

A MONOGRAPH OF THE ITHOMI-  
IDAE (LEPIDOPTERA)

PART 1

RICHARD M. FOX

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## *PART 1*

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## INTRODUCTION

TAXONOMY NEEDS NO APOLOGY, for it is the basis on which must be built all work, observational and experimental, with living things. The lepidopterous family Ithomiidae offers a wealth of material for studies in ecology, genetics, and evolution, but first the taxonomy must be put into order. The present paper is planned as the beginning of a comprehensive systematic monograph of the family, and it is intended that it will be followed in due course by parts dealing with the remaining tribes.

No one American collection includes sufficient representation in the Ithomiidae to warrant its use as a sole basis for a monographic revision. Thanks to the cooperation I have had from the leading museums in America and some abroad, I have been able to study nearly all the named species, subspecies, and variants, and thus have been able to reach reasonable opinions about them. With pleasure I acknowledge that the persons and institutions named below have made this study possible:

The American Museum of Natural History, New York (Dr. Charles D. Michener, Dr. F. H. Rindge, Dr. Frank E. Lutz, Mr. W. P. Comstock); Carnegie Museum, Pittsburgh, Pennsylvania (Dr. Walter R. Sweadner, Dr. M. Graham Netting, and Mr. Harry K. Clench); the United States National Museum (Dr. William Schaus, Mr. W. D. Field); Reading Public Museum, Reading, Pennsylvania (Dr. Earl L. Poole); the Academy of Natural Sciences of Philadelphia, Pennsylvania (Mr. James A. G. Rehn, Mr. Ezra T. Cresson, Jr., Mr. Roswell C. Williams); Museum of Comparative Zoölogy, Harvard College (Dr. J. C. Bequaert, Mr. V. Nabokov); Cornell University, Ithaca, New York (Dr. W. T. M. Forbes); New York Zoological Society Department of Tropical Research (Dr. William Beebe); Mr. F. Martin Brown of Colorado Springs, Colorado; British Museum (Natural History), London, England (Capt. Norman D. Riley, Mr. A. G. Gabriel).

## HISTORICAL SKETCH

Linné described *Papilio (Heliconia) polymnia* from Surinam, the only butterfly certainly an ithomine to be mentioned in the tenth edition of the "Systema naturae." That *Papilio (Heliconia) mopsa* may in fact be *Tithorea harmonia* is discussed below under *Tithorea*.

Each of the classic lepidopterists contributed a few species and some generic names. Fabricius, Hübner, Latreille, and Cramer all appear in the synonymies and bibliographies. A growing knowledge of the ithomines was an integral consequence of the unfolding of the neotropic lands during the nineteenth century.

By modern standards the first comprehensive treatment of the butterflies of the world was the magnificent "The genera of diurnal Lepidoptera" prepared by Edward Doubleday of the British Museum, continued after his death by John O. Westwood and illustrated throughout by William Hewitson (1846-1852). Six of the new generic names

proposed in that work belong in the Ithomiidae, and a critical review of the earlier genera and species was incorporated. The high standards of the descriptions, analyses, and illustrations were such that the work takes its place as a great milestone in modern lepidopterology.

F. Martin Brown (1941) writes of the "Genera," "For this work there exists widespread confusion in the citation of authors for the genera and species described. . . . The genera must be credited to either Doubleday or Westwood and the species 'described' by the figures to either Doubleday and Hewitson or Westwood and Hewitson." All text relating to ithomines is found from page 96 to page 136, completed by Doubleday before his death. The six ithomine genera must therefore be ascribed to Doubleday alone, and the new species to Doubleday and Hewitson. All these species and genera date from 1847, when the including fascicles were issued, except *Eutresis*

*hypereia*. This species was listed in an 1847 fascicle, but not described; it was figured on the supplemental plate, issued in 1852, and this figure is the only original description.

During the next 40 years many new genera and a host of new species appeared; the chief authors contributing were Bates, Butler, Hewitson, the brothers Felder, Boisduval, Kirby, Druce, and Herrich-Schäffer.

One of the more important publications dealing with ithomines during this period was William C. Hewitson's "Illustrations of new species of exotic Lepidoptera," a labor of love undertaken at the author's personal expense. His remarks in the introduction to the first volume are expressive of a philosophy that should be appreciated in order that one may understand the lepidopterologic work of the middle nineteenth century: "Although the first volume . . . has not succeeded in a pecuniary point of view, we do not hesitate to proceed with a second. . . willing to consider any loss which we might sustain as a slight contribution towards the advancement of our favorite science, and unwilling that the many beautiful things which have delighted our own eyes should not also be enjoyed by our brother naturalists." Begun in 1856 and terminated in 1876, the work consisted of five volumes in all, concerned solely with the description and picturing of new species. The format was centered about the plates, beautifully drawn and colored, with a page of text for each plate. These were issued periodically as fascicles, each consisting of a few plates with accompanying text. I have relied on Kirby's "Catalogue" (1871, 1877) for dating most of the species (200 ithomines were included), for only towards the end of the work were the fascicles dated by the publisher. The text pages were not numbered; the plates were headed by the name of a genus and those with the same generic heading were numbered consecutively as issued. In each volume Hewitson himself supplied a key to numbering pages and plates and requested that his subscribers go through their copies and number everything accordingly. I have so numbered the copy in the W. J. Holland library at the Carnegie Museum, and in this

paper cite the page numbers penciled in accordance with Hewitson's own directions by using brackets; the headings engraved on plates are cited also, followed by Hewitson's appended number in brackets. This may avoid some of the general bibliographic confusion. In some cases the figure number on the plate and in the text do not agree, so that it has been difficult to decide whether to cite the plate figure number or the text figure number or both.

Hewitson preferred to recognize only a few genera, being an unregenerate Linnean, and placed nearly all ithomines in the genus *Ithomia*. In his introduction to the second volume he again states a philosophy of historical interest: "The author's sole object in the production of this work has been to leave behind him correct pictorial representations of the exquisite things which have been to him a joy through life. He believes that there is nothing higher or more worthy of his ambitions than the simple child-like study of the works of his and their Creator. He believes each species in itself perfect and as it first came from the hands of the Creator; and if he could believe in the transmutation of species or that there was one grain of truth in the chaotic jumble of Mr. Darwin, his life-long pleasure and occupation would be taken from him" [1861 (1852-1876)]. This view Hewitson never revised. It detracted nothing and doubtless added greatly to the value of his drawings.

Godman and Salvin's volumes on butterflies in the "Biologia Centrali-Americana" appeared from 1879 to 1901. While limited in geographic scope, the approach set a precedent by its use of comparative anatomy. Brown (1941) has recorded the correct dating and authorship. Ithomines appear on pages 6 through 56 and plates 1 through 4 issued in 1879, on pages 57 through 62 and plate 5 issued in 1880 (all of volume 1), and on pages 639 through 649 of volume 2 issued in 1901. All this material in the first volume should be credited to both Godman and Salvin, while Godman alone was responsible for the material mentioned in volume 2.

Otto Staudinger published from 1884 to 1888 the first volume, subtitled "Exotische Tagfalter," of the "Exotische Schmetter-



linge." Many of the illustrations are good, and the greater part of the names proposed since 1852 were gathered into one place. Innumerable errors in nomenclature and generic assignment can be ascribed only to carelessness or haste. One of the classic descriptions of all time appears on page 63 of this work, concluding with the statement, "I name this form variation *centralis*, in case Godman and Salvin have not already named it."

Volume 2 of the same work, subtitled "Die Familien und Gattungen der Tagfalter," appeared from 1885 to 1892, the first two-thirds by Schatz and the final parts by Röber after Schatz's death. The viewpoint and caliber of the second volume contrast remarkably with those of the first. Schatz presented a thoroughly sound, considered revision of the families and genera, amply documented and illustrated with morphologic detail. For nearly the first time ecologic and life history data were applied to butterfly systematics. The pages on ithomines were written by Schatz, although actually published after his death. Thus there is little basis for citing Röber as co-author for that part of the work.

Richard Haensch published two excellent papers in *Berliner Entomologische Zeitschrift* in 1903 and 1905. The influence of phylogenetic and zoogeographic concepts is evident. It is difficult to reconcile the high quality of these two studies with the same author's presentation of the ithomines in volume 5 of "Die Gross-Schmetterlinge der Erde" in 1909, except on the theory that Seitz, the editor, employed his blue pencil more liberally than wisely. The 1909 work, widely circulated in three languages, is replete with blunders, misidentifications, and

misstatements, many of which actually reversed conclusions published in Haensch's two earlier papers.

The period between 1909 and 1937 saw the description of many species from newly explored corners of tropical America. In addition, several studies of greater importance were published, the chief of these by Jerzy Kremky (1925) of Warsaw. Here, for the first time, a systematic plan included study of the male genitalia. Kremky's fine historic work was marred only by the fact that he had available only a small collection of ithomines. Generic revisions of *Mechanitis* (1924) and *Melinaea* (1927) by W. T. M. Forbes showed the kind and quality of work needed in the ithomines.

In 1937 the Junk publishing house issued part 80, subtitled "Danaiidae II," of the "Lepidopterorum catalogus" series. This is a bibliographic compilation of value. The state of knowledge of ithomine taxonomy was such that the compiler, Felix Bryk, was forced to employ some systematic judgment in order to present the bibliographies in the taxonomic sequence required by the plan of the series. The results were various, including excellent bibliographic research along with taxonomic blunders only natural to a work not based on the insects themselves. The errors were sufficiently undesirable that I felt called upon to prepare "A generic review of the Ithomiinae" (1940).

Recently papers have appeared under the names of Forbes, d'Almeida, and Fox, dealing with problems in ithomine taxonomy. The present monograph is the first comprehensive revision dealing with the entire family since Haensch's contribution in Seitz (1909).

## NOMENCLATURE

Depending upon one's viewpoint and inclination, nomenclature and taxonomy are regarded as an absorbing preoccupation, a convenience, a necessary evil, or an unnecessary evil. For my part I hold with those who believe that nomenclature is a convenience and that taxonomy by its nature

must reflect to some degree the phylogeny and evolution of the organisms concerned. Those who demur that lineal classification is two-dimensional and thus not suited for expressing three-dimensional evolution are, strictly speaking, right. But it can be made to serve. Those who demur on the grounds

that our system of nomenclature is useless for expressing clinal variations are also right. Clinal with certain other sorts of variation need not be expressed by formal nomenclature.

Carl von Linné believed in special Divine Creation. This belief was the basis of thought for most working biologists for the first two-thirds of the nineteenth century. Special Divine Creation implies that all species are homogeneous, hermetically sealed, individually recognizable, and different from all other species, unvarying since creation. For such a species concept binomial nomenclature is eminently suitable. Each species has its name. Similar species may be grouped into genera, not because they may be related but because it is convenient. The task of the taxonomist, under special Divine Creation, was to search out all the species created during the First Week, and to give each a name. While tedious, this task was finite and eventually all the created species would be detected. In this thinking is based the system of nomenclature we use today.

There is no need for reviewing here the development of the concepts of modern biology, for this is familiar to all. Suffice to observe that, while the basis of biological thinking has been drastically altered, we have pressed into service and used for a new purpose the old system of nomenclature. Now we understand the species as a variable thing, subject to complex internal and external influences. To express some of the variation within a species, the subspecies was introduced as a taxon—not introduced with forethought, but haphazardly. Other infraspecific categories appeared: race, variety, and form, and with them confusion.

When the International Rules legalized the subspecies as a taxon and set forth rules for naming it, those who preferred "race," "variety," or "form" made use of subspecies. An alarming diversity of infraspecific concepts (if that is what they are) has been produced, with subspecific names applied to all manner of physiologic, genetic, and seasonal variations. It is fine and useful to study variations, but only a few are really subspecies. This is a question debated at length elsewhere (see Edwards, 1954; Hubbell, 1954;

Wilson and Brown, 1953, 1954; and Fox, 1955). But sometimes it seems to me that special creation lingers at the frontiers of taxonomic thinking, at least to the degree, perhaps subconscious, that there are some persons today who want the subspecies to be a taxon to fit all kinds and conditions of infraspecific situations.

I find that the vast majority of ithomine species subdivide into subspecies on the basis of readily recognizable external variation such as coloring, degree of pigmentation, and development of pattern elements—all correlated with geographic distribution. The subspecies making up the species as a whole all share such features as the basic pattern (aside from its development) and every anatomic feature. I have come to regard the anatomy of the pattern as a significant specific character, whereas the color and the size of the spots are not significant of specific difference. I have not noted any case of non-geographic subspecies in this family.

From the preceeding paragraph it would appear that within a species the subspecies differ one from another only in the most minor respects, so that only the specialist would be able to detect the differences. This is, however, far from the case. The substitution of yellow for white in a series of spots, the change in ground color from light tan to deep mahogany, the suffusion of melanic coloring in a part of the wing so as to obscure a whole series of spots—these differences are readily seen by anyone, although they are morphologically minor and of only subspecific value. So obvious is such variation that until the present century a name of species rank was always applied.

On the other hand, a certain number of situations have come to my attention where two species only distantly related within a genus, or perhaps belonging to different genera, are so closely similar that only a study of the genitalia, venation, and legs reveals that they are not one and the same. These are cases of parallel evolution, and whether "mimicry" causes them or not I cannot say, but I am doubtful that it does.

The result is that one must indeed be suspicious of two series of ithomines that resemble each other, for they may be differ-

ent species or even different genera owing to parallel evolution, and one must consider the possibility, when one has dissimilar series belonging to a genus but captured in different places, that the two may be but subspecies of the same species.

Under the International Rules the names of species and of subspecies are treated in the same manner. Application of the Law of Priority requires that, among the subspecies of a polytypic species, the historically oldest published name must become the species name.

It is my practice to apply the Rules somewhat rigidly to all categories covered by it, in the interest of ultimate uniformity and stability. I cannot become so emotionally attached to any scientific name that I am willing to perpetuate a non-prior one merely on the grounds that it has been used for many years. If the Commission rules to conserve a non-prior name, I abide by the ruling as part of the Code; I do not independently conserve names without a ruling. Since the publication of "Die Gross-Schmetterlinge," with its host of nomenclatural errors in the ithomines, there have been those who defended the errors and sought to conserve them. But nomenclature is just a mechanical convenience; only a uniform procedure can ever insure the keeping of nomenclature in its proper place and perspective.

Mayr (1942) pointed out the existence of three evolutionary categories that are worth discussing in relation to the ithomines. These are the "superspecies," the "sympatric species," and the "allopatric species." The three concepts are closely related and are aspects of the speciation phenomenon.

The superspecies was proposed by Mayr (1942, p. 169) as a more acceptable name for *Artenkreis* as used by Rensch (1929, 1934). It is defined as "a monophyletic group of geographically representative (allopatric) species which are morphologically too distinct to be included in one species." The other two concepts are defined thus (Mayr, 1942, pp. 148-149): "Two . . . species are sympatric if they occur together, that is if their areas of distribution overlap or coincide. Two species are allopatric if they

do not occur together, that is if they exclude each other geographically." In each case Mayr was referring to closely related, monophyletic species.

It would seem clear that the sympatric species represents an evolutionary situation that has progressed one step beyond the condition of the allopatric species. The sequence of events is: (1) A species becomes divided into two or more comparatively isolated parts through the action of external events resulting in ecologic discontinuity; in the course of time the several isolated populations, unable to exchange mutations, reach a degree of differentiation sufficient to be recognizable as subspecies. (2) One or more of these isolated populations continues differentiation beyond the point where specific homogeneity is admissible, so reaching the status of separate species; this is the allopatric situation that Mayr calls the "superspecies" (but note that "superspecies" may be used in other senses by other writers). (3) Further external events lead to a shifting of geographic range on the part of one or more of these allopatric species so that two of them come to overlap in distribution; differentiation has now progressed to a degree precluding interbreeding. This is the sympatric situation.

That it is difficult or even impossible to decide in practice whether or not a group of monophyletic allopatric species has differentiated to a degree so as to preclude interbreeding is evident from the protests (led by Mayr) against Dobzhansky's definition (1941) of a species solely as a category unable to interbreed with other species. Furthermore, Sweadner (1937) has shown that morphologically and biologically sound species are sometimes capable of interbreeding to produce non-sterile offspring.

It appears that the difference between the allopatric and the sympatric situations is one of degree, not of kind, of evolution. In my opinion Mayr's superspecies falls short as a practical taxon. Yet there indeed is a need for a category between the species and the genus to express monophyletic lines of less value than the genus. I avoid the formal subgenus because, according to the Rules, its use necessitates the application of a

formal Latinized name. Not only is this a minor "headache," but by using the subgenus one places in the path of a certain type of entomologist an almost irresistible temptation to elevate the subgenus to generic rank—a temptation more easily resisted if he must also find his own unpreoccupied name for the group.

I have used in this study a category called the "species group" in those genera where the evolutionary situation seems to require it. As herein used, the species group may be defined in the same way that Mayr defines the superspecies, except that the species group admits both allopatric and sympatric species, whereas Mayr's superspecies admits only allopatric species.

Larger than the species group, the genus is used throughout in the traditional manner. In most, but not all, cases, the gaps between genera are sufficiently large to admit ready definition. In a few genera (for example, *Hyalyris* and *Hypothyris* to be discussed in a later part of the monograph) the differences are neither large nor readily recognizable on the basis of any single structure, but rather represent the accumulation of many small differences in nearly every structure.

In order further to express phylogenetic lines I used (1940) the tribe. The tribe is a

category smaller than the subfamily, into which may be grouped genera of structural similarity and common probable origin. Although not mentioned in the Rules, I have applied Code principles to it: the tribal names are constructed on the root of the name of the type genus, with the addition of the ending "ini." This is not without precedent. The only possible confusion lies in the fact that in the past the tribe has sometimes been used as a kind of subgenus.

The structure of familial and subfamilial names is covered in Articles 4 and 5 of the Rules. Such contrivances as Schatz's "Neotropidae" are not acceptable. Nor is there any ruling requiring that the oldest genus in a family or subfamily be selected as the type genus, with the categorical name accordingly formed. D'Almeida and a few others have attempted to maintain the name *Mechanitinae* to supplant *Ithomiinae* on the grounds that *Mechanitis* appeared in print before *Ithomia*. The name *Ithomiinae* first was used in 1894 by Kirby; the name *Mechanitinae* first was used by Kremky in 1925. On the basis of priority, aside from familiarity, *Ithomiinae* is to be preferred, although there is no "law." D'Almeida's most recent publications on these butterflies have returned to *Ithomiinae*.

## SYSTEMATICS

### FAMILY ITHOMIIDAE REUTER

Ithomiidae REUTER, 1896, p. 330. CLARK, 1948, p. 79. FOX, 1949, pp. 36-47.

The ithomines are not part of the family Danaidae, for reasons discussed below. A separate family must be recognized for them within the superfamily Nymphaloidea. The family Ithomiidae comprises two subfamilies: the Ithomiinae of tropical America and the Tellervinae of the New Guinea-Australian tropics.

### MORPHOLOGY

The antennae are not strongly clubbed, but a club is formed by the gradual enlargement of the joints near the tip followed by some successively smaller joints forming a blunt non-recurving terminus. The club never is strongly flattened; the joints contributing to it are either round or oval in section. The ventral surface is tricarinate and bisulcate. The scape is in the form of a low cylinder placed in a shallow pit at the medial margin of the eye, directly dorsad on the head as a whole and a little anterior of the faint transverse epicranial suture. The right and left scapes are separated by a distance equal to about one-third of the width of one scape.

The maxillary palpi are obsolete. The labial palpi have three joints and normally are held against the frons next to the inner edge of the eyes, not quite reaching the antennal scapes.

The third anal vein is present on the forewing (figs. 1, 2) but anastomoses with the second anal vein very near the base. The first anal vein is entirely wanting. The main longitudinal veins never are strongly swollen, though in a few genera a slight but appreciable swelling is noted. The discal cell is closed. The first radial branch originates near the end of the discal cell; the radial sector has four branches. Thus the forewing radius has five branches altogether.

On the hind wing (fig. 3) the humeral vein is well developed in every case, though in some genera the distal branch of its fork is wanting. The discal cell is closed in all females and in nearly all males. In a few

highly evolved genera the males have the third discocellular cross vein atrophied but not totally absent. Males of one genus, *Heterosais*, have the discal cell open through loss of both the second discocellular cross vein and the first branch of the medius.

The male fore tarsus is strongly aborted. The most generalized condition is found in *Roswellia* (fig. 4), in which the tarsus is composed of two distinct but non-articulating joints, these in turn articulating on a fairly well-developed tibia. In the rest of the Tithoreini (fig. 5) and in *Tellervo* the tarsus is a single short joint articulating on the tibia. The balance of the Ithomiinae have the tibia reduced to a round structure articulating on the femur, with the tarsus represented only by a small bump on the distal aspect of the tibia (fig. 6).

The female fore tarsus has either five (fig. 7) or four (fig. 8) joints, the former being the primitive condition as found in *Tellervo*, the Tithoreini, and many other genera. The first tarsal joint and the tibia are slender, not markedly thickened and never atrophied. Whether the tarsus has five or four joints, the proximal three joints are characteristically equipped with a pair of cuticular apophyses located ventrad and at the tip of the joint; these are called "spurs" in the present paper to distinguish them from the numerous setae and scales. The fifth tarsal joint, when it is present, has a pulvillus, although it sometimes is so small that it can be seen only with favorable magnification and lighting; it sometimes is flanked by a pair of curved claws. The four-jointed tarsus lacks claws and pulvillus, of course, but the fourth joint may have a pair of terminal spurs.

The larvae are slender, tapering at each end, smooth or with sparse hairs. The chaetotaxy is not recorded. The food plants so far recorded all belong to the family Solonaceae.

The pupae (fig. 11) are suspended anally by the cremasters from a silken button. The thorax is strongly enlarged and bowed, the abdomen short. The wing covers are prominent and break the cylindrical shape.

The terminology of the male genitalia is

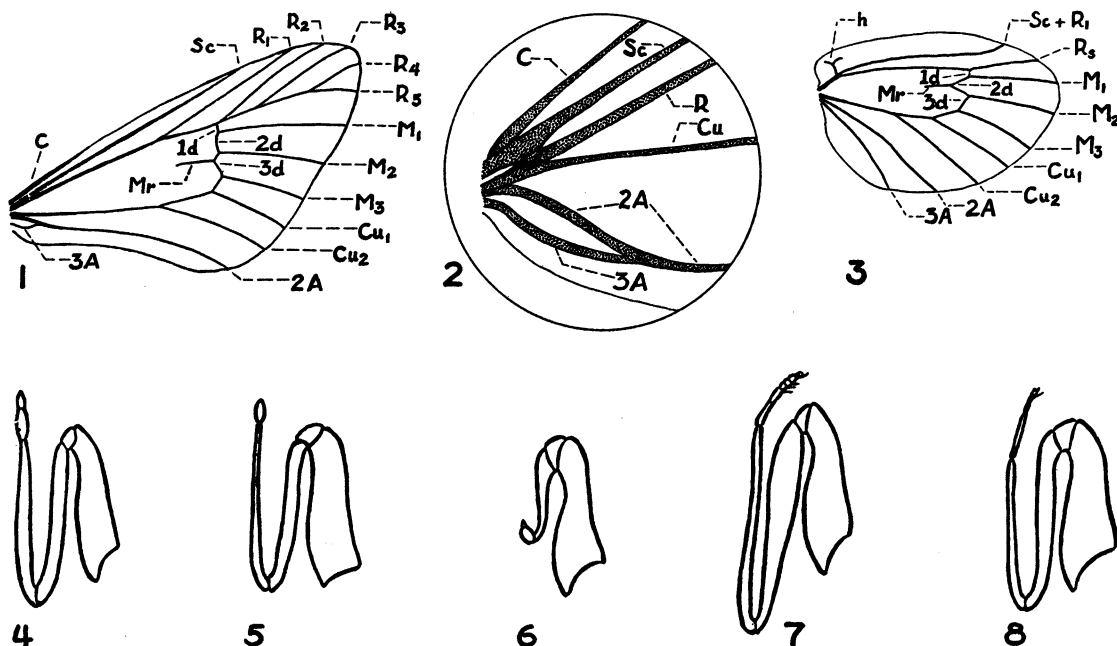


illustrated by figure 9. This is not the structural arrangement of any species or genus, but rather is a composite drawing to demonstrate all the major structures present anywhere in the family.

It is generally accepted that the genital structures, both male and female, are modified basic arthropod appendages, possibly with associated sclerites, belonging

family of insects is dealt with, it is advisable at present to employ nomenclature currently usual for the group concerned.

Kremky (1925) was the first to use the male genitalia in an over-all analysis of the ithomines. Since then Forbes, d'Almeida, and Fox have found these structures valuable. D'Almeida has been particularly enthusiastic about the use of male genitalia for



FIGS. 1-3. Venation of generalized ithomine showing terminology according to Comstock-Needham system. 1. Forewing. 2. Detail at base of forewing. 3. Hind wing. *Abbreviations:* 2A, 3A, second and third anal veins; C, costal vein; Cu<sub>1</sub>, Cu<sub>2</sub>, first and second branches of cubital vein; 1d, 2d, 3d, first, second, and third discocellular veins; h, humeral vein; M<sub>1</sub>, M<sub>2</sub>, M<sub>3</sub>, first, second, and third branches of median vein; Mr, median recurrent vein; R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub>, first to fifth branches of radial vein; R<sub>s</sub>, radial sector; Sc, subcostal vein.

FIGS. 4-6. Male forelegs illustrating three stages of reduction found in the Ithomiidae. 4. *Roswellia acrisione acrisione*. 5. *Eutresis hypereia hypereia*. 6. *Scada batesi*.

FIGS. 7, 8. Female forelegs illustrating two principal types found in the Ithomiidae. 7. *Roswellia acrisione acrisione*. 8. *Xanthocleis aedesia*.

to two abdominal segments. Beyond this statement there is little agreement among entomologists on terminology for the parts and none at all on structural homology. There is real need for a comprehensive study of these structures throughout the Class Insecta, with the use of embryologic methods to supplement examination of adult parts. Until such a study is available, the phylogenetic significance of modifications in the genitalia is obscure. When only one small

taxonomy in this group and has experimented with defining all categories within the family by the use of male genitalia. With much larger collections at my disposal I have found many exceptions to these definitions at every categorical level, but nevertheless agree with d'Almeida that male genitalia are of great value, particularly in view of the fact that color and pattern characteris, traditionally most important in lepidopterology, may be very misleading in

the ithomines. It seems best to include these structures in the study of all variable structures in reaching taxonomic conclusions.

With reference to figure 9, the hind gut region of the enteron runs beneath the tegumen and the anterior part of the uncus in the dorsal part of the body cavity, terminating in the anus under the uncus. The tegumen is a rounded elliptical plate

to me to be somewhat doubtful, although possible. In the generalized ithomine species the tegumen and the uncus are separated by a definite suture (the uncal suture), but in most species the two parts are fully ankylosed, with no sign of a suture. The posterior part of the uncus is variously developed. Frequently it is produced into a point, as drawn in figure 9. But it may also be short,

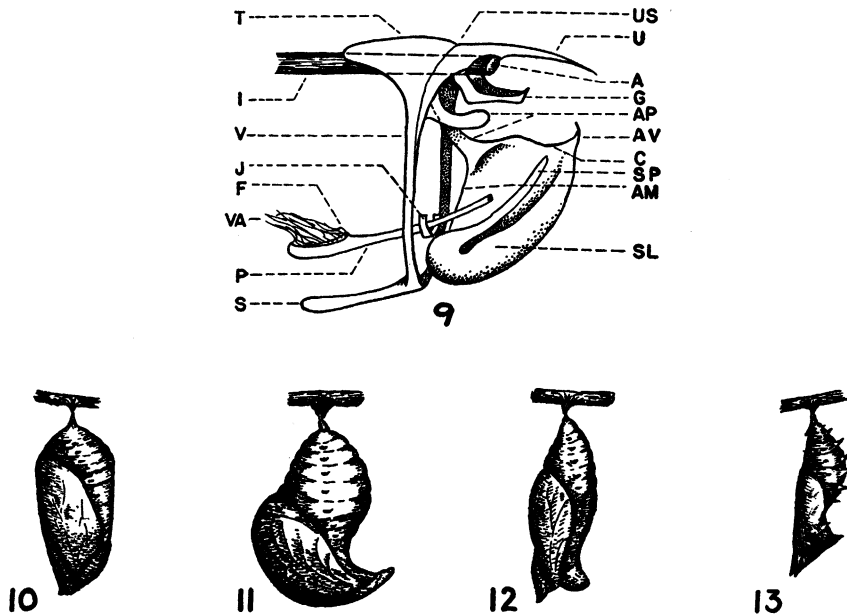


FIG. 9. Lateral view of male genitalia of non-existent species, combining structures found in the Ithomiidae, to illustrate terminology. Left valve removed, exposing inner surface of right valve. Posterior towards right. *Abbreviations:* a, anus; am, articulating margin of valve; ap, appendices angulares; av, apex of valve; c, costal margin of valve; f, foramen of penis; g, gnathos; i, hind gut; j, juxta; p, penis; s, saccus; sl, sacculus of valve; sp, saccular process of valve; t, tegumen; u, uncus; us, uncal suture; v, vinculum; va, vas deferens.

FIGS. 10-13. Lateral views of pupae of four related families. 10. Family Danaidae, *Danaus plexippus*. 11. Family Ithomiidae, *Tithorea harmonia megara*. 12. Family Satyridae, *Satyrus alope*. 13. Family Nymphalidae, *Aglais antiopa*.

lying beneath the tergite of the eighth (by my count) abdominal segment. It is often hood-like in the manner in which it extends anteriorward, and in a few cases is asymmetric. In some cases it is narrow and U-shaped rather than hood-like.

The uncus evidently is part of another metamere. Both the tegumen and the uncus have been identified as sclerites rather than as part of the appendages proper; this seems

rounded, or membranous, or even bilaterally biramous. In several groups (*Patricia* and the *Dircennini*) a strongly chitinous plate, the gnathos, projects from the posterior ventral margin of the uncus, more or less resembling a mandible. The gnathos is provided with muscles and evidently functions in closing the anus. The absence of a gnathos has been claimed as a characteristic for certain groups; as a matter of fact the gnathos is always

present, though not necessarily enveloped with chitin. It can be found in any preparation that has been softened only, rather than cooked away in caustic potash. When, in literature as well as in the discussion in this paper, the gnathos is noted as being absent, what is meant is that it is membranous and inevident.

The vinculum forms, with the tegumen and uncus, a complete ring inside the posterior end of the eighth abdominal metamere. It is always ribbon-like in the ithomines and appears to be formed from two narrow but complete parts, one behind the other. The anterior ring is connected to the tegumen, the posterior ring to the uncus.

The saccus extends anteriorward from the ventral end of the vinculum and is attached to the inside of the eighth abdominal sternite, though probably does not articulate with it but is firmly attached.

From their location one may infer logically that the tegumen, the saccus, and the anterior of the two rings contributing to the vinculum all belong to the eighth metamere, while the rest of the genitalic structures (except the penis, of course) appear to belong to the ninth metamere.

In figure 18 the left valve (towards one) has been dissected off, so that one views the inner face of the right valve in place. In general the valve is a triangular structure in the ithomines. The old name "clasper" describes the function. The anterior margin of the valve, which I call the "articulating margin" in descriptions, hinges with the posterior ring of the vinculum. Furthermore there is a strap-like structure connecting the dorso-anterior corner of the valve to the upper part of the vinculum. This strap-like structure always is present, but in some groups the anterior part, continuous with the vinculum, is chitinous, and only the posterior part remains membranous. Kremky (1925) noticed such a chitinous anterior part and called it the "appendix angularis." When the appendices angulares are mentioned in descriptions, reference is made only to the chitinous part; when it is said to be absent, what is meant is that it is entirely membranous.

The apex of the valve is the posterior end of the costal margin where it joins the outer

margin. Its great variation makes it one of the most useful taxonomic structures. Among the kinds of variation noted are: the angle formed at the apex may be rounded, blunt, or acute; the apex may be produced in various ways as one or several teeth or spines; the apex may be armed in various ways with hair-like or spine-like setae; in some cases the whole apex may be folded back over the inner face of the valve. The general area of the apex, rather than the apex itself, is sometimes referred to as the cucullus.

The sacculus of the valve is thought to be either an appendage separate from the valve or the biramous part of the same appendage. Certainly in many lepidopterous families it is a distinctly separated structure. In the ithomines the sacculus always is a fold continuous with the rest of the valve and seems to turn in and up from the ventral margin; it is widest near the articulating margin and becomes less and less evident towards the apex. In one genus, *Scada*, a long, slender, finger-like process extends up from the sacculus and ornaments the inner face of the valve. This I call the "saccular process" for want of a better name. In certain Microlepidoptera there has been observed a similar structure which may or may not be homologous with the saccular process of *Scada*.

An annular membrane closes off the interior of the abdomen at the cinctum and is pierced by the penis. In many Lepidoptera, including the ithomines, the annular membrane is not adorned with spines nor pocketed in any way. Where the penis passes through the membrane, the membrane is chitinous. In the ithomines this chitinous plate usually is in the shape of a V, with the penis fitting into its groove, and is called the *juxta*.

The preferable name for the intromittent organ long has been a topic for debate. Many prefer the term "aedeagus," varying the spelling with "aedeagus" and "aedeagus," on the grounds that the structure in the insect is not homologous with the mammalian penis and therefore should not receive the same name. Of course there is no homology. But it must be noted that the insect's head is not homologous with the mammalian head, though "head" it is to every

entomologist. The insect legs are not homologous to mammalian legs, but the term is used nonetheless. An impressive list could be made of the terms entomologists borrow by association or analogy from mammalian anatomy. Thus I use the term "penis" for the intromittent structure of the insect in disregard for what some believe to be tradition, mainly because I am sure how to spell the word and am safe in the knowledge that others will understand what is meant.

The penis is a chitinous tube open at each end. The posterior end encases an eversible membrane which, in some Lepidoptera, is armed with an alarming assortment of spines, but which in the ithomines is not so equipped and which varies so little that it is neither drawn nor discussed. The anterior opening of the penis is the "foramen penis" in descriptions. It is variously placed and shaped. It may be located dorsally near but not at the anterior end, or, more rarely, it may be the round inner opening of the cylinder of the penis. The proportion between the length of the foramen and the whole structure sometimes is of diagnostic value. In any event, the foramen admits into the penis the membranes of and investing the vasa deferentia from the testes.

There is very little variation in the chitinous female genitalia, and I have made no attempt to analyze them systematically.

The homology of the humeral cross vein (fig. 3) of the hind wing is a little more complicated than the terminology suggests. In many genera it is found as a Y-shaped vein branching erectly from the subcostal vein near the base. Only the stem of the Y is the humeral cross vein; the two arms are remnants of the costal vein. The distal arm, that part of the atrophied costal vein beyond the humeral cross vein proper, often is wanting, so that the whole structure in some genera resembles a back-curving sickle. It is convenient to refer to a "forked humeral" or a "simple humeral" to distinguish these two conditions.

The three discocellular cross veins (figs. 1, 3) are named conveniently for the lepidopterist, but attention must be drawn in passing to their homology, as well as to that of the "median recurrent vein." The first discocellular vein (1d) is, on both wings, the

radio-medial cross vein (r-m). The second discocellular vein (2d) of the forewing is the proximal part of the first median branch ( $M_1$ ); the second discocellular vein of the hind wing is the proximal part of both the second and first median branches ( $M_1$  and  $M_2$ ) when it is angled, or only of the first median branch when it is straight. The third discocellular (3d) of the forewing probably combines the proximal parts of the second and third median branches ( $M_2$  and  $M_3$ ); on the hind wing it is the proximal part of the third median branch alone ( $M_3$ ). The median recurrent vein is the distal part of the unbranched medius. On the hind wing of *Eutresis* there are two recurrent veins on the third discocellular vein (fig. 35). This suggests that the upper part of the discocellular and the upper recurrent veins are the second median branch ( $M_2$ ), the lower recurrent and the lower part of the discocellular vein are the third median branch ( $M_3$ ), while that part of the discocellular vein between the recurrent veins is a median cross vein (m).

The vein connecting the first cubital branch ( $Cu_1$ ) with the third median branch ( $M_3$ ) is sometimes called the fourth discocellular vein (4d), but actually it is the medio-cubital cross vein (m-cu).

An androconial patch is found on the forewing of males of *Tellervo* (fig. 17) and in a reduced form is present on the forewings of males of a few species of *Mechanitis* and one species of *Aeria*. In *Mechanitis* this patch, when present, lies below the cubitus and is only the posterior portion of the whole area as found in *Tellervo*. The opposite condition applies to *Aeria*, where the patch lies above the cubitus and is only the anterior part of the *Tellervo* patch.

*Tellervo* has a deep concavity along the costal margin of the male hind wing, but in this region none of the scales are modified into the long hairs found at the same place in ithomine males. The hair patch of the ithomines is of help in the recognition of genera. Its most primitive and complete form (fig. 23) is that in which the patch extends from beneath the humeral vein out to the first discocellular along the radius at the top of the discal cell. A first step in reduction (fig. 65) is the remodification of the scales near the middle of the patch so that it is divided into

two parts, a proximal and a distal patch. A final step (fig. 73) is the loss of the distal patch so that again there is only one, the proximal part of the original patch. The ultimate step, that of loss of the proximal patch also, does not occur in the Ithomiidae, unless the absence of a patch in *Tellervo* is to be so regarded. Females of some of the species in one genus, *Thyridia*, have acquired this typically male patch.

The speculative history of the male hair patch as outlined above seems logical and is in accord with the evolutionary principle of reduction and simplification of primitive structures, a principle that is evident in other structures including the forelegs and the venation. If the evolution of the hair patch occurred in the reverse sequence of steps, then one would expect to find the long, complete patch in the most advanced genera; such as *Heterosais*, but such is not the case.

#### PHYLOGENETIC POSITION OF THE ITHOMIIDAE

Schatz [1886 (1885-1892)] united the genus *Tellervo* with the ithomines. Other workers, while recognizing a relationship, usually have hesitated to unite them. In my opinion the relationship is so close that only the absence of the male hair patch on the hind wing excludes *Tellervo* from the ithomine tribe Tithoreini. The male genitalia of *Tellervo* would not be out of place with the Tithoreini on the one hand, or with the satyrid tribe Haeterini on the other. The legs and venation are similar to those of the Tithoreini.

Most students have appended both the ithomines and the tellervos to the nymphaloid family Danaidae. I am not certain who started the practice, but it has received wide acceptance because that was the arrangement in Seitz. Unquestionably the Ithomiidae show some relationship to the Danaidae. But they are equally, if not more closely, related to the Satyridae—a fact that seems to have been overlooked. (But see Frühstorfer, 1910, p. 272.)

