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A REVISION OF THE GENUS *PHÆBIS* (LEPIDOPTERA)

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INTRODUCTION

The great variations and overlapping of forms in both sexes of the numerous species usually referred to as *Callidryas*, or *Catopsilia*, have made the group rather puzzling to taxonomists. A. G. Butler, in 1878, published the first really comprehensive review in his 'Lepidoptera Exotica,' later published as a 'Monograph of the Genus *Callidryas*.' Godman and Salvin in their part of the 'Biologica Centrali-Americana' have followed this revision fairly closely. Roeber in Seitz's 'Macrolepidoptera of the World,' volume V, has disregarded the previous works and reverted to the use of a single genus for the group. In addition, he has confused the relationship of several superficially similar species. Forbes, in a very brief key, recently published, has grouped the species into subgenera but follows the pre-Butler concept of a single genus.

With the exception of Roeber, each of the aforementioned authors has subdivided the species into groups fairly uniform within themselves, but each has considered the values of those groups differently. According to Butler's scheme there are four genera covering five groups. Godman and Salvin have split off a sixth group and erected a genus on it. Forbes recognizes two more groups, eight in all, but considers them all subgroups of a single genus. I agree with Forbes' grouping, but do not consider the Old World species and the *menippe* group as even closely allied to the general group under discussion. A study of the structure and immature stages of the Old World group (*Catopsilia*) shows it to be related to the eurymoid rhodocerids, and *menippe* to be the New World representative of the *Catopsilia* group of genera.

If, instead of regarding any one group of characters as predominant in generic value, we consider the various groups in their interrelationships, we find the species fall rather well into three of Butler's groups. These resolve themselves into three genera. One, *Catopsilia*, with the Asiatic *crocale* as its type, encompassed the entire Old World group and none of the New World forms. Since *Catopsilia* must be reserved for the

Old World group, which is only distantly related to the New World group, we must seek the proper generic name for the American species. *Callidryas* Boisduval has been used by many authors and would be suitable, but *Phæbis*, used in 1816 by Huebner, antedates it by probably thirteen years, and therefore must be used. In 1873 Butler designed *argante* as the type species. The generic names that have been suggested from time to time are listed below with the date of their publication, authors, and type species.

1816	<i>Phæbis</i>	Huebner	<i>argante</i>
1829	<i>Callidryas</i>	Boisduval	<i>eubule</i>
1873	<i>Metura</i>	Butler (nec Walker)	<i>cipris</i>
1873	<i>Aphrissa</i>	Butler	<i>statira</i>
1889	<i>Rhabdodryas</i>	Godman and Salvin	<i>trite</i>
1896	<i>Parura</i>	Kirby (for <i>Metura</i>)	<i>cipris</i>
1920	<i>Prestonia</i>	Schaus	<i>clarki</i>

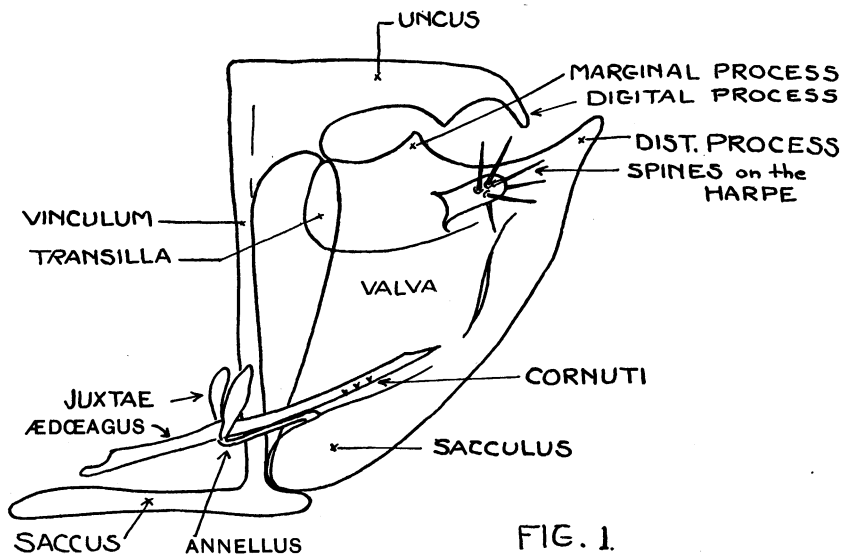


FIG. 1.

1. Labelled diagram of a hypothetical male armature.

Phæbis and *Aphrissa*¹ suffice for the New World forms. In studying the groups I have found that the structure of the genital armatures, especially in the males, is very useful not only in respect to specific value, but generic as well. Even a cursory glance at the slides of the male

¹Only the genus *Phæbis* is covered here; *Aphrissa* will appear in a future paper.

armature of the type species of the groups, *Catopsilia crocale*, *Phæbis argante* and *Aphrissa statira*, shows the generic value of a genitalic study in these groups.

I have had the opportunity of making and studying a series of slides, several hundred in number, that includes every American species and race. From these I have chosen the most representative in each case to be used for the figures accompanying the text. The terms applied are, so far as possible, those used by Dr. Carl Heinrich in his various studies of genitalia. However, to allay any misunderstanding and to illustrate my interpretation of the terms, I have made a labelled diagram of a typical male genital armature.

KEYS

This group of insects presents a difficult task in the erection of a key for the separation of the two genera recognized, except in the case of the male armature; all other characters are extremely uniform or extremely variable and an encompassing key for them would be unwieldy.

KEY TO MALES, BASED ON GENITALIA

1. Harpes clothed with heavy, loosely attached spines; juxtæ filamentous (*Phæbis*).....2.
- Harpes otherwise; juxtæ leaf-like (*Aphrissa*).....11.
2. Cephalad margin of transilla armed with a heavily spined pad (*labides*?)...3.
- Cephalad margin of transilla unarmed.....4.
3. Marginal process absent.....*trite*.
- Marginal process pronounced.....*agarithe*.
4. Uncus blade-like; digital process very small, if present.....5.
- Uncus slender, with pronounced digital process.....6.
5. Distal process long and slender.....*philea*, *thalestris*.
- Distal process absent or obscure.....*avellameda*.
6. Spines on harpes notched.....*eubule*.
- Spines on harpes not notched.....7.
7. *Ædæagus* with very obscure cornuti; harpes sparsely armed with long, heavy spines.....8.
- Ædæagus* with two or more cornuti; harpes densely armed distally with short spines.....10.
8. Harpes very simple, club-like, armed with one patch of spines.....9.
- Harpes foot-like, armed on "heel" and "toe" with spines.....*cypris*.
9. Distal process double.....*rurina*.
- Distal process single.....*virgo*.
10. Distal process much longer than marginal process; harpes usually club-like.
argante.
- Distal process about as long as marginal process; harpes usually foot-shaped.
agarithe.

