juan, Chontales; COSTA RICA: Cartago, Turrialba; San José, Carillo, Puntarenas, Palmar Norte; Villa Neily; San Vito; Limón, Guápiles; Santa Clara; Cairo; Heredia, Heredia; PANAMÁ: Chiriquí, Cerro La Galera; Bugaba; Veraguas, Ballena; Herrera, Chepo 650 m; Panamá, Cerro Jefe; Rio Trinidad; Cerro Campana 800 m; Darién, El Llano 300 m; Cana 400 m; Canal Zone, Gatún; Summit; Madden Forest; Gamboa; Piña; Las Cascadas; COLOMBIA: Valle, Cali; Cundinamarca, Bogotá; Mts. Bogotá; Boyacá, Muzo; Tunja; Tolima, Melgar; Rio Magdalena; Antioquia, Casabe; César, Manaure; Santander, Rio Suárez; El Centro; VENEZUELA: Distrito Federal, Caracas; Anzoategui, Puerto de la Cruz; Carabobo, Las Quiguas; Yaracuy, Aroa; Zúlia, Sierra Perijá; Táchira, La Morita 300 m; Barinas, Barinitas 625 m; TRINIDAD: Marvel; Maupert; St. Ann's.

Hamadryas arete (Doubleday) 1847

Figs. 157-160, 187, 192, 209

=*Papilio arethusa* Drury 1782, p. XIV and pl. 8, figs. 1 & 4, & p. 9 & 10 (*nec* Cramer).

This is a typical ♂ *H. arete* from Brazil. [Misdet.]

=*Peridromia arete* Boisduval (manuscript name not valid).

Ageronia arete Doubleday 1847:83, t. 10, f. 2 (*nec* ♀, fig. 3). TL - Brazil, No locality (♂ fig. is *H. arete*, ♀ fig. is *H. l. laodamia* (*nec* Cramer). Syntypes - Location unknown (Not found in BM nor Museum Zoology Berlin) [♀ Misdet.].

=*Ageronia arete alpheios* Fruhstorfer, in Seitz, 1916:545, Lieferung 228. TL - Paraguay (& S. Brazil). Syntypes - BM, 1 ♂ from Paraguay (Examined). (Figs. 157 & 158).

=*Peridromia alpheios* Fruhstorfer, in Seitz, 1916:pl. 104a, ♂ & ♀; Lieferung 237.

=*Ageronia arete f. alpheis* (Fruhstorfer) Köhler, 1923; 18:sond. 25 [Lapsus calami].

=*Ageronia arete ortygia* Fruhstorfer, in Seitz, 1916:545, Lieferung 228. TL - Brazil, Bahia. Syntypes - BM 15-130, 1 ♂ (Examined). 1 ♀ (Examined). ♀ is *H. l. laodamia* (*nec* Cramer) [♀ Misdet.] [Syn. nov.]

=*Hamadryas arete ortygia* (Fruhstorfer) Hayward, 1964:89 (♀ *nec* Cramer, synonymized as *H. arete*) [♀ Misdet.].

Description:

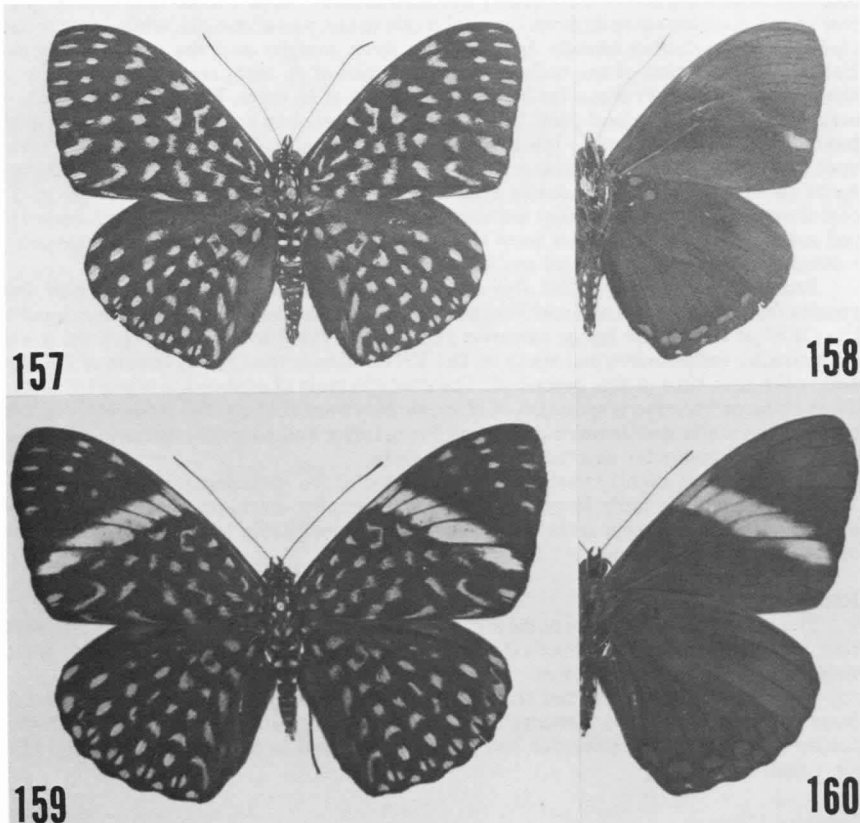
Male. Forewing with R_1 & R_2 with a single stalk. Radial sector and $r-m_2$ are inflated. m_2-m_3 joins cubital stalk $\frac{1}{4}$ or less distance or at junction of Cu_1 and M_3 to Cu_2 . DFW similar to *H. velutina* but larger blue spots, DHW similar to *H. velutina*, but relatively narrow brown sex patch, VFW grey-black with posterior brown sex patch, a bright blue diagonal median band or blue spots on band and in outer band area. VHW grey-black with three basal and submarginal red spots. Average wing length 35 mm.

Male genitalia. Vinculum with rather pointed prominent median posterior projection; forearm of gnathos elongate awl-shaped narrowly attenuated, curved and slightly flattened; uncus barren with no hairs; saccus 3.88 mm; valve 2.88 mm, aedeagus curved 5.2 mm. Rami short (1.2 mm) pubescent with several small flat spines near apex. Posterior lateral margin of sternite with seven to nine large flat spines, over one half the length of the rami.

Female. Upper surface similar to *H. velutina* but median diagonal band on DFW narrower and dissected by black veins with the terminal segment separate; DHW with reddish anterior costal markings. VFW pale greyish with broken median diagonal band. VHW greyish with three basal and five submarginal red spots with no anal bars or spots. Average wing length 38 mm.

Distribution:

H. arete occurs from Bahia, Brazil to Paraguay, northern Argentina and southern Brazil. Records from Cayenne, French Guiana and Chanchamayo, Peru are doubtful and need to be confirmed by recent collection.



Figures 157-160. *Hamadryas arete* (Doubleday). ♂ dorsal (157) ventral (158) surfaces. "PARAGUAY". Syntype, *Ageronia arete alpheios* Fruh. (BM). ♀ dorsal (159) ventral (160) surfaces. BRAZIL, Santa Catarina, "St. Cath." (Holland Coll. CM).

Taxonomy and Variation:

H. arete was described by Doubleday (1847) based on fig. t. 10, f. 2 of a male from Brazil (which is *H. arete*) and fig. t. 10, f. 3 of a female from Brazil (which is actually *H. l. laodamia* nec Cramer). I designate the figure of the male as the holotype of *H. arete* and the figure of the female a synonym of *H. l. laodamia* Cr. The name *arete* is based on an earlier manuscript name *Peridromia arete* Boisduval, who in 1870, published "*Peridromia arete* Boisd. non DD" and stated that Doubleday in place of publishing his *arete* showed a male from Brazil. As Godman & Salvin (1883) point out, Boisduval's earlier name was only in manuscript so that the Doubleday (1847) assignment must hold good. *P. arete* Boisduval (1870) becomes a synonym of *H. laodamia saurites* Fruhstorfer.

Fruhstorfer, in Seitz (1916) mistakenly states that "*A. arete*, a relatively common species, replaces *A. arethusa* in Central and South Brazil." Fruhstorfer unfortunately mixed the female of *H. l. laodamia* with *H. arete* and described a synonym of *H. laodamia* which he named *Ageronia arete ortygia* Fruhstorfer, in Seitz (1916). The description is: "Habitus smaller than that of *arete*. Male beneath with obsolete red basal and submarginal dots of the hindwings. Female, white oblique band of the forewings of a purer white and especially distally much more extensive than in *arete* and *alpheios*. Hindwing above more neatly speckled in blue. Under surface: the submarginal row of red maculae extends from the anal angle to the costal margin, while in *arete* and *alpheios* it terminates already between the inner margin and the anterior median. Bahia." Examination of the male and female types of *A. arete ortygia* Fruhstorfer in the BM shows that Fruhstorfer had a typical male of *H. arete*. However, the female of *ortygia* is typical *H. l. laodamia*. The female of *H. arete* has a whitish diagonal median band on the DFW divided by black veins which terminates distally in a separate white spot instead of being a continuous white stripe as in *H. laodamia*. The red submarginal spots on the VHW in *H. laodamia* from this region extend from the anal angle to the costal margin (from M_2 - M_3 there are very small red dots in black spots). In *H. arete* the red submarginal spots extend from the anal angle to M_2 - M_3 . Fruhstorfer apparently missed observing the red spots and bars in the anal cell and 2A-3A.

Fruhstorfer, in Seitz (1916) also described *Ageronia arete alpheios* as a new subspecies from southern Brazil and Paraguay based on the white diagonal median band of the DFW of the female being narrower and more divided by broader black veins and with smaller red submarginal spots on the VHW. This is the typical female of *H. arete* and is the first time it was described. The syntype male of *alpheios* is typical *H. arete*. Thus *alpheios* becomes a synonym of *H. arete*. Hayward (1964, p. 89) incorrectly included both the males and females of *ortygia* Fruhstorfer and correctly males and females of *alpheios* Fruhstorfer as synonyms of *H. arete*.

The species is slightly variable in the amount of red submarginal markings on the VFW. These may be fairly large and paler red, to smaller markings with darker red color. There does not appear to be any geographical relationship to this variation and no subspecies are recognized.

Biology:

The adults are common in some areas of S. Brazil. They are attracted to baits of rotting fruit. They are rare in Poços de Caldas, Minas Gerais, Brazil (Ebert, 1969) where they occur in low primary forest.

Adults have been collected throughout the year being more commonly collected from February to August. Females have been found from June to October. The species occurs mostly at lower altitudes but has been collected in localities at 600-1200 m in elevation.

Immature Stages:

The egg, all five larval instars and the pupae have been described in Brazil by Müller (1886). The sculptured eggs are laid singly and the larvae are solitary. The mature larval characters are shown in the larval key.

The mature larva of *H. arete* (as *Ageronia arete alpheios* Fruh.) was briefly described from Paraguay or S. Brazil in Fruhstorfer, in Seitz (1916).