It appears that the inclusion of the Ithomiidae as part of the Danaidae has been based on the following points said to be in common between the two groups: (1) a cylindrical pupa suspended anally; (2) the

vestigial third anal vein of the forewing; (3) the lack of abrupt, flat clubs on the antennae; (4) the presence of the third discocellular vein on the hind wing; and (5) coloring that is largely tawny, white, and black.

The anal suspension of the pupa is characteristic of the superfamily Nymphaloidea, to which both the Danaidae and the Ithomiidae clearly belong. Of itself this feature indicates no relationship within the superfamily. Holland (1898, p. 85) repeats the usual misapprehension when he ascribes to the ithomines a pupa similar in shape to that of the Danaidae. This is wrong. As a matter of fact, the Holland collection in the Carnegie Museum contains no ithomine pupa; at the time of writing (1898) none had been described in the literature except by Schatz (1886), whose description and figure evidently were not taken into account. Probably Holland had no first-hand information on the subject.

I have studied several ithomine pupal skins along with the insects emerged from them. D'Almeida has described and figured (1938, 1944) the life histories of several ithomines, including the pupae. A comparison of the danaid pupa (fig. 10) with the ithomine pupa (fig. 11) shows no great similarity in shape, but rather that the ithomine pupa resembles the nymphalid and satyrid pupae (fig. 12, 13). Note that the danaid pupa is evenly cylindrical, the thorax is not bowed, and the wing covers do not break the contour. But in the ithomines, satyrids, and nymphalids the thorax is bowed, the wing covers project prominently and interrupt the even cylindrical profile. On the whole, the pupae suggest that the ithomines and danaids are not closely related.

The vestigial third anal vein of the forewing is to be found in quite a diverse assortment of butterflies in addition to the ithomines (fig. 2) and the danaids, with the vein always in the same state and degree of reduction: family Nymphalidae, *Colaenis*, *Kallima*, *Apaturina*, a very small and scattered part of the family; family Morphidae, *Tenaris*, one of 12 genera; family Satyridae, the primitive tribe Haeterini comprising the genera *Haetera*, *Pierella*, and *Cithaeris*;



family Pieridae, *Delias*, *Pieris*, *Aporia*, and 18 other genera representing about half of the family; family Riodinidae, about half of the genera; family Lycaenidae, about one-third of the genera.

The evolutionary trend of the wing veins in butterflies is to simplify the venation through the loss of pieces of veins, or even the loss of an entire vein. Even the most generalized ithomine with the most complete venation has already undergone great modification of venation through vein loss. The basal part of the medius, for example, is never to be found, although vestiges of its distal end may be present. This being the case, one concludes that a butterfly having the third anal vein, even in a strongly atrophied form, is in that respect more generalized, less evolved, than a butterfly that has completely lost that vein. Thus the retention of a relict third anal vein establishes relationships by no means confined to the danaids. That the vein is present in the ithomines, the Danaidae, the most primitive tribe of Satyridae, and in some of the primitive genera of Nymphalidae and Morphidae serves only to support the view that the ithomines are primitive among the Nymphaloidea. Certainly there is no proof here that the ithomines belong to the Danaidae.

The abrupt, flat antennal club is found only in a part of the Nymphaloidea. The gradual antennal club is so frequent and phylogenetically diverse that, again, this structure offers no evidence of an especially close relationship between the ithomines and the danaids.

Regarding the closed discal cell of the hind wing, the same reasons and reasoning are applied as in the discussion above of the third anal vein. An open discal cell merely indicates that the discocellular veins have been lost, which is a more advanced condition. Here is further evidence that the ithomines as well as the danaids are more primitive than the Nymphalidae.

As to coloring, the combination of tawny, black, and white is common enough throughout all butterfly families. The close coincidence of pattern and coloring among the Lycoreinae, the Ithomiinae, the Heliconiinae, and other groups does not indicate phylogenetic relationship particularly, but rather

an ecologic association usually called "mimicry," a phenomenon not really understood but certainly involving parallel evolution.

In short, the five features reviewed above do not require that the danaids and the ithomines be placed in one family, do not suggest that these two groups are any more closely related to each other than each is to other nymphaloid groups. Examination of other characters brings out some points that tend to place the danaids and the ithomines rather farther apart. For example, study of the genitalia reveals that the general plan of construction in the ithomines resembles that of the satyrids more closely than that of the Danaidae.

Discal transparency, common in the ithomines, is not found in the danaids and in fact is present only in one other group of butterflies belonging to the Nymphaloidea—the Haeterini. The retransformation of the alar setae from scales to slender hairs, the histological basis for transparency, is a rather unusual phenomenon. Its presence in both the ithomines and the haeterines suggests a relationship, particularly in view of the number of other features the two groups share.

The male hair patch of the ithomines is diagnostic with respect to its position above the radius of the hind wing. Histologically similar patches differently placed on the hind wing are to be found in some satyrid genera and in several genera of the Brassolidae, a group the familial separation of which from the Satyridae probably is not necessary. Here is another bit of evidence for a closer relationship between the Satyridae and the Ithomiidae.

It is my conclusion that the family Ithomiidae is one of the most primitive families of the Nymphaloidea, and that its phylogenetic position is between the Satyridae and the Danaidae but that it is not an integral part of either, though closer to the former.

#### SUBFAMILY TELLERVINAE FRÜHSTORFER

Tellervinae FRÜHSTORFER, 1910, p. 272. HULSTAERT, 1931, p. 190. FORBES, 1939, p. 102.

Danaidinae, BATES (part), 1862, pp. 495, 497, 498. KIRBY, 1871, p. 17.

Danaididae, FELDER AND FELDER (part), 1862, p. 74.

- Euploeina MOORE (part), 1883, p. 253.  
 "Neotropiden" SCHATZ, 1886 (1885-1892), pp. 85, 87, 91. REUTER, 1896, p. 36.  
 "Danaomorpha" HAASE, 1891, p. 29.  
 "Paleotropinae" HAASE, 1891, pp. 29, 33; 1893, p. 25. VAN EECKE, 1915, p. 63. ROTHSCCHILD, 1915a, p. 116; 1915b, p. 13. VAN EECKE, 1916, p. 263. JOICEY AND TALBOT, 1916, p. 70. KREMKY, 1925, pp. 152, 160. SEITZ, 1927a, p. 1110.  
 Hamadryadinae REUTER, 1896, pp. 320, 552, 556.  
 Hamadryadidi REUTER, 1896, pp. 552, 556.  
 "Neotropinae" JORDAN, 1898, pp. 390, 402.  
 "Ithomiid" HOLLAND, 1900, p. 60.  
 Tellervidae KREMKY, 1925, p. 160. ZERNEY AND BEIER, 1936, p. 1721.  
 Heliconiini HANDLIRSCH, 1925, p. 940.

Aside from the systematic position of this group, as discussed above, the selection of a name has been a problem. Haase (1891) introduced a bastard procedure for denominating the tellervos and the ithomines, calling them, respectively, the "Paleotropinae" and "Neotropinae," using Latin taxonomic endings grafted to the German vernacular usage of Schatz (1885-1892). No slightest validity is to be attached to either name, and they are included in the synonymy as a matter of curiosity.

The subfamily contains the single monotypic genus *Tellervo*, which is found only in the insular tropical belt from Cape York north through New Guinea, west to Celebes, east to the Solomon Islands. It is unrelated to any other element of the fauna of that region. Schatz (1885-1892) placed *Tellervo* as one of the genera in his "Gruppe I" of the "Neotropiden," the other genera being *Tithorea*, *Melinaea*, *Athyrtis*, *Eutresis*, *Olyras*, *Athesis*, and *Methona*. The rest of the ithomines he placed in his "Gruppe II." Only Jordan (1898) and Holland (1900) have since ventured to recognize such a close association, most students being content to mention the relationship while reserving to *Tellervo* a separate major categorical name.

The venation, the legs, the palpi, and the genitalia of *Tellervo* all fit perfectly well with those of the ithomines. Only the absence of the male hair pencil on the hind wing is clearly diagnostic. Yet this feature is acquired by females of *Thyridia*, while the androconial patch of *Tellervo* is found in a partial state in certain ithomines.

The phylogeny and distribution of the Tellervinae are best interpreted in terms of Matthew's doctrine (1915) of holarctic distribution. The geologic times involved in the probable arrival of *Tellervo* at each of the presently insulated regions where now it is found must depend on the dating of the segregation of each island, which is a task for the geologist, not the entomologist. As far as I can determine, present geologic opinion places these events around the close of the Cretaceous and the beginning of the Tertiary, which fits well with the time of the probable entrance of the ithomines into South America.

I am tempted to include *Tellervo* in the tribe Tithoreini, as I indicated above, but the male hair pencil and the deep separation in geologic history of the two groups lead me to keep them in separate subfamilies.

The present study makes no pretense to a generic and specific revision of the Tellervinae. Material available to me has been too scanty. Suffice it to say that study of specimens available and of the literature leads me to believe that both the subfamily and the genus are monotypic.

#### GENUS TELLERVO KIRBY

*Tellervo* KIRBY, 1894, p. 28. Type: *Papilio zoilus* Fabricius, by original designation.

*Hamadryas* BOISDUVAL, 1832, p. 91. Type: *H. zoilus* (Fabricius), by original designation. Preoccupied by *Hamadryas* Hübner, 1806.

Palpus (fig. 14) closely appressed to the head, the second joint longest and curved. The first joint is one-fourth of the length of the second; the third joint is one-fifth of the length of the second. The structure of the first joint is more generalized than in most of the ithomines and is similar to the palpi of the Tithoreini.

The male foreleg (fig. 15) has the femur and coxa about the same length, while the tibia is longer than either. The tarsus is reduced to a single elongated joint a little more than one-half of the length of the tibia.

The female foreleg (fig. 16) has five tarsal joints. A pair of spurs are present on the first, second, and third joints, and a pulvillus and claws are present on the end of the fifth joint. The first tarsal joint is as long as the other four combined; the second joint

is flattened and subovate, as are the third and fourth joints; the fifth joint is small and cylindrical.

**VENATION (FIG. 17):** The forewing has the vestigial third anal vein present in the same manner that it is found in the Ithomiinae, the satyrid tribe Haetarini, and some Danaidae. The second radial branch arises proximad

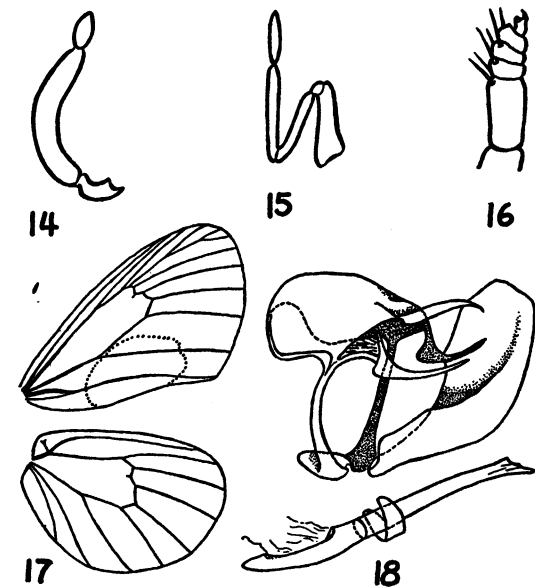
ently trifold, with the posterior side of the cell slightly longer than the anterior side.

**MALE GENITALIA (FIG. 18):** Similar to those of *Patricia* and to those of the Dir-cennini. The tegumen is hood-like, strongly developed. The uncus is slender and curved, ending in a point; it is not separated from the tegumen by a suture. The well-chitinized gnathos is developed as a pair of mandible-like structures which are not joined at their posterior tips, with the right and left halves remaining separate. The saccus is stubby, much shorter than the tegumen. The valve is fairly simple, unarmed; the sacculus is a wide, regularly curved fold. The juxta is broad and V-shaped. The penis is longer than the tegumen plus uncus and is not thick. The foramen is one-fourth of the length of the penis.

The single species, *Tellervo zoilus* (Fabricius), is polytypic, as might be expected of one sharing the modest flight habits and want of adventuresomeness of the ithomines. Not all of the numerous names recorded in this genus for species, subspecies, and sub-subspecies are biologically applicable, but sorting the wheat from the chaff is not feasible with material in American collections. It is to be hoped that someone having access to the British and continental museums will undertake the task.

#### SUBFAMILY ITHOMIINAE KIRBY

Ithomiinae KIRBY, 1894, pp. 20–21. REUTER, 1896, pp. 323, 330, 418, 552, 556. THAYER AND POULTON, 1903, pp. 558–571. HAENSCH, 1903, p. 157. POULTON, 1903, p. lv. HAENSCH, 1905, pp. 142–180. KAYE, 1904, p. 162; 1905, pp. 83, 85; 1906, p. 414. KIRBY, 1906, p. 7. POULTON, 1907, p. xli. MOULTON, 1909, p. 604. HAENSCH, 1909, pp. 113–171. KAYE, 1913, pp. 38–48; 1918, p. 77. D'ALMEIDA, 1923, pp. 232–235. FORBES, 1924, pp. 146–158. COCKAYNE, 1924, p. 9. KAYE, 1926, p. 464. FORBES, 1927, p. 23. SEITZ, 1927b, pp. 32, 39, 40, 48. COLLENETTE AND TALBOT, 1929, p. 393. KÖHLER, 1929, p. 314. MONTE, 1934, pp. 51, 63, 189, 194, 199. BRYK, 1937b, p. 451. FOX, 1939a, p. 72; 1939b, p. 141; 1940, pp. 161–207. FORBES, 1941, pp. 1–4. FOX, 1941, pp. 1–2. D'ALMEIDA AND FOX, 1941, p. 1. FORBES, 1942, p. 37. FOX, 1942a, p. 1; 1942b, pp. 7, 25; 1943, p. 397. LICHY, 1943, p. 209. FORBES, 1943, p. 707. BROWN, 1944, p. 329. LICHY, 1944, p. [13]. FOX, 1945, p. 1. D'ALMEIDA, 1945b, p. 1. FOX AND FOX, 1947, p. 173. CLARK, 1948, p. 79. FOX, 1948a, p. 315;



FIGS. 14–18. *Tellervo assarica*. 14. Palpus of male. 15. Male foreleg. 16. Female fore tarsus. 17. Venation of male, androconial patch indicated by dotted lines. 18. Male genitalia, left valve removed, dissected penis shown below.

of the end of the discal cell, though very little; this condition is found exceptionally in several genera in the Ithomiinae. The second discocellular vein is angled and bears a minute recurrent vein. An androconial patch is present below the discal cell in males only; this is on the upper side of the wing and is roughly ovoid. Its position is indicated by dotted lines on figure 17.

The hind wing venation is very much like the venation of various of the genera in the tribe Tithoreini. The subcostal and radius separate near the base of the wing, the humeral vein arising near their point of separation and being lightly forked. The second discocellular vein is angled and bears a small recurrent vein. The cubitus is appar-

1948b, p. 131. FORBES, 1948, p. 1. FOX, 1949, pp. 1-12. D'ALMEIDA, 1951a, pp. 1, 3; 1951b, p. 190. 1952, p. 1. FOX, 1953, pp. 141-155; 1955, pp. 93-95.

"Mechanitides" BAR, 1878, p. 24.

"Neotropiden" SCHATZ, 1886 (1885-1892), p. 85.

"Neotropinae" HAASE, 1891, p. 33. JORDAN, 1898, pp. 390, 402. FRÜHSTORFER, 1910, p. 272. LA CERF, 1925, p. 136.

Mechanitinae KREMKY, 1925, pp. 141, 143, 144, 147-154, 156, 175-184.

Mechanitidae D'ALMEIDA, 1939a, p. 78; 1939b, p. 277; 1940, p. 758; 1941, p. 79; 1943, p. 165; 1944, pp. 39-97.

Mechanitidae D'ALMEIDA, 1942, p. 179; 1945a, p. 97.

The subfamily Ithomiinae takes as its diagnosis the characters of all higher categories to which it belongs, including those of the family Ithomiidae and of the superfamily Nymphaloidea. It is distinguished from the only other subfamily of its family, the Tellervinae, by the presence of the hair pencil along the top of the radius of the upper side of the male hind wing.

In order to emphasize major phylogenetic lines among the genera, the subfamily was divided by Fox (1940) into three tribes: Tithoreini, Ithomiini, and Oleriini. Based on genitalic characters, d'Almeida (1941) recognized five tribes: Tithoreini, Thyridiini, Ithomiini, Dircennini, and Godyridini. He gave a key to these tribes based on the male genitalia and diagnoses of the three new tribes he proposed, but offered no indication as to the genera he intended to place in each. I find that he misinterpreted some of the genitalic structures and am further of the opinion that male genitalia alone may not be used to better advantage than any other structure used alone. Clark (1948) proposed a classification of the Rhopalocera in which he divided the Ithomiinae, a subfamily of the Danaidae, into three tribes, Melinaeini, Thyridiini, and Ithomiini, but listed no genera and offered no diagnoses; his arrangement remains a mystery to me.

I find that the Ithomiinae should be divided into eight tribes, as follows:

1. Tithoreini Fox, 1940, comprising the genera *Roswellia*, *Athesis*, *Patricia*, *Eutresis*, *Olyras*, *Athyrtis*, *Tithorea*, and *Elzunia*

2. Melinaeini Clark, 1948, with the single genus *Melinaea*

3. Mechanitini, new tribe, including *Xanthocleis*, *Mechanitis*, *Sais*, and *Scada*

4. Napeogenini, new tribe, comprising *Hyaliris*, *Hypothyris*, *Rhodussa*, *Napeogenes*, and *Garsauritis*

5. Ithomiini Zerny and Beier, 1936, with *Ithomia*, *Pagyris*, *Miraleria*, and *Placidula*

6. Oleriini Fox, 1940, including *Hyposcada*, *Oleria*, and *Aeria*, plus an undescribed genus

7. Dircennini d'Almeida, 1941, comprising *Callithomia*, *Dircenna*, *Velamysta*, *Ceratinia*, *Hyalenna*, *Episcada*, and *Pteronymia*

8. Godyridini d'Almeida, 1941 (=Thyridini d'Almeida, 1941), with *Thyridia*, *Epityches*, *Godyris*, *Dygoris*, *Pseudoscada*, *Hymenitis*, *Hypoleria*, *Mcclungia*, *Hypomenitis*, *Veladyris*, and *Heterosais*

#### KEY TO THE TRIBES OF ITHOMIINAE

1. Femur of male foreleg longer than coxa . . . 2  
Femur of male foreleg shorter than coxa . . . 5
2. Male fore tibia longer than coxa, the tarsus articulate . . . . . Tithoreini  
Male fore tibia shorter than coxa, fused with tarsus . . . . . 3
3. Female fore tarsus with four joints; appendices angulares of male genitalia well developed as curved, unarmed plates . . . Napeogenini  
Female fore tarsus with five joints; appendices angulares of male genitalia poorly developed, usually not chitinized . . . . . 4
4. Male gnathos membranous . . . . . Oleriini  
Male gnathos chitinized, shaped like a mandible . . . . . Dircennini  
Male gnathos chitinized, shaped as a suspended plate . . . . . Godyridini
5. Female fore tarsus with four joints . . . . . Mechanitini  
Female fore tarsus with five joints . . . . . 6
6. Male appendices angulares large, ovoid, armed . . . . . Melinaeini  
Male appendices angulares subtriangular unarmed . . . . . Ithomiini

#### TRIBE TITHOREINI FOX

Tithoreini FOX, 1940, pp. 175-180. D'ALMEIDA, 1941, pp. 79, 80. FOX, 1953, p. 143.

This tribe as originally defined included *Melinaea* and *Thyridia* with the genera mentioned below. D'Almeida, seeking to place the tribes on a genitalic basis, defined the Tithoreini as including those genera having the uncus present and having a narrow chitinized band serving to support the "subscaphium" (gnathos). While he did not list the genera he thought belonged to the tribe as so defined, it must be noted that according to such definition it would include also most of

TABLE 1  
SUMMARY OF CHARACTERS OF THE TRIBES OF THE SUBFAMILY ITHOMIINAE

	Ratio of Male Fore Femur to Coxa	Ratio of Male Fore Tibia to Femur	Form of Male Fore Tarsus	Form of Male Gnathos	Form of Male Appendices Angulares	No. of Female Fore Tarsal Joints
Tithoreini	Femur longer	Tibia longer	Distinct	Various	Various	5
Melinaeini	Coxa longer	Femur longer	Fused or distinct	Not chitinized	Large, flat, armed	5
Mechanitini	Coxa longer	Femur longer	Fused	Ribbon-like	Not chitinized	4
Napeogenini	Femur longer	Femur longer	Fused	Not chitinized	Large, flat, un- armed	4
Ithomiini	Coxa longer	Femur longer	Fused	Not chitinized	Large, flat, un- armed	5
Oleriini	Femur longer	Femur longer	Fused	Not chitinized	Slightly chi- tinized	5
Direcennini	Femur longer	Femur longer	Fused	Mandible-like	Ribbon-like	5
Godyridini	Femur longer	Femur longer	Fused	Plate-like	Not chitinized	5

the Mechanitini and a few other scattered and unrelated genera, but would exclude *Eutresis*.

I now place eight genera in the Tithoreini: *Roswellia*, *Athesis*, *Patricia*, *Eutresis*, *Olyras*, *Athyrtis*, *Elzunia*, and *Tithorea*. The foreleg of the male has the femur as long as or longer than the coxa; the tibia is longer than the femur; the tarsus is distinct and articulates on the tibia. This is a primitive condition worthy of special notice, because in most of the ithomines, and for that matter in most of the Nymphaloidea, the tarsus is reduced to an inarticulate bump on the aborted tibia. The female foreleg likewise is generalized, but few ithomine females have the fore leg very greatly reduced, and the presence of all five tarsal joints is usual throughout the family. The pulvillus is present. There are a pair of spurs on each of the first three tarsal joints. The venation includes all the elements ever present in the Ithomiidae. The females differ only slightly or not at all from the males in venation and strength of coloring.

Only *Tithorea* is widely distributed throughout the American tropics, the other genera

being limited to the higher rain forest ecologies of the "back-bone" mountains. *Roswellia*, *Athesis*, *Patricia*, *Eutresis*, and *Athyrtis* all are plainly relict genera, monotypic or with few species, and with limited, frequently discontinuous geographic distribution. All five genera give evidence of distributional "drying-up." *Elzunia* and *Olyras*, while limited to the high rain forests, show a greater degree of speciation and a greater adaptability. In these two genera there is less indication of "drying-up" and some suggestion of mild expansion in recent time, though not nearly so strongly as in *Tithorea*.

If the monophyletic origin of the Tithoreini be assumed, the living genera are difficult to understand vertically. The phylogenetic chart (fig. 19) gives a possible explanation. But one must understand that these are most probably relicts of ancient genera which have survived the rigors of changing environments through an expanse of geologic time exceeding the age of the higher mammalian orders. One yearns for the convenience of a fossil record! As none exists, any reconstruction must be hypothetical.



In general I have applied the principle that a structure evolves by reduction and simplification; probably this principle should generally be applied to reconstructing the phylogeny of forms within a family. There is no basis for supposing that new structures have been added or old structures made more complex at infrafamilial level.

first be present. How a structure first appears is not part of the present problem. The appearance of a major structure doubtless signals the advent of a major category. For present purposes it is safe to assume that insects had as the original ancestral condition six similar legs, each leg with coxa, trochanter, femur, tibia, and tarsus, and that

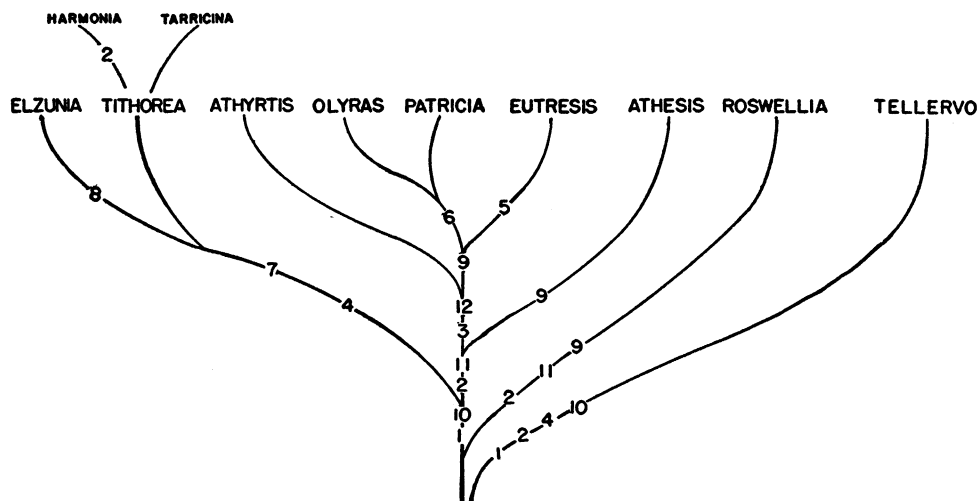


FIG. 19. Phylogenetic chart of the tribe Tithoreini. Numerals indicate steps in structural evolution from previous conditions, as follows: 1. Male fore tarsus, previously with two joints, is reduced to one joint. 2. Claws on female fifth fore tarsal joint are lost. 3. Distal arm of humeral vein on hind wing, previously strong and fully as long as proximal arm and as stem, is shortened. 4. Both arms of humeral vein are shortened. 5. Distal arm of humeral vein is completely lost, although proximal arm is not reduced. 6. Hair pencil on hind wing of male, previously a complete patch from base to apex of discal cell, is divided into two by loss of section of patch located about one-third of distance from base of wing. 7. Hair pencil is divided into two by loss of section located about two-thirds of distance from base of wing. 8. Having previously completed step 7, smaller distal patch is lost, leaving only proximal part of original pencil. 9. Certain pale elements of wing pattern become transparent through modification of alar setae which changes scales to hairs. 10. Ankylosis of tegumen and uncus of male genitalia perfected and uncal suture lost. 11. Wide, triangular forewing becomes slightly elongated. 12. This process carried even further, and forewing is strongly elongated.

The foreleg is an apt example. Throughout the pterygote insects there appears to be a broad trend involving the reduction of the locomotory function in the prothoracic segment. This trend takes many forms. In the butterflies, as in many other insects, the foreleg is reduced in size, and joints are lost. Note that the loss of joints begins distad, affecting first the fifth tarsal joint and its parts, and proceeds thence proximad. Similarly the wing venation in insects has evolved through the anastomosis or the loss of veins and parts of veins.

Of course to be reduced a structure must

the tarsus had five joints. Accordingly a tarsus with five joints would be more primitive than one having four; a hind wing having a complete costal vein would be more primitive than one having only a piece of the costal vein.

Once lost, a structure or part of a structure is unlikely to reappear, and it may be assumed that structural modifications can survive in a population only if the modification is not detrimental to the animal in its environment. Thus the modification may be helpful (the rarer situation), or it may be only neutral and does not affect survival in any way (probably

the more common situation). Accordingly, if an insect can get along without its fifth tarsal joint there need not be any particular advantage attached to its loss in order to enable establishment of the condition in a population. It can do without the fifth joint, probably it can do without the fourth joint as well, or the third, or even the whole leg. This may be the basis for the frequent tarsal reductions found in insects. Only should the conditions for survival be altered in such a way as to change the partly reduced tarsus from a non-essential structure to a useful one could one imagine the possibility of a reversal of the trend and the reacquisition of the lost joints by a partly reduced tarsus; and this would raise serious questions concerning the embryologic *anlagen*.

In order to construct a hypothetical phylogenetic chart, one must apply the foregoing reasoning in the absence of compelling evidence to the contrary, considering each structure in the light of its possible usefulness to the insect, now and in such of the past as may be reasonably reconstructed. In my phylogenetic chart (fig. 19) of the primitive ithomine genera I have considered seven structures: the tarsus of the male foreleg, the tarsus of the female foreleg, the humeral vein of the hind wing, the hair patch on the male hind wing, transparency of pattern elements, the general shape of the forewing, and the relationship between the uncus and tegumen of the male genitalia.

The evolutionary trend in reduction of the male foreleg is discussed above. The most joints are found in *Roswellia* (figs. 4, 21), with two tarsal joints. The other Tithoreini, as well as *Tellervo*, have a single reasonably long, articulate, tarsal joint (figs. 5, 15, 27, 33, 40, 47, 55, 62, 71). In none of the other ithomines is the fore tarsus articulate, and generally it is but a knob on the end of the tibia. The foreleg seems to have no usefulness to the Ithomiidae, probably because the longitudinal center of balance has been shifted posteriorward by the small head and the long abdomen. This seems to be a case of the reduction of an appendage not in use by the insect—not loss through mere disuse, but because disuse permits the survival of reductional mutations.

The female foreleg is subject also to some reduction. A few of the Tithoreini have a

pulvillus and a pair of claws on the fifth tarsal joint. This evidently ancestral condition is preserved in *Elzunia* and in one of the two species in *Tithorea* (figs. 63, 72). In the rest of the Tithoreini and in *Tellervo* the pulvillus is present but the claws are not (figs. 22, 34, 41, 48, 56). In certain ithomine tribes not otherwise discussed in this first part of the monograph, the fifth female fore tarsal joint is lost (fig. 8).

In butterflies the hind margin of the forewing overlaps the costal margin of the hind wing; thus articulation during flight is afforded and the two wings operate as a unit. The only leading edge is the costal margin of the forewing, well stiffened with veins, while the hind wing contributes the trailing edge. Thus the costal vein of the hind wing is not needed to support the front margin of that wing. All the rigidity necessary for wing articulation is afforded to the hind wing by the humeral vein in the enlarged humeral angle. As shown elsewhere, the humeral vein in the Ithomiidae actually consists of the true humeral cross vein forming the stem of a Y, the arms of which are vestigial parts of the costal vein. As the entire hind wing costal vein was present originally in phylogeny, it would follow that the more of the costal vein that remains, the more primitive the condition. A complete Y-shaped humeral vein is present in *Roswellia* and *Athesis* (figs. 23, 29) but is reduced in the other genera of Tithoreini. Two different and doubtless independent methods of humeral vein reduction are to be found in these genera: In *Patricia*, *Olyras*, and *Athyrtis* the distal arm of the Y is reduced in size and the proximal arm remains unaffected (figs. 42, 49, 57); this trend is carried to the point where only the proximal arm remains in *Eutresis*, so that the humeral vein becomes a sickle-shaped structure (fig. 35). In *Tellervo*, *Tithorea*, and *Elzunia* a second method of reduction is found, where both arms are shortened but neither is lost (figs. 17, 65, 73).

As pointed out above, the ancestral condition of the hair pencil of the male Ithomiinae is that in which one continuous patch runs along the radius from the base to the apex of the discal cell. Variations in the hair patch have arisen through reduction. The first step in this reduction evidently was the

elimination of a part of the patch from somewhere in its middle, leaving two patches. The missing part is differently located in various genera having this stage of reduction, however, so that logically it must be assumed that the loss has been polytypic. *Roswellia*, *Athesis*, *Eutresis*, and *Athyrtis* have a complete hair patch (figs. 23, 29, 35, 57). In *Patricia* and *Olyras* the loss involves a part of the patch located about one-third of the way out from the base of the cell, the resultant distal patch being larger than the proximal patch (figs. 42, 49). In *Tithorea* the loss involves a part of the patch located two-thirds of the distance out from the base of the cell, so that the larger patch is the proximal one (fig. 65). In *Elzunia*, closely related to *Tithorea*, further reduction has led to the loss of the smaller distal patch (fig. 73).

Transparency of pattern elements in the Ithomiinae involves the modification of flat scales (alar setae) into slender, short hairs. This affects first the white or yellow pattern elements, and affects the tawny elements as a further step. In its extreme form all pattern elements except the black margins of the wings become transparent. *Tellervo*, *Athyrtis*, *Tithorea*, and *Elzunia* have no transparent pattern elements; the other genera of the tribe Tithoreini have some degree of transparency. That transparency must have developed polyphyletically is suggested by several ithomine genera in which some of the species are entirely opaque, and others have transparency. *Hypothyris* and *Napeogenes* (not detailed in the present paper) are cases at point. Among the Tithoreini, *Olyras* and *Eutresis* both offer less perfect examples.

Because most familiar butterflies have wide triangular forewings, that condition is usually regarded as being ancestral. It may not be, but for present purposes I have accepted the viewpoint. *Tithorea* and *Elzunia*, then, have the most generalized forewing shape, while the other genera are evolved in this respect. Measurements show that *Roswellia* and *Athesis* have their forewings only slightly elongated, while *Eutresis*, *Patricia*, *Olyras*, and *Athyrtis* all have the forewings elongated to a greater degree.

In the male genitalia, the tegumen and uncus (fig. 9) are understood to be derived from separate consecutive metameres. This being the case, the presence of an uncal

suture separating the two structures would be a condition more primitive than the obliteration of the uncal suture through ankylosis of the parts. The suture is present in two of the genera of this tribe, *Roswellia* and *Athyrtis* (figs. 24, 58). However, I think that its presence in the latter may be a secondary development attendant on the unusual asymmetry of the tegumen.

When the foregoing discussion is reviewed, it becomes evident that no genus stands out among these as the single most primitive ithomine in every respect. Each genus having certain primitive conditions also has some evolved ones. *Tithorea* has usually been considered the most primitive ithomine genus, possibly because it resembles less an ithomine and more a "normal" butterfly. Of the structures I have selected for this evaluation, however, *Tithorea* preserves the primitive condition only in three: claws on the female fore tarsus in one of the two species but not in the other, opaque scaling, and wide forewing. Because it can easily be shown that the loss of female fore tarsal claws and the development of transparency both are polyphyletic, the importance of these characters in *Tithorea* as the most primitive genus diminishes. On the whole, I favor *Roswellia* as the genus preserving the most important of the ancestral conditions: two-jointed male fore tarsus, complete Y-shaped humeral vein, complete hair pencil, and the uncal suture.

This discussion began with the assumption that the tribe Tithoreini is monophyletic in origin. The contrary possibility is that the Tithoreini are not monophyletic but rather that the tribe is the accidental grouping of some of the most primitive members of several tribes. Could it be shown, genus by genus, that each represents the forerunner of more advanced generic series in other parts of the subfamily, it then would be desirable to break up the Tithoreini as a tribe and assign the genera to the tribes containing the derived series. Such relationships I cannot demonstrate to my own satisfaction, thus am led to keep these eight genera together as being probably monophyletic.

#### KEY TO THE GENERA OF THE TRIBE TITHOREINI

1. Humeral vein of hind wing simple, sickle-shaped; two recurrent veins present on 3d of

- the hind wing . . . . . *Eutresis*  
 Humeral vein of hind wing forked, Y-shaped;  
 only one recurrent vein present on hind wing  
 . . . . . 2
2. Recurrent vein of hind wing arising from an  
 acute angle of 2d . . . . . *Olyras*  
 Recurrent vein of hind wing arising opposite  
 M<sub>2</sub>, sometimes at the very bottom of 2d or  
 the extreme top of 3d; anterior side of hind  
 wing discal cell much longer than the poste-  
 rior side . . . . . *Athyrtis*  
 Recurrent vein of hind wing arising on the  
 angle of 3d; 2d straight . . . . . 3
3. Humeral vein weakly forked, the distal arm  
 short and poorly developed but the proximal  
 arm well developed; hair patch of male di-  
 vided into a larger patch at the distal end of  
 the cell and a shorter patch at the base . .  
 . . . . . *Patricia*  
 Humeral vein strongly forked, both arms well  
 developed; hair patch of males extending  
 complete from base to apex of the discal cell  
 . . . . . 4  
 Humeral vein weakly forked, both arms very  
 short . . . . . 5
4. Male foreleg with two tarsal joints; uncal su-  
 ture present; length of one forewing 42 mm.  
 or more . . . . . *Roswellia*  
 Male foreleg with one tarsal joint; no uncal  
 suture; length of one forewing 38 mm. or less  
 . . . . . *Athesis*
5. Male with a single small hair patch at the base  
 of the hind wing cell; eyes naked . . *Elzunia*  
 Male with a small hair patch at the base of the  
 hind wing cell, a second small patch at the  
 apex of the cell; eyes hirsute . . . *Tithorea*

#### GENUS *ROSWELLIA* FOX

*Roswellia* FOX, 1948a, pp. 131-132. Type:  
*Athesis acrisione* Hewitson, by monotypy. FOX,  
 1949, p. 11.

*Athesis*, HEWITSON (part), 1869, p. 12. STAU-  
 DINGER, 1885 (1884-1888), p. 55. SCHATZ, 1886  
 (1885-1892), p. 89. HAENSCH, 1909, p. 118. BRYK,  
 1937b, p. 455. FOX, 1940, p. 177.

This relict, monotypic genus is placed  
 first in the generic sequence as the most  
 primitive by reason of the preservation of  
 two fore tarsal joints in the male and the  
 preservation of the male uncal suture.

The palpi (fig. 20) have the first joint  
 closely appressed to the head, deeply curved;  
 the second joint is lightly curved and stands  
 free, is one-fifth longer than the first joint.  
 The third joint is ovate, one-fifth of the  
 length of the first joint.

The antennae are a little more than four-  
 fifths of the length of the body and slightly

more than half of the length of the forewing,  
 reaching just beyond the end of the discal  
 cell.

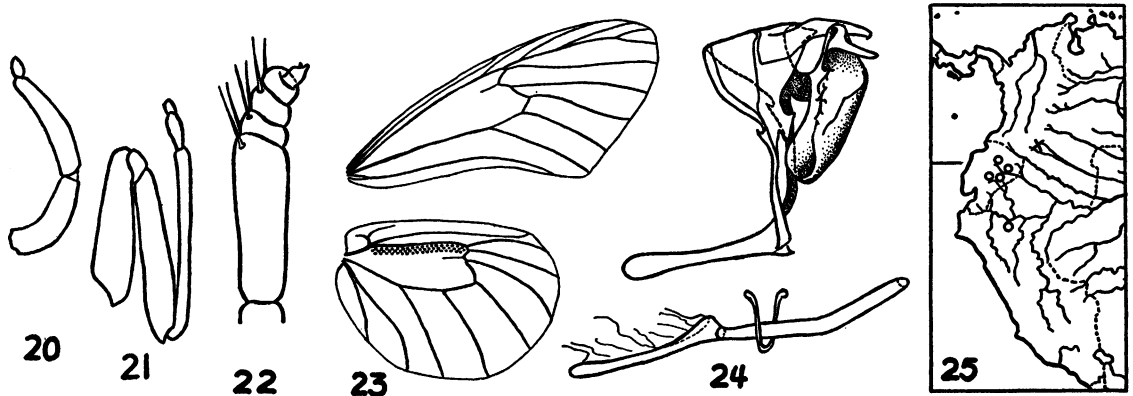
The male forelegs (fig. 21) have the coxa  
 stout, the femur slightly longer than the  
 coxa, the tibia the same length as the femur  
 plus the trochanter. The tarsus is divided  
 into two joints by a suture placed so that the  
 proximal joint is about three times the  
 length of the distal joint.