- | | |
|-------------------------------------------|--------------------|
| 11. Harpes blade-like, serrate-edged..... | 13. |
| Harpes not blade-like..... | 12. |
| 12. Harpes a single bent rod..... | <i>orbis.</i> |
| Harpes biramous..... | <i>godartiana.</i> |
| 13. Uncus trifurcate at tip..... | <i>hartonia.</i> |
| Uncus simple at tip..... | <i>statira.</i> |

COLOR KEY TO IDENTIFICATION OF MALES

- | | |
|-------------------------------------------------------------------------------------------|--------------------------------------------|
| 1. Species tailed..... | 13. |
| Species without tail..... | 2. |
| 2. Under side of forewing with spots arranged in a straight, diagonal line..... | 3. |
| Underside of forewing otherwise..... | 4. |
| 3. Ground color orange..... | <i>agarithe.</i> |
| Ground color yellow..... | <i>trite.</i> |
| 4. No sex-patches at bases of wings..... | 5. |
| Sex-patches at bases of wings..... | 6. |
| 5. Yellow, narrow, chalky marginal band..... | <i>eubule.</i> |
| White, lemon-yellow toward base, broad, chalky marginal band..... | <i>statira f. etiolata and f. schausi.</i> |
| 6. Secondaries with long, hair-like scales at base..... | 7. |
| Secondaries without such a fringe of "hair"..... | 8. |
| 7. Almost immaculate beneath..... | <i>agarithe mazima.</i> |
| Not immaculate beneath..... | <i>argante.</i> |
| 8. Broad, chalky, scaled, marginal band extending about halfway across the forewing..... | 11. |
| Chalky margin may be broad apically but narrow at the outer angle of the forewings..... | 9. |
| 9. Much red scaling across the disc of the forewing..... | <i>avellaneda.</i> |
| Some orange scaling across the disc of the forewing..... | 10. |
| 10. With a large black spot on the discoidal vein of the forewing; from the Antilles..... | <i>thalestris.</i> |
| Without such spot, or with the spot greatly reduced; mainland..... | <i>philea.</i> |
| 11. Ground color of forewing same as of hind wing..... | <i>statira, hartonia.</i> |
| Ground color of forewing not the same as of hind wing..... | 12. |
| 12. Forewing with orange spot..... | <i>orbis.</i> |
| Forewing with yellow spot..... | <i>godartiana.</i> |
| 13. Marginal, chalky scales of hind wing appearing to be same color as other scales..... | 14. |
| Marginal, chalky scales of hind wing appearing lighter colored than other scales..... | <i>cypris.</i> |
| 14. Central American..... | <i>intermedia.¹</i> |
| South American..... | <i>rurina.¹</i> |

The females are so variable and so little known, that I prefer not to key them as yet. Dr. Forbes's paper contains as adequate a key as is possible to construct from our present knowledge.

¹Although genitally different, I am unable to find any consistent color characters with which to separate these forms. See figures 29 and 32.

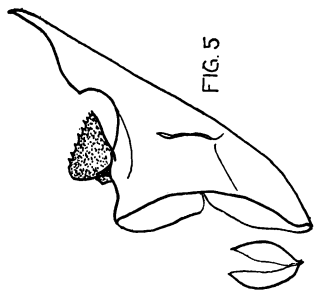


FIG. 5

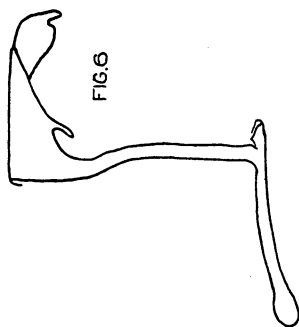


FIG. 6



FIG. 7

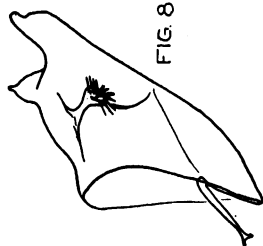


FIG. 8

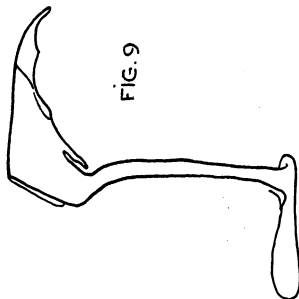


FIG. 9



FIG. 10



FIG. 2

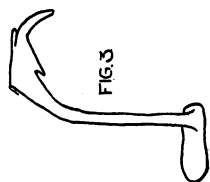


FIG. 3

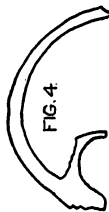


FIG. 4

2. Valva of *Catopsilia crocale*.
3. Uncus, etc., of *Catopsilia crocale*.
4. Aedeagus of *Catopsilia crocale*.
5. Valva of *Aphrissa statira*.
6. Uncus, etc., of *Aphrissa statira*.
7. Aedeagus of *Aphrissa statira*.
8. Valva of *Phaebis eubule*.
9. Uncus, etc., of *Phaebis eubule*.
10. Aedeagus of *Phaebis eubule*.

PHÆBIS Huebner

This large genus may be divided into five groups of species, four of which have at times been given separate generic or subgeneric standing. Of these subgroups, only *Rhabdodryas* Godman and Salvin seems worthy of recognition, apart from *Phæbis* proper as a subgenus. The salient characters of the male armature may be briefly set forth as follows:

Valvæ crudely subtriangular; harpes prominent (differing from *Catopsilia*); distal process prolonged (quite short in *eubule*, *rurina*, and obscure in *avellaneda*); marginal process prominent (except in *trite*); annellus slender; juxtæ broadly filamentous, never leaf-like (differing from *Catopsilia* and *Aphrissa*). Uncus and saccus each simple and about equal in length (saccus the longer in *trite*), no dorsal lobe on the uncus (differing from *Catopsilia*); scaphium absent; vinculum slender. *Ædæagus* slender, straight or undulating, never sickle-shaped as in *Catopsilia*; distal end semilanceolate; several cornuti in the distal portion.

The palpi of both sexes are short and thick (differing from *Aphrissa*). The margins of the wings of the males broadly bordered with mealy scales varying in width with the species. The males with a sex-patch or pencil of hair, or both, above the subcosta of the hind wings, except in *eubule* which has neither, and in *philea* and *avellaneda*, where sex-patches are found on both wings.

The division of the group into subgenera has usually been based on the extent of the mealy scales on the wings and the various combinations of sex-patches and hair-pencils at the bases of the wings. If we were to accept all of the subgenera proposed, it would not be long before each species would stand alone in a subgenus of its own. It is unfortunate that many of the modern taxonomists can not recognize slight structural differences as specific, but must erect a new subgenus or genus to accommodate them. With the species concept broadening and the generic narrowing, it may not be long before the ultra-taxonomist will find the term species synonymous with subgenus.