Food Plants:

<i>Dalechampia</i> sp. In Brazil	Euphorbiaceae	Müller (1866)
<i>Dalechampia</i> sp. In Brazil	Euphorbiaceae	Costa Lima (1936)

Specimens Examined: 156 ♂, 31 ♀

FRENCH GUIANA: Cayenne (Locality probably in error);
PERU: *Junín*, Chanchamayo (Locality probably in error);
BRAZIL: *Mato Grosso*, Nioaque; *Minas Gerais*, Parque Rio Doce; São Jacinto, Vale; Sabará; Poços de Caldas X; *Espírito Santo*, Linhares; *Paraná*, Castro; Iguaçú; Riberão Azul; "N. Paraná": Caviúna; Rolândia; *Goiás*, Serra Dourada; *Distrito Federal*, Brasília; *São Paulo*, São Paulo; Anhangai; Rio Paraná; Bauru; Indiana; Araçatuba; Araras; *Santa Catarina*, "St. Catherines"; Blumenau; *Rio de Janeiro*, Rio de Janeiro; Corcovado; Mendes; Asilo, São Clemente; Teresópolis; Nova Friburgo; Tijuca; Santo Antônio dos Brotos; Petrópolis; PARAGUAY: *Caaguazú*, Yhú; "Paraguay"; ARGENTINA: *Misiones* X, no locality (Hayward, 1964).

***Hamadryas velutina* (Bates) 1865**

Figs. 188, 192, 209

H. velutina was considered rare and restricted in range to the upper Amazon by Fruhstorfer, in Seitz (1916). It is now known to occur in the Amazon basin from the source to the headwaters in S. W. Colombia, Ecuador and Peru. It also occurs in Guyana and in Mato Grosso, Brazil near the Bolivian border. The recently discovered Mato Grosso population is described as a new subspecies with intergrades from Iquitos, Peru to Tefé, Brazil.

Description:

Male. Forewing with R_1 & R_2 with a single stalk. Radial sector & $r-m_2$ are inflated, m_2-m_3 joins cubital stalk less than $\frac{1}{4}$ distance to Cu_2 or at junction of Cu_1 and M_3 .

DFW deep blue-black with about seven rows of bright blue spots and markings rather evenly distributed. DHW with black basal sex patch. The remainder with deep blue-black with bright blue markings. VFW with steely blue iridescence with black-brown sex patch, VHW with steely blue iridescence with two or three basal and a series of red submarginal markings.

Male genitalia. Vinculum with prominent median posterior projection; forearm of gnathos elongate, awl-shaped and narrowly attenuated and curved and slightly flattened; uncus with sparse very small hairs; saccus (3.8-5.2)4.50 mm; valve (2.80-3.08)2.94 mm; aedeagus very curved 5.08 mm. Rami elongate (2.08-2.28)2.18 mm, pubescent with flat spines only on enlarged terminal area. Posterior lateral margin of sternite with three to seven very large flat spines (1.0 mm) ventral to rami.

Female. DFW black with bright blue spots, and a whitish or yellowish diagonal median band. DHW black with bright blue markings and no reddish costal areas. VFW with grey-black and a yellowish or white diagonal median band. VHW grey-black with three basal and five or six submarginal red spots.

Key to Subspecies of *H. velutina*

- 1a. Male VFW without iridescent light blue postmedian markings in M_3-Cu_2 ; VHW with only two basal red spots, with no red spot in discal cell (or in in-

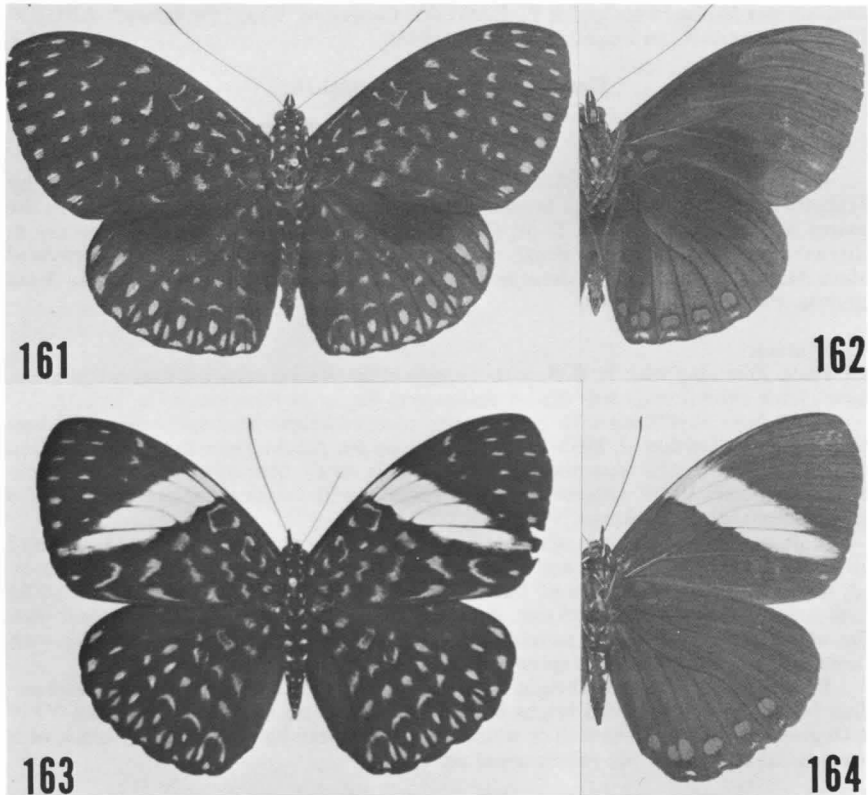
- tergrades rarely a very small red spot); submarginal red spots in M_3-Cu_2 , relatively flattened baso-distally; Female DFW and VFW usually with yellowish postmedian diagonal band with widest area 6 mm. *velutina*
- 1b. Male VFW with iridescent light blue thin postmedian cross bands or spots in M_3-Cu_2 ; VHW with three large basal red spots including a prominent red spot in discal cell; submarginal red spots in M_3-Cu_2 and especially Cu_1-Cu_2 elongated baso-distally, being triangular on basal margin; Female DFW and VFW with white postmedian diagonal band, with widest area 5 mm. *browni*

Hamadryas velutina velutina (Bates) 1865 [Stat. rev.]

Figs. 161-164, 209

Ageronia velutina Bates, 1965: 315. TL - Brazil, Amazonas, São Paulo de Olivença. Syntypes - BM Type No. Rh. 9270. 1 ♂ (Examined) (Figs. 161 & 162.).

=*Ageronia arethusa palliolata* Fruhstorfer, in Seitz, 1916:545. TL - Brazil, Obidos. Syntypes - BM 15-130, 1 ♀ (Examined) [♀ Syn. nov.] (Figs. 163 & 164).



Figures 161-164. *Hamadryas velutina velutina* (Bates). ♂ dorsal (161) ventral (162) surfaces. BRAZIL, Amazonas, São Paulo de Olivença. Syntype, *Ageronia velutina* Bates (BM). ♀ dorsal (163) ventral (164) surfaces. BRAZIL, Pará, Óbidos. Syntype, *Ageronia arethusa form palliolata* Fruh. (BM).

Description:

As in *H. velutina* except for differences listed for *H. v. velutina* in the key to subspecies. Average wing length ♂ 37 mm, ♀ 38 mm.

Distribution:

H. v. velutina is found in the Amazon basin from the source (and in Guyana) to some of the headwaters of the Amazon River in southern Colombia, Ecuador and Peru south to Chanchamayo.

Taxonomy and Variation:

I have examined the "type" male of *H. velutina* in the BM and it is typical with other *velutina*. There is some variation in the size and color of the red submarginal spots on the VHW. The female of *H. velutina* was described as *Ageronia arethusa* form *palliolata* by Fruhstorfer. I have examined a female labeled "type" in the BM and it is typical *H. velutina* when compared with 34 other females I have identified as *velutina*, and becomes a synonym. Comparison of the female I caught in copula with a male of *H. velutina* provides final confirmation of this synonymy.

Biology:

Adults are found in heavy tropical evergreen forest, mostly along rivers. They occur in both sunny openings and in darker forest. Fruhstorfer, in Seitz (1916) states that *H. velutina* was reported "at places for washing, the basins of which were constructed in the thicket of foliage plants." It is attracted to excrement bait on the ground. I have not heard it make crackling sounds and Fruhstorfer, in Seitz (1916) also states that it has not been heard to rattle.

A pair of *H. velutina* was observed resting on a large tree trunk at about two meters high at 1400 hours on 24 March 1981 by the author. When disturbed the male flew above and carried the female from one tree to another where they were collected. They were in heavy undisturbed tropical evergreen forest beside a small indian hunting trail near the Napo River, about 65 km upstream from its confluence with the Amazon River at San Francisco de Orellana, Peru.

Adults have been collected in nearly every month of the year, but more were collected from January-March and August-October. They are more frequently found at lower altitudes, but have been collected in localities from 600 to 1,200 m in elevation.

There are no known reports on the immature stages or host plants.

Specimens Examined: 136 ♂, 33 ♀

GUYANA: Essequibo River, 40 mi. inland; COLOMBIA: *Putumayo*, Umbria; Florida; ECUADOR: *Napo*, Upper Rio Napo; PERU: *Loreto*, Iquitos X; Pebas; Achinamiza; Mishana X; Aguaytía; Napo River, 65 km NW of Francisco de Orellana; *Huánuco*, La Morada, Rio Huallaga; Tingo María; *San Martín*, Japelacio; *Junín*, Chanchamayo; BRAZIL: *Amazonas*, Ypiranga, Rio Purus; São Paulo de Olivença; Tefé, Rio Solimões X; Tonantins; Rio Javari; Manaus; Itacoatiara X; *Pará*, Óbidos, Óbidos & Rio Trombetas; Itaituba to Óbidos.

***Hamadryas velutina browni* [Subsp. nov.]**

Figs. 165-168, 209

Description:

As in *H. velutina*. Subspecific characters for *H. v. browni* males are: the VFW has iridescent light blue postmedian markings of spots or thin lines in M_3-Cu_2 ; VHW has three large basal red spots including a prominent red spot in the discal cell; submarginal red spots in M_3-Cu_2 , and especially Cu_1-Cu_2 elongated baso-distally, and triangular on basal margin. The female DFW and VFW has white postmedian diagonal

band, with widest area five mm. Average wing length ♂ 36 mm; ♀ 37 mm.

Described from five specimens, three ♂ and two ♀, from Brazil.

HOLOTYPE ♂: BRAZIL: *Mato Grosso*, Barra do Bugres a Tangará, km 30-35, 12 July, 1973, K. Brown.

PARATYPES: BRAZIL: *Mato Grosso*, Barra do Bugres a Tangará, km 30-35, 2 ♂ and 1 ♀, 12 July 1973, K. Brown; and 1 ♀ same locality, 27 Mar. 1975, K. Brown.