The female forelegs (fig. 22) are propor-  
 tioned nearly like those of the female of  
*Athesis* (fig. 28), but the tibia and first three  
 tarsal joints are very much stouter. The  
 first joint, especially, is nearly twice as thick  
 at its distal end as it is at its proximal end.

VENATION (FIG. 23): Nearly like that of  
*Athesis* (fig. 29), but R<sub>2</sub> of the forewing arises  
 at or only just beyond the end of the cell, and  
 on the hind wing Sc is less sinuate, more  
 evenly curved. The hair patch of the males is  
 complete, running from the base to the end  
 of the discal cell.

MALE GENITALIA (FIG. 24): The tegumen is  
 hood-like, but not extending very far ante-  
 riorad. Along its dorsal median line the uncus  
 is about the same length as the tegumen and  
 is separated from it by an evident suture.  
 The saccus is slender, as long as the uncus  
 plus tegumen. The juxta is narrow and thin,  
 V-shaped. The slender penis is a little more  
 than twice the length of the tegumen plus  
 uncus, is lightly up-angled at a point one-  
 fourth of its length from the posterior tip.  
 The foramen penis is one-third of the length  
 of the penis. The valve is suboval and erect,  
 so that its costal margin tends to parallel  
 the vinculum. Its apex is armed with a thin  
 terminal projection which is as long as the  
 tegumen and normally recurves inwardly,  
 then bends so that its tip projects posteriorad.  
 The sacculus is about one-half as wide as the  
 valve itself, appearing to be more of a thick-  
 ening of the valve than a fold and presenting  
 no even dorsal margin. The exposed tips of  
 the uncus and valves are equipped with hairs  
 and scales.

The single species seems to be uncommon  
 and is found in two subspecies: *R. a. acrisione*  
 comes from the high rain forests of eastern  
 Ecuador, south into northern Peru; *R. a.*  
*deflavata* is known only from the poorly col-  
 lected country of the upper Rio Caqueta in  
 southern Colombia (fig. 25).



FIGS. 20-24. *Roswellia acrisione acrisione*. 20. Palpus of male. 21. Male foreleg. 22. Female fore tarsus. 23. Venation of male, hair patch indicated by stippling. 24. Male genitalia, left valve removed, dissected penis shown below.

FIG. 25. Distribution of genus *Roswellia*. Symbols: O, *R. a. acrisione*; X, *R. a. deflavata*.

#### KEY TO THE SUBSPECIES OF *Roswellia acrisione*

- Apical and postdiscal areas of forewing strongly marked with tawny color. . . . *R. a. acrisione*  
 Apical and postdiscal areas of forewing without tawny coloring . . . . . *R. a. deflavata*

#### *Roswellia acrisione acrisione* (Hewitson)

Plate 1, figure 1; text figures 20-24

*Athesis acrisione* HEWITSON, 1869 (1869-1877), p. 12; Ecuador. KIRBY, 1871, p. 640. HEWITSON, 1872 (1852-1876), vol. 5, p. [9], pl. [5] Heliconidae, fig. 1. STAUDINGER, 1885 (1884-1888), p. 55. HAASE, 1893, p. 51. HAENSCH, 1909, p. 118. RILEY AND GABRIEL, 1925, p. 5. CAMPOS, 1927, p. 13. BRYK, 1937b, p. 455. FOX, 1940, p. 177.

*Roswellia acrisione*, FOX, 1948a, p. 132.

The types are in British Museum (Natural History) numbered 6922 and 6923, both from "Ecuador."

Seven males and nine females from American collections have been studied.

#### *Roswellia acrisione deflavata* (Niepelt)

*Athesis acrisione deflavata* NIEPELT, 1928, p. 217, pl. 1, fig. 1; Macoa, Colombia. BRYK, 1937b, p. 455. FOX, 1940, p. 177.

*Roswellia acrisione deflavata*, FOX, 1948a, p. 132.

The type is a female from Macoa, Rio Caqueta, Colombia.

No specimens were found in American collections.

#### GENUS *ATHESIS* DOUBLEDAY

*Athesis* DOUBLEDAY, 1847 (1846-1852), p. 109. Type: *Athesis clearista* Doubleday and Hewitson, by monotypy. KIRBY, 1871, p. 18, 640. SCUDDER,

1875, p. 10. STAUDINGER (part), 1885 (1884-1888), p. 55. SCHATZ, 1886 (1885-1892), pp. 87, 89, pl. 10. HAASE, 1893, pp. 50, 51. HAENSCH AND THIEME, 1899, p. (12). HAENSCH (part), 1909, p. 118. D'ALMEIDA, 1923, p. 223. KREMKY, 1925, pp. 144, 147, 152, 160, 176, 177, 180, 183, 233, 234, figs. 120, 121, 124. BRYK (part), 1937b, pp. 455-457. FOX (part), 1940, pp. 165, 172, 175, 177, 178, fig. 3. FORBES, 1940, p. 308; 1941, pp. 1-4. D'ALMEIDA, 1942, p. 180. FOX AND FOX, 1947, p. 174. FOX, 1948a, p. 132; 1949, p. 11.

Doubleday's genus was monotypic. Hewitson, who favored the Linnean plan of few genera, added to it some species only distantly related. Of the species listed by Haensch (1909) and Bryk (1937b), only Doubleday's original *A. clearista* remains. *Roswellia* has received *acrisione*, while *dercyllidas* and allies have been removed to *Patricia*.

The first joint of the palpi (fig. 26) is closely appressed to the head and is deeply curved. The second joint is lightly curved and stands free; it is one-half longer than the first joint. The third joint is ovate, one-fifth of the length of the first joint.

The antennae are a little more than four-fifths of the length of the body, a little more than half of the length of one forewing, reaching just to the end of the discal cell.

The male forelegs (fig. 27) have the coxa stout, the femur being the same length as the coxa. The tibia is longer than the femur plus trochanter. The tarsus is separate, with a single elongated joint which is about one-fourth of the length of the tibia.

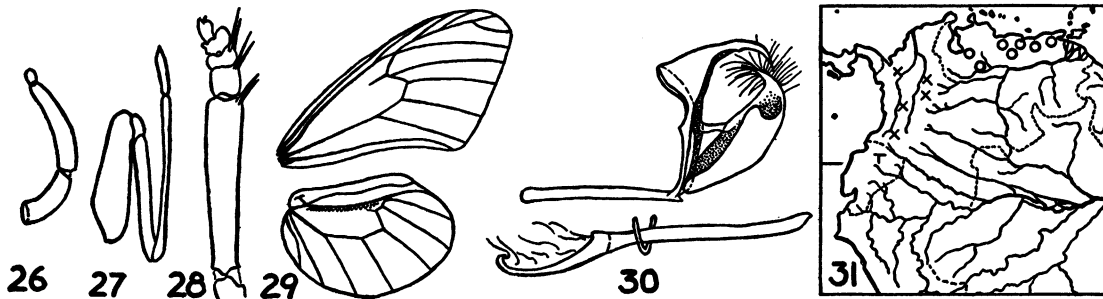


The female forelegs (fig. 28) have five tarsal joints, with a pair of spurs on each of the first three joints. The second, third, and fourth joints are discoid; the reduced fifth joint is subovate and bears claws and a pulvillus. The first joint is nearly twice the length of the other four combined, with its distal end not much thicker than the proximal end.

**VENATION (FIG. 29):** On the forewing  $R_2$  arises distad of 1d, which is minute. The angled 2d bears a recurrent vein. Both 2d and 3d are the same length, the latter slightly curved. On the hind wing the humeral vein is erect, deeply forked. The sinuate Sc separates from R at the humeral and runs out

the tegumen plus uncus. The foramen is placed dorsally and is more than one-fourth of the length of the penis. The valve is subtriangular, armed at the apex with a tooth-like projection which normally curves in and towards the anterior. The sacculus is a simple fold, widest below the costal margin where it forms a blunt, rounded apex before merging into the outer margin of the valve. The uncus and tips of the valves, where exposed, are equipped with hairs and scales.

The genus is distributed in Venezuela, Colombia, Ecuador, and Peru (fig. 31), always in the higher rain forests. *Athesis c. clearista* is found in the mountains of coastal Venezuela; it probably is a phylogenetic off-



FIGS. 26-30. *Athesis clearista clearista*. 26. Palpus of male. 27. Male foreleg. 28. Female fore tarsus. 29. Venation of male, hair patch indicated by stippling. 30. Male genitalia, left valve removed, dissected penis shown below.

FIG. 31. Distribution of genus *Athesis*. Symbols: O, *A. c. clearista*; T, *A. c. vitrala*; X, *A. c. colombiensis*.

well beyond the end of the cell, which is closed by the minute 1d, the angled 2d, and the long, curved 3d. In a few cases, 2d is straight and 3d is angled. In any event, the recurrent vein is situated at the angle, either of 2d or of 3d as the case may be.

**MALE GENITALIA (FIG. 30):** The tegumen is hood-like but does not extend very far anteriorad. The uncus is longer than the tegumen but is not separated from it by a suture. The gnathos is membranous, unchitinized, and may be seen only in preparations that have not been "cooked" in caustic potash; it is in the form of a wide band articulating at each end with the lower end of the tegumen at the top of the vinculum. The saccus is slender, longer than the tegumen plus uncus. The juxta is well chitinized, V-shaped. The penis is slender, nearly straight, and more than twice the length of

shoot of *A. c. colombiensis*, which is found in western Venezuela, central and southern Colombia, and south into northeastern Peru. *Athesis c. vitrala* is native to the high valleys of eastern Ecuador.

#### KEY TO THE SUBSPECIES OF *Athesis*

1. Males with hind wing borders about 1 mm. wide, the forewings with only very faint tawny scaling in the base of  $Cu_1-Cu_2$ ; females with the hind wing margins cleanly defined, the forewings with strong black markings and a squarish tawny spot in the upper half of  $Cu_2-A$  and in the lower half of  $Cu_1-Cu_2$ , divided in two by the black  $Cu_2$  . . . . . *A. c. vitrala*
- Hind wing borders of males wider than 1 mm., the forewings with strong tawny and/or black in the base of  $Cu_1-Cu_2$ ; females with inner edges of hind wing borders indefinite, the forewing lacking a tawny spot crossing  $Cu_2$  . . . . . 2

2. Bands and spots of both wings beneath with extensive tawny; the marginal white spots of the hind wing smaller, borders narrower . . . . . *A. c. clearista*  
 Bands and spots below broadly black-brown, with little or no tawny; margins wider, sub-marginal spots larger . . . . . *A. c. colombiensis*

***Athesis clearista clearista***

Doubleday and Hewitson

Plate 1, figure 2; text figures 26–30

*Athesis clearista* DOUBLEDAY AND HEWITSON, 1847 (1846–1852), p. 110, pl. 16, fig. 3; Venezuela. KIRBY, 1871, p. 18. SCUDDER, 1875, p. 123. STAUDINGER, 1885 (1884–1888), p. 55. WEYMER, 1890, p. 26. HAASE, 1893, p. 51. LONGSTAFF, 1909, p. 610. HAENSCH, 1909, p. 118, pl. 31e. LONGSTAFF, 1912, pp. 310, 312, 313, 494. FASSL, 1915, p. 10. KREMKY, 1925, pp. 232–234, figs. 120, 121, 124. RILEY AND GABRIEL, 1925, p. 12. BRYK, 1937b, p. 456. FOX, 1940, p. 177. FORBES, 1940, p. 311. FOX, 1941, pp. 4–5. FOX AND FOX, 1947, p. 174. FOX, 1948a, p. 132.

The types in the British Museum (Natural History) are three males and two females from "Venezuela," numbered 6917 to 6921 inclusive.

Ten males and five females have been examined in American collections.

***Athesis clearista colombiensis* Kaye**

Plate 1, figure 3

*Athesis clearista colombiensis* KAYE, 1918, p. 77; Cauca, San Martin, Llanos of Rio Meta. D'ALMEIDA, 1949, p. 393.

*Athesis clearista bassleri* FOX, 1941, pp. 4–6, pl. 2, fig. 14; Muzo, Colombia. FOX AND FOX, 1947, p. 174.

The type series of *A. c. colombiensis* consists of five males and eight females in the Joicey collection, the British Museum (Natural History), from "Colombia, interior, Cauca valley, San Martin, Llanos of Rio Meta."

The holotype of *A. c. bassleri* is a male from "Muzo, Colombia" in the Mengel collection at the Reading Public Museum; paratypes are in the collections of the Reading Public Museum, Carnegie Museum, the American Museum of Natural History, Cornell University, and the Instituto Oswaldo Cruz. I had overlooked Kaye's 1918 paper; *bassleri* is an absolute synonym, as pointed out by d'Almeida (1949).

Thirty males and 44 females have been examined in American collections.

***Athesis clearista vitrala* Kaye**

Plate 1, figure 4

*Athesis vitrala* KAYE, 1918, pp. 77–78; River Tabaconas, north Peru. D'ALMEIDA, 1949, p. 393.

A series of five specimens in the United States National Museum, collected at Abitagua, eastern Ecuador, agree with the photograph of Kaye's type sent me by the British Museum (Natural History). This evidently is the southernmost geographic subspecies of *A. clearista*. These five specimens and the single female described by Kaye are the only ones I have been able to locate. It did not appear either in Brown's collection or in Coxey's. From the scanty data available, one concludes that *A. vitrala* should be found from the Rio Pastaza south into northern Peru, but that it is quite rare and probably is limited to discontinuous islands of population.

The subspecies is easily recognized by the much narrower dark marginal color which is cleanly edged proximad, and by the similar narrowing of all discal black markings. The yellow transparent spot just beyond the forewing discocellular bar, found in *clearista* and *colombiensis*, is entirely wanting.

The type, a female from "River Tabaconas, northern Peru, 6000 ft.," is in the Joicey collection deposited in the British Museum (Natural History).

Two males and three females have been examined from the collection of the United States National Museum.

**GENUS *EUTRESIS* DOUBLEDAY**

*Eutresis* DOUBLEDAY, 1847 (1846–1852), p. 111.

Type: *Eutresis hypereia* Doubleday and Hewitson, by monotypy. KIRBY, 1871, p. 19. SCUDDER, 1875, p. 176. GODMAN AND SALVIN, 1879 (1879–1901), pp. 8–9. STAUDINGER, 1885 (1884–1888), p. 56. SCHATZ, 1886 (1885–1892), pp. 87, 89. HAENSCH AND THIEME, 1899, p. (12). HAENSCH, 1909, p. 117. D'ALMEIDA, 1922, p. 233. BRYK, 1937b, pp. 454–455. FOX, 1940, pp. 164, 171, 172, 179, fig. 24. FORBES, 1941, pp. 2, 3. D'ALMEIDA, 1942, p. 184. FOX, 1949, p. 11.

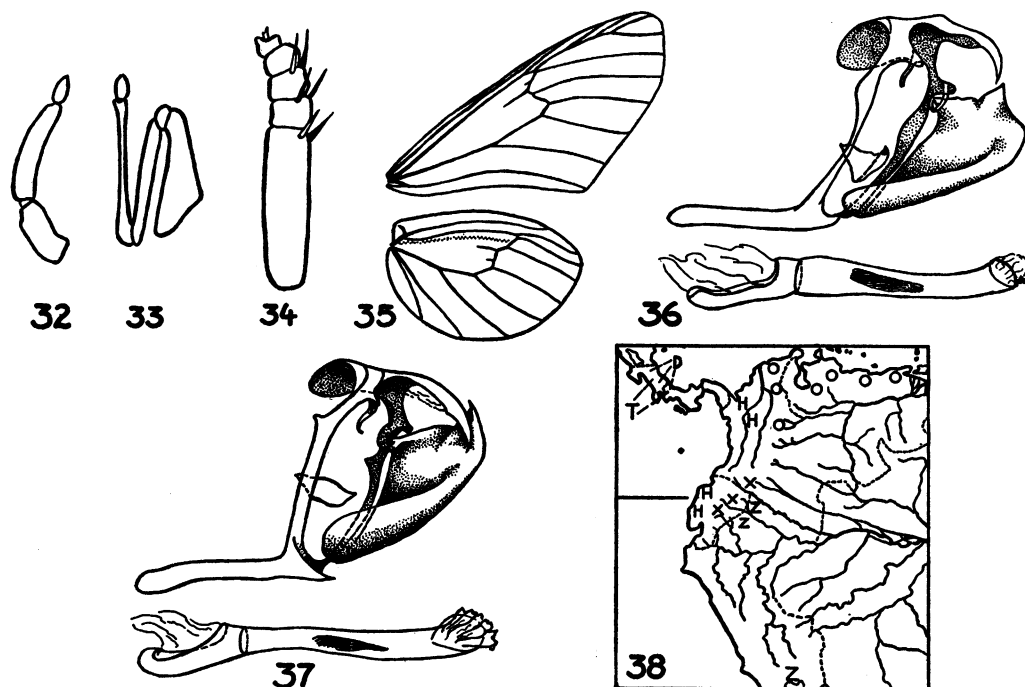
Doubleday's clear characterization of *Eutresis* has enabled proper and unconfused assignment of species throughout.

The first joint of the palpus (fig. 32) is

closely appressed to the head, only slightly curved and stout. The second joint is tapering, lightly curved, and stands free; it is one-half longer than the first joint. The terminal joint is one-half of the length of the first and is ovate.

The antennae are four-fifths of the length

of which is wanting. The lightly sinuate Sc separates from R at the humeral and reaches the margin at the apex of the wing. Both 1d and 2d are straight, the former half as long as the latter; 3d is angled in such a way that the upper arm is very short. A strong recurrent vein arises at the angle of 3d, and fre-



FIGS. 32-36. *Eutresis hypereia hypereia*. 32. Palpus of male. 33. Male foreleg. 34. Female fore tarsus. 35. Venation of male, hair patch indicated by stippling. 36. Male genitalia, left valve removed, dissected penis shown below.

FIG. 37. *Eutresis dilucida*. Male genitalia, left valve removed, dissected penis shown below.

FIG. 38. Distribution of genus *Eutresis*. Symbols: D, *E. dilucida*; H, *E. hypereia hyspa*; O, *E. h. hypereia*; T, *E. h. theope*; X, *E. h. banosana*; Z, *E. h. imitatrix*.

of the body, one-half of the length of a forewing.

The forelegs of the male (fig. 33) have the coxa as long as the femur plus trochanter, the slender tibia only slightly longer than the coxa, the strongly reduced tarsus one-sixth of the length of the coxa.

The tarsus of the female foreleg (fig. 34) has five distinct joints, with a pair of spurs each on the first three joints. The second, third, and fourth joints are discoid; the fifth is subovate and reduced. The first joint is thick, unconstricted, a little less than twice the length of the other four joints combined.

VENATION (FIG 35): The hind wing has a simple, unforked humeral, the distal branch

quently a second recurrent vein is placed about two-thirds of the way down 3d, short and generally wanting in females. The anterior side of the cell is longer than the posterior side, the wing being of the "quadrifid" type.

On the forewing  $R_2$  arises well beyond the end of the cell. The discal cell is closed by a minute 1d, an angled 2d, and a sinuate 3d. A strong recurrent vein arises from the angle of 2d, the upper arm of the angle being four times the length of the lower; in males a second shorter recurrent vein is usually found high on 2d.

MALE GENITALIA (FIGS. 36, 37): The narrow, hood-like tegumen extends well

anteriorad and is constricted at the vinculum; the uncal suture is not present. The uncus is pointed and curves down. The gnathos is a narrow, ribbon-like band articulated at the base of the tegumen from chitinized projections; its lateral ends are chitinized, but the rest is membranous. The slender saccus is as long as the tegumen plus the uncus. The juxta is strongly chitinized in the form of a semicircular plate folded along its central radius into a V-shaped groove. The penis is moderately slender, nearly twice the length of the tegumen plus uncus, its outer half lightly upcurved. The foramen is one-fourth of the length of the penis, broad and deeply cut. The valves are roughly triangular. The sacculus at the articulating margin is one-fourth of the height of the valve, its fold running out about halfway to the costa in *hypereia*, rounding the evenly curved outer margin and reaching the apex in *dilucida*. In *hypereia* there is a sharp angle, nearly a tooth, on the outer margin below the apex; the apex itself is prolonged as a wide tooth, and the costal margin is somewhat enfolded and uneven. The apex of the valve in *dilucida* is prolonged into a definite, narrow, sharp tooth, while the costal margin is more even.

#### KEY TO THE SPECIES AND SUBSPECIES OF *Eutresis*

1. Forewing with all dark markings semitransparent and diffuse; Cu<sub>1</sub> no more heavily scaled than Cu<sub>2</sub> and connected with the dark cell bar rather than with the discocellular shading; cell bar oblique, leaving a rhomboid transparent spot in the end of the cell; hind wing margins broadly edged proximad with tawny which is dentate, running in along the veins . . . . . *E. dilucida*  
Forewing with dark markings sharply defined, not diffuse; the dark spot over the discocellulars form a transverse band with the heavy scaling over Cu<sub>1</sub>; the cell bar nearly perpendicular to the costa, the transparent spot in the end of the cell nearly rectangular; tawny edging of the hind wing borders is not dentate at the veins, or the whole disc is clouded with tawny . . . . . (*E. hypereia*), 2
2. Dark markings heavily black, the tawny edging of the hind wing, when present, confined to the anal angle; a strong black-angled band runs along the discocellulars and over Cu<sub>1</sub> of the hind wing . . . . . *E. h. imitatrix*  
Hind wing borders completely edged with

- tawny; cross bar of hind wing, when present, tawny rather than black . . . . . 3
3. Cross bar of hind wing wanting, incomplete, or indicated only faintly . . . . . 4  
Cross bar of hind wing strong or hind wing disc completely clouded with tawny . . . . . 5
  4. Tawny edging on hind wing borders narrow, the black wide; tawny on the under side is reddish brown . . . . . *E. h. hyspa*  
Tawny edging on hind wing borders wide, the black narrow; tawny on the under side is yellow-brown. . . . . *E. h. theope*
  5. Hind wing clouded with tawny, or, if the disc is transparent, the tawny edging on the borders is quite wide; forewing with a strong, fully developed subapical dark band setting off the transparent spot in the apex . . . . .  
. . . . . *E. h. hypereia*  
Hind wing with the disc transparent in all males, somewhat clouded in some females; borders narrowly edged with tawny which widens slightly below Cu<sub>1</sub>; the subapical band of the forewing wanting or very faint . . . . . *E. h. banosana*, new subspecies

#### *Eutresis dilucida* Staudinger

Plate 1, figure 5; text figure 37

*Eutresis dilucida* STAUDINGER, 1885 (1884-1888), p. 57; Chiriqui. HAENSCH, 1909, p. 117. BRYK, 1937b, p. 455.

*Eutresis pethoë* GILLOTT, 1925, pp. 249-250; Irazu, Costa Rica. RILEY AND GABRIEL, 1925, p. 39. BRYK, 1937b, p. 455. FOX, 1950, p. 179.

The types of *pethoë*, a male and a female from "South eastern slopes of Irazu, Costa Rica," are in the British Museum (Natural History).

A male in the Carnegie Museum was purchased by Holland from Staudinger and bears the latter's determination as *E. dilucida*.

There is much similiarity between the two Costa Rican representatives of *Eutresis*, *E. dilucida* and *E. h. theope*, but the details of pattern development and the structure of the male valves indicate clearly that they are not the same. *Eutresis dilucida* may well be an ancient relict, for it is found only on the Chiriqui ridges, a region that is thought by geologists to have been dry throughout the Cretaceous.

Staudinger's description was buried in synonymy; the species was unrecognized by Godman and Salvin; specimens have been mixed with *theope*. In 1925 Gillott described *pethoë* from material he himself collected on

Mt. Irazu, recognizing its distinctiveness from *theope* but not realizing that a description already existed. Gillott's description is clear, and there is no doubt as to the form intended. Staudinger's description is: "*Die typischen Hypereia sind aus Venezuela, und sind von dem abgebildeten Stücke aus Chiriqui ziemlich verschieden. Erstere haben weit lebhafter rothbraune, kaum durchscheinende Htfl. und auch weit mehr Rothbraun auf Vdfln. deren Flecken kleiner, kürzer und am Rande gelblich sind. Sollten die Herren Salvin und Godman in ihrer vortrefflichen Biologia Centre. Amer., welches Werk ich gerade an Dr. Schatz geliehen habe, diese Chiriqui-Form nicht schon benannt haben, so schlage ich dafür den Varietät-Namen Dilucida vor.*" Staudinger was taking no chances!

Four males and two females from American collections have been examined.

**Eutresis hypereia** Doubleday and Hewitson

The five subspecies are distributed from Costa Rica south to Bolivia in the high rain forests of the Andes (fig. 38). *Eutresis h. theope* resembles and flies with *E. dilucida* along the Chiriqui ridges. *Eutresis h. hypereia* is found in Venezuela and eastern Colombia. *Eutresis h. hyspa* is from western Peru, western Ecuador, and northward into the department of Antioquia, Colombia. The population from eastern Ecuador is here described as new. The dark *E. h. imitatrix* is found in Bolivia and Peru north of the lower altitudes of eastern Ecuador.

**Eutresis hypereia theope** Godman and Salvin

Plate 1, figure 6

*Eutresis theope* GODMAN AND SALVIN, 1877, p. 6; Costa Rica; 1879 (1879-1901), p. 9, pl. 1, fig. 3. WEYMER, 1890, p. 17. HAENSCH, 1903, p. 159; 1909, p. 117, pl. 31e. FASSL, 1915, p. 58. GILLOTT, 1924, pp. 249-250. RILEY AND GABRIEL, 1925, p. 47. BRYK, 1937b, pp. 454-455. FOX, 1940, p. 179.

*Eutresis hypereia*, STAUDINGER (not Doubleday and Hewitson), 1876, p. 96; 1884 (1884-1888), pl. 27.

The types, three males and four females from "Costa Rica," are in the British Museum (Natural History), numbered 6904 to 6910 inclusive.

Five males from American collections have been examined.

**Eutresis hypereia hypereia**

Doubleday and Hewitson

Plate 1, figure 7

*Eutresis hypereia* DOUBLEDAY AND HEWITSON, 1852 (1846-1852), supplemental plate, fig. 2; [1847 (1846-1852), p. 111; Venezuela.] KIRBY, 1871, p. 19. SCHATZ, 1885 (1885-1892), pl. 10; 1886 (1885-1892), p. 89. WEYMER, 1890, p. 52. HAASE, 1893, p. 51. HAENSCH, 1909, p. 158. RILEY AND GABRIEL, 1925, p. 25. BRYK, 1937b, p. 454. FOX, 1940, p. 179, fig. 24. FORBES, 1940, p. 311. FOX AND FOX, 1947, p. 174.

The type is a male marked "Venezuela" in the British Museum (Natural History) numbered 6917.

Thirty-two males and nine females in American collections have been examined.

**Eutresis hypereia hyspa** Godman and Salvin

Plate 1, figure 8

*Eutresis hyspa* GODMAN AND SALVIN, 1879, p. 150; Jorge, Ecuador; 1879 (1879-1901), p. 8. HAENSCH, 1903, pp. 158-159; 1909, p. 117. RILEY AND GABRIEL, 1925, p. 25. BRYK, 1937b, p. 454. FOX, 1940, p. 179.

*Eutresis hypereia*, CAMPOS (not Doubleday and Hewitson), 1927, p. 14.

*Eutresis antioquiensis* STAUDINGER, 1885 (1884-1888), p. 57; Cauca Valley, Colombia. BRYK, 1937b, p. 454.

The types of *E. hyspa* are five males from "Jorge, Ecuador," which is on the Pacific side of the Andes, numbered 6911 through 6915 in the British Museum (Natural History).

Eight males and a female in American collections have been examined.

**Eutresis hypereia banosana**, new subspecies

Plate 1, figure 9

*Eutresis hyspa*, HAENSCH (part), 1903, pp. 158-159; Santa Inez, Ecuador; 1909, p. 117; Ecuador.

The type series of *E. hyspa* were taken at Jorge, on the Rio Chimbo, which is on the Pacific drainage of Ecuador, a fact that did not seem clear to Godman and Salvin, for in the "Biologia" they attributed *hyspa* to eastern Ecuador. Haensch likewise was under the impression that *hyspa* included the Oriente population, a mistake quite understandable in view of the brief original description, which hardly touches on a single significant character, and in view of the

statements made by the describing authors. Only specimens from western Ecuador and from southern Colombia agree with *hyspa*.

With series before me representing localities both in eastern and in western Ecuador as well as in Colombia, it seems clear that there are two subspecies. Indeed, with the series arranged side by side the differences are manifest and striking at a glance, although they are somewhat difficult to express in a description applying to all the Oriente specimens.

The dark subapical band isolating the subterminal spots of the forewing is not wholly wanting in any of the specimens of *hyspa* examined; at worst it appears as a definite though shadowy marking, and in many specimens is nearly as strong as in *E. h. hypereia*; that segment of the band between R and M<sub>1</sub> is always present, while the three segments between M<sub>1</sub> and Cu<sub>1</sub> may be faint. On the other hand, in the specimens of *E. h. banosana*, the segment in R-M<sub>1</sub> of this band often is wanting or abbreviated, rarely complete, while the segments in R<sub>1</sub> to Cu<sub>1</sub> generally are wholly wanting or are so faint as to be visible only when viewed obliquely.

*Eutresis hypereia banosana* has on the forewing an orange-tawny bar connecting the dark coloring over the base of Cu<sub>2</sub> with the hind margin; this bar is not present in *hyspa*.

On the hind wing *banosana* has the dark border narrow from the apex down as far as Cu<sub>2</sub>, below which it abruptly widens before tapering off at the anal angle; in *hyspa* this dark border is of an even width from the apex down to Cu<sub>2</sub>, with no widening at Cu<sub>1</sub>. The orange-tawny inner edging of the hind wing border also is quite even in *hyspa*, whereas in *banosana* it is narrow between the apex and Cu<sub>1</sub>, but wider and suffused below Cu<sub>1</sub>, and it is confluent with an orange-tawny bar which runs up over Cu<sub>1</sub>, then angles out over the discocellulars; this cross bar is represented in *hyspa* only by some scattered orange-tawny scaling over the discocellulars.

On the under side of the wings, the dark markings of *hyspa* are dark brownish tawny, frequently with extensive black scaling, especially at the veins; in *banosana* these markings are a vivid orange-tawny, with a minimum of black scaling. The hind wing margins of *banosana* are narrower, as a rule, than those of *hyspa*.

**TYPE MATERIAL:** Holotype male and allotype female: Banos, Tungurahua, Ecuador; 1800 and 1900 meters; April, 1939; F. M. Brown; in the collection of the American Museum of Natural History.

Twenty-two paratypes: Three males, Hacienda Chinchin Grande, Tungurahua, Ecuador; 1400 meters; Schilling; in the collections of the American Museum of Natural History and of the Reading Public Museum. One male, Rio Jondachi, Ecuador. One male, Hacienda la Palmera, Rio Pastaza, Ecuador; 1200 meters; F. M. Brown. One male, Rio Putamayo, Colombia. One female, Yungilla, near Banos, Ecuador; 1800 meters; F. M. Brown. These four in the collection of the Reading Public Museum. Three males, Oriente, Ecuador; in collections of the American Museum of Natural History and of the Academy of Natural Sciences of Philadelphia. One male, between Macas and Rio Abonica, Ecuador; in collection F. M. Brown. Nine males, Oriente, Ecuador. One male, Abitagua, Ecuador; 1200 meters; April, 1937. One male, Rio Jatanyan, Ecuador; July, 1936. These 11 in the United States National Museum.

#### ***Eutresis hypereia imitatrix* Staudinger**

Plate 2, figure 1

*Eutresis imitatrix* STAUDINGER, 1876, p. 96; Chanchamayo, Peru. KIRBY, 1877, p. 693. GODMAN AND SALVIN, 1879 (1879-1901), p. 9. STAUDINGER, 1885 (1884-1888), p. 57. HAASE, 1893, p. 51. HAENSCH, 1903, p. 159; 1909, p. 117, pl. 31e. BRYK, 1937b, p. 454. FOX, 1940, p. 179.

Thirteen males and a female have been studied in American collections.

#### **GENUS *PATRICIA* FOX**

*Patricia* FOX, 1940, pp. 165, 170, 175, 177-178, figs. 43, 44. Type: *Dircenna dercylldas* Hewitson, by original designation. D'ALMEIDA, 1942, p. 193. FOX, 1948, p. 132; 1949, p. 11.

*Athesis*, KIRBY (part), 1871, p. 640. HEWITSON, 1877, p. 83. STAUDINGER, 1885 (1884-1888), p. 55. SCHATZ, 1886 (1885-1892), pp. 87, 89. HAENSCH, 1909, p. 118. D'ALMEIDA, 1922, p. 223. KREMKY, 1925, pp. 233-234, figs. 122, 123. BRYK, 1937b, pp. 455-457. FORBES, 1941, pp. 1-4.

*Dircenna*, HEWITSON, 1864, p. 248.

Hewitson placed the first known of the species in *Dircenna*, and Kirby moved it to *Athesis*. The consequent generic structure of *Athesis* was not questioned until both Forbes and Fox independently reached the conclu-



sion that *dercyllidas* and allies should form a separate genus. That the species belonging in *Patricia* have a distant relationship with *Athesis* is suggested by nearly every feature.

Palpus (fig. 39) has the first joint closely appressed to the head and deeply curved. The second joint is free and lightly curved, twice the length of the first. The third joint is elongate-ovate, one-third of the length of the first joint.

The antennae are only a little shorter than the body and about four-sevenths of the length of a forewing.

The forelegs of the male (fig. 40) have a stout coxa which is slightly shorter than the femur plus trochanter. The tibia is slender, one-twelfth longer than the coxa. The tarsus is unusually long and slim, consisting of a single joint which is about two-thirds of the length of the tibia.

The fore tarsus of the female (fig. 41) has five joints, with a pair of spurs on each of the first three. The second, third, and fourth are discoid; the fifth joint is reduced and sub-ovate. The first joint is slender, somewhat enlarged at the distal end, and twice as long as the other four joints combined.

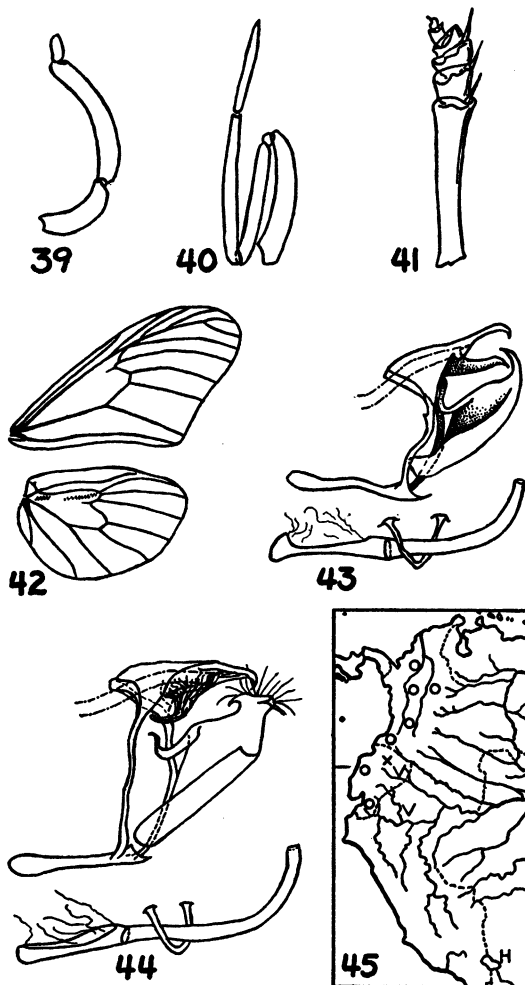
VENATION (FIG. 42): The forked humeral vein is erect. The lightly sinuate Sc separates from R at the humeral, runs to the margin beyond the end of the cell in females, but in the males is atrophied a little beyond the end of the cell and does not reach the margin. Though particularly short in females, 1d is present; 2d is straight; 3d is sharply angled, with the upper arm as long as or longer than 2d, and the lower arm sinuate and about three times the length of the upper. A strong recurrent vein arises on the angle of 3d. The hind wing is of the "trifid" type, with the lower end of the cell a little longer than the upper end.

Males have the hair pencil of the hind wing divided into two parts. The basal part is small, the hairs short and pale in color, situated below the humeral vein. The distal patch is longer and consists of longer, dark hairs placed near the end of the cell above the recurrent vein.

On the forewing  $R_2$  arises opposite to or a very little beyond the end of the discal cell. The cell is closed by a minute 1d, and 2d and 3d are about the same length, the latter sharply angled so that the upper arm is half of

the length of the lower arm. Arising from this angle is a short but strong recurrent vein.

MALE GENITALIA: Tegumen is hood-like and extends well anteriorad of the vinculum, more so in *hewitsonii* (fig. 44) than in *dercyllidas* (fig. 43). The uncus is as long as the tegumen in *dercyllidas*, but only two-thirds as long in *hewitsonii*, and has a downcurved hook at its posterior end. The gnathos is present. In *hewitsonii* it is membranous and placed



FIGS. 39-43. *Patricia dercyllidas dercyllidas*. 39. Palpus of male. 40. Male foreleg. 41. Female fore tarsus. 42. Venation of male, hair patch indicated by stippling. 43. Male genitalia, left valve removed, dissected penis shown below.

FIG. 44. *Patricia oligyrtis hewitsonii*. Male genitalia, left valve removed, dissected penis shown below.

FIG. 45. Distribution of genus *Patricia*. Symbols: H, *P. oligyrtis hewitsonii*; O, *P. d. dercyllidas*; V, *P. o. oligyrtis*; X, *P. d. hazelea*.

well up under the tegumen; in *dercyllidas* it is chitinized and is developed as a long, mandible-like projection below the uncus and extending posteriorward nearly as far as the uncus itself. The saccus is slender, about the same length as the tegumen plus uncus. The juxta is chitinized, V-shaped. The penis is moderately slender, twice to three times the length of the tegumen plus uncus. The foramen is about one-fourth of the length of the penis.

The valves are subtriangular, longer than the tegumen plus uncus; the sacculus is well defined. In *dercyllidas* the sacculus is nearly one-half of the height of the valve at the articulating margin and gradually decreases in width towards the apex where, joining with the costal margin, it forms a strong, tooth-like projection which curves up and in. In *hewitsonii* the sacculus is one-third of the height of the valve at the articulating margin and forms a fold uniform in width as far as the outer margin, where it drops off steeply and forms a weak tooth; the apex is armed with a widened projection bearing two laterally placed teeth that are directed inward.