There are apparently eight groups of forms in this genus that are sufficiently different to be considered species. They are *P. eubule*, *P. philea*, *P. avellaneda*, *P. argante*, *P. agarithe*, *P. rurina*, *P. neocipris*, and *P. trite*. In addition to the notes upon the male armature and the descriptions of newly recognized forms, I have included short discussions of the forms and races. The general laws of zoological nomenclature have been followed throughout. The races have been named by carefully considering material from the type localities when available.

***Phæbis eubule* Linnæus**

Valvæ crudely subtriangular; distal process short, bicuspid, the inner spur always prominent, the outer usually obscure and smoothly rounded, rarely equally prominent; marginal process always present, variable in outline, usually blunt or flat-topped, occasionally devoid of the terminal thorn, rarely acutely triangular; harpes small, simple, slightly curved, distal portion armed with many short, sturdy, loosely attached spines notched at the tip. Uncus rather long and slender, the distal end prolonged into a long curved digital process varying slightly in proportion and degree of curvature; vinculum rather heavy; saccus stocky, about as long as the uncus. *Ædeagus* straight or slightly curved, usually slender; two cornuti in the distal third.

An analysis of about one thousand specimens with data, in The American Museum of Natural History, the Museum of Comparative Zoölogy, and the author's collection results in the following considerations.

P. eubule and its related forms are found throughout the entire American tropics and extends well into the north and south temperate zones. As might be expected, such a wide distribution over diverse areas has caused considerable variation and given rise to several races. Those inhabiting the eastern United States may be referred to as *P. eubule eubule* Linnæus. This has two forms, the nymotypical appearing in the southern states in the spring and autumn, and form *drya* Fabricius occurring throughout the racial range in the latter season. The last-named form is the one taken in the northeastern states. The under surface of the males of *drya* shows only a few traces of the normal markings, and the females similarly show a great reduction and usually some slight suffusion of the markings. The types of both forms were probably taken in the Carolinas.

The Antillean race, *P. eubule sennæ* Linnæus, is readily distinguished by the intensity of the markings as well as the distribution. The females are particularly recognizable by the submarginal and subcostal row of brown spots on the upper surface that is always present, rarely only in traces. In addition, the marginal markings terminating the nervures are much heavier, and in the forewing usually form a continuous band serrate on the inner edge. Below, both sexes show a very definite series of fine, short, wavy, Indian-red lines covering the entire hind wing and the marginal and costal areas of the forewing through which the pattern distinctly shows. Occasionally these lines are faint. Linnæus' type was from Jamaica.

The tropical race, as used here, extending from central and northern South America through Central America and Mexico to Arizona may

possibly represent two races. I have, however, been unable to find tangible characters that will separate them. This race may be called *P. eubule marcellina* Cramer. To it I refer *pallida* Cockerell for the females in which the ground color has been reduced to white; *yamana* Reakirt is merely an intermediate transitional to *pallida*. The race *P. e. marcellina* differs from the preceding in that the typical females are much more intensely marked, the hind wings often being orange in color, a thing rarely, if ever, occurring in *sennæ* or *eubule*. Females of this race are found in almost any shade between the dark burnt-orange of occasional specimens and the pure white of the typical *pallida* form. The males are lighter colored than the females and show considerable marking beneath. The fully typical *marcellina*, as figured by Cramer, is rare. I have seen but one, from Honduras, in a series of several hundred of this race. The male aberration *schausi* Oberthür belongs to this race. The name applies to those males in which the markings of the underside of the hind wings are suffused across the disc and form a row of broad marks extending toward the base.

The forms from the southern part of South America closely resemble the race *P. eubule eubule* and live under similar climatic conditions. To this race I apply the name *amphitrite* Fiethamel (not Blanchard as stated by Butler). It was described from Chili. *P. giacomelli* Köhler is merely a very small male and from the scant description is of the typical form. A future paper will be devoted to a more thorough study of the synonymy and biologic relationship of the forms of this species.

These various races and forms may be catalogued as follows:

- a. *Phæbis eubule eubule* Linnæus (North Temperate race)
 - f. *drya* Fabricius
- b. *Phæbis eubule sennæ* Linnæus (West Indian race)
 - f. ♀ *sennalba*, new form
- c. *Phæbis eubule marcellina* Cramer (Tropical race)
 - f. ♀ *pallida* Cockerell
 - ab. ♂ *schausi* Oberthür
- d. *Phæbis eubule amphitrite* Feisthamel (South Temperate race)

***Phæbis eubule sennæ* female form *sennalba*, new form**

ABOVE.—White, with faintly greenish or buff cast. Margin of forewing narrowly brown, serrate on the inner edge, indentations in border at terminals of nervures. Apex and costa brown, decreasing in intensity along the costa toward the base; a subcostal row of three and a submarginal row of five or six patches of brown scales decreasing in intensity toward the anal margin; discal spot on vein between M_2 and M_3 . Margin of hind wings with patches of brown scales at the terminals of the nervures, patches almost contiguous.

BELOW.—Very faintly greenish yellow, except the anal area of the forewing which is white, and the very base of both wings which is buff-yellow to light cadmium-yellow. Maculation as in typical females, except lighter and more diffuse. No fine wavy lines of Indian red as in the typical females.

HOLOTYPE.—Female, taken 7 kilometers north of Viñales, Cuba, September 16-22, 1913, (Lutz).

PARATYPES.—One female, Cristo, Ornte, Cuba, October 3, 1913, (Lutz); one female, San Juan, Porto Rico, July 1-5, 1915, (Lutz and Mutchler).

All types in The American Museum of Natural History.

The nymotypical *eubule* has been named as the type of the genus *Callidryas*. The following two species are usually considered members of this group. They have, however, been separated into a subgroup by Forbes, which he does not consider worthy of a name. The separation is based on the scaling.

***Phæbis philea* Linnæus**

Valvæ subtriangular, distal process greatly prolonged (shorter in race *thalestris*) and rather of uniform width throughout, bluntly tipped; marginal process an acute anteriorly curved spur (not quite so prominent in *thalestris*); harpes large, usually T-shaped, rounded at the dorsal and pointed at the ventral end of the head, sometimes simply curved, heavily spined on the outer face, spines not notched; annellus slender; juxtæ narrowly blade-like. Uncus large and heavy, distal portion spatulate, abruptly terminating in a sharp spur; vinculum moderately heavy; saccus about as long as the uncus and moderately heavy. *Ædæagus* slender and rather straight, distal end flaring slightly, armed with a single cornutus near the tip and a second cornutus on the very tip, often obscure and easily overlooked.

