WILLIAM D. FIELD

Butterflies of the Genus Vanessa and of the Resurrected Genera Bassaris and Cynthia (Lepidoptera: Nymphalidae)

SMITHSONIAN CONTRIBUTIONS TO ZOOLOGY NUMBER 84

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SMITHSONIAN INSTITUTION PRESS
CITY OF WASHINGTON
1971

ABSTRACT

Field, William D. Butterflies of the Genus *Vanessa* and of the Resurrected Genera *Bassaris* and *Cynthia* (Lepidoptera: Nymphalidae). *Smithsonian Contributions to Zoology,* number 84, 105 pages, 1971.—The genus *Cynthia* with nine species (including *C. annabella,* new species) and the genus *Bassaris* with two species are recognized as separate from the genus *Vanessa,* with five species remaining. All taxa are keyed and redefined with characters, including the male and female genitalia, tarsi, and wing habitus. Knowledge of the distribution and biology of most species is extensive and is given herein (for distribution) or cited (known food plants are listed and references to the literature of the biology are given). Unusual modified setae on the ovipositors are described for five *Cynthia* species.

Official publication date is handstamped in a limited number of initial copies and is recorded in the Institution's annual report, Smithsonian Year.

UNITED STATES GOVERNMENT PRINTING OFFICE
WASHINGTON : 1971

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C. 20402 - Price $1.50 (paper cover)

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Butterflies of the Genus Vanessa and of the Resurrected Genera Bassaris and Cynthia (Lepidoptera: Nymphalidae)

Introduction

In this paper the genera *Cynthia* and *Bassaris* are resurrected and removed from the genus *Vanessa* and all three genera are redefined on the basis of characters in male and female genitalia, tarsi, and habitus.

These butterflies collectively are found nearly all over the world. The genus *Vanessa* contains five species and is mainly, and was perhaps originally, an Old World genus. One *Vanessa* species is, however, Holarctic; another is distributed over a great part of Asia and even occurs in southeast Europe, Madeira, and the Canary Islands; and the three remaining species are found in limited island areas of the Old World. The genus *Cynthia* contains nine species and is mainly New World except for one nearly cosmopolitan species and for one which occurs in Australia. The genus *Bassaris,* on the other hand, is confined to Australia and New Zealand and a few islands in the southern Pacific region.

There is a considerable amount of available information concerning the immature stages and the life histories of the genera treated in this paper.

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The eggs of all species have not been described, but from those that have been we can say that they are barrel shaped, broad at the base, short, and ovate with prominent laminate ribs that increase in height to the summit, where they end abruptly. In *Cynthia* eggs, there are from fourteen to nineteen of these ribs, in *Bassaris* there are eight (*B. itea*) or nine (*B. gonerilla*), and in *Vanessa* there are nine.

The eggs are laid singly on the underside of the leaves of the food plant in *Bassaris* and usually on the upper side of the leaves in *Vanessa and Cynthia.*

In four species of *Cynthia* (*C. virginiensis, C. altissima, C. braziliensis,* and *C. myrinna*) the ovipositors contain a number of greatly modified, cephalically directed, teethlike setae (Figures 26–30). These modified setae (shown enlarged in Figure 26a) may be an aid in stabilizing or anchoring the ovipositor as it is worked carefully through the thickly matted hairs on the surface of the leaf of the host plant prior to the laying of the egg under this carpet of hairs. Scudder (1889, p. 464) describes this peculiarity of egg laying for *C. virginiensis,* but apparently was not aware of structures that could aid in this careful procedure.

No such attempt at egg concealment has been described for species of *Vanessa* or *Bassaris,* nor for other *Cynthia* species; I would, however, expect *C.*

altissima, C. braziliensis, and *C. myrinna* to act similarly to *C. virginiensis.*

The ovipositor setae of *Cynthia kershawi* (Figure 25) are slightly modified in having their apical portions bent at nearly right angles and with these bent portions cephalically directed. The purpose of this modification is not known, and nothing peculiar about its egg laying has been reported.

The caterpillars of *Bassaris* and *Vanessa* species feed almost exclusively upon the Urticaceae, while those of *Cynthia* prefer the Compositae and Malvaceae.

As far as is known, the caterpillars of all three genera are solitary, living usually in vertical nests made of leaves tied together with silken strands. In *Vanessa* and one species of *Bassaris* (*B. itea*) the nests are made of a single leaf, and feeding takes place in this nest until the leaf is completely devoured. In *Cynthia* and the other species of *Bassaris* (*B. gonerilla*), the caterpillars construct nests composed of several leaves and in *Cynthia* at least they feed only on the upper surface of these leaves.

The most troublesome taxonomic problem that a worker faces in revisionary work on many popular groups of butterflies is the question of how to deal with the vast horde of infrasubspecific names. Because this was a major problem in the present study, I wish to discuss it further in order to explain the various decisions which were adopted.

Over the past fifty years there has been a considerable amount of controversy among taxonomists, particularly lepidopterists, as to the value of giving names to various types of taxons below the rank of subspecies. Thousands of such names have been given to "aberrations," "seasonal forms," "color forms," "sexual forms," and the like. For example, forty-seven names have been proposed for forms and aberrations of *Vanessa atalanta,* and *Cynthia cardui* has received nearly the same number of such names. The record for this kind of name proposing is probably held by *Lysandra coridon* (Poda) (Lycaenidae), which has received some seven hundred and thirty-seven aberrational names.

Brown (1956, pp. 140–142), following Bang-Haas (1915, pp. 181–185) and Eisner (1955, pp. 177–179), believes that form and aberrational names "serve a purpose for the serious student of variation fully as great as species and subspecies names" and proposes that their system embodying some sixty-six "names" crossing subspecific and specific lines be used in the genus *Parnassius.* This would mean that each species and subspecies of *Parnassius* could receive sixty-six of these "names." Brown goes on to say that these "names are purely descriptive and when used do not take an author's name. They have no nomenclatorial status." If students of variation wish to adopt such a system, I certainly have no objection as long as its users realize that they are really using names as terms to help write about variation within the various species and subspecies.

In the genera *Vanessa, Bassaris,* and *Cynthia,* as well as in almost all other Rhopalocera, no such system has ever been proposed or used, and so we are confronted with the problem of what to do about the numerous names given to individual variations. Fortunately aberrational and other infrasubspecific names were removed from our formal nomenclature by the International Code of Zoological Nomenclature Adopted by the XV International Congress of Zoology. Article 1 of the Code states that "This Code is concerned with such names" (i.e., scientific names) "in the family-, genus-, and species-groups" and that "names given to . . . infrasubspecific forms as such . . . are excluded" from zoological nomenclature. Article 5 states that "the name of a species consists of two words (binomen) and that of a subspecies of three words (trinomen); in each case the first word is the generic name, the second word is the specific name, and the third word, when applicable, is the subspecific name." Article 45 (a) states that "the species-group for the purposes of this Code, includes the categories species and subspecies."

It could hardly be stated more clearly than it is stated in the Code, but to emphasize this point, the Code recognizes names for categories only down to and including the subspecies and since subspecies names are necessarily in the form of trinomials, all quadrinomials are excluded as well as all infrasubspecific names. Names proposed for "sub-subspecies" or "forms" of subspecies are not recognized.

We need to understand clearly what is meant by subspecific names and infrasubspecific names and we need to know how to recognize such names.

Article 45 (d) of the Code dictates three situations under which we are to accept a proposed name as a subspecific name:

1. The original status of any name of a taxon of

lower rank than species is determined as subspecific, if the author, when originally establishing the name, clearly stated it to apply to a subspecies. Obviously the best way to propose a subspecific name is to state that it is a subspecies.

2. The original status of any name of a taxon of lower rank than a species is determined as subspecific, if the author, when originally establishing the name, did not state its rank. This clearly means that if an author proposed a trinomial name without explaining the trinomen in any way, we are to accept it as a proposal of a subspecies.

3. The original status of any name of a taxon of lower rank than a species is determined as subspecific, if the author, when originally establishing the name, stated the taxon to be characteristic of a particular geographical area (or geological horizon) and did not expressly refer it to any infrasubspecific category. This clearly covers all names proposed in the past as races, local forms, altitude forms, and the like, provided they were proposed as trinomial names.

Article 45 (d) (iii) gives two ways of recognizing when a taxon is of infrasubspecific status:

1. The original status of any name of a taxon of lower rank than species is determined as infrasubspecific, if the author, when originally establishing the name, expressly referred the taxon to an infrasubspecific rank. This necessarily includes names given to all categories lower in rank than the subspecies and includes all names given to individual specimens and segments of populations such as aberrations, transition forms, seasonal forms, wet and dry forms, cold forms, color forms, sexual forms, and the names given to the separate generations of the same population.

2. The original status of any name of a taxon of lower rank than species is determined as infrasubspecific, if the author, when originally establishing the name, after 1960, did not clearly state that it was a subspecies.

What to do about the terms "variety" and "form" are taken up in paragraph (e) of article 45. In this paragraph on the "interpretation of the terms 'variety' and 'form'" it is stated that "(i) Before 1961, the use of either of the terms 'variety' or 'form' is not to be interpreted as an express statement of either subspecific or infrasubspecific rank." (ii) "After 1960, a new name published as that of a 'variety' or 'form' is to be regarded as of infrasubspecific rank." (This is also stated in article 15.)

For publications dated before 1961, we have to study each author's text to determine what he meant by his use of the terms "variety" and "form." If in any way this text conveys the modern idea of the term subspecies, then we accept the proposed name. If an author clearly indicates in his text that he is writing about an individual variant (such as an aberration, color form, or the like) that is a part of a population, then we have to reject the name. On the other hand, if the original author in no way shows what he meant by the term "variety" or "form," or if it is not clear that he is naming either subspecies or individual varients of such populations, then we have to accept any such proposed trinomial name as an acceptable trinominal under article 45 (d) (i).

In summary then there are five kinds or types of names that I regard as acceptable subspecific names under the Code:

1. Names given as trinomials (article 5), as subspecies (article 45 (d) (i)).

2. Names given as trinomials (article 5), before 1961, where no expressed category or rank is indicated (article 45 (d) (i)).

3. Names given as trinomials (article 5), before 1961, as races, local forms, altitude forms, or given as trinomials, to any other geographically based population (article 45 (d) (ii)).

4. Names given as trinomials (article 5), before 1961, as "varieties" and "forms" where the author indicates or even hints that they represent geographically based populations (article 45 (d) (ii) and (e) (i)). Many authors, perhaps most authors that used the terms "variety" and "form," indeed used those terms for subspecies. Article 45 (e) (i) allows us to accept these terms as subspecific or as infrasubspecific. When it is obvious that subspecies is meant, as in the case where a geographical area is involved, we accept the terms as of subspecific rank.

5. Names given as trinomials (article 5), before 1961, as "varieties" and "forms" where the author in no way indicates what he meant by the use of these terms (article 45 (d) (i) and (e) (i)). Article 45 (e) (i) allows us to accept these terms as subspecific or as infrasubspecific. Where we cannot determine an author's meaning, we may accept

the terms "variety" and "form" as of subspecific rank.

There are seven types of names that are excluded by the Code or that may be excluded under the Code, and these seven types of names I treat as excluded names in this paper:

1. All names proposed as quadrinomials (article 5 by recognizing only the generic name, the specific name, and, when applicable, the subspecific name).

2. All names given to aberrations as such, transition forms as such, seasonal forms, wet and dry forms, color forms, sexual forms, generation forms as such, and similar forms (article 1; article 45 (d) (iii) and glossary of the code: definition of the term infrasubspecific).

3. All names given to "varieties" and "forms," before 1961, where the author clearly indicates that he is dealing with an individual variant such as those mentioned above under number 2. (Some authors used these terms in a very general way to apply to what we now call subspecies and for individual variants, using these terms now for one and again for the other type of variation. Article 45 (e) (i) allows us to interpret these terms either as infrasubspecific or as subspecific. When it is obvious that an author meant an aberration or one of the other types of individual variants in his use of these terms, then we may exclude the name he proposed for such a variation.)

4. All names proposed as trinomials, after 1960, where it is not clearly stated that such names are subspecific names (article 45 (d) (iii)).

5. All names proposed for "varieties" or "forms" after 1960 (article 15, article 45 (e) (ii)).

6. All names proposed for races, local forms, altitudinal forms, or to any geographically based populations, after 1960, where they are not expressly called subspecies (article 45 (a) and article 45 (d) (iii)).

7. All names given to hybrids (article 1).

Names rejected or excluded under the Code may later become available, for article 10 (b) states that "a name first established with infrasubspecific rank becomes available if the taxon in question is elevated to a rank of the species-group, and takes the date and authorship of its elevation." For this reason all of the literature dealing with the infrasubspecific names used in the species treated in the present paper had to be examined carefully to determine if a name which had been excluded because of its treatment in an earlier work might be available because of a different treatment in a later work.

The terminal bibliography is selective. A complete bibliography to the literature of the genera *Vanessa* and *Cynthia* would total many times the number of titles given at the end of this paper. Hopefully all papers that were taxonomically significant were included and an attempt was made to include most of the literature giving life-history information (except for the large part of this literature that is repetitive). The literature was searched particularly for distribution data for those species of which only a relatively few specimens were available for study. Thus the greater amount of the literature for *V. atalanta* and *C. cardui*, for example, was ignored (distribution records within their normal range, state and local lists, and the like), while an effort was made to be as complete as possible for the less abundant and more restricted species.

Acknowledgments

I wish to thank Mr. José Herrera of the University of Chile for the loan of material and for his valuable aid given a number of years ago while he and I were studying the Chilean species of *Cynthia*. I greatly appreciate the many courtesies shown to me by Drs. Frederick H. Rindge and Alexander B. Klots during my visits to the American Museum of Natural History, and my especial thanks go to the former for allowing me to study specimens in his care. For the same reasons thanks are due to Drs. P. J. Darlington and John M. Burns of the Museum of Comparative Zoology, Harvard University. I am indebted to Dr. Paul H. Arnaud, Jr., of the California Academy of Sciences, for the loan of a large series of the new species of *Cynthia* described in this paper. I am especially grateful to Dr. J. W. Tilden of San Jose State College, San Jose, California, for advice and to his student, Mr. Thomas Dimock, for a fresh series of the new species of *Cynthia*, from which the primary type, the allotype, and the paratypes were chosen (the latter very kindly offered by Mr. Dimock for distribution to other museums). Mr. Allan Watson and Mr. T. G. Howarth of the British Museum (Natural History) have my thanks for the loan of material formerly

unobtainable to me and Mr. Howarth especially receives my thanks for his critical remarks on part of my manuscript. Dr. Pierre Viette of the Museum National d'Histoire Naturelle, Paris, supplied me with information on certain types in his care for which I am especially grateful. Dr. F. Kasy of the Naturhistorisches Museum of Vienna very kindly supplied me with the news of the destruction by fire of much of the Hübner collection over a century ago, a fact not generally known.

Explanation of Figures

In the figures of the male genitalia (Figures 1–16) the lateral aspect of the whole genital capsule (minus the aedeagus) is shown on the left-hand side of the illustrations. The aedeagus in lateral view is shown in the lower right-hand corner of each figure, and the uncus and gnathos are shown in ventral view in the upper right-hand corner. The figure in the middle is of the ventral element (all that remains) of the anellus (sometimes called juxta or furca) shown in a ventral view.

In the figures of the female genitalia (Figures 17–32) the bursa copulatrix, seventh and eighth abdominal segments, and ovipositors are shown in ventral view.

These figures were drawn under the author's supervision by Mr. Andre D. Pizzini, staff artist.

Figures 33 through 160 are photographs of the adult butterflies. These were made by Mr. Andrew Wynn and Mr. Victor E. Krantz of the Smithsonian Institution photo laboratory.

Key to the Genera Treated in This Paper

1. Mid and hind tarsi with paronychia simple, consisting of a single slender lobe, sometimes with a slight basal projection; both surfaces of forewing with middle of cell Cu_2 occupied by a large light-colored spot, greatly contrasting with the fuscous color on either side of this spot; upper surface of hindwing with a contrasting light-colored spot adjacent to end of cell, which may be part of a light-colored band crossing wing near middle; forewing underneath with area opposite end of cell and between there and subapical light-colored bar dark brown or black and divided by white or yellowish-white lines; under surface of hindwing with very distinct ocular spots contrastingly greatly with surrounding area ..... ***Cynthia*** Fabricius

   Mid and hind tarsi with paronychia bifid, lower element slightly shorter than upper element; both surfaces of forewing not as described above, or if a light-colored spot is present it is small, not extending more than halfway to anal vein, or if larger it is part of a single central band running across wing from costa to anal vein; upper surface of hindwing not as described above, with end of cell concolorous with surrounding area; forewing underneath with dark area opposite end of cell and between there and subapical light-colored bar solidly dark brown or black, not divided and with one or two blue bands or a complete circle of blue; under surface of hindwing with submarginal ocular markings obscured, not constrasting greatly with surrounding area 2

2. Upper surface of hindwing without submarginal blue-centered ocular spots; under surface of forewing with dark area opposite end of cell and between there and subapical light-colored bar with blue marking not forming a circle; male genitalia with uncus bifurcate distally; female genitalia with signum bursae entirely divided or very weakly sclerotized in middle and relatively short, not more than three times as long as broad .. ***Vanessa*** Fabricius

   Upper surface of hindwing with a series of submarginal blue-centered ocular spots; under surface of forewing with dark area opposite end of cell and between there and subapical light-colored bar with a nearly perfect circle of blue; male genitalia with uncus not birfucate distally; female genitalia with signum bursae not divided in middle, and more than three times as long and broad ..... ***Bassaris*** Hübner

Genus *Vanessa* Fabricius

FIGURES 1–5, 17–21, 33–80

Vanessa Fabricius, 1807, p. 281.—Latreille, 1810, pp. 354, 400.—Boisduval, 1840, p. 21.—Humphreys and Westwood, 1841, pp. 47–55.—Herrich-Schaffer, 1843, pp. 38–41.—Duponchel, 1844, pp. 6–7.—Lucas, 1845, p. 57.—Poey, 1847, pp. 121–124.—Duponchel, 1849, pp. 92–109.—Blanchard, 1852, pp. 25–26.—Stainton, 1857, pp. 36–38.—Rambur, 1858, pp. 13–14.—Humphreys, [1859], p. 22.—Scudder, 1875, pp. 287–288.—De Waldheim and Eversmann, 1881, pp. 104–110.—Scudder,

1889, pp. 430–441.—Dale, 1890, pp. 135–154.—Meyrick, 1899, pp. 193–194.—Moore, 1899–1900, pp. 102–107.—Dyar, 1903, p. 23.—Bingham, 1905, pp. 363–367.—Lhomme, 1923, p. 51.—Antram, 1924, pp. 175–176.—Barnes and Benjamin, 1926, p. 11.—Hudson, 1928, pp. 34–36.—Holland, 1930, p. 46; 1931, pp. 153–154.—Evans, 1932, p. 177.—Frohawk, 1934, pp. 16, 134–147.—Hemming, 1934 pp. 60–68.—Bates, 1935, pp. 164–165.—Peile, 1937, pp. 139–140.—Field, 1940b, pp. 73, 80–88, 274.—Hoffmann, 1940, p. 640.—Pierce and Beirne, 1941, p. 20.—Bryk, 1944, pp. 10–11.—Comstock, 1944, pp. 449–451.—Aubert, 1949, pp. 129–135.—Pinhey, 1949, pp. 82–83.—Verity, 1950, pp. 327–340.—Clark and Clark, 1951, pp. 13–14, 43–45.—Hayward, 1951, p. 195.—Klots, 1951, pp. 107–108.—Forster and Wohlfahrt, 1955, pp. 55–56.—Corbet and Pendlebury, 1956, pp. 203, 207.—Lempke, 1956, pp. 185–194.—Wynter-Blyth, 1957, pp. 209–212.—Zimmerman, 1958, pp. 452–472.—Forbes, 1960, pp. 158–159.— dos Passos, 1964, p. 77.—Gifford, 1965, p. 115.—Niculescu, 1965, pp. 185–196.—Hemming, 1967, p. 455.

Nymphalis Latreille [not Fabricius 1804], pp. 184, 199.—Hemming, 1934, pp. 68–69.—Scudder, 1875, pp. 229–230.—dos Passos, 1964, p. 77.—Hemming, 1967, p. 316.

Pyrameis Hübner, [1819], p. 33.—Doubleday, 1849, pp. 202–205.—Horsfield and Moore, 1857, pp. 138–139.—Lucas, 1857, pp. 542–544.—Morris, 1860, p. 8; 1862. pp. 58–60.—Trimen, 1862–1866, pp. 117–121.—Butler, [1870], pp. 77–78.—Kirby, 1871, p. 185.—Scudder, 1875, p. 260.—Reed, 1877, pp. 678–680.—Strecker, 1878, pp. 135–138, 190.—Moore, 1880–1881, pp. 49–51.—Butler, 1881, pp. 466–467.—Godman and Salvin, 1882, pp. 217–219.—Saalmuller, 1884, p. 77.—Marshall and de Nicéville, 1886, pp. 225–229.—Trimen, 1887, pp. 198–203.—Scudder, 1889, pp. 434, 435, 440, 441.—Dale, 1890, pp. 137–152.—Maynard, 1891, pp. 92–93.—Miskin, 1891, p. 39.—Leech, 1892–1894, pp. xv, 349–350.—Aurivillius, 1898, p. 130.—Denton, 1898, pp. 264–268.—Holland, 1898, pp. 169–171.—Miyajima, 1899, pp. 3, [117]—[119].—Cannaviello, 1900, p. 17.—Staudinger and Rebel, 1901, p. 24.—Wright, 1905, pp. 177–178.—Stichel, 1908, pp. 198–200; 1909, pp. 198–200.—Rebel, 1910, p. 20.—Reuss, 1910a, pl, 1; 1910b, pp. 62–67.—Fruhstorfer, 1912a, pp. 524–526; 1912b, pp. 524–526.—Aurivillius, 1913a, p. 227; 1913b, p. 227.—Seitz, 1914a, pp. 458–459; 1914b, pp. 458–459.—Waterhouse and Lyell, 1914, pp. 55–56.—Holland, 1915, pp. 99–100; 1920, pp. 143–144.—Bang-Haas, 1926, pp. 55–56; 1927, pp. 55–56; 1928, p. 26; 1929, p. 11; 1930, p. 162.—Gaede, 1931a, p. 343.—Hayward, 1931, pp. 68–72.—Clark, 1932, pp. 72–73, 84–91.—Hemming, 1934, p. 69.—Barrett and Burnes, 1951, pp. 132–135.—Paulian, 1956, pp. 67–69.—Hemming, 1967, p. 398.

Pyrameides Hübner, [1826], p. 7.—Hemming, 1967, p. 389.

Amiralis Rennie, 1832, p. 10.—Scudder, 1875, p. 109.—Hemming, 1934, p. 69; 1967, p. 40.

Phanessa Sodovskii, [1837], p. 80.—Humphreys, [1859], p. 22.—Scudder, 1875, p. 247.—Hemming, 1934, p. 70; 1967, p. 356.

Vanesja Philippi [misspelling of *Vanessa*], 1859, pp. 1089–1090.

Payrameis Reed [misspelling of *Pyrameis*], 1877, p. 735.

Zanessa Hemming, [misspelling of *Vanessa*], 1967, p. 249.—Cowan, 1970, p. 70.

Type species: *Papilio atalanta Linnaeus.* Type by reason of subsequent selection by Latreille (1810, pp. 440, 354).

The generic names *Vanessa* and *Cynthia* with closely related type-species (*atalanta* L. and *cardui* L. respectively) were both described by Fabricius in the same paper on the same page (1807, p. 281). Because it was feared that *Cynthia* might take precedence over *Vanessa,* the latter name was accorded precedence in Opinion 156 (1944, *Opinions Rendered by the International Commission on Zoological Nomenclature* 2: 239–250). At the same time *Vanessa* Fabricius was placed on the "Official List of Generic Names in Zoology" as Name No. 601. This action was deemed necessary because *Cynthia* and *Vanessa* were usually thought to be congeneric. In the present paper they are regarded as two separate genera.

Vanessa differs from *Bassaris* and *Cynthia* in the habitus and in the structures of the male and female genitalia. From *Cynthia* it differs also in the paronychia.

GENITALIA.—Male (Figures 1–5) with uncus (in both dorsal and ventral view) bifurcate distally; lateral arms of gnathos sharply bent, forming a distinct "heel" before or near middle and with distal part after bend, usually longer than or nearly as long as the base; aedeagus sharply bent downward near middle (*V. indica, V. dejeani, V. samani*), slightly bent (*V. tameamea*), or nearly straight with distal end pointed (not semi-spade shaped); valva with clasper near middle of inner face, downward directed; clasper usually small, sometimes large and overlying cuiller.

Female (Figures 17–21) with genitalia consisting of a central pod-shaped structure on eighth sternite, surrounding the ostium bursae, and with two or more lateral plates on either side of this central structure; each signum bursae entirely divided or much more weakly sclerotized in middle and relatively short, not more than three times as long as broad.

TARSI.—Paronychia of mid and hind tarsi bifid, lower element slightly shorter than upper element.

HABITUS.—In the genus *Vanessa* the upper surface of the forewing is of a uniform dark fuscous ground color with a single red, orange, or yellowish band crossing this wing from just below middle of costal margin almost to the anal angle (except in

V. dejeanii mounseyi, where this band is lacking and is replaced by the fuscous ground color); with middle of interspace Cu_2 adjacent to anal vein of the same uniform color as the base of the wing, with a white, yellow, or tawny subapical bar opposite end of cell, and with a series of from three to seven submarginal and subapical white spots in the interspaces between costa and vein Cu_1. Basal two thirds to three fourths of the upper surface of the hindwing is uniformly dark fuscous (or as in *V. samani* a uniform yellowish color) without the submarginal ocular markings found in *Cynthia,* these being replaced by spots that are somewhat darker than the ground color, that are triangular or crescent shaped, or round or lunular shaped, and that occur at the outer edge of the fuscous or yellowish basal and discal area; the light-colored area of hindwing is submarginal in position and lies between veins R_s or M_1 and 1st A; through the middle of this light-colored area there is a series of from four to six fuscous and lunular, triangular, or round spots. On the under surface of the forewing, *Vanessa* differs from *Cynthia* in having a great amount of blue in the fuscous area opposite end of cell and between there and the white subapical bar, and in having the base of wing below cell and out to at least the origin of vein Cu_2 black or fuscous, much darker than in *Cynthia.* On the under surface of hindwing the overall color is much darker, and the ocular spots are greatly obscured by the reticulated dark ground color and are not round in shape but lunular, or round and flattened along their outer sides.

LIFE HISTORY.—Some life-history information has been recorded for all of the species except *V. samani* and the subspecies *V. indica pholoe, V. indica buana,* and *V. dejeanii mounseyi.* The food plants are various genera and species of the Urticaceae (order Urticales). The commonest and most widely distributed species *V. atalanta* also feeds upon *Humulus* (Moraceae, order Urticales) and upon occasion has been reported as reared upon *Helichrysum* (Compositae, order Asterales) and Salix (Salicaceae, order Salicales), but these last two plants are not its usual food and the question as to how readily it takes to them should be investigated if indeed these records are authentic.

DISTRIBUTION.—The five Vanessa species are inhabitants of the Old World except for *V. atalanta,* which is represented by a distinct subspecies found over most of the northern half of the New World.

List of Included Species and Subspecies

1. *Vanessa atalanta* (Linnaeus), 1758
1a. *Vanessa atalanta atalanta* (Linnaeus)
1b. *Vanessa atalanta rubria* (Fruhstorfer), 1909
2. *Vanessa tameamea* Eschscholtz, 1821
3. *Vanessa indica* (Herbst), 1794
3a. *Vanessa indica indica* (Herbst)
3b. *Vanessa indica pholoe* (Fruhstorfer), 1912
3c. *Vanessa indica nubicola* (Fruhstorfer), 1898
3d. *Vanessa indica buana* (Fruhstorfer), 1898
3e. *Vanessa india vulcania* Godart, 1819
4. *Vanessa dejeanii* Godart, 1824
4a. *Vanessa dejeanii dejeanii* Godart
4b. *Vanessa dejeanii mounseyi* (Talbot), 1936
5. *Vanessa samani* (Hagen), 1895

The numbers preceding the above names are also used before these species and subspecies in the keys and in the headings.

Key to the Species of *Vanessa*
(based upon male genitalia)

1. Cuiller smooth; clasper directed toward distal margin of valva (Figure 1) ..... 1. ***V. atalanta*** (Linnaeus)
   Cuiller with its distal one fourth or more toothed; clasper directed toward ventral margin of valva or toward ventral arm of valva 2
2. (1) Valva without ventral arm (Figure 2) ..... 2. ***V. tameamea*** Eschscholtz
   Valva with a very distinct ventral arm 3
3. (2) Acute lobe on costal margin of valva very large, much larger than harpe; ventral arm of valva without this tooth 4
   Acute lobe on costal margin of valva small, about size of harpe; ventral arm of valva with a subapical upward directed blunt tooth (Figure 3) ..... 3. ***V. indica*** (Herbst)

Key to the Species of *Vanessa*—Continued
(based upon male genitalia)

4. (3) Upper distal angle of valva bluntly pointed; acute lobe on costal margin of valva not heavily sclerotized (Figure 4) ..... 4. ***V. dejeanii*** Godart
Upper distal angle of valva a rounded lobe; acute lobe on costal margin of valva heavily sclerotized (Figure 5) ..... 5. ***V. samani*** (Hagen)

Key to the Species of *Vanessa*
(based upon female genitalia)

1. Ostium bursae lobe large, as large as lateral plates, and with opening near posterior margin of eighth sternite (Figure 17) ..... 1. ***V. atalanta*** (Linnaeus)
Ostium bursae lobe not so large and with opening placed near anterior margin of eighth sternite 2
2. (1) Plates on either side of ostium bursae lobe very large and winglike in shape 3
These plates greatly reduced with no heavy sclerotization beyond middle one fourth of eighth sternite (Figure 18) ..... 2. ***V. tameamea*** Eschscholtz
3. (2) Posterior margin of seventh sternite deeply incised in middle, allowing for intrusion of ostium bursae lobe from anterior margin or eighth sternite 4
Posterior margin of seventh sternite not incised in middle (Figure 21)
5. ***V. samani*** (Hagen)
4. (3) Plates on either side of ostium bursae lobe tapering laterally to a fine line (Figure 19)
3. ***V. indica*** (Herbst)
Plates on either side of ostium bursae lobe not as described above (Figure 20)
4. ***V. dejeanii*** (Godart)

Key to the Species and Subspecies of *Vanessa*
(based upon habitus)

1. Hindwing above yellow in color except for costal margin, abdominal margin, and marginal and two submarginal rows of fuscous spots (Figures 76–80) 5. ***V. samani*** (Hagen)
Hindwing above fuscous, dark brown or black, or sometimes an orange brown, with submarginal band of red, orange, or yellow, enclosing a series of submarginal fuscous spots. 2
2. (1) Forewing above and below with a red, orange, or yellowish band extending from just below middle of costal margin to near anal angle 3
Forewing above and below without this band, the area which it would occupy being replaced by three separate white spots (Figures 70, 71)
4b. ***V. dejeanii mounseyi*** (Talbot)
3. (2) Forewing above with this bright-colored (red, orange, or yellow) band surrounding or partially surrounding three large fuscous, dark brown, or black spots (one a bar in middle of cell, one at and above and below base of vein Cu_2, and one above and below this vein near middle) 5
Forewing above with this bright-colored band not surrounding or partially surrounding such spots (bar in cell only faintly indicated, the other two absent, being completely absorbed in the dark ground color of the base of wing) 4
4. (3) Forewing above and below with subapical white bar extending from costa to vein M_2, narrow; black spots in marginal orange or orange-red band on hindwing reduced in size (Figures 36–40; 44–46) ..... 1b. ***V. atalanta rubria*** (Fruhstorfer)
Forewing above and below with subapical white bar broader; black spots in marginal orange or orange-red band on hindwing larger (Figures 33–35; 41–43)
1a. ***V. atalanta atalanta*** (Linnaeus)
5. (3) Forewing above with band extending across wing from just below costal margin to near anal angle, yellowish in color and narrow; hindwing above with a submarginal yellowish band (Figures 66–69) ..... 4a. ***V. dejeanii dejeanii*** (Godart)
Forewing above with this band orange or orange red in color and broad; hindwing above with this submarginal band orange or orange red in color 6

Key to the Species and Subspecies of *Vanessa*—Continued

(based upon habitus)

6. (5) Hindwing above with ground color through base of wing dark orange brown or reddish brown; with outer half of costal margin and area below this dark brown or black, this color extending along both outer and inner sides of the submarginal orange band (Figures 72–75) ..... 2. ***V. tameamea*** Eschscholtz

Hindwing above with ground color not as described above, being entirely fuscous or dark brown in color except for submarginal orange band and a row of black somewhat cheveron-shaped spots along inner side of this band 7

7. (6) Forewing above with an orange or orange-red line or band along inner side of black or fuscous bar in middle of cell 8

Forewing above without this orange or orange-red line or band (Figures 64, 65) 3d. ***V. indica buana*** (Fruhstorfer)

8. (7) Forewing above with orange or orange-red color forming a thin line on inner side of black or fuscous bar in middle of cell 9

Forewing above with orange or orange-red color forming a thicker band on inner side of black or fuscous bar in middle of cell 10

9. (8) Extreme margin of hindwing above entirely fuscous or black (Figures 50–53) 3c. ***V. indica nubicola*** (Fruhstorfer)

This margin of hindwing with some orange between the veins (Figures 54–55) 3b. ***V. indica pholoe*** (Fruhstorfer)

10. (8) Forewing above and below with subapical white bar extending from costa to vein M_2 narrow; with round white spot below vein M_2 greatly reduced and with black bar in middle of cell usually smaller (Figures 56–63) ..... 3e. ***V. indica vulcania*** Godart

Forewing above and below with this subapical white bar broader; with white spot below vein M_2 and black bar in middle of cell larger (Figures 47–49) 3a. ***V. indica indica*** (Herbst)

1. *Vanessa atalanta* (Linnaeus)

FIGURES 1, 17, 33–46

Papilio atalanta Linnaeus, 1758, p. 478; 1767, p. 776.— Fabricius, 1775, p. 504; 1787, p. 49; 1793, pp. 118–119.—Esper, 1777, pp. 182–197.—Herbst, 1794, pp. 171–175.—Godart, 1821, p. 99.

Vanessa atalanta Godart, 1819, pp. 319–320.—Boisduval, Rambur and Gaslin, 1832, p. 50.—Boisduval and LeConte, 1834, pp. 175–177.—Humphreys and Westwood, 1841, p. 55.—Doubleday, 1844, p. 78.—Lucas, 1845, pp. 57–58.—Wagner, 1870, p. 170.—Scudder, 1889, pp. 443, 447.—Dale, 1890, p. 149.—Barrett, 1893, p. 149.—Merrifield, 1893, pp. 58–62.—Favre, 1899, p. 99.—Dyar, 1903, p. 23.—Comstock and Comstock, 1904, p. 156.—Kirkaldy, 1906, p. 139.—Comstock, 1927, p. 131.—Williams, 1930, pp. 223–225.—Holland, 1931, p. 153.—Frohawk, 1934, p. 136.—Bates, 1935, p. 165.—Field, 1940b, p. 81.—Macy and Shepard, 1941, p. 123.—Pierce and Beirne, 1941, p. 20, pl. 3; fig. 1.—Richards, 1946, pp. 21–22.—Aubert, 1949, pp. 130–132.—Williams, 1949b, p. 39.—Klots, 1951, p. 107.—Forbes, 1960, p. 159.

Pyrameis atalanta Doubleday, 1849, p. 204.—Lucas, 1857, p. 542.—Morris, 1862, pp. 58–59.—Trimen, 1862–1866, p. 118.—Butler, 1870, p. 78.—Kirby, 1871, pp. 185, 648.—Strecker, 1878, p. 135.—Staudinger, 1885, p. 97.—Shatz and Röber, 1887, p. 125.—Dixey, 1890, pp. 92, 93, 94, 96, 98, 99, 100, 102, 106, 107, 109, 111, 115, 117, 118, 119, 122, 123, 126, 127, plate 1: figs. 3, 6, 7, pl. 3: fig. 42; 1893, pp. 69–73.—Tutt, 1896, p. 361.—Holland, 1898, p. 170.—Skinner, 1898, pp. 23–24.—Stichel, 1900, pp. 124–125; 1908, pp. 124–125; 1909, pp. 124–125.—Reuss, 1910b, pp. 62, 63, 64, 65.—1910c, pp. 85, 86, 87, 88; 1910d, p. 303.—Verity, 1913, p. 181.—Seitz, 1914a, p. 458; 1914b, p. 458.—Holland, 1915, p. 100.—Schultz, 1916, p. 27.—Verity and Querci, 1924, p. 42.

This species is one of the commonest and best known butterflies in the Northern Hemisphere. The upper surface of the forewing is mainly dark fuscous, very dark brown or black, with the *Vanessa* orange or red band crossing this wing from just below middle of costal margin almost to anal angle, more narrow than in the other *Vanessa* species except in *V. dejeanii*, where it is yellow and more irregular in its traversal of the wing or is even absent as in *V. dejeanii mounseyi*. It has the white subapical bar opposite end of cell and normally has seven submarginal white spots in the interspaces between costa and vein Cu_1 on this surface of forewing. On the upper surface of the hindwing the basal three fourths of the area is uniformly dark fuscous, very dark brown or black, with the dark submarginal round to triangular shaped spots in the orange to red marginal band much smaller than

in the other *Vanessa* species. *V. atalanta* differs from the other species (except *V. dejeanii*) on the under surfaces in again having a more narrow reddish or orange band across the forewing and in having the hindwing much darker in overall color, usually with a very contrasting yellowish or whitish triangular or subtriangular spot near middle of costal margin.

MALE (Figures 33–39).—Forewing on upper surfaces as mentioned before, mainly dark fuscous to black, with a narrow orange to red band; with a large pure white subapical bar opposite end of cell; with a series of seven submarginal white spots between costa and vein Cu_1 and with the first three of these down to vein R_5 very close together, often completely fused and appearing as one white spot; between the margin of the wing and these submarginal white spots there are four pale bluish to purplish spots in interspaces R_4, R_5, M_2, and M_3; the white spots in interspaces R_5 and M_1 are small but distinct, not indistinct to absent as they are in the other species of *Vanessa*.

Hindwing on the upper surface also mainly dark fuscous to black, with a marginal orange to red band about the same width or somewhat wider than the orange or red band of the forewing and lying between veins R_s and the anal angle; with a series of four small, round to triangular-shaped black spots crossing the center of this band between veins M_1 and Cu_2 and with a relatively large submarginal blue spot below vein Cu_2 and between there and the anal angle.

Under surface of forewing with most of the pattern of the upper surface repeated except that the subapical area between apex and subapical white bar is mottled, with several shades of light and dark brown, the inner margin of the red band is much more irregular and is invaded by the dark fuscous or black color of the base of wing, and there are two large bluish lines or bars or sometimes a large bluish spot in the black ground color between cell and subapical white bar.

The hindwing on the under surface is greatly mottled and intricately lined with numerous shades of brown, reddish brown, and black and with a considerable amount of lilac-colored scaling. The large subtriangular to triangular white or yellowish spot near middle of costal margin is usually very distinct, contrasting greatly with the overall dark color of most of the rest of the wing. There is a series of five submarginal, somewhat obscured, dark ocular spots between veins R_s and Cu_2 and pale streaks between these spots and the margin of the wing, these streaks being of a lilac color and paler between veins M_2 and Cu_2 than elsewhere.

Length of forewing, 25–34 mm (average 28.7 mm).

Male genitalia as illustrated in Figure 1 (of *V. atalanta atalanta*, my preparation no. 6179), uncus terminating in a small hook; gnathos in lateral view with lateral arms forming a boot-shaped structure; valva with a small, sharp anteriorly directed lobe at apex and with an obtuse lower angle; clasper with outwardly directed acute spur; cuiller a spike-like process ending in a single spur or sometimes in two spurs; aedeagus nearly straight, bent slightly downward at base, and with distal end pointed; anellus consisting of a ventral plate, forked both dorsally and ventrally where it is attached to the valves. The two subspecies *V. atalanta atalanta* and *V. atalanta rubria* show no differences in the male genitalia.