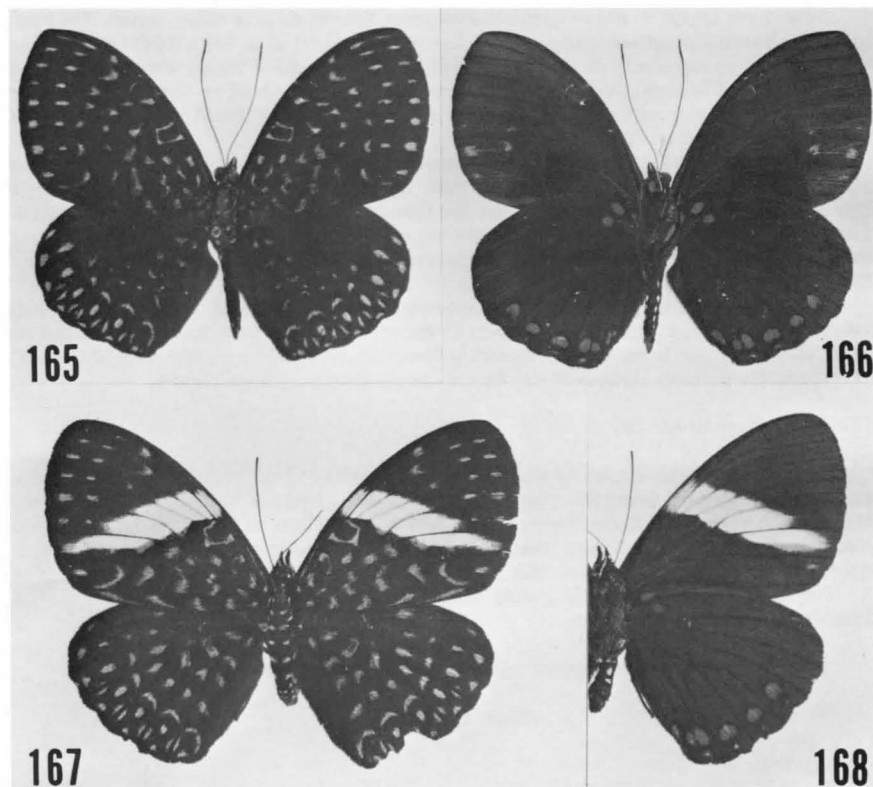
The holotype ♂ will be deposited in the collection of the Museo Nacional, Rio de Janeiro, Brazil. Two ♂ and 2 ♀ paratypes are in the collection of the Allyn Museum.

Distribution:

This new subspecies is presently known only from Mato Grosso, Brazil. Intergrades are known from Iquitos, Peru to Tefé, Brazil.

Taxonomy and Variation:

The original description by Bates (1865) states "The whole under surface of the wings in *A. velutina* has a rich, silky, changing blue gloss and the red basal spots of the hindwing are only two in number." The contrasting iridescent light blue postmedian markings in M_3-Cu_2 on the VFW and the three basal red spots on the VHW distinguish the males of this subspecies from *H. v. velutina*.



Figures 165-168. *Hamadryas velutina browni* Jenkins. ♂ dorsal (165) ventral (166) surfaces. BRAZIL, *Mato Grosso*, Barra do Bugres a Tangará. Holotype, (Museo Nacional Rio de Janeiro, Brazil). ♀ dorsal (167) ventral (168) surfaces. BRAZIL, *Mato Grosso*, Barra do Bugres a Tangará. Paratype (AA).

This new subspecies was not recognized until after specimens from Diamantino and Tapirapuá had been examined so that their subspecific status needs to be confirmed.

Biology:

Nothing has been reported on the biology of this subspecies. Adults have been collected in March and July.

The immature stages and host plants have not been reported.

This subspecies is named for Dr. Keith S. Brown, Jr. who collected the type series and who has collected extensively and has greatly advanced our knowledge of Lepidoptera in Latin America.

Specimens Examined: 10 ♂, 2 ♀ (including types)

BRAZIL: *Mato Grosso*, Barra do Bugres a Tangará, 3 ♂ 2 ♀ (AA); (?) Diamantino, 6 ♂ (BM), (?) Tapirapuá, Sep. 1 ♂ (BM).

INCERTAE SEDIS

Ageronia fritilla Reverdin (1914) p. 98, plate 2, fig. 4, a photograph shows the 8th appendage rami and male genitalia. This is related to *H. februa* but it cannot be identified. Reverdin states that the specimen was received from Fruhstorfer but no description was published. No type was found in the Fruhstorfer Collection in the BM.

The following are unpublished [*Nomina nuda*]:

Peridromia arete chaironia Fruhstorfer. Type ♀ from Bolivia cited in Martin (1923). Description not published.

Peridromia amphinome sairis Fruhstorfer. Type ♂ from Bolivia; cited in Martin (1923). Description not published.

Ageronia ferox maina Fruhstorfer. Type ♂ from Cuzco, Peru in BM labeled "TYPE/PERU, Cuzco, Fruhstorfer/*ferox maina* Fruhst (in handwriting) Fruhstorfer Coll. BM 1933-131." I have examined and photographed this type ♂ in the BM. It is a very light marked specimen of *H. f. februa* similar to the synonymized *Ageronia februa fundania* Fruhstorfer. The type of *maina* was cited by Martin (1923) but no description was published.

Ageronia ipthime [sic] *itania* Fruhstorfer. Type ♂ from Mato Grosso, Brazil; cited in Martin (1923). Description not published.

Ageronia epinome aldrina Fruhstorfer. Type ♂ from Prov. de Sara, Bolivia; cited in Martin (1923). Description not published. Type ♂ in Fruhstorfer Coll. in BM examined. It is typical *H. epinome*.

Ageronia chloe phocis Fruhstorfer. In Fassl (1918) p. 30. Description not published. (*phocis* is possibly a *lapsus calami* of *daphnis*).

Ageronia prunaria ab. *sordida* Fuessl. Gross in Staudinger. (Uncertain reference).

Ageronia eridane Ménétériés 1857:71 (no. 1167). (Becker, Paris) "Bogotá", Description not published.