The synonymy of this rather large and interesting species is somewhat lengthy, since many of the early authors based their names on the variable marginal markings. The following are synonyms of the female *philea*: *aricye* Cramer, *arica* Godart, and *fornax* Butler. Forbes applies *editha* Butler (female only) to the Santo Domingo race of *thalestris*, but I consider it a seasonal form. The albino female of *philea* has been named *obsoleta* by Niepelt. There are three synonyms for the male *philea*: *corday* Hübner, *lollia* Godart, and *larra* Fabricus. D'Almeida considers that *melanippe* Cramer should be applied to the spring form in the southern extreme of the range.

The status of *thalestris* Illiger is slightly doubtful in my mind. It may be worthy of specific recognition or may be only a very well-differentiated race. I am inclined to the latter concept, as there are intermediates between it and *philea*. There is a particularly good intermediate male in The American Museum of Natural History that was bred in Haiti by

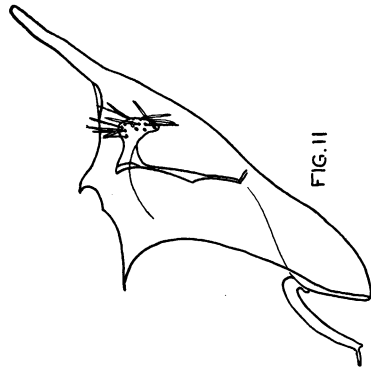


FIG. 11

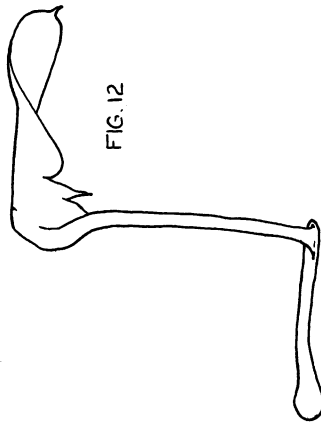


FIG. 12

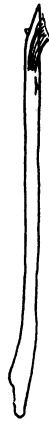


FIG. 13

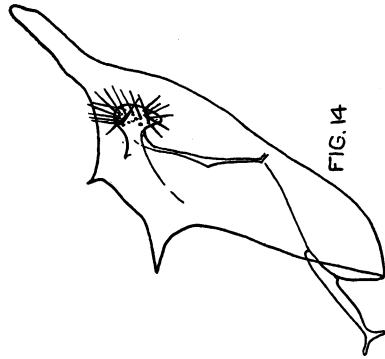


FIG. 14

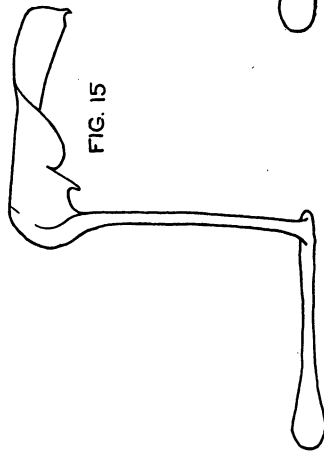


FIG. 15

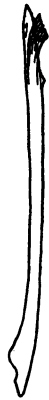


FIG. 16

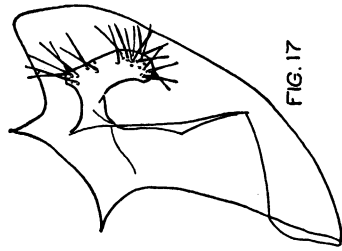


FIG. 17

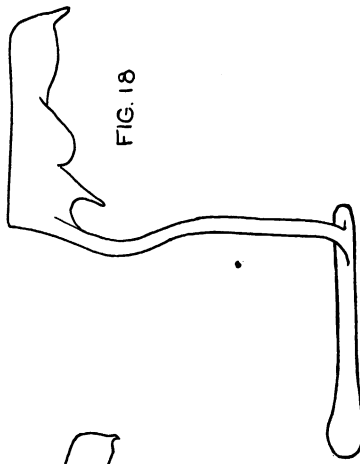


FIG. 18

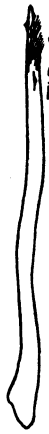


FIG. 19

11. Valva of *Phæbis philea philea*.
12. Uncus, etc., of *Phæbis philea philea*.
13. Ædeagus of *Phæbis philea philea*.

14. Valva of *Phæbis philea thalestris*.
15. Uncus, etc., of *Phæbis philea thalestris*.
16. Ædeagus of *Phæbis philea thalestris*.

17. Valva of *Phæbis avellaneda*.
18. Uncus, etc., of *Phæbis avellaneda*.
19. Ædeagus of *Phæbis avellaneda*.

Mr. Frank E. Watson. The careful breeding of both *philea* and *thalestris* will probably be the only solution to the riddle.

The forms may be catalogued as follows:

- a. *Phæbis philea philea* Linnaeus (Mainland race)
 - f. ♀ *obsoleta* Niepelt
 - gen. vern. *melanippe* Cramer
- *b. *Phæbis philea thalestris* Illiger (West Indian race)
 - f. temp. *editha* Butler

Phæbis avellaneda Herrick-Schaeffer

Valvæ subtriangular; marginal process an acute spur situated in about the middle of the dorsal margin; distal process lacking, or so uniform with the slightly acute but rounded dorsal posterior angle of the valva as to be indiscernible; harpes large and heavy, with a double bend, armed with long, heavy spines on the outer face; annellus slender and long, juxtæ short and narrow. Uncus large and heavy, distal end spatulate, ending in a short, hooked spur; vinculum slender; saccus large and heavy, slightly longer than the uncus. Ædœagus moderately heavy and rather straight, distal end armed with a single cornutus, possibly a second.

There is only the typical form of this species known. It hails from Cuba. Butler described a species, *solstitia*, from Chili, which is in no way different from *avellaneda*. I strongly doubt the validity of the locality datum for *solstitia*.

Phæbis argante Fabricius

Valvæ crudely subtriangular; distal process long, hooked at the tip; marginal process a prominent spur, occasionally blade-like; a secondary marginal process at the base of the distal process; harpes small, simple, slightly bent, rarely angular, heavily armed with short, slender spines at the distal end and along the ventral surface; annellus slender; juxtæ slender and tapering. Uncus moderately large, long and slender, terminating in a digital process; vinculum prominent on the uncus, slender; saccus slender and about as long as the uncus. Ædœagus slender, undulating, distal end sharply curved; two cornuti about one-third the distance from distal end and set in low eminences.