FEMALE (Figures 40–46).—Not distinguishable in habitus from the male sex except that the outer margin of forewing near vein Cu_2 is slightly more produced and the marginal orange to red band on upper surface of hindwing is often slightly wider.

Length of forewing, 25–35 mm (average 30.5 mm).

Female genitalia as illustrated in Figure 17 of *V. atalanta atalanta* drawn from my preparation no. 3667), with lateral plates located along anterior margin of eighth sternite deeply concave; with sclerotization around ostium bursae large and pod-like in appearance, as large as each lateral plate and projecting posteriorly, with ostium bursae near posterior margin of eighth sternite; signa deeply indented both anteriorly and posteriorly near middle. There are no differences displayed between the female genitalia of the two subspecies *V. atalanta atalanta* and *V. atalanta rubria*.

GEOGRAPHICAL VARIATION.—As just indicated, I recognize two subspecies of *V. atalanta*, the nominate subspecies *V. atalanta atalanta* found in the Old World and *V. atalanta rubria* of the New World.

1a. *Vanessa atalanta atalanta* (Linnaeus)

FIGURES 1, 17, 33–35, 41–43

Papilio atalanta [including the synonym *ammiralis*] Linnaeus, 1758, p. 478 [Article 11 (d), International Code of Zoologi-

cal Nomenclature states that "a name first published as a synonym is not thereby made available." Hence *ammiralis* is not an available name.]; 1767, p. 779.—Fabricius, 1775, p. 504; 1787, p. 49; 1793, pp. 118–119.—Esper, 1777, pp. 182–187, pl. 14: fig. 1; pl. 86: fig. 4.—Herbst, 1794, 171–175, figs. 3–6.

Vanessa atalanta. Godart, 1919, pp. 319–320.—Boisduval, Rambur and Graslin, 1832, pp. [49]–[50], pl. [13].—Boisduval and LeConte, 1834, p. 177.—Boisduval, 1840, p. 21.—Humphreys and Westwood, 1841, pp. 54, 55, pl. 15: figs. 1–4.—Herrich-Schaffer, 1843, pp. 38, 41.—Doubleday, 1884, p. 78.—Duponchel, 1844, p. 7.—Lucas, 1845, pp. 57–58.—Noel, 1845, pl. 1.—Duponchel, 1849, pp. 105–106, pl. 12: figs. 41 a–c.—De Waldheim and Eversmann, 1851, pp. 109–110, pl. 12: figs. 3, 4.—Stainton, 1857, pp. 37–38.—Rambur, 1858, p. 15.—Humphreys, [1859], pp. 21–22, pl. 11: figs. 5–8.—Berge, 1863, p. 53, pl. 3: fig. 3.—Berce, 1867, pp. 164–165, pl. 11: fig. 1.—Milliere, 1868, pp. 27–28, pl. 88: fig. 3.—Morris, 1868, pp. 64–66, pl. 27.—Wagner, 1870, p. 170.—Staudinger 1871, p. 17.—Frey, 1880, p. 26.—Kirby, 1882, p. 11, pl. 6: fig. 1.—Kane, 1885, p. 62.—Buckler, 1886, pp. 176–179, pl. 8: figs. 2, 2a, 2b.—Jordan, 1886, pp. 84–85.—Failla-Tedaldi, 1887, p. 69.—Scudder, 1889, p. 447.—Dale, 1890, pp. 148–152.—Barrett, 1893, pp. 145–149, pl. 20: figs. 2, 2a–2d.—Fischer, 1895, pp. 17, 18, 22, 24, 33.—Schille, 1895, p. 217.—Horsbrugh, 1896, p. 360.—Standfuss, 1896, pp. 252–256, pl. 7: fig. 7.—Favre, 1899, p. 99.—Dyar, 1903, p. 23.—Comstock and Comstock, 1904, p. 156.—Kirkaldy, 1906, p. 139.—Lhomne, 1923, p. 51.—Comstock, 1927, p. 131.—Holland, 1931, pp. 153–154.—Evans, 1932, p. 177.—Frohawk, 1934, pp. 16, 24, 25, 33, 134–140, 144, pl. 11: figs. 7–12.—Bates, 1935, p. 165.—Peile, 1937, p. 139.—Field, 1940b, pp. 81–82.—Macy and Shepard, 1941, p. 123.—Pierce and Beirne, 1941, p. 20, pl. 3: fig. 1.—Stokoe, 1944, pp. 92–93, pl. 11: fig. 7, pl. 12: fig. 3.—Ford, 1945, pp. 45, 60, 70, 90, 103, 154, 247, pl. 2: fig. 4, pl. 6: figs. 1–6.—Richards, 1946, pp. 21–22.—Aubert, 1949, pp. 130–132.—Paul and Robert, 1949, pl. 16.—Verity, 1950, pp. 334–340, pl. 52: figs. 7–13, pl. 18: fig. 3.—Klots, 1951, p. 107.—Agenjo, 1952, p. 282.—Forster and Wholfahrt, 1955, p. 56, fig. 21 (p. 55), pl. 15: fig. 12.—Lempke, 1956, pp. 189–191.—Wiltshire, 1957, p. 31.—Wynter-Blyth, 1957, p. 212.—Forbes, 1960, p. 159.—Chalmers-Hunt, 1960–1961, pp. 59–60, 140.—Niculescu, 1965, pp. 191–196, pl. 6: figs. 3, 4.

Pyrameis atalanta.—Doubleday, 1849, p. 204.—Lucas, 1857, p. 542.—Morris, 1862, p. 59.—Trimen, 1862–1866, p. 118.—Behr, 1864, p. 125.—Butler, 1870, p. 78.—Kirby 1871, pp. 185, 648.—Newman, 1874, pp. 62–64, fig. 16.—Strecker, 1878, p. 135.—Alphéraky, 1885, p. 598.—Marshall and de Niceville, 1886, p. 226.—Leech, 1892–1894, p. 352.—White, 1894, pp. 52–53, 63, pl. 3: fig. 7.—Tutt, 1896, pp. 355–361, fig. 38 (p. 356).—Holland, 1898, p. 170.—Skinner, 1898, pp. 23–24.—Cannaviello, 1900, pp. 17–18.—Stichel, 1900, pp. 124–125, pl. 2: fig. 3.—Staudinger and Rebel, 1901, p. 24.—Alphéraky, 1908, pp. 572–573.—Stichel, 1908, pp. 198–199, pl. 62: fig. c 2; 1909, pp. 198–199, pl. 62: fig. c 2.—Rebel, 1910, p. 20.—Reuss, 1910a, fig. 18; 1910b, pp. 62, 63, 64, 65; 1910c, pp. 85, 86, 87, 88, 90; 1910d, p. 303.—Fritsch, 1913, p. 25.—Verity, 1913, p. 181.—Seitz, 1914a, p. 458; 1914b, p. 458.—Holland, 1915, p. 100.—Schultz, 1916, p. 27.—Reuss, 1918, p. 41.—Ragusa, 1919, p. 145.—Sevastopulo, 1920, p. 283.—Stephan, 1923, pp. 35–36.—Frohawk, [1924], pp. 158–165, pl. 27.—Stephan, 1924, p. 25.—Verity and Querci, 1924, p. 42.—Bang-Haas, 1926, p. 55; 1927, p. 55; 1928, p. 26; 1930, p. 162.—Gaede, 1930a, pp. 199–200; 1930b, pp. 199–200.—Bryk, 1940, p. 16.—South, 1941, pp. 81–82, pls. 46–48.—Zerkowitz, 1946, p. 246.

Pyrameis atalanta atalanta.—Verity and Querci, 1924, p. 42.

Vanessa atalanta atalanta.—Verity, 1950, p. 339.

Papilio ammiralis Godart, 1821, pp. 99–101.—Lucas, 1845, p. 57.

Papilio amiralis Retzius [misspelling of *ammiralis*], 1783, p. 31, index, p. 23.—Kirby, 1871, p. 648.—Strecker, 1878, p. 136.

Pyrameis atalanta aberration *parisiensis* Girard [excluded name, type 2], 1866, pp. 567–568.

Pyrameis atalanta form *parisiensis*.—Bang-Hass [excluded name, type 3], 1927, p. 55.

Vanessa atalanta aberration *parisiensis*.—Verity, 1950, p. 377.

Pyrameis atalanta aberration *fracta Tutt* [excluded name, type 2], 1896, p. 355.—Lambillion, 1903, p. 23.—Stichel, 1908, p. 198.—Rebel, 1910, p. 20.—Fritsch, 1913, p. 25.—Lambillion, 1913, p. 127.—Ragusa, 1919, p. 145.—Wize, 1922, p. 261.—Stephan, 1925, p. 36.—Pionneau, 1924, p. 59.

Vanessa atalanta aberration *fracta*.—Lhomne, 1923, p. 51.—Fletcher, 1936, p. 273.—Peile, 1936, p. 181.—Verity, 1950, p. 336.—Chalmers-Hunt, 1960–1961, p. 59.—Niculescu, 1965, p. 196.

Vanessa atalanta form *fracta*.—Agenjo [excluded name, type 3], 1952, p. 282.—Lempke, 1956, p. 192.

Vanessa atalanta aberration *klemensiewiczi* Schille.—Fischer [excluded name, type 2], 1895, pp. 217–218.—Fischer, 1903, p. 224.—Lhomme, 1923, p. 51.—Chalmers-Hunt, 1960–1961, p. 59.

Pyrameis atalanta aberration *klemensiewiczi*.—Tutt, 1896, p. p. 357.—Stichel, 1900, pp. 126–127.—Staudinger and Rebel, 1901, p. 24.—Stichel, 1908, p. 198; 1909, p. 198.—Rebel, 1910, p. 20.—Reuss, 1910a, figs. 15, 16; 1910b, p. 66; 1910c, pp. 89, 90.—Fritsch, 1913, p. 25.

Cynthia atalanta transition form *klemensiewiczi*.—Gunder [excluded name, type 2], 1927c, p. 270, pl. 8: fig. 1.

Pyrameis atalanta form *klemensiewiczi*.—South [excluded name, type 3], 1941, p. 82.

Vanessa atalanta form *klemensiewiczi*.—Verity, 1950, p. 337.

Vanessa atalanta aberration *merrifieldi* Standfuss [excluded name, type 2], 1895, p. 90; 1896, p. 387, pl. 7: fig. 8.

Pyrameis atalanta cold variety *merrifieldi*.—Fischer [excluded name, type 3], 1900, p. 5.

Pyrameis atalanta aberration *merrifieldi*.—Stichel, 1900, pp. 124, 126.—Fischer, 1901, p. 326.—Stichel, 1908, pp. 198–199; 1909, pp. 198–199.—Reuss, 1910b, p. 64; 1910c, pp. 85–86; 1910d, p. 304.

Vanessa atalanta warm variety *merrifieldi*.—Fischer [excluded name, type 3], 1903, p. 224.

Vanessa atalanta cold variety *merrifieldi*.—Fischer, 1907, p. 170.

Pyrameis atalanta form *merrifieldi*.—Gaede [excluded name, type 3], 1930a, p. 199; 1930b, p. 199.

Vanessa atalanta form *merrifieldi*.—Verity, 1950, p. 337.

Vanessa atalanta aberration *merifieldi* Standfuss [misspelling of *merrifieldi*], 1896, p. 387.

Vanessa atalanta aberration *klymene* Fischer [excluded name, type 2], 1896, pp. 18, 57, pl. 5: fig. 6b; 1903, p. 224; 1907, pp. 170. 201, figs. 9, 11.

Pyrameis atalanta aberration *klymene*.—Fischer, 1900, p. 5.—Stichel, 1900, pp. 127–128; 1908, p. 198, pl. 62: fig. c 3; 1909, p. 198, pl. 62: fig. c 3.

Vanessa atalanta form *klymene*.—Verity [excluded name, type 3], 1950, p. 337.

Pyrameis atalanta italica Stichel [new synonymy], 1900, pp. 125–126; 1908, p. 199; 1909, p. 199.—Lamibillion, 1913, p. 127.—Verity, 1916a, p. 102.—Ragusa, 1919, p. 145.—Verity, 1920, pp. 61–62.—Verity and Querci, 1924, p. 42.

Pyrameis atalanta aberration italica.—Rebel, 1910, p. 20.—Fritsch, 1913, p. 25.

Vanessa atalanta italica.—Verity, 1950, pp. 339–340.—Niculescu, 1965, p. 196.

Pyrameis atalanta variety *cabeauensis* Lambillion [excluded name, type 3], 1903, pp. 22–23.

Pyrameis atalanta aberration *cabeauensis*.—Bang-Haas [excluded name, type 2], 1926, p. 55.

Pyrameis atalanta form *cabeauensis*.—Gaede [excluded name, type 3], 1930a, p. 200; 1930b, p. 200.

Vanessa atalanta aberration *cabeauensis*.—Verity, 1950, p. 336.—Chalmers-Hunt, 1960–1961, p. 59.—Niculescu, 1965, p. 196.

Vanessa atalanta form *cabeauensis*.—Lempke, 1956, p. 193.

Pyrameis atalanta aberration and variety *nana* Schultz [excluded name, type 2 and type 3], 1905, p. 67.

Pyrameis atalanta aberration *nana*.—Stichel, 1908, pp. 198, 248; 1909, pp. 198, 248.—Rebel, 1910, p. 20.—Fritsch, 1913, p. 25.—Ragusa, 1919, p. 145.—Stephan, 1923, p. 36.

Pyrameis atalanta form *nana*.—Gaede [excluded name, type 3], 1930a, p. 199; 1930b, p. 199.

Vanessa atalanta aberration *nana*.—Lhomne, 1923, p. 51.—Verity, 1950, p. 336.—Chalmers-Hunt, 1960–1961, p. 59.

Vanessa atalanta form *nama*.—Lempke, 1956, p. 191.

Pyrameis atalanta aberration *cyclops* Stichel [excluded name, type 2], 1908, p. 198; 1909, p. 198.

Vanessa atalanta form *cyclops*.—Verity [excluded name, type 3], 1950, p. 337.

Vanessa atalanta aberration *cyclops*.—Niculescu, 1965, p. 196.

Pyrameis atalanta aberration *umbrosa* Fischer [excluded name, type 2], 1908, p. 130.—Bang-Haas, 1926, p. 56.

Pyrameis atalanta form *umbrosa*.—Gaede [excluded name, type 3], 1930a, p. 199.—Gaede, 1930b, p. 199.

Vanessa atalanta form *umbrosa*.—Verity, 1950, p. 337.

Pyrameis atalanta aberration *aestiva* Reuss [excluded name, type 2], 1910, p. 303.

Pyrameis atalanta aberration *cabeanensis* Rebel [misspelling of *cabeaunensis*], 1910, p. 20.—Fritsch, 1913, p. 25.

Pyrameis atalanta aberration *merrifieldoides* Reuss [excluded name, type 2], 1910d, pp. 303–304.—Bang-Haas, 1926, p. 56.

Pyrameis atalanta form *merrifieldoides*.—Gaede [excluded name, type 3], 1930a, p. 199; 1930b, p. 199.

Pyrameis atalanta aberration *merrifieldoides*.—Verity, 1950, p. 336.

Pyrameis atalanta aberration *rosea* Reuss [excluded name, type 2], 1910, p. 88.

Pyrameis atalanta form *rosea*.—Gaede [excluded name, type 3], 1930a, p. 199; 1930b, p. 199.

Vanessa atalanta form *rosea*.—Lempke, 1956, p. 191.

Pyrameis atalanta aberration *atalantoides* Lambillion [excluded name, type 2], 1911, p. 91.—Bang-Haas, 1926, p. 199.

Pyrameis atalanta form *atalantoides*.—Gaede [excluded name, type 2], 1930a, p. 199; 1930b, p. 199.

Vanessa atalanta aberration *atalantoides*.—Verity, 1950, p. 336.

Pyrameis atalanta aberration *bialbata* Cabeau [excluded name, type 2], 1911, p. 22.—Bang-Haas, 1926, p. 55.

Vanessa atalanta variety *bialbata*.—Lhomne [excluded name, type 3], 1923, p. 51.

Pyrameis atalanta form *bialbata*.—Gaede [excluded name, type 3], 1930a, pp. 199–200; 1930b, pp. 199–200.

Vanessa atalanta form *bialbata*.—Lempke, 1956, p. 192.

Vanessa atalanta aberration *bialbata*.—Verity, 1950, p. 336.—Chalmers-Hunt, 1960–1961, p. 59.

Pyrameis atalanta aberration *octocyanea* Cabeau [excluded name, type 2], 1913, p. 25.—Bang-Haas, 1926, p. 56.

Pyrameis atalanta form *octocyanea*.—Gaede [excluded name, type 3], 1930a, p. 199; 1930b, p. 199.

Vanessa atalanta aberration *octocyanea*.—Verity, 1950, p. 336.

Pyrameis atalanta aberration *cyanosticta* Fritsch [excluded name, type 2], 1913, p. 26.—Bang-Haas, 1926, p. 55.

Pyrameis atalanta form *cyanosticta*.—Gaede [excluded name, type 3], 1930a, p. 199; 1930b, p. 199.

Vanessa atalanta aberration *cyanosticta*.—Verity, 1950, p. 336.

Pyrameis atalanta aberration *eos* Fritsch [excluded name, type 2], 1913, p. 25.—Bang-Haas, 1926, p. 55.

Pyrameis atalanta form *eos*.—Gaede [excluded name, type 3], 1930a, p. 199; 1930b, p. 199.

Vanessa atalanta aberration *eos*.—Verity, 1950, p. 336.—Chalmers-Hunt, 1960–1961, p. 59.

Vanessa atalanta form *eos*.—Lempke, 1956, p. 191.

Pyrameis atalanta aberration *flavescens* Fritsch [excluded name, type 2], 1913, p. 25.—Bang-Haas, 1926, p. 56.

Pyrameis atalanta form flavescens.—Gaede [excluded name, type 3], 1930a, p. 199; 1930b, p. 199.

Vanessa atalanta aberration *flavescens*.—Verity, 1950, p. 337. Chalmers-Hunt, 1960–1961, p. 59.

Vanessa atalanta form *flavescens*.—Lempke, 1956, p. 192.

Pyrameis atalanta aberration *hyensis* Lambillion [excluded name, type 2], 1913, pp. 126–127.—Bang-Haas, 1926, p. 56.

Vanessa atalanta aberration *hyensis*.—Lhomne, 1923, p. 51.—Verity, 1950, p. 336.—Chalmers-Hunt, 1960–1961, p. 59.
Pyrameis atalanta form *hyensis*.—Gaede [excluded name, type 3], 1930a, p. 200; 1930b, p. 200.
Vanessa atalanta form *hyensis*.—Lempke, 1956, p. 192.

Pyrameis atalanta aberration *ochrobrunnea* Fritsch [excluded name, type 2], 1913, p. 25.—Bang-Haas, 1926, p. 56.
Pyrameis atalanta form *ochrobrunnea*.—Gaede, [excluded name, type 3], 1930a, p. 199; 1930b, p. 199.
Vanessa atalanta aberration *ochrobrunnea*.—Verity, 1950, p. 337.—Chalmers-Hunt, 1960–1961, p. 59.

Pyrameis atalanta aberration *pallida* Fritsch [excluded name, type 2], 1913, p. 25.—Bang-Haas, 1926, p. 56.
Pyrameis atalanta form *pallida*.—Gaede [excluded name, type 3], 1930a, p. 199; 1930b, p. 199.
Vanessa atalanta aberration *pallida*.—Verity, 1950, p 337.—Chalmers-Hunt, 1960–1961, p. 59.

Pyrameis atalanta aberration *rubra* Fritsch [excluded name, type 2], 1913, p. 25.—Bang-Haas, 1926, p. 56.
Pyrameis atalanta form *rubra*.—Gaede [excluded name, type 3], 1930a, p. 199; 1930b, p. 199.
Vanessa atalanta aberration *rubra*.—Verity, 1950, p. 336.—Chalmers-Hunt, 1960–1961, p. 59.
Vanessa atalanta form *rubra*.—Lempke, 1956, p. 191.—Niculescu, 1965, p. 196.

Pyrameis atalanta aberration *sordida* Fritsch [excluded name, type 2], 1913, p. 26.—Bang-Haas, 1926, p. 56.
Pyrameis atalanta form *sordida*.—Gaede [excluded name, type 3], 1930a, p. 199; 1930b, p. 199.
Vanessa atalanta aberration *sordida*.—Verity, 1950, p. 337.
Vanessa atalanta form *sordida*.—Lempke, 1956, p. 191.

Pyrameis atalanta aberration *bipunctata* Gussich [excluded name, type 2], 1917, p. 214.—Bang-Haas, 1927, p. 55; 1928, p. 26.
Pyrameis atalanta form *bipunctata*.—Gaede [excluded name, type 3], 1930a, p. 199; 1930b, p. 199.
Vanessa atalanta aberration *bipunctata*.—Verity, 1950, p. 336.

Pyrameis atalanta variety *turcica* Wize [excluded name, type 3], 1917, p. 5.—Wize, 1922, p. 261.
Vanessa atalanta form *turcica*.—Lempke [excluded name, type 3], 1956, p. 193.

Pyrameis atalanta aberration *albipunctata* Ragusa [excluded name, type 2], 1919, p. 145.
Vanessa atalanta aberration *albipunctata*.—Verity, 1950, p. 336.

Pyrameis atalanta form *septiespupillata*.—Verity [excluded name, type 3], 1919 pp. 198–199.—Gaede, 1930a, p. 199; 1930b, p. 199.
Pyrameis atalanta aberration *septiespupillata*.—Bang-Haas [excluded name, type 2], 1927, p. 55.
Vanessa atalanta aberration *septiespupillata*.—Field, 1940b, p. 83.—Verity, 1950, p. 336.
Vanessa atalanta form *septiespupillata*.—Lempke, 1956, p. 192.

Pyrameis atalanta form *sexiespupillata* Verity [excluded name, type 3], 1919, pp. 198-199.—Gaede, 1930a, p. 199; 1930b, p. 199.
Pyrameis atalanta aberration *sexiespupillata*.—Ban-Haas [excluded name, type 2], 1927. p. 55.
Vanessa atalanta aberration *sexiespupillata*.—Field, 1940b, p. 83.—Verity, 1950. p. 336.
Vanessa atalanta form sexiespupillata.—Lempke, 1956, p. 192.

Pyrameis atalanta *variety leliva* Wize [excluded name, type 3], 1922, p. 261.
Vanessa atalanta form *leliva*.—Lempke [excluded name, type 3], 1956, p. 193.

Pyrameis atalanta aberration *albimaculata* Pruffer [excluded name, type 2], 1923, p. 281.—Bang-Haas, 1927, p. 55; 1928, p. 26.
Pyrameis atalanta form *albimaculata*.—Gaede [excluded name, type 3], 1930a, p. 199; 1930b, p. 199.
Vanessa atalanta aberration *albipunctata*.—Verity, 1950, p. 336.

Pyrmeis atalanta aberration *martha* Stephen [excluded name, type 2], 1923, p. 36.—Bang-Haas, 1927, p. 55.
Pyrameis atalanta form *martha*.—Gaede [excluded name, type 3], 1930a, p. 199; 1930b, p. 199.
Vanessa atalanta aberration *martha*.—Verity, 1950, p. 336.

Pyrameis atalanta aberration *millierei* Cabeau [excluded name, type 2], 1923, p. 14.—Bang-Haas, 1927, p. 55.
Vanessa atalanta aberration *millierei*.—Lhomne, 1923, p. 51.—Verity, 1950, p. 337.
Pyrameis atalanta form *millierei*.—Gaede [excluded name, type 3], 1931a, p. 343; 1931b, p. 343.

Pyrameis atalanta aberration *balbiata* Pionneau [misspelling of *bialbiata*], 1924, p. 59.

Pyrameis atalanta aberration *flava* Eitel [excluded name, type 2], 1924, p. 141.—Bang-Haas, 1927, p. 55.
Pyrameis atalanta form *flava*.—Gaede [excluded name, type 3], 1930a, p. 199; 1930b, p. 199.
Vanessa atalanta aberration *flava*.—Verity, 1950, p. 337.

Pyrameis atalanta minutior Verity and Querci [new synonymy], 1924, p. 42.—Bang-Haas, 1927, p. 55.
Pyrameis atalanta form *minutior*.—Gaede, 1930a, p. 199; 1930b, p. 199.
Vanessa atalanta italica subrace *minutior*.—Verity, 1950, p. 340.

Pyrameis atalanta aberration *testacea* Pionneau [excluded name, type 2], 1924, p. 59.—Bang-Haas, 1927, p. 55; 1930, p. 162.
Pyrameis atalanta form *testacea*.—Gaede [excluded name, type 3], 1931a, p. 343; 1931b, p. 343.
Vanessa atalanta aberration *testacea*.—Verity, 1950, p. 336.—Niculescu, 1965, p. 195.

Pyrameis atalanta aberration *dewalschei* Derenne [excluded name, type 2], 1926, pp. 90–91.—Bang-Haas, 1927, p. 55.
Pyrameis atalanta form *dewalschei*.—Gaede [excluded name, type 3], 1930a, p. 200; 1930b, p. 200.

Vanessa atalanta aberration *dewalschei*.—Verity, 1950, p. 337.

Cynthia atlanta.—Gunder [misspelling of *atalanta*], 1927c, p. 270, pl. 8: fig.1.

Pyrameis atalanta form *angustata* Gaede [excluded name, type 3], 1930a, p. 199; 1930b, p. 199.
Vanessa atalanta aberration *angustata*.—Verity [excluded name, type 2], 1950, p. 336.—Niculescu, 1965, p. 196.

Vanessa atalanta aberration *albopunctura* Frohawk [excluded name, type 2], 1938, p. 87, pl. 20: figs. 1, 2.

Pyrameis atalanta aberration *flavomaculata* Lempke [excluded name, type 2], 1939, pp. 120–121.
Vanessa atalanta form *flavomaculata*.—Lempke [excluded name, type 3], 1956, p. 192.

Vanessa atalanta form *ocellata* Stammeshaus [excluded name, type 3], 1954, p. 271.—Lempke, 1956, p. 193.

Vaness atalanta form *angustifasciata* Lempke [excluded name, type 3], 1956, p. 192.
Vanessa atalanta aberration *angustifasciata*.—Chalmers-Hunt excluded name, type 2], 1960–61, p. 59.

Vanessa atalanta form *caerulocellata* Lempke [excluded name, type 3], 1956, p. 193.
Vanessa atalanta aberration *caerulocellata*.—Chalmers-Hunt [excluded name, type 2], 1960–1961, p. 59.

Vanessa atalanta form *fuscescens* Lempke [excluded name, type 3], 1956, p. 191.
Vanessa atalanta aberration *fuscescens*.—Chalmers-Hunt [excluded name, type 2], 1960–1961, p. 59.

Vanessa atalanta form *infranigrans* Lempke [excluded name, type 3], 1956, p. 192.

Vanessa atalanta form *reducta* Lempke [excluded name, type 3], 1956, p. 192.

Vanessa atalanta form *largomarginata* Groenendijk [excluded name, type 5], 1966, p. 22.

Vanessa atalanta form *virescens* Groenendijk [excluded name, type 5], 1966, p. 22.

This is the subspecies found in northern Africa along the Mediterranean coast and in Asia Minor, Europe, and central Asia.

MALE (Figure 33–35).—*V. atalanta atalanta* differs from *V. atalanta rubria* solely in having the subapical white bar opposite end of cell on both surfaces of forewing considerably larger, sometimes as much as twice as large as it is in the latter. Usually the submarginal white spot in interspace M_2 on the forewing is also slightly larger. Frequently the orange or red bands on both fore- and hindwings on the upper surfaces are slightly broader, and the central black spots in the marginal orange band of hindwing above are larger; these last two differences, however, are not constant enough to be considered diagnostic characters.

Length of forewing, 27–31.5 mm (average 28.8 mm).

FEMALE (Figures 41–43).—This sex is very much like the male and it differs from the females of *V. atalanta rubria* in the same way that the males do. Some females have a larger subapical white bar and a larger submarginal white spot in interspace M_2 on the forewing than do the males, and some have a slightly larger wing expanse.

Length of forewing, 27–34 mm (average 30.5 mm).

INDIVIDUAL AND ABERRATIONAL VARIATION.—The ordinary individual variation in this subspecies often consists of differences in color of the light-colored bands on the upper surfaces of the wings, this color may vary from yellow to orange to red to crimson. Other individual differences are caused by black scaling, which sometimes breaks this same band on the forewing into two or three distinct parts. Also specimens are common in both sexes with an extra white dot in this band in interspace Cu_1, and Richards (1946, pp. 21–22) reports that out of five hundred specimens, one hundred had this extra white spot. Aberrational and individual variations have been studied extensively in this subspecies, unfortunately chiefly by persons who gave formal names to the individuals they described. A perusal of the literature and synonymy citations given previously shows that some twenty-six writers have given forty-seven formal names to what are sometimes remarkable aberrations and to what are most often slight individual variants. Specimens lacking a particular submarginal white spot, having an extra white spot, having a misplaced marking, or showing any slight difference from the "normal" have received names ad infinitum. These names serve no useful purpose and all are excluded from our formal nomenclature or synonymized in the preceding text. Workers who are interested in these named aberrations should consult Verity (1950, pp. 334–340) and Lempke (1956, pp. 189–191).

SEASONAL VARIATION.—Seasonal variation or variation in habitus between the two broods (where two broods occur) does not seem to exist in this subspecies.

METHOD OF IDENTIFICATION.—Since Linnaeus in his original description of *atalanta* (1758, p. 478) refers to his 1746 work "Fauna Svecica," I consider Sweden to be the type locality of *V. atalanta atalanta*. This consideration and his references to other previous descriptions and illustrations, all of which refer to the European population, leave no doubt about the identification of this name. Verity (1913, p. 181) in his study on the Linnean types states of *atalanta*: "The example labelled by Linnaeus is of the commonest form, with moderately wide crimson bands." This specimen is in the Linnean collection of the Linnean Society, London.

SYNONYMY.—See literature citations and previous synonymy. *Papilio ammiralis* Linnaeus (1758, p. 478), a name used earlier by Linnaeus (and therefore not available), is listed by him as a synonym. This name was used by Godart (1821, p. 99) and in a variant spelling, *P. amiralis*, by Retzius (1783, p. 31). Stichel (1900, pp. 125–126) described *Pyrameis atalanta italica* as a subspecies from south and central Italy, stating that it is characterized by the reduced width of the red band of the forewing. This is an individual variant. Verity and Querci (1924, p. 42) describe *Pyrameis atalanta minutior* as a race from "Quercianella, near Leghorn" in Tuscany, Italy. It is doubtful if they had any reasonable idea of what the term "race" should mean. At any rate their name is a synonym of *V. atalanta atalanta*.

LIFE HISTORY.—The larval food plants are: *Urtica dioica, Urtica urens,* and *Parietaria officinalis* (all Urticaceae, order Urticales). Larvae feed also upon *Humulus* (Moraceae, order Urticales) and have been reported upon *Helichrysum* (Compositae, order Asterales) and *Salix* (Salicaceae, order Salicales)! These last two plants are not its usual food and perhaps represent forced rearings.

Brief descriptions of the larva and pupa were given as long ago as 1775 (Fabricius, p. 504). Life-history notes and descriptions of the immature stages were given by Esper (1777, pp. 185–186, pl. 14: fig. 1), Herbst (1794, pp. 174–175), Godart (1819, p. 320), Boisduval, Rambur and Graslin (1832, pp. [49]–[50], pl. [13]), Humphreys and Westwood (1841, p. 54, pl. 15: figs. 3, 4), Duponchel (1849, pp. 105–106, pl. 12: fig. 41), Stainton (1857, pp. 37–38), Morris (1868, p. 66, pl. 27), Newman (1874, pp. 62–64), Buckley (1888, pp. 176–179, pl. 8: figs. 2, 2a, 2b), Dale (1890, pp. 149–152), Barrett (1893, pp. 147–148, pl. 20: figs. 2c, 2d), Tutt (1896, pp. 358–360), Frohawk ([1924], pp. 158–165, pl. 27); (1934, pp. 137–139, pl. 11: figs. 7, 10), South (1941, p. 82, pl. 46), Stokoe (1944, pp. 92–93, pl. 11: fig. 7; pl. 12: fig. 3), Niculescu (1965, pp. 193–195, figs. 100, 101), and numerous other writers.

DISTRIBUTION.—This species is found in the Canary Islands, along the Mediterranean coast of Africa and from Asia Minor east to Pakistan and Kashmir (northern India) and north throughout all Europe (except the northernmost portions) through central Asia north of the Himalayan Mountains to the Amur River. Very few individuals survive the winter in the northern part of its range (even in England) and it reintroduces itself each year by migrations from the south.

MATERIAL STUDIED.—Twenty males and thirty-five females were studied from the following localities: CANARY ISLANDS: Port Orotava, Teneriffe (July). SPAIN: Sodelleta (September); Segovia (July); Sierra de Alfacar. FRANCE: Alsace; Royan (July, October). ITALY: Isola d'Elba (Poggio), Toscana (May, 500 m). AUSTRIA. CZECHOSLOVAKIA: Prague (September); Friedland (September). HUNGARY: Falgamácsu (August); Baja (September). TURKEY: Anlakya (December). SYRIA: Beirut.

1b. *Vanessa atalanta rubria* (Fruhstorfer)

FIGURES 36–40, 44–46

Papilio atalanta.—Fabricius, 1775, p. 504; 1787, p. 49; 1793, pp. 118–119.

Vanessa atalanta.—Godart, 1819, p. 319.—Boisduval, Rambur and Graslin, 1832, p. 50.—Boisduval and LeConte, 1834, pp. 175–177.—Humphreys and Westwood, 1841, p. 55.—Doubleday, 1844, p. 78.—Lucas, 1845, p. 58.—Poey, 1847, p. 122.—Wagner, 1870, p. 170.—Scudder, 1888, pl. 2: fig. 6, pl. 78: figs. 58, 59, pl. 83: figs. 52, 53, 55; 1899, pp. 441–456, pl. 12: fig. 5; pl. 20: fig. 7; pl. 33: figs. 29, 29*a*; pl. 61: figs. 29, 37; pl. 64: fig. 24; pl. 70: fig. 10; pl. 74: fig. 35; pl. 81: figs. 2, 6; pl. 86: figs. 61–65.—Dale, 1890, p. 150.—Barrett, 1893, p. 149.—Favre, 1889, p. 99.—Meyrick, 1899, p. 193.—Dyar, 1903, p. 23.—Comstock and Comstock, 1904, pp. 154–156, pl. 26: figs. 1, 2.—Barnes and McDunnough, 1917, p. 11.—Comstock, 1927, p. 131, pl. 43: figs. 1, 2.—Holland, 1931, pp. 153–154, pl. 3: fig. 35; pl. 4: figs. 52, 53, 55; pl. 43: fig. 4.—Frohawk, 1934, p. 136.—Bates, 1935, p. 165.—Davenport and Dethier, 1938, p. 163.—McDunnough, 1938, p. 20.—Wild, 1939, p. 26, pl. 7: fig. 1.—Field, 1940b, pp. 81–84, 274.—Hoffmann, 1940, p. 680.—

Macy and Shepard, 1941, pp. 122-123.—Pierce and Beirne, 1941, p. 20, pl. 3: fig. 1.—Comstock, 1944, p. 451.—Leighton, 1946, p. 59.—Aubert, 1949, p. 132.—Clark and Clark, 1951, pp. 13, 43–44, 205, pl. 8: fig. *f*.—Klots, 1951, pp. 49, 107, 113, 114, pl. 6: fig. 7, pl. 14: fig. 9, pl. 17: fig. 2.—Ferguson, 1954, p. 194.—Brown, 1955, p. 100 2 figs.—Zimmermann, 1958, pp. 453, 454, 455, 456–457, figs. 388, 389, 390, 395, 399.—Forbes, 1960, p. 159.—Dos Passos, 1964, p. 77.

Pyrameis atalanta.—Doubleday, 1849, p. 204.—Lucas, 1857, p. 542.—Morris, 1860, p. 8; 1862, pp. 58-59.—Girard, 1868, p. 290.—Kirby, 1871, pp. 185, 648.—Strecker, 1878, pp. 135–136, 190.—Godman and Salvin, 1882, p. 219.—Edwards, 1889, p. 25.—Maynard, 1891, pp. 92, fig. 32*c* (p. 95).—Tutt, 1896, p. 361.—Denton, 1898, pp. 264–266, pl. [54].—Holland, 1898, p. 170, pl. 3: fig. 35, pl. 4: figs. 52, 53, 55, pl. 43: fig. 4.—Skinner, 1898, pp. 23–24.—Stichel, 1900, p. 125.—Wright, 1905, p. 177, pl. 22: fig. 227.—Kirkaldy, 1906, p. 139.—Stichel, 1908, p. 199; 1909, p. 199.—Reuss, 1910b, pp. 62, 63, 64, 65; 1910c, pp. 85, 86, 87, 88, 90.—Verity, 1913 p. 181.—Seitz 1914a, p. 458, pl. 94: fig. A 1; 1914b, p. 458, pl. 94: fig. A 1.—Holland, 1915, p. 100, pl. 33.—Schultz, 1916, p. 27.

Cynthia atalanta.—Barnes and Benjamin, 1926, p. 14.

Pyrameis atalanta rubria Fruhstorfer, 1909, p. 94.—Martin, 1922, p. 44.—Bang-Haas, 1926, p. 56.

Vanessa atalanta rubria.—Verity, 1950, p. 339.

Vanessa atalanta variety *edwardsi* Grinnell [excluded name, type 3], 1918, pp. 113, 114, pl. 4: fig. 3.

Cynthia atalanta aberration *edwardsi*.—Barnes and Benjamin [excluded name, type 2], 1926, p. 14.

Vanessa atalanta aberration *edwardsi*.—Comstock, 1927, p. 131, pl. 43: figs. 4, 7.—McDunnough, 1938, p. 20.—Dos Passos, 1964, p. 77.

Cynthia atalanta hybrid *edwardsi*.—Gunder [excluded name, type 7], 1927c, p. 270, pl. 8: figs. 2, 3.

Vanessa atalanta italica aberration *edwardsi*.—Field [excluded name, type 1 and type 2], 1940b, pp. 82, 84.

Vanessa atalanta italica Stichel, Field not Stichel [a misidentification], 1940b, pp. 82-84, 264.—Klots, 1951, p. 107. Forbes, 1960, p. 159.

Vanessa atalanta italica form *minutior* Verity and Querci, Field not Verity and Querci [a misidentification], 1940b, pp. 82, 84, 274.

This is the subspecies found in North America. Several authors who have mentioned that the North American population differed from that of European are: Humphreys and Westwood (1841, p. 55), Girard (1868, p. 290), Fruhstorfer (1909, p. 94), Seitz (1914a, 1914b, p. 458), Bang-Haas (1926, p. 56), and others. Fruhstorfer is the first and only author to give a name to this population. All of these authors, however, mentioned characters for the two populations that do not hold up and all missed the real difference between them.

MALE (Figures 36–39).—This subspecies differs from *V. atalanta atalanta* mainly in having the subapical white bar opposite end of cell on both surfaces and forewing considerably smaller, sometimes half as large as it is in the latter. Usually the submarginal white spot in interspace M_2 on the forewing is also slightly smaller, frequently the orange bands on both forewing and hindwing on the upper surface are slightly more narrow, and the central black spots in the marginal orange band of hindwing above are smaller. These last two differences are not constant enough to be considered diagonostic characters.

Length of forewing, 25–34 mm (average 28.7 mm).

FEMALE (Figures 40, 44–46).—Very much like the male, differing from the females of *V. atalanta atalanta* in the same ways that the males differ from the males of that subspecies. Some females have a larger subapical white bar and a larger submarginal white spot in interspace M_2 on the forewing than do the males, and some have a slightly larger wing expanse. Because this is true, comparisons between the two subspecies should only be made by sexes.

Length of forewing, 25–35 mm (average 30.5 mm).

INDIVIDUAL AND ABERRATIONAL VARIATION.—The ordinary individual variation in this subspecies is quite like that of *V. atalanta atalanta* (which see). Fortunately workers have not applied names to individual variants in this population (probably because it was not thought to be a separate subspecies) except in one case where a hybrid was suspected (Grinnell, 1918, pp. 113, 114).

SEASONAL VARIATION.—There is some slight seasonal variation in the adults of this subspecies but this is not at all constant. In the summer many individuals are somewhat darker and larger than spring individuals, with the band across the forewing more narrow and more reddish in color.