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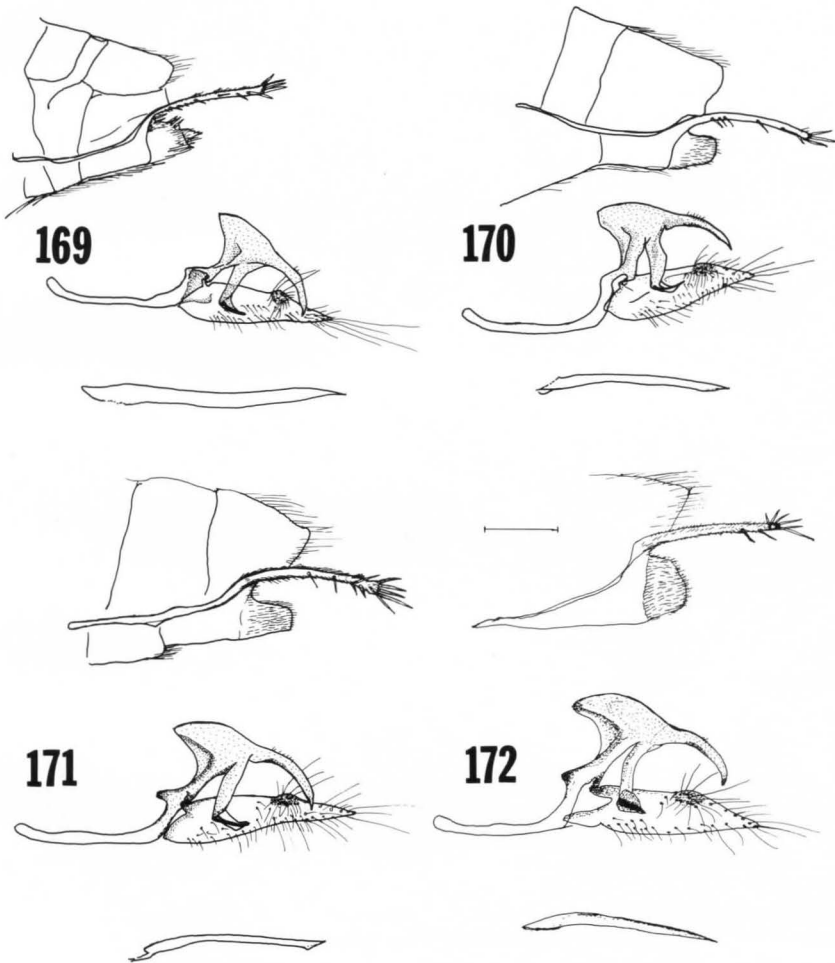
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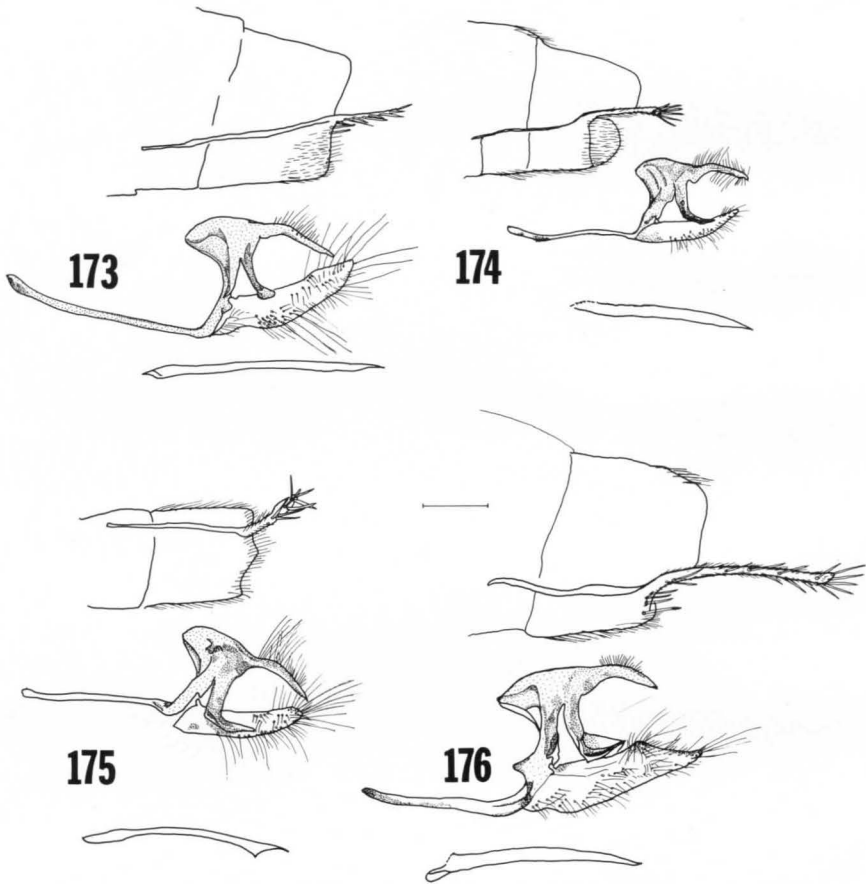
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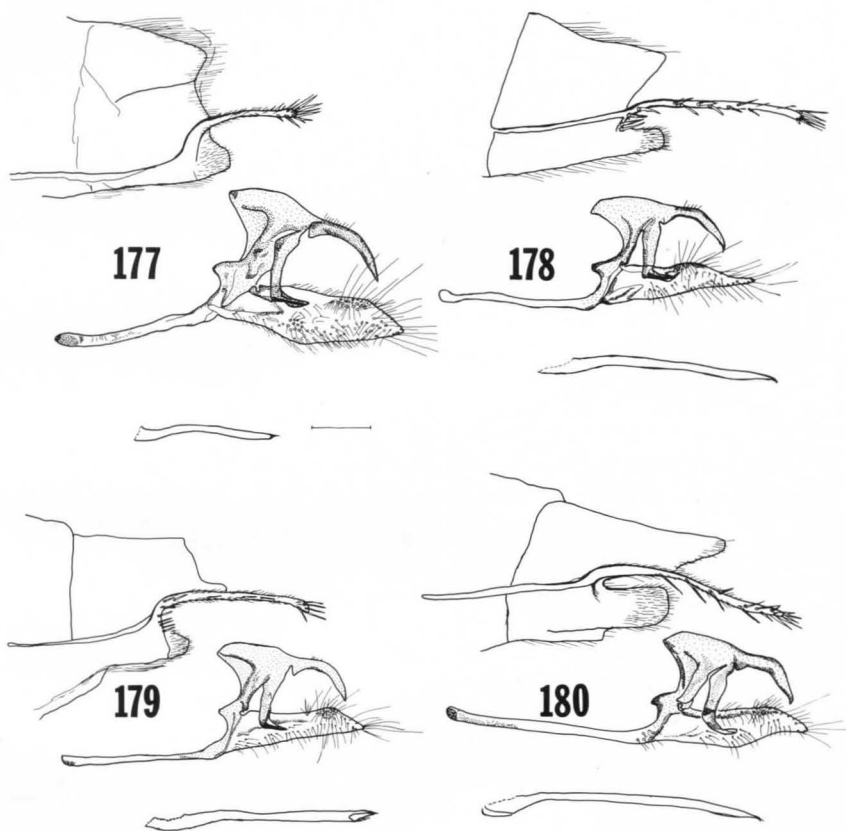
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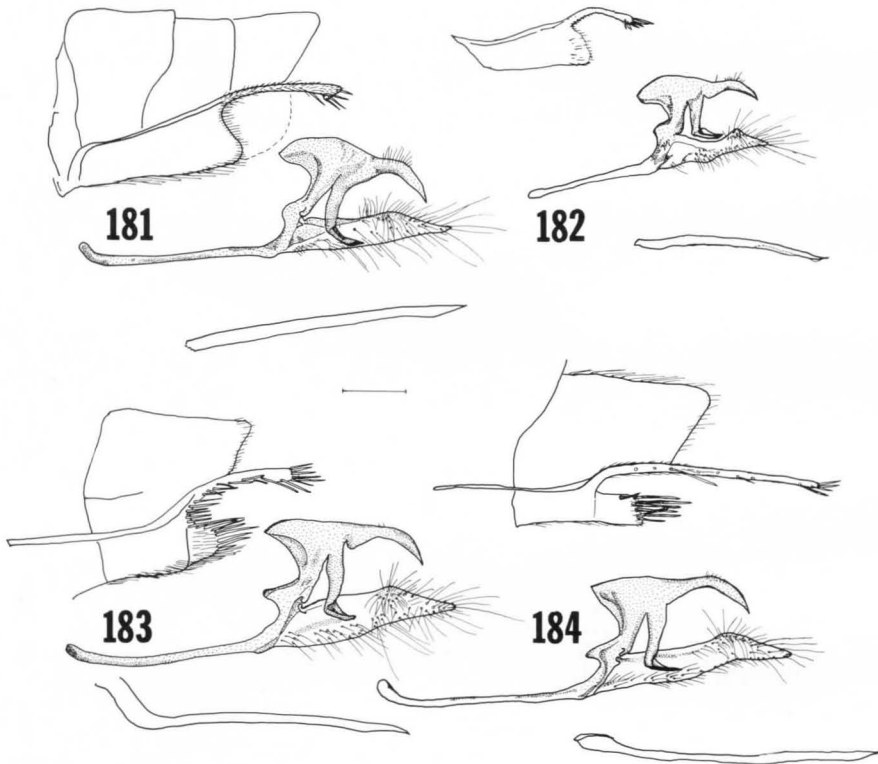
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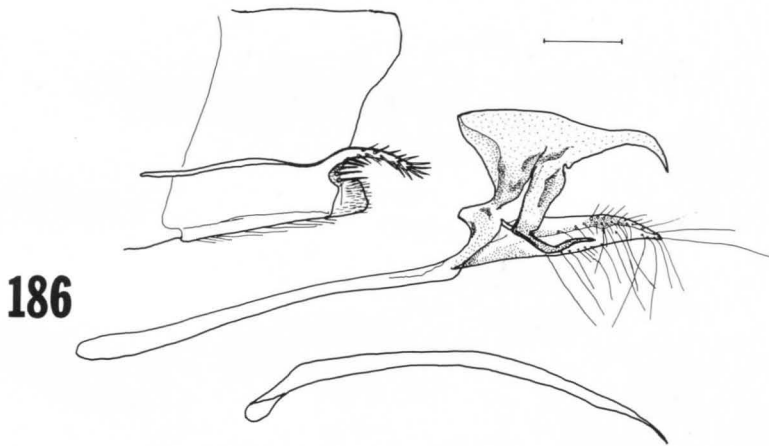
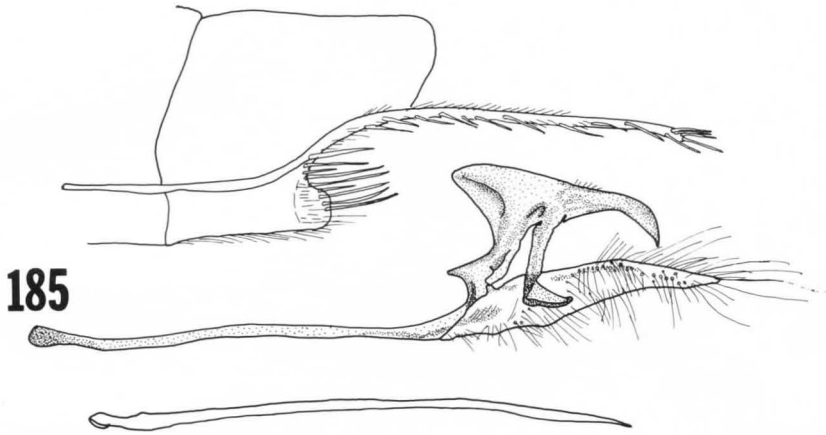
Figures 173-176. ♂ genitalia and rami of *Hamadryas*. 173, *Hamadryas atlantis*. 174, *Hamadryas chloe*. 175, *Hamadryas albicornis*. 176, *Hamadryas feronia*.