There is, apparently, no consistent variation in the male armature throughout the range of this species; forms *hersilia* and *rorata* differ in no respect from *argante*. Specimens were examined from Cuba, Santo Domingo, Haiti, Mexico, Honduras, Costa Rica, Panama, Venezuela, Brazil, Colombia, Bolivia.

There are two well-defined races: one on the mainland, the other in the West Indies. It is apparent, also, that the mainland form is differentiating to the north and south, and that there will be in time three mainland races, as we find in *eubule*. To the parent race on the main-

land I apply Fabricius' name *argante* and to the insular race *rorata* Butler, first applied to an albino female from Haiti. Again, as in *eubule*, the females show the racial differences more distinctly than the males. The upper surface of *rorata* females usually is heavily overlaid with Indian-red scales and shows several differences in the dark markings, primarily the reduction of black-brown on the apex, the increased scaling of the diagonal submarginal bands, and the reduction of the marginal band to a series of spots. Beneath, the markings are intensified throughout and usually with little or no pearly scaling. The males often are more heavily marked beneath than the typical *argante*, which type they resemble on their upper surfaces. Then, too, in the males there is found silver scaling in the discal spot of the under side of the hind wings. I have seen only one *argante* male in which this spot, usually golden, is silvery—a small specimen from Tezonapa, Mexico, in the collection of The American Museum of Natural History. Forms *rorata* and *hersilia* are similar in this respect.

Two forms of the mainland race occur: the nymotypical *argante* and Cramer's *hersilia*.¹ In studying a series of about two hundred specimens from over the entire range of this insect, it became apparent at once that *hersilia* is the dominant tropical form and *argante* the dominant form in the north and south. Form *hersilia* is gradually separating itself from the *argante* type and forming a purely tropical race that will be flanked on the north and south by forms similar to our present *argante*. In this case the difference in forms is apparent in the males—the marginal row of black dots having become confluent and having formed a black band in *hersilia*. However, only about forty per cent of the specimens from the northern part of South America show a complete band, but only one to two per cent show no trace of this band. There is a transitional group of about seventy per cent of all the males in the collections I have examined. The form *hersilia* ranges from Honduras to Bolivia—almost the entire range of the mainland race.

Butler has named a miniature male *miniscula*, in the Kaden collection, from Havana; it appears wherever *argante* flies, as it is merely a very small specimen. The differences in color noted by Butler do not hold for all specimens.

In the tropics there appears an albino female, probably of form *hersilia*. I call it *Callidryas argante argante* female form *albante*.

¹Butler has noted that *cipris* (female) Cramer has page priority in the case of *hersilia*, but since there is a Fabrician species of the same name, *cipris*, he uses *hersilia*.

***Callidryas argante argante* female form *albante*, new form**

ABOVE.—White, with a very faint yellow area at the margin of the wings extending not much beyond the brown marginal patches. On the forewings the marginal patches are terminal to the nervures and not joined to make a band; the apex is narrowly black-brown and the same color extends along the edge of the costa; there are three subcostal spots and five submarginal spots (the middle one very faint and out of line); the submarginal spot between M_2 and M_3 on the hind wing is faintly represented.

BELOW.—Bright cadmium yellow, a little darker at the bases of the wings. The pattern is distinct and Indian red in color with some blue and pearly scaling. The usual wavy red lines are few and scattered and do not cause the pattern to become suffused.

HOLOTYPE.—Female, Tegucigalpa, Honduras, June 30, 1918, (F. J. Dyer).

Type in The American Museum of Natural History.

Huebner's *cypris* is transitional to this form with the markings much more intense and on the upper surface of the forewing coalesced.

Schaus's *clarki* is, I believe, merely a large female from Mexico.

The normal yellow female of race *rorata* may be called normal female form *adela*, new form.

The forms may be listed as follows:

Phæbis argante argante Fabricius (Mainland race)

f. *hersilia* Cramer

f. ♀ *albante*, new form

Phæbis argante rorata Butler (West Indian race)

f. norm. *adela*, new form

***Phæbis agarithe* Boisduval**

Valvæ subtriangular; distal process short, slightly hooked; marginal process prominent, slenderly tapering at the tip or blade-like; secondary marginal process small but prominent; harpes large, bent, often foot-like with many long, hairy spines especially at the distal end; a secondary harpes is present at the base of the dorsal point of attachment. It is usually obscure, a mere fold armed with three or four heavy spines; occasionally it is heavily chitinized and then noticeable. These heavily chitonized specimens are found throughout the range; annellus moderately slender; juxtæ short and blade-like. Uncus moderately long and terminating in a short, slightly curved digital process; vinculum slender; saccus slender and about as long as the uncus. *Ædæagus* undulating, tapering to the distal end; two cornuti, one-fourth the length from the distal end.

There is not much apparent variation in the genitalia throughout the range of this species. Specimens examined from Florida, Cuba, Jamaica, Haiti, Mexico, Colombia, Brazil.

The combined series of this species that I have been able to study numbers a little more than one hundred. Two races are usually accepted;

there is, however, a third that is recognizable, and possibly a fourth. *P. agarithe agarithe* Boisduval is the mainland form found throughout neotropical and subneotropical South America. Apparently, it is less abundant on the mountainous western coast than elsewhere. *P. agarithe maxima* Neumoegen is found in the region bordering the Gulf of



FIG. 20

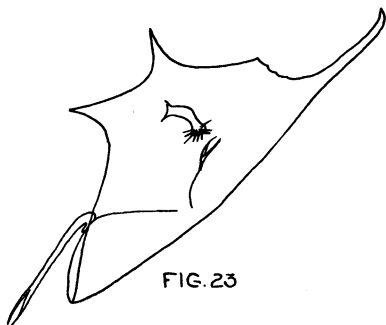


FIG. 23

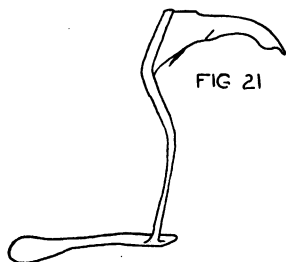


FIG. 21

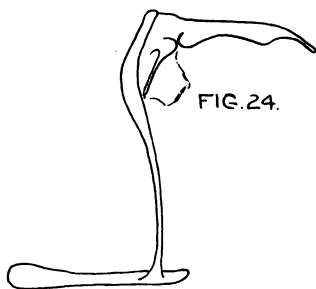


FIG. 24.



FIG. 22



FIG. 25

- 20. Valva of *Phæbis agarithe*.
- 21. Uncus, etc., of *Phæbis agarithe*
- 22. Ædæagus of *Phæbis agarithe*.
- 23. Valva of *Phæbis argante*.
- 24. Uncus, etc., of *Phæbis argante*.
- 25. Ædæagus of *Phæbis argante*.