METHOD OF IDENTIFICATION.—After having established that there were two subspecies and that the name *V. atalanta atalanta* belonged to the European population, it was only necessary to find the oldest available name for the North American population. Fruhstorfer's name *V. atalanta rubria* is the oldest name applicable and is the only avail-

able valid name. His original description (1909, p. 94) establishes that he had specimens of *V. atalanta* from Mexico and the United States.

The Fruhstorfer collection in the Museum National d'Histoire Naturelle, Paris, contains four syntypes of *V. atalanta rubria*. From these, I select as the lectotype, the lectotype candidate labeled "lectotype." It is a male specimen from "Mexico."

SYNONYMY.—See previous literature citations. There is one excluded name and several misidentifications, but there is no synonymy for this subspecies.

LIFE HISTORY.—It is not known whether there are differences in the immature stages between the two subspecies or not, nor is it known whether there are any differences in the life cycles, and it is not expected that this will be shown to be the case. The following information does apply to the North American population.

The larval food plants are reported to be: *Urtica, Boehmeria cylindrica, Paritaria debilis,* and in Hawaii, *Pipturus albidus* (all Urticaceae, order Urticales). This subspecies also feeds upon *Humulus lupulus* (Moraceae, order Urticales).

Edwards (1889, p. 25) and Davenport and Dethier (1938, p. 163) have listed most of the references to the life-history notes and to the descriptions of the immature stages. Probably the single most important reference is Scudder (1889, pp. 445–453, pl. 64: fig. 24; pl. 70: fig. 10; pl. 74: fig. 35; pl. 78: figs. 58, 59; pl. 81: figs. 2, 6; pl. 86: figs. 61–65; pl. 83: figs. 52, 53, 55).

DISTRIBUTION.—This species is found in North America from Hudson Bay and Great Slave Lake, south throughout the United States and Mexico into Guatemala, and in Bermuda, Cuba, and Hispaniola and has been introduced into the island of Hawaii.

MATERIAL STUDIED.—One hundred and nine males and seventy-nine females were studied from the following localities: DISTRICT OF MACKENZIE: Fort Resolution (July). BRITISH COLUMBIA: Victoria (July, September, October). SASKATCHEWAN: Redvers. ONTARIO. WASHINGTON: Black Canyon, Brewster (June); Cooney Lake (July); Mud Lake, Brewster (June); Neheotta (August); Yakima (October). OREGON: Crater Lake (July). CALIFORNIA: Camp Baldy, San Bernardino Mountains (July); Los Angeles; Mission San Jose, Alameda County (July). NEVADA: Del Monte Ranch, Reno (August). UTAH: Provo (July); Stockton (August). COLORADO: Golden (June). MICHIGAN: Betsy River (August); Detroit (July, August); Interlochen (August); Lake Wabekaness (August); Monroe Center (August). WISCONSIN: Madison (September). ILLINOIS: Decatur (August). KANSAS: Eureka (April, May, June, July, October, November); Lawrence (June); Troy (May). NEW HAMPSHIRE: Mount Washington (July). NEW YORK: Allegany State Park (July, August); Brooklyn (September); Botanical Gardens, Brooklyn (June); Franklin County (July); Jamaica, Long Island; Maspeth, Long Island (July); Prospect Park (June); Staten Island (September). PENNSYLVANIA: Buena Vista (August); New Brighton (September). NEW JERSEY: Cape May County (July). MARYLAND: Brinklow City. DISTRICT OF COLUMBIA (June). VIRGINIA: Alleghany County (May); Apple Orchard Mountain, Bedford County (July, 4,000 ft); Difficult Run (June); Fairfax County (October); Green Sea (September); Montgomery County (July); Salem (June, July, October); Shenandoah National Park (September); Suffolk (October). NORTH CAROLINA: Great Smoky Mountain National Park (September). SOUTH CAROLINA. FLORIDA: Homestead (February); Key West (April); Miami; Palm Beach. LOUISIANA: Harahan (June, July). TEXAS: Brownsville (February); Dallas (September); New Braunfels (March, June); San Antonio (September); San Benito (May); Tiger Hill. ARIZONA: Hereford; Huachuca (September); Redington. MEXICO: Cuernavaca (June); Jalapa; Mexico City (June, December); Orizaba (July); Popocatepetl Park (June); San Luis Obispo. GUATEMALA: Volcan Santa Maria (June). CUBA: Cerro, Havana (September); San Blas, Province Santa Clara (July, 600 ft). HAITI. DOMINICAN REPUBLIC.

2. *Vanessa tameamea* Eschscholtz

FIGURES 2, 18, 72-75

Vanessa tameamea Eschscholtz, 1821, p. 207.—Kirkaldy, 1906, pp. 138–139.—Perkins, 1913, p. clv.—Williams, 1928, p. 164.—Verity, 1950, p. 329.—Swezey, 1954, p. 157, figs. 26-28.—Zimmerman, 1958, pp. 452, 453, 454, 456, 463–467, 470–472, figs. 386, 387, 389, 392, 393, 397, 401.—Gorelick and Wielguns, 1968, pp. 111-114, figs. 1–4.

Pyrameis tameamea.—Tueley, 1878, p. 234.—Alfken, 1903, p. 569.—Fruhstorfer, 1912a, p. 526, pl. 117: figs. c 3, c 4; 1912b, p. 526, pl. 117: figs. c 3, c 4.

Vanessa tammeamea Eschscholtz [misspelling of *tameamea*], 1821, pl. 5: figs. 8*a*, 8*b*.—Blackburn, 1882, pp. 55–56.—Dale, 1890, p. 150.—Meyrick, 1899, pp. 193–194, pl. 5: fig. 9.—Kirkaldy, 1906, pp. 138–139.—Williams, 1928, pp. 164-169, figs. 1–3.

Pyrameis tammeamea.—Doubleday, 1849, p. 204.—Trimen, 1862-1866, p. 118.—Kirby, 1871, p. 185.—Standinger, 1885, p. 98, pl. 37: fig. [d-2].—Fruhstorfer, 1898b, p. 151.—Reuss, 1910c, pp. 85, 86, 87, 88.—Perkins, 1913, pp. xxix, xxxi, xxxvi, lxix, clv-clvi.

Pyrameis cordelia Doubleday, 1847, pl. 25: fig. 3.—Doubleday, 1849, p. 204 [synonym of *tammeamea*].—Meyrick, 1899, p. 193.—Zimmerman, 158, p. 463.

This species is unusual as are two other *Vanessa* species (*V. samani* of Sumatra and *V. dejeani* of Java, Bali, Lombok, and Mindanao) in being found only in a relatively small area of the world, in this case the Hawaiian Islands. It is the largest species in the genus and it and *V. samani* are the two most lightly colored. The forewing has the centrally placed orange-yellow band very broad, the broadest of any species in the genus, and like *V. indica* and *V. dejeanii* has both margins of this wing band very irregular. Nearly all of the outer and upper part of this wing entirely to the apex is dark brown or black. The base of the forewing on this surface is a light orange brown as is the base of the upper surface of the hindwing. The ground color of the outer one third of the hindwing is dark brown, and within this area there is the usual submarginal band of orange which, in this species, is much broader and set in farther from the margin than in the other species. This band is broken into a series of five separate spots located between veins R_s and 1st A. Four of the five fuscous spots near the middle of these orange spots are triangular in shape, the fifth spot, located between veins Cu_2 and 2d A, has blue along its outer edge and is subdivided into two fused ocular markings. On the under surface of the forewing and over much of the hindwing the predominant color varies from grayish brown to green, and these colors alone distinguish *V. tameamea* from all other species of *Vanessa*.

MALE (Figures 72, 73).—Forewing above dark brown to black, with a broad orange band crossing wing from below middle of costal margin to near anal angle, and with both upper and lower margins of this band very irregular; this band encircling black spot in middle of cell as it does in *V. indica;* subapical light-colored bar opposite end of cell not pure white, always suffused with orange or entirely orange or orange brown in color; with series of submarginal white spots ending just above vein M_3, usually four in number; interspace R_5 always lacking such a spot and interspace M_1 usually lacking it, or if present greatly reduced in size and with spot in interspace between margin M_2 sometimes white and often suffused with orange; between margin of the wing and these submarginal white spots the pale bluish spots of interspaces R_4, R_5, M_2 and M_3 found in *V. atalanta* are lacking in this species, although there may be a very faint, pale streak near this margin.

Hindwing on the upper surface with the basal one half orange brown and with wing beyond this dark brown, containing a large submarginal band of five nearly confluent orange spots, each centered with triangular-shaped small fuscous spots except the one located between vein Cu_2 and 2d A, which has blue along its outer edge and is subdivided into the two fused ocular markings mentioned before.

Under surface of forewing with much of the pattern of the upper surface repeated except ground color and apex are usually green, there is an additional black spot in the cell, and there are blue streaks between the end of cell and apical bar. This apical bar is white, not suffused with orange or orange brown in color as it is on the upper surface.

Hindwing on under surface with an overall grayish brown to greenish color, greatly mottled, and lined with shades of white, brown, and usually with several shades of green.

Length of forewing, 31–37 mm (average 33.4 mm).

Male genitalia as illustrated in Figure 2 (drawn from my preparation no. 3657), uncus with a broad blunt distal end; gnathos in lateral view with lateral arms parallel to and as long as uncus; valva with large rounded lobe at apex and with a short, sharp projection at lower angle; clasper downward directed and slightly curved anteriorly; cuiller a spikelike process with numerous spurlike projections at distal end; aedeagus slightly curved upward near base and at distal end, basal one-half slightly undulate; anellus similar to that of *V. atalanta,* with lateral arms more widely separated and relatively thinner.

FEMALE (Figures 74, 75).—This sex differs from the male in having the subapical bar opposite end

of cell white, not orange or heavily suffused with orange; the submarginal spot in interspace M_2 is also always white, never sometimes suffused with orange as it is in the male sex.

Length of forewing, 32–40 mm (average 36.4 mm).

Female genitalia as illustrated in Figure 18 (drawn from my preparation no. 6265), with sclerotization of seventh and eighth sternites greatly reduced, genital plate somewhat trapezoidal in shape; signa very large with a pale, central area and scabrous elsewhere.

INDIVIDUAL VARIATION.—Zimmerman (1958, p. 465) and Gorelick and Wielgus (1968, p. 114) remark upon the individual variation present on the under surfaces of the wings, where the predominant color varies from grayish brown to olive green.

METHOD OF IDENTIFICATION.—The type locality is Oahu, Hawaiian Islands. The original description and colored illustrations (Eschscholtz, 1821, p. 207, pl. 5: figs. 8*a*, 8*b*) thoroughly depict the species known for over one hundred years by this name.

SYNONYMY.—On page 207 of the original description Eschscholtz (1821) spells the name of his new species as *"tameamea"* and on the plate in the same publication (plate 5) as *"tammeamea"*. Kirkaldy (1906, p. 139) shows that *"tameamea"* is the more correct orthography.

Pyrameis cordelia described by Doubleday (1847, pl. 25: fig. 3) was correctly synonymized by him (1849, p. 204).

LIFE HISTORY.—The larval food plants are the following members of the Urticaceae (order Urticales) : *Pipturus albidus* (the principal food plant), *Boehmeria nivea, Neraudia, Touchardia,* and *Urera.*

Blackburn (1882, pp. 55–56) described the larva and Perkins 1913, p. clv) the larva and chrysalis. Life-history notes and descriptions of the immature stages were given by Williams 1928, pp. 164–169, figs. 2, 3), Zimmerman (1958, pp. 463–465, 467, 470, 472), and Gorelick and Wielgus (1968, pp. 111–114, fig. p. 112).

DISTRIBUTION.—This species is endemic to the mountainous regions of most the Hawaiian Islands: Kauai, Oahu, Molokai, Maui, Lanai, and Hawaii.

MATERIAL STUDIED.—Twenty-two males and thirteen females were studied from the following localities: KAUAI: (January, February, April, June, July; 3,500 to 4,000 ft); Camp Kokee (500 ft). OAHU: (March, June); Mount Olympus (May); Tantalus (May). HAWAII: *Kona* (September); Olaa (2,500 ft).

3. *Vanessa indica* (Herbst)

FIGURES 3, 19, 47–65

Papilio atalanta Linnaeus, Herbst not Linnaeus [a misidentification] 1794, pp. 175–176.

Papilio atalanta indica Herbst, 1794, pl. 180: figs. 1, 2.

Pyrameis indica.—Kirby, 1871, p. 185.—Marshall and de Niceville, 1886, p. 229.—Shatz and Röber, 1887, p. 125.—Leech, 1892–1894, pp. xv, 352.—Stichel, 1908, p. 199; 1909, p. 199.—Fruhstorfer, 1912a, p. 525; 1912b, p. 525.—Bang-Haas, 1926, p. 56.—Matsumura, 1929, p. 10.

Vanessa indica.—Kirby, 1882, p. 11.—Moore, 1899–1900, p. 104.—Bingham, 1905, pp. 366–367.—Peile, 1937, p. 140.—Bryk, 1946, p. 39.—Verity, 1950, p. 329.—Niculescu, 1965, pp. 190, 196.

This species is the second most common species in the genus (*V. atalanta* being the most common) and is mainly Asiatic with a very broad distribution. The upper surface of the forewing is somewhat similar to *V. atalanta* and *V. tameamea,* differing from the latter in having a slightly more narrow orange band across the wing and like that species differing from *V. atalanta* in having both margins of this band very irregular. Nearly all of the outer and upper part of this wing is dark brown or black. The base of forewing on this surface is golden brown or dark brown suffused with golden brown. The ground color of the inner three fourths or more of hindwing on the upper surface is the same color as the base of the forewing, and as in *V. atalanta* there is an orange marginal band, this band usually more narrow and containing a row of dark brown or black triangular-shaped spots that are much larger than those found in *V. atalanta. V. indica* on the under surface of forewing is more similar to *V. atalanta* than to *V. tameamea,* but the orange band across this wing is wider than in *V. atalanta* and intermediate in width to that of *V. tameamea.* On the under surface of the hindwing the pattern is very similar to that of *V. atalanta,* usually with more white present in the greatly mottled and lined pattern.

MALE (Figures 47–48, 50–51, 56, 57, 60, 61, 64, 65).—Forewing on the upper surface dark brown or black, with the orange band crossing wing much

broader than in *V. atalanta* and somewhat more narrow than in *V. tameamea* and, as in the latter, with both upper and lower margins of this band very irregular; this band encircling the black spot in middle of cell as it does in *V. tameamea* and with the orange inward from this spot even wider than in that species; subapical light-colored spots white, sometimes suffused with a litle orange, especially near costa; with the series of submarginal white spots ending just above vein M_3, usually six in number; interspace R_5 always lacking such a spot and with those in interspaces R_5 and M_1 more reduced in size than in *V. atalanta*; there are pale streaks between margin of wing and these submarginal white spots which, instead of being bluish, are gray or pale brown and more indistinct.

On the upper surface of hindwing the ground color is golden brown or dark brown suffused with golden brown, quite similar to that of the base of forewing, with a marginal orange band more narrow than the orange band of the forewing and more narrow than a similar band on hindwing of *V. atalanta;* with the series of four black spots crossing center of this band larger than in *V. atalanta* and with two fused blue-edged ocular spots below vein Cu_2; inward the orange marginal band is bordered by a series of black spots.

Forewing on under surface as in *V. atalanta* and *V. tameamea,* with most of the pattern of the upper surface repeated except that the subapical area between apex and subapical white bar is mottled with several shades of light and dark brown, there are two black spots in the cell that are surrounded by orange except along costa, and there is a large amount of blue in the black ground color between cell and subapical white bar.

The under surface of hindwing is greatly mottled and intricately lined with numerous shades of brown, reddish brown, and black and has a considerable amount of blue and lilac scaling and lines of white in the basal half of wing. As in *V. atalanta* there is a large area of suffused white near middle of costa, but this pale area is not so clearly triangular or subtriangular in shape; other markings are very similar to those of *V. atalanta.*

Length of forewing, 25–34 mm (average 29 mm).

Male genitalia as illustrated in Figure 3 (drawn from my preparation no. 3649 of *V. indica indica*), uncus in lateral view slightly enlarged distally and distinctly projected toward its lower angle, presenting a somewhat beaklike appearance; gnathos in lateral view bootlike in shape with a distinct "heel"; valva deeply incised on distal margin, forming an elongated and usually toothed ventral arm and a dorsal lobe, with a lower angle that is usually acute, and with a well-defined acute process near middle of its outer margin; clasper on valva small and ventrally directed; cuiller large and armed with two or more spurlike processes; aedeagus bent upwardly both anteriorly and posteriorly from just beyond middle; anellus similar to that of *V. atalanta,* with lateral arms more deeply separated from each other. The five subspecies display no differences in the male genitalia.

FEMALE (Figures 49, 52–55, 58, 59, 62, 63).—Females of this species are not separable from the males except by examination of the genitalia; individuals of this sex, however, often have slightly wider orange bands on upper surfaces of both fore- and hindwing and often have slightly larger black spots in the middle of the orange band on hindwing.

Length of forewing, 27–37 mm (average 31.3 mm).

Female genitalia as illustrated by Figure 19 (drawn from my preparation no. 6298 of *V. indica indica*), with lateral plates of eighth sternite much larger than in *V. atalanta* and with podlike sclerotization around ostium bursae small, much smaller than each lateral plate; posterior margin of seventh sternite deeply incised, allowing for intrusion of ostium bursae from anterior margin of eighth sternite; signa divided in middle by pale non-dentate area.

GEOGRAPHICAL VARIATION.—There are five described subspecies recognized in this paper. The nominate subspecies *V. indica indica* has the largest distribution, being found from northern India to eastern Siberia and Korea and south through Japan, Okinawa, and Taiwan to northern Luzon in the Philippine Islands. The subspecies *V. indica vulcania* occurs at a great distance from the other subspecies, being found in the Canary Islands, Madeira, southern Portugal, and Andalusia in southern Spain.

From the material I have for study of the three remaining subspecies, it seems that there is at least one subspecies, southern in distribution (southern

India, Ceylon, Celebes), distinct from *V. indica indica* and *V. indica vulcania*. I have been unable to accumulate enough material of all of these three to form an opinion as to their subspecific reality, and so for the present I treat them as separate subspecies. These three are *V. indica pholoe*, described from southern India, *V. indica nubicola*, described from Ceylon, and *V. indica buana*, described from the Celebes.

3a. *Vanessa indica indica* (Herbst)

FIGURES 3, 19, 47–49

Papilio atalanta indica Herbst, 1794, pl. 180: figs. 1, 2.
Pyrameis indica.—Kirby, 1871, p. 185.—Staudinger, 1885, p. 97.—Marshall and de Nicéville, 1886, p. 229, pl. 18: fig. 74.—Leech, 1892–1894, pp. xv, 352.—Miyajima, 1899, pp. 3. [118]–[119], pl. 11: fig. 1.—Staudinger and Rebel, 1901, p. 24.—Stichel, 1908, p. 199, pl. 62: fig. c 4; 1909, p. 199, pl. 62: fig. c 4.—Reuss, 1910a, figs. 13, 17; 1910b, pp. 62, 63, 64, 67; 1910c, pp. 85, 86, 88, 90.—Matsumura, 1929, pp. 9, 10, 19, pl. 5: fig. 2.—Mori, 1934, pp. 72–73.
Vanessa indica.—Kirby, 1882, p. 11.—Moore, 1899–1900, pp. 103–105, pl. 320: figs. 1, 1a, 1b.—Bingham, 1905, pp. 366–367.—Atram, 1924, p. 176.—Verity, 1950, p. 329.—Yokoyama, 1955, pp. 36, 96–97, pl. 29: fig. 88.—Wynter-Blyth, 1957, p. 212, pl. 37: fig. 7.
Pyrameis indica indica.—Fruhstorfer, 1898a, pp. 60–61; 1912a, p. 525; 1912b, p. 525.—Cho, 1934, pl. 20: fig. 1.—Doi, 1934, p. 29.
Vanessa indica indica—Evans, 1932, p. 177, pl. 24: fig. F 36.3.—Peile, 1937, p. 140.—Okano and Ohkura, 1959, p. 42, pl. 41: fig. 123.

Hamadryas calliroe Hübner, [1808], pl. 46: figs. 3, 4.
Pyrameis calliroe.—Hübner, [1919], p. 33.
Vanessa calliroe.—Doubleday, 1844, pp. 78–79.—Pryer, 1888, p. 26; 1889, p. xii, pl. 7: fig. 3.—Gray, 1846, p. 11.—Marshall and de Niceville, 1886, p. 229.—Leech, 1892–1894, p. 352.—Moore, 1899–1900, p. 103.

Pyrameis callirhoe Horsfield and Moore [misspelling of *calliroe*], 1857, p. 138.—Trimen, 1862–1866, p. 118.—Bremer, 1864, p. 17.—Leech, 1892–1894, p. 352.—Tutt, 1896, p. 357.
Vanessa collirhoe.—Dale, 1890, p. 150.—Fischer, 1895, pp. 22, 23, 24, 33.

Pyrameis callirrhoe Dixey [misspelling of *calliroe*], 1890, pp. 94, 107, 112, 117, 118, 123, pl. 1: fig. 10.

Pyrameis indica variety *asakurae* Matsumura [excluded name, type 3], 1908, p. 158.—Bang-Haas, 1926, p. 56.
Vanessa indica variety *asakurae*.—Matsumura, 1908, p. 158.
Pyrameis indica form *asakurae*.—Fruhstorfer [excluded name, type 3], 1912a, p. 525.—Fruhstorfer, 1912b, p. 525.—Matsumura, 1929, p. 19.

Pyrameis indica ab. *horishanus* Nire [excluded name, type 2], 1917, p. 145.
Pyrameis indica asakurae ab. *horishanus*.—Bang-Haas [excluded name, type 1], 1926, p. 56.
Pyrameis indica form *horishanus*.—Matsumura [excluded name, type 3], 1929, p. 19.

MALE. (Figures 47, 48).—Upper surface of forewing with ground color on base of wing paler than in the other four subspecies; with a much larger subapical white bar opposite end of cell, a larger submarginal white spot in interspace M_2 than in *V. indica vulcania*, and with these markings slightly larger than in *V. indica buana;* with dark brown spots projected into the orange band from the base along lower vein of cell and into middle of interspace Cu_2 larger than in *V. indica vulcania* and, like the latter, differing from *V. indica nubicola* and *V. indica pholoe* in having a broader band of orange in the cell on the inner and lower sides of the dark brown or black spot found in middle of cell.

Upper surface of hindwing with ground color paler than in the other four subspecies and the same as in the base of the forewing on this surface; with the triangular to diamond-shaped black spots through the middle of the marginal orange band somewhat intermediate in size, larger than those of *V. indica vulcania* and smaller than those of *V. indica buana, V. indica nubicola,* and *V. indica pholoe.*

Under surface of forewing with white and dark markings of upper surface repeated and differing from the other four subspecies in the same ways as they differ on the upper surface.

Under surface of hindwing indistinguishable from *V. indica vulcania,* not as dark in allover appearance as in *V. indica buana.*

Length of forewing 25–34 mm (average 30 mm).

FEMALE (Figure 49).—The females of the subspecies are much like the males and differ from the other four subspecies in the same ways that the males do. Some females have even larger white markings on the forewing and have a slightly larger wing expanse.

Length of forewing, 27–37 mm (average 32.8 mm).

METHOD OF IDENTIFICATION.—The type locality is India. The original description by Herbst includes two color figures (1794, pl. 180: figs. 1, 2) which

clearly establish this name for the subspecies herein described.

SYNONYMY.—See literature citations above. *Hamadryas calliroe* is clearly a synonym of *V. indica indica* as is shown by the original colored figures (Hubner, [1808], pl. 46: figs. 3, 4) and by the type locality, China (Hemming, 1937, p. 424).

LIFE HISTORY.—The larval food plants are reported to be *Boehmeria nivea* and *Urtica* (Urticaceae, order Urticales).

Very little has been written on the immature stages or the life history. A brief description of the larva was given by Moore (1899-1900, p. 104) and a few brief life-history notes were given by Pryer (1888, p. 26), Matsumura (1929, p. 10), Peile (1937, p. 140), and Wynter-Blyth (1957, p. 212).

DISTRIBUTION.—This subspecies has a rather broad distribution from northern India and the Himalayan Mountains east to Burma, northern Thailand, China, eastern Siberia, Korea, and Japan and south from there to Okinawa, Taiwan, and Luzon of the Philippine Islands. In India it has been taken in Bombay but is only sporadically found in the plains, being common in the high hills. There is one male specimen of this subspecies in the collection of the American Museum of Natural History labeled "Muzo, Columbia." This may represent an introduction but I am inclined to believe that the label is a mistake.

MATERIAL STUDIED.—Seventy-nine males and forty-six females were studied from the following localities: INDIA: Ahwa, The Dangs District, Gujarat States (June, 1,694 ft). Coorg (October); Darjoeling; Landour; Mussoorie, United Provinces (May, June, July, 2,000-7,900 feet); Rawalpindi (March); Simla, Punjab (July); Teesta Valley, Sikkim. NEPAL: Polhara, Phewa Tal (November). BHUTAN: Chamsa (September, 13,000 ft); Dotenag (September, 8,400 ft), CHINA: Central China; Chengtu; Hsingan Mountain, Tachili (September, 1,500 m); Hunan Province; Kingfoo Shan, Szechuan (August); Kiuhau Shan, Anhwei; Minschan, Tauho, Kansu (July, 2,500 m); Peiping, Hopei; Suifu, Szechuen; Tsinglingschan Mountains, Kansu (May, 1,500 m), SIBERIA: Vladivostok; Awatschin Bai, Kamtschatka (July). KOREA: Whitecapped Mountain, (July); Western Korea (August). JAPAN: Akashi (October); Kanagawa; Kyoto (May, June, November); Mount Asama (September); Mount Hira (July, 1,000 m); Shimojima, Nagano (March). OKINAWA: Kaniku (September); Nagatomi (June). FORMOSA; Mount Taihei (November). PHILIPPINES: Baguio, Benguet, Luzon (February).

3b. *Vanessa indica pholoe* (Fruhstorfer)

FIGURES 54, 55

Pyrameis indica pholoe Fruhstorfer, 1912a, p. 525; 1912b, p. 525.

Vanessa indica pholoe.—Evans, 1932, p. 177.—Peile, 1937, p. 140.

MALE.—This subspecies was described by Fruhstorfer as somewhat intermediate between *V. indica nubicola* and the northern subspecies *V. indica indica.* As in the former the orange color outlining the dark brown bar in the cell on upper surface of forewing is much more narrow and has much less orange, sometimes none, in interspace Cu_2 near the cell. The extreme margin of the hindwing on the upper surface in this subspecies is similar to *V. indica indica* in having some orange, although not quite as much, between the veins.

Length of forewing, 27–29 mm (average 28 mm).

FEMALE.— (Figures 54, 55).—This sex does not differ in habitus from the male.

Length of forewing, 28–30 mm (average 29 mm).

METHOD OF IDENTIFICATION.—The type locality is Otocamuna, Nilgiris, India. Two syntypes, a male and a female, are in the collection of the British Museum (Natural History). The male specimen bears the type number Rh. 8711 and the female the type number Rh. 8712. The original description adequately identifies this subspecies.

I select as the lectotype the male syntype bearing the type number Rh. 8711 and the paralectotype the female syntype bearing the type number Rh. 8712, both in the collection of the British Museum (Natural History). Labels so indicating these selections have been placed on these two specimens by Mr. T. B. Howarth of the staff of that institution.

LIFE HISTORY.—The larval food plants have not been reported upon and the immature stages have not been described.

DISTRIBUTION.—This subspecies is found only in southern India.

MATERIAL STUDIED.—Three males and two females were available for study and these were from the following localities: INDIA: Nilgiri Hills; Trichinopoly; Kodaimanal.

3c. *Vanessa indica nubicola* (Fruhstorfer)

FIGURES 50–53

Pyrameis indica Herbst, Moore not Herbst [a misidentification], 1880–1881, p. 50, pl. 27: fig. 2.
Pyrameis indica nubicola Fruhstorfer, 1898a, p. 61; 1898b, p. 151; 1912a, p. 525, pl. 117: fig. c 2; 1912b, p. 525, pl. 117: fig. c 2.—Martin, 1922, p. 44.—Ormiston, 1924, pp. 32–33.
Vanessa indica nubicola.—Peile, 1937, p. 140.—Evans, 1932, p. 177.—Woodhouse, 1950, pp. xiii, 50–51, pl. 15: figs. 2, 3.

MALE (Figures 50, 51).—This subspecies was described by Fruhstorfer as having the orange color outlining the dark brown bar in cell on upper surface of forewing more narrow than in *V. indica indica,* and it is thus quite like *V. indica pholoe* in this respect. It is also described as having the entire margin of the hindwing on the upper surface dark brown, and this seems to be its only differentiating character. The five males and five females I have for study also display, as does *V. indica pholoe,* a tendency to less orange in interspace Cu_2 near cell on upper surface of forewing.

Length of forewing, 26–31 mm (average 28.2 mm).

FEMALE (Figures 52, 53).—The sexes show no habitus differences.

Length of forewing, 30–33 mm (average 31.2 mm).

METHOD OF IDENTIFICATION.—This subspecies was originally described from four specimens from "the mountains of Ceylon" (Fruhstorfer, 1898a, p. 61). This was later more completely given as Nuwara Eliya, Ceylon, in the Horton Plains at 3,000-6,000 feet elevation (Fruhstorfer, 1912a, p. 325). Fruhstorfer's original description quite adequately points out the slight differences displayed by the Ceylon population.

Three of the original series of four syntypes are in the Museum National d'Historie Naturelle, Paris, France. I select as the lectotype, the lectotype candidate labeled "lectotype" in that collection. It is a male specimen labeled "Ceylon, 5,000 feet."

LIFE HISTORY.—The larval food plants are reported to be *Girardinia heterophylla, G. heterophylla* variety *palmata,* and *Urtica neilgherriensis* (all Urticaceae).

The immature stages have not been described and what little is known about the life history was given by Ormiston (1924, p. 33) and Woodhouse (1950, p. 51).

DISTRIBUTION.—This subspecies occurs in the mountains of Ceylon, seldom below 3,000 feet and usually from 4,500 feet and above.

MATERIAL STUDIED.—As mentioned above only five males and five females were available for study and these are from the following localities: CEYLON: Haldummulla (2,900–4,000 ft), Nuwara Eliya (June), Haputale (June).

3d. *Vanessa indica buana* (Fruhstorfer), new combination

FIGURES 64, 65

Pyrameis indica buana Fruhstorfer, 1898a, pp. 60–61; 1898b, p. 151; 1912a, p. 525; 1912b, p. 525—Martin, 1922, p. 44.

MALE (Figures 64, 65).—This subspecies is more distinctly different from *V. indica indica* than are *V. indica pholoe* and *V. indica nubicola* and could be regarded as the extreme end of a step-cline. Only a single male specimen is available to me for study and it agrees completely with the original description. In *V. indica buana* the dark brown bar in the cell on the upper surface of the forewing is fused with the dark brown bar lying along the lower cellular vein and base of Cu_2, and there is no orange outlining this cellular bar inwardly. The orange present in interspace Cu_2 in middle of wing in *V. indica indica* is completely absent in this subspecies. On the upper surface of the hindwing there is orange between the veins on the extreme margin of the wings, as is true of *V. indica indica,* and the triangular dark brown spots running through the middle of the marginal orange band are larger than in any other subspecies, being nearly confluent.

Length of forewing, 27.5 mm.

FEMALE.—Unknown. The sex of Fruhstorfer's specimen was not stated in the original description, but it is known to be a male (Martin, 1922, p 44).

METHOD OF IDENTIFICATION.—The original description is quite adequate to identify this name as representing the subspecies treated here.

Martin (1922, p. 44) lists the type (male) in his list of types in the Fruhstorfer collection before its sale. This holotype is in the Fruhstorfer collection in the Museum National d'Histoire Naturelle, Paris, France. It is labeled: "S. Celebes, Bua-Kraeng, 5,000', Oct. 1895, H. Fruhstorfer."

LIFE HISTORY.—The immature stages, the food plant, and the life history have not been reported upon.

DISTRIBUTION AND MATERIAL STUDIED.—Described from a specimen from the north side of the peak of Bonthain, South Celebes, at an elevation of about 4,000 feet. The single specimen available to me for study is from the same locality. This is the way Fruhstorfer gave the type locality; however, as reported above the holotype is labeled slightly different.

3e. *Vanessa indica vulcania* Godart

FIGURES 56–63

Vanessa vulcania Godart 1819, pp. 320–321.—Doubleday, 1844, p. 78.—Gray, 1846, p. 11.—Doubleday, 1849, p. 204.—Horsfield and Moore, 1857, p. 138.

Pyrameis indica vulcania.—Kirby, 1871, p. 185.—Staudinger and Rebel, 1901, p. 24.—Stichel, 1908, p. 199, pl. 62: fig. c 5; 1909, p. 199, pl. 62: fig. c 5.

Pyrameis vulcania.—White, 1894, pp. 54, 63, pl. 3: fig. 6.

Pyrameis callirhoe Doubleday [misspelling and misidentification of *Hamadryas calliroe* Hubner = *V. indica indica*], 1849, p. 204.—Milliere, 1868, pp. 26–27, pl. 86: figs. 1, 2.—White, 1894, pp. 54, 63, pl. 3: fig. 6.

Vanessa callirhoe.—Kane, 1885, p. 62.

Pyrameis callirhoe variety *occidentalis* Felder [new synonymy], 1862, p. 473.—Stichel, 1908, p. 199; 1909, p. 199.

Vanessa callirrhoe Staudinger [misspelling and misidentification of *Hamadryas calliroe* Hubner = *V. indica indica*], 1871, p. 17.

Vanessa vulcanica Staudinger [misspelling of *V. vulcania* Latreille], 1871, p. 17.

Pyrameis indica vulcanica.—Leech, 1892–1894, p. 352.—Reuss, 1910b, p. 63.

MALE (Figures 56, 57, 60, 61).—Upper surface of forewing with ground color on base of wing darker than in *V. indica indica;* with a much smaller subapical white bar opposite end of cell and a smaller submarginal white spot in interspace M_2 than in *V. indica indica* and the other subspecies; with black spots projected into the orange band from the base along lower vein of cell and into middle of interspace Cu_2 smaller than in *V. indica indica* and, like the latter, differing from *V. indica nubicola* and *V. indica pholoe* in having a broader band of orange in the cell on the inner and lower sides of the dark brown or black spot found in middle of cell.

Upper surface of hindwing with ground color darker than in *V. indica indica* and the same as in the base of the forewing on this surface; with the triangular to diamond-shaped black spots through the middle of the marginal orange band smaller than those of *V. indica indica.*

Under surface of forewing with white and dark markings of upper surface repeated.

Under surface of hindwing indistinguishable from *V. indica indica* and not as dark in allover appearance as in the remaining three subspecies.

Length of forewing, 26–32 mm (average 28.8 mm).

FEMALE (Figures 58, 59, 62, 63).—Much like the male sex having the same characters. Females have slightly larger white markings on the forewing and a slightly larger wing expanse.

Length of forewing, 29–33 mm (average 30.9 mm).

METHOD OF IDENTIFICATION.—The original description by Godart quite adequately gives the characters that differentiate this subspecies.

SYNONYMY.—See literature citations above. Felder (1862, p. 473), overlooking Godart's name, described *Pyrameis callirhoe occidentalis* as a new subspecies from Madeira.

LIFE HISTORY.—The food plant is reported to be *Urtica dioica* (Urticaceae). Descriptions of the immature stages and other life-history information are not available.

DISTRIBUTION.—This subspecies has a rather limited distribution, being reported from the Canary Islands, the Madeira Islands, southern Portugal, the coast of central Portugal, and from Andalusia in Spain. It may have evolved from specimens accidentally introduced from India by early Portuguese traders.

MATERIAL STUDIED.—Nine males and ten females were studied from the following localities: CANARY ISLANDS: Canaria; La Palma (November); Monte; Port Crotava, Tenerife (March); Santa Cruz; Tenerife. MADEIRA ISLANDS: Porto Santo (February).

4. *Vanessa dejeanii* Godart

FIGURES 4, 20, 66–71

Vanessa dejeanii Godart [1824], pp. 821–822.—Dale, 1890, p. 150.—Moore, 1899–1900, p. 107.

Pyrameis dejeanii.—Doubleday, 1849, p. 204.—Trimen, 1862–1866, p. 118.—Kirby, 1871, p. 185.

Pyrameis dejeani Fruhstorfer [misspelling or unjustified emendation of *dejeanii*], 1898a, p. 62; 1898b, p. 151.—Reuss, 1910c, pp. 85, 86, 88.—Fruhstorfer, 1912a, p. 525; 1912b, p. 525.

This species as mentioned before is one of three *Vanessa* species that does not enjoy a wide distribution, being found in two subspecies, one found only on the islands of Java, Bali, Lombok, and Sumbawa, and the other found only on Mindanao. These two subspecies differ greatly in habitus, so I offer here a description to show their similarities and their essential differences from the other four *Vanessa* species.

MALE (Figures 66, 67 = *V. dejeanii dejeanii;* Figures 70, 71 = *V. dejeanii mounseyi*).—Forewing above with the usual *Vanessa* light-colored bar opposite end of cell, with a series of six submarginal white spots beginning at costa and ending just above vein M_3; with the orange or red of the light-colored band found in other species of *Vanessa* here replaced by yellow, or this band greatly broken up and represented by individual white spots.

Hindwing on the upper surface with marginal light-colored band greatly reduced in width and outlined on inner side with five isolated small, dark brown or black, round to triangular spots and with triangular spots found through middle of this marginal band nearly as large as in *V. indica.*

Under surface of forewing as elsewhere in *Vanessa,* with most of the pattern of the upper surface repeated, with all dark coloration much paler, especially in apex of wing, and with a blue bar and a narrow blue line between the cell and subapical white bar.

Hindwing on under surface resembling *V. indica* more than the other species, mottled and intricately lined in a similar fashion, with area of suffused white near middle of costa even more obscure than in *V. indica.*

Length of forewing, 23–26 mm (average 24.9 mm).

Male genitalia as illustrated in Figure 3 (drawn from my preparation no. 3653 of *V. dejeanii dejeanii*), uncus, gnathos, aedeagus, and anellus very similar to those of *V. indica,* but differing from that species in the valva, where the ventral arms are more slender, distinctly upcurved with rough surfaces, but unarmed (not armed with teeth), and in having the cuiller on each valva slightly downwardly bent near distal end and armed with numerous spines. The subspecies *V. dejeanii dejeanii* and *V. dejeanii mounseyi* display no differences in the male genitalia.

FEMALE (Figures 68, 69).—I have seen only the females of the nominate subspecies and they differ very slightly from the male sex in having a paler ground color on upper surfaces of both forewing and hindwing.

Length of forewing, 23–27 mm (average 25.7 mm).

Female genitalia as illustrated by Figure 20 (drawn from my preparation 6257 of *V. dejeanii dejeanii*), similar to those of *V. indica,* with seventh and eighth sternites fused and shallowly concave; with ostium bursae from podlike swelling near middle of anterior margin of eighth sternite, the latter protruding into posterior margin of seventh sternite; each signum elongate and only slightly paler through middle. Females of *V. dejeanii mounseyi* were not available for study.

GEOGRAPHICAL VARIATION.—As indicated above there are two very different-appearing subspecies, the nominate subspecies *V. dejeanii dejeanii* from several of the Indonesian Islands and *V. dejeanii mounseyi* from Mindanao, Philippine Islands.

4a. *Vanessa dejeanii dejeanii* Godart

FIGURES 4, 20, 66–69

Vanessa dejeanii Godart [1824], pp. 821–822.—Dale, 1890, p. 150.—Moore, 1899–1900, p. 107.

Pyrameis dejeanii.—Doubleday, 1849, p. 204.—Trimen, 1862–1866, p. 118.—Kirby, 1871, p. 185.

Pyrameis dejeani Fruhstorfer [misspelling or unjustified emendation of *dejeanii*], 1898a, p. 62; 1898b, p. 151.—Reuss, 1910c, pp. 85, 86, 88.

Pyrameis dejeani dejeani.—Fruhstorfer, 1912a, pp. 525–526, pl. 117: fig. c 1; 1912b, pp. 525–526, pl. 117: fig. c 1.

Pyrameis dejeani sambaluna Fruhstorfer [new synonymy], 1898b, pp. 150–151; 1912a, p. 526.—Martin, 1922, p. 44.