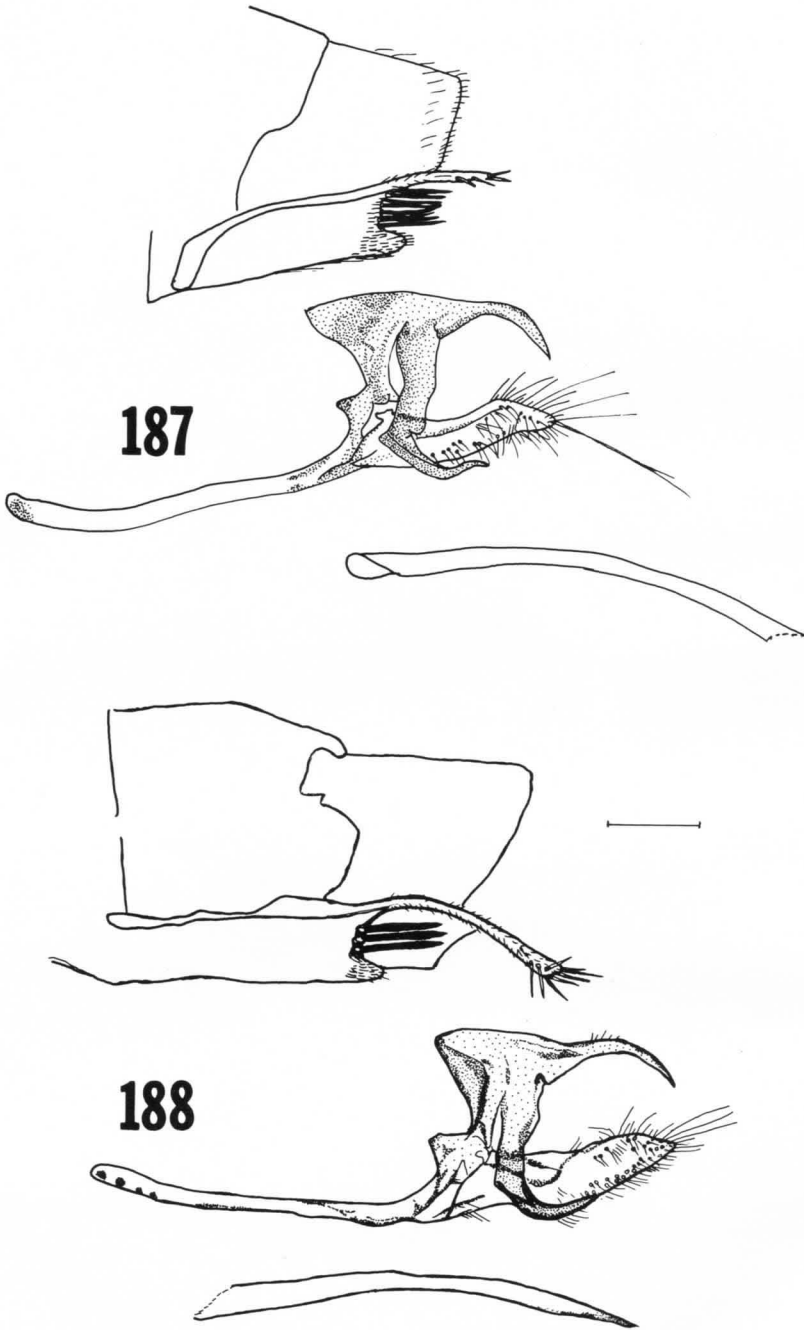
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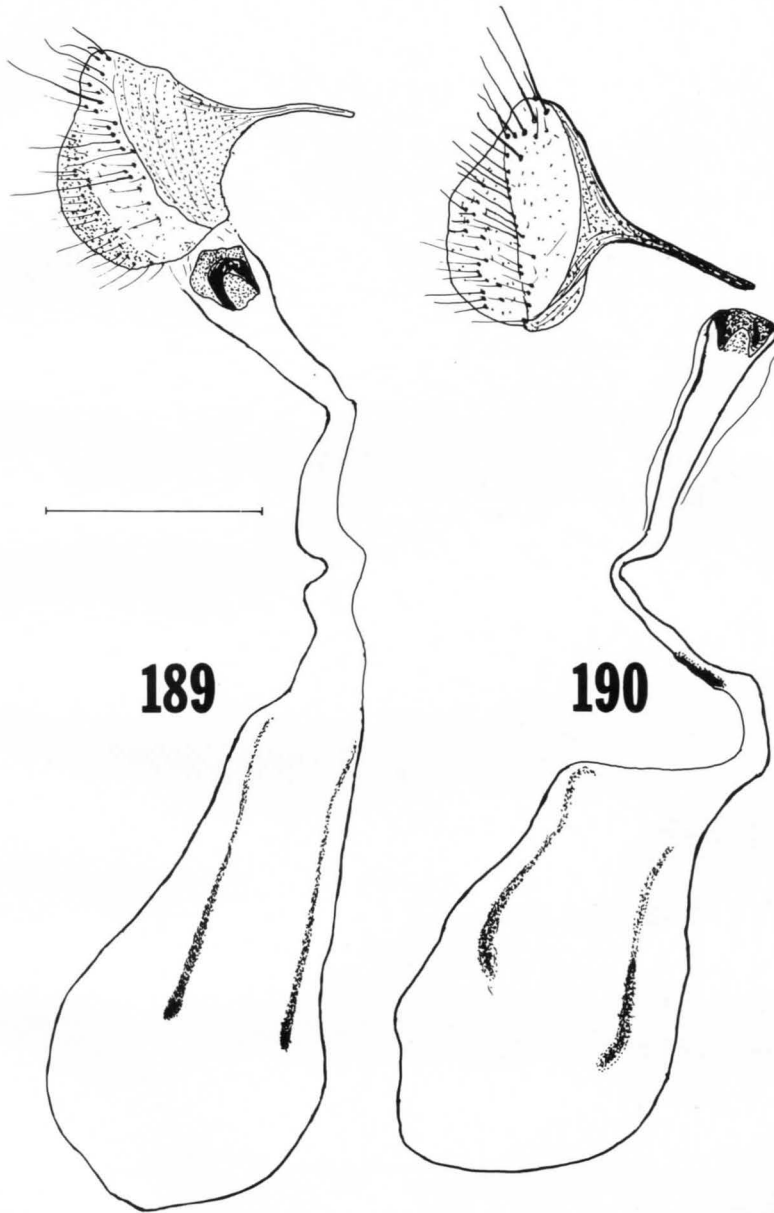
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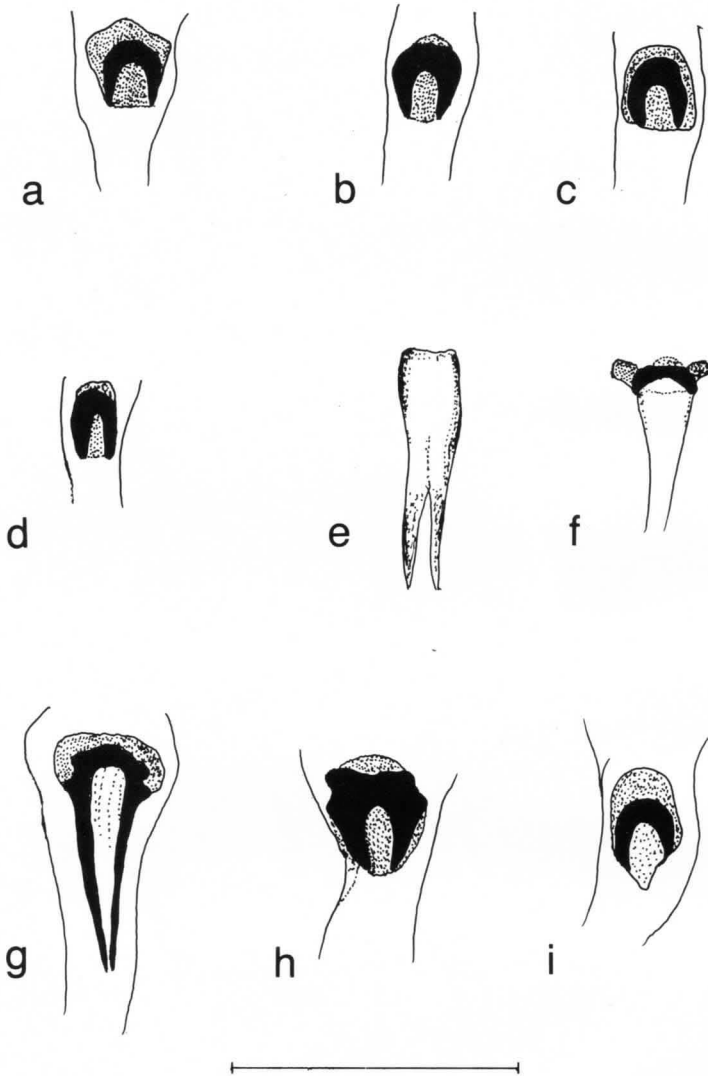
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Figures 187-188. ♂ genitalia and rami of *Hamadryas*. 187, *Hamadryas arete*. 188, *Hamadryas velutina*.

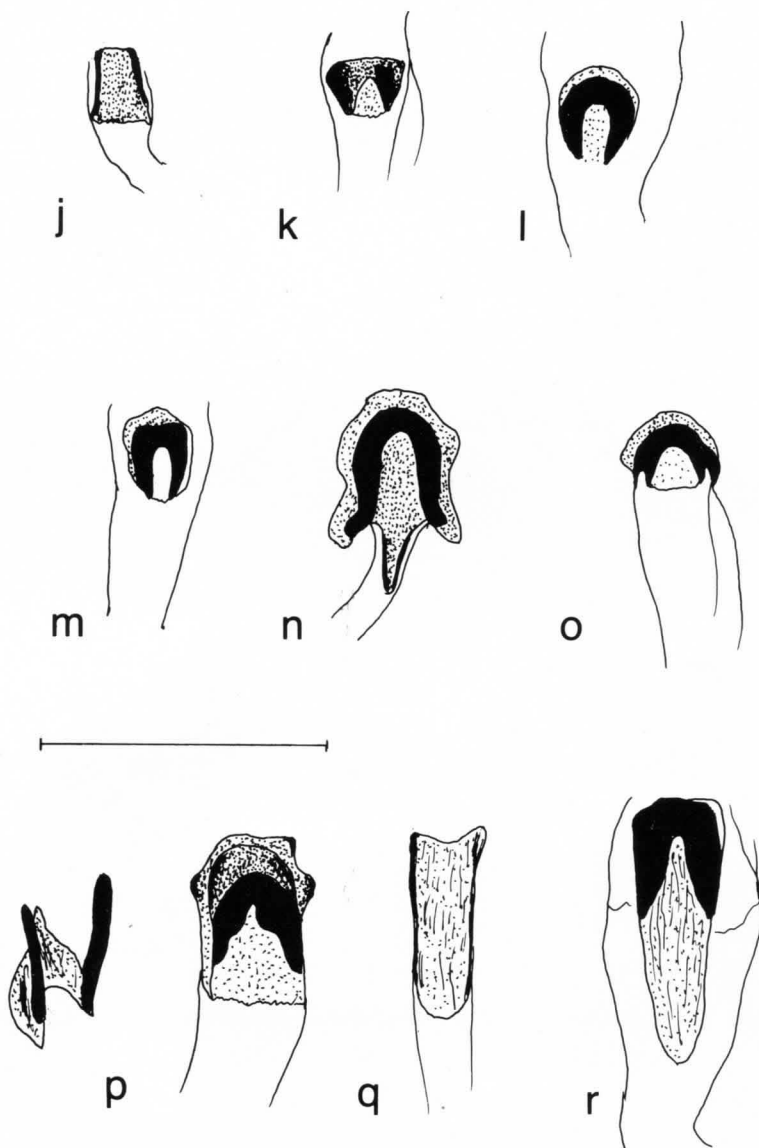


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Figure 191. Sterigma of ♀ genitalia of *Hamadryas*. a. *februa*; b. *amphichloe*; c. *glauconome*; d. *honorina*; e. *atlantis*; f. *chloe*; g. *feronia*; h. *guatemalena*; i. *amphinome*.



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Figure 192. Sterigma of ♀ genitalia of *Hamadryas*. j. *belladonna*; k. *iphthime*; l. *epinome*; m. *fornax*; n. *alicia*; o. *arinome*; p. *laodamia*; q. *arete*; r. *velutina*.

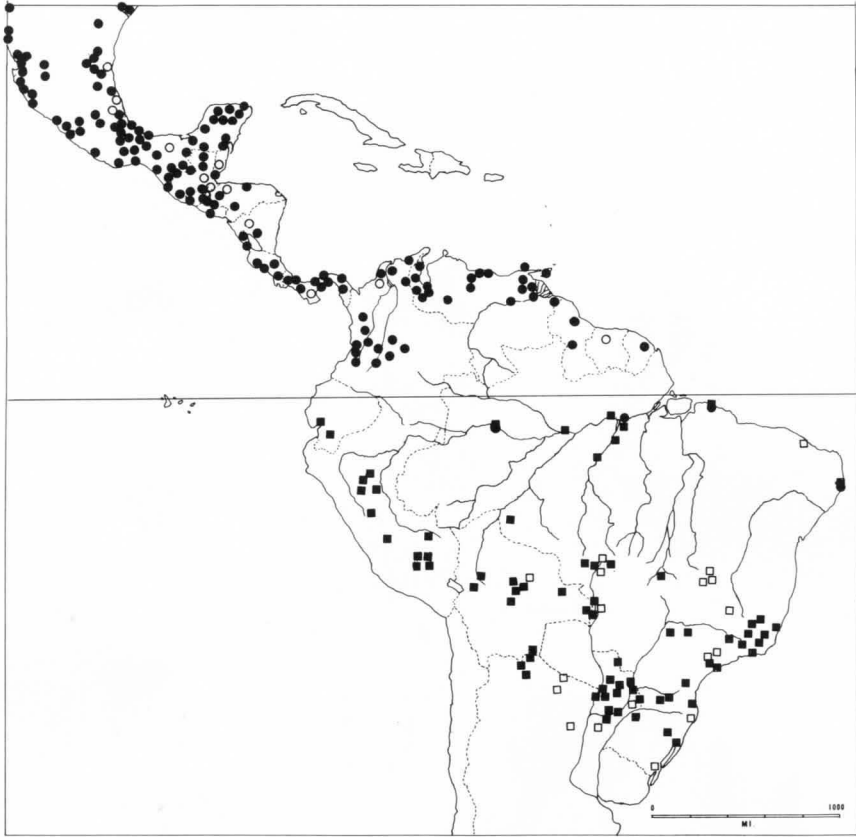


Figure 193. Distribution of subspecies of *Hamadryas februa*. ■ = *f. februa*; ● = *f. ferentina*.