Mexico from Florida to Southern Mexico, and possibly well south in the isthmus of Central America. *P. agarithe antillia*, new subspecies, is the West Indian race and is found throughout the Antilles. *P. a. maxima* is easily recognized by the great decrease in reddish-brown markings on the under surface, as compared with either of the other races, making a form

more clearly and sharply marked. The black dots terminating the nervures on the upper surface are reduced to a minimum and in no case before me are they run together on the apex to form a continuous line as is often the case in *agarithe* and *antillia*. The race *antillia* is characterized by a great amount of Indian-red scaling on the under surface, arranged in wavy lines, as in *P. e. sennæ*. This scaling is usually distinctly visible through the wing from the other side. *P. a. agarithe* shows this scaling to some degree, but I have not as yet seen one with markings as intense as the least intense specimen of *antillia*. In 1883, Henry Edwards described a female of this group as *Callidryas fischeri*; it is either a small *maxima* or a race that has developed in Lower California. The type and a male are in the collection of The American Museum of Natural History and are the only specimens I have seen from Lower California, hence I am not willing to take a definite stand; they differ considerably from the normal and I feel that additional material will show them to be a good race.

I append the description of the Antillian race and of an unnamed albino female.

***Phœbis agarithe antillia*, new subspecies**

MALE

ABOVE.—Dark chrome-yellow, secondaries lighter than primaries toward the base; nervures tipped with a few black scales except on the costal margin of the apex, where the black scaling forms a short, discontinuous line.

BELOW.—Chrome-yellow, except inner margin of the forewing which is paler, covered with short, wavy lines of Indian-red scaling; diagonal line and three apico-costal spots of the same color on the forewing; discal spots small but intensely marked.

FEMALE

ABOVE.—Chrome-yellow, dusted with Indian red over the costal and cellular region of the primaries and the entire secondaries where the dusting is most marked along the margin; aggregates of brownish-black scales on the tips of the nervures of the forewing and less noticeably so on the hind wing; apex broadly tipped with blackish brown; a blackish-brown discal spot on the forewing; diagonal stripe on under side distinctly noticeable.

BELOW.—Chrome-yellow, heavily overlaid with wavy lines of reddish purple; discal spots large and silvery, rimmed with purple.

HOLOTYPE.—Male, Pivert, Haiti, April 1, 1922, (Watson).

ALLOTYPE.—Female, Fond Parisien, Haiti, February 11-18, 1922, (Watson).

PARATYPES.—One male, Caymanas, St. Catherine, Jamaica, November 23, 1919, (Watson); one male, Two Mile Wood, St. Catherine, Jamaica, Nov. 14-23, 1919, (Watson); one male, Fond Parisien, Haiti, February 11-18, 1922, (Watson); one male, Santiago, Cuba, February, 1892, (Schaus).

Types in The American Museum of Natural History.

The genitalia figured are of the type.

***Phœbis agarithe maxima* female form *albarithe*, new form**

ABOVE.—White, usually so overscaled with reddish as to appear pink; the black-brown marginal markings a little more suffused than in the typical females and perhaps a little larger than the average; submarginal row of patches in the fore-wing marked and present between M_2 and Cu on the hind wing.

BELOW.—Pearly; reddish scaling greatly reduced in comparison to typical form; marginal and submarginal markings rather faint, discal spots narrowly margined.

HOLOTYPE.—Female, Jalapa, Mexico, (Schaus).

PARATYPES.—Two females, Jalapa, Mexico, (Schaus). One female, Nueces River, Texas.

Types in The American Museum of Natural History.

The forms of this species then are:

Phæbis agarithe agarithe Boisduval (South American race)

Phæbis agarithe maxima Neumoegen (Gulf Region race)

f. ♀ *albarithe*, new form

Phæbis agarithe fischeri Henry Edwards (Lower Californian race)

Phæbis agarithe antillia, new subspecies (West Indian race)

The various forms constituting the tailed group of this genus are very similar and easily confused; there are two good species and probably a third. I shall consider them as three species: *cypris*, *urina*, and *intermedia*. The first is confined to the southern subneotropical regions and ranges through northern Argentine, Uruguay, southern Brazil and, rarely, into Bolivia; the second, *urina*, is found in Peru, Ecuador, Colombia, Venezuela, the Amazon basin of Brazil and the Guianas; the third, *intermedia*, ranges from Costa Rica to southern Mexico.

***Phœbis cypris* Fabricius**

Valvæ subtriangular; distal process moderately long, tipped with a small, hooked spur; marginal process prominent, a tapering spur; secondary marginal process lacking; harpes foot-like, long, heavy spines abundant at the "heel" and "toe"; annellus very slender; juxtæ very slender. Uncus rather short for the group, stocky, terminating in a long, curved digital process; vinculum slender; saccus slender, as long as, or a little longer than the uncus. *Ædæagus* slender and undulating two conspicuous cornuti about one-third the length from the distal end.

There is some variation in the coloring in this, the smallest member of the group. The males may be practically a dull yellow monotone or rather deeply flushed with orange on the disc of both wings. These last superficially resemble *urina*. I believe that, with sufficient material with the date of collection it will be found that the two phases are wet