The genus is confined to the higher tropical valleys among the Andes from southern Colombia south into Bolivia (fig. 45). *Patricia dercyllidas* is found only in southern Colombia and Ecuador. *Patricia hewitsonii* is known from the deep valleys of Bolivia near Lake Titicaca. *Patricia oligyrtis* is found in Ecuador. The greater part of Peru has yielded no member of the genus. This discontinuous distribution I am inclined to regard as evidence that *Patricia* is an ancient relict, although there remains a slight possibility that additional subspecies will be found.

I am unable to suggest the historic factors that led to the separation of *dercyllidas* from *oligyrtis*, but surely the time of separation must have been prior to the Pleistocene. *Patricia dercyllidas* itself probably was divided into its two subspecies by the Andean uplift, as geographic and climatic factors during the latter half of the Tertiary and into recent time would have prevented any contact between suitable habitats in western with eastern Ecuador. If this be the case indeed, it suggests that speciation in *Patricia*

dates from the first half of the Tertiary but not before the initial closure of the Central American land bridge at the end of the Cretaceous.

#### KEY TO THE SPECIES AND SUBSPECIES OF *Patricia*

1. Cell  $M_3-Cu_1$  of forewing entirely black, the color continuous with the discocellular band . . . . . (*P. dercyllidas*), 3  
Cell  $M_3-Cu_1$  of forewing greenish transparent. . . . . (*P. oligyrtis*), 2
2. Dark cross bands in  $R-M_1$  and  $M_1-M_2$  of forewing, as well as the dark median band of the hind wing, are as wide as or wider than the marginal color; apices of wings lacking white spots beneath . . . . . *P. o. hewitsonii*  
Dark cross bands in  $R-M_1$  and  $M_1-M_2$  of forewing and the dark median band of hind wing narrower than the marginal color; white spots present in the apices of forewings beneath . . . . . *P. o. oligyrtis*
3. Transparent submarginal spot in  $M_1-M_2$  less than one-third of the size of the black oblong immediately proximad of it. *P. d. dercyllidas*  
Transparent submarginal spot in  $M_1-M_2$  as long as, or nearly, the black oblong immediately proximad of it. . . . . *P. d. hazelea*

#### *Patricia dercyllidas* (Hewitson)

The subspecies that is most common in collections is *P. d. dercyllidas*, which is found in southern Colombia through western Ecuador into western Peru. This well illustrates the fact that the fauna of the Pacific slopes of Ecuador is more closely related to the fauna of Colombia than to that of the Oriente. The subspecies from eastern Ecuador is described herein as *P. d. hazelea*. It differs from *P. d. dercyllidas* in a sufficient number of minor respects to be consistently recognizable. Note that many specimens in collections attributed to localities in eastern Ecuador actually belong to the western Ecuador fauna and are mislabeled.

#### *Patricia dercyllidas dercyllidas* (Hewitson)

Plate 2, figure 2; text figures 39-43

*Dircenna dercyllidas* HEWITSON, 1864, p. 248, pl. 16, fig. 4; New Grenada. KIRBY, 1871, p. 20.  
*Athesis dercyllidas*, KIRBY, 1871, p. 640. HEWITSON, 1872 (1852-1876), vol. 5, p. [9], pl. [5] Heliconidae, fig. 3. KIRBY, 1877, p. 693. STAUDINGER, 1885 (1884-1888), p. 55. SRNKA, 1885, p. 122. WEYMER, 1890, pp. 15, 33. HAENSCH, 1903, p. 159; 1909, p. 118, pl. 32a. FASSL, 1915, p. 10. KREMKY,

1925, p. 234, figs. 122, 123. RILEY AND GABRIEL, 1925, p. 16. BRYK, 1937b, p. 456.

*Patricia dercyllidas*, Fox, 1940, pp. 177, 178, figs. 43, 44; 1948, p. 132.

The type is a female from "Bogota" numbered 6924 in the British Museum (Natural History).

Six males and 12 females from American collections have been examined.

***Patricia dercyllidas hazelea*, new subspecies**

Plate 2, figure 3

F. Martin Brown's careful collecting in the Oriente has turned up a series taken in the vicinity of Banos, these specimens varying sufficiently from Colombian *dercyllidas* to require recognition as a subspecies. Of the differences in coloring and maculation, the easiest to recognize is the development of the subapical dark patches of the forewing. In *dercyllidas* the upper patch, in R-M<sub>1</sub>, is confluent with the dark costal border on the one hand and with the dark coloring in M<sub>1</sub>-M<sub>2</sub> on the other. The patch in M<sub>1</sub>-M<sub>2</sub> is placed nearer the outer margin than is the patch in R-M<sub>1</sub>; the two form a continuous diagonal band. The greenish transparent spot M<sub>1</sub>-M<sub>2</sub> just distad of the dark patch is smaller, therefore, and sometimes wanting; it rarely is any larger than one-third of the size of the black patch. But in *hazelea* these two black patches are smaller and are connected only by the black scaling over M<sub>1</sub>; the distal end of the upper patch does not overlap the proximal end of the lower patch. Thus the transparent spot in M<sub>1</sub>-M<sub>2</sub> is proportionately larger and generally is fully as large as, or even larger than, the dark patch preceding it; it may be slightly smaller, but in any event the transparent spot is clearly larger than one-third of the size of the dark spot. Other characters present are relative and difficult to evaluate without a series of each form for comparison. However, both orange and green on the under side of both wings are darker in *hazelea* than in *dercyllidas*; the greenish spot on the under side in the base of R-M<sub>1</sub> is longer in *hazelea*, while the dark bands and borders of both wings tend to be narrower.

TYPE MATERIAL: Holotype male and allotype female: San Pablo, near Banos, Tungurahua, Ecuador; F. M. Brown; in the American Museum of Natural History.

Eleven paratypes: A male and female, same data as holotype; in the Reading Public Museum. A male, Agayon, near Banos, Tungurahua, Ecuador; F. M. Brown. A female, Runtun, near Banos, Tungurahua, Ecuador; F. M. Brown. These two in the American Museum of Natural History. Four males, La Merced, Rio Pastaze near Banos, Ecuador; 4000 feet; W. J. Coxey. Three females, Oriente, Ecuador; W. C. Macintyre. These seven in the United States National Museum.

This subspecies is named for Hazel H. Brown, who, accompanying her husband into the Ecuadorian jungle, took a special interest in ithomines.

***Patricia oligyrtis* (Hewitson)**

The only representative of this species I have seen is the male of *hewitsonii* in the Weeks collection, recorded from Bolivia. The other subspecies, *oligyrtis*, was recorded from Ecuador. As indicated in the key, these two are readily distinguished by the width of the postmedian markings on both wings relative to the width of the borders.

***Patricia oligyrtis oligyrtis* (Hewitson)**

Plate 2, figures 4, 5

*Athesis oligyrtis* HEWITSON, 1877 (1869-1877), p. 83; Ecuador. STAUDINGER, 1885 (1884-1888), p. 55. HAENSCH, 1909, p. 118. RILEY AND GABRIEL, 1925, p. 36. BRYK, 1937b, p. 457.

*Patricia oligyrtis*, Fox, 1940, pp. 177, 178; 1948, p. 132.

*Athesis demylus* GODMAN AND SALVIN, 1879, p. 150; Sarayacu, Ecuador. HAENSCH, 1909, p. 118. RILEY AND GABRIEL, 1925, p. 15. BRYK, 1937b, p. 456.

*Patricia demylus*, Fox, 1940, pp. 177, 178; 1948, p. 132.

The type of *oligyrtis* is a female from "Ecuador" numbered 6927, and the types of *demytus* are a male and female from "Sarayacu, Ecuador," a male from "North Peru," numbered 6925, 6926, and 6928; all are in the British Museum (Natural History).

At hand are photographs of the types of both names, reproduced here as figures 4 and 5 on plate 2. I can unhesitatingly say that *demytus* is an absolute synonym for *oligyrtis*. It is interesting to compare the Hewitson description with that of Godman and Salvin and to see how misleading can be

written descriptions alone. Each description emphasizes different points of pattern and coloring, while dealing with the same insect, so that the respective authors seem to be discussing totally different species!

There are no specimens in American collections.

***Patricia oligyrtis hewitsonii* (Srnka)**

Plate 2, figure 6

[*Atheris dercyllidas* HEWITSON (part), 1872 (1852–1876), vol. 5, p. [9], pl. [5] Heliconidae, fig. 2; Ecuador.]

*Athesis hewitsonii* SRNKA, 1885, p. 121; for Hewitson's figure cited above. HAENSCH, 1909, p. 118. BRYK, 1937b, p. 456.

*Patricia hewitsonii*, FOX, 1940, pp. 177, 178; 1948, p. 132.

The type should be in the British Museum (Natural History), but Riley and Gabriel did not mention it in their catalogue. Srnka founded his name on the Hewitson figure, the original of which was in the Hewitson collection.

One male has been examined from American collections.

**GENUS *OLYRAS* DOUBLEDAY**

*Olyras* DOUBLEDAY, 1847 (1846–1852), p. 107. Type: *Olyras crathis* Doubleday and Hewitson, by monotypy. KIRBY, 1871, pp. 19, 640. SCUDDER, 1875, p. 232. GODMAN AND SALVIN, 1879 (1879–1901), p. 7. STAUDINGER, 1885 (1884–1888), p. 56. SCHATZ, 1886 (1885–1892), pp. 87, 89. HAASE, 1893, p. 51. HAENSCH AND THIEME, 1899, p. (12). HAENSCH, 1909, p. 117. D'ALMEIDA, 1923, p. 233. BRYK, 1937b, pp. 452–453. FOX, 1940, pp. 165, 170, 173, 176. FORBES, 1941, pp. 2, 3. D'ALMEIDA, 1942, p. 192. FOX, 1949, p. 11.

Doubleday's generic diagnosis was complete and to the point. A remarkable historical homogeneity characterizes the literature, and *Olyras* never has been the center of any confusion.

The first joint of the palpus (fig. 46) is closely appressed to the head, deeply curved. The second joint is one-third longer, curved only lightly, and stands free. The terminal joint is one-third of the length of the first, is straight and free.

The antennae are from two-thirds to five-sixths, depending on the species, of the length of the body.

Forelegs of the male (fig. 47) have a stout

coxa, the femur plus trochanter one-sixth longer. The tibia is one-fourth longer than the coxa; the tarsus is one-third of the length of the coxa and is slender and articulated.

The fore tarsus of the female (fig. 48) has five joints, the first three each with a pair of spurs. The second, third, and fourth joints are discoid. The first joint is twice the length of the other four together.

VENATION (FIG. 49): The erect humeral vein of the hind wing is forked, but both arms are short; Sc and R are well separated from the base. The recurrent vein arises from the angle of 2d, the arms of which are about the same length. The anterior side of the cell is longer than the posterior side.

The hair patch of the male hind wing is divided, the distal part being the larger.

On the forewing  $R_2$  always arises a little beyond the end of the discal cell, which is closed by 2d and 3d, both straight, with 2d a little shorter; 1d is wanting. The recurrent vein arises opposite the base of  $M_2$ . The two sides of the discal cell are the same length.

MALE GENITALIA (FIGS. 50–52): Tegumen is hood-like, about the same length as the uncus; the uncal suture is present. The uncus is sharply pointed and curves downward. The gnathos is a lightly chitinated ribbon articulating at each end with a low tooth on the vinculum at the base of the tegumen. The saccus is short, blunt, one-fourth of the length of the tegumen. The vinculum is continuous with the tegumen above and the saccus beneath, and has a blunt, low tooth on its anterior margin opposite the costa of the valve. The penis is slender, lightly angled just posterior to the foramen, and is longer than the tegumen plus uncus. The foramen is two-fifths of the length of the penis. The juxta is strongly chitinated, a flat, V-shaped structure.

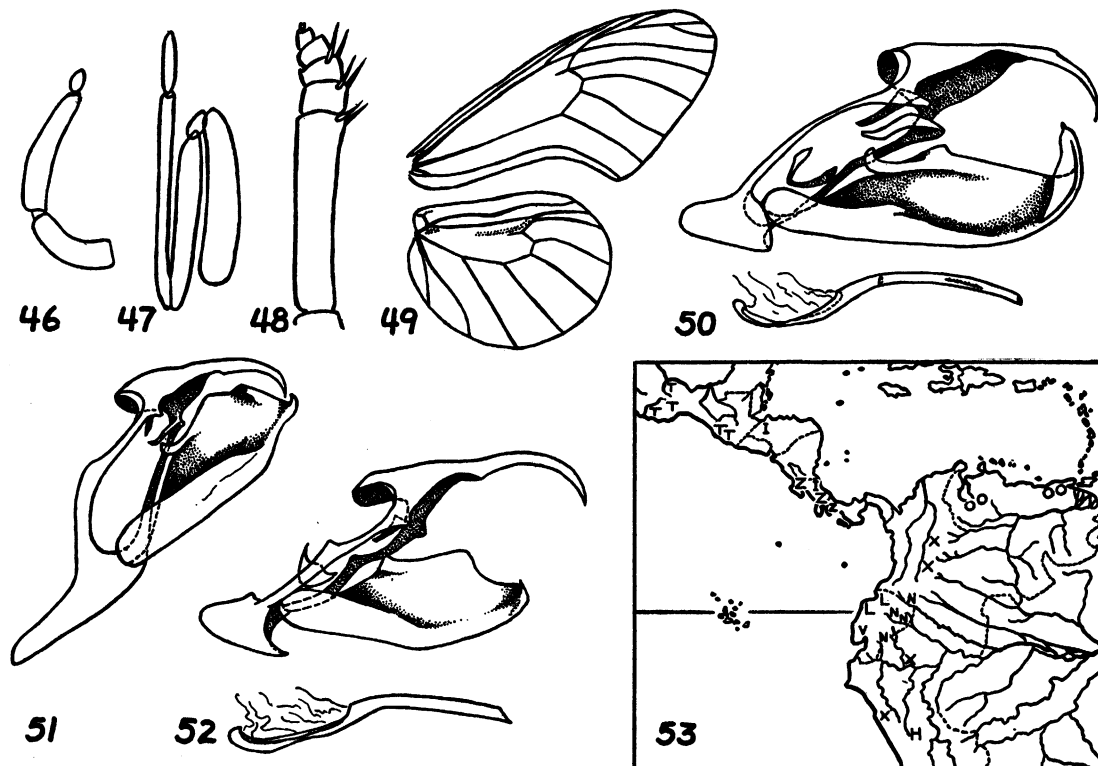
The species are distinguished by the shape and development of the valves. In general, the valves are more than twice as long as high, are roughly triangular, and the fold of the sacculus is well developed and studded with hairs anteriorad. In *O. crathis* there is a long terminal hook below the apex, and the costal margin is fairly even. In *insignis* the terminal hook is quite short, curved inward rather than upward as in *crathis*, and the costal margin is bluntly angled. In *theon* the

costal margin is sinuate, provided with a recurved, flat tooth on the inner face just proximal of the apex, and the apex itself bears a short, lightly curved hook.

*Olyras theon*, heretofore placed as a subspecies of *O. crathis*, has proved to be a distinct species found only in Guatemala and

KEY TO THE SPECIES OF *Olyras*  
BY MALE GENITALIA

1. Apex of valve bearing an upcurved hook nearly as long as the costal margin, which is nearly straight . . . . . *O. crathis*
- Apex of valve bearing a hook much shorter than the costal margin. . . . . 2



FIGS. 46-50. *Olyras crathis crathis*. 46. Palpus of male. 47. Male foreleg. 48. Female fore tarsus. 49. Venation of male, hair patches indicated by stippling. 50. Male genitalia, left valve removed, dissected penis shown below.

FIG. 51. *Olyras theon*. Male genitalia, penis and left valve removed.

FIG. 52. *Olyras insignis insignis*. Male genitalia, left valve removed, dissected penis shown below.

FIG. 53. Distribution of genus *Olyras*. Symbols: H, *O. crathis sticheli*; I, *O. i. insignis*; L, *O. i. translucens*; N, *O. c. montagui*; O, *O. c. crathis*; T, *O. theon*; V, *O. c. weeksi*; X, *O. i. praestans*; Z, *O. c. staudingeri*.

southern Mexico (fig. 53). *Olyras crathis* and the forms of *O. montagui*, separated by Haensch (1909), are conspecific. *Olyras translucens*, of which only a few specimens are known, forms the third species with *praestans* and *insignis*. The subspecies of *O. crathis* and *O. insignis* are distributed in southern Central America and in northwestern South America from Venezuela to Peru.

2. Costal margin strongly sinuate, bearing a flat, recurved tooth on the inner face proximal of the apex, which bears a short tooth . . . . . *O. theon*
- Costal margin humped, the apex armed with a short, incurved tooth . . . . . *O. insignis*

KEY TO THE SPECIES AND  
SUBSPECIES OF *Olyras*

1. The disc of the hind wing and the base of the forewing cell are transparent yellowish;

- orange-brown, when present, appears only as narrow marks along the darker borders of the hind wing . . . . . (*O. insignis*), 2
- The disc of the hind wing has strong orange-brown; the base of the forewing cell is opaque, either black or red-brown . . . . 4
2. Cell of forewing entirely transparent, lacking all but a trace of the diagonal cell bar . . . . . *O. i. translucens*
- Cell of forewing crossed, or nearly, by a fully scaled black diagonal bar . . . . . 3
3. Transparent yellow area on the hind wing disc of the female is cut off sharply at  $M_1$  on the under side; the black marginal band of the hind wing with tawny edging on the upper side in both sexes . . . . . *O. i. insignis*
- Transparent yellow area on the hind wing disc of the female crosses the black  $M_1$  and ends in a small, semitransparent white spot in  $M_1-R_2$ , which often is visible faintly above; black marginal band of the hind wing above with no tawny edging, or only slightly. . . . . *O. i. praestans*
4. A long, wide, orange-brown streak runs along the forewing cubitus (which is the same color) from the base of the wing out to the suboval admarginal yellow spot  $Cu_2-A$ , and entirely fills the area between the cell bar and the dark marginal streak over and behind A . . . . . *O. theon*
- The cubitus and all the forewing behind it is black-brown, continuous with the dark bar over 4d; the light color in the base of the cell thus is cut off from the admarginal spot  $Cu_2-A$  . . . . . (*O. crathis*), 5
5. Base of the forewing cell is velvety black-brown, usually with only slight red-brown dusting along the cubitus; transparent spot in the end of the cell always oblong, never constricted . . . . . *O. c. montagui*
- Forewing cubitus with a strong triangular red to yellow-brown stripe filling the base of the cell . . . . . 6
6. Black diagonal bar crossing forewing cell, cutting off the triangular brown streak in the base . . . . . 7
- Black diagonal bar not completely crossing the forewing cell, not reaching the cubitus, so that the triangular brown streak in the base is not cut off by it . . . . . 8
7. Brown triangular streak in the base of the forewing cell is narrow; cell  $Cu_1-Cu_2$  with two transparent spots; borders of hind wings narrow; the transparent spot in the end of the forewing cell is suboblong. . . . . *O. c. staudingeri*
- Brown triangular streak in the base of the fore-

- wing cell is wider; cell  $Cu_1-Cu_2$  with one large transparent spot; hind wing borders wider; the transparent spot in the end of the forewing cell always narrow or constricted by black scaling over the recurrent vein . . . . . *O. c. sticheli*
8. The black-brown bar over 4d of the forewing is edged narrowly with orange-brown; the transparent spot in  $Cu_2-A$  is shorter than the spot in  $Cu_1-Cu_2$ , generally two-thirds or less in length. . . . . *O. c. crathis*
- Bar over 4d of the forewing is broadly orange-brown, only the vein itself remaining black, and is continuous with the long streak in the discal cell; the transparent spot  $Cu_2-A$  is fully as long as the spot in  $Cu_1-Cu_2$ . . . . . *O. c. weeksi*

#### *Olyras crathis* Doubleday and Hewitson

Five subspecies are known (fig. 53). *Olyras crathis staudingeri* has been found throughout Costa Rica south as far as Chiriqui, Panama. The narrow part of the Panamanian isthmus apparently is without any *crathis* form, perhaps because of insufficient altitude. *Olyras c. crathis* is found throughout the mountains of Venezuela; several unlocalized Colombian specimens are at hand, but the exact limit of distribution is not clear at present. It may be discovered in Darien or in the Guianas, but probably does not occur in southern Colombia. To the south it is replaced by *O. c. montagui* in eastern Ecuador, a form that may logically be expected also from southern Colombia. *Olyras crathis sticheli* is known from the upper valley of the Rio Ucayali in southern Peru; a specimen in the collection of the Reading Public Museum comes from Haensch's type locality. The single female described herein as *O. c. weeksi* bears only "Ecuador" on the label. The development of the pattern, where brown replaces some of the black and where the transparent areas are larger at the expense of the brown, suggests an ecology rather more arid than that of the Oriente. In pattern it stands in exactly the same relationship to *montagui* as does *O. i. translucens* to *O. i. praestans*. I believe that this new subspecies actually comes from western Ecuador.

In those *crathis* subspecies that I have examined in reasonably long series, there appears to be considerable stability of pattern

and very little difference between the males and females. Each subspecies is homogeneous, and I have seen no intergrading examples or aberrations.

The *crathis* subspecies may be distinguished from *theon* by the wider black border on the hind margin of the forewing, the black cubitus, and by the distinctive valves of the male genitalia. From *insignis* subspecies *crathis* is immediately separable by the extensive red-brown color and the lack of sulphur transparent fascia on the hind wing, as well as by the valves of the male genitalia.

The large hook formed on the tip of the valve by the juncture of the dorsal margin with the fold of the sacculus is characteristic of *crathis* and serves to emphasize the unity of the species as distinguished from the other two species of *Olyras*. The costa of the valve (dorsal margin) runs fairly straight from the articulating margin out to the hook, leaving no particular apical point anteriorward, and not being much curved.

***Olyras crathis staudingeri* Godman and Salvin**

Plate 2, figure 7

*Olyras staudingeri* GODMAN AND SALVIN, 1897, p. 242; Costa Rica. GODMAN, 1901, in Godman and Salvin, 1879-1901, p. 640. HAENSCH, 1905, p. 143; 1909, p. 117. RILEY AND GABRIEL, 1925, p. 46. BRYK, 1937b, p. 453. FOX, 1940, p. 177.

The type series, four males and two females from "Irazu, Costa Rica," is in the British Museum (Natural History) numbered 6890 to 6896.

Eleven males and nine females in American collections have been studied.

***Olyras crathis montagui* Butler**

Plate 2, figure 8; text figures 46-50

*Olyras montagui* BUTLER, 1870, p. 490. KIRBY, 1871, p. 640. BUTLER, 1873 (1869-1874), p. 138, pl. 50, fig. 1. BUTLER AND DRUCE, 1874, p. 331. KIRBY, 1877, p. 693. GODMAN AND SALVIN, 1879 (1879-1901), p. 7. STAUDINGER, 1885 (1884-1888), p. 56. SCHATZ, 1885 (1885-1892), pl. 10, fig. 10a; 1886 (1885-1892), pp. 89-90. HAASE, 1893, p. 53 (typographical error, *montagnei*). HAENSCH, 1903, p. 158; 1905, pp. 143, 158; 1909, p. 117 (typographical error, *montagni*). RILEY AND GABRIEL, 1925, p. 34. BRYK, 1937b, pp. 452-453. FOX, 1940, p. 177.

The type is a male from "Bogota" in the British Museum (Natural History) numbered 6897.

Nine males and two females in American collections have been examined.

***Olyras crathis crathis* Doubleday and Hewitson**

Plate 2, figure 9

*Olyras crathis* DOUBLEDAY AND HEWITSON, 1847 (1846-1852), p. 108, pl. 16, fig. 2; Venezuela. KIRBY, 1871, p. 19. SCUDDER, 1875, p. 232. STAUDINGER, 1885 (1884-1888), p. 56. HAENSCH, 1909, p. 117. RILEY AND GABRIEL, 1925, p. 14. BRYK, 1937b, p. 452. FOX, 1940, pp. 176-177, fig. 41. FORBES, 1940, p. 310.

The types, a male and a female from "Venezuela," are in the British Museum (Natural History) numbered 6898 and 6899.

Thirty-three males and eight females in American collections have been examined.

***Olyras crathis sticheli* Haensch**

Plate 3, figure 2

*Olyras montagui sticheli* HAENSCH, 1905, p. 142; Pozuzo, Rio Ucayali, Peru; 1909, p. 117. BRYK, 1937b, p. 453. FOX, 1940, p. 177.

A single female representing this subspecies has been found in American collections.

***Olyras crathis weeksi*, new subspecies**

Plate 3, figure 1

**FEMALE:** The pattern is nearest that of *O. c. crathis*, but the brown coloring is more reddish, not so yellowish. The dark bar over 4d of the forewing is brown rather than black; this brown coloring is diffused out into the base of  $M_2$ - $M_3$  and the base of  $M_3$ - $Cu_1$ . The black hind marginal color of the forewing thus is cut off by the brown fascia from the discocellular bar. All veins of the forewing are black, although 4d is only narrowly so, except the anal vein, which has some red-brown scaling.

The hind wing has a strong yellow transparent discal fascia running from the anal margin across the tip of the cell and terminating at  $M_1$ , forming a nearly straight line. The black-brown border is the same width as it is in *montagui*; the white submarginal spots show through strongly from beneath.

On the under side, the red-brown coloring replaces extensively the black markings of the



forewing, so that only the outer edge of the margins, the dark fascia behind the cubitus to the anal margin, the costa itself, and a small patch over 3d remain black-brown. On the hind wing red-brown is diffused through the black-brown on the costa. The submarginal white double dots on both wings are strong, although not especially large. There is a subtriangular white spot over the apex of the hind wing cell.

TYPE MATERIAL: Holotype female: Ecuador; A. G. Weeks; in the Museum of Comparative Zoölogy, Harvard College. Paratype female: no data; accession 35633; in the United States National Museum.

The redder color of the brown markings and the general invasion by this brown of the black markings suggest that this is the subspecies from western Ecuador.

#### *Olyras theon* Bates

Plate 3, figure 3; text figure 51

*Olyras theon* BATES, 1866, p. 50; Guatemala. KIRBY, 1871, p. 79. GODMAN AND SALVIN, 1879 (1879-1901), p. 7, pl. 1, fig. 2. STAUDINGER, 1884 (1884-1888), pl. 27; 1885 (1884-1888), p. 56. HAASE, 1893, p. 51. GODMAN, 1901, in Godman and Salvin, 1879-1901, p. 639. HAENSCH, 1909, p. 117, pl. 31d. RILEY AND GABRIEL, 1925, p. 47. BRYK, 1937b, p. 452. FOX, 1940, p. 177.

The type is in the British Museum (Natural History), a female from "Central valleys, Guatemala," numbered 6900. Eleven males and six females have been examined from American collections.

Both the pattern anatomy and the male genitalia show that *theon* is a distinct species. No other subspecies is known. *Olyras theon* comes from the high valleys of Guatemala and of the southernmost part of Mexico.

Both pairs of wings are narrower, more acute, than in other *Olyras* species; the black of the forewing tends to be thinner and less brownish. The black anal margin of the forewing remains opaque but is reduced to the true marginal region, leaving an appreciable light brown area over the entire cubitus; this area runs out along  $Cu_2$  to connect with the yellow transparent admarginal spot in  $Cu_2-A$ . The color along the anal margin in other *Olyras* species actually is composed of two elements united, one of which, the anterior, is wanting in *theon*. The dorsal thoracic

spots are yellow, not white as in other *Olyras* species.

The fold of the sacculus of the male valve (fig. 51) forms a very short, upturned hook at the apex; the costal margin is deeply sinuous, being concave next to the articulating margin, then recurving to form a rounded apex, beyond which there is a small flat tooth on the inner face of the valve.

#### *Olyras insignis* Salvin

Three subspecies are known. Honduras, Costa Rica, and Panama are inhabited by *O. i. insignis*; *praestans* is found in the valleys east of the Andes from central Colombia south through Ecuador into Peru; *translucens* is limited to the high arid valleys of western Ecuador. None of these appears to be abundant anywhere, and they are not well represented even in the most carefully made collections.

*Olyras i. insignis* and *O. i. praestans* are quite similar, and are perhaps most easily distinguished by the character used in the key—whether the hind wing yellow fascia stops at  $M_1$ , as in *insignis*, or forms a small spot above it, as in *praestans*. The Central American subspecies has more red-orange at the base of the hind wing and along the black border near the anal margin than does the east Andean subspecies, but this is a variable feature. *Olyras insignis translucens* is easily recognized by the lack of the dark cell bar and the dark subapical bar of the forewing. This is an example of one kind of pattern deviation common in ithomines of western Ecuador: the pattern is simplified, the black scaling is denser and narrower, while the transparent spots are more extensive.

The fold of the sacculus of the male valve (fig. 52) curves upward as it approaches the apex, there forming a small tooth. The costa from the articulating margin is deeply convex, swinging up to a fairly prominent, untoothed hump, from which the margin falls away in a convex curve to the apex.

#### *Olyras insignis insignis* Salvin

Plate 3, figure 4; text figure 52

*Olyras insignis* SALVIN, 1869, p. 163; Calobre, Panama. KIRBY, 1871, p. 19. BUTLER AND DRUCE, 1874, p. 331. GODMAN AND SALVIN, 1879 (1879-1901), p. 8, pl. 1, fig. 1. STAUDINGER, 1885 (1884-

1888), p. 56. HAENSCH, 1909, p. 117. RILEY AND GABRIEL, 1925, p. 26. BRYK, 1937b, p. 453. FOX, 1940, p. 177.

The type is a male from "Calobre, Panama," numbered 6902 in the British Museum (Natural History).

Three males and two females from American collections have been examined.

***Olyras insignis praestans* Godman and Salvin**

Plate 3, figure 5

*Olyras praestans* GODMAN AND SALVIN, 1897, p. 242; San Martin, Colombia. HAENSCH, 1909, p. 117, pl. 31e. FASSL, 1912, p. 157. RILEY AND GABRIEL, 1925, p. 41. BRYK, 1937b, p. 253. FOX, 1940, p. 177.

The type in the British Museum (Natural History) is a female from "San Martin, Colombia" numbered 6903.

Two males and six females from American collections have been studied.

***Olyras insignis translucens* Hewitson**

Plate 3, figure 6

*Olyras translucens* HEWITSON, 1872, p. 83; Ecuador. KIRBY, 1877, p. 693. STAUDINGER, 1885 (1884-1888), p. 56. HAENSCH, 1903, p. 158, pl. 3, fig. 1; 1909, p. 117. RILEY AND GABRIEL, 1925, p. 48. BRYK, 1937b, p. 253. FOX, 1940, p. 177.

The type is a male from "Ecuador" numbered 6901 in the British Museum (Natural History). Two males have been examined from American collections.

**GENUS *ATHYRTIS* FELDER AND FELDER**

*Athyrtis* FELDER AND FELDER, 1862, p. 413. Type: *Athyrtis mechanitis* Felder and Felder, by monotypy. KIRBY, 1871, p. 26. SCUDDER, 1875, p. 123. SCHATZ, 1886 (1885-1892), pp. 87, 89. HAASE, 1893, pp. 50, 51. HAENSCH AND THIEME, 1899, p. (12). HAENSCH, 1909, p. 121. D'ALMEIDA, 1923, p. 233. BRYK, 1937b, p. 469. FOX, 1940, pp. 165, 170, 173, 180, pl. 5, fig. 4. FORBES, 1940, p. 308; 1941, pp. 2-3. D'ALMEIDA, 1942, p. 180. FOX, 1949, p. 11.

The forms belonging in this genus are not common in collections. The first discovered species was placed by the brothers Felder in a new genus erected for the purpose; the accompanying diagnosis was well written, a fact that, together with the morphological distinctiveness of the species, has led to complete accord as to generic assignment.

The first joint of the palpus (fig. 54) is

closely appressed to the head, strongly curved. The second joint is one-third longer, is free and lightly curved. The reduced terminal joint is nearly round, one-fourteenth of the length of the first joint.

The male fore coxa (fig. 55) is stout, the femur slender. The femur plus trochanter is one-fifth longer than the coxa. The slim tibia is about one-fifteenth longer than the femur plus trochanter and one-fourth longer than the coxa. The tarsus is elongated, slender, a little constricted in the middle, and has only one joint; it is four-fifths of the length of the coxa and a bit less than two-thirds of the length of the tibia.

The female fore tibia (fig. 56) has the terminal joint strongly reduced and cylindric. There are a pair of spurs on each of the first three joints. The second, third, and fourth joints are discoid; the first joint is more than three times the length of the other four combined.

VENATION (FIG. 57): The humeral vein of the hind wing is erect and forked, the distal branch being shorter than the proximal branch; Sc and R separate at the humeral. The arched Sc emarginates at the apex of the wing. The discal cell is closed by the short 1d, the straight 2d which is four times as long as 1d, and the angled 3d. The recurrent vein arises from the angle of 3d placed near  $M_2$ , but sometimes the angle (and the recurrent vein) occur opposite  $M_2$  so that 3d is then straight. The anterior side of the cell is much longer than the posterior side; the wing is of the "quadrifid" type.

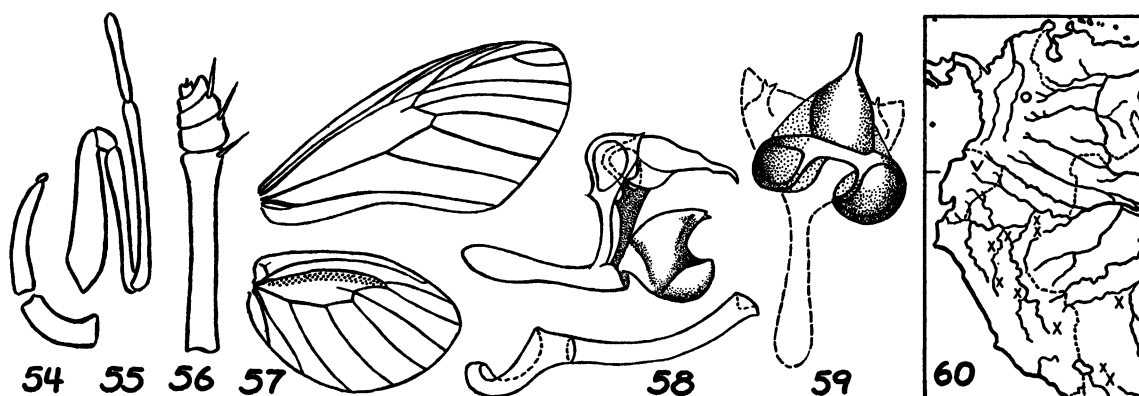
On the forewing  $R_2$  arises a little beyond the end of the cell; 1d is minute; 2d is angled below its mid-point so that the upper arm is three times the length of the lower; a strong recurrent vein arises from this angle; 3d is longer than 2d and is lightly sinuate.

The hair patch of the males is fully developed and undivided.

MALE GENITALIA (FIGS. 58, 59): The tegumen is divided by a deep, U-shaped indentation near its dorsal anterior line into two asymmetric lobes, the left lobe being larger than the right lobe. These two lobes have heavily chitinized margins, apparently infolded proximad, while the ovate central areas are much thinner and more lightly chitinized. The uncus is twice the length

of the tegumen and terminates in a small, slender, pointed projection; the uncal suture is present. The ribbon-like gnathos is only lightly chitinized and articulates at the anterior end of the uncus. The saccus is as long as the tegumen plus uncus, is thick and blunt. The vinculum is continuous with the saccus below and the tegumen above. The penis is thick, lightly upcurved, and about twice the length of the tegumen plus uncus. The foramen is one-fourth of the length of

hind wing yellow is reduced or wanting was named *distincta*. The eastern slopes of the Andes in Ecuador and Peru are the home of *A. m. oberthuri*, which also has a normal genetic form lacking yellow, which has received the name *similis*. Along the Amazon from Teffé to the Rio Huallaga, in the Ucayali and Jurua valleys, along the middle Rio Madiera, and in Bolivia is found *A. m. salvini*, with its melanic variation which Haensch named *amanga*.



FIGS. 54-59. *Athyrtis mechanitis mechanitis*. 54. Palpus of male. 55. Male foreleg. 56. Female fore tarsus. 57. Venation of male, hair patch indicated by stippling. 58. Lateral view of male genitalia, left valve removed, dissected penis shown below. 59. Dorsal view of male genitalia, with saccus and valves shown by broken lines.

FIG. 60. Distribution of the genus *Athyrtis*. Symbols: O, *Athyrtis m. mechanitis*; V, *A. m. oberthuri*; X, *A. m. salvini*.

the penis. The juxta is a narrow, U-shaped plate.

The valves are roughly triangular and articulate with the vinculum only for a short distance opposite the saccus, and with each other along their ventral margins. The anterior margin is straight, swinging away from the vinculum, curving sharply posteriorad beneath the uncus, and terminating in a blunt projection armed with two minute teeth. The posterior margin is deeply sinuate. The sacculus is folded, widening and thickening at the posterior margin, affording a nearly flat perpendicular surface, the dorsal aspect of which is armed with a row of dentate projections.

*Athyrtis* is monotypic and includes three rather variable populations. The first named form, *A. m. mechanitis*, is found in Colombia (fig. 60); the normal variation in which the

The *Athyrtis* subspecies appear to be common nowhere and to be distributed in small segregated islands of populations. The genitalic structure of the males, as well as the pattern elements, is primitive. This appears to be another relict genus. It is not closely allied to any other living genus, although the pattern of *Mechanitis* and the genitalia of *Xanthocleis* show similarities.

#### KEY TO THE SUBSPECIES OF *Athyrtis mechanitis*

1. Forewing above with a black spot in the base of  $Cu_1-Cu_2$  . . . . . 2  
Forewing above lacking a black spot in the base of  $Cu_1-Cu_2$  . . . . . *A. m. salvini*
2. Hind wing borders broad, nearly as wide as the spots in the discal row. . . . . *A. m. mechanitis*  
Hind wing borders narrow, much narrower than the spots in the discal row . . . . . *A. m. oberthuri*

**Athyrtis mechanitis mechanitis** Felder and Felder

Plate 4, figure 1; text figures 54–59

*Athyrtis mechanitis* FELDER AND FELDER, 1862, p. 413; Bogota; 1865 (1864–1867), p. 353, pl. 44, fig. 2. KIRBY, 1871, p. 26. STAUDINGER, 1885 (1884–1888), p. 71. SRNKA, 1885, p. 129. HAENSCH, 1905, pp. 144–145; 1909, p. 121, pl. 33a. FASSL, 1915, p. 58. BRYK, 1937b, p. 469. FOX, 1940, p. 180, fig. 4.

*Athyrtis distincta* HAENSCH, 1905, pp. 114–115, fig. 2; Colombia; 1909, pp. 121–122. BRYK, 1937b, p. 469. FOX, 1940, p. 180.

Three males from American collections have been examined.

**Athyrtis mechanitis oberthüri** Srnka

*Athyrtis oberthüri* SRNKA, 1885, p. 129, pl. 1, fig. 2; Ecuador. HAENSCH, 1909, p. 121. BRYK, 1937b, p. 469. FOX, 1940, p. 180.