Pyrameis dejeani sambulana Fruhstorfer [misspelling of *sambaluna*], 1912a, p. 526.—Talbot, 1936, p. 112.

This, the nominate subspecies, is found on the islands of Java, Bali, Lombok, and Sumbawa.

MALE (Figures 66, 67).—Upper surface of forewing with ground color of base and inner four fifths of anal interspace light brown with a dull greenish-gold suffusion; ground color of remainder of wing dark brown with a subapical white bar opposite end of cell, with six submarginal white spots down to vein M_3, and with a yellowish to whitish-yellow band across middle of wing from costa to near anal angle; this band irregular in shape and broken by black streaks along veins Cu_1 and Cu_2.

Upper surfaces of hindwing with ground color like that of base of forewing, light brown with a dull greenish-gold suffusion; with a submarginal band of dirty yellow to dirty orange enclosing a row of triangular to diamond-shaped dark brown spots and with a row of similar but smaller spots along its inner edge.

Under surface of forewing with yellow band through middle of wing and submarginal white spots and subapical white bar repeated; ground color of apex of wing grayish brown with blue streaks in dark brown area opposite end of cell and between there and subapical white bar, and with a U-shaped yellow and orange bar outlining lower and inner sides of dark brown spot in middle of cell.

Under surface of hindwing grayish brown, greatly mottled, and reticulated with lines and spots of darker brown, gray, and white; with a series of triangular submarginal blue spots between veins Sc and anal angle, and inward from this series a series of eye spots between veins R_s and Cu_2, two of these in interspaces M_2 and M_3 are blue in color, the other three are dark brown.

Length of forewing, 23–26 mm (average 24.9 mm).

FEMALE (Figures 68, 69).—The females are quite similar to the males, with a slightly paler ground color on the upper surfaces of the wings.

Length of forewing, 23–27 mm (average 25.7 mm).

METHOD OF IDENTIFICATION.—Godart's original description ([1824], pp. 821–822) is very clear and applies only to the subspecies treated herein as *V. dejeanii dejeanii*. The type locality is Java.

SYNONYMY.—Fruhstorfer (1898b, pp. 150–151) describes from Lombok what he took to be a different subspecies as *Pyrameis dejeani* (sic!) *sambaluna*. His character, a darker and narrower median band on the forewing above that, is sometimes heavily suffused with black and is wholly within the range of individual variation of *Vanessa dejeanii dejeanii*. I have therefore synonymized his name to the latter.

This synonym was described by Fruhstorfer from twelve specimens "vom Plateau von Sambalun, Insel Lombok, gefangen in April 1896." Martin (1922, p. 44) indicates both sexes were represented. A holotype designation was not published by Fruhstorfer. Grabriel (1927) does not list this name among the types in the collection of the British Museum (Natural History), but a male specimen bearing a type label is in that collection. A second specimen bearing a type label is in the Museum National d'Historie Naturelle, Paris. I do not see a need for a lectotype designation at the present time.

LIFE HISTORY.—The immature stages and the life history have not been reported upon except that the larva were observed by Fruhstorfer (1912a and 1912b, p. 526) on the island of Lombok, feeding upon a common large member of the Urticaceae, which obtained a height of from 3 to 6½ feet. This plant has not been further identified.

DISTRIBUTION.—As mentioned before, this subspecies is known only from the Indonesian islands of Java, Bali, Lombok, and Sumbawa.

MATERIAL STUDIED.—Fourteen males and four females from the following localities were studied: JAVA: Tosari. LOMBOK: Sambalun (4,000 ft.). SUMBAWA.

4b. *Vanessa dejeanii mounseyi* (Talbot), new combination

FIGURES 70, 71

Pyrameis dejeanii mounseyi Talbot, 1936, pp. 112–113.

MALE (Figures 70, 71).—Upper surface of forewing with ground color of base of wing and of anal interspace dark brown, not light brown as in *Vanessa dejeanii dejeanii*, and without the gold suffusion also found in the latter; ground color of remainder

of wing even darker brown, almost black; with a subapical white bar opposite end of cell and with six submarginal white spots down to vein M_3. The yellowish to whitish-yellow band across middle of wing in *V. dejeanii dejeanii* is here replaced by three greatly separated white spots, a large one at end of cell, another large one in middle of interspace Cu_1, and a much smaller one in interspace Cu_2 near anal angle.

Upper surface of hindwing with ground color dark brown like that of base of forewing, with submarginal band dark red orange in color, and with other submarginal markings approximately as in *V. dejeanii dejeanii.*

Under surface of forewing with separate white spots in cell and in interspaces Cu_1 and Cu_2 repeated on this surface as are also the submarginal white spots and the white subapical bar; ground color of apex of wing darker than in *V. dejeanii dejeanii,* with blue streak in dark brown area opposite end of cell, between there and subapical white bar obscure, and with U-shaped bar outlining lower and inner sides of dark brown spot in middle of cell entirely white, not orange or yellow as it is in *V. dejeanii dejeanii.*

Under surface of hindwing similar to that of the nominate subspecies but much darker.

Length of forewing, 26 mm.

FEMALE.—As indicated before, the females are unknown to me. Talbot (1936, p. 113) describes this sex as having a slightly darker ground color, with the yellow-brown area on upper surface of hindwing, which forms a border to the submarginal spots, not reduced as it is in the male, and with the under surface as in the male.

METHOD OF IDENTIFICATION.—The type locality is Mindanao, Philippine Islands. The holotype is a female specimen in the collection of the British Museum (Natural History). Talbot's original description (1936, pp. 112–113) clearly describes this very striking subspecies.

LIFE HISTORY.—Nothing is known concerning the food plant or the immature stages of this subspecies.

DISTRIBUTION.—This subspecies is known only from the island of Mindanao, Philippine Islands.

MATERIAL STUDIED.—A single male specimen was available for study from Mount Apo, Mindanao (July, 6,000 ft).

5. *Vanessa samani* (Hagen)

FIGURES 5, 21, 76–80

Pyrameis samani Hagen, 1895, pp. 359–360; 1896, p. 165, pl. 1: fig. 7.—Fruhstorfer, 1898a, p. 62; 1898b, p. 151; 1912a, p. 525, pl. 117: fig. B 5; 1912b, p. 525, pl. 117: fig. B 5.
Vanessa samani.—Moore, 1899–1900, p. 107.

V. samani is the rarest and most isolated species in the genus, being found only in the mountains of Sumatra and apparently known only from two specimens up to the year 1912. It is a relatively small species and the most lightly colored species of *Vanessa,* having nearly all of the hindwing and lower half of forewing, execpt extreme base, ocherous yellow in color.

MALE (Figures 77, 78).—On the forewing above, this species has, as just mentioned, the light-colored band, ocherous yellow in color, and greatly widened toward base of wing; the black spot in middle of cell is more narrow than in the other species; the light-colored subapical bar opposite end of cell is ocherous yellow or heavily suffused with that color; the usual black spot covering middle of interspace Cu_1 is almost gone, represented only by a small, very faint spot, only slightly darker than the ocherous yellow ground color; there are only three very small submarginal white spots in the black apical area, one each in interspaces R_4, M_1 and M_2, those in interspaces R_4 and M_1 being mere points.

Hindwing on upper surface entirely ocherous yellow except for the fuscous, dark brown or black along outer two thirds of costal margin, except for two rows of parallel, round to triangular-shaped submarginal fuscous spots, and except for this same fuscous color along the outer margin, especially at the ends of the veins.

Forewing underneath similar to upper surface, with most markings repeated, with apical area much paler than it is above, and with narrow blue semicircle or two nearly parallel lines of blue in dark area found inward from subapical bar of ocherous yellow opposite end of cell.

Hindwing on the under surface very similar to that of *V. dejeanii dejeanii,* with overall color even paler.

Length of forewing, 25 mm.

Male genitalia as illustrated in Figure 5 (drawn from my preparation no. 6281), quite similar to those of *V. indica* and *V. dejeanii,* differing from

V. indica, as does *V. dejeanii,* in having ventral arms of valva more slender, distinctly upcurved and with rough surfaces, but unarmed; it differs from *V. dejeanii* mainly in having cuiller distinctly constricted before distal end.

FEMALE (Figures 76, 79, 80).—Entirely like the male in habitus.

Length of forewing, 23 mm.

Female genitalia as illustrated in Figure 21 (drawn from my preparation no. 6282), with seventh and eighth sternites not as extensively sclerotized as those of *V. indica* and *V. dejeanii,* with these sternites fused and shallowly concave on either side of ostium bursae, which is swollen and podlike and does not intrude into posterior margin of seventh sternite; with each signum completely divided by a broad pale band.

METHOD OF IDENTIFICATION.—Hagen's original description (1895, pp. 359–360) and his subsequent illustration in color (1896, pl. 1: fig. 7) clearly depict this species. The type locality is given as, "Karo-Lanndern (1000–1200 m), Sumatra."

According to Hagen's subsequent description only two specimens were known to him and he did not indicate the sex. These syntypes may be found in the collection of the Zoologisches Museum of the Humboldt Universitat, Berlin.

LIFE HISTORY.—Nothing is known about the food plants, immature stages, or life history of this species.

DISTRIBUTION.—This species is found only in the mountains of Sumatra.

MATERIAL STUDIED.—One male and one female from the collection of the British Museum (Natural History) were available for study. The data on the male specimen is Sungei, Kumbang, Korinchi, west Sumatra (April, 4,500 ft). The data on the female specimen is Danan Bento Morass, foot of Korintji Peak, southwest Sumatra (August, 5,000 ft).

Vanessa aequatorialis Wagner, nomen nudum

Vanessa aequatorialis Wagner, 1870, p. 171.
Pyrameis aequatorialis.—Reuss, 1910b, p. 66.
Pyrameis myrinna form *aequatorialis.*—Seitz, 1914a, p. 459; 1914a, p. 459.

This name used by Wagner for a species found on Mount Chimborazo, Ecuador, without one word of description is therefore a nomen nudum. It was next used by Staudinger who stated only that it is a questionable and unknown species. Reuss used the name also but did not mention a single character, only stating that it was found in Ecuador. The most recent use of this name was by Seitz, who assigns it to *Pyrameis myrinna* as a form and in the next sentence states that it may be identical to *Pyrameis huntera braziliensis* or a synonym of the preceding species (*P. terpsichore*). He then goes on to say that it would be well to strike out the name entirely. Because it is a nomen nudum and cannot be assigned to any recognized species, the name should be dropped from nomenclature. From its supposed country of origin it seems likely that it was intended for a species of *Cynthia.*

Genus *Bassaris* Hübner, resurrected genus

FIGURES, 6, 7, 22, 23, 81–88

Bassaris Hübner, [1821], pl. [24].—Scudder, 1875, p. 126.—Hemming, 1934, p. 70; 1967, p. 74.

Type species: *Papilio itea* Fabricius. Type by reason of being the sole included species.

Scudder (1875, p. 126) synonymizes *Bassaris* to *Vanessa* and Hemming (1934, p. 70) concurs. Later Hemming (1967) does not indicate that he considered it to be a synonym of *Vanessa,* nor does he indicate anything other than that it is a valid and available generic name. The two species here assigned to *Bassaris* have heretofore nearly always resided in the genus *Vanessa.*

Bassaris differs from *Vanessa* and *Cynthia* in the habitus and in the structures of the male and female genitalia. From *Cynthia* it differs also in the paronychia, which in *Vanessa* and *Bassaris* are alike.

GENITALIA.—Male (Figures 6, 7) with uncus blunt, not bifurcate distally; lateral arms of gnathos rather blunt and sharply bent beyond middle, forming a "heel" on ventral margin; extreme distal end of each lateral arm bent downward as in *Cynthia* (except *C. carye* and *C. annabella*) so that the whole aspect of gnathos is directed downward; aedeagus with basal one half or more straight, sharply bent upward beyond middle, and with distal end sharply pointed; valva with clasper near middle of inner face, large and downward directed; dorsal margin nearly straight or only with a shallow lobe and

terminating at apex, with an upward directed lobe; distal margin continuous with lower margin, lacking any pronounced lobe; cuiller unarmed and upward directed in one species (*B. itea*) and caudally directed in the other species (*B. gonerilla*).

Female (Figures 22, 23) with genitalia consisting of a central pod-shaped structure on eighth sternite, surrounding the ostium bursae, and with lateral plates either winglike (*B. itea*) or very large, embracing most of the remainder of eighth sternite, and with rounded posterior margins (*B. gonerilla*); with lateral saucer-like depressions (*B. itea*) or deep pockets to each side of ostium bursae (*B. gonerilla*); signum bursae very long, similar to those of *Cynthia*.

TARSI.—Paronychia of mid and hind tarsi bifid as in *Vanessa*, lower element slightly shorter than upper element.

HABITUS.—The forewing on upper surface is of a uniform fuscous to black color except for the usual subapical and submarginal white to yellowish spots and a band of red or yellow running across the wings from below middle of costal margin to near anal angle. The upper surface of the hindwing is mainly fuscous or brown with four submarginal ocular spots, thus resembling *Cynthia* in the latter character. On the under surface of the forewing there is a blue circle in the fuscous area opposite the end of cell and between the cell and the subapical yellow or white bar. The pattern of the hindwing on the under surface resembles *Vanessa*, with the submarginal ocular markings a little more round, not so flattened along their outer markings.

LIFE HISTORY.—Brief notes and descriptions on the life histories of the two *Bassaris* species have been published and their hosts are reported to be *Urtica* (Urticaceae).

DISTRIBUTION.—This genus is known only from Australia, New Zealand, and a few islands in the south Pacific region.

List of Included Species and Subspecies

1. *Bassaris itea* (Fabricius), 1775
2. *Bassaris gonerilla* (Fabricius), 1775
2a. *Bassaris gonerilla ida* (Alfken), 1889
2b. *Bassaris gonerilla gonerilla* (Fabricius)

Key to the Species of *Bassaris*
(based upon male genitalia)

Cuiller greatly swollen at base, this base armed with teeth along its inner margin, and with its distal end directed toward apex of valva (Figure 6) ..... 1. ***B. itea*** (Fabricius)

Cuiller with base not swollen, this base armed with teeth along its inner surface, and with its distal end directed downward (Figure 7) ..... 2. ***B. gonerilla*** (Fabricius)

Key to the Species of *Bassaris*
(based upon female genitalia)

Ostium bursae opening before middle of eighth sternite; with deep lateral pouches on each side of eighth sternite (Figure 23) ..... 2. ***B. gonerilla*** (Fabricius)

Ostium bursae opening from anterior margin of eighth sternite, which is projected into seventh sternite; without these deep pouches (Figure 22) ..... 1. ***B. itea*** (Fabricius)

Key to the Species and Subspecies of *Bassaris*
(based upon habitus)

1. Forewing above with a large, broad yellow band near middle of wing between costa and anal vein; subapical bar extending from costa to vein M_2 yellow or yellowish white; hindwing above with submarginal blue-centered ocular markings very small and with ground color of base of this wing concolorous with area surrounding these ocular spots (Figures 81–84) ..... 1. ***B. itea*** (Fabricius)

   Forewing above with this yellow band replaced by an orange or orange-red band; subapical bar white in color; hindwing with submarginal blue-centered ocular markings large and

Key to the Species and Subspecies of *Bassaris*—Continued

(based upon habitus)

with ground color of base of wing darker, not concolorous with area surrounding these ocular spots 2

2. Hindwing above with orange-red band surrounding blue-centered ocular spots larger; whole aspect of under surface of hindwing paler (Figures 87, 88) ..2b. ***B. gonerilla ida*** (Alfken)

Hindwing above with this band smaller; whole aspect of under surface of hindwing darker (Figures 85, 86) ..... 2a. ***B. gonerilla gonerilla*** (Fabricius)

1. *Bassaris itea* (Fabricius), resurrected combination

FIGURES 6, 22, 81–84

Papilio itea Fabricius, 1775, p. 498; 1787, p. 45; 1793, p. 103.
Bassaris itea.—Hübner, [1821], pl. [24],—Scudder, 1875, p. 126.—Hemming, 1967, p. 74.
Vanessa itea.—Godart, 1819, p. 321.—Boisduval, 1832, pp. 121–122.—Doubleday, 1844, p. 78.—Dale, 1890, p. 150.—Hudson, 1898, pp. 107–108, pl. 12: figs. 3, 4; 1928, pp. 35–36, pl. 4: fig. 8.—Verity, 1950, p. 329.—Gaskin, 1966, p. 88, pl. 1: fig. [6].—Burnes, 1969, pp. 80, 82, fig. 59.—Pritchard, 1969, p. 12.
Pyrameis itea.—Doubleday, 1849, p. 204.—Trimen, 1862–1866, p. 118.—Butler, 1870, p. 78.—Semper, 1878, p. 148.—Kirby, 1871, p. 185.—Staudinger, 1885, p. 98.—Mathew, 1888, pp. 145–146, pl. 6: fig. 10.—Dixey, 1890, p. 113.—Miskin, 1891, p. 39.—Fruhstorfer, 1898b, p. 151.—Waterhouse, 1903, p. 11.—Reuss, 1910c, pp. 85, 88.—Fruhstorfer, 1912a, p. 526, pl. 117: figs. E 1, D 5; 1921b, p. 526, pl. 117: figs. E 1, D 5.—Waterhouse and Lyell, 1914, p. 55, pl. 5: fig. 34.—Barrett and Burnes, 1951, pp. 134–135.

MALE (Figures 81, 82).—Upper surface of forewing with ground color of apical and outer half dark brown, almost black, and containing a subapical bar of yellow or yellowish white opposite end of cell; with four subapical white spots between costa and vein R_5 and in interspace M_2; base of wing reddish brown suffused with dull gold; with a black bar through middle of cell and with a large yellow band lying over middle of wing from costa to anal vein.

Hindwing on upper surface with apical area and outer margin dark brown, almost black; with cell area and area between vein M_2 and first anal vein colored reddish brown; base of wing suffused with dull gold and with four small submarginal ocular spots pupillated with blue, lying between veins M_1 and Cu_2. The ocular spot lying in interspace M_1 is at least partially obscured by the dark brown color of the apical part of the wing.

Under surface of forewing with most of the pattern of the upper surface repeated, with much gray in the apex; with a blue circle between the yellow subapical bar and the yellow band of middle of the wing; base of cell reddish brown in color and base on interspace Cu_2 and anal margin dark brown.

Under surface of hindwing intricately lined and mottled with shades of black, dark brown, gray, and lilac and with a series of five obscure submarginal dark ocular spots between veins R_5 and Cu_2.

Length of forewing, 23–31 mm (average 26.3 mm).

Male genitalia as illustrated by Figure 6 (drawn from my preparation no. 3655), with distal end of uncus rounded in lateral view, much as in *B. gonerilla*; gnathos downward directed and quite similar to *B. gonerilla*; aedeagus differing from that species in having a spadelike distal end; valva with dorsal margin nearly straight, with a slight lobe beyond middle near apex, and with a large upward directed lobe at apex; clasper a large, long, and finger-like lobe, downward directed so that it can and sometimes does cover the cuiller; cuiller with a large swollen base, which is anteriorly toothed, greatly reduced and constricted beyond middle, upward bent, smooth, and spikelike.

FEMALE (Figures 83, 84).—Hardly differing from the male sex except in having the outer margin of hindwing slightly more rounded and in having the area on either side of vein Cu_2 on the forewing slightly more produced outwardly.

Length of forewing, 23–30 mm (average 27.3 mm).

Female genitalia as illustrated by Figure 22 (drawn from my preparation no. 6273), with seventh sternite only slightly sclerotized through the central area; eighth sternite with pod-shaped structure surrounding the ostium bursae, with wing-shaped lateral plates, and without the deep lateral pouches found in *B. gonerilla*; signa very long and narrow.

METHOD OF IDENTIFICATION.—The type locality is New Zealand. A single original male specimen, the holotype, is in the collection of the British Museum (Natural History) and bears the type number

Rh. 8719. The original description of Fabricius (1775, p. 498) is adequate to identify the name *Bassaris itea* for the species treated here.

LIFE HISTORY.—The larval food plant is *Urtica incisa* (Urticaceae).

Brief life-history notes were given by Hudson (1928, p. 35), Barrett and Burnes (1951, p. 135 and figures of larva and pupa, p. 134), and Gaskin (1966, p. 88).

DISTRIBUTION.—This species is found in Australia, Tasmania, Norfolk Island, New Zealand, Loyalty Islands, and on Rapa in the Tabuai Islands. In Australia it occurs in northeast Queensland near Herberton and from MacKay, Queensland, south to Victoria and west to Adelaide in South Australia and also in the southwest part of Western Australia. In New Zealand it is more widely distributed in North Island than in South Island.

MATERIAL STUDIED.—Eighteen males and twenty-three females were studied from the following localities: QUEENSLAND: Atherton (January); Brisbane. NEW SOUTH WALES: Colo Vale (January). VICTORIA: Newmarket (September, November); Sandringham. NORFOLK ISLAND (October). NORTH ISLAND, NEW ZEALAND: Haumoana, Hawkes Bay (February). RAPA: Haurei (November).

2. *Bassaris gonerilla* (Fabricius), new combination

FIGURES 7, 23, 85–88

Papilio gonerilla Fabricius, 1775, p. 498; 1782, p. 82; 1793, p. 103.—Gabriel, 1927, p. 56.

Vanessa gonerilla.—Godart, 1819, p. 321.—Boisduval, 1832, p. 121.—Hudson, 1883, pp. 217–219.—Dale, 1890, p. 150.—Hudson, 1898, pp. 105–107, pl. 3: figs. 1, 2, 31, 32, pl. 12: figs. 5, 6.—Quail, 1900, pp. 153–156.—Hudson, 1928, pp. 34–35, pl. 4: figs. 2, 9.—Williams, 1930, p. 231.—Hudson, 1939, p. 388.—Verity, 1950, p. 329.—Gaskin, 1966, pp. 87–88, pl. 1: figs. [8], [9].—Pritchard, 1969, p. 12.

Pyrameis gonerilla.—Doubleday, 1849, p. 204.—Trimen, 1862–1866, p. 118.—Butler, 1870, p. 78.—Kirby, 1871, p. 185.—Staudinger, 1895, p. 98, pl. 37: fig. [d–1].—Distant, 1882–1886, p. 173.—Dixey, 1890, pp. 94, 98, 100, 107, 112, 114, 118, 122, 123, 127, pl. 1: fig. 11, pl. 2: fig. 25.—Fruhstorfer, 1898b, p. 151.—Alfken, 1899, pp. 5–6; 1903, p. 602, pl. 32: fig. 11.—Reuss, 1910c, pp. 85, 86, 88; 1910d, p. 303.—Fruhstorfer, 1912a, p. 526, pl. 117: figs. D 3, D 4; 1912b, p. 526, pl. 117: figs. D 3, D 4.

Papilio generilla Fabricius [misspelling of *gonerilla*], 1787, p. 24.

MALE (Figure 85).—Upper surface of forewing with apical half black and with an orange or orange-red band crossing middle of wing from near costa to a point at about the outer one third of anal vein; this band outlined by black along its inner surface; base of wing dark brown, heavily suffused with bronze; with a subapical white bar opposite end of cell and with a series of six white and blue submarginal spots between veins R_3 and Cu_1; the latter in interspaces R_5, M_1, and M_3 always blue, those in interspace R_3 and R_4 sometimes blue, and that in interspace M_2 much larger than the rest and with blue around its outer edge.

Upper surface of hindwing dark brown with a large orange or orange-red submarginal bar enclosing four ocular black spots pupillated with blue; these ocular markings located between veins M_1 and Cu_2, with the uppermost two of these spots (those in interspaces M_1 and M_2) closer together and placed more inward than those in interspaces M_3 and Cu_1; with a submarginal blue line or very thin bar running between veins Cu_2 and anal angle.

Under surface of forewing with orange or red bar of upper surface repeated, replaced with white near costa, and broader in interspaces Cu_1 and Cu_2 than it is above; with a crescent-shaped yellow or white subapical bar opposite end of cell and with a blue ocular spot, pupillated with a large black spot between this bar and end of cell; with a blue marginal stripe along outer margin of wing and a second broad submarginal blue band or stripe between vein M_2 and the anal angle; with four rather indistinct ocular markings between veins R_3 and M_2, the two above vein R_5 obscure, very small, and with a submarginal white spot faintly outlined by blue along its outer margin in interspace M_2.

Under surface of hindwing fuscous, sometimes nearly black, with an overall purplish-blue cast, heavily reticulated, and marked with lines and spots of several shades of brown, black, and yellowish white; with a series of five distinct and rather dark submarginal ocular spots between veins R_s and Cu_2.

A statement on the length of forewing cannot be made for the species, since only the nominal subspecies is available for study (see paragraph on wing length under *Bassaris gonerilla gonerilla*).

Male genitalia as illustrated by Figure 7 (= *B. gonerilla gonerilla* drawn from my preparation no. 6192), with uncus and gnathos very much as in *B.*

itea; aedeagus differing in having a simple pointed tip; valva with dorsal margin having a distinct but shallow lobe near middle; apex of valva with upward directed lobe that is not swollen along its caudal margin, this lobe much smaller than in *B. itea*; clasper a blunt subtriangular lobe and downward directed; cuiller not swollen at base, caudally directed, evenly thick throughout, and lacking teeth.

FEMALE (Figures 86, 87 (♀?), 88 (♀?)).—Distinguishable from the male sex only in having the apex of forewing and the hindwing on under surfaces pale brown to tan in color.

As in the male, a statement on the length of forewing cannot be made (see above).

Female genitalia as illustrated by Figure 23 (= *B. gonerilla gonerilla*, drawn from my preparation no. 6194), with seventh sternite heavily sclerotized; eighth sternite forming a large genital plate covering entire sternite, divided in middle of posterior margin; ostium bursae large and from before middle of eighth sternite; with deep lateral pouches on either side of ostium bursae; signa ribbon-like, very large and long, more than half the length of bursa copulatrix.

GEOGRAPHICAL VARIATION.—Two subspecies are recognized, but since specimens of *B. gonerilla ida* Alfkin were not available for study, the characters for separating the nominate subspecies from Alfkin's subspecies are based upon the original description of the latter.

2a. *Bassaris gonerilla ida* (Alfken), new combination

FIGURES 87, 88

Pyrameis ida Alfken, 1899, pp. 5–8; 1903, p. 602, pl. 32: fig. 12.

Pyrameis gonerilla ida.—Fruhstorfer, 1912a, p. 526, pl. 117: figs. D 1, D 2; 1912b, p. 526, pl. 117: figs. D 1, D 2.

Vanessa gonerilla form *ida.*—Hudson, 1928, p. 35, pl. 5: fig. 31.

Pyrameis ida variety *argentata* Alfken [excluded name, type 3], 1903, p. 602, pl. 32: fig. 13.

As mentioned above, since no specimens of *B. gonerilla ida* were available for study, I can only offer statements comparing it with the subspecies *B. gonerilla gonerilla* that are based upon the original description of the former and other statements from the literature.

Alfkin did not specify the sex of his ten specimens but I suspect that they were females because of his subsequent colored illustration of the under surface of *ida* (1903, pl. 32: fig. 12 and Figures 87, 88 in present work). In Alfkin's illustration the under surface of forewing at apex and the under surface of the hindwing are very pale in color and thus quite similar to females of typical *B. gonerilla.* If his material should prove to be entirely of the female sex, I suspect that his name will probably fall as a synonym of *B. gonerilla.*

Until Alfkin's material is found and studied or until additional material from the type locality (Te One and Maunganui, Island of Warekauri, Chatham Islands) is studied, I provisionally recognize *B. gonerilla ida.*

In this subspecies the upper surfaces are said to be more brownish black in color and the red more yellowish, with the black border of the ocular spots more diffused. The fringes are said to be shorter and more indistinctly checkered than in *B. gonerilla gonerilla.*

On the under surface of the forewing the pattern is said to be blurred, not distinct as in *B. gonerilla gonerilla.* The two ocular spots standing directly over the round white spots on the apex of forewing are hardly distinguishable, whereas in *B. gonerilla gonerilla* they are said to stand out clearly.

The under surfaces of the hindwing are said to be almost uniformly red brown, sometimes indistinctly marbled, sometimes without pattern, and the ocular spots are absent or if present are hardly distinguishable. In *B. gonerilla gonerilla,* on the other hand, the under surface of the hindwing is said to be marbled with black and brown and in a few places dusted with whitish, and four distinct ocular spots are present.

Fruhstorfer (1912a, 1912b, p. 526) offers another character for *B. gonerilla ida* by stating that it is easily distinguished from *B. gonerilla gonerilla* by the enlarged red area on the upper surface of the hindwing (compare Figures 86, 87). If this statement holds true, this character may be the best way to distinguish the two subspecies.

Hudson (1928, p. 35) states: "On the Chatham Islands a form of *Vanessa gonerilla* occurs (Plate V. fig. 31), in which the ground colour of the upper side may be slightly bluer than usual, and the

sprinkling of golden scales on base of wings slightly less pronounced. On the underside, the apex of the fore-wings and the whole of the hind-wings are strongly suffused with bright reddish-brown."

METHOD OF IDENTIFICATION.—As indicated above, my statements on this subspecies are based entirely upon the original description and subsequent descriptions and illustrations.

The location of the original series is unknown to me.

LIFE HISTORY.—Nothing has been reported on the immature stages or food plant on this subspecies.

An interesting observation reported by Hudson (1928, p. 35) is: "Mr. C. Lindsay, who recently collected quite a number of these butterflies at the Chathams, informs me that they are much more timid and harder to catch than the ordinary *Vanessa gonerilla,* and that their manner of flight is somewhat different." It is hoped that observations of this nature will be repeated and more thoroughly described and documented.

DISTRIBUTION.—This subspecies is known only from the Chatham Islands, more than six hundred miles east of New Zealand.

2b. *Bassaris gonerilla gonerilla* (Fabricius)

FIGURES 7, 23, 85, 86

Pyrameis gonerilla gonerilla.—Alfken, 1899, pp. 5–8; 1903, p. 602, pl. 32: fig. 11.—Fruhstorfer, 1912a, p. 526, pl. 117: figs. D 3, D 4; 1912b, p. 526, pl. 117: figs. D 3, D 4.

Vanessa gonerilla gonerilla.—Hudson, 1928, p. 35, pl. 4: figs. 2, 9.

MALE (Figure 85) and FEMALE (Figure 86).—For the supposed characters of this subspecies see description above under *B. gonerilla ida.* This, the nominate subspecies, is the basis for the above description of the species.

Length of forewing in male sex, 28–31 mm (average 29.3 mm).

Length of forewing in female sex, 27–33 mm (average 29.2 mm).

METHOD OF IDENTIFICATION.—The species *B. gonerilla* received a rather more extensive original description than most butterflies described by Fabricius (1775, p. 498) and was easily identified as the New Zealand (= type locality) butterfly treated herein. There is a single original male specimen, the holotype, in the collection of the British Museum (Natural History). This specimen bears the type number Rh. 8918.

The recognition of the subspecies *B. gonerilla gonerilla* is dependent entirely upon the continued recognition of *B. gonerilla ida,* and as explained under the last named subspecies it is characterized provisionally by characters mentioned in the original and subsequent descriptions of *B. gonerilla ida.*

LIFE HISTORY.—The larva feeds upon *Urtica incisa* and *Urtica ferox* (Urticaceae).

Descriptions of the immature stages of life-history notes are given by Hudson (1883, pp. 217-219; 1898, pp. 106-107, pl. 3: figs. 1, 2, 31, 32 and 1929, pp. 34–35), Quail (1900, pp. 153–156), and Gaskin (1966, p. 87).

DISTRIBUTION.—This subspecies is distributed throughout most of New Zealand.

MATERIAL STUDIED.—Ten males and ten females were available for study from the following New Zealand localities: NORTH ISLAND: Haumoana, Hawkes Bay (November, January); Little Bush, Hawkes Bay (October). SOUTH ISLAND: Canterbury; Christchurch; Lyttleton (March); Nelson (February).

Genus *Cynthia* Fabricius, resurrected genus

FIGURES 8–16, 24–32

Cynthia Fabricius, 1807, p. 281.—Westwood, 1840, p. 87.—Humphreys and Westwood, 1841, pp. 56–57.—Stainton, 1857, pp. 36–37.—Humphreys, [1859], p. 21.—Scudder, 1875, p. 152.—Holland, 1930, pp. 46–47.—Hemming, 1934, p. 70; 1967, p. 136.

Neopyrameis Scudder, 1889, pp. 434, 435, 440, 441, 456.—Dixey, 1890, p. 94.—Hemming, 1967, p. 310.

Cyntia Costa Lima [misspelling of *Cynthia*], 1923, p. 150; 1928, p. 135.

Zynthia Hemming [misspelling of *Cynthia*], 1967, p. 93.—Cowan, 1970, p. 70.

Type species: *Papilio cardui* Linnaeus. Type by reason of subsequent selection by Westwood (1840, p. 87).

The generic name *Vanessa* (with type species *P. atalanta* L.) was accorded precedence over *Cynthia* (with type species *P. cardui L.*) in Opinion 156 (1944) of the International Commission on Zoological Nomenclature (see notes above under *Vanessa*). In 1954 in its Direction 4 (same publication, no. 2, pt. 53, pp. 629-652) the Commission endorsed the name *Cynthia* Fabricius as a name "to be used by

any specialist who may consider that the type-species of this genus is generically distinct from *Papilio atalanta* Linnaeus, 1758, but not to be used in preference to the name *Vanessa* Fabricius, 1807." The name *Cynthia* Fabricius was thereupon placed on the Official List of Generic Names in Zoology as Name No. 805.

Cynthia differs from *Vanessa* and *Bassaris* in the habitus, in the structures of the male and female genitalia, and in the paronychia and is here recognized as generically distinct.

GENITALIA.—Male (Figures 8–16) with uncus (in dorsal or ventral view) not bifurcate distally; lateral arms of gnathos sharply bent with a distinct "heel" beyond or near middle of ventral margin, so that the base is directed downward, and distal one half or more is directed outward; with distal part after this "heel" shorter than the base; aedeagus nearly straight or slightly undulate with distal end pointed (not semi-spade shaped); valva with clasper near middle, upwardly curved and directed toward outer margin, or curved inward toward opposite valva.

Female (Figures 24-32) with genitalia consisting of a central pod-shaped structure located on anterior margin of eighth sternite, surrounding the ostium bursae (except in *C. carye* and *C. annabella,* where this structure is enlarged and located near posterior margin); with two large lobelike lateral plates on either side of ostium bursae; margin between seventh and eighth sternites undulate or sinuate and greatly extended forward in middle at location of ostium bursae (except in *C. carye* and *C. annabella,* where this margin is nearly straight); with a pocket on each side near end of these lateral plates; each signum bursae long, much more than three times as long as broad, and simple, not divided as in *Vanessa.*

TARSI.—Paronychia of mid and hind tarsi each consisting of a single slender lobe, not bifid, sometimes with a slight projection on its base.

HABITUS.—In *Cynthia* the upper surface of the forewing is predominently tawny, sometimes pinkish with fuscous restricted to the extreme base of wing, to the apical area, to a number of fuscous spots in the cell, and in interspaces Cu_1 and Cu_2; with middle of interspace Cu_1 adjacent to anal vein tawny, not fuscous; with a white or tawny subapical bar opposite end of cell and a series of five or sometimes six submarginal and subapical white spots in the interspaces between costa and vein Cu_1 or vein Cu_2; discal area of hindwing always light colored, usually tawny, not fuscous as in *Vanessa,* and with a series of two or more submarginal ocular spots, although these may sometimes lack their blue centers and may be nearly absorbed by a fuscous band (*C. myrinna*). On the under surface of the forewing *Cynthia* differs from *Vanessa* in lacking the blue in the fuscous area opposite end of cell and between there and the white subapical bar and in having the base of the wing below cell much lighter in color, with white or tawny near or at origin of vein Cu_2. On the under surfaces of the hindwing the overall color of *Cynthia* is much paler, with large amounts of white, many white lines and spots, and often with a white to yellowish band across discal area from costa to just before anal angle; the ocular spots usually large, very distinct and round.

LIFE HISTORY.—Of the nine species of *Cynthia,* some life-history information has been recorded for all but *C. altissima* and *C. terpsichore.* Of the seven species for which we have host records, all feed upon various genera and species of either Compositae (order Asterales) or Malvaceae (order Malvales). The commonest species, *C. cardui,* also has been reared from three genera of Boraginaceae and a genus of Solanaceae (both families in the order Polemoniales) and has even been reported feeding upon *Zornia* (a genus of Leguminosae, order Rosales) and upon *Urtica dioica* (order Urticaceae). I believe these last two records are open to question. At any rate *V. cardui* has been recorded as feeding upon twenty-one genera of plants, many ranging over wide areas of the world, and this certainly helps to explain its own nearly cosmopolitan distribution.

The unusual cephalically directed teethlike setae found on the ovipositors of four of the five species of the *Virginiensis* group of *Cynthia* and not on species of *Bassaris, Vanessa,* or in the remaining *Cynthia* species may be explained as structures necessary as an aid in egg laying. These setae are perhaps useful to those species which carefully tuck their eggs under the hairs which cover the leaves of their food plant so that these eggs are nearly concealed under a thick mat of hairs. This concealment habit in egg laying was described by Scudder (1889, p. 464) for *C. virginiensis* and is probably

true of the three other *Cynthia* species which have these modified setae (*C. altissima, C. braziliensis, C. myrinna*), although the egg-laying habits of these species have not been studied.

DISTRIBUTION.—As just mentioned, *V. cardui* is nearly cosmopolitan in distribution. The homeland of *C. kershawi* is Australia. The remaining seven species are entirely New World except for *V. virginiensis,* which has established itself also in the Azores, Madeira, the Canary Islands, and the Hawaiian Islands.

List of Included Species

1. *Cynthia cardui* (Linnaeus), 1758
2. *Cynthia kershawi* (M'Coy), 1868
3. *Cynthia virginiensis* (Drury), 1773
4. *Cynthia altissima* (Rosenberg and Talbot), 1914
5. *Cynthia braziliensis* (Moore), 1883
6. *Cynthia terpsichore* (Philippi), 1859
7. *Cynthia myrinna* (Doubleday), 1849
8. *Cynthia annabella,* new species
9. *Cynthia carye* (Hübner), 1812

I arrange the nine species of *Cynthia* into three species groups as follows: the cardui group, containing, besides that species, *C. kershawaii;* the virginiensis group, containing also *C. altissima, C. braziliensis, C. terpsichore,* and *C. myrinna*; and the carye group, which also includes *C. annabella.* These groups are not included in the following keys but are defined later in heading paragraphs in the treatment of the species.