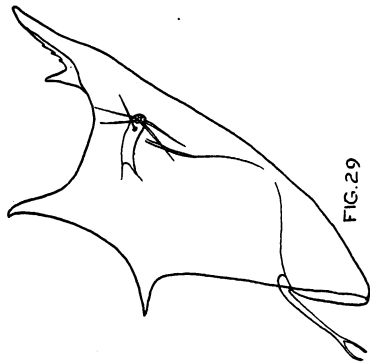


FIG. 29



FIG. 32

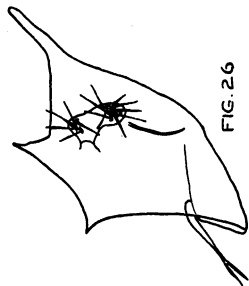


FIG. 26

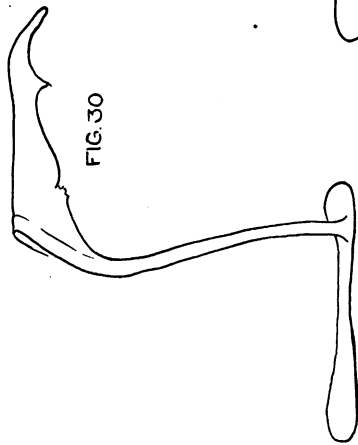


FIG. 30

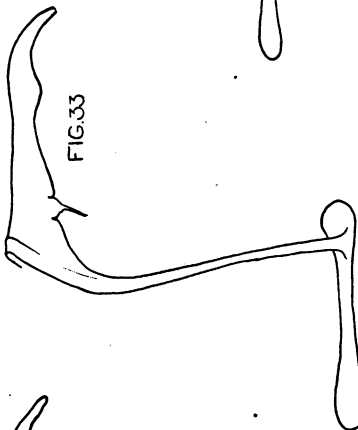


FIG. 33

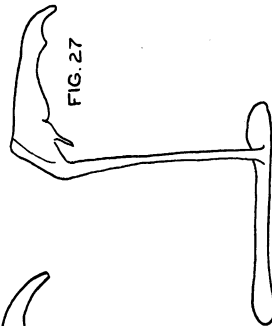


FIG. 27



FIG. 31

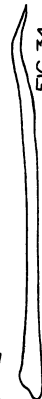


FIG. 34



FIG. 28

26. Valva of *Phæbis cypris*. 29. Valva of *Phæbis rurina*. 32. Valva of *Phæbis intermedia*.
 27. Uncus, etc., of *Phæbis cypris*. 30. Uncus, etc., of *Phæbis rurina*. 33. Uncus, etc., of *Phæbis intermedia*.
 28. Aedeagus of *Phæbis cypris*. 31. Aedeagus of *Phæbis rurina*. 34. Aedeagus of *Phæbis intermedia*.

or dry—or, more correctly, spring and summer generations. To this species I refer *irrigata* Butler, *bracteolata* Butler, and *neocipris* Huebner. The light form may be called *cypris* Fabricius; the dark, *neocipris* Huebner.

***Phæbis rurina* Felder**

Valvæ subtriangular; distal process short, terminating in a short, hooked spur; marginal process prominent; secondary marginal process at the base of the distal process small but prominent; harpes simple, straight, knobbed at the end, knob armed with several long, heavy spines; annellus short; juxtæ broad, blade-like. Uncus long, slender, well differentiated from the vinculum, terminating in a long, straight digital process; vinculum slender; saccus slender; about as long as the uncus. *Ædæagus* long and slender, undulating; two cornuti about two-fifths the length from the distal end.

This striking species has escaped the usual synonymic muddle. It is very uniform throughout its range, which probably accounts for that. A Peruvian male specimen has of late been named *peruvicola* by Strand. I can find no difference between my series of Peruvian and Colombian materials. (*P. rurina* was described from Bogota, Colombia.) *P. peruvicola* may be considered a male aberration with abnormally large patches of brown on the under side of the wings. The female figured by Butler in his monograph is not at all the normal type which Felder figures in the the 'Reise Novara.' I have seen but one specimen that is of the type figured by Butler and but few intermediates to it among the twenty-five female specimens examined.

The following form may or may not be a full-fledged species; it may be merely a race of *rurina*.

***Phæbis intermedia* Butler**

Valvæ subtriangular; distal process short, tipped with a hooked spur; marginal process prominent, a tapering spur; secondary marginal process absent; harpes simple, straight, knobbed, armed with several, long, heavy spurs on the knob; annellus stocky; juxtæ broad, blade-like. Uncus long and slender, terminating in a slightly curved digital process; vinculum slender; saccus slender and about as long as the uncus. *Ædæagus* slender, tapering to the distal end, undulating; two inconspicuous cornuti about one-third the length from the distal end.

The albinio female of this species has been named *virgo* by Butler.

The foregoing group may be listed as follows:

- Phæbis cypris* Fabricius
- f. temp. *neocipris* Huebner
- Phæbis rurina* Felder
- ab. ♂ *peruvicola* Strand
- Phæbis intermedia* Butler
- f. ♀ *virgo* Butler

The following species, *Phæbis trite*, is sufficiently removed from the preceeding groups to be considered a distinct subgenus, *Rhabdodryas* Godman and Salvin. In all manner of structure it is intermediate between *Phæbis* and *Aphrissa*, but with a much stronger relationship with *Phæbis* than with *Aphrissa*. In the genitalia of the males it is apparent in the position of the harpes and the absorption of the marginal process. However, the juxtæ definitely ally it with *Phæbis*.

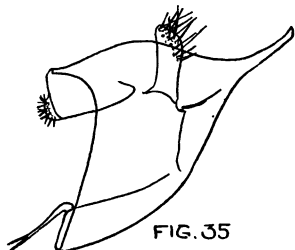


FIG. 35

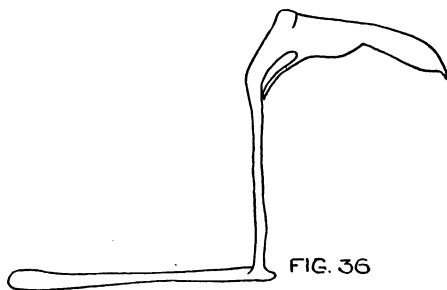


FIG. 36

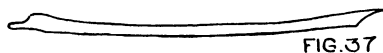


FIG. 37

35. Valva of *Phæbis* (*Rhabdodryas*) *trite*.
 36. Uncus, etc., of *Phæbis* (*Rhabdodryas*) *trite*.
 37. Ædæagus of *Phæbis* (*Rhabdodryas*) *trite*.

***Phæbis* (*Rhabdodryas*) *trite* Linnæus**

Valvæ subtriangular; distal process moderately long, terminating in a slightly curved hook; dorsal margin smoothly curved; marginal process lacking; harpes very large, straight or slightly bent, projecting dorsally beyond the margin of the valvæ, dorsally armed on the posterior surface with several, long, heavy spines; anterior margin of the transilla, terminating in a tuft of heavy, easily detached spines (*labides*?); annellus moderately heavy; juxtæ narrow. Uncus very simple and slender, terminat-

ing in a very short curved spur; vinculum slender; saccus slender; about one and one-half times as long as the uncus. *Ædæagus* slender, straight or slightly curved; five or six inconspicuous cornuti in the distal half, the outermost being most prominent.

This species is primarily a neotropical species, rarely finding its way into the subneotropical regions. Heretofore, no forms or races have been described. However, an examination of a large series from the entire range of the insect shows that there are two distinct races: one on the mainland and the other in the West Indies. The Antillean race is easily distinguished from the mainland race by the absence of the black marginal markings and the reduction of the markings on the underside to a minimum. In the first respect, this form is similar to the one found principally in Southern Brazil, but the latter has the underside normally marked. The former I call race *watsoni* and the latter form *banksi*.

***Phœbis (Rhabdodryas) trite watsoni*, new subspecies**

MALE

ABOVE.—Similar to *trite* but lacking entirely the black margin of the forewing and hind wing.

BELOW.—Ground color citron-yellow instead of light buff, as in *trite*. Maculation reduced to a minimum; the diagonal lines, characteristic of the species, very faintly represented by a few brown scales; the patches between M_2 and M_3 , and M_3 and Cu on the hind wing each represented by fifteen or twenty scattered brown scales.