*Athyrtis similis* TESSMANN, 1928, p. 119, pl. 5, fig. 20; Pachitea, Peru. BRYK, 1937b, p. 469. FOX, 1940, p. 180.

The type of *similis* is a male from "Monea-legre, Pachitea, Peru" in the Berlin Museum.

There are no specimens in American collections.

**Athyrtis mechanitis salvini** Srnka

*Athyrtis salvini* SRNKA, 1884, p. 163; Rio Huallaga; 1885, p. 129, pl. 1, fig. 1. STAUDINGER, 1884 (1884–1888), pl. 30; 1885 (1884–1888), pp. 70–71. SCHATZ, 1885 (1885–1892), pl. 10; 1886 (1885–1892), p. 89. HAENSCH, 1905, p. 143; 1909, p. 121. BRYK, 1937b, p. 469. FOX, 1940, p. 180.

*Athyrtis amanga* HAENSCH, 1909, p. 121; upper Amazon. BRYK, 1937b, p. 469. FOX, 1940, p. 180.

Twenty-one males and four females from American collections have been examined.

GENUS **TITHOREA** DOUBLEDAY

*Tithorea* DOUBLEDAY, 1847 (1846–1852), pp. 99–100, pl. 14, fig. 1. Type: *Tithorea harmonia* (Cramer), by designation of Scudder, 1875. BATES, 1862, p. 552. KIRBY, 1871, p. 35. SCUDDER, 1875, p. 285. STAUDINGER, 1885 (1884–1888), p. 72. SCHATZ, 1885 (1885–1892), pl. 10; 1886 (1885–1892), pp. 87, 88. HAASE, 1893, p. 50. REUTER, 1896, pp. 36, 325, 326, 552. HAENSCH AND THIEME, 1899, p. (12). SHARP, 1899, p. 346. SEITZ, 1927b, pp. 36, 48. BRYK, 1937a, p. 20; 1937b, pp. 460–466. FOX, 1940, pp. 165, 170, 173, 175, fig. 54. FORBES, 1941, pp. 1–3. D'ALMEIDA, 1942, p. 196. FOX, 1949, p. 11; 1953, p. 142.

*Hirsutis* HAENSCH, 1909, pp. 118–119. Type: *Papilio harmonia* Cramer, by designation of Fox,

1940. D'ALMEIDA, 1923, p. 233. KREMKY, 1925, pp. 146, 147, 153, 154, 158, 160, 176, 177–179, 183, 190, 192, 194. FORBES, 1927, p. 24. KÖHLER, 1929, pp. 307, 315. D'ALMEIDA, 1942, p. 186.

*Papilio*, FABRICIUS (part), 1781, p. 27; 1787, p. 13; 1793, pp. 160, 163. CRAMER, 1777, p. 16. HERBST, 1840, pp. 116–117. DRURY, 1782, pl. 38, fig. 1. STOLL, 1790, pl. 30, fig. 3.

*Melinaea* HÜBNER (part), 1816 (1816–1826), p. 11.

*Heliconia* LATREILLE (part), 1819, in Latreille and Godart, 1819–1823, p. 223.

Doubleday originally included also those species now placed in *Elzunia*. In 1875 Scudder designated as type of the genus one of the species included by Doubleday, *Papilio harmonia* Cramer, but in a footnote rather than in the main list. Haensch rightly separated *bonplandii* and allies from *harmonia* and allies, but incorrectly applied the name *Tithorea* to the former instead of the latter, thus foredooming *Hirsutis* to the synonymy. Unfortunately this blunder was published in the widely circulated "Die Gross-Schmetterlinge" (1909).

The first joint of the palpus (fig. 61) is curved, subcylindric, and closely appressed to the head. The second joint is lightly S-shaped, stands free of the head, and is one-half longer than the first joint. The third joint is straight, free, and ovoid; it is one-half of the length of the first.

The antennae are from four-fifths of the length of the body to the same length and are a little more than half of the costal marginal length of the forewings.

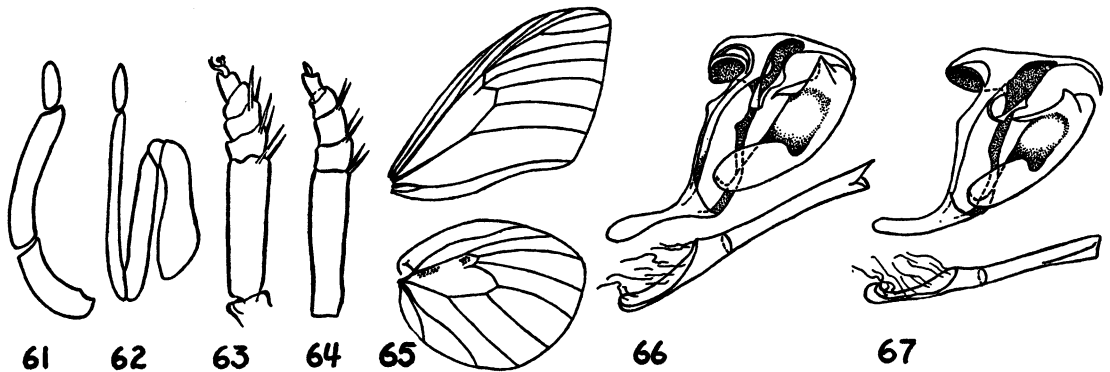
The male fore coxa (fig. 62) is stout and two-thirds of the length of the femur plus trochanter. The tibia is slightly more than a half longer than the coxa. The tarsus is a single, suboval, reduced joint. In *T. harmonia* the tarsus is less than one-fourth of the length of the coxa, but in *T. tarricina* it is nearly one-third.

The female fore tarsus (figs. 63, 64) has five joints, with a pair of spurs on each of the first three. The second, third, and fourth joints are discoid; the fifth is suboval and reduced. The first joint is about one-half longer than the other four combined. Pulvillus present; a pair of terminal claws are also present in *tarricina*, but wanting in *harmonia*.

**VENATION (FIG. 65):** On the hind wing the humeral vein is longer than 2d but only lightly forked, with Sc and R separating below it. The recurrent vein arises from the sharp angle of 3d, the upper part of which is about one-fifth of the length of the lightly sinuate lower part. The posterior side of the cell is longer than the anterior side, the cubitus seeming to be "trifid." The males have the hair patch divided; the basal patch consisting of light-colored hairs is the larger,

tegumen, broad and blunt. The penis is thicker than the uncus, about as thick as the saccus, and is one-third longer than the tegumen plus uncus. The foramen is one-third of the length of the penis. The juxta is thin, flat, V-shaped.

The valves are subtriangular, the curved lower margin twice the length of the costa. The apex is blunt, rounded, and preceded by an upright, flange-like fold which, in profile, gives the apex the appearance of a bird's



FIGS. 61-63. *Tithorea tarricina pinthias*. 61. Palpus of male. 62. Male foreleg. 63. Female fore tarsus.

FIGS. 64, 65. *Tithorea harmonia megara*. 64. Female fore tarsus. 65. Venation of male, hair patches indicated by stippling.

FIG. 66. *Tithorea tarricina pinthias*. Male genitalia, left valve removed, dissected penis shown below.

FIG. 67. *Tithorea harmonia harmonia*. Male genitalia, left valve removed, dissected penis shown below.

while the distal patch sometimes consists of only a few hairs, always black.

On the forewing  $R_2$  arises near the end of the cell, sometimes just opposite 1d, sometimes just beyond it but rarely proximal of it; these variations seem to be individual rather than specific. The recurrent vein arises from the angle of 3d and is at least as long as 2d; the upper arm of the angle of 3d is about one-tenth of the length of the sinuate lower arm; 1d is minute. The sides of the cell are about equal.

**MALE GENITALIA (FIGS. 66, 67):** The two species show virtually no differences in the male genitalia. The tegumen is hood-like, about the same length as the curved narrow uncus. There is no uncal suture. The gnathos is lightly chitinized in the form of a narrow ribbon articulating at each end with a low apex on the vinculum at the base of the tegumen and uncus. The saccus is as long as the

head. The position and size of this fold are the only diagnostic characters I have found in the male genitalia, and they are difficult to evaluate. In *T. tarricina* (fig. 66) the fold is placed so that the costa is shorter than it is in *T. harmonia* (fig. 67). The fold of the sacculus is well developed and wide at the base where it is studded with long, scale-like hairs; halfway to the apex it swings up to the costa.

Haensch (1909) recognized 17 species based on macular characters, particularly stressing the color of the collar and patagia, the shape of the outer end of the forewing stripe over  $M_3$ , and the position of the dark median band on the hind wings. None of these features withstands analysis. Although they may be used to distinguish subspecies, even there they are not wholly reliable, as many populations show a considerable range of normal variation.

Structurally there are only two species,

well marked from each other by several characters: the minor differences in the male valves, the hairiness of the eyes (the eyes of *tarricina* are much more hairy than the eyes of *harmonia*), differences in the male forelegs, the basic pattern, and the claws on the female fore tarsus of *tarricina*. This situation was expressly suspected in the past by Bates, Staudinger, and others and is fully substantiated by both morphologic and geographic analysis. Once allowance is made for the wide variation of detail in some populations, it is noted that there never are more than two populations in any one area.

While the species are easily separable, the subspecies are difficult to define, and each population tends to shade into neighboring populations along mutual boundaries where, undoubtedly, interbreeding is taking place.

Viewed in terms of geologic time and of geographic distribution, *Tithorea* must be an ancient genus fairly similar to the stem forms, but one which is nevertheless more adaptable than most genera of this tribe. Probably there has been an extension of range sufficiently recently that the populations have not yet had time to become completely stabilized. Forbes believes (in private correspondence) that this range extension, found also in *Hypothyris* and some other ithomine genera, was post-Pleistocene. It may have been earlier.

The retention of a fully scaled, triangular, typically nymphalid wing by *Tithorea*, while undeniably bearing all other ithomine characters, is an interesting puzzle. The male foreleg, for example, is even further reduced than in *Athesis*, *Patricia*, *Eutresis*, *Athyrtis*, and *Olyras*, yet these genera have the elongated wings, and all but *Athyrtis* tend strongly towards transparency. One cannot resolve the dilemma by assuming polyphyletic origins. Thereby a host of problems are raised while only one is solved and a great deal is expected of coincidence. Perhaps all that can be said at present is that *Tithorea* branched early from the ancestral stock, retaining the nymphalid triangular wing lost in other lines of development.

#### KEY TO THE SPECIES AND SUBSPECIES OF *Tithorea*

1. A round spot in the end of the forewing discal cell, placed anteriorward against the radial vein, never filling the end of the cell and never reaching the cubitus; eyes strongly hairy; valve of male with a flange-like fold placed two-thirds of the way out on the costa; female fore tarsus with claws . . . . . (*T. tarricina*), 2
- Spot in the end of the forewing discal cell elongated, filling the end of the cell and reaching from the radial to the cubital vein, never reduced to a round spot against the upper side of the cell, though sometimes divided into two by a central constriction; eyes only lightly hairy; valve of males with the flange-like fold placed three-quarters of the way out on the costa; no claws on the female fore tarsus . . . . . (*T. harmonia*), 5
2. Base of the forewing black . . . . . 3
- Base of the forewing with tawny, at least beneath the cubitus . . . . . 4
3. An isolated round black spot on the hind wing just beyond the end of the cell, crossing  $M_2$ ; no yellow postmedian spots . . . . . *T. t. bonita*
- A triangular black spot on the hind wing in the base of  $M_2-M_3$  crossing into  $M_1-M_2$ , sometimes obscured by black suffusion of the disc; a series of yellow postmedian spots varying in number and size, sometimes fused into a complete band. *T. t. tarricina*
- Apex of hind wing broadly black, filling the upper corner of the discal cell, most of  $M_2-M_3$ , and about half of  $M_3-Cu_1$ ; yellow postmedian spots between  $M_1$  and  $M_3$  sometimes showing through from beneath, particularly in females, but the upper side never with more than shadowy forms; black apex often continued as a short sharp median band . . . . . *T. t. pinthias*
4. Hind wing disc tawny, partly crossed by a long, narrow, median band which usually is free at the apical end . . . . . *T. t. duenna*
- Hind wing disc tawny, with an ill-defined yellowish or white band beyond the cell; a minute black dot in the end of the cell opposite  $M_3$  and sometimes a larger spot in the base of  $M_2-M_3$  . . . . . *T. t. tagarma*
5. Base of the forewing black, with scant tawny scaling over A and Cu, never with strong tawny streaks in the cell and below the cubitus . . . . . *T. h. irene*
- Base of forewing predominantly tawny or yellow, or at least with prominent tawny streaks . . . . . 6
6. Light color of both wings pale yellow, with only a suggestion of tawny over the veins and along the edges of the black markings . . . . . *T. h. megara*
- Ground color of both wings tawny, with yellow confined to limited spots, usually only at the apex of the forewing. . . . . 7
7. Median band of hind wing wanting or broken

- into clearly separated round spots; tawny streak below the cubitus of the forewing short, not reaching the yellow postmedian double spot over  $Cu_2$  . . . . . 8
- Median band of hind wing present, and, if broken into spots, the tawny streak of the forewing below the cubitus is long, reaching at least far enough to encompass the postmedian spot over  $Cu_2$ , which usually is tawny rather than yellow . . . . . 9
8. Proximal edge of yellow spot in end of forewing cell straight; the hind wing generally immaculate tawny, sometimes with the median band incompletely suggested by a few small black dots. . . . . *T. h. helicaon*  
Proximal edge of yellow spot in end of forewing cell angled, the spot sometimes divided and always shaped rather like an hourglass; hind wing with median band clearly indicated by isolated spots, the series usually complete beneath and abbreviated above . . . . . *T. h. hippothous*
9. Black median band of hind wing never enters the cell on the upper side, narrow, with its upper edge straight, the part in  $Cu_1-Cu_2$  being no wider than the black border in the same cell; when this band is broken into components, the black discal spot completely crosses the forewing and joins the black in  $Cu_1-Cu_2$  . . . . . 10  
Black median band of hind wing usually entering the cell on the upper side, wide, the part in  $Cu_1-Cu_2$  being distinctly wider than the black border in the same cell (except in a very few specimens), frequently broken into components, but these generally well isolated or the black spot in the forewing cell is not connected with the black in  $Cu_1-Cu_2$  . . . . . 14
10. Apical spots of the forewing oblong, separated from each other only by the black veins; black spot over the discocellulars of the forewing isolated . . . . . *T. h. furia*  
Apical spots of forewing rounded, rarely oblong; black spot over forewing discocellulars not isolated . . . . . 11
11. Borders and median band of hind wing broader, the tawny coloring between them in  $M_2-Cu_1$  narrower than either. . . . . 12  
Borders and median band of hind wing quite narrow, the tawny coloring between them in  $M_2-Cu_1$  wider than either . . . . . 13
12. Forewing discal cell and disc of hind wing towards the apex with strong yellow scaling; wings not especially elongated . . . . . *T. h. deltana*  
No yellow scaling in the forewing cell or in the disc of the hind wing; wings strongly elongated . . . . . *T. h. manabiana*
13. Forewing above with a strong yellow suffusion in the base of the cell and below the cubitus; hind wing above with yellow suffusion in the apical part of the tawny and in the discal cell . . . . . *T. h. salvadoris*  
Forewing above without yellow suffusion in the base of the cell or below the cubitus; hind wing only rarely with some yellow suffusion in the apical part of the tawny . . . . . *T. h. furina*
14. Black median band and border of the hind wing merged into a large single spot, leaving only a band above it tawny . . . . . *T. h. harmonia*  
Black median band, when present, separated from the border . . . . . 15
15. Disc of the hind wing between the median band and the costal margin strongly yellow . . . . . 16  
Disc of hind wing without any yellow on the upper side . . . . . 17
16. Forewing with extensive yellow; the black spot at the end of the cell less than half of the size of the spot in the base of  $Cu_1-Cu_2$ , both isolated . . . . . *T. h. pseudethra*  
Forewing with black coloring much more extensive than the yellow; spot at the end of the cell as large as the one in the base of  $Cu_1-Cu_2$ , one or both always joined with other black marks . . . . . *T. h. neitha*
17. The black spot over the forewing discocellulars less than half of the size of the spot in the base of  $Cu_1-Cu_2$ , both being isolated, or at most the latter may be connected only by the black cubitus . . . . . 18  
The black spot on the forewing over the discocellulars, if isolated, as large as the spot in the base of  $Cu_1-Cu_2$ , which rarely is isolated . . . . . 20
18. Median band of the hind wing broken into three or four components, the tawny coloring above it always much wider than the band itself . . . . . *T. h. pseudonyma*  
Median band of the hind wing solid, unbroken, the tawny coloring above it narrower than the band itself . . . . . 19
19. Apical spots of the forewing minute; the yellow spot in the anal angle isolated; the yellow streak over  $Cu_1$  pointed, not strongly T-shaped . . . . . *T. h. cuparina*  
Apical spots of the forewing larger, narrowly separated from each other by the black veins; the yellow spot in the apical angle not usually isolated; the yellow streak over  $Cu_1$  T-shaped . . . . . *T. h. harmonia*
20. Hind wing immaculate; forewing largely black, the yellow fascia broken into com-



- ponents; the hind wing borders generally narrow . . . . . *T. h. hermius* (= *napona*)  
 Hind wing with some components of the median band present . . . . . 21  
 21. Median band of hind wing broken into spots . . . . . 22  
 Median band of hind wing complete, consisting of large connecting components . . . . . 25  
 22. On the forewing all light spots, including the apical spots, tawny . . . . .  
 . . . . . *T. h. pseudonyma* (= *assimilis*)  
 Apical spots and median fascia of forewing yellow . . . . . 23  
 23. The forewing with a well-developed, T-shaped fascia over  $Cu_1$  . . . . . *T. h. hermius*  
 T-shaped fascia over  $Cu_1$  of the forewing obscured by a wide extension of the yellow median band, leaving only an isolated dot in the end of  $Cu_1-Cu_2$  . . . . .  
 . . . . . *T. h. pseudonyma* (= *lateflava*)  
 T-shaped fascia over  $Cu_1$  of the forewing obscured by the extension of black, breaking it into component spots . . . . . 24  
 24. The black streak over the cubitus of the forewing narrow, the tawny in the discal cell continuous, or nearly, with that below the cubitus . . . . .  
 . . . . . *T. h. pseudonyma* (melanic aberration)  
 Black streak over the cubitus of the forewing broad, isolating the tawny in the base of the cell from that below the cubitus . . . . .  
 . . . . . *T. h. hermius* (= *hermina*)  
 25. All forewing light spots tawny . . . . .  
 . . . . . *T. h. neitha* (= *brunnea*, = *melanina*)  
 Apical spots of forewing yellow . . . . . 26  
 26. Black spot over the forewing discocellulars elongated, connected with the black beyond it; black on both wings strong; median band of hind wing wider than the tawny above or below it . . . . . *T. h. martina*  
 Black on both wings less extensive; black spot over the forewing discocellulars separate from the black beyond it; median band of hind wing generally narrower than the tawny below it; hind wing border always narrower than the median band . . . . . 27  
 27. Light fascia of forewing colored sulphur yellow; borders of hind wing generally narrow . . . . . *T. h. hermius*  
 Light fascia on forewing colored muddy orange-yellow; borders of hind wing generally broader . . . . . *T. h. egaënsis*

***Tithorea tarracina* Hewitson**

The six subspecies range throughout Central America, south into Bolivia along both sides of the Andes (fig. 68). The northernmost is *T. t. duenna*, found in southern

Mexico, throughout Guatemala except in the southern part of the Atlantic drainage, and in Honduras in the valley of the Chamel-econ. In the southern half of Central America *pinthias* replaces *duenna*. The most northerly records are on the Atlantic side of Honduras and the southern part of the Guatemalan Pacific coast. It is common in Costa Rica collections and is found as far south as the

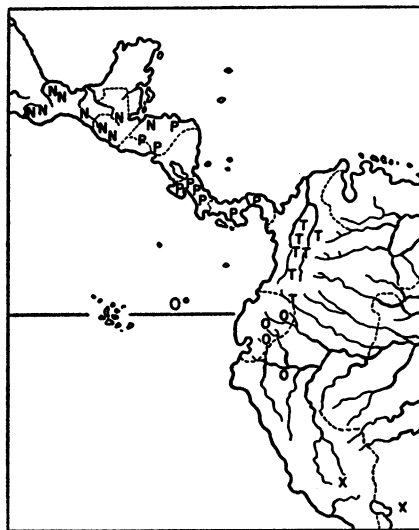


FIG. 68. Distribution of *Tithorea tarracina*. Symbols: N, *T. t. duenna*; O, *T. t. bonita*; P, *T. t. pinthias*; T, *T. t. tarracina*; X, *T. t. tagarma*.

Panama Canal Zone. In Colombia the variations of *T. t. tarracina* appear and are found south into the Putamayo Valley. Eastern Ecuador is inhabited by *T. t. bonita*; Bassler found it along the great bend of the Rio Marañon to the south. The species is represented by *T. t. tagarma* in southern Peru and Bolivia, where it seems to be rare.

The distribution of the *tarracina* subspecies differs from that of *harmonia* in that the former in Central America appear not to be coincident in any way with Tertiary geography, while in South America they do not stray far from the Andean valleys. On the other hand, *harmonia* is found over nearly all of South America, and in Central America is broken into a series of subspecies which appear to reflect the Tertiary water gaps.

The range of variation in most *tarracina* populations has led to some synonymy. Basically they are not hard to sort out, how-

ever, and on the whole are far more clear cut as subspecies than are the *harmonia* populations, as there seems to be less interbreeding between subspecies of the former than is true of the latter. If color and pattern are disregarded, there is no structural difference to be found within the species. The pattern is, in general, in a more primitive state of development than that of *harmonia*, as evidenced by the failure of the light markings, especially, to fuse into compound spots. The stronger hairiness of the eyes and the retention of claws on the female fore tarsus suggest also that *tarricina* is the more primitive species.

***Tithorea tarricina duenna* Bates**

Plate 4, figure 2

*Tithorea duenna* BATES, 1864, p. 56; Duenas, Guatemala. KIRBY, 1871, p. 35. GODMAN AND SALVIN, 1879 (1879-1901), p. 9, pl. 2, fig. 7. STAUDINGER, 1885 (1884-1888), p. 73. HAASE, 1893, p. 51. GODMAN, 1901, in Godman and Salvin, 1879-1901, p. 640. THIEME, 1902, p. 282. RILEY AND GABRIEL, 1925, p. 17. BRYK, 1937b, p. 461. FOX, 1940, p. 175.

*Hirsutis duenna*, HAENSCH, 1909, p. 120.

The type is a female from "Duenas, Guatemala" numbered 6960 in the British Museum (Natural History).

In some specimens the black median band of the hind wing is as abbreviated as it is in *pinthias*, but *duenna* can always be recognized by the tawny coloring in the base of the forewing.

Nineteen males and 17 females from American collections have been examined.

***Tithorea tarricina pinthias* Godman and Salvin**

Plate 4, figure 3; text figures 61-63, 66

*Tithorea pinthias* GODMAN AND SALVIN, 1878, p. 259; Calobre, Panama; 1879 (1879-1901), p. 10, pl. 2, fig. 8. STAUDINGER, 1884 (1884-1888), pl. 30 (titled *tarricina* in error); 1885 (1884-1888), p. 73. HAASE, 1893, p. 51. HAENSCH, 1903, p. 161. RILEY AND GABRIEL, 1925, p. 40. BRYK, 1937b, p. 464. FOX, 1940, p. 175.

*Hirsutis pinthias*, HAENSCH, 1909, pp. 119-120, pl. 32b.

*Tithorea duenna*, BUTLER AND DRUCE (not Bates), 1874, p. 335.

*Tithorea monosticta* GODMAN AND SALVIN, 1897, p. 243; Chiriqui, Panama. GODMAN, 1901, in Godman and Salvin, 1879-1901, p. 640. FOX, 1940, p. 175.

*Hirsutis monosticta*, HAENSCH, 1909, p. 120.

The type of *pinthias* is in the British Museum (Natural History), a female from "Calobre, Panama" numbered 6961.

*Tithorea monosticta* is the variant having the black median band of the hind wing completely lost, leaving the apical discal area tawny. The original description compares the form with *duenna* on the basis of the narrower margins of the hind wing; these, however, are variable.

Thirty-two males and 28 females from American collections have been studied.

***Tithorea tarricina tarricina* Hewitson**

Plate 4, figures 4-6

*Tithorea tarricina* HEWITSON, 1857 (1852-1876), vol. 2, p. [25], pl. [13] *Tithorea* and *Heliconia* iv, fig. 1; New Grenada. KIRBY, 1871, p. 35. STAUDINGER, 1885 (1884-1888), p. 73. WEYMER, 1890, p. 35. HAASE, 1893, p. 51. RILEY AND GABRIEL, 1925, p. 47. BRYK, 1937b, p. 466. FOX, 1940, p. 175.

*Hirsutis tarricina*, HAENSCH, 1909, p. 120.

*Tithorea hecalesina* FELDER AND FELDER, 1865 (1864-1867), p. 352; Nova Grenada, Bogota. KIRBY, 1871, p. 35. BRYK, 1937b, p. 466. FOX, 1940, p. 175.

*Hirsutis hecalesina*, HAENSCH, 1909, p. 120, pl. 32c.

*Tithorea parola* GODMAN AND SALVIN, 1898, p. 106; Cauca Valley, Colombia. RILEY AND GABRIEL, 1925, p. 38. BRYK, 1937b, p. 466. FOX, 1940, p. 175.

*Hirsutis parola*, HAENSCH, 1909, p. 120.

*Hirsutis obscurata* HAENSCH, 1909, p. 120; Colombia.

*Tithorea obscurata*, BRYK, 1937b, p. 466. FOX, 1940, p. 175.

The type of *tarricina* is a male from "New Grenada," numbered 6962; the type of *parola* is a male from "Cauca valley, Colombia," numbered 6963, and there are three female paratypes from "Colombia" numbered 6964 through 6966; these are in the British Museum (Natural History).

The four forms listed above are placed as one. It is recognized that more complete distributional data may necessitate the recognition of one or more of them as separate subspecies, but the data now at hand suggest that all four are found through most of the total range and that the names apply only to intrapopulational variations in coloring.

The specimens with a minimum of yellow on the hind wing are *tarricina* as originally

described. But the amount of yellow grades from this condition evenly through *hecalesina* and *parola*. The former has the brown-black coloring reduced and replaced by tawny on the hind wing disc; the latter has half of the discal area covered with brown-black, with the tawny greatly reduced. Specimens with the tawny entirely replaced by brown-black were named *obscurata*.

Not all the locality data available are trustworthy, and some of the labels bear no specific information at all. Only a summary of the specific localities recorded, with the elimination of doubtful and generalized localities, fails to show that these color variations are in any way geographically correlated. Haensch's *obscurata* can be eliminated from consideration, as it is quite evidently an aberrational extreme of *parola*. Godman and Salvin described *parola* from the valley of the Cauca. The American Museum of Natural History has some accurately localized material from the department of Antioquia on the lower Cauca; the Carnegie Museum has a good series from the Pass of Quindio, which crosses the central ridge just to the west of Bogota. Both these series contain specimens belonging to several of the names in question.

Fifty-four males and 45 females in American collections have been examined.

***Tithorea tarricina bonita* Haensch**

Plate 4, figure 7

*Tithorea bonita* HAENSCH, 1903, pp. 161-162; Santa Inez, Ecuador. BRYK, 1937b, p. 460. Fox, 1940, p. 175.

*Hirsutis bonita* HAENSCH, 1909, p. 120. FASSL, 1915, p. 35.

*Hirsutis macasica* NIEPELT, 1915, p. 63; Macas, Ecuador. NIEPELT AND STRAND, 1916, pl. 16, fig. 6.

*Tithorea macasica*, BRYK, 1937b, p. 464. Fox, 1940, p. 175.

Two males and four females, all with authentic data, have been examined in American collections. The Niepelt name is an absolute synonym.

***Tithorea tarricina tagarma* Hewitson**

Plate 4, figure 8

*Tithorea tagarma* HEWITSON, 1874, p. 4; Bolivia. KIRBY, 1877, p. 697. RILEY AND GABRIEL, 1925, p. 47. BRYK, 1937b, p. 465. Fox, 1940, p. 175.

*Hirsutis tagarma*, HAENSCH, 1909, p. 120.

*Tithorea anachoreta* THIEME, 1902, p. 282;

Chanchamayo Valley, Peru. BRYK, 1937b, p. 465. Fox, 1940, p. 120.

*Hirsutis anachoreta*, HAENSCH, 1909, p. 120.

Two males and a female have been examined in American collections. The Thieme name is an absolute synonym.

***Tithorea harmonia* (Cramer)**

Eighteen subspecies are distributed throughout tropical Central and South America (fig. 69). In some of these subspecies the intrapopulational variation possible can be enormous, a fact that seems not to have been generally recognized heretofore. As a consequence, the synonymy is somewhat involved. The pattern and color characters relied upon so heavily by Haensch and others usually break down as taxonomic criteria when a sufficient series can be analyzed. For example, the "lance mark" of the forewing, to which reference is so often made and by which "species" were formerly separated, is potentially present in every one of the subspecies. In some, such as *hermias* or *pseudonyma*, it is present or absent quite at random. Indeed, examination of a series of either of these subspecies should throw suspicion on the separation of the *furia* forms from the *harmonia* forms on the basis of this marking. Further temptation for description rests with the perfectly normal tendency for tawny to replace yellow, or *vice versa*, and with the great individual variation in the width of the borders.

Because of these variations, inherent in all these populations, constructing a useful key to the subspecies has been difficult. It is hoped that the key presented above will enable the ready identification of at least most specimens.

This species is stronger in flight than are most ithomines. The subspecies commonly intergrade at their common boundaries. Among all the species belonging in genera of the tribe Tithoreini, *T. harmonia* is the most strongly polytypic, and the only species found in a variety of ecologies. It seems to be a highly plastic species and probably the present wide geographic and ecologic range it occupies signifies an expanding rather than a "drying-up" distribution.

The northernmost subspecies is *salvadoris*, found in the department of Chiapas, Mexico, south through Guatemala into El Salvador

along the Pacific side of the divide. On the Caribbean side and around the Gulf of Honduras is found *hippothous*. *Tithorea harmonia helicaon* is from central Costa Rica. *Tithorea h. irene* has been taken only in the vicinity of the Panama Canal on the Pacific side.

The distribution of these Central American subspecies is interesting, because the limits of each coincide with those land areas thought

fairly uniform population, *harmonia*. In Guiana, however, this subspecies occurs in two very different-appearing forms: the melanistic variation in which the median band and the black borders of the hind wing are widened and fused into a large black spot covering most of the wing, and the "normal" variation in which the band and borders are separate, with tawny between. The name *cuparina* applies to a population that may be



FIG. 69. Distribution of *Tithorea harmonia*. Symbols: A, *T. h. pseudethra*; C, *T. h. cuparina*; D, *T. h. deltana*; E, *T. h. helicaon*; F, *T. h. furia*; H, *T. h. hippothous*; I, *T. h. irene*; L, *T. h. egaënsis*; M, *T. h. megara*; N, *T. h. manabiana*; O, *T. h. harmonia*; P, *T. h. pseudonyma*; S, *T. h. salvadoris*; T, *T. h. martina*; V, *T. h. neitha*; X, *T. h. furina*; Z, *T. h. hermius*.

by the geologists to have remained emerged during the Tertiary, while the species is not represented in the regions of the former water gaps.

In Venezuela and along the northern coast of Colombia is found *furia*, a variable population which intergrades with *furia* of southwestern Venezuela, eastern Colombia, and eastern Peru. The delta of the Rio Orinoco is the habitat of *deltana*, intermediate in markings between *furia* and the Trinidad subspecies, *megara*. South of the Orinoco throughout inland Venezuela, the Guianas, and the main Amazon Valley is found a

found to extend well into the valley of the Rio Xingu.

Western Ecuador is the habitat of a peculiar population, *manabiana*, which appears to be closest to *furia* and the Central American populations. In eastern Ecuador is found the variable *hermius*, evidently confined to a wide belt extending south to the Rio Marañon. Western Peru, within the great bend of the Marañon, is the home of *martina*, a fairly distinct population. To the west in the Huallaga Valley is found *egaënsis*, which connects the populations to the north and south, but which is easily separable from

either. *Tithorea harmonia neitha* is the subspecies from the upper Rio Ucayali and the Chanchamayo. The striking but variable *pseudonyma* is found near Lake Titicaca and throughout Bolivia into Paraguay, the Mato Grosso, and northern Argentina. In these last areas it integrates with *pseudethra*, which is found from the upper Rio Tocantins south into Minas Gerais and São Paulo.

***Tithorea harmonia salvadoris* Staudinger**

Plate 4, figure 9

*Tithorea salvadoris* STAUDINGER, 1885 (1884–1888), p. 73; San Salvador. WEYMER, 1890, p. 99. GODMAN, 1901, in Godman and Salvin, 1879–1901, p. 641. BRYK, 1937b, p. 465. FOX, 1940, p. 175.

*Hirsutis salvadoris*, HAENSCH, 1909, p. 121.

*Tithorea hippothous* GODMAN AND SALVIN (part), 1879 (1879–1901), pl. 2, fig. 9.

Eighteen males and 15 females have been examined from American collections.

***Tithorea harmonia hippothous***

Godman and Salvin

Plate 5, figure 1

*Tithorea hippothous* GODMAN AND SALVIN, 1879 (1879–1901), p. 11; Guatemala. GODMAN, 1901, in Godman and Salvin, 1879–1901, pp. 640–641. RILEY AND GABRIEL, 1925, p. 24. BRYK, 1937b, p. 464. FOX, 1940, p. 175.

*Hirsutis hippothous*, HAENSCH, 1909, p. 120, pl. 32c.

The type, a male from "Guatemala," is numbered 6955 in the British Museum (Natural History).

Nine males and six females have been examined.

***Tithorea harmonia helicaon* Godman and Salvin**

Plate 5, figure 2

*Tithorea helicaon* GODMAN AND SALVIN, 1879 (1879–1901), p. 10; Costa Rica. GODMAN, 1901, in Godman and Salvin, 1879–1901, p. 640. RILEY AND GABRIEL, 1925, p. 23. BRYK, 1937b, p. 463. FOX, 1940, p. 175.

*Hirsutis helicaon*, HAENSCH, 1909, p. 120.

There are four males from "Costa Rica" in the type series, numbered 6956 through 6959 in the British Museum (Natural History).

Thirteen males and 14 females from American collections have been studied.

***Tithorea harmonia irene* (Drury)**

Plate 5, figure 3

*Papilio irene* DRURY, 1782, pl. 38, fig. 1; Jamaica. STOLL, 1790, pl. 30, fig. 3. FABRICIUS, 1793, p. 165.

*Melinaea irene*, HÜBNER, 1816, p. 11.

*Heliconia irene*, LATREILLE, 1820, in Latreille and Godart, 1819–1823, p. 223.

*Tithorea irene*, BUTLER, 1869, p. 124. KIRBY, 1871, p. 35. GODMAN AND SALVIN, 1879 (1879–1901), p. 11, pl. 2, fig. 10. HAASE, 1893, pp. 51, 53. BRYK, 1937b, p. 464. FOX, 1940, p. 175.

*Hirsutis irene*, HAENSCH, 1909, p. 120.

*Tithorea umbratilis* BATES, 1866, p. 86; Lion Hill, Panama. KIRBY, 1871, p. 35. GODMAN AND SALVIN, 1879 (1879–1901), p. 11. HAENSCH, 1903, p. 161. RILEY AND GABRIEL, 1925, p. 49. BRYK, 1937b, p. 464. FOX, 1940, p. 175.

*Hirsutis umbratilis*, HAENSCH, 1909, p. 120.

The type of *irene* is in the Drury collection at Oxford University. The type of *umbratilis* is a female from "Lion Hill, Panama" numbered 6968 in the British Museum (Natural History).

Four males and three females from American collections have been studied.

Godman and Salvin [1879 (1879–1901), p. 11] recognized *umbratilis* as an absolute synonym for *irene*; Haensch's resurrection of the Bates name was unjustified. The population appears to be quite stable.

***Tithorea harmonia furia* Staudinger**

Plate 5, figure 4

*Tithorea furia* STAUDINGER, 1884 (1884–1888), pl. 30; 1885 (1884–1888), p. 73; Venezuela and Colombia. GODMAN AND SALVIN, 1898, p. 105. HAENSCH, 1903, p. 162. BRYK, 1937b, p. 461. FOX, 1940, p. 174. FOX AND FOX, 1947, p. 174.

*Hirsutis furia*, HAENSCH, 1909, p. 121, pl. 32d. KREMKY, 1925, p. 192. FORBES, 1940, p. 311.

*Tithorea harmonia* variation, SNELLEN, 1887, p. 14, pl. 1, fig. 1.

Thirty-nine males and 35 females from American collections have been examined.

***Tithorea harmonia furina* Godman and Salvin**

Plate 5, figure 5

*Tithorea furina* GODMAN AND SALVIN, 1898, p. 105; Bogota. HAENSCH, 1903, p. 162. RILEY AND GABRIEL, 1925, p. 21. BRYK, 1937b, p. 461. FOX, 1940, p. 175. FOX AND FOX, 1947, p. 174.

*Hirsutis furina*, HAENSCH, 1909, p. 121. FORBES, 1940, p. 311.

*Tithorea flacilla* GODMAN AND SALVIN, 1898, pp. 105-106; Colombia. HAENSCH, 1903, p. 162. RILEY AND GABRIEL, 1925, p. 20. BRYK, 1937b, p. 461. FOX, 1940, p. 175.

*Hirsutis flacilla*, HAENSCH, 1909, p. 121.

The type series of *furina* is in the British Museum (Natural History) consisting of a male from "Bogota" and a male and three females from "Colombia" numbered 6949 through 6953. The type series of *flacilla* consists of a male from "Cauca valley" and two males and a female from "Colombia" numbered 6969 through 6972 in the British Museum (Natural History).

On the whole the Venezuelan and Colombian populations may be separated readily. However, light *furina*-like individuals occur in the Colombia population, while dark *furina*-like individuals are found in Venezuela. With series laid out side by side one notes at once that the Venezuelan lot is lighter, the Colombian specimens generally darker. How shall the two names be applied? Once all light specimens would have been called *furina*, all dark ones *furina*. I prefer to apply the names to subspecies on a geographic basis, while noting that individuals do not always segregate well.

*Tithorea flacilla* is an extreme variation rather than a subspecies.

Sixty-two males and 29 females from American collections have been examined.