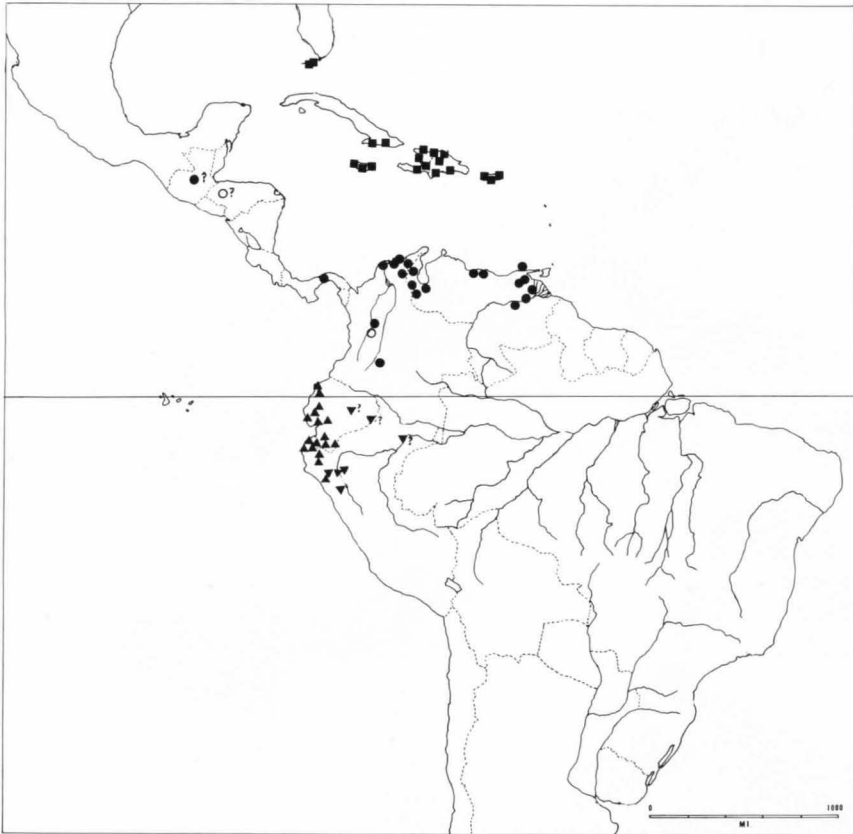


Figure 194. Distribution of subspecies of *Hamadryas amphichloe*. ▲ = *a. amphichloe*; ● = *a. ferox*; ■ = *a. diasia*; ▼ = *a. lamasi*.



Figure 195. Distribution of *Hamadryas honorina*, and subspecies of *Hamadryas glauconome*. ■ = *honorina*; ● = *g. glauconome*; ▲ = *g. grisea*.

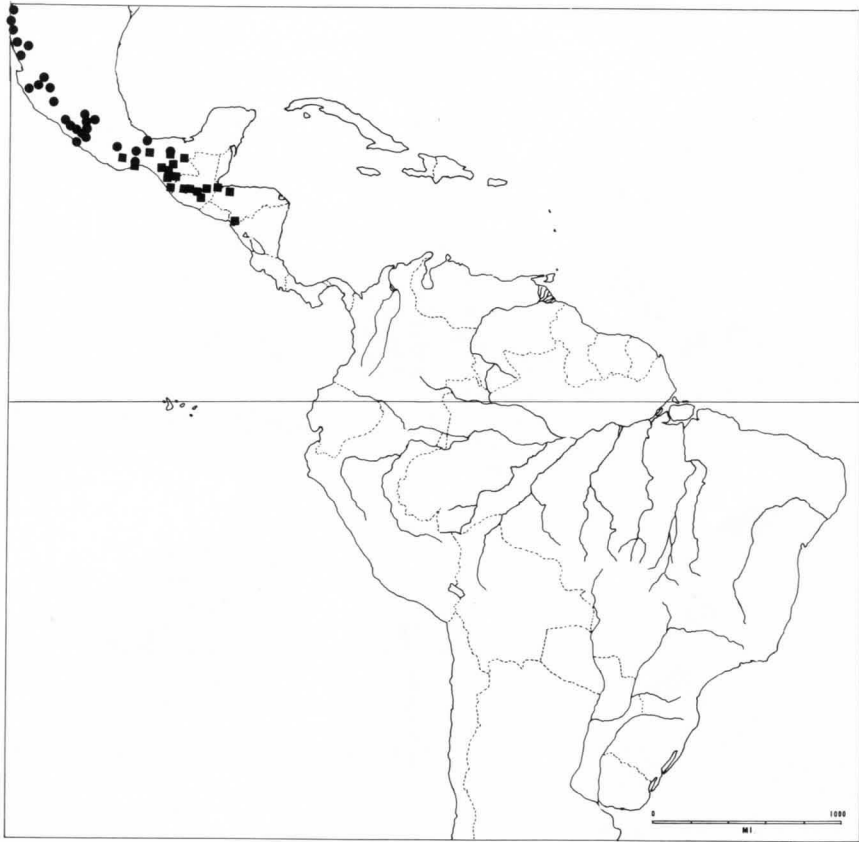


Figure 196. Distribution of subspecies of *Hamadryas atlantis*. ■ = *a. atlantis*; ● = *a. lelaps*.

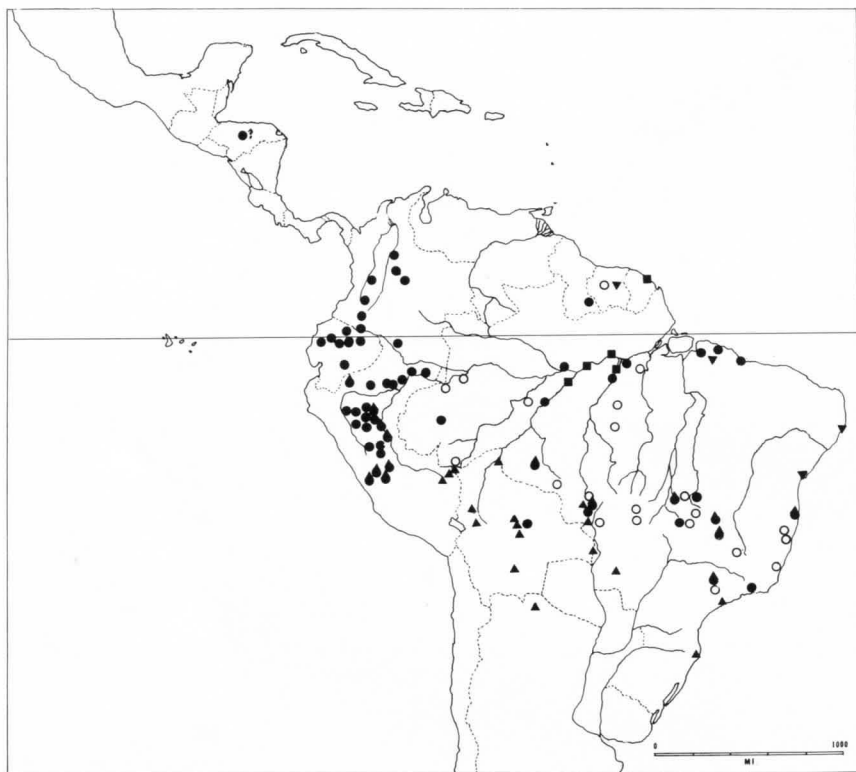


Figure 197. Distribution of subspecies of *Hamadryas chloe*. ● = *c. chloe*; ▲ = *c. daphnis*; ▼ = *c. rhea*; ■ = *c. obidona*.

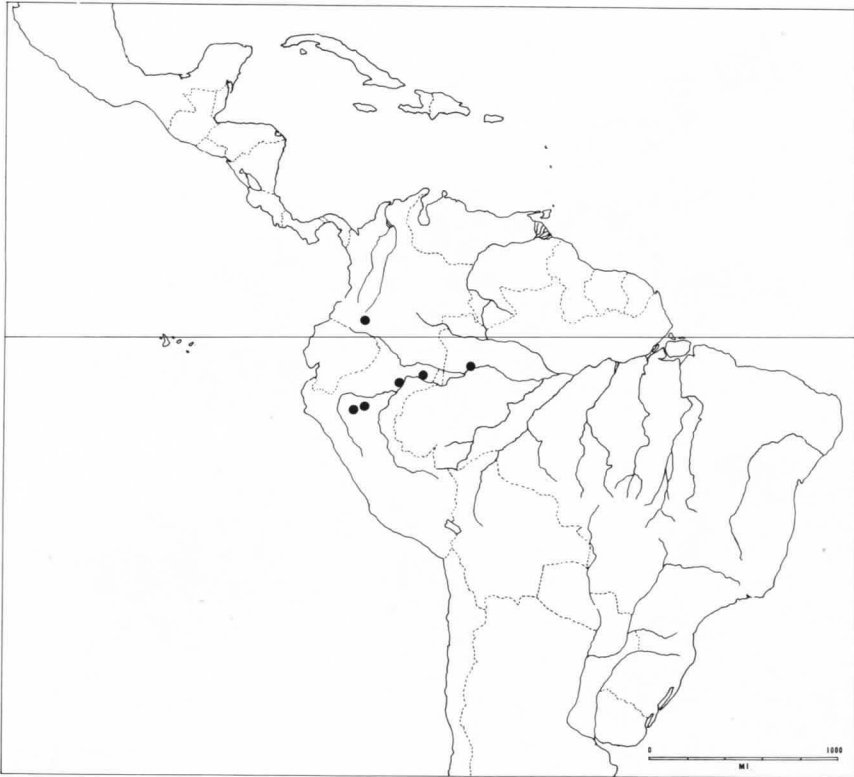


Figure 198. Distribution of *Hamadryas albicornis*.

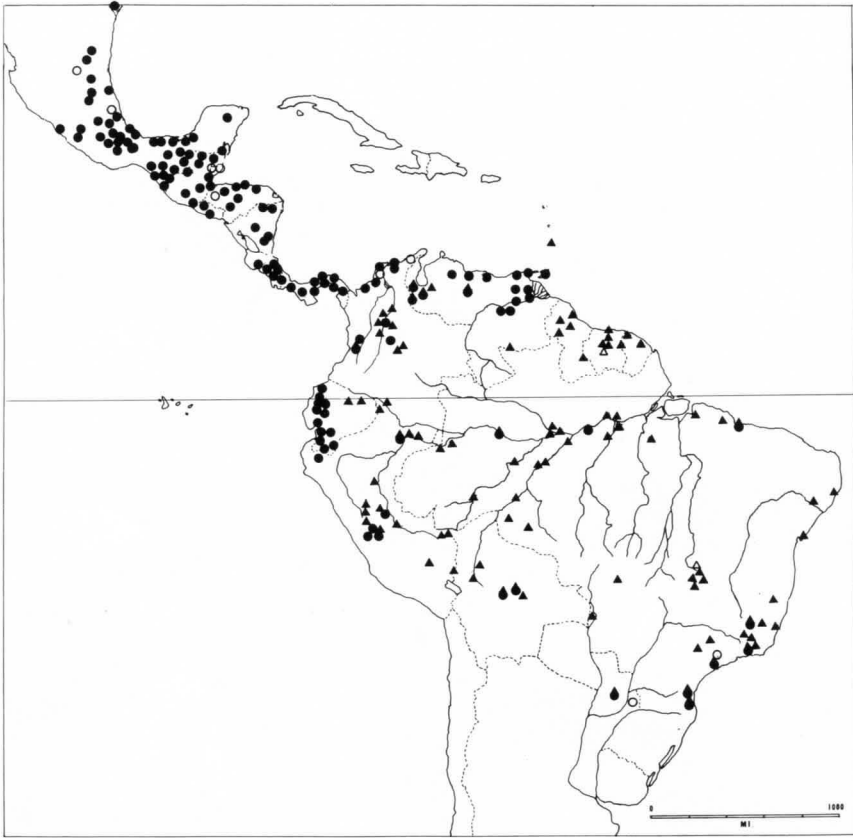


Figure 199. Distribution of subspecies of *Hamadryas feronia*. ▲ = *f. feronia*; ● = *f. farinulenta*.