Key to the Species of *Cynthia*
(based upon male genitalia)

1. Cuiller smooth 2
   Cuiller armed with teeth 6
2. (1) Costal margin of valva nearly straight (Figure 8) ..... 1. ***C. cardui*** (Linnaeus)
   Costal margin of valva with large upward directed lobe 3
3. (2) Valva with large tooth or acute lobe at lower distal angle 4
   Valva without large tooth or acute lobe at lower distal angle 5
4. (3) Cuiller upward directed; with large acute lobe at lower distal angle of valva (Figure 9) ..... 2. ***C. kershawi*** (M'Coy)
   Cuiller distally directed; with large tooth at lower distal angle of valva (Figure 12) 5. ***C. braziliensis*** (Moore)
5. (3) Lobe on costal margin of valva armed with large tooth on its inner surface (Figure 10) ..... 3. ***C. virginiensis*** (Drury)
   Lobe on costal margin of valva armed with a small tooth on its outer margin near apex (Figure 13) ..... 6. ***C. terpsichore*** (Philippi)
6. (1) Cuiller lightly armed with teeth along its upper edge only 7
   Cuiller heavily armed with teeth along the outer half of its inner surface 8
7. (6) Valva with a tooth at apex of upward directed lobe on costal margin (Figure 14) 7. ***C. myrinna*** (Doubleday)
   Valva with tooth missing at apex of this lobe, but with a large tooth near its base (Figure 11) ..... 4. ***C. altissima*** (Rosenberg and Talbot)
8. (6) Valva with a large club-shaped process at junction of dorsal and distal margins (Figure 16) ..... 9. ***C. carye*** (Hübner)
   Valva lacking this club-shaped process but with an acute lobe in this position (Figure 15) ..... 8. ***C. annabella,*** new species

Key to the Species of *Cynthia*
(based upon female genitalia and the ovipositor)

1. Ovipositor with all setae hairlike (Figures 24, 25, 29, 31, 32) 2
   Ovipositor with at least a few setae short, toothlike, and cephalically directed (Figures 26–28, 30) 6

Key to the Species of *Cynthia*—Continued

(based upon female genitalia and the ovipositor)

2. (1) Ovipositor with some setae having apical portions bent at nearly right angles and with bent portions directed cephalically (Figure 25) .....2. ***C. kershawi*** (M'Coy)
Ovipositor with setae normal, not as described above (Figures 24, 29, 31, 32) 3

3. (2) Opening of ductus bursae placed forward within lobes of seventh sternite 4
Opening of ductus bursae at end of podlike swelling in center of eighth sternite 5

4. (3) Heavily sclerotized lobes of eighth sternite greatly expanded caudally, with a pale central area leading to opening of ductus bursae nearly same width throughout (Figure 29) .....6. ***C. terpsichore*** (Philippi)
Heavily sclerotized lobes of eighth sternite not so greatly expanded caudally, with central area next to opening of ductus bursae not as described above (Figure 24)
1. ***C. cardui*** (Linnaeus)

5. (3) Posterior margin of seventh sternite and anterior margin of eighth sternite forming an even line across central one third or more of ventral surface; podlike area around opening of ductus bursae without swollen base (Figure 33) 8. ***C. annabella,*** new species
These margins more irregular; podlike area around opening of ductus bursae with base greatly swollen (Figure 32) .....9. ***C. carye*** (Hübner)

6. (1) Eighth sternal plate broadly rounded along posterior margin (Figure 30)
7. ***C. myrinna*** (Doubleday)
Eighth sternal plate not broadly rounded along this margin 7

7. (6) Eighth sternal plate abruptly angled laterally (Figure 27)
4. ***C. altissima*** (Rosenberg and Talbot)
Eighth sternal plate tapering and becoming rather thin laterally 8

8. (7) With opening of ductus bursae placed deeply forward within the lobes of seventh sternite; with large lateral pockets between seventh and eighth sternites (Figure 26)
3. ***C. virginiensis*** (Drury)
With opening of ductus bursae more shallowly placed within the lobes of seventh sternite; with lateral pockets between seventh and eighth sternites small (Figure 28)
5. ***C. braziliensis*** (Moore)

Key to the Species of *Cynthia*

(based upon habitus)

1. Hindwing below with two ocular spots, one each in interspaces M_1 and Cu_1 2
Hindwing below with four or more ocular spots 6

2. (1) Hindwing above with fuscous band crossing middle of wing between anal area and costal margin straight and broad, enclosing and obliterating submarginal ocular spots; hindwing below with whitish or yellowish band crossing middle of wing from costa to anal area straight (Figures 135, 136) .....7. ***C. myrinna*** (Doubleday)
Hindwing above with this fuscous band narrow and wavy, not enclosing submarginal ocular spots, sometimes entirely absent; hindwing below with this whitish or yellow band projected outward along vein M_3 3

3. (2) Hindwing above with fuscous band crossing middle of wing between anal area and costal margin broken into small spots or absent (Figures 109–118)
3. ***C. virginiensis*** (Drury)
Hindwing above with this fuscous band not broken into small spots 4

4. (3) Forewing above with light-colored subapical bar just beyond end of cell tawny in color (Figures 131–134) .....6. ***C. terpsichore*** (Philippi)
Forewing above with this subapical bar white 5

5. (4) Forewing above with small apical and submarginal spot in interspace M_1 white in color; without distinct white band outlining inner surface of black bar at end of cell; with fuscous band crossing middle of hindwing not projected outward in interspace M_3 (Figures 119–122) .....4. ***C. altissima*** (Rosenberg and Talbot)

Key to the Species of *Cynthia*—Continued

(based upon habitus)

Forewing above with this spot blue; with distinct white band outlining inner surface of black bar at end of cell; fuscous band crossing middle of hindwing projected outward in interspace M_3 (Figures 123–130) .....5. ***C. braziliensis*** (Moore)

6. (1) Forewing above with light-colored subapical bar just beyond end of cell, white in color .7
Forewing above with this subapical bar tawny 8

7. (6) Hindwing above with five round, submarginal fuscous spots, located between veins R_s and Cu_2, very rarely centered with blue; forewing with tawny ground color extended into base of interspace M_2 just beyond bar opposite end of cell (Figures 89–104)
1. ***C. cardui*** (Linnaeus)

Hindwing above with four round, submarginal fuscous spots, located between veins M_1 and Cu_2, the three spots between veins M_2 and Cu_2 blue centered; forewing with tawny ground color not extending into base of interspace M_2 (Figures 105–108)
2. ***C. kershawi*** (M'Coy)

8. (6) Forewing above with tawny subapical bar just beyond cell slightly larger; forewing below with yellowish-white postmedial and marginal bar slightly larger; bar below base of Cu_2 on the forewing above distinct; white spot in middle of wing opposite end of cell on underside of hindwing triangular in shape (Figures 143–147; 155–160)
8. ***C. annabella,*** new species

Forewing above with tawny subapical bar just beyond cell smaller; forewing below with yellowish-white postmedial and marginal bar slightly smaller; bar below base of Cu_2 on forewing above very small or absent; white spot in middle of wing opposite end of cell on underside of hindwing hour-glass in shape (Figures 137–142; 149–154)
9. ***C. carye*** (Hübner)

The Cardui Group

The cardui group contains two species, *C. cardui* and *C. kershawi*. Here on the upper surface of the forewing the fuscous color in interspace Cu_2, found just beyond the middle of anal vein, extends upward into interspace Cu_1 but no farther. On the upper surface of the hindwing the fuscous and usually sinuous band crossing the wing from costa to just above anal angle is broken along vein M_2 or found only below that vein and represented by a hooklike spot that extends upward from the basal fuscous area. On the under surface of the forewing the cardui group has most of the area behind end of cell and between there and the fuscous spots through middle of cell white and, as on the upper surfaces, the fuscous color from interspace Cu_2 just beyond the middle of the anal vein does not extend upward to vein M_3 as it does in the virginiensis and carye groups. On the under surface of the hindwing there are always five small, submarginal ocular spots and there is an isolated white spot, subtriangular in shape, opposite end of cell just above vein M_3. The ovipositor setae are hairlike.

1. *Cynthia cardui* (Linnaeus), resurrected combination

FIGURES 8, 24, 89–104

Papilio cardui (including the synonym *belladonna*) Linnaeus, 1758, p. 475 [Article 11 (d), International Code of Zoological Nomenclature states that "a name first published as a synonym is not thereby made available." Hence *belladonna* is not an available name.].—Fabricius, 1775, p. 499.—Esper, 1777, pp. 132–139, pl. 10: fig. 3.—Fabricius, 1787, p. 45; 1793, p. 103.—Godart, 1821, p. 102.

Vanessa cardui.—Hübner, [1819], p. 33.—Godart, 1819, pp. 323–324.—Boisduval, 1832, p. 119.—Boisduval and LeConte, 1834, pp. 178–179.—Boisduval, 1840, p. 21.—Herrich-Schaffer, 1843, pp. 38, 41.—Doubleday, 1844, p. 79.—Duponchel, 1844, p. 7.—Lucas, 1845, p. 57.—Noel, 1845, pl. 3.—Gray, 1846, p. 11.—Poey, 1847, p. 122.—Duponchel, 1849, pp. 107–109, pl. 12: figs. 42 *a-c.*—Rambur, 1858, p. 15.—Berge, 1863, p. 51. figs. 1 *a-c.*—Berce, 1867, p. 165, pl. 10: fig. 2.—Wagner, 1870, pp. 169–171.—Staudinger, 1871, p. 17.—Frey, 1880, p. 26.—De Waldeim and Eversmann, 1881, pp. 107–108, pl. 12: figs. 1, 2.—Kirby, 1882, p. 13, pl. 7: figs. 3 *a-d.*—Kane, 1885, p. 62, pl. 9: fig. 1.—Jordan, 1886, pp. 84–85.—Pryer, 1888, p. 26; 1889, p. xii, pl. 7: fig. 2.— Scudder, 1888, pl. 2: fig. 1, pl. 67: fig. 7, pl. 83: figs. 60–62; 1889, pp. 470–487, pl. 12: fig. 7, pl. 21: fig. 1, pl. 33: fig. 31, pl. 61: figs. 35, 54, pl. 64: fig. 30, pl. 74: fig. 37, pl. 81: fig. 10, pl. 86: figs. 69–73.—Dale, 1890, pp. 137–148.—Barrett, 1893,

pp. 149–155, pl. 21: figs. 1, *a-e*.—Fischer, 1895, pp. 18, 22–23, 24.—Schille, 1895, p. 218.—Standfuss, 1896, pp. 256–258, pl. 7: fig. 5.—Aurivillius, 1898, p. 130.—Favre, 1899, p. 99.—Meyrick, 1899, p. 194.—Moore, 1899–1900, pp. 105–107, pl. 320: figs. 2 *a-b*.—Dyar, 1903, p. 24.—Comstock and Comstock, 1904, pp. 158–160, pl. 26: figs. 5, 6.—Bingham, 1905, pp. 365–366.—Kirkaldy, 1906, p. 139.—Barnes and McDunnough, 1917, p. 11.—Grinnell, 1918, p. 113.—Lhomme, 1923, pp. 51–52.—Antram, 1924, pp. 175–176.—Comstock, 1927, pp. 133–134, pl. 43: figs. 8, 9.—Hudson, 1828, p. 36, pl. 4: fig. 1.—Williams, 1930, pp. 168–212.—Holland, 1931, pp. 154–155, pl. 1: fig. 1, pl. 3: fig. 37, pl. 4: figs. 60–62.—Evans, 1932, p. 177.—Frohawk, 1934, pp. 16, 24, 25, 33, 140–147, pl. 11: figs. 1–6.—Bates, 1935, p. 166.—Peile, 1937, p. 139.—Davenport and Dethier, 1938, p. 164.—McDunnough, 1938, p. 21.—Hudson, 1939, p. 388.—Wild, 1939, p. 26, pl. 7: figs. 4, 5.—Field, 1940b, pp. 85–87, 274.—Hoffmann, 1940, p. 681.—Macy and Shepard, 1941, pp. 125–126, pl. 4: fig. [7].—Pierce and Beirne, 1941, p. 20, pl. 3: fig. 2.—Comstock, 1944, pp. 450–451.—Stokoe, 1944, pp. 94–96, pl. 9: fig. 3, pl. 10: fig. 3, pl. 15: fig. 1.—Ford, 1945, pp. 60, 76, 90, 154, pl. 2: fig. 2, pl. VIII: fig. 4, pl. 25.—Leighton, 1946, p. 59.—Richards, 1946, pp. 21–22.—Aubert, 1949, pp. 129, 133–135.—Paul and Robert, 1949, pl. 17.—Pinhey, 1949, p. 83, pl. 12: fig. 3.—Williams, 1949a, pp. 72–73; 1949b, p. 39.—Verity, 1950, pp. 329–334, pl. 51: figs. 26–30, pl. 52: figs. 1–6, pl. 18: fig. 2, pl. 19: fig. 14.—Woodhouse, 1950, pp. xiii, 49, pl. 15: fig. 1, pl. 37, fig. 4; pl. 42: fig. 4.—Clark and Clark, 1951, pp. 14, 44, 201, pl. 4: figs. *d, e*.—Klots, 1951, pp. 107–108, 113, pl. 6: fig. 14, pl. 14: fig. 10.—Agenjo, 1952, p. 283.—Peters, 1952, p. 76.—Ferguson, 1954, p. 195.—Brown, 1955, p. 102, 2 figs.—Forster and Wohlfahrt, 1955, p. 56, pl. 15: fig. 13.—Yokoyama, 1955, pp. 37, 96–97, pl. 29: fig. 89.—Lempke, 1956, pp. 185–186.—Wiltshire, 1957, p. 31.—Wynter-Blyth, 1957, pp. 210–212, pl. 38: fig. 8.—Zimmermann, 1959, pp. 453, 454, 455, 456, 457, 463, figs. 388, 389, 391, 396, 400.—Chalmers-Hunt, 1960–1961, pp. 60–62, 140.—Forbes, 1960, p. 159.—Dos Passos, 1964, pp. 77.—Niculescu, 1965, pp. 186–191, pl. 6: figs. 1, 2.—Gifford, 1965, p. 115.—Gaskin, 1966, pp. 88–89, pl. 1: fig. [5].—van Son, 1966, p. 66, fig. 1.—Dimock, 1968, p. 146.—Williams, 1970, pp. 157–175.

Cynthia cardui.—Humphreys and Westwood, 1841, pp. 54, 56–57, pl. 15: figs. 7–10.—Stainton, 1857, pp. 36–37, fig.—Humphreys, [1859], pp. 21–22, pl. 11: figs. 1–4.—Morris, 1868, pp. 81–82, pl. 34.—Buckler, 1886, pp. 49–52, 174–176, pl. 8: figs. 1 *a-e*.—Barnes and Benjamin, 1926, p. 15.—Gunder, 1928, p. 202, pl. 8: figs. 3*b*, 3*c*; 1929, p. 9.

Pyrameis cardui.—Doubleday, 1849, p. 205.—Horsfield and Moore, 1857, pp. 138–139, p. [3], pl. 5: figs. 3, 3*a*.—Lucas, 1857, pp. 543–544.—Morris, 1860, p. 8; 1862, pp. 59–60.—Behr, 1864, pp. 125–126.—Bremer, 1864, p. 17.—Trimen, 1862–1866, pp. 119–121.—Butler, 1870, pp. 77–78.—Kirby, 1871, pp. 185–186.—Newman, 1874, pp. 64–66, fig. 17.—Strecker, 1878, pp. 136–138, 190.—Moore, 1880–1881, pp. 50–51, pl. 27: figs. 1, 1*a*.—Godman and Salvin, 1882, pp. 217–218.—Saalmüller, 1884, p. 77.—Alphéraky, 1885, p. 598.—Staudinger, 1885, p. 97.—Distant, 1882–1886, pp. 48, 91.—Mabille, 1886, pp. 126–127.—Marshall and de Nicéville, 1886, pp. 227–228.—Shatz and Röber, 1886, pl. 16: fig. [9]; 1887, p. 125.—Trimen, 1887, pp. 200–203.—Edwards, 1889, p. 26.—Dixey, 1890, pp. 92, 93, 94, 96, 97, 98, 99, 101, 106, 109, 112, 115, 116, 117, 118, 122, 123, 126, 127, pl. 1: figs. 5, 8, pl. 2: fig. 24, pl. 3: fig. 38.—Maynard, 1891, p. 93, pl. 5: fig. 5.—Leech, 1892–1894, pp. xv, 351.—White, 1894, pp. 54–55, 63, pl. 2: fig. 5.—Hagen, 1896, p. 165.—Skinner, 1898, pp. 24–25.—Tutt, 1896, pp. 350–355, fig. 37.—Denton, 1898, pp. 266–267.—Fruhstorfer, 1898b, p. 151.—Holland, 1898, pp. 170–171, pl. 1: fig. 1, pl. 3: fig. 37, pl. 4: figs. 60–62.—Miyajima, 1899, pp. 3, [118], pl. 11: fig. 2.—Cannaviello, 1900, pp. 18–19.—Staudinger and Rebel, 1901, p. 24.—Wright, 1905, pp. 177–178, pl. 22: fig. 229.—Kirkaldy, 1906, p. 139.—Schultz, 1906, p. 108.—Stichel, 1908, pp. 199–200, pl. 62: fig. D 1.—Stichel, 1909, pp. 199–200, pl. 62: fig. D 1.—Rebel, 1910, p. 20.—Reuss, 1910a, pl. 1: figs. 1, 5, 9; 1910b, pp. 62, 63, 64, 65, 66, 67; 1910c, p. 90; 1910d, p. 303.—Fruhstorfer, 1912a, pp. 524–525; 1912b, p. 525.—Aurivillius, 1913a, p. 227; 1913b, p. 227.—Verity, 1913, p. 181.—Seitz, 1914a, p. 458; 1914b, p. 458.—Waterhouse and Lyell, 1914, p. 55.—Holland, 1915, p. 102, pl. 35.—Schultz, 1916, p. 27.—Verity, 1916b, p. 128.—Reuss, 1918, pp. 41–42.—Ragusa, 1919, p. 146.—Holland, 1920, pp. 143–144.—Stephan, 1923, p. 36.—Frohawk, [1924], pp. 151–157, pl. 26.—Ormiston, 1924, p. 32.—Stephan, 1924, p. 25.—Verity and Querci, 1924, p. 42.—Bang-Haas, 1926, p. 56; 1927, p. 55; 1928, p. 26.—Schrader, 1928, pp. 68–70, pl. 6.—Haas, 1929, p. 11.—Matsumura, 1929, pp. 9, 11, 19, pl. 5: fig. 5.—Schrader, 1929, p. 8.—Bang-Haas, 1930, p. 162.—Gaede, 1930a, p. 200; 1930b, p. 200; 1931, p. 343.—Clark, 1932, pp. 13, 14, 22, 88–91, pl. 8: figs. 1–3.—Bryk, 1940, p. 17.—South, 1941, pp. 78–81, fig. 24, pls: 44, 45.—Zerkowitz, 1946, p. 246.—Barrett and Barnes, 1951, pp. 132–133.—Swanepoel, 1953, pp. 213–215.—Paulian, 1956, pp. 67–69.

Pyrameis cardui cardui.—Fruhstorfer, 1912a, p. 524; 1912b, p. 524.—Verity, 1919, p. 197.

Vanessa cardui cardui.—Field, 1940b, p. 85.—Corbet and Pendlebury, 1956, p. 207, pl. 6: fig. 69, pl. 40: fig. 100.—Okano and Ohkura, 1959, p. 42, pl. 41: fig. 124.

Papilio carduelis Seba, 1765, p. 6, pl. 1.—Cramer, 1775, pp. 40–41, pl. 26: figs. E, F; 1776, p. 152.—Doubleday, 1844, p. 79 [synonym of *cardui*]; 1849, p. 205.—Horsfield and Moore, 1857, p. 138.—Lucas, 1857, p. 544.—Saalmuller, 1884, p. 77.—Mabille, 1886, p. 126.—Marshall and de Niceville, 1886, p. 227.—Leech, 1892–1894, p. 351.—Aurivillius, 1898, p. 130.—Moore, 1899–1900, p. 105.

Vanessa carduelis.—Dyar, 1903, p. 24 [synonym of *cardui*].—McDunnough, 1928, p. 21.—Comstock, 1944, p. 450.—Dos Passos, 1964, p. 77.

Cynthia carduelis.—Barnes and Benjamin, 1926, p. 15 [synonym of *cardui*].

Pyrameis cardui universa form *carduelis*.—Verity, 1919, p. 198.

Pyrameis cardui variety *carduelis*.—Verity, 1920, p. 61.

Pyrameis cardui race *carduelis*.—Verity and Querci, 1924, p. 42.

Vanessa cardui form *carduelis:* Verity, 1936, p. 87; 1950, p. 334.

Vanessa cardui carduelis.—Field, 1940a, p. 342; 1940b, pp. 85, 86, 274.—Klots, 1951, p. 108.
Vanessa cardui aberration *carduelis*.—Verity, 1950, p. 330.

Papilio belladonna Godart, 1821, pp. 102–104, pl. 14: fig. 2.

Vanessa elymi Rambur, 1829, pp. 256–257, pl. 5: figs. 1, 2.—Dyar, 1903, p. 24 [synonym of *cardui*].
Vanessa cardui aberration *elymi*.—Boisduval, 1840, p. 21.—Duponchel, 1844, p. 7.—Staudinger, 1871, p. 17.—Jordan, 1886, pp. 84–85.—Scudder, 1889, p. 473.—Fischer, 1896, pp. 17–18, 57, 66, pl. 2: fig. 5 *b*.—Skinner, 1898, p. 25.—Fischer, 1903, p. 224; 1907, pp. 170, 201, figs. 5, 7.—Barnes and McDunnough, 1917, p. 11.—Lhomme, 1923, p. 51.—Comstock, 1927, p. 134.—Gunder, 1925, p. 198.—McDunnough, 1938, p. 21.—Field, 1940a, p. 87.—Leighton, 1946, p. 59.—Verity, 1950, p. 332.—Chalmers-Hunt, 1960–1961, p. 61.—Dos Passos, 1964, p. 77.
Pyrameis cardui variety *elymi*.—Kirby, 1871, p. 186.
Pyrameis cardui aberration *elymi*.—Strecker, 1878, p. 137.—Tutt, 1896, p. 352.—Staudinger and Rebel, 1901, p. 24.—Schultz, 1906, p. 108.—Stichel, 1908, p. 200; 1909, p. 200.—Rebel, 1910, p. 20.—Reuss, 1910a, pp. 63, 65, 66.—Fischer, 1900, p. 5.
Vanessa cardui variety *elymi*.—Dale, 1890, p. 138.
Pyrameis cardui elymi.—Fruhstorfer, 1912a, p. 525.
Vanessa cardui elymi.—Fox, 1921, p. 46, pl. 2: fig. 3.
Cynthia cardui aberration *elymi*.—Barnes and Benjamin, 1926, p. 15.
Cynthia cardui transition form *elymi*.—Gunder, 1927, p. 133, pl. 2: fig. 2*a*; 1927c, p. 270, pl. 9: figs. 2–4; 1929, p. 9.
Vanessa cardui form *elymi*.—Dimock, 1968, p. 146, fig. 1.

Pyrameis cardui variety *leachiana* Doubleday [nomen nudum], 1849, p. 205.

Pyrameis cardui aberration *ate* Strecker [excluded name, type 2], 1878, pp. 137–138.—Skinner, 1898, p. 25.
Vanessa cardui aberration *ate*.—Scudder, 1889, pp. 474–475.—Barnes and McDunnough, 1917, p. 11.—McDunnough, 1938, p. 21.—Field, 1940b, p. 86.—Dos Passos, 1954, p. 77.
Cynthia cardui aberration *ate*.—Barnes and Benjamin, 1926, p. 14.
Cynthia cardui transition form *ate*.—Gunder [excluded name, type 2], 1927c, p. 270, pl. 9: fig. [6].

Vanessa cardui aberration *pallens* Noel [excluded name, type 2], 1881, p. 102.—Field, 1940b, p. 86.—Verity, 1950, p. 331.—Niculescu, 1965, p. 190.
Pyrameis cardui aberration *pallens*.—Stichel, 1908, p. 199; 1909, p. 199.
Pyrameis cardui form *pallens*.—Seitz [excluded name, type 3], 1914a, p. 458; 1914b, p. 458.
Pyrameis cardui transition form *pallens*.—Gunder [excluded name, type 2], 1927, p. 53.

Vanessa cardui variety *pallida* Schøyen, 1881, pp. 77–79.
Pyrameis cardui aberration *pallida*.—Tutt, 1896, p. 352.—Rebel, 1910, p. 20.—Pionneau, 1926, p. 4.
Pyrameis cardui variety *pallida*.—Staudinger and Rebel, 1901, p. 24.—Schultz, 1906, p. 108.
Pyrameis cardui form *pallida*.—Stichel, 1908, p. 200; 1909, p. 200.
Pyrameis cardui cardui form *pallida*.—Verity, 1919, p. 197.
Vanessa cardui aberration *pallida*.—Lhomme, 1923, p. 51.—Verity, 1950, p. 330.—Niculescu, 1965, p. 190.
Pyrameis cardui race *pallida*.—Gaede, 1930a, p. 200; 1930b, p. 200.
Vanessa cardui form *pallida*.—Field, 1940b, p. 84.—Lempke, 1956, p. 187.

Pyrameis kershawi M'Coy, Godman and Salvin not M'Coy [a misidentification], 1882, p. 218.

Vanessa cardui aberration *inornata* Bramson [excluded name, type 2], 1886, p. 284.—Scudder, 1889, pp. 473, 474.—Frohawk, 1934, p. 147; 1938, pp. 84, 88, pl. 21: figs. 1, 2.—Field, 1940b, p. 86.—Verity, 1950, p. 331.—Chalmers-Hunt, 1960–1961, p. 62.
Pyrameis cardui aberration *inornata*.—Tutt, 1896, p. 352.—Staudinger and Rebel, 1901, p. 24.—Stichel, 1908, pp. 199–200; 1909, pp. 199–200.—Rebel, 1910, p. 20.—Pionneau, 1926, p. 4.
Pyrameis cardui form *inornata*.—Seitz [excluded name, type 3], 1914a, p. 458; 1914b, p. 458.—Van Mellaerts, 1928, p. 105.
Pyrameis cardui variety *inornata*.—Stephan [excluded name, type 3], 1924, p. 25.
Vanessa cardui form *inornata*.—Kuijken, 1967, pp. 224, 225.

Vanessa cardui aberration *minor* Failla-Tedaldi [excluded name, type 2], 1887, pp. 70–71.—Verity, 1950, p. 330.
Pyrameis cardui aberration *minor*.—Ragusa, 1919, p. 146.
Pyrameis cardui universa form *minor*.—Verity [excluded name, type 1 and type 2], 1919, p. 198.
Vanessa cardui carduelis form *minor*.—Field, 1940b, pp. 86, 274.
Vanessa cardui form *minor*.—Lempke, 1956, p. 187.

Vanessa cardui semisuffusa Cockerell [excluded name, type 2, as an individual variation], 1889, p. 54.
Vanessa cardui form *semisuffusa*.—Lempke [excluded name, type 3], 1956, p. 187.
Vanessa cardui aberration *semisuffusa*.—Chalmers-Hunt [excluded name, type 2], 1960–1961, p. 62.

Vanessa cardui aberration *wiskotti* Standfuss [excluded name, type 2], 1895, pp. 90–91; 1896, 392, pl. 7: fig. 6.—Verity, 1950, p. 332.
Pyrameis cardui variety *wiskotti*.—Fischer [excluded name, type 3], 1900, p. 5.
Pyrameis cardui aberration *wiskotti*.—Fischer, 1901, p. 326.—Schultz, 1906, p. 108.—Stichel, 1908, p. 200; 1909, p. 200.—Reuss, 1910a, fig. 19; 1910b, p. 64; 1910c, p. 90.
Vanessa cardui warm variety *wiskotti*.—Fischer [excluded name, type 3], 1903, p. 224.
Vanessa cardui cold variety *wiskotti*.—Fischer [excluded name, type 3], p. 170.

Pyrameis cardui form *minor* Cockerell [excluded name, type 3 and homonym of *minor* Failla-Tedaldi], 1890, p. 57.
Pyrameis cardui aberration *minor*.—Skinner [excluded name, type 2], 1898, p. 25.

Vanessa cardui aberration *minor*.—Barnes and McDunnough, 1917, p. 11.—McDunnough, 1938, p. 21.
Cynthia cardui aberration *minor*.—Barnes and Benjamin, 1926, p. 15.—Gunder, 1928, p. 202, pl. 8: fig. 3 *a*.

Pyrameis cardui aberration *minor* Cannaviello [excluded name, type 2 and homonym of *minor* Failla-Tedaldi], 1900, pp. 19–20.—Stichel, 1908, p. 199; 1909, p. 199.—Rebel, 1910, p. 20.—Stephan, 1923, p. 36; 1924, p. 25.
Pyrameis cardui variety *minor*.—Schultz [excluded name, type 3], 1905, p. 67; 1906, p. 108.
Pyrameis cardui form *minor*.—Seitz [excluded name, type 3], 1914a, p. 458; 1914b, p. 458.—Gaede, 1930a, p. 200; 1930b, p. 200.
Vanessa cardui aberration *minor*.—Lhomme, 1923, p. 51.—Verity, 1950, p. 330.

Pyrameis cardui aberration *carduelis* Schultz [excluded name, type 2 and homoym of *carduelis* Seba], 1906, p. 108.—Stichel, 1908, p. 199; 1909, p. 199.—Rebel, 1910, p. 20.
Pyrameis cardui variety *carduelis*.—Stephan [excluded name, type 3], 1924, p. 25.
Vanessa cardui aberration *carduelis*.—Verity, 1950, p. 331.

Pyrameis cardui aberration *priameis* Schultz [excluded name, type 2], 1906, p. 108.—Stichel, 1908, p. 199; 1909, p. 199.—Rebel, 1910, p. 20.—Van Mellaerts, 1928, p. 105.—Zerkowitz, 1946, p. 246.
Pyrameis cardui variety *priameis*.—Stephan [excluded name, type 3], 1924, p. 25.
Vanessa cardui aberration *priameis*.—Verity, 1950, p. 332.—Chalmers-Hunt, 1960–1961, p. 62.

Pyrameis cardui aberration *carduelina* Alphéraky [excluded name, type 2], 1908, pp. 573–574.—Bang-Haas, 1926, p. 56.
Pyrameis cardui form *carduelina*.—Gaede [excluded name, type 3], 1930a, p. 200; 1930b, p. 200.
Vanessa cardui aberration *carduelina*.—Field, 1940b, p. 86.—Verity, 1950, p. 330.

Pyrameis cardui japonica Stichel [new synonymy], 1908, p. 200, pl: 62, fig. D 2; 1909, p. 200, pl. 62: fig. D 2.—Fruhstorfer, 1912a, p. 525; 1912b, p. 525.—Matsumura, 1929, p. 19.—Cho, 1934, pl. 20: fig. 2.—Doi, 1934, p. 29.—Mori, 1934, pp. 72–73.—Bryk, 1946, p. 39.
Pyrameis cardui universa form *japonica*.—Verity, 1919, p. 197.
Vanessa cardui japonica.—Field, 1940b, p. 85.
Vanessa cardui aberration *japonica*.—Verity, 1950, p. 331.
Vanessa cardui form *japonica*.—Lempke, 1956, p. 188.

Pyrameis cardui aberration *ocellata* Rebel [excluded name, type 2], 1910, p. 20.—Reuss, 1910b, pp. 63, 64.—Bang-Haas, 1926, p. 56.
Pyrameis cardui variety *ocellata*.—Wize [excluded name, type 3], 1917, p. 5.—Stephan, 1924, p. 25.
Pyrameis cardui form *ocellata*.—Gaede [excluded name, type 3], 1930a, p. 200; 1930b, p. 200.
Vanessa cardui aberration *ocellata*.—Field, 1940b, p. 86.—Verity, 1950, p. 331.
Vanessa cardui form *ocellata*.—Lempke, 1956, p. 187.

Pyrameis cardui aberration *carnea* Fritsch [excluded name, type 2], 1912, p. 136.—Bang-Haas, 1926, p. 56.
Pyrameis cardui form *carnea*.—Reuss [excluded name, type 3], 1918, p. 41.—Gaede, 1930a, p. 200; 1930b, p. 200.
Pyrameis cardui variety *carnea*.—Stephan [excluded name, type 3], 1924, p. 25.
Vanessa cardui aberration *carnea*.—Field, 1940b, p. 86.—Verity, 1950, p. 330.
Vanessa cardui form *carnea*.—Lempke, 1956, p. 187.

Pyrameis cardui aberration *melanosa* Cabeau [excluded name, type 2], 1913, p. 43.—Bang-Haas, 1926, p. 56.
Vanessa cardui aberration *melanosa*.—Lhomme, 1923, p. 51.—Verity, 1950, p. 332.
Pyrameis cardui form *melanosa*.—Gaede [excluded name, type 3], 1930a, p. 200; 1930b, p. 200.
Vanessa cardui form *melanosa*.—Lempke, 1956, p. 187.

Pyrameis cardui form *brunneaalbimaculata* Reuss [excluded name, type 3], 1916, pp. 130–131.—Bang-Haas, 1926, p. 56.—Gaede, 1930a, p. 200; 1930b, p. 200.
Vanessa cardui aberration *brunneaalbimaculata*.—Field [excluded name, type 2], 1940b, p. 86.—Verity, 1950, p. 331.

Pyrameis cardui form *rosacea* Reuss [excluded name, type 3], 1916, p. 131; 1918, p. 41.—Bang-Haas, 1926, p. 56.—Gaede, 1930a, p. 200; 1930b, p. 200.
Pyrameis cardui variety *roseacea*.—Stephan [excluded name, type 3], 1924, p. 25.
Vanessa cardui aberration *rosacea*.—Field [excluded name, type 2], 1940b, p. 86.—Verity, 1950, p. 330.

Pyrameis cardui form *hunteri* Reuss [excluded name, type 3], 1918, p. 41.
Vanessa cardui form *hunteri*.—Lempke, 1956, p. 187.

Pyrameis cardui form *ochracea* Reuss [excluded name, type 3], 1918, p. 41.
Vanessa cardui form *ochracea*.—Lempke, 1956, p. 187.

Pyrameis cardui form *conjuncta* Verity [excluded name, type 1 and type 3], 1919, p. 197.
Pyrameis cardui form *conjuncta*.—Bang-Haas [excluded name, type 3], 1927, p. 55.—Gaede, 1930a, p. 200; 1930b, p. 200.
Vanessa cardui cardui aberration *conjuncta*.—Field [excluded name, type 1 and type 2], 1940b, p. 85.
Vanessa cardui aberration *conjuncta*.—Verity [excluded name, type 2], 1950, pp. 331, 336.—Niculescu, 1965, p. 190.

Pyrameis cardui aberration *emielymi* Verity [excluded name, type 2], 1919, p. 198.—Bang-Haas, 1927, p. 55.
Pyrameis cardui form *emielymi*.—Gaede [excluded name, type 3], 1930a, p. 200; 1930b, p. 200.
Vanessa cardui aberration *emielymi*.—Field, 1940b, p. 86.—Verity, 1950, p. 331.—Chalmers-Hunt, 1960–1961, p. 62.
Vanessa cardui form *emielymi*.—Lempke, 1956, p. 189.

Pyrameis cardui variety *infrabrunnea* Verity [excluded name, type 3], 1919, p. 198.
Pyrameis cardui inops form *infrabrunnea*.—Bang-Haas [excluded name, type 1 and type 3], 1927, p. 56.

Pyrameis cardui form *infrabrunnea*.—Gaede [excluded name, type 3], 1930a, p. 200; 1930b, p. 200.
Vanessa cardui aberration *infrabrunnea*.—Verity [excluded name, type 2], 1950, p. 331.

Pyrameis cardui form *infraflava* Verity [excluded name, type 3], 1919, p. 198.—Gaede, 1930a, p. 200; 1930b, p. 200.
Pyrameis cardui inops form *infraflava*.—Bang-Haas, 1927, p. 56.
Vanessa cardui aberration *infraflava*.—Verity [excluded name, type 2], 1950, p. 331.

Pyrameis cardui form *infragrisea* Verity [excluded name, type 3], 1919, p. 198.—Gaede, 1930a, p. 200; 1930b, p. 200.
Pyrameis cardui inops form *infragrisea*.—Bang-Haas, 1927, p. 56.
Vanessa cardui aberration *infragrisea*.—Verity [excluded name, type 2], 1950, p. 331.

Pyrameis cardui form *infranigrans* Verity [excluded name, type 3], 1919, p. 198.—Gaede, 1930a, p. 200; 1930b, p. 200.
Pyrameis cardui inops form *infranigrans*.—Bang-Haas, 1927, p. 55.
Vanessa cardui aberration *infranigrans*.—Verity [excluded name, type 2], 1950, p. 331.

Pyrameis cardui form *infraochracea* Verity [excluded name, type 3], 1919, p. 198.—Gaede, 1930a, p. 200; 1930b, p. 200.
Pyrameis cardui inops form *infraochracea*.—Bang-Haas, 1927, p. 56.
Vanessa cardui aberration *infraochracea*.—Verity [excluded name, type 2], 1950, pp. 331, 334.

Pyrameis cardui universa form *inops* Verity [excluded name, type 1], 1919, p. 198.
Pyrameis cardui race *inops* Verity and Querci, [new synonymy], 1924, p. 42.—Bang-Haas, 1927, p. 55.—Gaede, 1930a, p. 200; 1930b, p. 200.
Pyrameis cardui form *inops*.—Verity, 1936, p. 87.
Vanessa cardui inops.—Field, 1940b, p. 85.
Vanessa cardui aberration *inops*.—Verity, 1950, pp. 331, 334.
Vanessa cardui form *inops*.—Lempke, 1956, pp. 186–187.

Pyrameis cardui form *sexiespupillata* Verity [excluded name, type 3], 1919, p. 198.—Gaede, 1930a, p. 200; 1930b, p. 200.
Pyrameis cardui aberration *sexiespupillata*.—Bang-Haas [excluded name, type 2], 1927, p. 55.—Van Mellaerts, 1928, pp. 104–105.
Vanessa cardui aberration *sexiespupillata*.—Field, 1940b, p. 86.—Verity, 1950, p. 330.—Chalmers-Hunt, 1960–1961, p. 62.
Vanessa cardui carduelis aberration *sexiespupillata*.—Field [excluded name, type 1], 1940b, p. 274.
Vanessa cardui form *sexiespupillata*.—Lempke, 1956, p. 188.

Pyrameis cardui form *septiespupillata* Verity [excluded name, type, 3], 1919, p. 198.—Gaede, 1950a, p. 200; 1950b, p. 200.
Pyrameis cardui aberration *septiespupillata*.—Bang-Haas [excluded name, type 2], 1927, p. 55.—Van Mellaerts, 1928, p. 104.
Vanessa cardui aberration *septiespupillata*.—Field, 1940b, p. 86.—Verity, 1950, p. 331.
Vanessa cardui form *septiespupillata*.—Lempke, 1956, p. 188.

Pyrameis cardui race *universa* Verity, [new synonymy], 1919, p. 197; 1920, p. 61.—Verity and Querci, 1924, p. 42.—Bang-Haas, 1926, p. 56.—Gaede, 1930a, p. 200; 1930b, p. 200.
Vanessa cardui form *universa*.—Verity, 1950, p. 334.—Lempke, 1956, p. 186.
Vanessa cardui race *universa*.—Verity, 1936, p. 87; 1937, p. 22.—Field, 1940b, p. 85.

Pyrameis cardui aberration *maria* Stephan [excluded name, type 2], 1924, p. 25.
Pyrameis cardui aberration *marthamaria* Stephen [excluded name, type 2], 1924, p. 25.—Bang-Haas, 1927, p. 55.
Vanessa cardui aberration *marthamaria*.—Field, 1940b, p. 86.—Verity, 1950, p. 331.

Pyrameis cardui aberration *schoenfellneri* Hoffman [excluded name, type 2], 1924, p. 25.—Bang-Haas, 1927, p. 55.
Vanessa cardui aberration *marthamaria*.—Field, 1940b, p. 86.—Verity, 1950, p. 331.

Pyrameis cardui aberration *schoenfellneri Hoffman* [excluded name, type 2], 1925, pp. 29–30.
Pyrameis cardui litoralis aberration *schoenfellneri*.—Bang-Haas [excluded name, type 1], 1927, p. 56.
Pyrameis cardui form *schoenfellneri*.—Gaede [excluded name, type 3], 1930a, p. 200; 1930b, p. 200.
Vanessa cardui aberration *schoenfellneri*.—Field, 1940b, p. 86.—Verity, 1950, p. 332.

Pyrameis cardui aberration *subfracta* Stack [excluded name, type 2], 1925, p. 114, fig. 3.—Bang-Haas, 1928, p. 26.
Pyrameis cardui litoralis aberration *subfracta*.—Bang-Haas [excluded name, types 1 and 2], 1927, p. 56.
Pyrameis cardui form *subfracta*.—Gaede [excluded name, type 3], 1930a, p. 200; p. 1930b, p. 200.
Vanessa cardui aberration *subfracta*.—Field, 1940b, p. 86.—Verity, 1950, p. 330.—Niculescu, 1965, p. 190.
Vanessa cardui form *subfracta*.—Lempke, 1956, p. 188.

Pyrameis cardui aberration *takesakiana* Kato [excluded name, type 2], 1925, pp. 145–146, fig.
Vanessa cardui aberration *takesakiana*.—Field, 1940b, p. 86.

Pyrameis cardui litoralis de Souza [new synonymy], 1926, p. 3.—Bang-Haas, 1927, p. 56.

Pyrameis cardui aberration *rosea* Pionneau [excluded name, type 2], 1926, p. 4.—Bang-Haas, 1927, p. 55.
Pyrameis cardui form *rosea*.—Gaede [excluded name, type 3], 1930a, p. 200; 1930b, p. 200.
Vanessa cardui aberration *rosea*.—Field, 1940b, p. 86.