***Tithorea harmonia deltana*, new subspecies**

Plate 5, figure 6

In size and general maculation this population agrees with *furina* and *megara*, but the black areas on the forewing are heavier than in either, in which respect it resembles *furina*. The light apical spots of the forewing are small, and borders and median band of the hind wing are wide and strong. The coloring is between that of *megara* and that of *furina*. On the forewing the apical spots and the discal spots are yellow, while the tawny streak in the cell and the one below the cubitus are heavily scaled with yellow, though predominantly tawny. The light discal area of the hind wing has the tawny suffused with yellow scaling, particularly in the end of the cell and in the apical portion, though again these regions are predominantly tawny. Beneath, the light areas are yellow, with strong tawny edging against the black.

TYPE MATERIAL: Holotype male: Tucupito, Delta Amecuro, Venezuela; April 7, 1931; Rene. A male paratype from the same locality collected April 9, 1931. These are both in the American Museum of Natural History. A male paratype: Buelta Trieste, Venezuela; February 20, 1911; S. Brown; genitalic slide 161; in the Academy of Natural Sciences of Philadelphia.

***Tithorea harmonia megara* (Latreille)**

Plate 5, figure 7; text figures 64-65

*Heliconia megara* LATREILLE, 1819, in Latreille and Godart, 1819-1823, p. 223; Antilles.

*Tithorea megara*, DOUBLEDAY AND HEWITSON, 1847 (1846-1852), p. 100, pl. 14, fig. 2. KIRBY, 1871, p. 35. HOPFFER, 1879, p. 90. STAUDINGER, 1885 (1844-1888), p. 73. KAYE, 1904, p. 163. GUPPY, 1904, p. 225, pl. 18, fig. 3. LONGSTAFF, 1909, p. 610. BRYK, 1937b, p. 462. FOX, 1940, p. 175.

*Hirsutis megara*, HAENSCH, 1909, p. 121.

*Tithorea harmonia*, BATES (part), 1862, p. 552.

*Tithorea flavescens* KIRBY, 1889, p. 149; Trinidad. GUPPY, 1893, p. 199; 1895, p. 170; 1904, p. 225. BRYK, 1937b, p. 462. RILEY AND GABRIEL, 1925, p. 20.

The type of *flavescens* is a male from "Trinidad" numbered 6954 in the British Museum (Natural History).

Forty-one males and 41 females from American collections have been examined.

***Tithorea harmonia harmonia* (Cramer)**

Plate 5, figure 8; text figure 67

*Papilio harmonia* CRAMER, 1777, p. 16, pl. 190D; Surinam. HERBST, 1840, pp. 116-117, pl. 70, fig. 2.

*Tithorea harmonia*, DOUBLEDAY AND HEWITSON, 1847 (1846-1852), p. 100, pl. 14. BATES, 1862, p. 552. BUTLER, 1869, p. 124. KIRBY, 1871, p. 35. SCUDDER, 1875, p. 285. STAUDINGER, 1885 (1844-1888), p. 73. SCHATZ, 1886 (1885-1892), p. 88. WEYMER, 1892, p. 119. HAASE, 1893, p. 51. KAYE, 1906, pp. 414, 431. MOULTON, 1909, p. 597. AURIVILLIUS, 1882, p. 50; 1929, p. 151. BRYK, 1937b, p. 462. FOX, 1940, p. 175.

*Hirsutis harmonia*, HAENSCH, 1909, p. 121, pl. 32d.

*Papilio mopsa*, FABRICIUS (not Linné?), 1781, p. 27; 1787, p. 13; 1793, p. 160.

*Hirsutis mopsa*, HAENSCH, 1909, p. 121.

*Tithorea mopsa*, FOX, 1940, p. 175.

[*Tithorea moppa* BRYK, 1937b, p. 462. *Nomen nudum*.]

According to Butler (1869) the type of

*P. mopsa*, Fabricius, is in the British Museum (Natural History). By modern definition, this specimen is not the type of the name, which was originally described by Linné.

According to Butler (1869) and Aurivillius (1929) *P. mopsa* of Fabricius is an absolute synonym for *P. harmonia* Cramer, while *P. mopsa* of Linné, 1767, is a synonym for *P. polymnia* Linné, 1758. The status of *P. mopsus* Linné, 1758, remains uncertain. In the tenth edition of the "Systema naturae" the name is under the Barbari, but in later editions it is found next following *polymnia*. Evidently Linné did not think it was the same insect as *polymnia*. For the present I follow Butler's decision, which, however, I regard as incomplete.

This subspecies is found in the Guianas and the Amazon Valley as far up as Teffé (Ega). A series at hand from this last place agrees in detail with the Guiana specimens. Normally the black median band of the hind wing is separate from the border, but in the Guianas a high percentage of individuals have the median band merged with the border to form a large black spot covering most of the hind wing. Cramer had such a specimen before him when describing and figuring *harmonia*. The difference, while obvious and striking, is of no taxonomic significance. Haensch evidently wanted to distinguish between the two forms, so revived *mopsa* but in an incorrect usage. Bryk tried to help the nomenclatorial difficulty by offering *moppa* as a substitute for the preoccupied *mopsa* of Fabricius. I believe one can treat *moppa* only as a *nomen nudum*, in view of Bryk's failure to do more than merely introduce the name without explanation into a catalogue list.

Thirty-one males and 21 females from American collections have been examined.

***Tithorea harmonia cuparina* Bates**

Plate 5, figure 9

*Tithorea cuparina* BATES, 1862, pp. 552-553; Rio Cupari. STAUDINGER, 1885 (1884-1888), p. 73. RILEY AND GABRIEL, 1925, p. 14. BRYK, 1937b, p. 461. FOX, 1940, p. 175.

*Hirsutis cuparina*, HAENSCH, 1909, p. 121.

*Tithorea harmonia*, variation b, KIRBY, 1871, p. 35.

The types, a male and a female from "Cupari, Rio Tapajos, Amazons," are num-

bered 6947 and 6948 in the British Museum (Natural History).

The only specimen I have seen that fits Bates's description and agrees with the photograph of the type is marked merely "Lower Amazon River," so that no distributional information is afforded. I recognize this subspecies tentatively.

***Tithorea harmonia manabiana*, new subspecies**

Plate 6, figure 1

This western Ecuador subspecies differs from *hermias* of eastern Ecuador by the wider hind wing margins and by the rather straight edges of the hind median band. It differs from Colombian *furina* by the clearer yellow in the forewing apical spots and by the more extensive dark markings. It differs from both in the much more elongated shape of the forewings. On the whole it resembles *furina* and the Central American populations more closely than it does *hermias*.

The forewing is elongated and acute; the costal margin is twice the length of the outer margin, whereas in *furina* the costal margin is less than twice the length of the outer margin. The light discal and apical areas of the forewings are broken into yellow spots, and towards the base the light pattern elements are tawny. The hind wing margins and the median band are strong and broad; the light areas are tawny and similar to those of *furina*. Beneath, the light pattern elements on both wings are yellow tawny, the white marginal spots small.

TYPE MATERIAL: Holotype male and allotype female: Palmar, Manabi, western Ecuador; April, 1941; Laddey; in the American Museum of Natural History. A male and a female paratype: Balzabamba, western Ecuador; Owens collection; in the United States National Museum.

***Tithorea harmonia hermias* Godman and Salvin**

Plate 6, figures 2, 3

*Tithorea hermias* GODMAN AND SALVIN, 1898, p. 106; Ecuador. HAENSCH, 1903, p. 162. RILEY AND GABRIEL, 1925, p. 23. BRYK, 1937b, p. 463. FOX, 1940, p. 175.

*Hirsutis hermias*, HAENSCH, 1909, p. 120. CAMPOS, 1927, p. 13.

*Tithorea harmonia*, CAMPOS, 1927, p. 6.

*Tithorea hermina* HAENSCH, 1903, p. 162; Napo, Ecuador. BRYK, 1937b, p. 463. FOX, 1940, p. 175.



*Hirsutis hermina* HAENSCH, 1909, p. 120, pl. 32c.

*Tithorea hermius hermina napona* HAENSCH, 1903, p. 162; Napo, Ecuador. BRYK, 1937b, p. 463. FOX, 1940, p. 175.

*Hirsutis hermina napona* HAENSCH, 1909, p. 120.

The type series of *hermius* is in the British Museum (Natural History) and consists of four males and three males from "Ecuador" numbered from 6938 to 6844 inclusive.

This eastern Ecuador population has wide extremes of variation in color and pattern as a normal phenomenon. Haensch's *napona* is a variation without the median band on the hind wing; *hermina* has the forewing so suffused with black at the expense of the yellow spots that the pattern is close to that of *furina*, with the "lance mark" broken into its component spots. Both of Haensch's series came from the same locality, and both names are absolute synonyms. Although *napona* was proposed as a quadrinomial, it must be dealt with, although quadrinomials have no real status.

Most individuals of this population have the "lance spot" in its typical shape and the hind wing median band more or less complete. The margins always are much narrower than in the Peruvian subspecies.

Forty-six males and 27 females have been examined.

***Tithorea harmonia martina*, new subspecies**

Plate 6, figure 4

Specimens taken in the mountain valleys within the great bend of the Rio Marañon in the department of San Martin represent a distinct subspecies which, while less variable than most of the *harmonia* populations, is not completely uniform.

The black markings are strong, clean cut, and contrast strikingly with the clear yellow apical spots of the forewings; the borders are wide. The forewing apical spots are separated only by the black veins, so that the whole series forms a large patch. The "lance mark" is present but narrow. The black spot over the discocellulars is long, rarely isolated, and usually connected with adjacent black markings. The light median spot beyond the discocellulars is tawny, with a variable amount of yellow scaling. The black spot in the base of  $Cu_1$ - $Cu_2$  is connected with the strong black

streak over the cubitus and almost always also with the outer spot in  $Cu_1$ - $Cu_2$ . The submarginal spot below  $Cu_2$  generally is isolated, tawny. The light elements in the discal cell and the "lance mark" are tawny.

The hind wing is deep reddish tawny, with very wide black margins and a complete black median band, the edges of these black markings being sharp and clean.

On the under side the black of the upper side in the borders of both wings and in the apical region of the forewing is replaced by a coppery tawny black which is edged narrowly with clear black. The light markings of both wings are yellow to yellow tawny. The paired marginal dots are white, very small. The fringe spots are white and usually strong.

The allotype and the two paratypes in the United States National Museum are slightly atypic in that the apical spots of the forewing are smaller, well isolated from each other, and tend to be tawny yellow instead of clear yellow. Unfortunately, precise locality data are wanting for these three specimens. Though undoubtedly from the same region, they probably are not from the same locality as the Woytkowski series.

**TYPE MATERIAL:** Holotype male: Rioja, Rio Seco, western Peru; November 18, 1936; Woytkowski; in the Carnegie Museum. Allotype female and two male paratypes: Peru; Owens collection; in the United States National Museum. Thirteen male paratypes topotypic with holotype are in the Carnegie Museum and the American Museum of Natural History. One male paratype: Japalacia, San Martin, Peru; June, 1934; G. Klug; in the Reading Public Museum.

***Tithorea harmonia egaënsis* Butler**

Plate 6, figure 5

*Tithorea egaënsis* BUTLER, 1873, p. 156; Ega, Amazons. KIRBY, 1877, p. 697. RILEY AND GABRIEL, 1925, p. 17. BRYK, 1937b, p. 463. FOX, 1940, p. 175.

*Hirsutis egaënsis*, HAENSCH, 1909, p. 120.

The type, a female from "Ega, Amazons," is in the British Museum (Natural History) numbered 6937.

The good series at hand agrees with Butler's description of *egaënsis* and with the photograph of the type supplied to me by the British Museum (Natural History). The

subspecies occupies a range in the valleys of the Rio Huallaga and the Rio Marañon between *hermias* to the north, *neitha* to the south, and *martina* to the west. Down river along the Amazon there is a gradual intergrading with *harmonia* between Iquitos and Tefé. The type locality probably is a generalized record, and the specimen most likely was captured much farther to the west.

As might be expected, *egaënsis* partakes of color and pattern characteristics of all its neighbors. The hind wing is like that of *neitha*, having the moderately wide border and median band, but the yellow suffusion is entirely lacking on the forewing where the light spots are tawny in the median region as in *martina*. The black of the forewing tends to be narrower, as in typical *hermias*, and the tone of the tawny coloring is similar to that of *hermias*, being lighter and less reddish than in *martina*, but darker than in *neitha*.

Twenty-four males and 22 females from American collections have been examined.

***Tithorea harmonia neitha* Hoppfer**

Plate 6, figure 6

*Tithorea neitha* HOPPFER, 1874, p. 337; Chamayo, Peru. KIRBY, 1877, p. 697. HOPPFER, 1879, p. 89. WEYMER, 1890, p. 78. HAENSCH, 1903, p. 162; 1905, p. 143. BRYK, 1937b, p. 463. FOX, 1940, p. 175.

*Hirsutis neitha*, HAENSCH, 1909, p. 120, pl. 32c. KÖHLER, 1923, p. 19. FORBES, 1924, p. 155. KREMKY, 1925, pp. 187, 191-193, 271, figs. 39-41, pl. 21, fig. 4. KÖHLER, 1929, p. 307.

*Tithorea melanina* HAENSCH, 1905, p. 143, fig. 1; Hillapani, Peru. BRYK, 1937b, p. 463. FOX, 1940, p. 175.

*Hirsutis melanina* HAENSCH, 1909, p. 120.

*Tithorea brunnea* HAENSCH, 1905, p. 144; Cajon, Peru. BRYK, 1937b, p. 460, Fox, 1940, p. 175.

*Hirsutis brunnea* HAENSCH, 1909, p. 120.

Most specimens of *neitha* have the hind wing suffused with yellow in the tawny areas, thus approaching the Brazilian subspecies *pseudethra*. However, this yellow suffusion is by no means constant; in fact, no two specimens are exactly alike. Extremes in the direction of loss of yellow on both wings received names from Haensch (1905). Geographic analysis demonstrates that the yellow may be totally absent in some of the usual population, perhaps caused by unfavorable

ecologic conditions during the immature period, perhaps existing as a normal genetic combination. Neither *melanina* nor *brunnea* is a population, nor can either lay any claim to being a subspecies as presently understood. The difference between the two lies with the degree of black, that is, the width of the hind wing margins and of the median band and the size of the forewing spots. Variation in the margins, bands, and spots occurs also in the specimens in which the light elements are yellow.

Twenty-nine males and eight females have been examined from American collections.

***Tithorea harmonia pseudonyma* Staudinger**

Plate 6, figures 7, 8

*Tithorea pseudonyma* STAUDINGER, 1894, p. 65, pl. 2, fig. 7; Bueyes, Bolivia. HAENSCH, 1905, p. 144. BRYK, 1937b, p. 465. FOX, 1940, p. 175.

*Hirsutis pseudonyma*, HAENSCH, 1909, pp. 120-121. KÖHLER, 1923, p. 19; 1929, p. 316. COLLENETTE AND TALBOT, 1929, pp. 393, 394, 399, 401, 411, 415, 416, pl. 14, fig. 6, pl. 16, fig. 6.

*Tithorea assimilis* HAENSCH, 1905, pp. 143-144; Cuzco, Peru. BRYK, 1937b, p. 465. FOX, 1940, p. 175.

*Hirsutis assimilis* HAENSCH, 1909, p. 121. KÖHLER, 1929, p. 216.

*Hirsutis lateflava* HAENSCH, 1909, p. 121; Santa Cruz, Bolivia.

*Tithorea lateflava*, BRYK, 1937b, p. 465. FOX, 1940, p. 175.

*Hirsutis mira* NEUSTETTER, 1929, p. 390; eastern Bolivia.

*Tithorea mira*, BRYK, 1937b, p. 465. FOX, 1940, p. 175.

Despite its variability, this is a cohesive population which extends into southern Peru, Paraguay, and the Mato Grosso. The aberration lacking yellow was called *assimilis*; the opposite extreme, where the yellow of the forewing is exceptionally extensive and the black reduced to a minimum, was called *lateflava*; where the yellow is retained on the forewing but is greatly reduced, with the black consequently extensive, the name *mira* was given. All three of these are striking, recognizable aberrations, but they are normal within the subspecies and must be placed in the synonymy.

One hundred and eleven males and 23 females have been studied in American collections.

***Tithorea harmonia pseudethra* Butler**

Plate 6, figure 9

*Tithorea pseudethra* BUTLER, 1873, p. 155; Brazil. KIRBY, 1877, p. 687. HAASE, 1893, pp. 51, 53. RILEY AND GABRIEL, 1925, p. 41. BRYK, 1937b, pp. 464–465. FOX, 1940, p. 175.

*Hirsutis pseudethra*, HAENSCH, 1909, p. 121, pl. 32d. KÖHLER, 1923, p. 19; 1929, p. 316.

The types, two males from "Brazil," are numbered 6945 and 6946 in the British Museum (Natural History).

Ten males and five females from American collections have been examined.

***Hirsutis virginalis* Köhler**

*Amauris albimaculata* BUTLER, 1875, p. 394; Natal, Africa. AURIVILLIUS, 1911, p. 76, pl. 25d.

*Hirsutis virginalis* KÖHLER, 1923, pp. 19–20, pl. 2, fig. 10; Missiones, Argentina; 1929, pp. 315–316.

*Tithorea virginalis*, BRYK, 1937b, p. 466. FOX, 1940, p. 175.

Because this description was recorded as of an ithomine and as such has appeared a few times since, it is necessary to dispose of *virginalis*. The photograph published with the original description, as well as the description itself, clearly is the not uncommon *Amauris albimaculata* Butler from British East Africa. There are half a dozen specimens in the Carnegie Museum collection from Kenya and the Orange Free State which match Köhler's figure in every respect. No such insect is native to Argentina, although it might have been transported accidentally from Africa. In any event, it is a danaid and not an ithomine. Most likely Köhler had a mislabeled specimen.

**GENUS ELZUNIA BRYK**

*Elzunia* BRYK, 1937a, p. 20; type: *Tithorea bonplandii* (Guérin), by original designation; 1937b, p. 466. FOX, 1940, pp. 165, 170, 173, 176, fig. 12. D'ALMEIDA, 1942, p. 182. FOX, 1949, p. 11; 1953, p. 142.

*Tithorea* DOUBLEDAY (part), 1847 (1846–1852), pp. 99–100, pl. 14, fig. 1. KIRBY, 1871, p. 35. SCUDDER, 1875, p. 285. STAUDINGER, 1885 (1884–1888), p. 72. SCHATZ, 1886 (1885–1892), pp. 87, 88. HAASE, 1893, p. 50. REUTER, 1896, p. 37. HAENSCH AND THIEME, 1899, p. (12). SHARP, 1899, p. 346. HAENSCH, 1909, pp. 118–119. D'ALMEIDA, 1923, p. 233. KREMKY, 1925, pp. 144, 147, 153, 158, 160, 177, 178, 183, 186, 189, 192, 199. SEITZ, 1927b, pp. 36, 48. FORBES, 1941, pp. 1–3.

*Heliconia*, GUÉRIN (part), 1841, p. 472.

*Heliconius*, LATREILLE (part), 1811 (1811–1832), p. 194; 1820, in Latreille and Godart, 1819–1823, p. 224. LUCAS, 1835, pl. 53, fig. 2.

The species now assigned to this genus originally comprised section I of Doubleday's *Tithorea*. Haensch (1909) recognized that the two sections of *Tithorea* were not congeneric, erring only in applying a new name to the wrong section. This mistake was rectified by Bryk (1937a) through the erection of *Elzunia*.

The first joint of the palpus (fig. 70) is curved, subcylindric, and closely appressed to the head. The second joint is lightly S-shaped, three-quarters longer than the first, and stands free. The terminal joint is straight, free, and ovate, one-half of the length of the first joint. The second joint is proportionately longer than in *Tithorea*.

The antennae are as long as the body, or only slightly shorter.

The eyes are naked, not hairy.

The forelegs of the male (fig. 71) have a stout coxa which is two-thirds of the length of the trochanter plus femur. The femur is slender. The tibia is nearly twice as long as the coxa. The tarsus is a single subovate reduced joint, one-fourth of the length of the coxa.

The forelegs of the female (fig. 72) have the fifth tarsal joint well developed, subcylindric in cross section, and bearing a pulvillus and a pair of claws. The first three tarsal joints each bear a pair of spurs. The second, third, and fourth joints are discoid. The first joint is about one-half longer than the other four combined.

VENATION (FIG. 73): The humeral vein of the hind wing is erect, longer than 2d, forked but lightly; Sc and R separate at the humeral vein, and Sc reaches the margin only slightly beyond the end of the cell. The recurrent vein arises from the angle of 3d, this angle being placed well anteriorward so that the lower arm is about 10 times the length of the upper arm; 2d is at least twice the length of 1d; the posterior side of the cell is longer than the anterior side.

The forewing has  $R_2$  branching near the end of the cell, sometimes opposite it, sometimes beyond it, rarely proximad of it—an individual variation. First discocellular vein is present, minute; 2d is gently incurved, slightly longer than the upper arm of 3d; 3d

is sharply angled, the lower arm S-shaped, about three times the length of the upper arm. The sides of the cell are about equal.

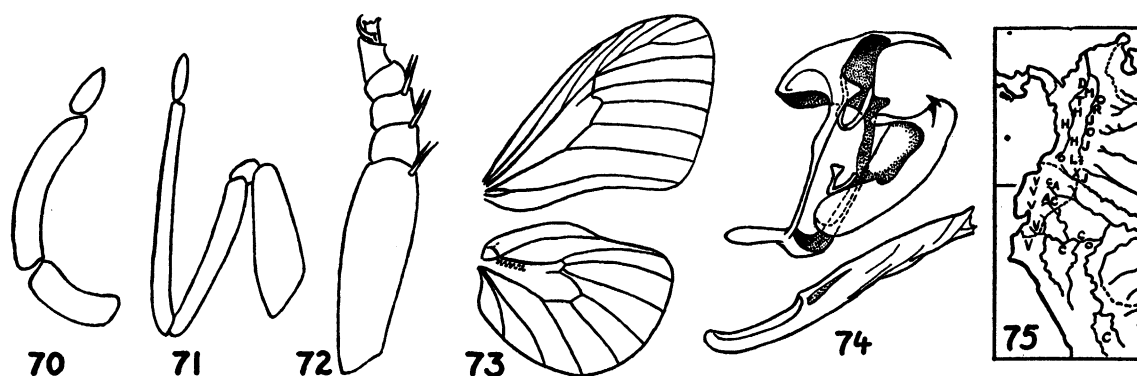
The hair patch of the male hind wing is reduced to a wide brush at the base just outside the fork of R and Sc, similar to that of *Tithorea* except that the distal patch is wanting; the hairs are straw colored.

**MALE GENITALIA (FIG. 74):** Closely similar to those of *Tithorea*; there are no substantial differences between the two genera in these structures.

The tegumen is strongly hood-like, the

in *Tithorea*, placed nearer the apex; in *humboldtii* it is so placed that the part of the costa beyond it is one-fifth of the length of the part before it, while in all other forms it is placed so that the part of the costa beyond it is one-eighth of the length of the part before it.

Because of the lack of any clue in the genitalia, the species of this genus are difficult to separate satisfactorily. In main, the grouping herein is much the same as used by Haensch (1909). The minor difference in the valve, mentioned above, separates *cas-*



FIGS. 70-73. *Elzunia bonplandii bonplandii*. 70. Palpus of male. 71. Male foreleg. 72. Female fore tarsus. 73. Venation of male, hair patch indicated by stippling.

FIG. 74. *Elzunia cassandrina microguttata*. Male genitalia, left valve removed, dissected penis shown below.

FIG. 75. Distribution of genus *Elzunia*. Symbols: A, *E. humboldtii albomaculata*; C, *E. c. cassandrina*; D, *E. bonplandii descandollesi*; H, *E. h. humboldtii*; J, *E. h. judsona*; L, *E. regalis joiceyi*; M, *E. c. microguttata*; O, *E. b. bonplandii*; R, *E. r. regalis*; T, *E. tamasea*; V, *E. pavonii*; X, *E. atahualpa*.

uncus curved, though less so than in *Tithorea*, three-quarters of the length of the tegumen. The uncal suture is not present. The gnathos is lightly chitinized, ribbon-like, and articulates at each end with a low apex on the tegumen at the top of the vinculum. The saccus is a little more slender than in *Tithorea* and is not quite so long as the uncus. The penis is much thicker than the saccus, one-half longer than the tegumen plus uncus; the foramen is nearly one-third of the length of the penis. The penis in *Tithorea* is a little narrower. Juxta is narrow and flat, V-shaped, well chitinized.

The valves are roughly triangular, the curved lower margin twice the length of the costa. The apex is rounded and preceded by an upright, flange-like tooth which in profile gives the apex the appearance of a bird's head. This tooth is narrower and higher than

*sandrina* from the *humboldtii* forms; otherwise the pattern development remains as a sole basis for specific delineation. I am not satisfied that the results are anything but artificial. I have used the presence or absence of the light median band of the hind wing and the development of the orange bands on the under side. This results in seven species, one of them not heretofore described. Within this structure are found names based on the color (white or yellow) of the forewing spots. This I regard as a usual intrapopulational variation and am satisfied with its subspecific value only in a few cases, but I have avoided making synonyms except where ample and exact locality data are available.

The genus is confined to the Andean valleys of Colombia, Ecuador, and Peru. Probably it is an ancient genus, for ithomines, and its contemporary distribution suggests frag-

mentation. Phylogenetically it evidently has branched from *Tithorea*, showing, on the whole, many small advances in structural evolution.

KEY TO THE SPECIES AND SUBSPECIES  
OF *Elzunia*

1. Upper side of the hind wing with a light (white or yellow) discal band running from the inner margin across the outer end of the cell . . . . . 2  
No light-colored discal band on the upper side of the hind wing, the discal cell entirely black . . . . . 8
2. Under side of the hind wing with a complete red-brown band between the marginal rows of white spots . . . . . 3  
Area between the rows of white spots on the under side of the hind wing entirely black . . . . . 5
3. Under side of the hind wing with two red-brown bands: a distal band between the white spots and a proximal band between the white submarginal row and the yellow discal band; Sc and R black . . . *E. pavonii*  
Under side of the hind wing with four red-brown bands: two of them placed as in *pavonii*, these two connected by a strong third band running along R above the light discal band, and a fourth band represented by a short streak along the base of the costal margin . . . . . (*E. regalis*), 4
4. A large ovoid white patch on the forewing cut about in half by the black Cu<sub>2</sub>, the lower part only slightly shorter than the part above the vein; submarginal and postmedian red-brown bands on the under side running to the anal margin. . . *E. r. regalis*  
The white patch on the forewing cut by Cu<sub>2</sub> so that the lower part is only half as long as the upper part, its inner edge perpendicular to the vein; postmedian red-brown band beneath not crossing Cu<sub>2</sub>. . . *E. r. joiceyi*
5. A red-brown patch present on the under side of the hind wing over R and running back to the base; on the forewing beneath some red-brown scaling present just proximad of the apical spots and there is a red-brown streak over R . . . . . *E. atahualpa*  
No red-brown streak or scaling over R on either wing. . . . . 6
6. Forewing above with the submarginal row of yellow spots either minute or wanting entirely, and the postdiscal spots just beyond the end of the cell never present . . . . . *E. tamasea*  
Forewing above with a row of submarginal isolated spots, a diagonal series of postdiscal spots just beyond the end of the cell and two isolated postdiscal spots, one on either side of Cu<sub>2</sub>. . . . . (*E. bonplandii*), 7
7. On the upper side of the wings all spots white except the discal series of the hind wing, which is yellow; the paired submarginal spots of the hind wing very small, those in M<sub>3</sub>-Cu<sub>1</sub> and Cu<sub>1</sub>-Cu<sub>2</sub> no larger than the others in the same band. . . *E. b. bonplandii*  
All spots on both wings on the upper side yellow; the submarginal row on the hind wing small, with the pairs in M<sub>3</sub>-Cu<sub>1</sub> and Cu<sub>1</sub>-Cu<sub>2</sub> slightly larger than the others . . . . . *E. b. descandollesi*
8. All light spots small, particularly the submarginal series on the hind wing, the members of which are well separated from each other, two between each vein; on the under side of the hind wing the red-brown patch extends across Cu<sub>1</sub>, usually ending sharply at Cu<sub>2</sub>. . . . . (*E. cassandrina*), 9  
Submarginal spots of the hind wing larger, those in M<sub>3</sub>-Cu<sub>1</sub> and Cu<sub>1</sub>-Cu<sub>2</sub> being longer than the others, the pairs between the veins almost always merged into single spots; the red-brown patch on the under side almost never crossing Cu<sub>1</sub>, though often there is scattered scaling below Cu<sub>1</sub>. . . . . (*E. humboldtii*), 10
9. The postdiscal spots of the forewing large; the submarginal band of the hind wing with the spots between M<sub>3</sub> and Cu<sub>2</sub> larger than those above M<sub>3</sub>. . . *E. c. cassandrina*  
The postdiscal spots of the forewing reduced and minute, either white or yellow; the submarginal band of the hind wing with all the spots about the same size. . . . . *E. c. microguttata*
10. Light spots on the forewing all yellow, usually reduced in size . . . . . *E. h. humboldtii*  
Light spots on the forewing all white, generally larger, with the postdiscal series strong . . . . . 11
11. Submarginal spots of the hind wing entirely sulphur yellow above, but whitish yellow on the under side . . . . . *E. h. judsoni*  
The three anteriorad spots of the submarginal series of the hind wing on the upper side are white, the others pale yellowish white; on the under side the whole submarginal series is silvery white, only rarely slightly tinged with yellow . . . . . *E. h. albomaculata*

*Elzunia humboldtii* (Latreille)

The three well-marked forms comprising this species are treated here as subspecies. *Elzunia humboldtii humboldtii* is found in central and northern Colombia (fig. 75). In

southern Colombia and the Rio Putumayo is found *E. h. judsoni*, which differs from *E. h. humboldtii* by having the forewing spots white instead of yellow. The subspecies from eastern Ecuador is *E. h. albomaculata*.

***Elzunia humboldtii humboldtii* (Latreille)**

Plate 7, figures 1, 2

*Heliconius humboldtii* LATREILLE, 1811 (1811-1832), p. 194, pl. 18, fig. 1; New Grenada; 1820, in Latreille and Godart, 1819-1823, p. 224. LUCAS, 1835, pl. 53, fig. 2.

*Tithorea humboldtii*, DOUBLEDAY, 1847 (1846-1852), p. 100. KIRBY, 1871, p. 35. SCUDDER, 1875, p. 285. SCHATZ, 1885 (1885-1892), pl. 10; 1886 (1885-1892), p. 88. WEYMER, 1890, p. 35. HAASE, 1893, p. 51. REBEL, 1901, pp. 246-247. HAENSCH, 1903, p. 160; 1909, p. 119, pl. 32a. KREMKY, 1925, pp. 187-189, 193, 271, figs. 34, 35, 37, pl. 21, fig. 3. BRYK, 1937a, p. 21.

*Elzunia humboldtii*, BRYK, 1937b, pp. 467-468. FOX, 1940, p. 176; 1941, pp. 2-3.

*Tithorea flavomaculata* STAUDINGER, 1885 (1884-1888), p. 72. HAENSCH, 1903, p. 160.

*Elzunia flavomaculata*, BRYK, 1937b, p. 468.

Eighteen males have been examined in American collections.

***Elzunia humboldtii albomaculata* (Haensch)**

Plate 7, figures 3, 4

*Tithorea humboldtii albomaculata* HAENSCH, 1903, pp. 160-161; Banos, Ecuador; 1909, p. 119.

*Elzunia humboldtii albomaculata*, BRYK, 1937b, p. 468. FOX, 1940, p. 176.

*Elzunia humboldtii coxeyi* FOX, 1941, pp. 2-4; La Merced, Rio Pastaza, Ecuador.

The holotype of *coxeyi* is a male from "La Merced, Rio Pastaza, Ecuador" numbered 7794 in the Academy of Natural Sciences of Philadelphia; paratypes are in the American Museum of Natural History, Cornell University, and the Instituto Oswaldo Cruz.

Haensch's *albomaculata* applies to the Oriente population. The description states, "Auf der Unterseite sind alle Flecken und Binden Weisslich, bis auf den Basal teil der discalen Schrägbinde." My *coxeyi* is an absolute synonym.

Twenty-one males and five females have been seen in American collections.

***Elzunia humboldtii judsoni*, new subspecies**

Plate 7, figure 5

*Tithorea humboldtii*, STAUDINGER, 1885 (1884-1888), p. 72.

*Tithorea humboldtii albomaculata* HAENSCH (part), 1909, p. 119.

*Elzunia humboldtii albomaculata*, FOX, 1941, pp. 3-4.

This subspecies is distinguished from *E. h. humboldtii* by the spots on the forewing, which are white rather than yellow. From *E. h. albomaculata* of eastern Ecuador it is distinguished by the uniformly sulphur yellow coloring of the postmedian spots of the hind wing above and below and by the decidedly smaller size of all spots on the forewing. The red-brown patch on the under side of the hind wing tends to be slightly larger than in *albomaculata*.

TYPE MATERIAL: Holotype male: north-eastern Peru, H. Bassler station F 6186 [believed to be on the Rio Putumayo]. Allotype female: Colombia; Ovalle collection. A male and a female paratype with the same data as the allotype. These four are in the American Museum of Natural History. A paratype male with the same data as the holotype is in the Carnegie Museum. Five male paratypes, Bogota, Colombia, and two male paratypes, Amazonas; Carnegie Museum and the Museum of Comparative Zoölogy. Three paratype males: Neiva, Colombia; Reading Public Museum. A male paratype, Colombia, and a male paratype without locality; United States National Museum. A paratype male, Rioja, Ecuador [erroneous]; Museum of Comparative Zoölogy.

This subspecies is named for W. Judson Coxey.

***Elzunia cassandrina* (Srñka)**

*Elzunia cassandrina cassandrina* is from southern Colombia, eastern Ecuador, and northern Peru. One record from Chanchamayo is too far south and probably is an error. Northern Colombia is the region in which *microguttata* is found. Because of the overlapping distribution between this and the preceding species, I have separated them.

***Elzunia cassandrina cassandrina* (Srñka)**

Plate 7, figures 6, 7

*Tithorea cassandrina* SRNKA, 1885, pp. 129-130; Ecuador. WEYMER, 1890, pp. 20, 26. HAENSCH, 1909, p. 119. FASSL, 1915, p. 35. RÖBER, 1927, p. 402. CAMPOS, 1927, p. 6.

*Elzunia cassandrina*, BRYK, 1937b, p. 467. FOX, 1940, p. 176.

Thirty-four males and two females have been studied from American collections.

***Elzunia cassandrina microguttata* (Röber)**

Plate 7, figures 8, 9; text figure 74

*Tithorea cassandrina microguttata* RÖBER, 1927, p. 402; Rio Magdalena, Colombia.

*Elzunia cassandrina microguttata*, BRYK, 1937b, p. 467.

The single specimen in American collections agrees well with the Röber description except that the forewing dots are yellow rather than white. This is probably a normal variation within the population.

***Elzunia bonplandii* (Guérin)**

Three distinctly marked forms are found, but only two subspecies. *Elzunia bonplandii bonplandii* flies in the valleys of the eastern Cordillera from northern Colombia to north-eastern Peru. The other two, *descandollesi* and *latreillei*, both are from the Cauca Valley and differ from each other only in minor respects, particularly in the postdiscal series of light spots on the hind wing. In the latter the paired spots of this series from  $M_3$  to  $Cu_2$  are larger than the others; in the former all the spots are about the same size. There is intergrading in the series studied, as well as some aberrations of each form in which the forewing spots are white.

***Elzunia bonplandii bonplandii* (Guérin)**

Plate 8, figures 1, 2; text figures 70–73

*Heliconia bonplandii* GUÉRIN, 1841, p. 472; New Grenada.

*Tithorea bonplandii*, DOUBLEDAY AND HEWITSON, 1847 (1846–1852), p. 100, pl. 14, fig. 1. KIRBY, 1871, p. 35. SCUDDER, 1875, p. 285. STAUDINGER, 1884 (1884–1888), pl. 30; 1885 (1884–1888), p. 72. WEYMER, 1890, p. 26. HAASE, 1893, p. 51. REUTER, 1896, pp. 36–37. HAENSCH, 1909, p. 110, pl. 32b.

*Elzunia bonplandii*, BRYK, 1937a, p. 21; 1937b, p. 467. FOX, 1940, p. 176.

Eighty males and five females have been examined in American collections.

***Elzunia bonplandii descandollesi* (Staudinger)**

Plate 8, figures 3–6

*Tithorea bonplandii descandollesi* STAUDINGER, 1885 (1884–1888), p. 72; Cauca Valley, Province of Antioquia, Colombia. HAENSCH, 1909, p. 199.

*Elzunia bonplandii descandollesi*, BRYK, 1937b, p. 467. FOX, 1940, p. 176.

*Tithorea humboldtii latreillei* STAUDINGER, 1885 (1884–1888), p. 72; Cauca, Colombia. HAENSCH, 1909, p. 119.

*Elzunia bonplandii latreillei*, BRYK, 1937b, p. 467. FOX, 1940, p. 176.

Staudinger (1885) thought he had parallel variants of two different species.

Thirty-five males and a female have been studied in American collections.

***Elzunia tamasea* (Hewitson)**

Plate 8, figures 7, 8

*Tithorea tamasea* HEWITSON, 1873 (1852–1876), vol. 5, p. [11], pl. [6] *Tithorea* and *Heliconius* VII, fig. 2, not figs. 1, 3; Villagomes, New Grenada. KIRBY, 1877, p. 697 (as *tamesca*, typographical error). WEYMER, 1890, p. 35. HAENSCH, 1909, p. 119. SEITZ, 1910, p. 170 (as *tamasta*, typographical error). RILEY AND GABRIEL, 1925, p. 47.

*Elzunia tamasea*, BRYK, 1937b, pp. 468–469. FOX, 1940, p. 176.

*Tithorea tamasea lugubris* HAENSCH, 1909, p. 119; Colombia.

*Elzunia tamasea lugubris*, BRYK, 1937b, p. 469. FOX, 1940, p. 176.

The types of *tamasea* are a male and female from "Villagomes, New Grenada," numbered 6934 and 6935 in the British Museum (Natural History).

There are three males in American collections.

The number of spots retained is variable in the specimens seen. The pattern of the under side differs from that of other species but is nearest to that of *bonplandii*. The fact that the two overlap in distribution indicates that *tamasea* either is a good species or is an aberration of *bonplandii*, the latter case being unlikely. Haensch described *lugubris* from an area apparently a part of the *tamasea* distribution, and probably it is an aberration.

Of the figures accompanying Hewitson's description, only figure 2 seems typical. Figures 1 and 3 evidently are of some other species which I have not seen and which probably are not *Elzunia*.