HOLOTYPE.—Male, Sanchez, Santo Domingo, W. I., May 28–31, 1915, (Watson).

PARATYPES.—Two males from Cayey, Porto Rico, W. I., May 30–31, 1915, (Lutz and Mutchler); one male from Adjuntas, Porto Rico, W. I., June 8–13, 1915, (Lutz and Mutchler).

Types all in The American Museum of Natural History.

***Phœbis (Rhabdodryas) trite trite* form female *tralba*, new form**

ABOVE.—White with greenish-buff cast; brownish marginal stripe as in typical females on both forewing and hind wings.

BELOW.—Very light buff; maculation as in normal females.

HOLOTYPE.—Female, Inca Mines, Peru, September 29, 1900.

Type in The American Museum of Natural History.

***Phœbis (Rhabdodryas) trite trite* form *banksi*, new form**

MALE

ABOVE.—Similar in *trite*, but completely lacking the black marginal markings.

BELOW.—As in *trite*.

HOLOTYPE.—Male, Santa Catherina Province, Brazil.

PARATYPES.—Nine males, Santa Catherina Province, Brazil.

Holotype and eight paratypes in the Museum of Comparative Zoölogy, Harvard University; one paratype in The American Museum of Natural History.

BIBLIOGRAPHY OF ORIGINAL DESCRIPTIONS¹

- adela* (*argante*), new form.
agarithe BOISDUVAL, 1836, 'Spec. Gen.,' I, p. 623.
albante (*argante*), new form.
albarithe (*agarithe*), new form.
amphitrite (*eubule*) FIESTHAMEL, 1852, Gay's 'Fauna Chilena,' VII, p. 20, Pl. v, figs. 1, 2.
antillia (*agarithe*), new subspecies.
argante FABRICIUS, 1775, 'Syst. Ent.,' p. 470, No. 116.
arica (*philea*) GODART, 1819, 'Enc. Méth.,' IX, p. 94, No. 16.
aricye (*philea*) CRAMER, 1779, 'Pap. Exot.,' I, Pl. xciv, figs. A, B.
avellaneda HERRICK-SCHAEFFER, 1864, Corresp'blatt. Zool. min. Ver. in Regensberg, XVIII, p. 169.
banksi (*trite*), new form.
bracteolata (*cypris*) BUTLER, 1865, Proc. Zoöl. Soc. Lond., p. 458, No. 6., Pl. xxvi, fig. 6.
cypris (*argante*) CRAMER, 1779, 'Pap. Exot.,' II, Pl. xcix, figs. E, F.
clarki (*argante*) SCHAUS, 1920, Proc. U. S. N. M., LVII, p. 109.
corday (*philea*) HUEBNER, 1816(?), Verz. bek. Schmett., p. 99, No. 1053.
cypris FABRICIUS, 1793, 'Ent. Syst.,' III, 1, p. 212, No. 663.
cypris (*argante*) HUEBNER, 1820-26 (?), 'Samml. Exot., Schmett.,' II, Pl. cxxxI, figs. 1-4.
drya (*eubule*) FABRICIUS, 1775, 'Syst. Ent.,' p. 478, No. 153.
editha (*philea*) BUTLER, 1870, Trans. Ent. Soc. Lond., p. 10, No. 4.
eubule LINNÆUS, 1766, 'Syst. Nat.,' II, p. 764, No. 102.
fischeri (*agarithe*) HY. EDWARDS, 1883, 'Papilio,' III, p. 43.
fornax (*philea*) BUTLER, 1871, Trans. Ent. Soc. Lond., p. 170.
giacomelli (*eubule*) KOEHLER, 1923, Zts. wiss. Insectenbiol., Berlin, Beiheft, XVIII, p. 16.
hersilia (*argante*) CRAMER, 1779, 'Pap. Exot.,' II, Pl. clxxxiii, figs. C, D.
intermedia BUTLER, 1872, 'Cist. Ent.,' IV, p. 81, January.
irrigata (*cypris*) BUTLER, 1870, Trans. Ent. Soc. Lond., p. 9, No. 2.
larra (*philea*) FABRICIUS, 1798, 'Ent. Syst.,' Suppl., p. 428, Nos. 653, 654.
lollia (*philea*) GODART, 1819, 'Enc. Méth.,' IX, p. 94, No. 15.
marcellina (*eubule*) CRAMER, 1779, 'Pap. Exot.,' Pl. clxiii, figs. A, C.
maxima (*agarithe*) NEUMOEGEN, 1891, Can. Ent., XXIII, p. 122.
melanippe (*philea*) CRAMER, 1782, 'Pap. Exot.,' IV, Pl. ccclxi, figs. E, F.
miniscula (*argante*) BUTLER, 1869, 'Cist. Ent.,' I, p. 16.
neocypris (*cypris*) HUEBNER, 1820-26 (?), 'Samml. Exot., Schmett.,' II, Pl. cxxxvi, figs. 1, 2.
obsoleta (*philea*) NIEPALT, 1920, Intern. Ent. Zeit., XIV, Col. 17.
pallida (*eubule*) COCKERELL, 1889, Entomologist, XXII, p. 5.
peruvicola (*rurina*) STRAND, 1912, Arch. Naturges., LXXXVIII, A-9, p. 186.
philea LINNÆUS, 1766, 'Syst. Nat.,' II, p. 764, No. 104.
rorata (*argante*) BUTLER, 1869, 'Ann. and Mag. Nat. Hist.,' (4) IV, p. 202.
rurina FELDER, 1861, Wien. Ent. Mon., V, p. 82, No. 36.

¹The names in brackets refer to the species under which the form is discussed.

schausi (*eubule*) OBERTHÜR, 1912, Études Lép. Comp., VI, p. 328, Pl. cxxvi, fig. 1116.

sennæ (*eubule*) LINNÆUS, 1766, 'Syst. Nat.,' II, p. 764, No. 103.

sennalba (*eubule*), new form.

solstitia (*avellaneda*) BUTLER, 1869, Ann. and Mag. Nat. Hist., (4) IV, p. 203.

thalestris (*philea*) ILLIGER, 1802, 'Magazin,' I, p. 207, No. 31.

tralba (*trite*), new form.

trite LINNÆUS, 1766, 'Syst. Nat.,' II, p. 763, No. 97.

virgo (*intermedia*) BUTLER, 1870, Trans. Ent. Soc. Lond., p. 9, No. 1.

watsoni (*trite*), new subspecies.

yamana (*eubule*) REAKIRT, 1863, Proc. Ent. Soc. Phila., II, p. 352, No. 3.