Cynthia cardui jacksoni Clark [as an individual variant, excluded name, type 2], 1927, p. 127.
Pyrameis cardui form *jacksoni*.—Clark [excluded name, type 3], 1932, p. 89, pl. 8: figs. 2, 3.
Vanessa cardui carduelis aberration *jacksoni*.—Field [excluded name, type 1], 1940b, pp. 86, 87, 274.
Vanessa cardui form *jacksoni*.—Lempke, 1956, p. 187.—Dos Passos, 1964, p. 77.

Pyrameis cardui aberration *browni* Meilhan [excluded name, type 2], 1928, pp. 102–103.

Pyrameis cardui form *browni*.—Gaede [excluded name, type 3], 1931a, p. 343; 1931b, p. 343.
Vanessa cardui aberration *browni*.—Verity, 1950, p. 331.

Pyrameis cardui aberration *flava* Bandermann [excluded name, type 2], 1928, pp. 236–237.—Bang-Haas, 1929, p. 11.
Pyrameis cardui form *flava*.—Gaede [excluded name, type 3], 1930a, p. 200; 1930b, p. 200.
Vanessa cardui aberration *flava*.—Field, 1940b, p. 86.

Pyrameis cardui aberration *rogeri* Meilhan [excluded name, type 2], 1928, pp. 100–103.—Bang-Haas, 1930, p. 162.
Pyrameis cardui subspecies *rogeri*.—Gaede [new synonymy], 1931a, p. 343; 1931b, p. 343.
Vanessa cardui aberration *rogeri*.—Field, 1940b, p. 86.—Verity, 1950, p. 331.—Chalmers-Hunt, 1960–1961, p. 62.

Pyrameis cardui aberration *varini Meilhan* [excluded name, type 2], 1928, p. 103.—Bang-Haas, 1930, p. 162.
Pyrameis cardui form *varini*.—Gaede [excluded name, type 3], 1931a, p. 343; 1931b, p. 343.
Vanessa cardui aberration *varini*.—Field, 1940b, p. 86.—Verity, 1950, p. 331.—Chalmers-Hunt, 1960–1961, p. 62.
Vanessa cardui form *varini*.—Lempke, 1956, p. 189.

Pyrameis cardui form *hemielymi* Gaede [excluded name, type 3], 1930a, pl. 13: fig. B 1; 1930b, pl. 13: fig. B 1.

Pyrameis cardui aberration *johni* Fischer [excluded name, type 2], 1932, p. 158, fig.
Vanessa cardui aberration *johni*.—Field, 1940b, p. 86.

Vanessa cardui aberration *pallida Frohawk* [excluded name, type 2 and homonym of *pallida* Schøyen]. 1938, p. 84.

Vanessa cardui ushuwaia Bryk [new synonymy], 1944, pp. 10–11, pl. 1: fig. 6; 1946, p. 39; 1953, p. 93.

Vanessa cardui japonica form *koreana* Bryk [excluded name, types 1, 2, 3], 1946, p. 39.

Vanessa cardui aberration *albicans* Verity [excluded name, type 2], 1950, p. 331.

Vanessa cardui aberration *infralutea* Verity [excluded name, type 2], 1950, p. 334.

Vanessa cardui form *albipuncta* Lempke [excluded name, type 3], 1956, p. 188.

Vanessa cardui form *nigripuncta* Lempke [excluded name, type 3], 1956, pp. 188–189.

This species, probably one of the two or three best known and most described and illustrated species of butterflies in the world, hardly needs redescription except to compare it to the other species of the genus that are not nearly as well known. *C. cardui*, as mentioned earlier in the group description, differs from all other species of *Cynthia*, except *C. kershawi*, in having the fuscous color in interspace Cu_2 on upper surface of forewing not extending to vein Cu_1. On the upper surface of the hindwing it differs from *C. kershawi* in having five, not four, submarginal ocular spots, these located between veins R_s and Cu_2, and all lacking blue centers except for a rare individual variant that sometimes occurs with a blue center in the spot located in interspace Cu_1.

MALE (Figures 89–96).—Forewing above with subapical white bar just beyond cell, and subapical and submarginal white spots very much as in *C. kershawi* and quite similar to those of the other *Cynthia* species except that the white spot found in interspace Cu_1 in the species of the virginiensis group is lacking in *C. cardui* and *C. kershawi*; with fuscous bar in interspace Cu_1 connecting apical and subapical fuscous areas to central fuscous spot in interspace Cu_2 lacking; with the central fuscous spot in interspace Cu_2 just mentioned usually not so strongly connected to the fuscous spot at base and above base of Cu_2 as it is in *C. kershawi* and with the fuscous spots in middle of cell distinctly separated, not nearly confluent as is true of *C. kershawi*.

Hindwing on the upper surface as mentioned before with five, not four, submarginal ocular spots between vein R_s and Cu_2, none with blue centers except very rarely the one in interspace Cu_1; with an upwardly projected hooklike fuscous marking below and beyond cell, all that remains of the fuscous and usually sinuous band that crosses the wing from costa to just above anal angle in the species of the virginiensis group, this hooklike fuscous spot nearly or sometimes entirely joining a downward projected fuscous streak from the fuscous area of the costal margin and base of wing.

Under surfaces of forewing with fuscous of central area of interspace Cu_2 extending upward nearly, or at least halfway, through interspace Cu_1 and with two fuscous spots in middle of cell just inward from the white area distinctly separated from each other.

Hindwing on the under surface with a lighter overall appearance than in *C. kershawi*, with the submarginal ocular markings distinctly larger than in that species, and with the subtriangular white spot at the end of the cell in interspace M_2 also much larger.

Length of forewing, 22–39.5 mm (average 29.3 mm).

Male genitalia as illustrated by Figure 8 (drawn

from my preparation no. 6104), with uncus tapered distally to a point; gnathos longer, with uncus with distal part after "heel" nearly at right angles to the base; valva with costal margin broadly projected upward, forming a broad obtuse angle with a small upward projecting spine at its summit just below uncus; distal margin of valva also broadly projected and terminating in one or two spines; lower margin of valva broadly convex and continuous with distal margin, lacking completely the sickle-shaped projection found in *C. kershawi*; clasper directed toward outer margin and curved inward at its extremity; cuiller smooth with free part curved in a shallow figure **S** toward distal margin; aedeagus very similar to that of *C. myrinna*, with base slightly bent downward.

FEMALE (Figures 97–104).—This sex hardly differs from the male except that most females have a slightly more rounded outer margin on the hindwing and have the outer margin of forewing near vein Cu_2 slightly more produced.

Length of forewing, 24–37 mm (average 30.9 mm).

Female genitalia as illustrated by Figure 24 (drawn from my preparation no. 3675), with anterior margin of eighth and posterior margin of seventh sternite greatly undulated and with these sternites forming two large posteriorly directed lobes; ostium bursae swollen and located in eighth sternite between lobes of seventh sternite; with a pair of laterally placed pockets between seventh and eighth sternites; ribbonlike signa extending nearly full length of bursa copulatrix.

INDIVIDUAL AND ABERRATIONAL VARIATION.—Individual variation in this species commonly consists of differences in the ground color of the upper surfaces, which varies from a pale tan to a salmon red. The fuscous markings vary in extent and sometimes there are blue centers in the lowermost submarginal round spots of the upper surfaces of the hindwings. Aberrational variation has been studied by numerous persons who unfortunately have given some forty-nine formal names to individuals displaying this "more rare" type of individual variation. Specimens having an extra white spot, or lacking one, or displaying any slight variation from the "normal" have received names. Names have usually always been given also to any remarkably different looking specimen. All of these names are synonymized above or are excluded from nomenclature. Gaede (1930a, 1930b, p. 200), Verity (1950, pp. 330–332), and Lempke (1956, pp. 186–189) treat many of these names and should be consulted by those interested.

SEASONAL VARIATION.—Variation in habitus between the three broods (where there are three broods) does not seem to occur in this species. There are "wet" and "dry" forms in material collected in microenvironments that would be thought of (at least temporarily) as wet and dry areas. Where there is sufficient rain, specimens occur that are larger, brighter, and more pinkish above and darker on the under surfaces.

GEOGRAPHICAL VARIATION.—Verity (1919, p. 197; 1920, p. 21; 1950, p. 334), and Verity and Querci (1924, p. 42) have maintained that there is a great deal of geographical variation and have recognized several subspecies as *Vanessa cardui universa, V. cardui inops, V. cardui carduelis,* and *V. cardui cardui.* Stichel (1908, p. 200) describes what he considers to be a subspecies as *Pyrameis cardui japonica.* None of these hold up as subspecies. Of the more than two hundred and fifty specimens examined, the characters supposedly differentiating these subspecies occur without relation to geography, so all of these proposed subspecies are synonymized above.

METHOD OF IDENTIFICATION.—The original description of Linnaeus (1758, p. 475) and his references to previous descriptions and illustrations clearly identify his name with the species here treated as *Cynthia cardui.*

Since Linnaeus in his original description refers to his 1746 work "Fauna Svecica," I consider Sweden to be the type locality of *C. cardui.* Verity (1913, p. 181), in his study of the Linnean types, states of *cardui*: "There is nothing noteworthy about the one typical specimen." This specimen is in the Linnean collection of the Linnean Society, London.

SYNONYMY.—See synonymy and literature citations above. In addition to the names proposed for so-called subspecies, which are synonymized above, *Papilio belladonna* Linnaeus, a name used earlier by Linnaeus (and therefore not available), is listed by him as a synonym (1758, p. 485). *Vanessa elymi* Rambur (1829, pp. 256–257), described as a species, was based upon an aberrant specimen of *C. cardui* and is a synonym.

LIFE HISTORY.—The food plants of the larvae are principally members of the Compositae and most especially the various thistles. Among its recorded hosts are: *Anaphalis margaritaceae, Arctium leppa, Artemisia vulgaris, Blumea, Carduus nutans, C. crispus, C. acanthoides, Centaurea benedicta, Cirsium, Cnicus lanceatatus, C. acaulis, Filago arvenis, Gnaphalium indicum, Lappa officinalis, Senecio cineraria, Silybum marianum,* and *Xanthium,* all members of the Compositae (order Asterales). Occasional hosts are: *Althaea officinalia, Malva sylvestris,* and *M. rotundifolia* of the Malvaceae (order Malvales); *Anchusa officinales, Borago officinalis,* and *Echium vulgare* of the Boraginaceae (order Polemoniales), and *Nicotiana glauca* (Solanaceae, order Polemoniales). It has even been reported upon *Zornia* (Leguminosae, order Rosales) and upon *Urtica dioica* (Urticaceae)! I believe these last two records are open to question.

Fabricius (1775, p. 499) gave brief descriptions of the larva and pupa. Life-history notes and descriptions of the immature stages are numerous. Edwards (1889, p. 26) and Davenport and Dethier (1938, p. 164) listed many of the references. Some other references are: Esper (1777, p. 136), Latreille (1824, p. 325), Boisduval and LeConte (1834, p. 179), Duponchel (1849, pp. 107–109, pl. 12: figs. 42 *a–c*), Morris (1862, p. 60), Trimen (1862–1866, pp. 120–121), Newman (1874, p. 64), Buckley (1886, pp. 49–52, 174–176, pl. 8: figs. 1, 1*a-e*), Marshall and de' Nicéville (1886, pp. 227–228), Tutt (1886, pp. 352–354), Trimen (1887, p. 202), Dale (1890, pp. 138–140), Barrett (1893, pp. 151–154), Moore (1899–1900, p. 106), Stichel (1909, p. 200), Frohawk (1934, pp. 143–146, pl. 11: figs. 1–4), Stokoe (1944, pp. 94–96, pl. 9: fig. 3, pl. 10: fig. 3, pl. 15: fig. 1), Woodhouse (1950, p. 49), and Wynter-Blyth (1957, pp. 210–211).

DISTRIBUTION.—This butterfly is the most cosmopolitan of all butterflies being found in most parts of the world except Australia, New Zealand, and only rarely in South America south of Venezuela. It is absent in the Antartic and the Artic regions. Its migrations have attracted attention for nearly two hundred years and much of this information has been summarized by Williams (1930, pp. 168–212).

MATERIAL STUDIED.—One hundred and thirty-eight males and one hundred and twenty-one females were studied from the following localities.

NORTH AMERICA: BRITISH COLUMBIA: Duncans; Vancouver (August); Victoria (August). ALBERTA: Calgary (June). MANITOBA: Manchester (July). ONTARIO: Cedarhurst (September); Hymers. MAINE: Mount Desert Island (July). MASSACHUSETTS: Essex (July). NEW YORK: Allegany State Park; Staten Island (September). MARYLAND: College Park (August); Prince Frederick County October). DISTRICT OF COLUMBIA: (June, August). VIRGINIA: Bald Mountain (August); Limeton (October); Salem (July, August, September, October). NORTH CAROLINA: Asheville (July). SOUTH CAROLINA: Sullivans Island. NORTH DAKOTA: Tower City (August). MINNESOTA: No specific locality. MICHIGAN: Chelsey (October); Detroit (July); Saint Ignace (July). ILLINOIS: Decatur (September). MISSOURI: Webster Groves (September). NEBRASKA: Lincoln (September). KANSAS: Concordia (June); Eureka (April, June, November); Lawrence (June); Scandia (June). KENTUCKY: Frankfort (September). LOUISIANA: Baton Rouge (December). TEXAS: Brownsville; San Benito (May). WASHINGTON: Brewster (June, July); Cooney Lake (July); Godman Springs, Blue Mountains (July); Yakima (October). UTAH: Stockton (June). WYOMING: Fremont County; Yellowstone Park. COLORADO: Golden (June). NEW MEXICO: Mount Tasco (August). ARIZONA: Huachuca Mountains (September); Palmerlee, Cochise County; Readington. CALIFORNIA: Los Angeles; San Diego (June, September); Taft (May). HAWAII: Oahu (March). MEXICO: Aguascalientes (August); Jalapa; Mazatlan, Sinaloa; Mexico City (June); Orizaba (November). GUATEMALA: San Sebastian (June, 3,000 ft.). HONDURAS: No specific locality. COSTA RICA: San Jose (January, 4,000 ft.). COSTA RICA: San Jose (January, 4,000 ft). PANAMA: No specific locality. CUBA: Loma del Gato, Sierre del Cobre, Oriente (September, 2,600 ft); Vinales (June). HAITI: Beaumont (October).

EUROPE: FRANCE: Royan (October). SWITZERLAND: Zurich. GERMANY: Miesbach. CZECHOSLOVAKIA: Carpathian Mountains; Friedland. HUNGARY: Budapest (July); Galgamacsa (August). ALBANIA: No specific locality. GREECE: Athens (May); Spetsai Island (July, August).

ASIA: TURKEY: No specific locality. SYRIA:

Beyrout. JORDAN: Jordan Valley (March). INDIA: Kasmir; Khasia Hills; Madras; Sikkim (May). BHUTAN: Thimbu (September, 7,700 ft). CHINA: Foochow; Ishang; near Mupin (14,000 ft); Mount Omei, Szechuan (August); Ts'ao P'o, Szechuan (August, 6,300 ft); Tschili Province (September). JAPAN: Kotanijochi (July); Musaki (October); Oeda (September); Oita (September); Sifu; Tokosanchi (June); Tosari (July). JAVA: Buitenzorg. SUMATRA: Deli.

AFRICA: UGANDA: No specific locality. KENYA: Kibwezi (December); Nairobi (May); Thomsons Falls (January). RHODESIA: Sinoia. NYASALAND: No specific locality. MADAGASCAR: No specific locality.

2. *Cynthia kershawi* M'Coy, resurrected combination

FIGURES 9, 25, 105–108

Cynthia kershawi M'Coy, 1868, p. 76.

Pyrameis kershawi.—Godman and Salvin, 1882, p. 218.—Dixey, 1890, pp. 113, 117, 122, 123.—Waterhouse, 1903, p. 12.—Clark, 1932, p. 91.

Pyrameis cardui kershawi.—Olliff, 1888, pp. 1251–1252.—Fruhstorfer, 1912a, p. 525; 1912b, p. 525.—Reuss, 1910a, pp. 63, 66.—Waterhouse and Lyell, 1914, p. 56, pl. 5: fig. 36.—Barrett and Burnes, 1951, p. 134.

Pyrameis cardui form *kershawi.*—Seitz, 1914a, p. 458; 1914b, p. 458.

Vanessa cardui kershawi.—Williams, 1930, pp. 204–205; 1949a, p. 73; 1949b, p. 40.—Burns, 1969, p. 80, fig. 58.

Vanessa kershawi.—Field, 1940b, p. 85.—Smithers and Peters, 1966, pp. 67–68.—van Son, 1966, p. 66, fig. 2.—Fox, 1969, pp. 7, 9, 10.—Pritchard, 1969, pp. 11–12.

Pyrameis cardui kershawii Kirby [misspelling or unjustified emendation of *kershawi*], 1871, p. 186.—Semper, 1878, p. 148.—Marshall and de Nicéville, 1886, p. 226.—Fruhstorfer, 1898a, p. 151.

Pyrameis kershawii.—Miskin, 1891, p. 39.—Verity, 1916b, p. 128.—Bodley, 1920, pp. 74–75.

Vanessa cardui kershawii.—Dale, 1890, p. 138.—Gaskin, 1966, p. 88.

Vanessa kershawii.—Niculescu, 1965, p. 191.

Pyrameis lucasii Miskin [new synonymy], 1888, pp. 1515–1516; 1891, p. 39.

Pyrameis itea lucasii.—Waterhouse, 1903, p. 12.

Pyrameis itea lucasi Fruhstorfer [misspelling or unjustified emendation of *lucasii*], 1912a, p. 526; 1912b, p. 526.

Pyrameis cardui kershawi aberration *lucasi.*—Waterhouse and Lyell, 1914, p. 56.

Pyrameis cardui aberration *lucasi.*—Fruhstorfer, 1927a, p. 1112; 1927b, p. 1112.

Pyrameis cardui kershawii aberration *suffusa* Olliff [excluded name, type 2], 1888, pp. 1250–1252.—Waterhouse and Lyell, 1914, p. 56.

Pyrameis kershawii suffusa Miskin [new synonymy], 1891, p. 39.—Waterhouse, 1903, p. 12.

Pyrameis cardui aberration *suffusa.*—Fruhstorfer, 1912a, p. 525; 1912b, p. 525.

Vanessa cardui Linnaeus, Hudson not Linnaeus [a misidentification], 1898, pp. 108–109, pl. 12: figs. 1, 2.

C. kershawi has been treated frequently as an Australian subspecies of *C. cardui,* almost from the time that it was first described. Its specific reality was settled by Van Son (1966).

As mentioned in the group description above it differs from all other species of *Cynthia* except *C. cardui* in having the fuscous color in interspace Cu_2 on upper surface of forewing not extending to vein Cu_1. On the upper surface of the hindwing it differs from *C. cardui* in having four, not five, submarginal ocular spots, these being located between veins M_1 and Cu_2, with the lower three of these spots having blue centers.

MALE (Figures 105, 106).—Forewing above with subapical white bar just beyond cell and subapical submarginal white spots very much as in *C. cardui* and quite similar to those of the other *Cynthia* species except that the white spot found in interspace Cu_1 in the species of the virginiensis group is lacking in *C. kershawi* and *C. cardui*; with fuscous bar in interspace Cu_1 connecting apical and subapical fuscous areas to central fuscous spot in interspace Cu_2 lacking; with central fuscous spot in interspace Cu_2 just mentioned usually more strongly connected to the fuscous spot at base and above base of Cu_2 than it is in *C. cardui,* and with the fuscous spots in middle of cell confluent or nearly confluent, not distinctly separate as is true of *C. cardui.*

Hindwing on the upper surface as mentioned before with four, not five, submarginal ocular spots between vein M_1 and Cu_2, the lower three with blue centers; with an upwardly projected hooklike fuscous marking below and beyond cell, all that remains of the fuscous and usually sinuous band that crosses the wing from costa to just above anal angle in the species of the virginiensis group, this hooklike fuscous spot only very infrequently connected to the fuscous area along costa.

Under surfaces of forewing with fuscous of central area of interspace Cu_2 not extending above that vein and with the two fuscous spots in middle of

cell just inward from the white area much closer to each other than is true in *C. cardui.*

Hindwing on the under surface with a darker overall appearance than in *C. cardui,* with the submarginal ocular markings distinctly smaller than in that species, and with the subtriangular white spot at the end of the cell in interspaces M_2 also much smaller.

Length of forewing, 23–24.5 mm (average 23.8 mm).

Male genitalia as illustrated by Figure 9 (drawn from my preparation no. 6098), with uncus slightly tapered distally and blunt; gnathos long, slightly longer than uncus, and more blunt distally than in *C. myrinna* and *C. cardui*; valva with costal margin broadly projected dorsally and forming a broad obtuse angle, with a small upward projected spine below and distad of this margin's greatest projection; valva with distal margin concave and, together with the distal end of costal margin, forming a second angular projection; lower margin of valva slightly undulate and terminating in a sickle-shaped process; clasper from near middle of valva broad and short and slightly curved toward costal margin; cuiller smooth and projected toward costal margin; aedeagus very similar to that of *C. cardui* and *C. myrinna,* not distinctly downward bent near base.

FEMALE (Figures 107, 108).—Females of this species, as is true of *C. cardui,* have a slightly more rounded outer margin on the hindwing and a slightly more produced outer margin on the forewing near vein Cu_2.

Length of forewing, 22–27 mm (average 25.2 mm).

Female genitalia as illustrated by Figure 25 (drawn from my preparation no. 6091), similar to those of *C. cardui,* with posteriorly directed lobes about as in that species except those of seventh sternite, which have at their apices dark colored, downwardly directed, thumblike spurs; pockets between seventh and eighth sternites much smaller than in *C. cardui*; ribbonlike signa over half the length of bursae copulatrix.

METHOD OF IDENTIFICATION.—The type locality is given as Australia, "in abundance about Melbourne and in many other parts of Australia." The original description gives the major habitus characters which distinguish this species. The location of the type specimen is unknown to me.

SYNONYMY.—*Pyrameis lucasii,* described as a new species from Victoria by Miskin (1888, p. 1515–1516), was shown to be an aberration of *C. kershawi* by Waterhouse and Lyell (1914, p, 56) and is here placed in synonymy.

LIFE HISTORY.—The larvae feed upon the following Compositae: *Helichrysum, Ammobium alatum, Acroelinium roseum, Gnaphalium japonicum,* and *Cryptostemma calendula,* a roadside weed introduced into Australia from South Africa. Very brief descriptions of the immature stages and some life-history notes were given by Bodley (1920, pp. 74–75) and by Burns (1969, p. 80). Notes on its migrations were given by Williams (1930, pp. 204–205) and Fox (1969, p. 7).

DISTRIBUTION.—This species is found all around the coastal region of Australia and for a considerable distance inland. Williams (1949b, p. 40) states that it may upon occasion migrate to New Zealand. Pritchard (1969, pp. 11–12) confirms one such migration and states that it has recently been observed ovipositing on *Gnaphalium japonicum* in Auckland, New Zealand.

MATERIAL STUDIED.—Seven males and eleven females were available for study from the following localities: AUSTRALIA: Birchip (February, March); Brisbane; Colo Vale, New South Wales (January); Maribyrnong (September); New Market, Victoria (September); Tasmania; Victoria (October). NEW ZEALAND: No specific locality.

The Virginiensis Group

This group contains five species: *C. virginiensis, C. altissima, C. braziliensis, C. terpsichore,* and *C. myrinna.* Here on the upper surface of the forewing the fuscous color from interspace Cu_2, just beyond the middle of anal vein, extends upward at least through interspace Cu_1 and usually through interspace M_3 to merge with fuscous ground color of the subapical area. On the under surface of the forewing the virginiensis group has no white behind the end of cell, or only a small amount, usually a white line along the inner surface of the fuscous bar at the end of the cell, and as on the upper surface the fuscous color from interspace Cu_2, just beyond the middle of the anal vein, extends upward to vein M_3. On the under surface of the hindwing there are only two submarginal ocular spots, these

being large, usually many times larger than those in the cardui group. There is a white spot, sometimes peppered with fuscous, subtriangular in shape, opposite the end of cell just above vein M_3, but this spot is not isolated as it is in the cardui and carye groups, and it forms the central segment of the light-colored band running across middle of wing from costa to abdominal margin just before anal angle.

In this group all species except *C. terpsichore* have on the ovipositors a number of cephalically directed teethlike spines. These spines are lacking in the cardui and carye groups.

3. *Cynthia virginiensis* (Drury), resurrected combination

FIGURES 10, 26, 109–118

Drury, 1770, pp. 10–11, pl. 5: fig. 1 [without name].

Nymphalis cardui virginiensis Drury, 1773, index p. [1] [name given to 1770 description].

Papilio cardui virginiensis.—Boisduval and LeConte, 1834, p. 180 [synonym of *Vanessa huntera* (Fabricius)].—Humphreys and Westwood, 1841, p. 57 [synonym of *huntera*].—Doubleday, 1849, p. 205 [synonym of *huntera*].—Lucas 1857, p. 543 [synonym of *huntera*].

Papilio virginiensis.—Doubleday, 1844, p. 80 [synonym of *huntera*].

Pyrameis virginiensis.—Morris, 1860, p. 8 [synonym of *huntera*].—Morris, 1862, p. 60 [synonym of *huntera*]; 1868, p. 83 [synonym of *huntera*].—Kirby, 1871, p. 186.—Staudinger, 1885, p. 98.—Rebel, Weymer and Stichel, 1901, p. 307.—Staudinger and Rebel, 1901, p. 24.—Alfken, 1903, p. 569.—Stichel, 1908, p. 200, pl. 62: fig. D 3; 1909, p. 200.—Reuss, 1910a, pl. 1: figs. 3, 7, 11; 1910b, pp. 63, 64, 66, 67; 1910c, p. 90.—Stephen, 1924, p. 25.—Clark, 1932, pp. 21, 26, 86–88, pl. 27: figs. 1, 2.—South, 1941, p. 81.

Vanessa virginiensis.—Kirby, 1882, p. 13.—Dale, 1890, p. 147.—Barrett, 1893, p. 155 [synonym of *huntera*].—Dyar, 1903, p. 23 [synonym of *huntera*].—Barnes and McDunnough, 1917, p. 11.—Gunder, 1925, p. 198, pl. 5: fig. 10*a*.—Comstock, 1927, p. 132, fig. D (p. 132), pl. 43: figs. 3, 6.—Williams, 1930, pp. 225–226.—Holland, 1931, pl. 154, pl. 1: fig. 2, pl. 3: fig. 34, pl. 4: figs. 54, 63, 64, pl. 33: fig. 6.—McDunnough, 1938, p. 20.—Wild, 1939, p. 26, pl. 7: figs. 2, 3.—Field, 1940b, pp. 81, 84–85, 274.—Hoffmann, 1940, p. 681.—Macy and Shepard, 1941, pp. 123–125.—Comstock, 1944, pp. 449–450.—Bryk, 1946, p. 39.—Leighton, 1946, p. 59.—Verity, 1950, p. 329.—Clark and Clark, 1951, pp. 14, 44–45, 201, 227, pl. 4: figs. *f*, *g*, pl. 30: figs. *j*, *k*—Klots, 1951, pp. 48, 108, 113, pl. 5: fig. 5, pl. 14: fig. 11.—Ferguson, 1954, pp. 194–195.—Brown, 1955, p. 101, 2 figs.—Zimmermann, 1958, pp. 453, 454, 455, 456, 472, figs. 388, 389, 394, 398, 402.—Forbes 1960, p. 159.—Dos Passos, 1964, p. 77.—Fulton, 1967, p. 289.

Pyrameis huntera virginiensis.—Seitz, 1914a, p. 459; 1914b, p. 459.

Cynthia virginiensis.—Barnes and Benjamin, 1926, p. 14.

Vanessa virginiensis virginiensis.—Bates, 1935, pp. 165–166.—d'Almeida, 1941, p. 308.

Papilio huntera Fabricius, 1775, p. 499; 1787, p. 45; 1793, p. 104.—Herbst, 1794, pp. 165–166.—Comstock, 1944, p. 449 [synonym of *virginiensis*].—Zimmermann, 1958, p. 472 [synonym of *virginiensis*].

Vanessa huntera.—Godart, 1819, p. 324.—Boisduval and LeConte, 1834, pp. 180–181.—Doubleday, 1844, p. 80.—Capronnier, 1874, p. 25.—Kirby, 1882, p. 13 [synonym of *virginiensis*].—Scudder, 1888, pl. 2: fig. 3, pl. 38: fig. 12, pl. 78: figs. 52, 53, 60, pl. 83: fig. 64; 1889, pp. 457–469, pl. 12: fig. 9, pl. 20: fig. 8, pl. 33: fig. 22, pl. 53: fig. 5, pl. 74: fig. 34, pl. 81: fig. 11.—Dale, 1890, p. 147 [synonym of *virginiensis*].—Barrett, 1893, pp. 155–156.—Meyrick, 1899, p. 194.—Dyar, 1903, p. 23.—Comstock and Comstock, 1904, pp. 156–157, pl. 26: figs. 3, 4.—Kirkaldy, 1906, p. 139.—Barnes and McDunnough, 1917, p. 11.—Holland, 1931, p. 154 [synonym of *virginiensis*].—Davenport and Dethier, 1938, p. 163.—McDunnough, 1938, p. 20.—Verity, 1950, p. 329.—Klots, 1951, p. 108 [synonym of *virginiensis*].—Chalmers-Hunt, 1960–1961, pp. 62, 140.—Dos Passos, 1964, p. 77 [synonym of *virginiensis*].

Cynthia huntera.—Humphreys and Westwood, 1841, pp. 54, 57, pl. 15: figs. 5, 6.—Morris, 1868, pp. 83–84, pl. 35.—Barnes and Benjamin, 1926, p. 14 [synonym of *virginiensis*].

Pyrameis huntera.—Doubleday, 1849, p. 205.—Lucas, 1857, pp. 542–543.—Morris, 1860, p. 8; 1862, p. 60.—Butler, 1870, p. 77.—Strecker, 1878, pp. 138, 190.—Godman and Salvin, 1882, pp. 218–219.—Marshall and de Nicéville, 1886, p. 226.—Edwards, 1889, pp. 25–26.—Dixey, 1890, pp. 93, 94, 100, 101, 107, 112, 115, 116, 117.—Maynard, 1891, pp. 92–93, 95 (fig. 32*b*).—Godman and Salvin, 1891, p. 101.—White, 1894, pp. 56–57, 63, pl. 2: fig. 4.—Denton, 1898, pp. 267–268, pl. [31].—Holland, 1898, p. 170, pl. 1: fig. 2, pl. 3: fig. 34, pl. 4: figs. 54, 63, 64, pl. 33: fig. 6.—Skinner, 1898, p. 24.—Wright, 1905, p. 177, pl. 22: fig. 228.—Kirkaldy, 1906, p. 139.—Seitz, 1914a, p. 459; 1914b, p. 459.—Holland, 1915, pp. 110–101, pl. 34.—Stephan, 1924, p. 25.—Forster, 1949, p. 106.

Papilio iole Cramer, 1776, p. 153 [as *jole*, validating *iole* Cramer without generic assignment, 1775, pp. 17, 18, pl. 12: fig. E, F].—Boisduval and LeConte, 1834, p. 80 [synonym of *huntera*].—Humphreys and Westwood, 1841, p. 54 [synonym of *huntera*].—Doubleday, 1844, p. 80 [synonym of *huntera*]; 1849, p. 205 [synonym of *huntera*].—Lucas, 1857, p. 543 [synonym of *huntera*].—Morris, 1869, p. 83 [synonym of *huntera*].—Berg, 1882, p. 166 [synonym of *virginiensis*].—Comstock, 1944, p. 449 [synonym of *virginiensis*].

Pyrameis iole.—Morris, 1860, p. 8 [synonym of *huntera*]; 1862, p. 60 [synonym of *huntera*].—Seitz, 1914a, pl. 94: figs. A 6, B 1; 1914b, pl. 94: figs. A 6, B 1.

Vanessa iole.—Dyar, 1903, p. 23 [synonym of *huntera*].—Barnes and McDunnough, 1917, p. 11 [synonym of *virginiensis*].—Holland, 1931, p. 154 [synonym of *virginiensis*].

—McDunnough, 1938, p. 20 [synonym of *virginiensis*].—Dos Passos, 1964, p. 77 [synonym of *virginiensis*].

Cynthia iole.—Barnes and Benjamin, 1926, p. 14 [synonym of *virginiensis*].

Vanessa virginiensis iole.—d'Almeida, 1941, p. 308.

Papilio jole Cramer, 1776, p. 153 [variant in spelling of *iole*].

Pyrameis huntera jole.—Berg, 1876, pp. 200–201.

Vanessa jole.—Dos Passos, 1964, p. 77 [as synonym of *virginiensis*].

Vanessa hunteri Hübner [misspelling of *huntera*], [1819], p. 33.—Doubleday, 1849, p. 205.—Berg, 1882, p. 166 [synonym of *virginiensis*].—Dyar, 1903, p. 23 [synonym of *huntera*].—Barnes and McDunnough, 1917, p. 11 [synonym of *virginiensis*]; 1938, p. 20 [synonym of *virginiensis*].—Dos Passos, 1964, p. 77 [synonym of *virginiensis*].

Pyrameis hunteri.—Behr, 1864, p. 126.

Cynthia hunteri.—Barnes and Benjamin, 1926, p. 14 [synonym of *virginiensis*].

Pyrameis huntera variety *fulvia* Dodge [excluded name, type 3], 1900, p. 92.

Vanessa huntera fulvia.—Dyar [new synonymy], 1903, p. 23.

Pyrameis virginiensis aberration *fulvia.*—Reuss, 1910b, p. 66.

Pyrameis huntera form *fulvia.*—Seitz, 1916a, p. 598; 1916b, p. 598.

Vanessa virginiensis aberration *fulvia.*—Barnes and McDunnough, 1917, p. 11.—Gunder, 1925, p. 198.—Comstock, 1927, p. 132.—McDunnough, 1938, p. 20.—Field, 1940b, pp. 84, 85, 274.—Forbes, 1960, p. 159.—Dos Passos, 1964, p. 77.

Cynthia virginiensis aberration *fulvia.*—Barnes and Benjamin, 1926, p. 14.

Pyrameis huntera form *fulva* Seitz [misspelling of *fulvia*], 1914a, p. 459; 1914b, p. 459.

Vanessa virginiensis fulva.—Fox, 1921, p. 46.

Vanessa virginiensis variety *ahwashtee* Fox [as an aberrant form, excluded name, type 3], 1921, pp. 45–46, pl. 2: figs. 1, 2.

Vanessa virginiensis aberration *ahwashtee.*—Gunder [excluded name, type 2], 1925, p. 198.—Comstock, 1927, p. 133, pl. 42: fig. 6.—McDunnough, 1938, p. 20.—Field, 1940b, pp. 84, 85.—Dos, Passos, 1964, p. 77.

Cynthia virginiensis aberration *ahwashtee.*—Barnes and Benjamin, 1926, p. 14.

Cynthia virginiensis transition form *ahwashtee.*—Gunder [excluded name, type 2], 1927c, p. 270, pl. 8: figs. 1–5.

Vanessa virginiensis aberration *massachusettensis* Gunder [excluded name, type 2], 1925, p. 198, pl. 5: fig. 10.—Comstock, 1927, p. 133, pl. 43: fig. 5.—McDunnough, 1938, p. 20.—Field, 1940b, pp. 84, 85.—Dos Passos, 1964, p. 77.

Cynthia virginiensis aberration *massachusettensis.*—Barnes and Benjamin, 1926, p. 14.

Cynthia virginiensis transition form *simmsi* Gunder [excluded name, type 2], 1927a, pp. 133–134, pl. 2: fig. 2; 1927c, p. 270, pl. 8: figs. 1–4.

Vanessa virginiensis aberration *simmsi.*—McDunnough [excluded name, type 2], 1938, p. 20.—Dos Passos, 1964, p. 77.

This species differs from all other species in the virginiensis group in having the fuscous band on the upper surface of the hindwing—that usually crosses the wing from costa to the hind margin near anal angle—greatly reduced in width and always broken up into separate interspacial spots and sometimes even absent. There are also four or five submarginal ocular spots between veins R_s and Cu_2 on the upper surface of this wing. It differs from *C. braziliensis, C. terpsichore,* and *C. myrinna* on the under surface of the hindwing in having the light spot (the central segment of the light-colored band running across middle of wing from costa to abdominal margin just before anal angle) opposite the end of cell just above vein M_3 white peppered with fuscous scales, not pure white as it is in those species; from *C. altissima,* which it otherwise greatly resembles on this surface of the hindwing, it differs in having the two submarginal ocular markings respectively larger and in lacking the great amount of white edging along inner surface of submarginal blue band, this white edging being reduced to a very thin line.

MALE (Figures 109, 110, 113–116).—Forewing above with subapical bar just beyond cell white, frequently straight, sometimes curved inwardly; with a series of subapical and submarginal spots down to vein M_3 white, including the spot in interspace M_1; white spot in interspace Cu_1 smaller than in *C. braziliensis,* about as in *C. altissima* and, as in that species and *C. terpsichore,* often reduced to a mere point; inner surface of fuscous bar at end of cell not outlined with white; marginal bluish-white line about as in *C. altissima* and *C. braziliensis,* somewhat thinner; light areas of wing tawny, sometimes rather pale.

Hindwing on upper surface tawny, with the fuscous band crossing the middle of the wing greatly reduced in width, sometimes absent, when present always broken up into separate interspacial spots (as mentioned above); with four or five submarginal ocular spots between veins R_s and Cu_2, the two in interspaces M_1 and Cu_1 fairly large with blue centers, those in interspaces R_s, M_2 and M_3 smaller and without blue centers, and the one in interspaces R_s sometimes reduced to a mere point or entirely absent.

Under surface of forewing very similar to that of *C. altissima,* with tawny color a little brighter, with

many of the same markings that occur on the upper surface, especially the white subapical bar just beyond the cell, the series of white subapical and submarginal spots found below costa and between there and vein R_5, the white spots in interspaces R_5 and M_1 and the white spots in interspaces M_2 and Cu_1; with fine, white lines behind the subapical white bar and between this bar and the fuscous bar opposite end of cell; white bar crossing cell along inner edge of this fuscous bar less distinct than in *C. altissima* and with less white along costal margin opposite end of cell than in that species; as in *C. altissima* the fuscous markings in base of wing near lower angle are similar to those markings above.

Hindwing underneath with white and peppered band crossing middle of wing from costa to anal angle similar to that of *C. altissima*, and as in that species with the element of this band opposite end of cell in interspace M_2 also peppered with fuscous, not pure white as in *C. braziliensis*, *C. terpsichore*, and *C. myrinna*; with two ocular markings in interspaces M_1 and Cu_1 rather large, larger than in any of the other *Cynthia* species, and, as is true of the other species in the virginiensis group, with the ocular spot in interspace Cu_1 the larger of the two; all aspects of pattern much as in *C. altissima* except as noted and except for the greatly reduced amount of white edging along inner surface of the submarginal blue band.

Length of forewing, 19–29 mm (average 25.1 mm).

Male genitalia as illustrated by Figure 10 (drawn from my preparation no. 6122), with uncus distally blunt; gnathos longer than uncus, very much like *C. cardui*, only slightly thicker; valva with anterior half of costal margin projected upward, forming a large, rounded lobe and containing a large spinelike process on posterior part of this lobe; costal margin of valva posterior to this lobe concave, ending in an acute process at the distal angle (junction of distal margin and costal margin); distal margin of valva rounded to slightly undulate; lower margin broadly rounded and with only a small slightly rounded lobe at junction of distal margin; clasper from near middle of valva large, but somewhat smaller than in *C. myrinna*, and directed upward toward distal angle; cuiller larger than in *C. cardui* but otherwise very similar, smooth, with free part curved in a shallow figure S toward distal margin; aedeagus similar to that of *C. cardui* except that the base is nearly straight, not bent downward as it is in that species.

FEMALE (Figures 111, 112, 117, 118).—Females of this species definitely show a more rounded outer margin on the hindwing and usually display a slightly more produced outer margin on the forewing near the end of the vein Cu_2.

Length of forewing, 21–35 mm (average 28.5 mm).

Female genitalia as illustrated by Figure 26 (drawn from my preparation no. 3679), with posterior margin of seventh sternite and anterior margin of eighth sternite as greatly undulated as in *C. myrinna*; with ostium bursae on eighth sternite and placed deeply within lobes of seventh sternite; with a pair of large laterally placed pockets between seventh and eighth sternites; lobes of eighth sternite greatly projected posteriorly; signa ribbonlike and much less than half the length of bursae copulatrix; ovipositors with number of forward-directed teethlike spines.