***Elzunia atahualpa*, new species**

Plate 9, figures 1, 2

A male bearing Bassler's station label "F 6186" is a distinct species on the basis on which species are separated in the present



paper. According to Bassler's list of stations, F 6186 is somewhere in northeastern Peru, but the exact locality is unknown. From the many other specimens with this label, there is strong indication that the true locality is on the Rio Putumayo.

On the upper side it is similar to *E. bonplandii*, except that the light streak above the cubitus at the base of the wing is yellow rather than white; the remainder of the light spots on the forewing above are silvery white and about the same size as found in *bonplandii*. The hind wing has the yellow submedian band narrow, as in *bonplandii*, and the postmedian series of white spots small and uniform in size, each well separated from the others. On the under side the markings and colors are repeated from above; in addition there is a complete series of bluish white submarginal double spots on both wings. The arrangement of the red-brown patches is the most significant feature and places this species midway between *bonplandii* and *regalis*. On the hind wing the red-brown patch lying between the yellow submedian band and the white postmedian series of spots is broad, extends as far down as  $Cu_2$ , and anteriorad it crosses R, then swings proximad along R, which it broadly covers, to the fork of  $Sc$ ; distad it is continued by a small spot in  $R-M_1$  between the postmedian and the submarginal series. On the forewing there is light but obvious red-brown scaling in the three cells from R to  $M_3$  just proximad of the apical spots; at the base of the wing there is a red-brown streak over R, not reaching the end of the cell.

**TYPE MATERIAL:** Holotype male: northeastern Peru; F 6186; H. Bassler; in the American Museum of Natural History.

***Elzunia regalis* (Stichel)**

This is a well-marked species, superficially similar to *bonplandii* on the upper side, characterized by the extensive red-brown markings on the under side. Two subspecies are known, but insufficient data prevent an adequate geographic analysis.

***Elzunia regalis regalis* (Stichel)**

Plate 9, figure 3

*Tithorea regalis* STICHEL, 1903, p. 285; upper Rio Magdalena, Colombia; 1904, p. (18). HAENSCH, 1909, p. 119.

*Elzunia regalis*, BRYK, 1937b, p. 468. FOX, 1940, p. 176.

*Tithorea bonplandii faba* WEYMER, 1909, p. 30; west Cordillera, Colombia.

*Elzunia bonplandii faba*, BRYK, 1937b, p. 476. FOX, 1940, p. 176.

Weymer's *faba*, described as a form of *bonplandii*, appears to be identical with *regalis*. Both descriptions stress the ovoid white spot on the forewing crossed by  $Cu_2$ , the yellow submedian band on the hind wing, and the arrangement of the red-brown stripes on the under side.

I have seen one male and one female in American collections.

***Elzunia regalis joiceyi* (Kaye)**

Plate 9, figures 4, 5

*Tithorea bonplandii joiceyi* KAYE, 1918, p. 78; Cauca, Colombia. D'ALMEIDA, 1949, p. 393.

The type series of 12 males from "Cauca, Colombia" are in the Joicey collection in the British Museum (Natural History).

The upper side is distinguished by the shape of the light spot over the base of  $Cu_2$ ; the under side, by the fact that the red-brown postmedian band does not cross  $Cu_2$  nor reach the anal margin. Despite the insufficiency of geographic data, I regard this as a valid subspecies of *regalis*, not so much because of the substitution of white for yellow in the spots, as because of the consistent shortening of the median red-brown stripe on the under side of the hind wing and the consistent shape of the spot over the forewing  $Cu_2$ . One of the specimens in the American Museum of Natural History series has all the spots yellow on the upper side, but the pattern structure is exactly like that of the rest of the series. Twenty-eight males have been examined.

***Elzunia pavonii* (Butler)**

Plate 9, figures 6, 7

[*Tithorea pavonii* DOUBLEDAY, 1847 (1846-1852), p. 100; Guayaquil.]

*Tithorea pavonii* BUTLER, 1873, p. 156; Panama. KIRBY, 1877, p. 697. STAUDINGER, 1884 (1884-1888), pl. 30; 1885 (1884-1888), p. 72. WEYMER, 1890, p. 71. HAASE, 1893, p. 51. REBEL, 1901, p. 247. HAENSCH, 1903, p. 161; 1909, p. 119, pl. 32b. RILEY AND GABRIEL, 1925, p. 38. KREMKY, 1925, pp. 147, 187, 189-190, figs. 36, 38. CAMPOS, 1927, p. 6.

*Elzunia pavonii*, BRYK, 1937b, p. 468. FOX, 1940, p. 176.

The type is a male in the British Museum (Natural History) numbered 6936 and labeled "Panama," an evident error.

Doubleday mentioned *T. pavonii* among the species to be included in *Tithorea*, but

gave neither description nor figure. This does not constitute an acceptable publication of the name for taxonomic purposes, and its priority must date from Butler (1873).

F. Martin Brown and W. Judson Coxey found this species only in western Ecuador, never in the Oriente. All records from the eastern slopes and valleys are errors.

## DISTRIBUTIONAL DATA

THE FOLLOWING ABBREVIATIONS are used to indicate the collections from which data have been recorded for this study. All specimens listed have been examined, and no data are listed from the literature.

A.M.N.H., the American Museum of Natural History

A.N.S.P., Academy of Natural Sciences of Philadelphia, Pennsylvania

C.M., Carnegie Museum, Pittsburgh, Pennsylvania

C.U., Cornell University, Department of Entomology, College of Agriculture, Ithaca, New York

F.M.B., F. Martin Brown, Colorado Springs, Colorado, private collection

I.O.C., Instituto Oswaldo Cruz, Rio de Janeiro, Brazil

M.C.Z., Museum of Comparative Zoölogy, Harvard College, Cambridge, Massachusetts

N.Y.Z.S., New York Zoological Society, Department of Tropical Research, New York

R.P.M., Reading Public Museum, Reading, Pennsylvania

U.S.N.M., United States National Museum, Washington, D. C.

### **Roswellia acrisione acrisione** (Hewitson)

ECUADOR: Sucua, Santiago-Zamora district (A.M.N.H.), 1 ♂. La Merced, Rio Pastaza (A.N.S.P.), 1 ♂, 1 ♀. Sarayacu (U.S.N.M.), 2 ♂, 2 ♀. Macas, 3500 ft. (U.S.N.M.), 1 ♀. Rio Coto-pino (C.M.), 1 ♂, 1 ♀. Without locality (M.C.Z.), 1 ♂.

COLOMBIA: Without locality (U.S.N.M.), 1 ♂.

PERU: Jevaros, Rio Ucayali (G. Klug; collection R.P.M.), 1 ♀. Without locality (M.C.Z., U.S.N.M.), 3 ♀.

### **Athesis clearista clearista**

Doubleday and Hewitson

VENEZUELA: Cumanaçoa, Department Sucre (C.M., R.P.M.), 5 ♂. Las Quigas, Department Sucre (C.M.), 1 ♂. Pie de Cerro, Department Argua (C.M.), 1 ♂. San Fernando (R.P.M.), 1 ♀. Caracas (U.S.N.M.), 2 ♀. Merida (U.S.N.M.), 1 ♂, 1 ♀. Rancho Grande (A.M.N.H.), 2 ♂. Without locality (U.S.N.M.), 1 ♀.

### **Athesis clearista colombiensis** Kaye

COLOMBIA: Muzo (C.M., R.P.M.), 5 ♂, 4 ♀. Mountains of Bogota (C.M.), 1 ♂. Las Mesitas (C.M.), 1 ♀. Region del Quindio (C.M.), 2 ♀. Viota (R.P.M.), 1 ♂. Choachi (R.P.M.), 1 ♂, 1 ♀. Carratera al Mar, Cauca Valley (A.M.N.H.,

C.M.), 5 ♂, 5 ♀. Munchique, Department Cauca (A.M.N.H., C.M.), 2 ♀. Rio Cocorna, Department Antioquia (A.M.N.H.), 1 ♂. Bogota (M.C.Z.), 1 ♀. Without locality (A.M.N.H., R.P.M., M.C.Z., U.S.N.M.), 10 ♂, 16 ♀.

PERU: Northeastern (H. Bassler; collections A.M.N.H., A.N.S.P., I.O.C.), 4 ♂, 8 ♀.

VENEZUELA: Merida [generalized locality] (C.M., U.S.N.M.), 1 ♂, 2 ♀. Without locality (M.C.Z., R.P.M., U.S.N.M.), 1 ♂, 2 ♀.

### **Athesis clearista vitrala** Kaye

ECUADOR: Abitagua, 1200 m. [3937 ft.], April (U.S.N.M.), 3 ♂, 3 ♀.

### **Eutresis dilucida** Staudinger

COSTA RICA: Carillo (W. Schaus; collections U.S.N.M., C.M.), 2 ♂. La Carpentera, Department Cartago (W. Schaus; collection U.S.N.M.), 1 ♂, 2 ♀.

PANAMA: Chiriqui [determined *E. dilucida* by O. Staudinger] (C.M.), 1 ♂.

### **Eutresis hypereia theope** Godman and Salvin

COSTA RICA: Tres Rios (W. Schaus; collection U.S.N.M.), 2 ♂.

PANAMA: Chiriqui (A.N.S.P., U.S.N.M.), 3 ♂.

### **Eutresis hypereia hypereia**

Doubleday and Hewitson

VENEZUELA: El Limon, Department Federal (C.M., R.P.M.), 1 ♂, 1 ♀. Las Quigas (C.M.), 9 ♂, 3 ♀. Laguita de Aroa (C.M.), 1 ♂. Alto de Rancho Grande, Department Aragua (U.S.N.M.), 1 ♂. Rancho Grande (W. Beebe; collections A.M.N.H., N.Y.Z.S.), 4 ♂, 1 ♀. Valera (U.S.N.M.), 1 ♂. Caracas (U.S.N.M.), 1 ♂. Without locality (A.N.S.P., C.M., U.S.N.M.), 5 ♂.

COLOMBIA: Onaca, Department Magdalena (C.M.), 1 ♂, 1 ♀. Minca, Department Magdalena (C.M.), 1 ♂. Nieva, Department Huila (R.M.), 1 ♀. Without locality (A.M.N.H., A.N.S.P., M.C.Z., R.P.M., U.S.N.M.), 5 ♂, 2 ♀.

PERU: Northeastern (H. Bassler locality F 6186; collection A.M.N.H.), 1 ♂.

ERRONEOUS RECORD: Costa Rica: Without locality (M.C.Z.), 1 ♂.

### **Eutresis hypereia hyspa** Godman and Salvin

COLOMBIA: Mesopotamia, Department Antioquia (A.M.N.H.), 1 ♂. Aduidite (C.M.), 2 ♂. Without locality [determined *E. antioquensis* by O. Staudinger] (C.M.), 1 ♂, 1 ♀.

ECUADOR: Rio Toachi, Department Pichincha (A.M.N.H.), 1 ♂. Huigra, 7000 ft. (A.N.S.P.), 3 ♂.

**Eutresis hypereia imitatrix** Staudinger

ECUADOR: Abitagua [generalized locality] (U.S.N.M.), 3 ♂. Oriente (U.S.N.M.), 8 ♂. Without locality (U.S.N.M.), 1 ♀.

PERU: Without locality (U.S.N.M.), 1 ♂.

BOLIVIA: Eight days north from Chochabamba, Aug. 25, 1899 (A. G. Weeks; collection M.C.Z.), 1 ♂.

**Patricia dercylldas dercylldas** (Hewitson)

COLOMBIA: Region del Quindio (C.M.), 2 ♂, 1 ♀. Rio San Joaquin, Department Cauca, 1500 m. [4921 ft.] (A.M.N.H.), 1 ♀. Tunja (R.P.M.), 1 ♂. Piedrancha, Department Narina (A.M.N.H.), 1 ♀. Santa Fortunato Bonis, Department Cauca (A.N.S.P.), 2 ♀. Bogota (M.C.Z.), 1 ♀. Without locality (A.M.N.H., A.N.S.P., M.C.Z., U.S.N.M.), 3 ♂, 4 ♀.

ECUADOR: Huigra (W. J. Coxey; collection A.N.S.P.), series ♂, ♀. Environs of Loja (U.S.N.M.), 1 ♀.

NO DATA: (A.M.N.H., C.M., U.S.N.M.), 4 ♀.

**Patricia oligyrtis hewitsonii** (Srnlka)

BOLIVIA: Coroico (A. G. Weeks; collection M.C.Z.), 1 ♂.

**Olyras crathis staudingeri** Godman and Salvin

COSTA RICA: Tres Rios (A.M.N.H., C.M., U.S.N.M.), 6 ♂, 8 ♀. San Jose (A.M.N.H.), 1 ♂. La Carpintera, Department Cartago (U.S.N.M.), 1 ♂. Without locality (U.S.N.M.), 1 ♂.

PANAMA: Chiriqui volcano (A.M.N.H., U.S.N.M.), 2 ♂, 1 ♀.

**Olyras crathis montagui** Butler

COLOMBIA: Without locality (A.M.N.H.), 1 ♂.

ECUADOR: Puyo, Napo-Pastaza district (F. M. Brown; collections A.M.N.H., F.M.B., R.P.M.), 3 ♂. Macas (A.M.N.H.), 1 ♂. Rio Bamba (R.P.M.), 2 ♂, 1 ♀. Without locality (U.S.N.M.), 1 ♂.

PERU: Northeastern (H. Bassler station F 6186; collection A.M.N.H.), 1 ♂.

NO DATA: (C.M.), 1 ♀.

**Olyras crathis crathis** Doubleday and Hewitson

VENEZUELA: San Esteban (C.M.), 4 ♂, 2 ♀. Valara (U.S.N.M.), 1 ♂. Las Quiguas (C.M., R.P.M.), 17 ♂, 4 ♀. Highlands of Merida (A.M.N.H.), 1 ♂. Without locality (C.M., M.C.Z.), 5 ♂.

COLOMBIA: Without locality (R.P.M., M.C.Z., U.S.N.M.), 1 ♂, 2 ♀.

NO DATA: (U.S.N.M.), 1 ♂.

ERRONEOUS RECORDS: Costa Rica, Chiriqui, Ecuador (M.C.Z., U.S.N.M.), 3 ♂.

**Olyras crathis sticheli** Haensch

PERU: Tingo Maria, Rio Ucayali (R.P.M.), 1 ♀.

**Olyras theon** Bates

MEXICO: Presidio, Department Veracruz (A.M.N.H.), 1 ♂. Atoyac, Department Veracruz (A.M.N.H.), 1 ♂. Jalapia (U.S.N.M.), 1 ♀. Guerrero (U.S.N.M.), 1 ♂.

GUATEMALA: San Sebastian, near Retalhuleu (U.S.N.M.), 1 ♂. Esperial (U.S.N.M.), 1 ♀. Volcan Sta. Maria (U.S.N.M.), 1 ♂, 1 ♀. Without locality (C.M., U.S.N.M.), 3 ♂, 3 ♀.

HONDURAS: Without locality (U.S.N.M.), 1 ♂.

NO DATA: (C.M.), 2 ♂.

**Olyras insignis praestans** Godman and Salvin

COLOMBIA: Bogota [generalized locality] (M.C.Z., R.P.M.), 1 ♂, 2 ♀. Tunja (R.P.M.), 1 ♂. La Lechera, Rio Opon (A.M.N.H.), 1 ♀. Without locality (U.S.N.M.), 1 ♂.

PERU: Huaylas (R.P.M.), 1 ♀. Northeastern (H. Bassler station F 6186) (A.M.N.H.), 1 ♀.

**Olyras insignis translucens** Hewitson

ECUADOR: Santo Domingo de los Colorados (Laddey; collection A.M.N.H.), 1 ♂. Rio Maizito, Department Palmar (Laddey; collection R.P.M.), 1 ♂.

**Athyrtis mechanitis mechanitis** Felder and Felder

COLOMBIA: Villavicencio (C.U.), 1 ♂. Rio Orteguiza, 1° N., 75° W. (A.M.N.H.), 1 ♂. Without locality (U.S.N.M.), 1 ♂.

**Athyrtis mechanitis salvini** Srnlka

PERU: Middle Rio Ucayali (H. Bassler; collection A.M.N.H.), 3 ♂. 1 ♀. Iquitos (R.P.M.), 1 ♂. Achinamiza, Rio Huallaga (A.M.N.H., R.P.M.), 1 ♂, 2 ♀. Juanguay, Rio Huallaga (R.P.M.), 1 ♀. Chizunta, Rio Huallaga (R.P.M.), 1 ♀. Upper Rio Huallaga (A.M.N.H.), 1 ♂. Without locality (U.S.N.M.), 1 ♂.

BRAZIL: Porto Velho (M.C.Z.), 1 ♂. Upper Rio Jurua (A.M.N.H., A.N.S.P., M.C.Z.), 3 ♂, 1 ♀. Without locality (R.P.M.), 1 ♂. Upper Amazons (A.N.S.P., U.S.N.M.), 6 ♂.

BOLIVIA: Coroico, Rio Songo, and upper Rio Madre de Dios (C.U.), series ♂ and ♀.

NO DATA: (C.M., U.S.N.M.), 2 ♂.

**Tithorea tarricina duenna** Bates

MEXICO: Cordoba (A.M.N.H.), 1 ♂, 2 ♀. Jalapa (A.M.N.H., U.S.N.M.), 2 ♀. Chiapas (A.M.N.H.), 1 ♀. Oaxaca (A.M.N.H.), 3 ♂. Mirador (U.S.N.M.), 1 ♂.

GUATEMALA: Rio Polochic, near Vera Paz (A.M.N.H.), 1 ♂. San Sebastian near Retalhuleu (U.S.N.M.), 1 ♂. Escuintla (U.S.N.M.), 1 ♂. Vol-

can Sta. Maria (U.S.N.M.), 5 ♂, 3 ♀. Amatitlan (U.S.N.M.), 1 ♀. Without locality (A.N.S.P., C.M., M.C.Z., U.S.N.M.), 5 ♂, 3 ♀.

HONDURAS: San Pedro Sula (C.M.), 2 ♀.

NO DATA: (U.S.N.M.), 1 ♂, 3 ♀.

***Tithorea tarricina pinthias* Godman and Salvin**

GUATEMALA: Cayuga (W. Schaus; collection U.S.N.M.), 1 ♂. Without locality (A.M.N.H., U.S.N.M.), 1 ♂, 3 ♀.

HONDURAS: Truxillo district (A.M.N.H.), 1 ♂, 2 ♀. Without locality (C.M., U.S.N.M.), 1 ♂, 2 ♀.

COSTA RICA: Guapiles (A.M.N.H., C.M., U.S.N.M.), 3 ♂, 3 ♀. Cairo (A.M.N.H.), 1 ♀. Peralta (A.M.N.H.), 1 ♂. Port Limon (A.M.N.H., U.S.N.M.), 1 ♂, 1 ♀. Uvita Bay (A.M.N.H.), 1 ♂. Hacienda El Rodeo (F. M. Brown; collection A.M.N.H.), 1 ♀. San Mateo (W. Schaus; collection U.S.N.M.), 3 ♂, 2 ♀. Juan Vinas (W. Schaus; collection U.S.N.M.), 1 ♂. Zent district (W. Schaus; collection U.S.N.M.), 1 ♂. Sixola River (C.M.), 2 ♂. Espenanza (C.M.), 1 ♂. Orosi near Volcan Irazu (C.M.), 1 ♀. Without locality (U.S.N.M.), 1 ♂.

PANAMA: Chiriqui (A.M.N.H., A.N.S.P., C.M., M.C.Z., U.S.N.M.), 6 ♂, 8 ♀. Bocos de Toro (A.M.N.H., U.S.N.M.), 2 ♀. Almaiata (A.M.N.H.), 1 ♀. Panama City (C.M.), 1 ♀. Chiriquicito (U.S.N.M.), 2 ♂.

CENTRAL AMERICA: (M.C.Z.), 1 ♂.

NEW GRENADA: (Probably Panama), (C.M., U.S.N.M.), 2 ♂.

NO DATA: (A.N.S.P.), 1 ♂.

ERRONEOUS RECORD: Amazona (M.C.Z.), 1 ♂.

***Tithorea tarricina tarricina* Hewitson**

COLOMBIA: Pass of Quindio (C.M.), 6 ♂, 3 ♀. Rio San Joaquin, Department Cauca (A.M.N.H., C.M.), 3 ♂, 1 ♀. Rio Corona, Department Antioquia (A.M.N.H.), 1 ♂, 1 ♀. Pichinde, Cali Valley (A.M.N.H., C.M.), 2 ♂, 5 ♀. Bogota (A.M.N.H., C.M., M.C.Z.), 8 ♂, 6 ♀. Mountains near Bogota (C.M.), 1 ♂, 1 ♀. Viota (R.P.M.), 1 ♀. Carmen de Yacopi (C.M.), 1 ♀. Neiva (R.P.M.), 6 ♂, 7 ♀. Frijolea (A.M.N.H.), 1 ♀. New Grenada (M.C.Z.), 1 ♂. Without locality (A.M.N.H., A.N.S.P., C.M., M.C.Z., U.S.N.M.), 20 ♂, 14 ♀.

ECUADOR: Without locality (A.M.N.H.), 2 ♂.

PERU: Northeastern (H. Bassler station F 6186; collection A.M.N.H.), 2 ♀.

NO DATA: (A.M.N.H., U.S.N.M.), 3 ♂, 1 ♀.

ERRONEOUS RECORDS: Guayaquil, Ecuador (R.P.M.), 1 ♀. Bolivia (U.S.N.M.), 1 ♂.

***Tithorea tarricina bonita* Haensch**

ECUADOR: Macas (W. J. Coxey; collections A.N.S.P., U.S.N.M.), 1 ♂, 2 ♀. Jatunyacu (W. C.

Macintyre; collection A.M.N.H.), 1 ♀. Zumba' Santiago-Zamora district (F. M. Brown; collection A.M.N.H.), 1 ♀.

PERU: Jpalacio, Department San Martin (G. Klug; R.P.M.), 1 ♂.

***Tithorea tarricina tagarma* Hewitson**

PERU: Chanchamayo (A.N.S.P., U.S.N.M.), 2 ♂.

ERRONEOUS RECORD: Chiriqui, Panama (R.P.M.), 1 ♀.

***Tithorea harmonia salvadoris* Staudinger**

MEXICO: Cordova (U.S.N.M.), 1 ♂, 1 ♀. Santa Rosa, Veracruz (W. Schaus; collection U.S.N.M.), 3 ♂. Escuintla, Chiapas (A.N.S.P.), 1 ♂.

SAN SALVADOR: Without locality (A.N.S.P., C.M., R.P.M.), 2 ♂, 3 ♀.

GUATEMALA: Escuintla (W. Schaus; collection U.S.N.M.), 6 ♂, 3 ♀. San Sebastian near Retalhuleu (U.S.N.M.), 3 ♀. Without locality (A.M.N.H., C.M., U.S.N.M.), 2 ♂, 3 ♀.

NO DATA: (U.S.N.M.), 2 ♂, 1 ♀.

ERRONEOUS RECORD: San Mateo, Costa Rica (U.S.N.M.), 1 ♂, 1 ♀.

***Tithorea harmonia hippothous***

Godman and Salvin

HONDURAS: San Pedro Sula (C.M., R.P.M.), 2 ♂, 4 ♀. Without locality (M.C.Z., U.S.N.M.), 2 ♂, 1 ♀.

BRITISH HONDURAS: Rio Grande (A.M.N.H., A.N.S.P.), 3 ♂, 1 ♀. Columbia (A.M.N.H.), 1 ♂.

NO DATA: (U.S.N.M.), 1 ♂.

***Tithorea harmonia helicaon* Godman and Salvin,**

COSTA RICA: San Mateo (A.M.N.H., C.M., U.S.N.M.), 10 ♂, 11 ♀. Port Barker, Elena Bay (A.M.N.H.), 2 ♂. Puriscal Mountains (W. Schaus; collection U.S.N.M.), 1 ♂, 1 ♀. Tres Rios (U.S.N.M.), 1 ♀. Without locality (U.S.N.M.), 1 ♀.

***Tithorea harmonia irene* (Drury)**

PANAMA: Albrook Field, Canal Zone (R. Bliss; collection R.P.M.), 1 ♂. Chiva Chiva, Canal Zone (R.P.M.), 1 ♀. Corozal, Canal Zone (R.P.M.), 1 ♀. Cerro Cobre, Canal Zone (C. D. Michener; collection A.M.N.H.), 1 ♀. Arraijan road (A.M.N.H.), 1 ♂. Porto Bello (U.S.N.M.), 1 ♂.

NO DATA: (A.N.S.P.), 1 ♂.

***Tithorea harmonia furia* Staudinger**

VENEZUELA: San Esteban (C.M.), 13 ♂, 9 ♀. Puerto la Cruz, District Federal (C.M.), 3 ♂, 3 ♀. Caripito (A.M.N.H., A.N.S.P.), 6 ♂, 9 ♀. Caracas (U.S.N.M.), 1 ♂, 2 ♀. Merida (U.S.N.M.), 1 ♂. Rancho Grande (W. Beebe; collection

A.M.N.H.), 1 ♀. Without locality (A.M.N.H., A.N.S.P., C.M., M.C.Z., U.S.N.M.), 9 ♂, 6 ♀.

COLOMBIA: Rio Magdalena (C.M.), 2 ♀. St. Vincente (U.S.N.M.), 1 ♂. Without locality (U.S.N.M.), 1 ♂, 1 ♀.

No DATA: (M.C.Z., U.S.N.M.), 4 ♂, 2 ♀.

***Tithorea harmonia furina* Godman and Salvin**

COLOMBIA: Pass of Quindio (C.M.), 2 ♂. Bogota (A.M.N.H., C.M., R.P.M., M.C.Z.), 5 ♂, 2 ♀. Viota (R.P.M.), 1 ♂. Rio Opon (A.M.N.H., C.M.), 5 ♂. Boyaca (U.S.N.M.), 3 ♂. Rio Cocorena, Department Antioquia (A.M.N.H., C.M.), 13 ♂, 12 ♀. Cano Quenane, Rio Meta (A.M.N.H.), 1 ♂. Rio Ortegua, 1° N., 75° W. (A.M.N.H., C.M.), 3 ♂, 1 ♀. Without locality (A.M.N.H., U.S.N.M.), 14 ♂, 7 ♀.

VENEZUELA: Merida (U.S.N.M., A.M.N.H.), 2 ♂, 2 ♀. San Esteban [doubtful] (R.P.M.), 1 ♀. Without locality (U.S.N.M.), 1 ♀.

PERU: Northeastern (H. Bassler station F 6186; collection A.M.N.H.), 5 ♂, 2 ♀. Lower Rio Tapiche (H. Bassler; collection A.M.N.H.), 1 ♂.

No DATA: (C.M., M.C.Z., U.S.N.M.), 7 ♂, 1 ♀.

***Tithorea harmonia megara* (Latreille)**

TRINIDAD: Various localities (A.N.S.P., C.M., M.C.Z., R.P.M., U.S.N.M.), 40 ♂, 37 ♀.

No DATA: (U.S.N.M.), 1 ♂.

ERRONEOUS RECORDS: British Guiana (C.M.), 2 ♀. Surinam (U.S.N.M.), 1 ♀. Ecuador (U.S.N.M.), 1 ♀.

***Tithorea harmonia harmonia* (Cramer)**

VENEZUELA: Rio Suapure (A.M.N.H., C.M.), 3 ♀.

BRITISH GUIANA: Rupununi trail between Essequibo and Demerara rivers (A.N.S.P.), 2 ♂. Kaieteur (A.M.N.H.), 1 ♂, 1 ♀.

FRENCH GUIANA: Cottica (R.P.M.), 3 ♂, 1 ♀. St. Jean, Maroni River (U.S.N.M.), 1 ♀. Maroni River (A.M.N.H., U.S.N.M.), 10 ♂, 2 ♀. St. Laurent, Maroni River (U.S.N.M.), 1 ♀.

DUTCH GUIANA: Cable station, Surinam River (M.C.Z.), 1 ♀. Berg-en-daal (U.S.N.M.), 1 ♂. Without locality (U.S.N.M.), 1 ♂.

GUIANA: Without locality (C.M.), 1 ♀.

BRAZIL: Para (A.M.N.H.), 1 ♂. Cucuhy, Amazonas (U.S.N.M.), 3 ♀. Porto Velho de Santo Antonio (U.S.N.M.), 1 ♂. Teffé [Ega] (C.M.), 4 ♂, 1 ♀. Nova Olinda, Rio Purus (C.M.), 1 ♂. Without locality (A.M.N.H., M.C.Z.), 3 ♂, 3 ♀.

PERU: Iquitos [probably actually farther east] (C.M.), 1 ♀. Without locality (C.M.), 1 ♀.

No DATA: (C.M., R.P.M.), 3 ♂, 1 ♀.

***Tithorea harmonia cuparina* Bates**

BRAZIL: Lower Amazon River (C. Riker; collection M.C.Z.), 1 ♀.

***Tithorea harmonia hermas* Godman and Salvin**

ECUADOR: Pacaiyacu, Rio Bobonaza (A.M.N.H., R.P.M., F.M.B.), 7 ♂. Indillama, Rio Puyo (A.M.N.H.), 1 ♀. Sarayacu, Rio Bobanaza (A.M.N.H., U.S.N.M.), 3 ♂, 2 ♀. Rio Jondachi near Archidona (A.M.N.H.), 1 ♂. Rio Toachi, Pichincha (A.M.N.H.), 1 ♂, 1 ♀. Sucua (A.M.N.H.), 1 ♀. Rio Santiago, Santiago-Zamora district (A.M.N.H.), 11 ♂, 3 ♀. Jatanyacu (A.M.N.H., A.N.S.P.), 3 ♂, 2 ♀. Copataza (M.C.Z.), 2 ♀. Rio Jatanya (U.S.N.M.), 2 ♂. Macas (U.S.N.M.), 1 ♀. Rio Napo (C.M.), 1 ♀. Rio Arajuno (C.M.), 3 ♀. Rio Cotopino (C.M.), 3 ♂, 2 ♀. 2°-4° S., 78° W. (A.M.N.H.), 5 ♂. Without locality (A.M.N.H., U.S.N.M.), 1 ♂, 2 ♀.

PERU: La Boca, Santiago (U.S.N.M.), 1 ♂. Puerto Melendez, upper Rio Marañon (A.M.N.H.), 4 ♂, 3 ♀. Middle Rio Marañon (A.M.N.H.), 1 ♂, 1 ♀. Without locality (U.S.N.M.), 2 ♂, 2 ♀.

No DATA: (A.M.N.H.), 1 ♂.

***Tithorea harmonia egaënsis* Butler**

PERU: Achinamiza, Rio Huallaga (A.M.N.H., A.N.S.P., R.P.M.), 6 ♂, 6 ♀. Juanguy, Rio Huallaga (R.P.M.), 2 ♂, 1 ♀. Chazuta, Rio Huallaga (R.P.M.), 1 ♀. Tingo Maria, Rio Huallaga (A.M.N.H., C.M.), 3 ♂, 1 ♀. Upper Rio Huallaga (A.M.N.H.), 4 ♂, 1 ♀. Middle Rio Ucayali (A.M.N.H., A.N.S.P.), 4 ♂, 2 ♀. Tushna, Rio Ucayali (R.P.M.), 1 ♀. Rio Ucayali (A.M.N.H.), 1 ♀. Middle Rio Marañon (A.M.N.H.), 1 ♀. Tarapoto region (A.M.N.H.), 2 ♂, 2 ♀. Department San Martin (A.M.N.H.), 1 ♀. Without locality (A.N.S.P., C.M., M.C.Z., U.S.N.M.), 3 ♂, 3 ♀.

No DATA: (U.S.N.M.), 1 ♀.

***Tithorea harmonia neitha* Hoppfer**

PERU: Chanchamayo (A.M.N.H., R.P.M.), 6 ♂, 2 ♀ [1 ♀, R.P.M., is *brunnea*.] Rio Colorado, Chanchamayo (M.C.Z.), 2 ♂. La Merced, Chanchamayo (A.M.N.H., C.M.), 3 ♂. Col de Perene (U.S.N.M.), 2 ♂, 3 ♀. Satipo, (M.C.Z.), 1 ♂. Middle Rio Ucayali (A.M.N.H., A.N.S.P.), 1 ♂, 1 ♀ [♀, A.M.N.H., is *melanina*.] Rio Uribamba (A.M.N.H.), 1 ♂, 1 ♀ [both *brunnea*.] Candalara la Mar, Ayachucho (C.M.), 5 ♂. Without locality (A.N.S.P., M.C.Z.), 3 ♂.

BRAZIL: Rio Jurua (A.M.N.H.), 1 ♂ [*melanina*.]

DOUBTFUL RECORDS: Pebas, Brazil (R.P.M.), 1 ♂. Ega, Brazil (R.P.M.), 1 ♂. South Brazil (U.S.N.M.), 1 ♂, 1 ♀.

No DATA: (C.M.), 1 ♂.

***Tithorea harmonia pseudonyma* Staudinger**

PERU: Inca Mines (A.M.N.H.), 1 ♂. Without locality (C.M., U.S.N.M.), 4 ♂.

BRAZIL: Chapada, Mato Grosso (C.M., M.C.Z.,

U.S.N.M.), 8 ♂. Corumba, Mato Grosso (M.C.Z.), 1 ♀. Sul da Miñas (M.C.Z.), 1 ♀. Cuyaba, Mato Grosso (U.S.N.M.), 1 ♀. Without locality (M.C.Z.), 2 ♂.

PARAGUAY: Sapucay (R.P.M.), 2 ♂, 1 ♀.

BOLIVIA: Provincia del Sara (C.M., R.P.M.), 52 ♂, 7 ♀. Rio Jacapani (C.M.), 16 ♂, 3 ♀ [1 ♀ is *lateflava*.] Rio Surutu (C.M.), 1 ♂. Los Juntos, Province Sara (C.M.), 2 ♂, 1 ♀. Cuatro Ojos (C.M.), 5 ♀ [1 is *mira*]. Portachuelo (C.M.), 1 ♂. Lower Mamore River (C.M.), 1 ♂, 1 ♀. Santa Cruz de la Sierra (C.M.), 2 ♂. Songa (M.C.Z.), 1 ♂. La Paz [generalized] (M.C.Z.), 1 ♂. Cusilluni (M.C.Z.) 2 ♂ [one is *assimilis*]. Coroico (M.C.Z.), 2 ♂ [1 is *mira*]. Rio Chimatao (A.M.N.H.), 1 ♂. Mapiri (A.M.N.H.), 3 ♂. Rio Velizue (A.M.N.H.), 1 ♂. 17° 46' 55" S., 63° 05' 34" W. [near Santa Cruz] (U.S.N.M.), 2 ♂. Without locality (A.N.S.P., C.M., U.S.N.M.), 3 ♂, 1 ♀.

No DATA: (U.S.N.M.), 2 ♂, 1 ♀.

***Tithorea harmonia pseudethra* Butler**

PARAGUAY: Neuva Italia (A.M.N.H.), 1 ♂.

BRAZIL: Sete Lagoas, Minas Gerais (M.C.Z.), 1 ♂, 1 ♀. Chapada [generalized] (C.M.), 1 ♂. Northeast of São Paulo (M.C.Z.), 2 ♂. São Paulo (A.M.N.H.), 1 ♂. Santa Maria de Taguatinga (A.M.N.H.), 1 ♀. Paz, Goyaz (M.C.Z.), 1 ♂. Without locality (M.C.Z.), 1 ♂.

No DATA: (U.S.N.M.), 1 ♂, 2 ♀.

***Elzunia humboldtii humboldtii* (Latreille)**

COLOMBIA: Cauca Valley (C.M.), 1 ♂. Region del Quindio (C.M.), 1 ♂. Manizales, Cauca Valley (M.C.Z., U.S.N.M.), 2 ♂. Santa Rita Valley. Caldas (U.S.N.M.), 1 ♂. Iraca (R.P.M.), 2 ♂. Neiva (R.P.M.), 4 ♂. Amazonas (purchased from O. Staudinger; collection U.S.N.M.), 1 ♂. Without locality (M.C.Z., U.S.N.M.), 2 ♂.

DOUBTFUL RECORDS: Caracas, Venezuela (R.P.M.), 1 ♂. Ecuador, without locality (U.S.N.M.), 1 ♂.

No DATA: (C.M., M.C.Z.), 2 ♂.

***Elzunia humboldtii albomaculata* (Haensch)**

ECUADOR: La Merced, Rio Pastaza (A.N.S.P.), 2 ♂, 2 ♀. Rio Pastaza, (A.M.N.H., U.S.N.M.), 2 ♂, 1 ♀. Rio Blanca (A.M.N.H., I.O.C., R.P.M.), 4 ♂. Hacienda San Francisco, Rio Mapoto (A.M.N.H.), 1 ♂. Macas (U.S.N.M.), 1 ♂. Yungilla (A.M.N.H., A.N.S.P., F.M.B., R.P.M.), 6 ♂, 2 ♀. Oriente (A.M.N.H., U.S.N.M.), 5 ♂.

***Elzunia cassandrina cassandrina* (Srñka)**

COLOMBIA: Without locality (A.M.N.H., A.N.S.P., U.S.N.M.), 6 ♂.

ECUADOR: La Merced, Rio Pastaza (A.N.S.P., U.S.N.M.), 16 ♂, 1 ♀. Macas (R.P.M.), 1 ♂. Rio

Napo (A.M.N.H., U.S.N.M.), 1 ♂, 1 ♀. Normandia near Macas (M.C.Z.), 1 ♂.

PERU: La Salud, Chanchamayo (R.P.M.), 1 ♂. Jevaros (R.P.M.), 1 ♂. Northeastern (H. Bassler station 6180 = Puerto Victoria, Rio Pachitea; collection A.M.N.H.), 1 ♂.

ERRONEOUS RECORD: Guayaquil, Ecuador (R.P.M.), 1 ♂.

No DATA: (M.C.Z., U.S.N.M.), 5 ♂.

***Elzunia cassandrina microguttata* (Röber)**

COLOMBIA: Mesopotamia, Antioquia (A.M.N.H.), 1 ♂.

***Elzunia bonplandii bonplandii* (Guérin)**

COLOMBIA: Bellavista (C.M.), 15 ♂. Choachi (C.M.), 7 ♂. Carmen de Yacopi (C.M.), 16 ♂, 3 ♀. Cauca (U.S.N.M.), 1 ♂. Santa Cruz (R.P.M.), 1 ♂. Pachó (R.P.M.), 1 ♂. Viota (R.P.M.), 2 ♂. Tunja (R.P.M.), 3 ♂. La Quirata, Rio Opon (A.M.N.H., C.M.), 2 ♂. Without locality (A.M.N.H., C.M., M.C.Z., U.S.N.M.), 16 ♂.

VENEZUELA: Pastoro [erroneous?] (R.P.M.), 2 ♂.

PERU: Northeastern (H. Bassler station F 6186; collection A.M.N.H.), 9 ♂.