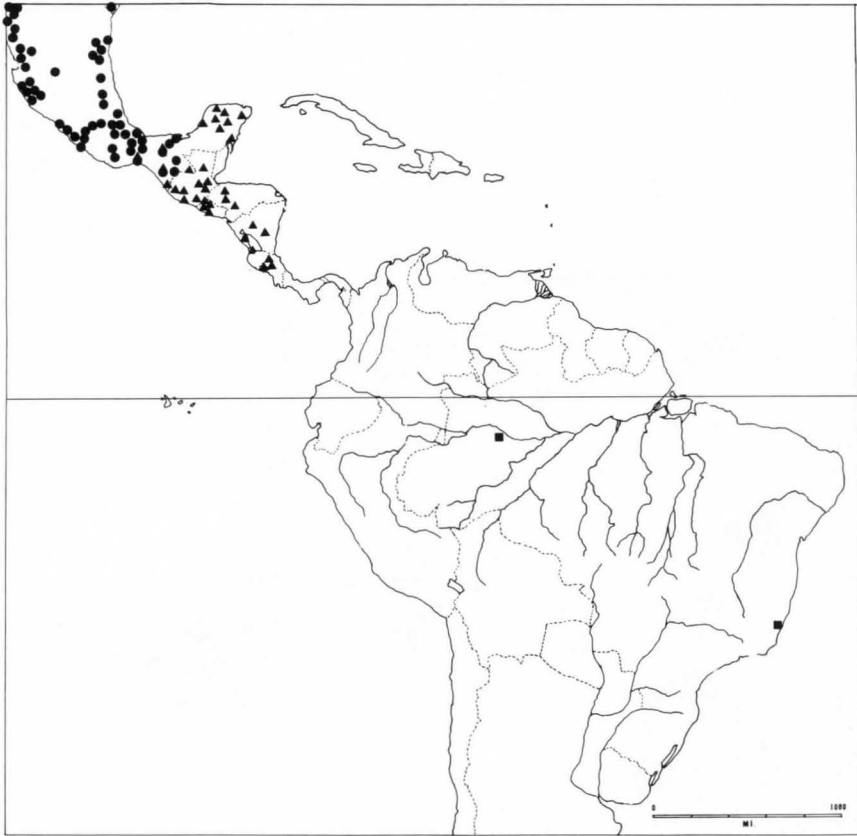


Figure 200. Distribution of subspecies of *Hamadryas guatemalena*. ▲ = *g. guatemalena*; ● = *g. marmorice*; ■ = *g. elata*.

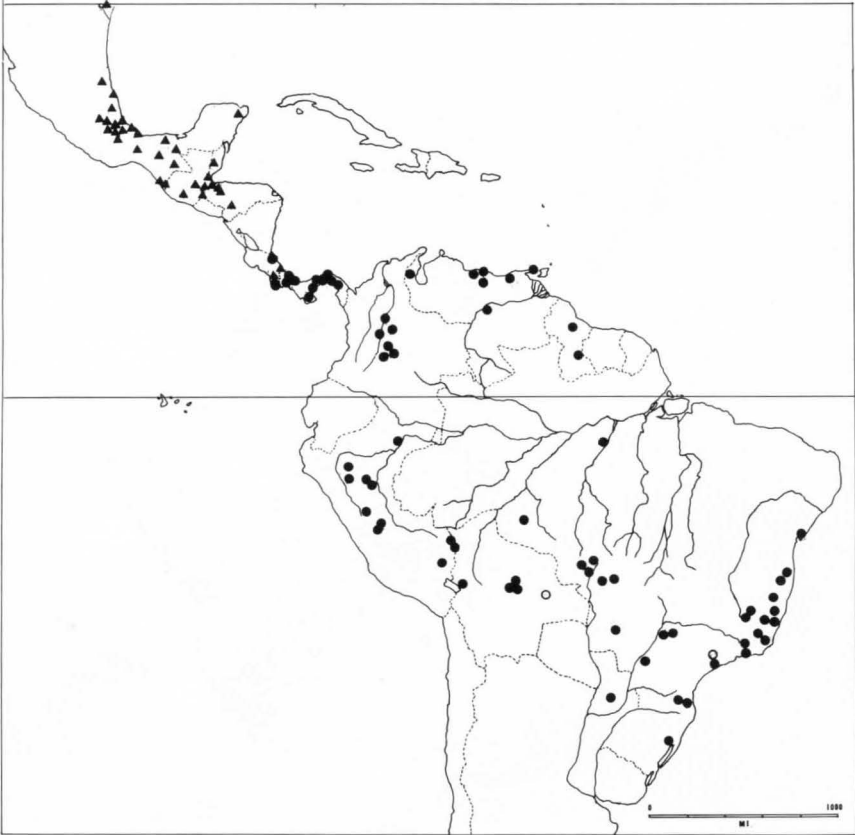


Figure 201. Distribution of subspecies of *Hamadryas iphthime*. ● = *i. iphthime*; ▲ = *i. joannae*.

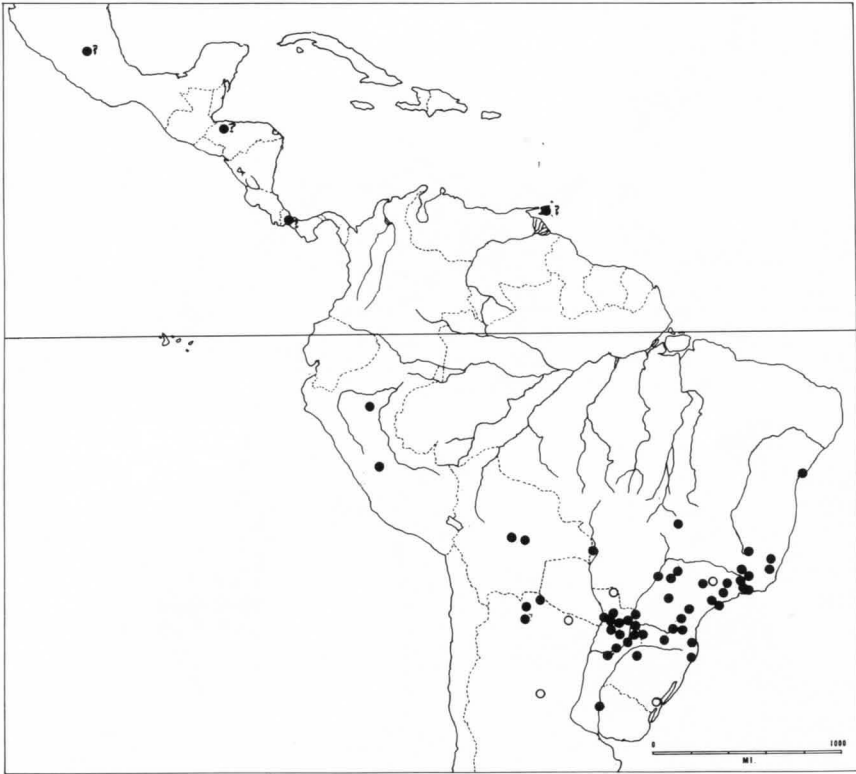


Figure 202. Distribution of *Hamadryas epinome*.

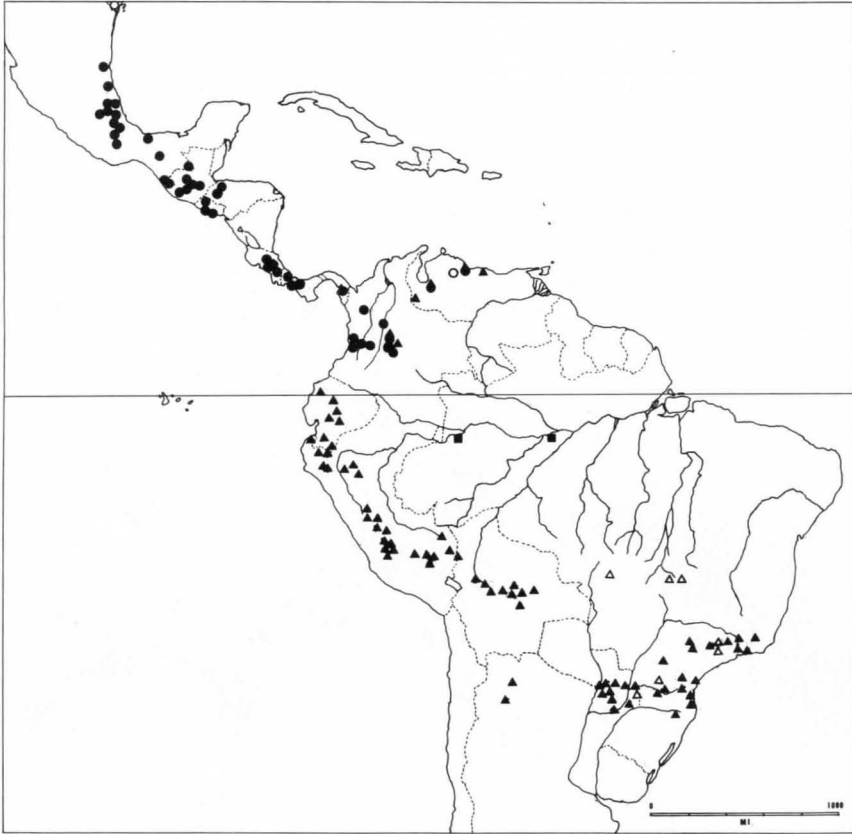


Figure 203. Distribution of *Hamadryas rosandra* and subspecies of *Hamadryas fornax*. ■ = *rosandra*; ▲ = *f. fornax*; ● = *f. fornacialia*.