SEASONAL VARIATION.—Specimens captured in the spring (Figures 9, 12) are smaller, paler colored with fuscous markings reduced in size, and often more narrow.

METHOD OF IDENTIFICATION.—This species was thoroughly described and illustrated in color by Drury (1770, pp. 10–11, pl. 5: fig. 1; 1773, index p. [1]), and there is no question of its identification with the species treated here. This species was described from New York, Maryland, and Virginia. Because of its name I restrict the type locality to Virginia. The original specimens have not been located. Because of the original and very excellent colored figures of both surfaces of the wings (probably made from a female specimen), a neotype designation is unnecessary.

SYNONYMY.—See synonymy and literature citations above. Fabricius (1775, p. 499) without giving a reason proposed *Papilio huntera* in place of Drury's name. Cramer (1775, pp. 17, 18, pl. 12: figs. E, F.; 1776, p. 153) describes the species *Papilio iole*, which is clearly a synonym of *C. virginiensis* as was shown by Boisduval and LeConte (1834, p. 80). Several names were given to aberrant specimens as is shown above.

LIFE HISTORY.—The larval food plants are: *Gnaphalium obtusifolium*, *G. purpureum*, *G. polycephalum*, *Antennaria plantaginifolia*, *Anaphalis*

margaritacea, and *Artemisia,* all members of the Compositae.

The larva was described as long ago as 1770 (Drury, p. 11). Life-history notes and descriptions of the immature stages were given by a number of authors. References to this literature were given by Edwards (1889, pp. 25–26) and Davenport and Dethier (1938, p. 163). The most important single reference is that of Scudder (1889, pp. 461–463, 465–468).

DISTRIBUTION.—From Nova Scotia, Alberta, and British Columbia, over most of North America south to Colombia and the Antilles, where it occurs on Cuba, Haiti, and Puerto Rico. It has emigrated to and is established in Hawaii, the Azores, Madeira, and the Canary Islands. I have one specimen labeled "Rio de Janeiro, Brazil" (Figures 115, 116). Further confirmation is desirable as to its occurence at this locality.

MATERIAL STUDIED.—One hundred and eighteen males and one hundred and twenty-three females were studied from the following localities: ONTARIO: Nepigon (July); Niagara Falls (August). MAINE: Augusta (July); Brunswick (July). NEW YORK: Allegany State Park (July, August); Brooklyn (September); Maspeth, Long Island (July); Monticello (July); Newtown, Long Island (July). PENNSYLVANIA: New Brighton (September, October); Tobyhanna (July). NEW JERSEY: Lakehurst (July); Pluckemin (July); Swartswood, Lake County. MARYLAND: Beltsville (July); Frostburg (July); Prince Frederick (October). DISTRICT OF COLUMBIA: Rock Creek Park (June); Washington (June, October). VIRGINIA: Dendron (September); Dismal Swamp (April, May); Lake Tecomseh (July); Millwood (May); Morrison City (August); Old Trap near Petersburg (August); Princess Anne (May, July); Salem (September, October); Sherando (July); White Top (August). SOUTH CAROLINA: Columbia (January, May, June, October). GEORGIA: Brookhaven (May, July); Calhoun (October). FLORIDA: Andras (March); Chokoloskee; Dade City; Glenwood. MICHIGAN: Interlochen (August); Monroe Center (August); New Hudson (July); Pinckney (August); Washington County (July). WISCONSIN: Madison. NEBRASKA: Lincoln (September). IOWA: Keokuk. ILLINOIS: Elkhart (October); Putnum (June). INDIANA: Bloomington (May). KANSAS: Eureka (April, May, June); Lawrence (June); Pittsburg (June). MISSOURI: Columbia (June); St. Louis (May). TENNESSEE: Bedford County (May); Cades Cove, Great Smoky Mountains National Park (August); Townsend, Great Smoky Mountain National Park (August). TEXAS: Brownsville; Dallas (April); Laredo (June); San Benito (May); Trinity (March). LOUISIANA: Fort McComb (June). MISSISSIPPI: Vicksburg. ALABAMA: Marion (January). OREGON: Reed (July, September, October). WYOMING: Clark County (August); Fremont County (7,000–11,000 ft). COLORADO: Hall Valley (June). CALIFORNIA: Camp Baldy, San Bernadino Mountains (July); Los Angeles; Olancha (September); San Diego (May); Shasta County (July). ARIZONA: Huachuca Mountains; Palmerlee, Cochise County; White Mountains. HAWAII: Olaa. MEXICO: Cordoba (May); Jalapa; Mexico City (June); Saltillo (July); Santa Rosa (July); Urupan. GUATEMALA: Volcan Santa Maria; Zacapa. HONDURAS: Subirana Yoro (February). COSTA RICA: Mount Poas; San Pedro de Montes de Oca (February). VENEZUELA: Chorone (September). COLOMBIA: Bogota. CUBA: Loma del Gato (July). HAITI: La Visite and La Selle Range (September, 5,000–7,000 ft); Mount Bovrette (September). PUERTO RICO: Cayey (February). BRAZIL: Rio de Janeiro!

4. *Cynthia altissima* (Rosenberg and Talbot), new combination, new status

FIGURES 11, 17, 19–122

Pyrameis huntera altissima Rosenberg and Talbot, 1914, p. 675.—Seitz, 1914a, p. 459; 1914b, p. 459.

Of all the *Cynthia* species, *C. altissima* is the most similar to *C. braziliensis.* It has on the forewing the submarginal spot in interspace M_1 white, not blue, however, and lacks the white band outlining inner surface of black bar at end of cell found in that species; it differs from all other species of *Cynthia* in having the fuscous band crossing the middle of hindwing not projected outward in interspaces M_2 and M_3.

MALE (Figures 119, 120).—Forewing above the subapical bar just beyond cell white, usually considerably wider in interspace R_5 than elsewhere; with the series of subapical and submarginal spots down to vein M_3 white; with the white spot in interspace Cu_1 small, often reduced to a mere point;

inner surface of fuscous bar at end of cell not outlined with white; marginal bluish-white line about as in *C. braziliensis*; light areas of wing tawny, only rarely with a slight pinkish hue.

Hindwing above tawny, with a nearly straight fuscous band crossing wing from costa to just above anal angle, this band not more obscure near anal angle; this band not greatly projected outward in interspaces M_2 and M_3 as it is in *C. braziliensis* and *C. terpsichore*; with two submarginal ocular markings, one each in interspace M_1 and interspace Cu_2, these markings usually smaller than in *C. braziliensis* and with blue centers sometimes lacking; with two small fuscous dots in interspaces M_2 and M_3 and sometimes a third dot in interspace R_5.

Forewing underneath hardly distinguishable from *C. virginiensis* except as mentioned below, with many of the same markings that occur on the upper surface, especially the white subapical bar just beyond the cell, the series of white subapical and submarginal spots found below costa and between there and vein R_5, the white spot in interspace R_5 and M_1 and the white spots in interspaces M_2 and Cu_1; the lines found in *C. myrinna* behind the subapical white bar and between this bar and the fuscous bar opposite end of cell are here white, not bluish white, and are greatly obscured except along outer side of this fuscous bar; white bar crossing cell along inner edge of this fuscous bar in *C. virginiensis, C. terpsichore,* and *C. myrinna* is more distinct than in *C. virginiensis* and *C. terpsichore,* similar to that of *C. myrinna* and with more white along costal margin opposite end of cell than in *C. virginiensis*; the fuscous markings in base of wing and near lower angle are similar to those markings above.

Hindwing underneath with white and peppered band crossing middle of wing from costa to anal angle very much as in *C. virginiensis,* projected outward in interspace M_2 as it is in *C. virginiensis* and other *Cynthia* species except *C. myrinna*; with two ocular markings in interspaces M_1 and Cu_1 rather small, larger than in *C. terpsichore* but smaller than in *C. virginiensis,* with the one in interspace Cu_1 slightly the larger of the two; all aspects of pattern much as in *C. virginiensis* except for a great amount of white edging along inner surface of submarginal blue band.

Length of forewing, 24–27 mm (average 25.5 mm).

Male genitalia as illustrated by Figure 11 (drawn from my preparation no. 6141), very similar to those of *C. virginiensis,* differing chiefly in the valva, where the distal angle lacks a definite angled toothlike projection, the lobe at junction of distal margin and lower margin is slightly more pronounced, and the cuiller is toothed along the middle of its inner edge, with clasper larger and directed toward costal margin of valva.

FEMALE.—This sex as is true of most other species of *Cynthia* only differs from the male sex in having a more rounded outer margin on the hindwing and a slightly more produced forewing in the area of the lower angle.

Length of forewing, 28 mm.

Female genitalia as illustrated by Figure 27 (drawn from my preparation no. 6465), most similar to *C. virginiensis,* differing in having the posterior margin of eighth sternite more abruptly produced posteriorly; signa as in *C. virginiensis*; ovipositors with a number of forward directed teethlike spines.

METHOD OF IDENTIFICATION.—The original description was not sufficient to identify the species to which the name *Cynthia altissima* belonged. This species was described from "a series from Agualani, S. E. Peru, 9000 feet, July and August 1905" from "Limbani, S. E. Peru, 9500 feet, April and May 1904" and from "one specimen from Banos, Rio Pastaza, E. Ecuador, 6100 feet, January 1911." The study of a paratype from Agualani in the collection of the Museum of Comparative Zoology, Harvard University, identified this name as belonging to the species here treated.

A male labeled type in the collection of the British Museum (Natural History) is here designated the lectotype, and a female labeled cotype, also in the collection, is designated the paralectotype. Appropriate labels have been placed on both of these specimens by Mr. T. G. Howarth of the aforementioned institution. The lectotype is also labeled "Agualani, S. E. Peru, 9,000 ft., July '05."

LIFE HISTORY.—Seitz (1914a, 1914b, p. 459) gave a brief description of the larvae but the food plants are unknown. They are probably Compositae.

DISTRIBUTION.—This species is found only in high elevations in the Andes of Ecuador, Peru, and Bolivia.

MATERIAL STUDIED.—Seven males and two females were available to me for study from the following localities: PERU: Agualani, Carabaya (June, August, October, 9,000 ft, 10,000 ft); north Peru, west slopes of Andes (June); Oroya to Limbani (January); Pisac (May). BOLIVIA: Cochabamba (five days north, August); Okara (April, 7,500 ft); Cusilluni (May).

5. *Cynthia braziliensis* (Moore), new combination

FIGURES 12, 28, 123–130

Pyrameis huntera iole (Cramer), Berg not Cramer, [a misidentification], 1875, pp. 69–70, 102.

Pyrameis braziliensis Moore, 1883, pp. 236.—Dukinfield Jones 1883, p. 237.

Pyrameis huntera braziliensis.—Seitz, 1914a, p. 459; 1914b, p. 459.—Hayward, 1931, pp. 71, 186, pl. 12: fig. 3.

Vanessa virginiensis braziliensis.—d'Almeida, 1941, p. 309.—Hayward, 1951, p. 196.—Biezanko, Ruffinelli and Carbonell, 1957, p. 127.

Pyrameis virginiensis (Drury), von Bayeran not Drury, [a misidentification], 1901, p. 256.—Stichel, 1909, pl. 62: fig. D 3.

Pyrameis virginiensis variety *rubia* Staudinger, 1894, pp. 70–71.—Hayward, 1951, p. 196 [synonym of *braziliensis*].

Pyrameis huntera rubia.—Seitz, 1914a, p. 459; 1914b, p. 459.

Pyrameis huntera form *rubia*.—Hayward, 1931, pp. 71–72.

Pyrameis brasiliensis.—Reuss [misspelling of *braziliensis*], 1910a, p. 66.

Pyrameis huntera Fabricius, Burmeister not Fabricius [a misidentification], 1878, pp. 149–151.—Berg, 1882, p. 166.—Hayward, 1931, pp. 70–71, pl. 12: fig. 2; 1951, p. 196.

Vanessa cardui ushuwaia Bryk, Hayward not Bryk [a misidentification as a synonym of *V. braziliensis*], 1951, p. 196.

Pyrameis huntera aberration *dallasi* Kohler [excluded name, type 2], 1945, p. 256, pl. 20: fig. 2.

Vanessa virginiensis braziliensis aberration *dallasi*.—Hayward, 1951, p. 196.

This species differs from all other species of *Cynthia* in having on the forewing above a white band outlining inner surface of the black bar found at the end of cell; on this wing it also differs from all species of *Cynthia*, except *C. myrinna*, in having the submarginal spot in interspace M_1 blue, not white.

MALE (Figures 123–126).—Forewing above with subapical bar just beyond cell white, slightly inwardly curved; with a series of subapical and submarginal spots down to vein M_3 white except for the spot in interspace M_1 which is blue, not white, as mentioned above; white spot in interspace Cu_1 larger than in *C. altissima*, *C. terpsichore*, and *C. myrinna*; as described above and as mentioned in the key with a white band outlining inner surface of fuscous bar at end of cell, this bar being much thicker along base of cell; with a marginal bluish-white line, about as in *C. myrinna*, extending from apex of wing to vein M_1, broken by the veins and continued between veins M_2 and lower angle and only faintly indicated below vein Cu_1; light areas of wing tawny, with a slight pinkish hue.

Hindwing above tawny, often with a pinkish cast and with a sinuous fuscous band crossing wing from costa to just above anal angle, this band more obscure near anal angle; with two submarginal ocular markings, one each in interspaces M_1 and Cu_1, usually about equal in size and often with two small fuscous spots between these ocular markings in interspaces M_2 and M_3.

Forewing underneath most similar to *C. virginiensis* and, as in other species of *Cynthia*, with many of the markings of the upper surfaces repeated, especially the white subapical bar and the series of white subapical and submarginal spots; margin of apex down to vein M_2 of a much less bluish hue than in *C. virginiensis* and *C. altissima*; as in *C. virginiensis* with less white outlining fuscous bar at end of cell along its inner edge, especially opposite costal margin; the lines found behind the subapical white bar and between this bar and the fuscous bar opposite end of cell in *C. myrinna* and other *Cynthia* species are more of a white color and more obscure than in *C. myrinna* and *C. virginiensis*; fuscous markings in base of wing and near lower angle similar to those same markings found on the upper surfaces and of about the same size.

Under surface of hindwing with yellowish band, peppered with fuscous, crossing middle of wing from costa to anal angle, projected outward along vein M_3; as in *C. virginiensis*, *C. altissima*, and *C. terpsichore*, this band pure white in interspace M_2; with two ocular markings in interspaces M_1 and Cu_1, about the size of those in *C. altissima*, with the one in interspace Cu_1 slightly larger.

Length of forewing, 20–28 mm (average 24.36 mm).

Male genitalia as illustrated by Figure 12 (drawn from my preparation no. 3663), similar to those of *C. virginiensis* and *C. altissima*, differing chiefly in the valva, where the spinelike process found on inner side of large lobe of costal margin in those two species is absent and is replaced by a spine located on outer edge of this lobe at the distal end of its base; the small rounded lobe found at the junction of distal and lower margins in *C. virginiensis* and *C. altissima* is in *C. braziliensis* greatly enlarged and upward projected, forming a large acute lobe; cuiller smooth and usually forked at distal end, rarely simple, and sometimes with three tines; clasper similar to that of *C. altissima*—large and directed toward costal margin of valva.

FEMALE (Figures 127–130).—The females of *C. braziliensis* have a more rounded hindwing along the outer margin and are slightly more produced on the forewing along the edges of interspaces M_1 and Cu_2.

Length of forewing, 21–30 mm (average 25.41 mm).

Female genitalia as illustrated by Figure 28 (drawn from my preparation no. 3680), similar to those of *C. virginiensis* with eighth sternite much more narrow and broadly divided near middle, forming two wing-shaped plates; pockets between seventh and eighth sternites small; signa about as in *C. virginiensis*; ovipositor with forward directed teethlike spines.

METHOD OF IDENTIFICATION.—The original description outlines the characters of this species quite adequately to fix the name for the species here called *Cynthia braziliensis*. The type locality is São Paulo, Brazil.

The type specimen of this species is apparently in the collection of the Liverpool Free Public Museum, Liverpool, England.

SYNONYMY.—A study of the original description of *Pyrameis virginiensis rubia* Staudinger (1894, pp. 70–71) shows that this is a synonym.

LIFE HISTORY.—The larvae feed upon the following Compositae: *Achyrocline satureioides, Gnaphalium spicatum, G. stachydifolium,* and *G. obtusifolium*. A description of the larva and brief life-history notes were given by Dukinfield Jones (1883, p. 237).

DISTRIBUTION.—This species occurs from Merida, Venezuela, south through the mountains of Colombia, Ecuador, Peru, and Bolivia and east to Rio de Janeiro, Brazil, south through Paraguay, Uruguay, and throughout most of Argentina.

MATERIAL STUDIED.—Sixty males and sixty-five females were studied from the following localities: VENEZUELA: Merida. COLOMBIA: No specific locality; Rio Quirata (December, 2,700 m). ECUADOR: No specific locality (April); Baños; Loja; Puyo, Pastaza, Oriente (3,500 ft). PERU: Cuzco (July, 11,500 ft); Oroya (May); Tincochaca (August, 7,000 ft); Tingo Maria (670 m). BOLIVIA: No specific locality; Chulumani (December). BRAZIL: Blumenau, Santa Catherina; Cauna, Santa Catherina (April); Pelotas, Rio Grande do Sul (March, April, May, October); Petropolis; Rio de Janeiro (April, November); São Paulo (February); Tijuca. PARAGUAY: Nueva Italia (July); Sapucay. ARGENTINA: No specific locality.

6. *Cynthia terpsichore* (Philippi), new combination

FIGURES 13, 29, 131–134

Vanesja [sic] *terpsichore Philippi*, 1859, pp. 1089–1091.

Vanessa terpsichore.—Philippi, 1860, pp. 266–267.—Ureta, 1938b, p. 298; 1938c, p. 127.—Bryk, 1944, p. 10.—Hayward, 1951, p. 196.—Herrera, 1954, pp. 45, 53, pl. 7: figs. 1, 2.—Herrera and Etcheverry, 1956, pp. 278, 286.—Herrera, Etcheverry, and Barrientos, 1958, pp. 240 (fig. 2), 243, 244, 247 (figs. 15–17), 248 (figs. 20, 21), 250–251, pl. 1: figs. 3, 4.

Pyrameis terpsichore.—Kirby, 1871, p. 186.—Reed, 1877, pp. 679–680.—Butler, 1881, p. 467.—Staudinger, 1885, p. 98.—Bartlett-Calvert, 1886, p. 314.—Dixey, 1890, p. 122.—Weymer and Maassen, 1890, pp. 14, 36, 48, 58.—Bartlett-Calvert, 1898, p. 99.—Porter, 1899a, p. 36.—Elwes, 1903, pp. 287–288.—Reuss, 1910a, pp. 65, 66, 67.—Seitz, 1914a, p. 459, pl. 94: figs. A 4, A 5; 1914b, p. 459, pl. 94: figs. A 4, A 5.—Stephan, 1924, p. 25.—Bullock, 1934, p. 47.—Ureta, 1934, p. 79; 1935, p. 94.—Ruiz and Stuardo, 1935, p. 315.

Payrameis [sic] *terpsichore*.—Reed, 1877, p. 735.

Pyrameis virginiensis (Drury), Berg not Drury [a misidentification], 1882, p. 166.

Pyrames [sic] *iterpsichore* [sic].—Ureta [a misspelling for *Pyrameis terpsichore*], 1935, p. 87.

C. terpsichore, like *C. annabella* and *C. carye*, has the subapical bar on forewing above just beyond cell tawny, not white, in both sexes; it can easily be distinguished from the latter two species by the presence of a sinuous and fuscous band on the upper surface of the hindwing that runs from the

costal margin across wing to the hind margin just above anal angle. It differs from all other species in the genus, except some specimens of *C. braziliensis,* by having two, not four, or more submarginal ocular spots on upper surfaces of hindwing.

MALE (Figures 131, 132).—Forewing above with subapical bar just beyond cell tawny, not white, and rather straight, not inwardly curved as it is in *C. myrinna;* with a series of subapical and submarginal spots down to vein M_3 white and with a small white spot in interspace Cu_1; with a marginal bluish-white line from apex of wing to vein M_1, greatly obscured below this vein; light areas of wing tawny in color; fuscous markings in base of wing and on lower half almost as greatly reduced as in *C. annabella* and *C. carye.*

Hindwing above tawny, with the sinuous fuscous band described before, and with two submarginal ocular markings, one each in interspaces M_1 and Cu_1.

Forewing underneath, as in the other species of *Cynthia,* with many of the same markings that occur on the upper surfaces, particularly the white subapical bar just beyond cell, the series of white subapical and submarginal spots found below costa and between there and vein R_5, the white spot in interspaces R_5 and M_1 (here reduced to mere points), and the white spots in interspaces M_2 and Cu_1 (here more reduced than in *C. myrinna, C. altissima,* and *C. braziliensis*); the bluish lines found in *C. myrinna* behind the subapical white bar and between this bar and the fuscous bar opposite end of cell are here greatly obscured and are replaced by tawny along lower half of outer side of this fuscous bar; white bar crossing cell along inner edge of this fuscous bar in *C. myrinna, C. altissima,* and *C. braziliensis* absent, replaced by the tawny ground color; fuscous markings in base of wing and near lower angle similar to those markings above, more reduced in size.

Hindwing underneath with yellowish band crossing middle of wing from costa to anal angle not straight as in *C. myrinna,* projected outward along vein M_3 as it is in *C. altissima, C. braziliensis,* and most other species of *Cynthia;* this band becoming white, almost silvery in interspace M_2; with two ocular markings, one each in interspaces M_1 and Cu_1, very small in size, the one in interspace Cu_1 slightly the larger of the two.

Length of forewing, 23–27 mm (average 25 mm).

Male genitalia as illustrated by Figure 13 (drawn from my preparation no. 3665), similar to those of *C. braziliensis, C. virginiensis,* and *C. altissima,* differing chiefly in the valva; costal spine of valva similar to that of *C. braziliensis,* located just below the greatest projection of costal lobe; junction of lower and distal margins lacking the acute lobe found in *C. braziliensis* and thus similar to *C. altissima* and *C. virginiensis;* cuiller smooth and somewhat shorter than in those species and clasper directed inward toward opposite valva as in *C. cardui;* aedeagus similar to that of *C. braziliensis.*

FEMALE (Figures 133, 134).—This sex shows very definitely a more rounded outer margin on the hindwing, and the outer margins of forewing at ends of interspaces Cu_1 and Cu_2 are more produced outwardly near end of vein Cu_2.

Length of forewing, 25–28 mm (average 27 mm).

Female genitalia as illustrated by Figure 29 (drawn from my preparation no. 6438), similar to those of *C. cardui,* with lobes of seventh and eighth sternites nearly as large as in *C. myrinna;* with lateral pockets between seventh and eighth sternites very small; signa longer than in *C. myrinna;* ovipositors without teethlike spines.

METHOD OF IDENTIFICATION.—The original description by Philippi (1859, p. 1089) was sufficient to identify his name for the species here described. The type locality is given as "Frequens prope Santiago, in prov. Valdiva etc."

LIFE HISTORY.—The food plants and immature stages are unknown.

DISTRIBUTION.—This species is found in Chile from the Province of Atacama south into the Province of Aysen. Weymer and Maassen (1890) report it also from Colombia and Ecuador, but I believe these records should be verified.

MATERIAL STUDIED.—Eight males and five females were studied from the following localities: CHILE: Andes (March, 6,000 ft); Angol; Penco.

7. *Cynthia myrinna* (Doubleday), new combination

FIGURES 14, 30, 135–136

Pyrameis myrinna Doubleday, 1849, p. 205.—Kirby, 1871, p. 186.—Staudinger, 1885, p. 98.—Dixey, 1890, pp. 93, 101, 116, 117, 118, 122.—Longstaff, 1908, p. 118.—Reuss, 1910a, pl. 1:

figs. 4, 8, 12; 1910b, pp. 62, 64, 65, 66, 67; 1910c, p. 90.—Seitz, 1914a, p. 459, pl. 94: figs. B 3, B 4; 1914b, p. 459, pl. 94: figs. B 3, B 4.—Stephan, 1924, p. 25.—Gabriel, 1927, p. 84.—Hayward, 1931, p. 72, pl. 12: fig. 1.

Vanessa myrinna.—Capronnier, 1874, p. 25.—Verity, 1950, p. 329.—Hayward, 1951, p. 196.—Biezanko, Rufinelli and Carbonell, 1957, p. 124.

Vanessa syngenesiae Capronnier, 1874, p. 25 [a Boisduval manuscript name and nomen nudem, in synonymy of *myrinna*].

Pyrameis myrinna aberration *incarnata* Seitz [excluded name, type 2], 1914a, p. 459; 1914b, p. 459.

Pyrameis myrinna aberration *eunice* Hall [excluded name, type 2], 1917, p. 171.

Pyrameis myrinna aberration *merlinde* Ziken [excluded name, type 2], 1937, pp. 386–387.

C. myrinna is easily distinguished from all other species in the genus by the broad, straight fuscous band crossing the upper surface of the hindwing near the middle and by the straight, white to yellowish band crossing the middle of this same wing on the under surfaces.

MALE (Figure 135).—Forewing above with a white subapical bar just beyond cell, lying between costa and vein M_3, and inwardly curved; with a series of subapical and submarginal spots down to vein M_3 white, except for the blue or bluish-white spot in interspace M_1, and as in *C. virginiensis, C. altissima, C. braziliensis,* and *C. terpsichore* with a small white spot in interspace Cu_1; with a marginal white to bluish-white line from apex of wing to vein M_1, broken by the veins and continued between vein M_2 and lower angle and only very faintly indicated below vein Cu_1; light areas of wing tawny in color.

Hindwing above tawny, with a broad and straight fuscous band as mentioned above and as described in the key; with a submarginal series of four or five ocular spots very indistinct, these being completely enclosed in the fuscous band and lacking light-colored centers.

Forewing underneath with many of the same markings that occur on the upper surfaces, particularly the white subapical bar just beyond cell, the series of white subapical and submarginal spots found below costa and between there and vein R_5, the white spot in interspace R_5 (here reduced to a mere point), and the white spots in interspaces M_2 and Cu_1; with two blue or bluish-white lines behind the subapical white bar and between this bar and fuscous bar opposite end of cell; with a narrow white bar crossing cell along inner edge of aforementioned fuscous bar; fuscous markings in base of wing and near lower angle similar to those markings above.

Hindwing underneath with the white to yellowish-white straight band crossing its middle as described before and as mentioned in the key; with two large submarginal ocular markings in interspaces M_1 and Cu_1, these being about equal in size.

Length of forewing, 25–32 mm (average 29.2 mm).

Male genitalia as illustrated by Figure 14 (drawn from my preparation no. 6147), with uncus blunt and slightly swollen; gnathos with lateral arms very long, longer than uncus; valva with distal margin projected acutely to a spinelike structure below uncus and rounded from just opposite clasper to lower margin; clasper directed toward upper part of outer margin; cuiller armed with numerous teeth along its dorsal margin and thus differing from all *Cynthia* species except *C. annabella* and *C. carye*; aedeagus slightly undulate and sharply downward bent near base.

FEMALE (Figure 136).—In the females of *C. myrinna* the fuscous areas on the upper surfaces of both fore- and hindwing are slightly larger, the outer margin of forewing is slightly more produced in the area on either side of vein Cu_2, and the outer margin of hindwing is more rounded.

Length of forewing, 27–35 mm (average 32 mm).

Female genitalia as illustrated by Figure 30 (drawn from my preparation no. 6441), similar to those of *C. cardui* but with posteriorly directed lobes much larger and lacking the lateral pockets found in *C. cardui* and other species; ovipositors with a large number of forward-directed teethlike spines; ribbonlike signa not as long as in *C. cardui*, extending not more than one half the length of bursae copulatrix.

METHOD OF IDENTIFICATION.—Doubleday's original description (1849, p. 205) gives the necessary characters to identify his name with the species here treated. The type locality is cited as Brazil.

There are two specimens of *C. myrinna* labeled types in the collection of the British Museum (Na-

tural History). I select as the lectotype the male labeled type Rh. 8713 and as the paralectotype the female specimen labeled type Rh. 8714. Appropriate labels have been placed on both of these specimens by Mr. T. G. Howarth of the aforementioned institution.

LIFE HISTORY.—The larvae feed upon *Achyrocline flaccida* (Compositae). Very brief descriptions of the larvae and pupae were given by Seitz (1914a, 1914b, p. 459).

DISTRIBUTION.—This species occurs from Caracas, Venezuela, south through the mountains of Colombia, Ecuador, Peru, and Bolivia, and in southern Brazil and Paraguay.

MATERIAL STUDIED.—Sixteen males and nineteen females from the following localities: VENEZUELA: Caracas. COLOMBIA: Sierra Nevada Mountains (8,000 ft). PERU: Chanchamayo. BOLIVIA: Cochabamba (5 days north, September). BRAZIL: Blumenau, Santa Catherina; Santa Gallo; Nova Friburgo; Pernambuco; Rio de Janeiro (April); Santa Catherina (February); São Paulo (April); Tijuca. PARAGUAY: No specific locality; Buena Vista (February).

The Carye Group

This group contains the two species, *C. carye* and *C. annabella*. The habitus of the upper surface of the forewing is most similar to the virginiensis group, differing in having a marginal tawny spot in interspace M_3. On the upper surface of the hindwing there are always four blue-centered round ocular spots between veins M_1 and Cu_2, and the fuscous sinuous band crossing this wing from costa to just above anal angle is greatly reduced in width and entirely absent, at least above vein M_1. On the under surface of the forewing this group has the area at the end of the cell, between there and the fuscous spots, and through the middle of cell entirely tawny, and as in the virginiensis group, as is true of the upper surfaces, the fuscous color from interspace Cu_2 just beyond the middle of the anal vein extends upward to vein M_3. On the under surface of the hindwing there are four, sometimes five, small submarginal ocular spots greatly obscured by the fuscous of the surrounding area. There is an isolated triangular or hourglass-shaped white spot opposite end of cell and just above vein M_3 on the under surface of this wing.

8. *Cynthia annabella*, new species

FIGURES 15, 31, 143–148, 155–160

Vanessa carye (Hübner), Doubleday not Hübner [a misidentification], 1844, p. 79.—Dyar, 1903, p. 24.—Barnes and McDunnough, 1917, p. 11.—Coolidge, 1925, pp. 146–147.—Comstock, 1927, pp. 134–135, fig. A 42 (p. 135), pl. 44: figs. 1–3.—Holland, 1931, p. 154, pl. 20: fig. 12.—Davenport and Dethier, 1938, p. 164.—McDunnough, 1938, p. 21.—Field, 1940, pp. 81, 87–88, 274.—Hoffmann, 1940, p. 681.—Leighton, 1946, p. 59.—Dos Passos, 1964, p. 77.—Carrillo, Ortego, and Gibson, 1966, p. 78.

Pyrameis carye.—Morris, 1860, p. 8.—Behr, 1864, p. 125.—Strecker, 1878, p. 138.—Godman and Salvin, 1882, p. 219.—Dyar, 1889, pp. 237–238.—Dixey, 1890, pp. 107, 117, 122.—Maynard, 1891, p. 93, fig. 32a (p. 95).—Skinner, 1898, p. 25.—Wright, 1905, p. 178, pl. 22: fig. 231.—Schrader, 1929, pp. 8–11, pl. 4.

Cynthia carye.—Barnes and Benjamin, 1926, p. 15.—Gunder, 1927c, p. 270, pl. 8: fig. 4, pl. 9: fig. 1; 1929, p. 9, pl. 17: figs. [1] [2].

Pyrameis caryae Edwards [misspelling of *carye*] not Hübner [a misidentification], 1874, p. 329; 1889, p. 26.—Holland, 1898, pp. 170–171, pl. 20: fig. 12.—Huguenin, 1921, pp. 216–217.

Vanessa caryae.—Grinnell, 1918, p. 111.—Brown, 1955, p. 103, 2 figs.

Pyrameis carye variety *muelleri* Letcher [as an individual variant, excluded name, type 3], 1898, p. 38, pl. 3.

Pyrameis carye aberration *muelleri*.—Skinner [excluded name, type 2], 1898, p. 25.

Vanessa carye aberration *muelleri*.—Barnes and McDunnough, 1917, p. 11.—Gunder, 1925, p. 198.—Comstock, 1927, p. 135, pl. 44: figs. 5, 6.—McDunnough, 1938, p. 21.—Field, 1940b, pp. 87, 88.—Dos Passos, 1964, p. 77.

Vanessa caryae variety *muelleri*.—Grinnell [as an individual variant, excluded name, type 3], 1918, p. 111.

Vanessa caryae form *muelleri*.—Fox [excluded name, type 3], 1921, p. 46.

Cynthia carye aberration *muelleri*.—Barnes and Benjamin, 1926, p. 15.

Cynthia carye transition form *muelleri*.—Gunder [excluded name, type 2], 1927a, p. 133, pl. 2: fig. 2 *b*; 1927c, p. 270, pl. 9: figs. 2–5; 1929, p. 9, pl. 17: figs. [3], [4].

Vanessa caryae variety *intermedia* Grinnell [as an individual variant, excluded name, type 3], 1918, pp. 111–112, pl. 4: fig. 6.

Cynthia carye aberration *intermedia*.—Barnes and Benjamin [excluded name, type 2], 1926, p. 15.

Vanessa carye aberration *intermedia*.—Comstock, 1927, p. 135, pl. 44: figs. 4, 5.—McDunnough, 1938, p. 21.—Field, 1940b, pp. 87, 88.—Dos Passos, 1964, p. 77.

Cynthia carye transition form *intermedia*.—Gunder [excluded name, type 2], 1927, p. 270.

Vanessa caryae variety *letcheri Grinnell* [as an individual

variant, excluded name, type 3], 1918, pp. 112–113, pl. 4: fig. 8.

Cynthia carye aberration *letcheri*.—Barnes and Benjamin [excluded name, type 2], 1926, p. 15.

Vanessa carye aberration *letcheri*.—Comstock, 1927, pp. 135–136, pl. 44: figs. 7, 8.—McDunnough, 1938, p. 21.—Field, 1940b, p. 87.—Leighton, 1946, p. 59.—Dos Passos, 1964, p. 77.

Cynthia carye transition form *letcheri*.—Gunder [excluded name, type 2], p. 270.

Cynthia carye transition form *nivosa* Gunder [excluded name, type 2], 1927, p. 53.

Vanessa carye aberration *nivosa*.—McDunnough [excluded name, type 3], 1938, p. 21.—Field, 1940b, pp. 87, 88.—Dos Passos, 1964, p. 77.

Cynthia carye transition form *schraderi* Gunder [excluded name, type 2], 1929, p. 9, pl. 17: figs. [5]–[10].

Vanessa carye aberration *schraderi*.—McDunnough [excluded name, type 2], 1938, p. 21.—Dos Passos, 1964, p. 77.

This species and *C. carye* are easily distinguished from all other species of *Cynthia*, except *C. terpsichore* and some females of *C. virginiensis*, in having the bar just beyond cell on upper side of forewing tawny instead of white. From *C. terpsichore* and *C. virginiensis* they are easily distinguished by having four, instead of two, blue-centered ocular markings on upper side of each hindwing.

MALE (Figures 143–148).—Forewing above with tawny subapical bar just beyond cell slightly larger in *C. annabella* than in *C. carye*; subapical white spot at costa and interspaces R_1 and R_2 slightly larger than in *C. carye*; basal transverse bar in cell more distinct in *C. annabella*; bar below case of Cu_2 usually very small, sometimes absent in *C. carye*, present and distinct in *C. annabella*; usually with a small tawny spot in interspace M_3 just above the large tawny quadrate spot in interspace Cu_1 in *C. annabella*, which is absent in most specimens of *C. carye*; submarginal white line composed of three slender bars on apex of forewing, usually more distinct in *C. annabella* than in *C. carye*.

Hindwing above with white spot in middle of costal margin larger and more distinct in *C. annabella*, otherwise as in *C. carye*.

Forewing underneath with the pale yellowish-white postmedial and marginal bar slightly larger in *C. annabella*; with dark spot at base of interspace Cu_1 smaller and usually separate from postmedial black bar in this interspace in *C. carye*, while in *C. annabella* it is larger and always connected to the postmedial black bar.

Hindwing underneath with whole aspect lighter in color in *C. annabella*; with pure white spot in middle of wing opposite end of cell more triangular in shape in *C. annabella* and somewhat hourglass shaped in *C. carye*.

Length of forewing, 17–27 mm (average 23 mm).

Male genitalia as illustrated by Figure 15 (drawn from my preparation no. 3716), with uncus in lateral view downward curved at distal end, in ventral view large and triangular, with distal end acute and greatly extended; gnathos with lateral arms smaller than those of *C. carye*, gradually curved upward along dorsal margin and abruptly bent along ventral margin, forming a distinct "heel" near middle of this margin; ventral process of lateral arms not showing in lateral view; valva with a large rounded lobe on middle of dorsal margin, with a large acute lobe at junction of dorsal and distal margins, instead of the large clublike process found in *C. carye*, margin beyond this acute lobe short and nearly straight; lower margin of valva gradually and broadly rounded, forming nearly a right angle at junction of distal margin; clasper a large flaplike lobe, directed toward lower angle (junction of distal and lower margins); cuiller heavily armed with large spinelike teeth along inner surface; aedeagus sharply constricted just before middle of ventral margin so that distal half is very thin and needle-like, base thick and slightly downward bent; saccus with a caudal element that projects outward a great distance past base of lower margin of valva.

FEMALE (Figures 155–160).—Not distinguishable from the male sex except by examination of the genitalia where the large podlike ostium bursae lobe can be seen after the scales are brushed off of the underside of posterior surface of abdomen.

Length of forewing 17–26 mm (average 22.8 mm).

Female genitalia as illustrated by Figure 31 (drawn from my preparation no. 6445), differing from all other species of *Cynthia*, except *C. carye*, in lacking the undulated margin between seventh and eighth sternites and in having the seventh sternite projected posteriorly near middle; it differs also from those species in having two heavily sclerotized laterally placed ridges near spiracles of seventh sternite and in having the eighth sternite heavily sclerotized with a very large podlike ostium bursa lobe, this podlike lobe not swollen at its base as is *C. carye*.

METHOD OF IDENTIFICATION.—When it was discovered that there were two distinct species going under the name of *C. carye* Hübner, a North American species and a South American species, an unsuccessful effort was made to locate the type material of *C. carye*. Unfortunately none could be found. The lack of this material was not of great importance as Hübner's original colored figures of the upper and under surfaces ([1812], pl. [45], figs. 1, 2) were found to quite accurately, and in fact beautifully, portray his species. This turned out to be the one found in the Andes of Peru, in Bolivia, Brazil, Chile, Uruguay, and Argentina. See further notes under *C. carye*.

TYPE LOCALITY.—First valley west of Arroyo Verde Park, Ventura, Ventura County, California.

ADDITIONAL TYPE DATA.—Described from the holotype male (USNM 71044), allotype female, and five male and fifteen female paratypes with data as follows: holotype, locality as given above, elevation 500 feet, reared from last instar larva, emerged 17–24 January 1965, Thomas Dimock collector; allotype, same data as holotype except emerged 21–31 March 1965; one male and six female paratypes, same data as holotype; two male and three female paratypes, same data as allotype; two female paratypes, same data as holotype except emerged February 1965; one female paratype, same data as holotype except collected in flight, not reared, 22 March 1965; one female paratype, collected in flight, above Arroyo Verde Park, elevation 780 feet, other data as in holotype; two male and two female paratypes, Arroyo Verde Park, Ventura, Ventura County, California, elevation 750 feet, 27 March 1970, Thomas Dimock.

LOCATION OF TYPES.—Holotype (USNM 71044), allotype, and one pair of paratypes in the National Museum of Natural History, one pair of paratypes in the collection of the California Academy of Sciences (San Francisco). The remainder of the paratypes to be deposited in various museums by Thomas Dimock of San Jose and Ventura, California.

LIFE HISTORY.—The larvae of this species have been reported feeding upon the following Malvaceae: *Althaea, Lavatera assurgentiflora, Malva borealis, M. parviflora, Malvastrum exile, M. fasciculatum,* and *Sphaeralcea ambiqua.* Larvae have also been reported feeding upon *Ligustrum* (Oleaceae, order Oleales), *Lupinus arborens* (Leguminosae, order Rosales), and *Urtica holosericea* (Urticaceae, Urticales).