ERRONEOUS RECORDS: Costa Rica (R.P.M.), 2 ♂. Honduras (R.P.M.), 1 ♂, 1 ♀. Nicaragua (R.P.M.), 3 ♂, 1 ♀.

No DATA: (A.M.N.H., A.N.S.P.), 2 ♂.

***Elzunia bonplandii descandollesi* (Staudinger)**

COLOMBIA: Mesopotamia, Antioquia (A.M.N.H., A.N.S.P.), 23 ♂ [9 are *descandollesi*, 11 are *latreillei*, 3 are transitional]. Bogota (generalized) (U.S.N.M.), 1 ♂. Without locality (U.S.N.M.), 4 ♂, 1 ♀.

ERRONEOUS RECORD: Brazil (M.C.Z.), 1 ♂.

No DATA: (C.M., M.C.Z., U.S.N.M.), 6 ♂.

***Elzunia tamasea* (Hewitson)**

COLOMBIA: Cauca Valley (C.M.), 2 ♂.

No DATA: (M.C.Z.), 1 ♂.

***Elzunia regalis regalis* (Stichel)**

COLOMBIA: Muzo (R.P.M.), 1 ♂. Bogota (M.C.Z.), 1 ♀.

***Elzunia regalis joiceyi* (Kaye)**

COLOMBIA: Without locality (A.M.N.H., A.N.S.P., M.C.Z., C.M.), 23 ♂.

No DATA: (M.C.Z., U.S.N.M.), 5 ♂.

***Elzunia pavonii* (Butler)**

ECUADOR: Huigra (A.M.N.H., A.N.S.P.), 12 ♂, 8 ♀. Dos Puntos (A.N.S.P.), 2 ♂. Portovelo, El Oro (A.M.N.H.), 1 ♂. Malacatos, Loja (A.M.N.H.),

1 ♂. Playas de Montevalvo, Los Rios (A.M.N.H., R.P.M.), 2 ♂. Arenillas (U.S.N.M.), 1 ♂. Balzabamba, Bolivar (A.M.N.H., R.P.M., U.S.N.M.), 4 ♂. San Eduardo (F. Campos; collection U.S.N.M.), 1 ♂. Loja (C.M., U.S.N.M.), 5 ♂, 1 ♀. Without locality (M.C.Z., R.P.M., U.S.N.M.), 6 ♂.

PERU: Llangua, Cajamarca (C.M.), 5 ♂, 3 ♀. Northern (A.M.N.H.), 3 ♂.

ERRONEOUS RECORDS: Ambata, Ecuador (M.C.Z.), 1 ♂. Rio Pastaza, Ecuador (M.C.Z.), 1 ♂, 1 ♀. Eastern Ecuador (F. Campos; collection U.S.N.M.), 1 ♂, 1 ♀. Cauca, Colombia (R.P.M.), 1 ♂.



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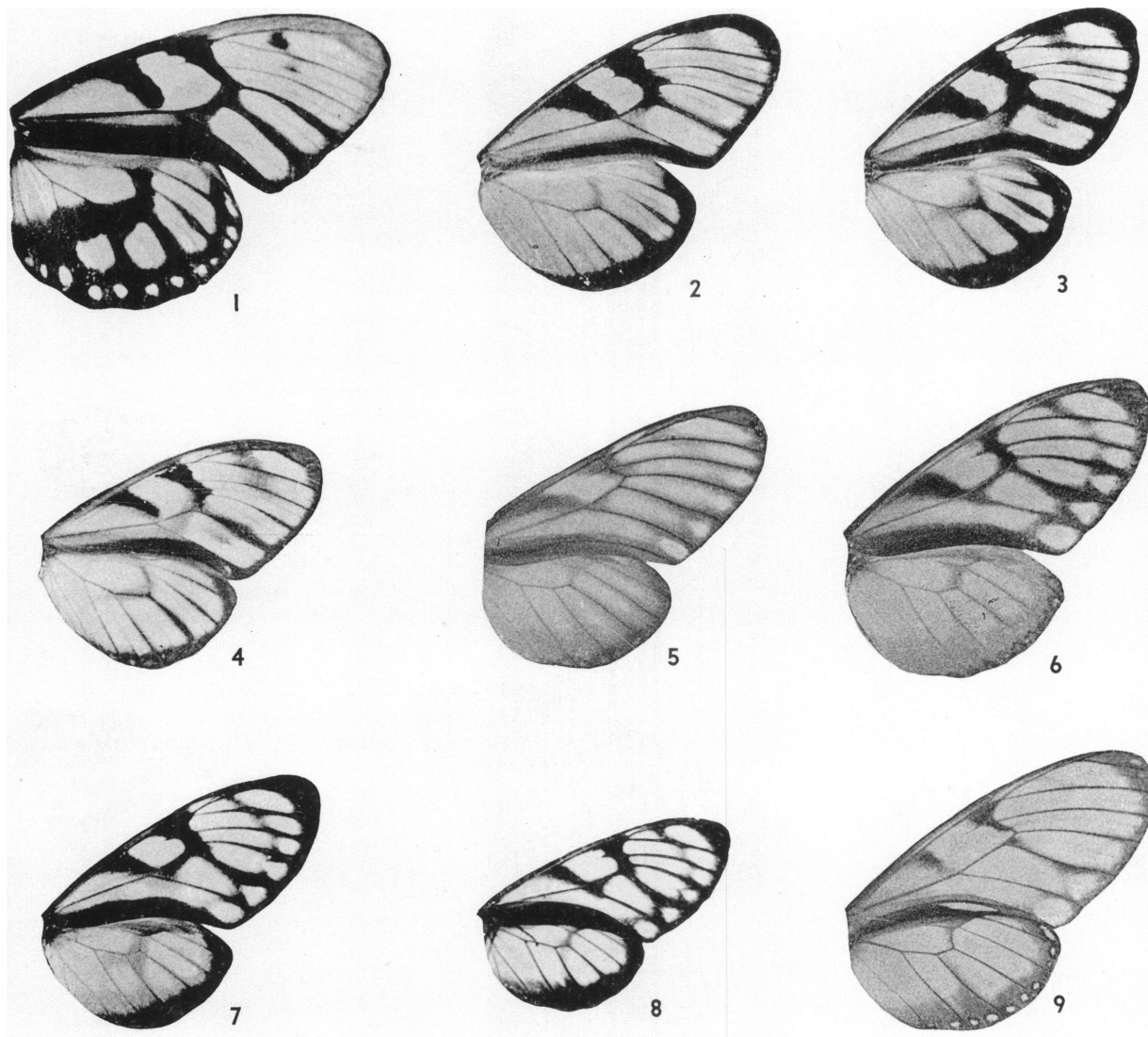
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1. *Roswellia acrisione acrisione* (Hewitson). Upper side of male from La Merced, Rio Pastaza below Banos, Ecuador, W. J. Coxey, collector, in Academy of Natural Sciences of Philadelphia

2. *Athesis clearista clearista* Doubleday and Hewitson. Upper side of male from Cumanacoa, Sucre, Venezuela, G. Netting, collector, in Carnegie Museum

3. *Athesis clearista colombiensis* Kaye. Upper side of female from mountains of Bogota, Colombia, in Carnegie Museum

4. *Athesis clearista vitrala* Kaye. Upper side of female from Abitagua, Ecuador, in United States National Museum

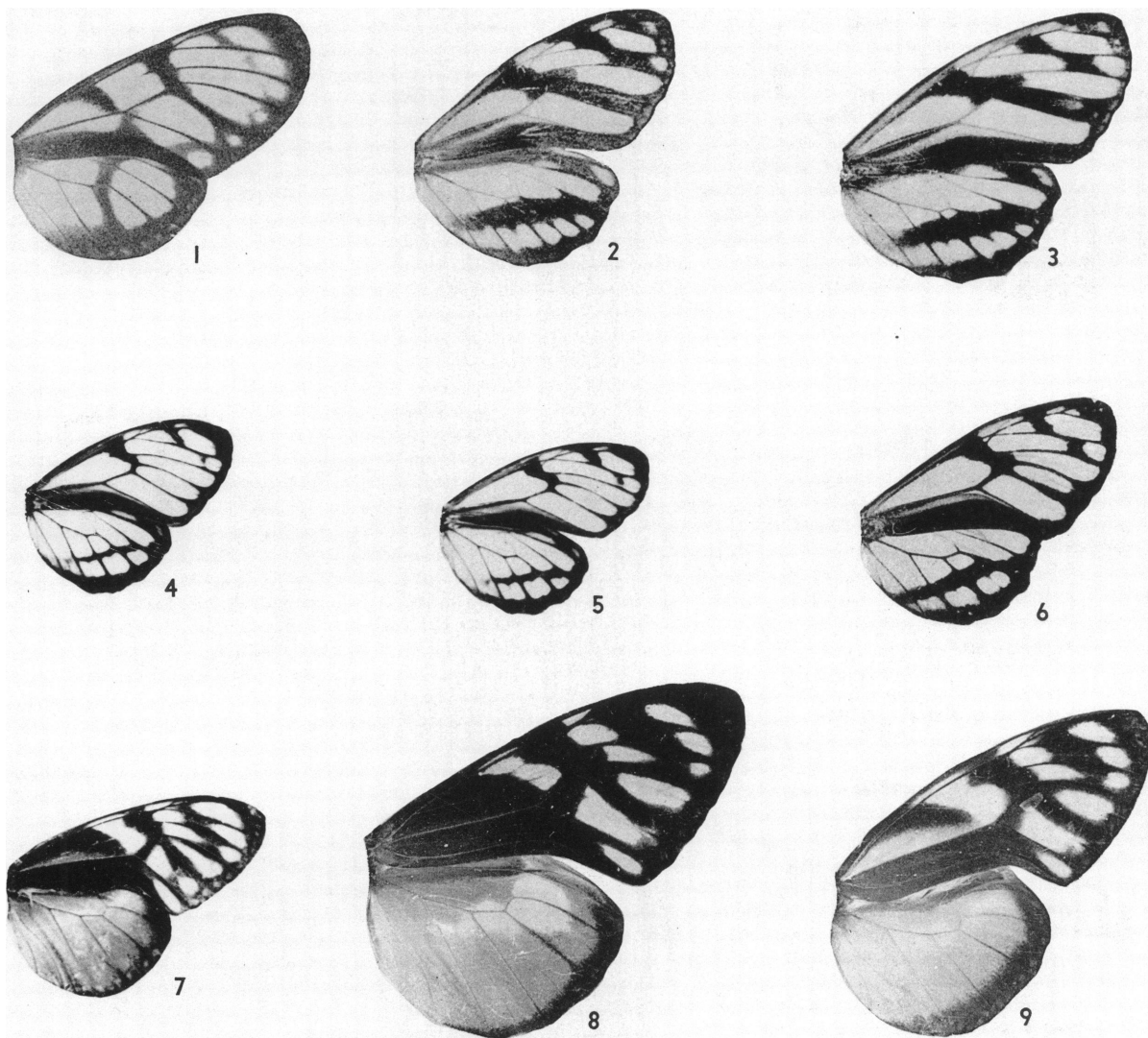
5. *Eutresis dilucida* Staudinger. Upper side of male from Chiriqui, Panama, determined by Staudinger, in Carnegie Museum

6. *Eutresis hypereia theope* Godman and Salvin. Upper side of male from Chiriqui, Panama, in Academy of Natural Sciences of Philadelphia

7. *Eutresis hypereia hypereia* Doubleday and Hewitson. Upper side of male from Las Quiguas, Esteban Valley, northern Venezuela, in Carnegie Museum.

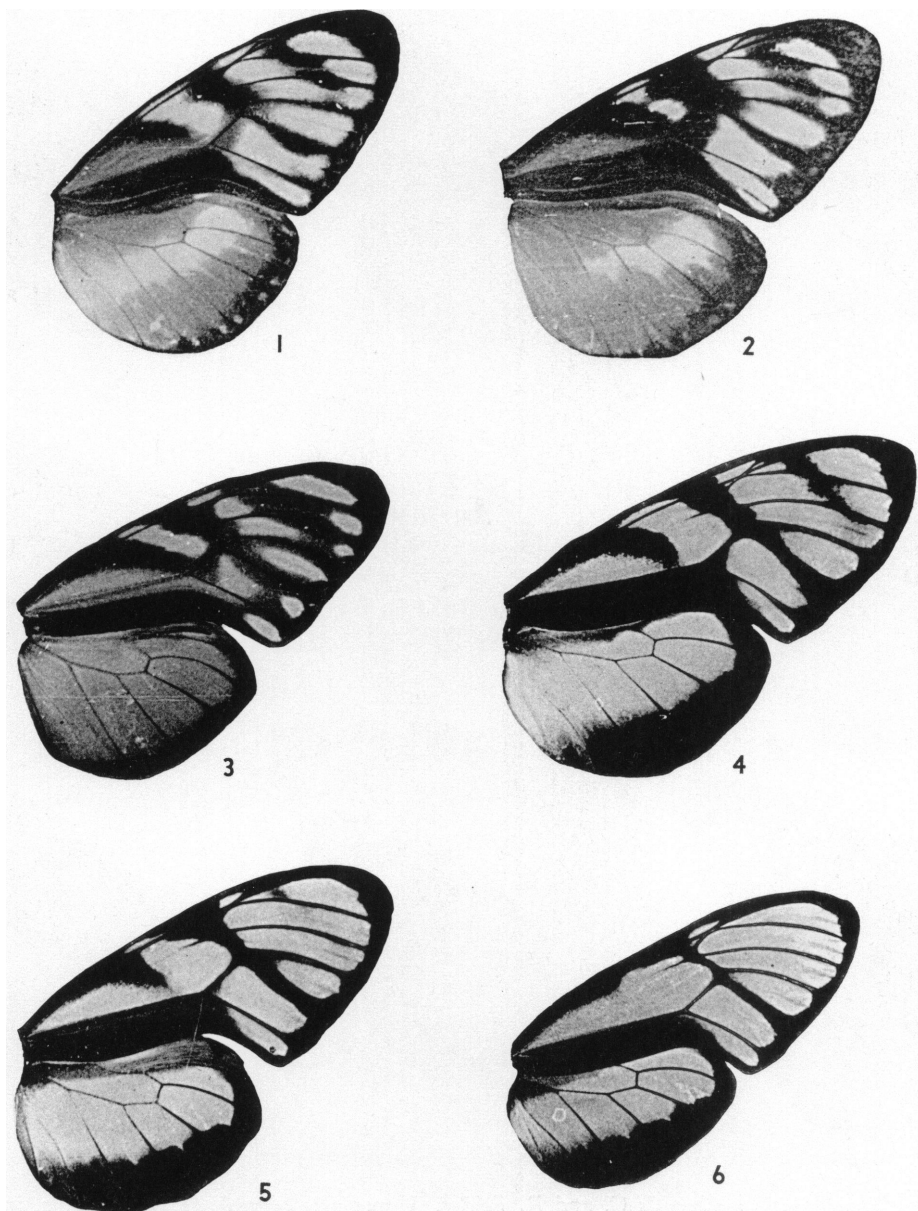
8. *Eutresis hypereia hyspa* Godman and Salvin. Upper side of holotype male from Jorge, Ecuador, C. Buckley, collector, in British Museum (Natural History)

9. *Eutresis hypereia banosana*, new subspecies. Under side of holotype male from Banos, Tungurahua, Ecuador, F. M. Brown, collector, in the American Museum of Natural History



1. *Eutresis hypereia imitatrix* Staudinger. Upper side of male from "8 days north of Cochabamba, Bolivia," A. G. Weeks, collector, in Museum of Comparative Zoölogy
2. *Patricia dercyllidas dercyllidas* (Hewitson). Upper side of female from Region del Quindio, Colombia, in Carnegie Museum
3. *Patricia dercyllidas hazelea*, new subspecies. Upper side of paratype female from San Pablo, near Banos, Ecuador, F. M. Brown, collector, in Reading Public Museum
- 4, 5. *Patricia oligyrtis oligyrtis* (Hewitson). 4. Upper side of holotype female from Ecuador, in British Museum (Natural History). 5. Upper side of allotype female of *Athesis demylus* Godman and Salvin, from Sarayacu, Ecuador, C. Buckley, collector, in British Museum (Natural History)
6. *Patricia oligyrtis hewitsonii* (Srnka). Upper side of male from Coroico, Bolivia, A. G. Weeks, collector, in Museum of Comparative Zoölogy
7. *Olyras crathis staudingeri* Godman and Salvin. Upper side of male holotype from Costa Rica, in Druce collection, British Museum (Natural History)
8. *Olyras crathis montagui* Butler. Upper side of female from Rio Bamba, Ecuador, in Reading Public Museum
9. *Olyras crathis crathis* Doubleday and Hewitson. Upper side of male from Las Quiguas, Venezuela, in Carnegie Museum





1. *Olyras crathis weeksi*, new subspecies. Upper side of holotype female from Ecuador, in Weeks collection, Museum of Comparative Zoölogy

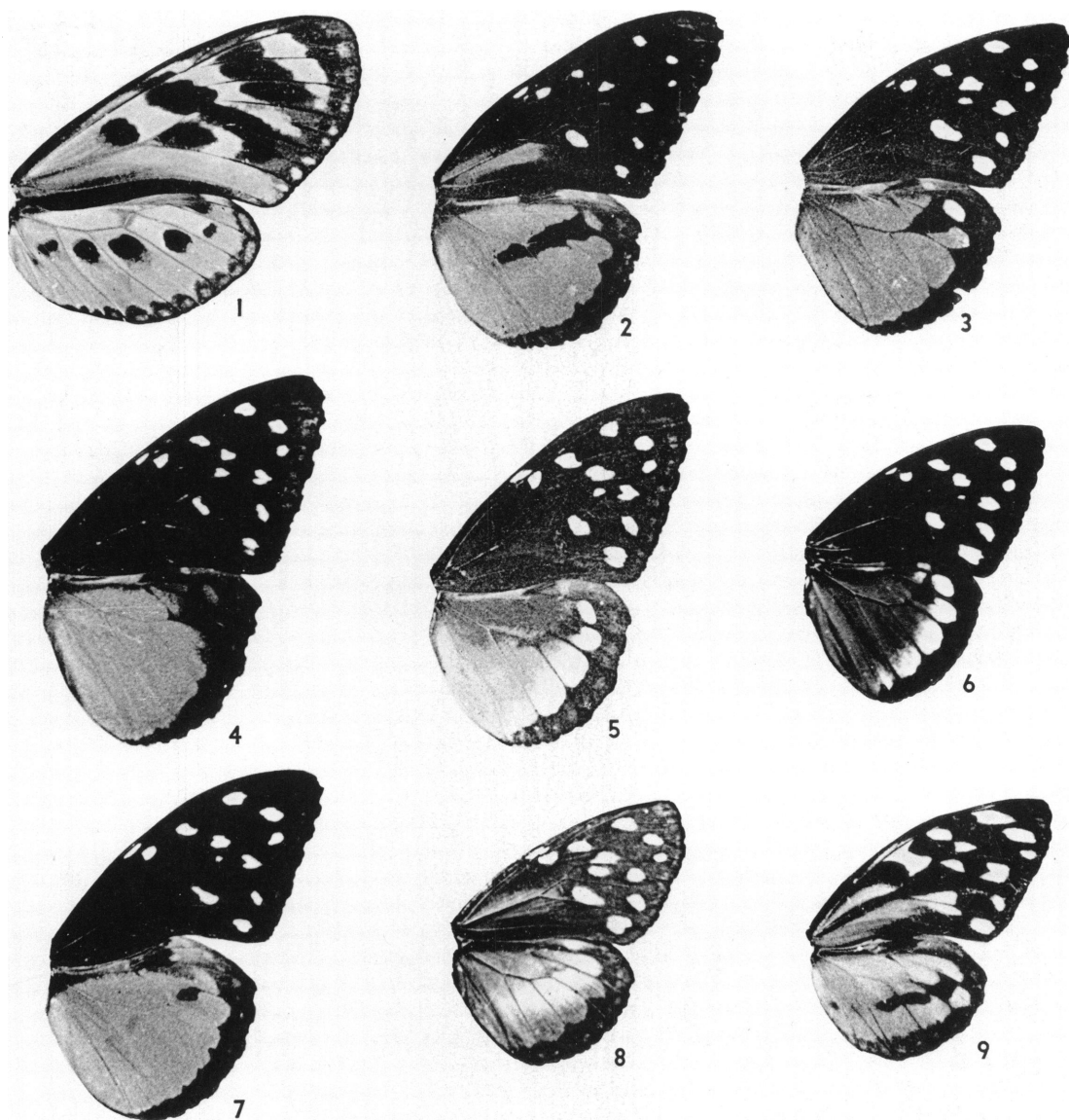
2. *Olyras crathis sticheli* Haensch. Upper side of female from Tingo Maria, Peru, in Reading Public Museum

3. *Olyras theon* Bates. Upper side of male from Guatemala in Carnegie Museum

4. *Olyras insignis insignis* Salvin. Upper side of male from Guapiles, Costa Rica, in Carnegie Museum

5. *Olyras insignis praestans* Godman and Salvin. Upper side of male from Colombia in Museum of Comparative Zoölogy

6. *Olyras insignis translucens* Hewitson. Upper side of male from Santo Domingo de los Colorados, Pichincha, western Ecuador, D. B. Laddey, collector, in the American Museum of Natural History



1. *Athyrthis mechanitis mechanitis* C. and R. Felder. Upper side of male from Colombia, in United States National Museum

2. *Tithorea tarricina duenna* Bates. Upper side of male from Guatemala, W. Schaus, collector, in Carnegie Museum

3. *Tithorea tarricina pinthias* Godman and Salvin. Upper side of male from Guapiles, Costa Rica, W. Schaus, collector, in Carnegie Museum

4-6. *Tithorea tarricina tarricina* Hewitson. 4. Upper side of typical male from Rio San Joaquin, Cauca, Colombia, in the American Museum of Natural History. 5. Upper side of male *T. hecalesina* Godman and Salvin, from Region del Quindio, Colombia, in Carnegie Museum. 6. Upper side of holotype male of *T. parola* Godman and Salvin, from Cauca, Colombia, in the British Museum (Natural History)

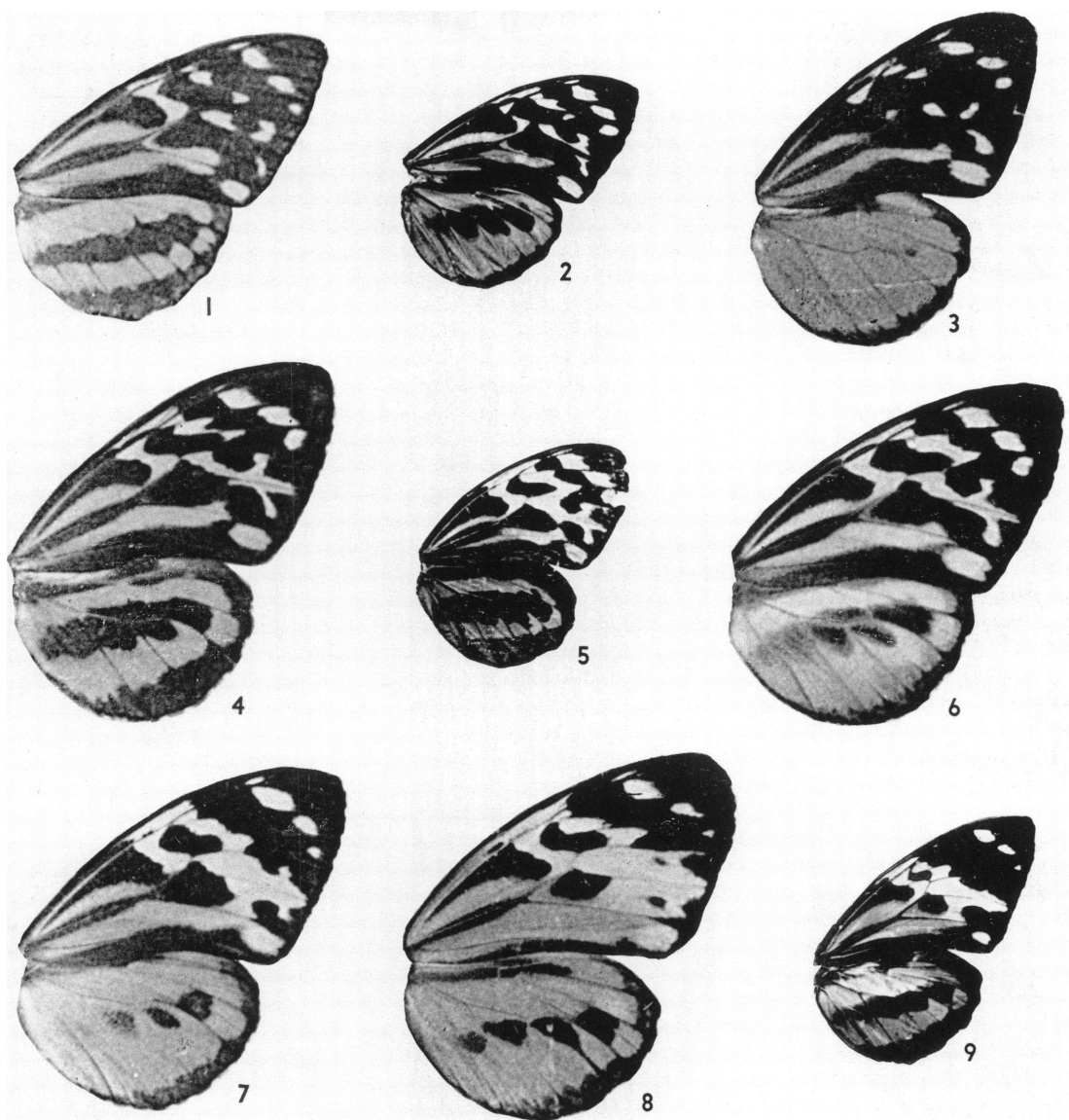
7. *Tithorea tarricina bonita* Haensch. Upper side of male from Jepelacio, San Martin, Peru, G. Klug, collector, in Reading Public Museum

8. *Tithorea tarricina tagarma* Hewitson. Upper side of holotype female from Bolivia, in the British Museum (Natural History)

9. *Tithorea harmonia salvadoris* Staudinger. Upper side of male from Escuintla, Chiapas, Mexico, in Academy of Natural Sciences of Philadelphia



1. *Tithorea harmonia hippothous* Godman and Salvin. Upper side of holotype male from Guatemala, in the British Museum (Natural History)
2. *Tithorea harmonia helicaon* Godman and Salvin. Upper side of holotype male from Costa Rica, in the British Museum (Natural History)
3. *Tithorea harmonia irene* (Drury). Under side of male from Albrook Field, Panama Canal Zone, R. Q. Bliss, collector, in Reading Public Museum.
4. *Tithorea harmonia furia* Staudinger. Upper side of male from San Esteban, Venezuela, S. M. Klages, collector, in Carnegie Museum
5. *Tithorea harmonia furina* Godman and Salvin. Upper side of male from La Soledad, Rio Opon region, Boyaca, Colombia, in the American Museum of Natural History.
6. *Tithorea harmonia deltana*, new subspecies. Upper side of male holotype from Tucupito, delta Amercuro, Venezuela, in the American Museum of Natural History
7. *Tithorea harmonia megara* (Latreille). Under side of male from Trinidad, in Carnegie Museum
8. *Tithorea harmonia harmonia* (Cramer). Upper side of male from Cottica, French Guiana, in Reading Public Museum
9. *Tithorea harmonia cuparina* Bates. Upper side of male holotype from Cupari, Rio Tapajos, Brazil, in the British Museum (Natural History)



1. *Tithorea harmonia manabiana*, new subspecies. Upper side of holotype male from Palmar, Manabi, western Ecuador, D. B. Laddey, collector, in the American Museum of Natural History

2, 3. *Tithorea harmonia hermius* Godman and Salvin. 2. Upper side of holotype male from Ecuador, C. Buckley, collector, in British Museum (Natural History). 3. Upper side of male of *T. napona* Haensch from Ecuador, W. von Hagen, collector, in the American Museum of Natural History

4. *Tithorea harmonia martina*, new subspecies. Upper side of male holotype from Rioja, Rio Seco, western Peru, F. Woytkowski, collector, in Carnegie Museum

5. *Tithorea harmonia egaensis* Butler. Upper side of holotype female from Ega, Amazons, H. Bates, collector, in the British Museum (Natural History)

6. *Tithorea harmonia neitha* Hoppfer. Upper side of male from Candalara la Mar, Ayachucha, Peru, F. Woytkowski, collector, in Carnegie Museum

7, 8. *Tithorea harmonia pseudonyma* Staudinger. 7. Upper side of typical male. 8. Upper side of male of *Hirsutiis lateflava* Haensch. Both from Rio Yapacani, eastern Bolivia, J. Steinbach, collector, in Carnegie Museum

9. *Tithorea harmonia pseudethra* Butler. Upper side of holotype male from Brazil, in British Museum (Natural History)



1, 2. *Elzunia humboldtii humboldtii* (Latreille). Male from Region del Quindio, Colombia, in Carnegie Museum. 1. Upper side. 2. Under side

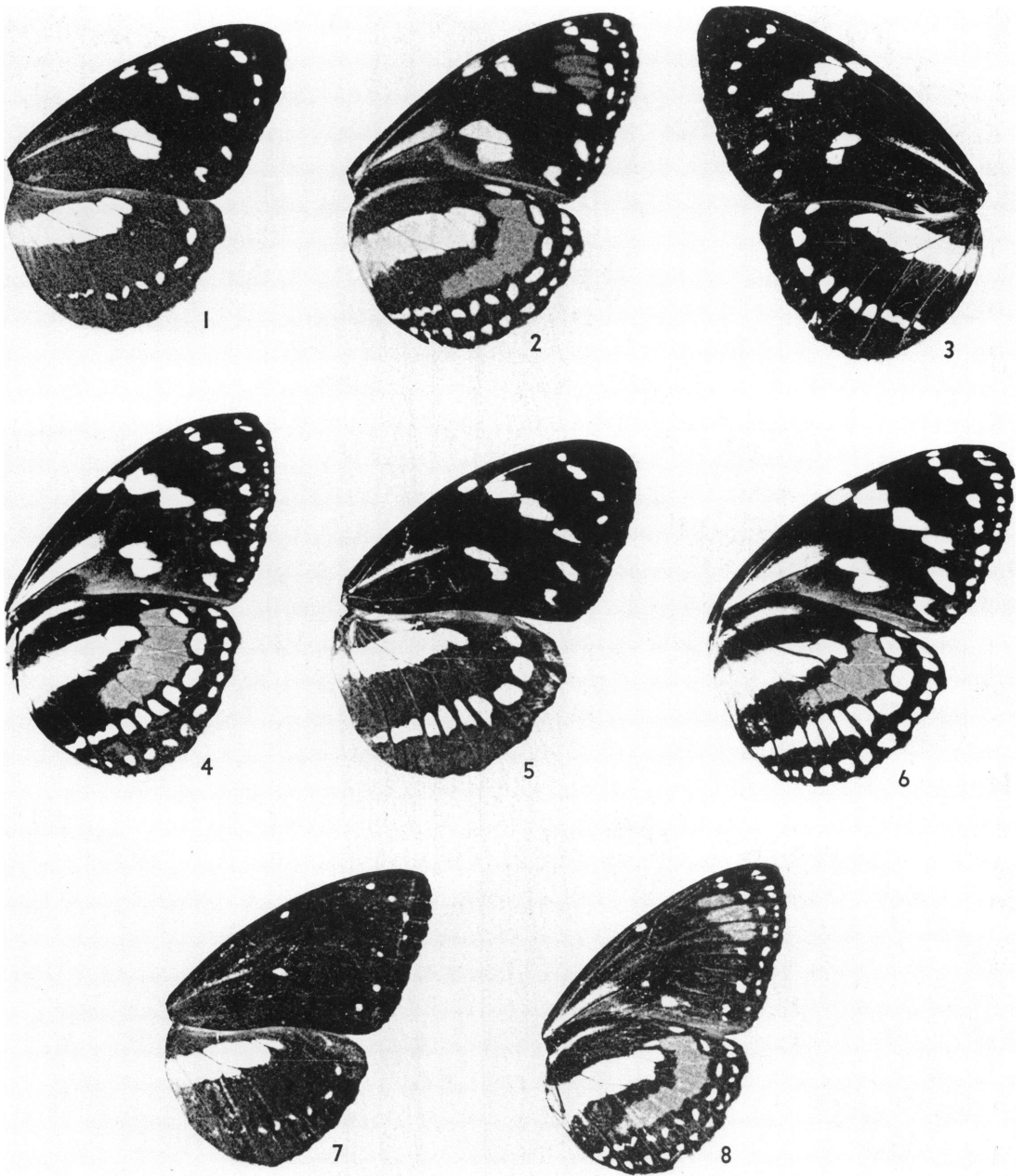
3, 4. *Elzunia humboldtii albomaculata* (Haensch). Male from La Merced, Rio Pastaza below Banos, Ecuador, W. J. Coxey, collector, in Academy of Natural Sciences of Philadelphia. 3. Upper side. 4. Under side.

5. *Elzunia humboldtii judsoni*, new subspecies. Upper side of holotype male from northeastern Peru, station F 6186 (probably Rio Putumayo), H. Bassler, collector, in the American Museum of Natural History

6, 7. *Elzunia cassandra cassandra* (Snka). Male from La Merced, Rio Pastaza below Banos, Ecuador, W. J. Coxey, collector, in Academy of Natural Sciences of Philadelphia. 6. Upper side. 7. Under side

8, 9. *Elzunia cassandra microguttata* (Rober). Male from Mesopotamia, Antioquia, Colombia, in the American Museum of Natural History. 8. Upper side. 9. Under side

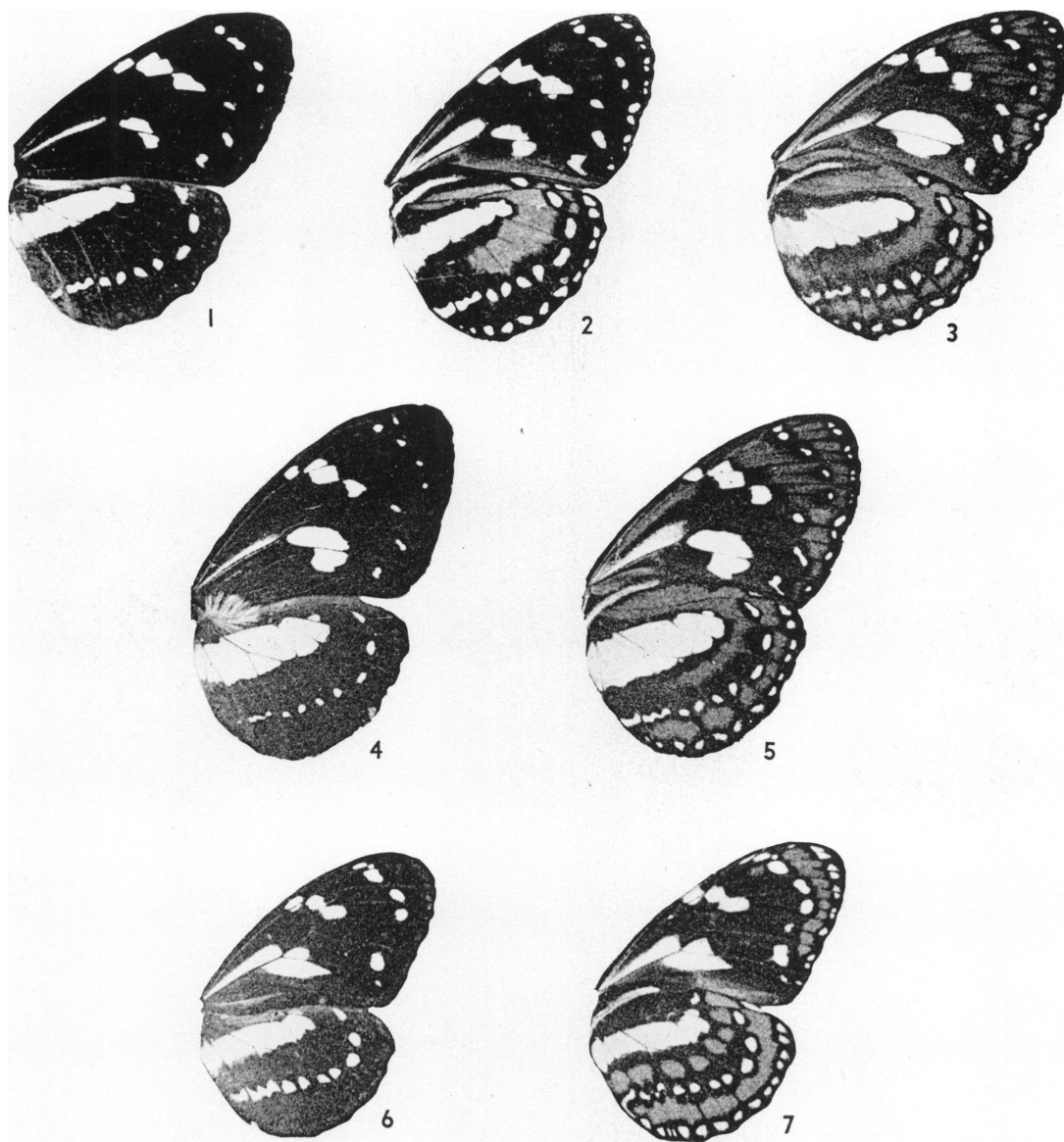




1, 2. *Elzunia bonplandii bonplandii* (Guérin). Male from Bellavista, Colombia, in Carnegie Museum. 1. Upper side. 2. Under side

3-6. *Elzunia bonplandii descandollesi* (Staudinger). Two males from Mesopotamia, Antioquia, Colombia, in the American Museum of Natural History. 3. Upper side of typical male. 4. Under side of typical male. 5. Upper side of male *Tithorea latreillei* Staudinger. 6. Under side of male *Tithorea latreillei* Staudinger

7, 8. *Elzunia tamasea* (Hewitson). Male without locality data, in Museum of Comparative Zoölogy. 7. Upper side. 8. Under side



1, 2. *Elzunia atahualpa*, new species. Holotype male from northeastern Peru, station F 6186 (probably Rio Putumayo), H. Bassler, collector, in the American Museum of Natural History. 1. Upper side. 2. Under side

3. *Elzunia regalis regalis* (Stichel). Under side of male from Muzo, Colombia, in Reading Public Museum

4, 5. *Elzunia regalis joiceyi* (Kaye). Male from Colombia, in the American Museum of Natural History. 4. Upper side. 5. Under side

6, 7. *Elzunia pavonii* (Butler). Male from Llangua, Cajamarca, western Peru, F. Woytkowski, collector, in the Carnegie Museum. 6. Upper side. 7. Under side