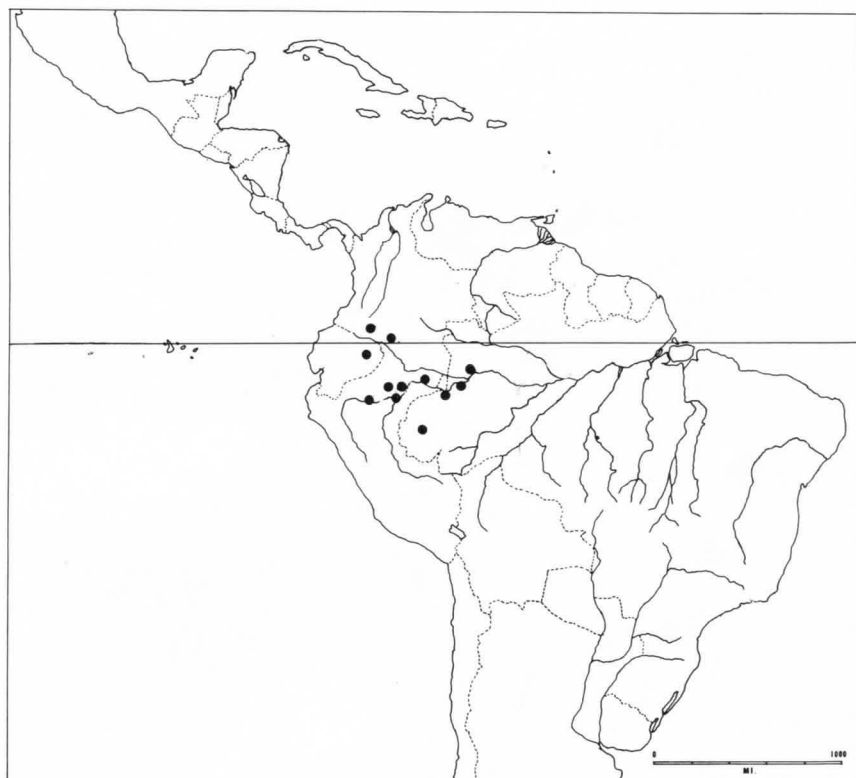


Figure 204. Distribution of *Hamadryas alicia*.

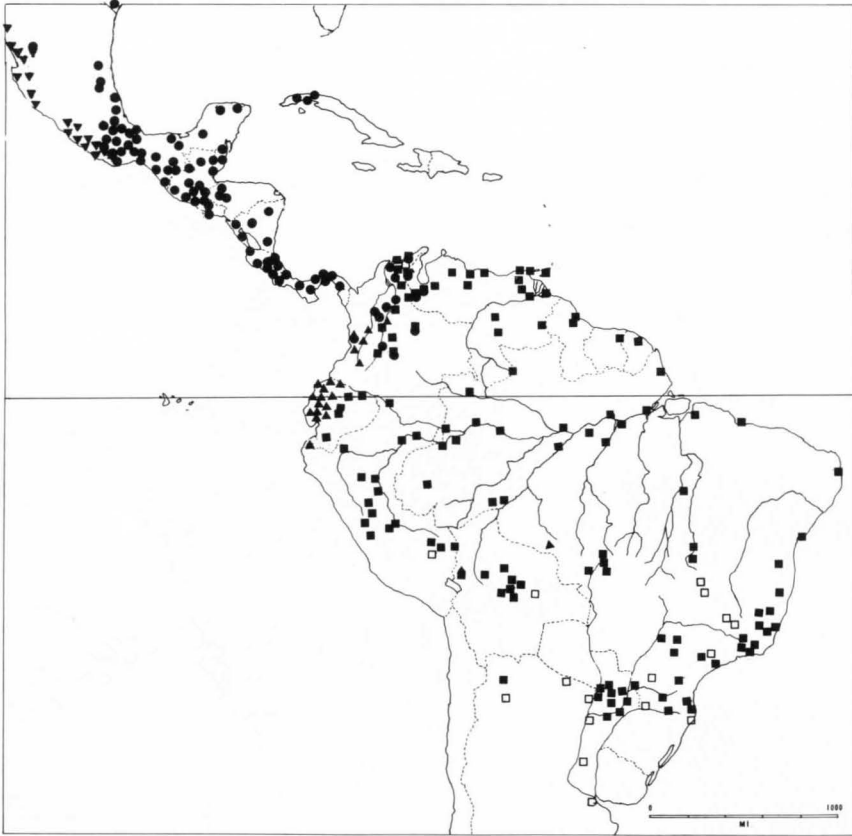


Figure 205. Distribution of subspecies of *Hamadryas amphinome*. ■ = *a. amphinome*; ● = *a. mexicana*; ▲ = *a. fumosa*; ▼ = *a. mazai*.



Figure 206. Distribution of *Hamadryas belladonna*.

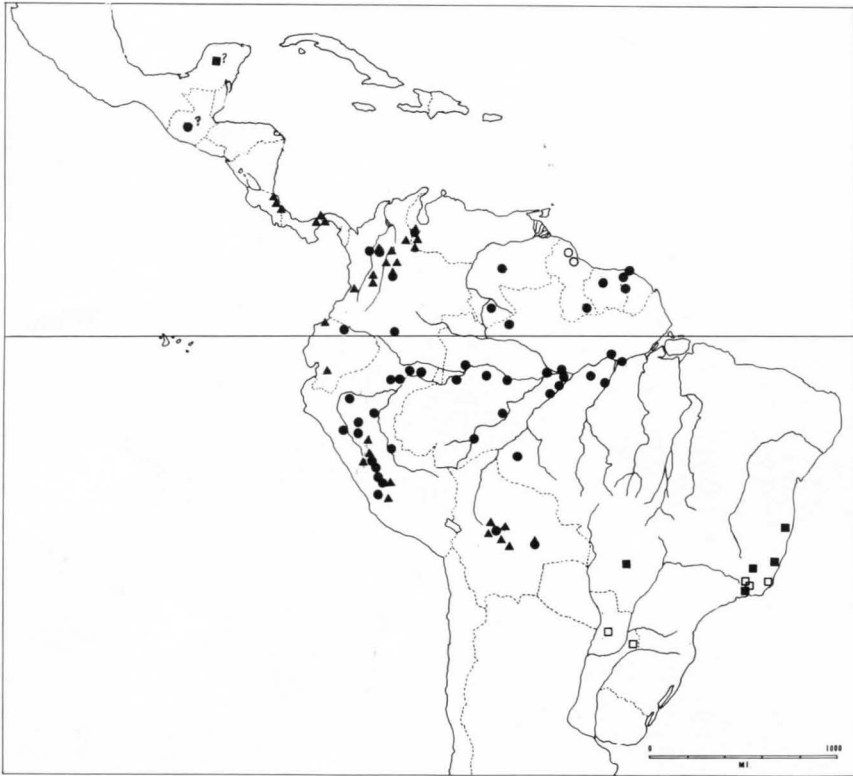


Figure 207. Distribution of subspecies of *arinome*. ● = *a. arinome*; ▲ = *a. arienis*; ■ = *a. obnubila*.

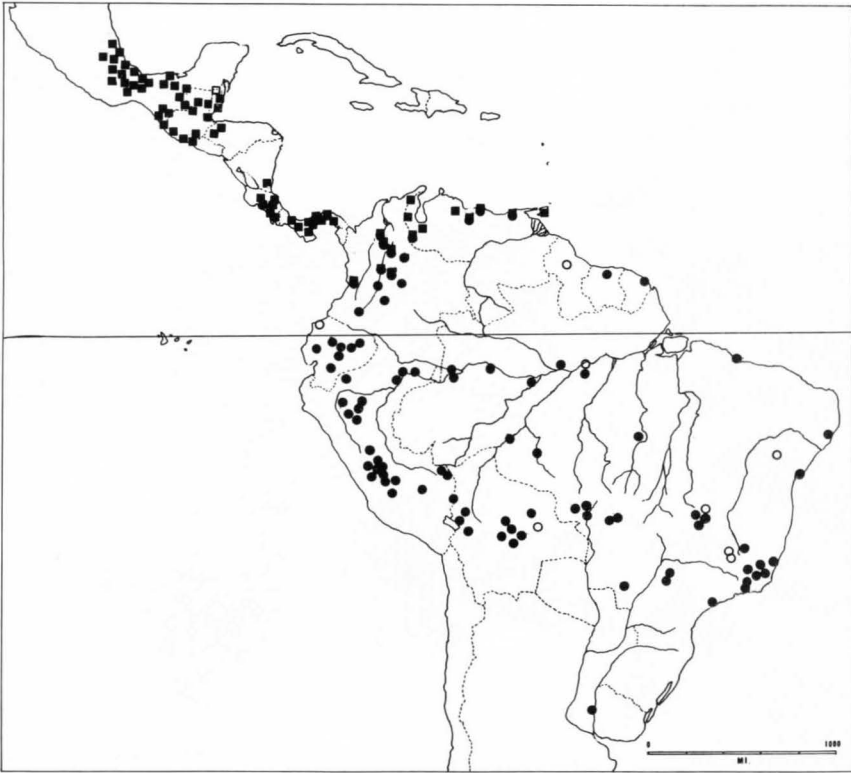


Figure 208. Distribution of subspecies of *Hamadryas laodamia*. ● = *l. laodamia*; ■ = *l. saurites*.

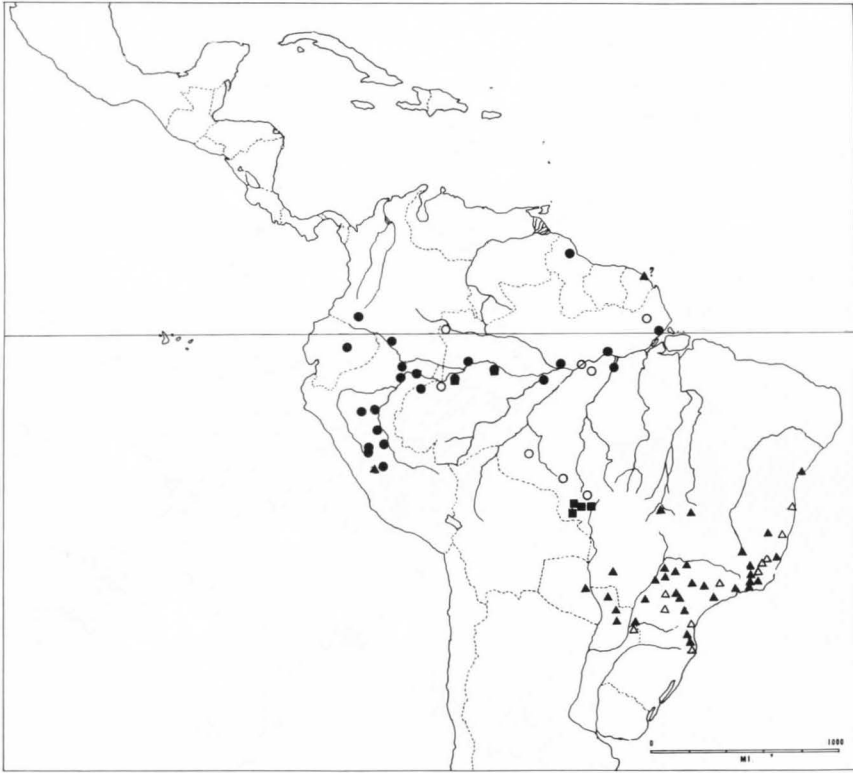


Figure 209. Distribution of *Hamadryas arete* and subspecies of *Hamadryas velutina*.
 ▲ = *arete*; ● = *v. velutina*; ■ = *v. browni*.

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