Notes on the life history and immature stages have been given by Behr (1863, p. 125), Edwards (1874, p. 329), Dyar (1889, pp. 237–238), Coolidge (1925, pp. 146–147), Huguenin (1926, pp. 216–217), and Comstock (1927, pp. 134–135). References to the literature on the life history and immature stages were given by Edwards (1889, p. 26) and Davenport and Dethier (1938, p. 164).

Mr. Thomas Dimock, the collector of the type series, has offered (in a letter) the following information about the type locality and the species association therein:

> Most of the specimens were taken in the first valley west (by about one-eighth of a mile) of a city park named Arroyo Verde Park (Ventura, Ventura County, California). This place is located in the foot-hills north of eastern Ventura, and about a half mile from my residence. Costal sage brush associations are on most northerly facing slopes, and a "weedy annual grassland" group occupies the south-facing exposed areas. In this valley west of the Park, mallow, the imported annual "weed", usually grows lushly on the flat valley bottom, provided cattle aren't pastured there, and the larvae of this butterfly can be found in abundance in very early spring (January to March), occupying the exact same niche as *cardui,* also on mallow. When the adults emerge they hilltop. Both species, and less frequently *atalanta,* can be found all year round on some of the hilltops, which are mostly 800 to 1200 feet in elevation. There are two main broods (both species): a late January and early February brood, and a late February–March brood, after which both are less common. In fall and early winter fresh adults of *"carye"* become slightly more frequent in backyards.

DISTRIBUTION.—Vancouver Island and the mainland of British Columbia east into Alberta and south through California and Mexico (all parts according to Hoffmann, 1940, p. 681) into Guatemala, and from California east through Nevada, Utah, Montana, Wyoming, Colorado, Arizona, New Mexico, and El Paso, Texas. It has strayed into Scott County, Kansas, from Colorado.

MATERIAL STUDIED.—In addition to the type series recorded above, I have studied one hundred eighty-two males and one hundred and seven females from the following localities: ALBERTA: near Mount Assinboine (August). WASHINGTON: Bellingham; Brewster (August); Godman Springs, Blue Mountains (July); Seattle (July); Seguin (September); Toroda (August). OREGON: Newport (September).

CALIFORNIA: Alameda County (January, March, September, December); Albany, Alameda County (June); Albany Hill, Contra Costa County (March); Alum Rock Park, Santa Clara County (May); Antioch, Contra Costa County (May, October); Beverly Hills; Berkeley, Alameda County (March, May); Bethel Island, Contra Costa County (May); Buttonwillow, Kern County (June); Cherry Flat, Santa Clara County (September); Chula Vista, San Diego County (January, March, April, May, August, September, October, December); Claremont (April); Concord (May, October); Davis (October); Deerpark, Placer County (August, 6,200 ft); Fairfax, Marin County (May); Fillmore (June); Glen Alpine Creek, El Dorado County (July); Glendora (February); Golden Gate Park, San Francisco (January, February); Griffith Park, Los Angeles County (February); Humbug Mountain, Siskiyou County (September); Indian Flat, Mariposa County (May); Inverness, Marin County (August); Laguna Beach (July); Lake Alpine, Alpine County (July); Lake Chabot Road, Alameda County (May); Las Uvas, Santa Clara County (June); Los Alamitos (July); Los Angeles (January, February, June, November); Mariposa Grove, Mariposa County; "Middle California"; Mill Valley (December); Mitchell Canyon, Contra Costa County (May); Mocho Canyon, Livermore (April); Mokel Hill; Mount Bruno Ridge, San Mateo (April); Napa County (September); Novato, Marin County (February); Oakland Hills, Alameda County (September); Ontario (March); Palo Alto (May, September, November); Pasadena (June); Petaluna (June); Pleasant Hill, Contra Costa County (March–July); Plumas County; Redwood Canyon, Contra Costa County (June, July); San Diego (September); San Francisco (January–March, May, July–October, December); San Jose; San Juan (August); San Leandro, Alameda County (May, June–August); San Mateo County; Santa Barbara Islands; Santa Cruz (May, June, August, September, October, December); Santa Rosa, Riverside County (April); Sherman Island, Sacramento County (September); Sierra County; "Southern California"; Warner Mountains, Modoc County (July); Yosemite Valley, Yosemite National Park (August). NEVADA: Del Monte Ranch, Reno (August); Reno (September). UTAH: Bellevue, Washington County (June, 4,000 ft); Vineyard (July). MONTANA: Deerlodge, Powell County (August). COLORADO. NEW MEXICO: Bear Trap Camp, 26 miles southwest, Magdalena, Socorro County (July, 8,500 ft); Cedar Creek Camp, 2 miles north Ruidosa, Lincoln County (June, 7,000 ft); McMillan Camp, 13 miles north Silver City, Grant County (July, 6,800 ft); Mogollon, Catron County (July, 7,200–7,600 ft); Pine Camp, 2 miles northeast Cloudcroft, Otero County (July, 8,600 ft); Signal Peak, 22 miles northeast Silver City, Grant County (July, 8,600–8,900 ft); Willow Creek Ranger Station, 25 miles east Alma, Catron County (July, 8,000 ft). ARIZONA: Alpine Divide Camp, 4 miles north Alpine, Apache County (July, 8,500 ft); Chiricahua Mountains (May, 9,000 ft); Coconimo County, 17 miles north Williams (August, 6,700–6,800 ft); Flagstaff (July, August, 7,000 ft); Graham Mountains, Graham County (September, 9,000 ft); Jacob Lakes, Coconino County (July); Keyanta, Navajo County (July); North Rim, Grand Canyon (July, 8,000–9,000 ft); Pinal County, near Superior (August); Slade Ranch, near Greer (July). TEXAS: Alpine, Brewster County; El Paso. MEXICO: Chiapas; Jalapa (February); La Boguilla (July); Llamas Peñon, Federal District (May); Mexico City (June, November); Morelia, Micoacan (March); Presidio, Vera Cruz (May, June); San Pedro de los Pinos, Federal District (October); Tuxtepec, Oaxaca (June); Yerbanis, Cuencamé, Durango (August, 6,700 ft). GUATEMALA: Mpio, Acatenango, Quisache, Chimaltenango (December, 1,750 m).

9. *Cynthia carye* Hübner, new combination

FIGURES 16, 32, 137–142, 149–154

Hamadryas carye Hübner, [1812], pl. 45: figs. 1, 2.

Vanessa carye.—Hübner, 1819, p. 33.—Williams, 1930, p. 231.—Ureta, 1938b, p. 298; 1938c, p. 127; 1939, p. 231.—Gutiérrez, 1940, p. 34.—Bridarolli, 1944, p. 32.—Breyer, 1945, p. 312.—Zischka, 1947, p. 32.—Verity, 1950, p. 329.—Hayward, 1951, p. 195.—Herrera, 1954, pp. 45, 53, pl. 6: fig. 4.—Herrera and Etcheverry, 1956, pp. 277, 285.—Biezanko, Ruffinelli and Carbonell, 1957, p. 124.—Herrera, Etcheverry and Barrientos, 1958, pp. 240 (fig. 1), 244, 246–250, 247 figs. 11–14), 248 (figs. 18, 19), pl. 1: figs. 1, 2.—Niculescu, 1965, p. 191.—Hayward, 1966, p. 69.

Pyrameis carye.—Doubleday, 1849, p. 205.—Kirby, 1871, p. 186.—Berg, 1875, p. 70; 1876, p. 201.—Burmeister, 1878, pp. 151–152.—Butler, 1881, p. 466.—Staudinger, 1885, pp. 97, 98.—Bartlett-Calvert, 1886, p. 314.—Weymer and Maassen, 1890, pp. 14, 41, 97.—Godman and Salvin, 1891, p.

101.—Staudinger, 1894, p. 70.—Izquierdo, 1895, p. 823, pl. 4: figs. 4, 13.—Bartlett-Calvert, 1898, p. 99.—Porter, 1899a, p. 36.—von Bayeren, 1901, p. 257.—Rebel, Weymer and Stichel, 1901, p. 305.—Elwes, 1903, p. 287.—Reuss, 1910a, pl. 1: figs. 2, 6, 10; 1910b, pp. 64, 66; 1910c, pp. 86, 89, 90. —Seitz, 1914a, p. 459, pl. 94: figs. A 2, A 3; 1914b, p. 459, pl. 94: figs. A 2, A 3.—Giacomelli, 1922, pp. 203–204.—Porter, 1930, p. 279.—Hayward, 1931, pp. 69, 186, pl. 12: fig. 4.—Ureta, 1934, p. 79; 1935, p. 87; 1938a, p. 181.

Pyrames [sic] *carye*.—Porter, 1899b, p. 181.

Cyntia [sic] *carye*.—Costa Lima, 1923, p. 150; 1928, p. 135.

Vanessa charie Blanchard [misspelling of *carye*], 1852, p. 26, pl. 2: fig. 5.—Hayward, 1951, p. 195 [synonym of *carye*].

Pyrameis charie.—Reed, 1877, p. 679.—Gazulla and Ruiz, 1928, p. 290.—Hayward, 1931, p. 69 [synonym of *carye*].

Vanesja [sic] *charie*.—Philippi, 1859, p. 1089.

Payrameis [sic] *charie*.—Reed, 1877, p. 735.

Vanessa charye Porter [misspelling of *carye*], 1898, p. 32.

Pyrameis caryae Verity not Hübner [misspelling of *carye*], 1916b, p. 128.—Hayward, 1931, p. 69 [synonym of *carye*, a misidentification of a misspelling by Holland]; 1951, p. 195 [as before].

Pyrameis caryoides Giacomelli [new synonymy], 1922, pp. 203–205, fig. [3].

Pyrameis carye aberration *caryoides*.—Hayward, 1931, p. 70.

Vanessa carye aberration *caryoides*.—Hayward, 1931, p. 196.

Pyrameis carye form *minscula* Hayward [excluded name, type 3], 1931, pp. 69–70, pl. 12: fig. 5.

Pyrameis carye minuscula Hayward, 1931, p. 186 [corrected spelling of *minscula*]; 1951, p. 196.

Pyrameis caryae aberration *bruchi* Kohler [excluded name, type 2], 1945, p. 256, pl. 20: fig. 1.

Vanessa carye aberration *bruchi*.—Hayward, 1951, p. 196.

C. carye and *C. annabella* as mentioned in the description of the latter are easily distinguished from all other species of *Cynthia*, except *C. terpsichore* and some females of *C. virginiensis*, in having the bar just beyond cell on upper side of forewing tawny instead of white. They are easily distinguished from *C. terpsichore* and *C. virginiensis* by having four, instead of two, blue-centered ocular markings on the upper side of hindwing.

MALE (Figures 137–142).—Forewing above with tawny subapical bar just beyond cell slightly smaller in *C. carye*; subapical white spot at costa and interspaces R_1 and R_2 slightly smaller than in *C. annabella*; basal transverse bar in cell less distinct in *C. carye* than in *C. annabella*; bar below base of Cu_2 usually very small, sometimes absent in *C. carye*, present and distinct in *C. annabella*; with the small tawny spot in interspace M_3 just above the large tawny quadrate spot in interspace Cu_1 found in *C. annabella*, absent in most specimens of *C. carye*; submarginal white line composed of three slender bars on apex of forewing much less distinct in *C. carye* than in *C. annabella*.

Hindwing above with white spot in middle of costal margin smaller and less distinct in *C. carye* than in *C. annabella*, otherwise as in *C. annabella*.

Forewing underneath with the pale yellowish-white postmedial and marginal bar slightly smaller in *C. carye*; with dark spot at base of interspace Cu_1 smaller and usually separate from post-medial black bar in this interspace in *C. carye*, while in *C. annabella* it is larger and always connected to the post-medial black bar.

Hindwing underneath with whole aspect darker in color in *C. carye*; with pure white spot in middle of wing opposite end of cell somewhat hourglass shaped in *C. carye*, more triangular in *C. annabella*.

Length of forewing, 20–27 mm (average 22.7 mm).

Male genitalia as illustrated by Figure 16 (drawn from my preparation no. 3660), with uncus in lateral view very similar to that of *C. annabella*, a little thicker, especially just before distal end, in ventral view constricted before distal end and thus not so clearly triangular in shape; gnathos with lateral arms very large, with distal one third sharply bent upward toward uncus, with lower margin of these arms having a "heel" near middle of relatively straight portion of lower margin; ventral process of lateral arm of gnathos bent inward so that it shows in lateral view; valva with dorsal margin nearly straight or only slightly curved upward near middle; valva with a large club-shaped process at junction of dorsal and distal margins instead of the acute lobe found in *C. annabella*, this club with a blunt toother lobe dorsally near its base; distal margin of valva greatly concave because of this club-like process; lower margin of valva gradually and broadly rounded with a large acute lobe at junction of distal and lower margins; clasper similar to but not as large as that of *C. annabella*; cuiller also similar to that species but much more heavily armed with large teeth; aedeagus similar to that of *C. annabella*, with base longer; saccus also similar to the latter species.

FEMALE (Figures 149–154).—As in *C. annabella* this species differs from *C. carye* in the same charac-

ters as do the males and is not distinguishable from the male sex except by examination of the genitalia, where the large podlike ostium bursa lobe can be seen after the scales are brushed off the underside of posterior surface of abdomen.

Length of forewing, 15–29 mm (average 25.4 mm).

Female genitalia as illustrated by Figure 32, (drawn from my preparation no. 3678), similar to those of *C. annabella*, differing in the shape of the large podlike lobe at ostium bursa, which in this species is swollen at the base.

METHOD OF IDENTIFICATION.—See notes under this heading in the description of *C. annabella*. The lack of type material of *C. carye* and the fact that Hübner did not cite a type locality were found not to be a deterrant in the identification of this species, since Hübner's original colored figures of both surfaces ([1812], pl. [45], figs. 1, 2) were found to beautifully and quite accurately portray *C. carye* as the species found in the Andes and farther south in South America. Hübner's figures agree with the population just mentioned in the following nine particulars: (1) The subapical white spot on forewing above in interspaces R_2 and R_3 is smaller than it is in *C. annabella*. (2) The basal transverse bar in forewing cell is smaller than in *C. annabella*. (3) The tawny spot found in *C. annabella* just above the large quadrate spot in interspace Cu_1 is absent in Hübner's figure as it is in the South American population. (4) The white spot in middle of costal margin of upper surface of hindwing is absent or greatly reduced as it is in the South American species, while in *C. annabella* it is never absent and is always larger and more distinct than in the latter. (5) On the under surface of forewing the pale yellowish-white postmedial bar is small in Hübner's figure as it is in the South American species. In the North American species this bar is distinctly larger. (6) On this same surface the postmedial fuscous bar ends at 2n A as it does in all of the South American specimens I have seen. In the North American species this bar continues into interspace 2nd A. (7) The white spot in middle of hindwing opposite the end of cell on the under surface is hourglass shaped in Hübner's figure. This is true also of the South American species, while in *C. annabella* this spot is more triangular in shape. (8) On the under surface the apex of hindwing is quite dark in Hübner's figure, with a cheveron-shaped terminal line in interspaces R_8. In the North American species this area is yellowish to white in color and lacks a cheveron-shaped terminal line in interspace R_8. (9) The tawny spot found in *C. annabella* just above the large quadrate spot in interspace Cu_1, on the under surface of the forewing, is absent in Hübner's figure as it is in the South American species.

According to Horn and Kahle (1935, p. 119) the Hübner collection went to the Zoologische Abteilung, Naturhistorisches Museum, Vienna. Dr. F. Kasy of that institution informs me that there are only a few Hübner types remaining in their collection, all of Heterocera. The butterfly types and other missing Hübner types were probably destroyed by fire in 1848. Because of the excellent original colored figures, I see no need to designate a neotype.

LIFE HISTORY.—The larval food plants are Malvaceae: *Althaea rosea, Malva nicacensis, M. parviflora, Modiola caroliniana, Sphaeralcea bonariensis,* and *S. obtusiloba*; Compositae: *Cynara cardunculus, Gaillardia scabiosoides,* and *Pascalia glauca*; Geraniaceae: *Pelargonium pelatatum* and *P. zonale*. It has been reported upon *Urtica urens* (Urticaceae) but this was perhaps a forced rearing.

The egg, larva, and pupa have been described by Burmeister (1878, p. 152), Izquierdo (1895, p. 832), and Hayward (1931, p. 70).

DISTRIBUTION.—This species is found from the Andes in Colombia, Ecuador, Peru, and Bolivia south through Chile and in southwestern Brazil, Paraguay, and Uruguay south through much of Argentina. It also occurs in the Juan Fernández Islands of Chile, on Easter Island, and on Mangareva Island of the Gambier Islands, of the Tuamotu Archipelago on the Tropic of Capricorn, over halfway to New Zealand from Chile.

MATERIAL STUDIED.—Forty-two males and forty-seven females were studied from the following localities: COLOMBIA: Guambia, Cauca (December). ECUADOR: Oriente; Salcedo (March, 2,700 m). PERU: Chichicastenango (September); Cuzco (July, 11,500 ft); Ollantaitambo, Cuzco (March, 9,200 ft); Oroya (May); Pisco (May); Puno (March, April); Usaquen, Cundiamarca (January, 2,800–2,900 ft). BOLIVIA: Belen Experiment Station (May); La Paz (April, May, 12,000 ft); Neguejahuica (May, 8,000 ft); Okala-Ankoma (April, 7,500–13,700 ft); Oruro

(March, April, 12,500 ft); Oruro (March, April, 12,500 ft); Pitiguaya (May, 5,800 ft); Playa Verde (December, 13,000 ft). CHILE: Angol (January–March); Criados, Province Tarapacá (February, October, November); Huanta, Conquimbo (December); Iquiqui, Province Tarapacá (September, October, November); La Junta, Coquimbo (December); Los Lagos; Olmul (March); Macul (March); Maipu; Pucon (February); San Carlos, Nuble (December); Santiago; Talca, 22 miles north (December); Temuco; Valparaiso (January, August); Tofo (January, Apirl, November). BRAZIL: Castro Paraná; Ponta Grossa, Paraná (August). URUGUAY: Carmen, Durazno; Montevideo (November). ARGENTINA: Cordova; La Rioja; Punta Lara, La Plata (November); Tucumen. JUAN FERNÁNDES ISLANDS (CHILE): Bahia Cumberland, Masatierra (January, March); Las Chozas, Masafuera (January). EASTER ISLAND (CHILE): Hanga Rosa (January). TUAMOTU ARCHIPELAGO: Rikitea Village, Mangarewa Island, Gambier Islands (December).

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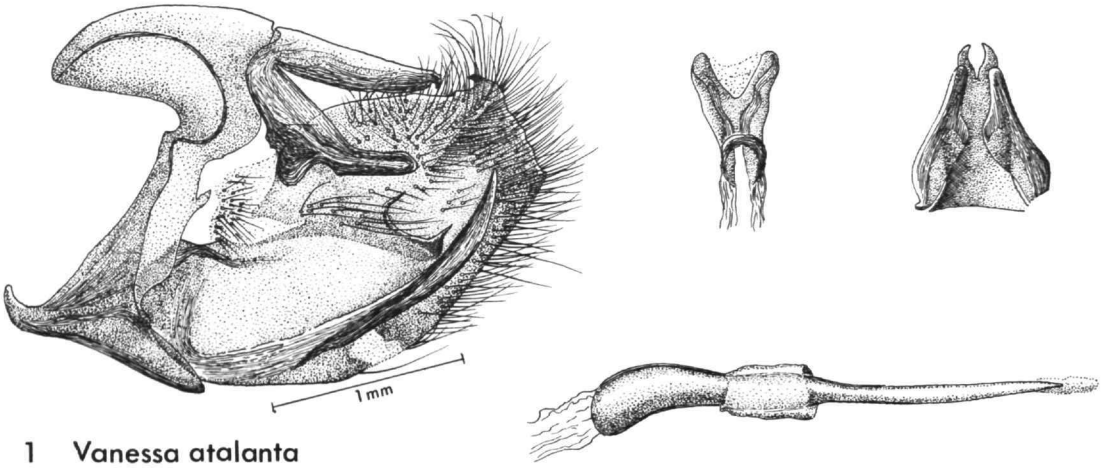
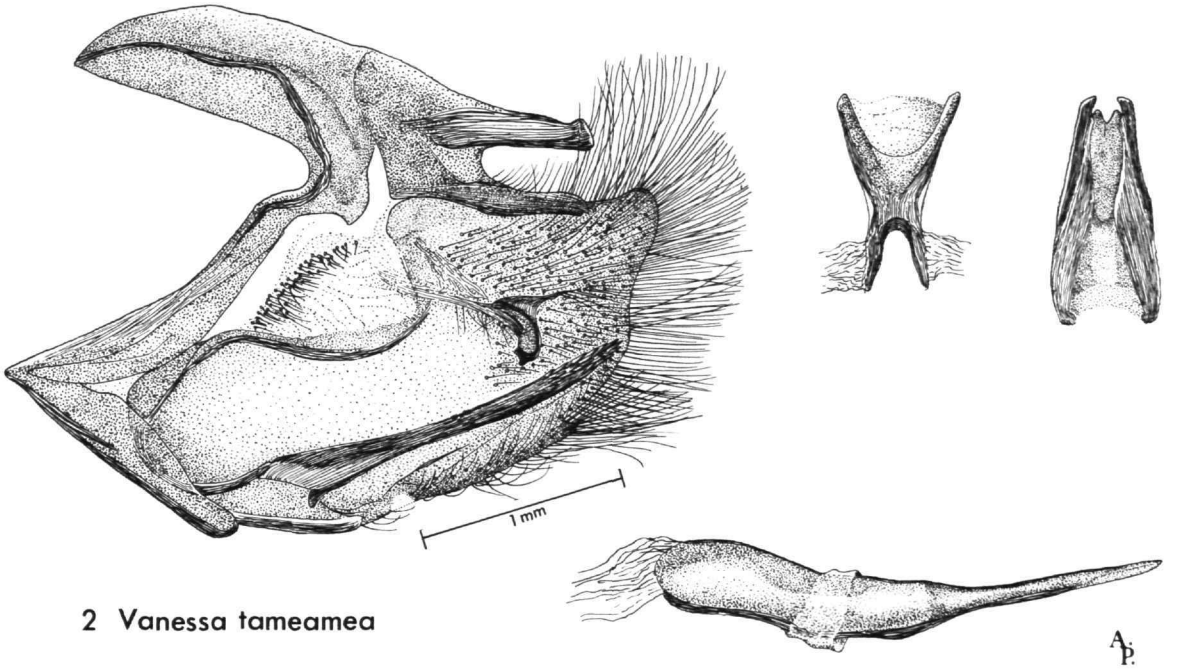
PLATES

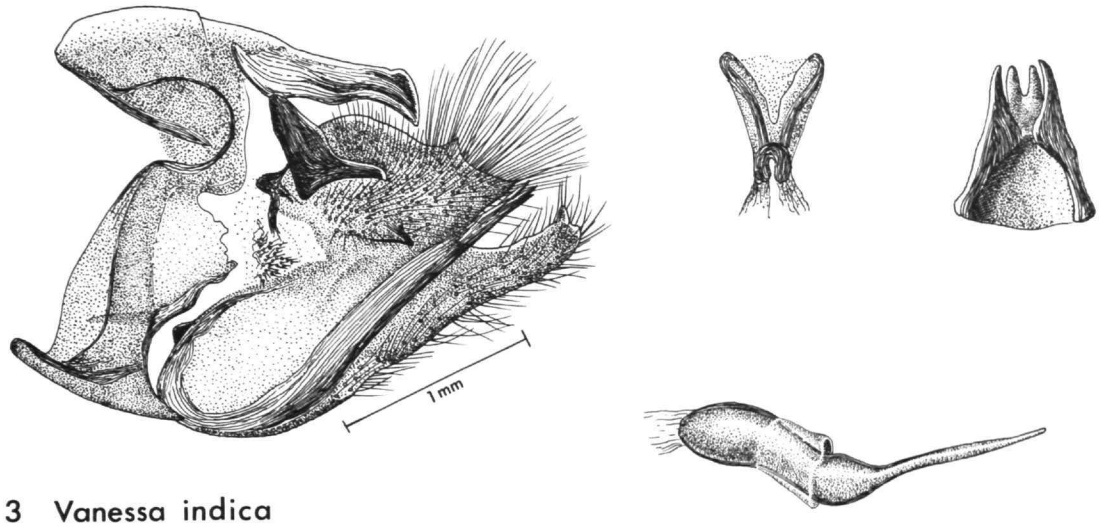


1 Vanessa atalanta



2 Vanessa tameamea

FIGURES 1–2.—Male genitalia consisting of lateral view (on the left side of each figure) of tegumen, vinculum, uncus, gnathos, and the right valva; ventral element of anellus in ventral view; gnathos and uncus in ventral viewa; aedeagus in lateral view. 1, *Vanessa atalanta* (drawn from preparation number 6179); 2, *Vanessa tamzamea* (drawn from preparation number 3657).



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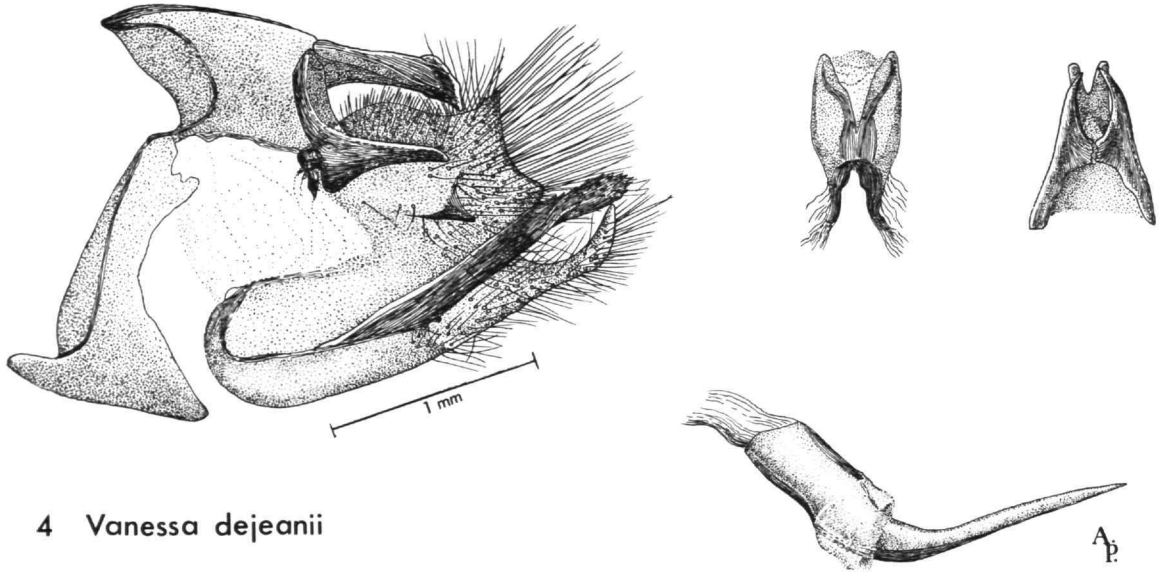
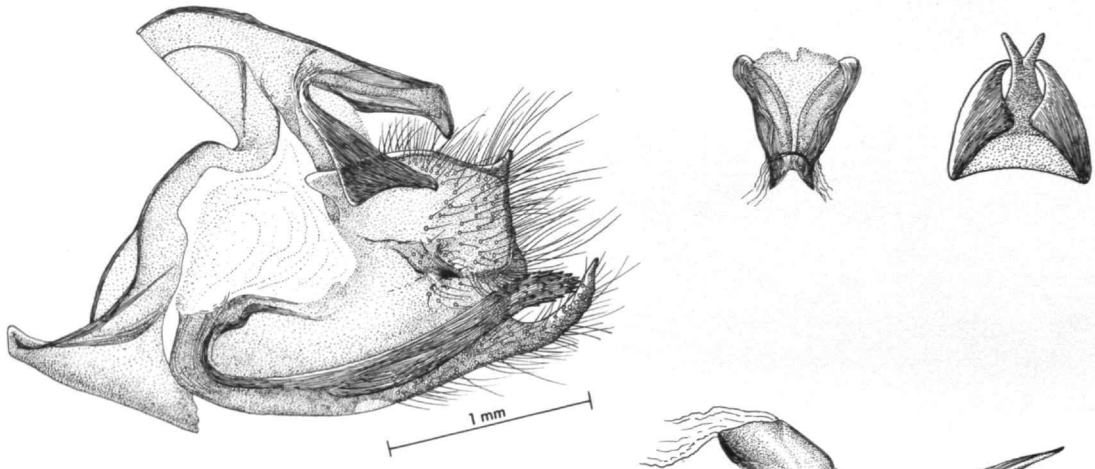
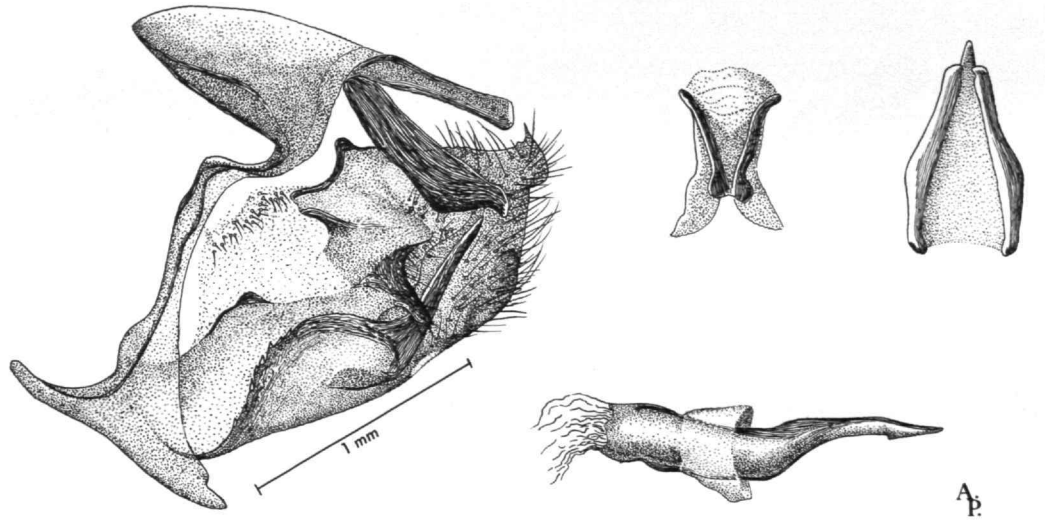


4 Vanessa dejeanii

FIGURES 3–4.—Male genitalia consisting of lateral view (on the left side of each figure) of tegumen, vinculum, uncus, gnathos, and the right valva; ventral element of anellus in ventral view; gnathos and uncus in ventral view aedeagus in lateral view. 3, *Vanessa indica* (drawn from preparation number 3649); 4, *Vanessa dejeanii* (drawn from preparation number 3653).

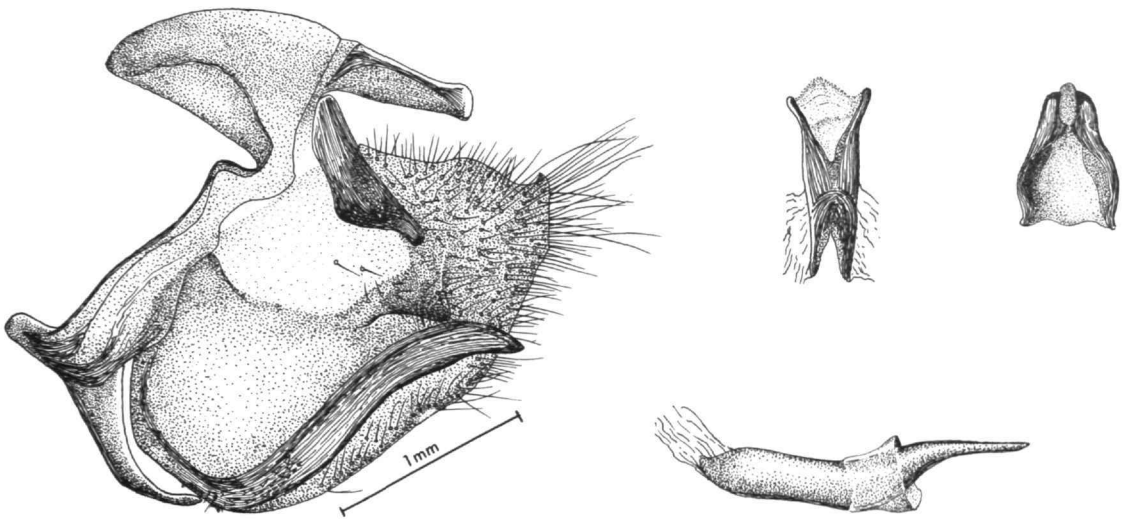


5 Vanessa samani

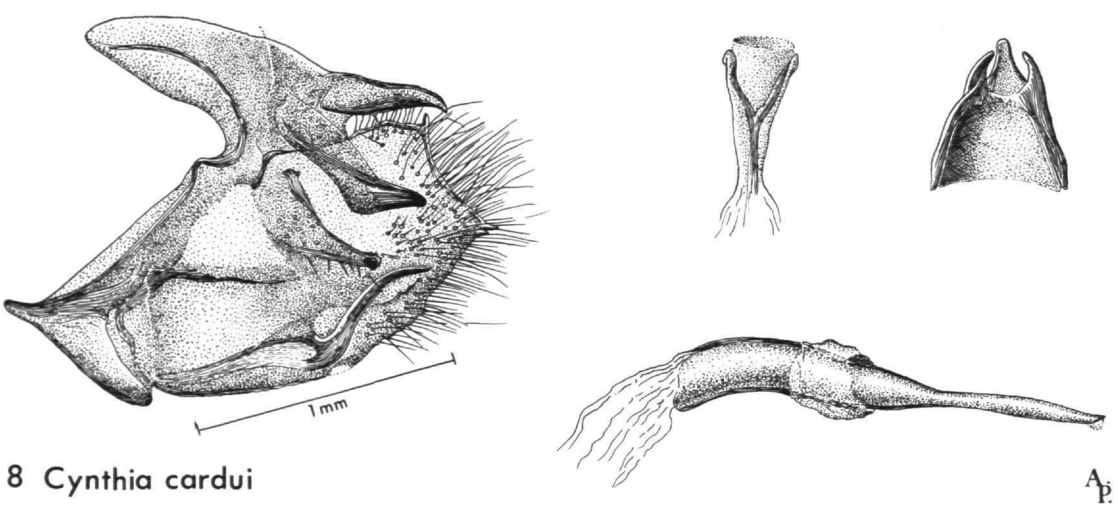


6 Bassaris itea

FIGURES 5–6.—Male genitalia consisting of lateral view (on the left side of each figure) of tegumen, vinculum, uncus, gnathos, and the right valva; ventral element of anellus in ventral view; gnathos and uncus in ventral view; aedeagus in lateral view. 5, *Vanessa samani* (drawn from preparation number 6281); 6, *Bassaris itea* (drawn from preparation number 3655).

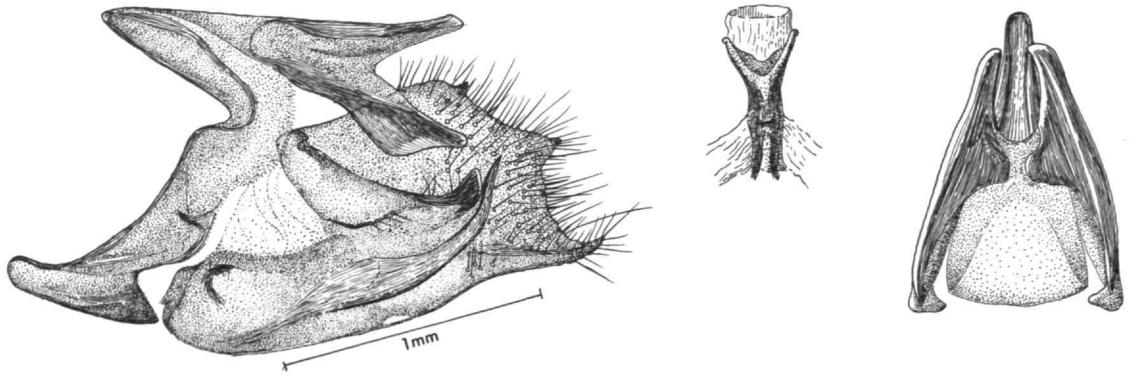


7 Bassaris gonerilla

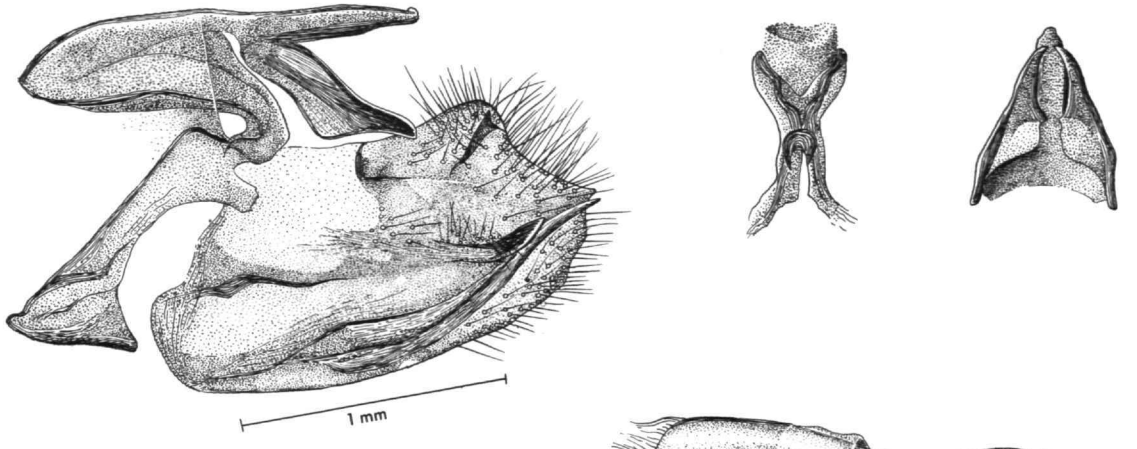


8 Cynthia cardui

FIGURES 7–8.—Male genitalia consisting of lateral view (on the left side of each figure) of tegumen, vinculum, uncus, gnathos, and the right valva; ventral element of anellus in ventral view; gnathos and uncus in ventra view; aedeagus in lateral view. 7, *Bassaris gonerilla* (drawn from preparation number 6192); 8, *Cynthia cardui* (drawn from preparation number 6104).

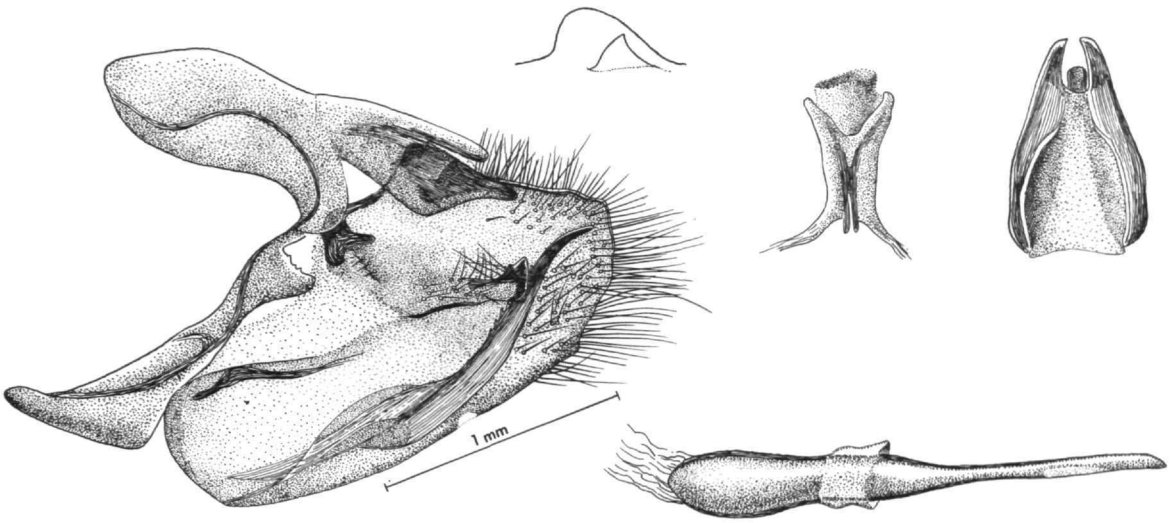


9 Cynthia kershawi

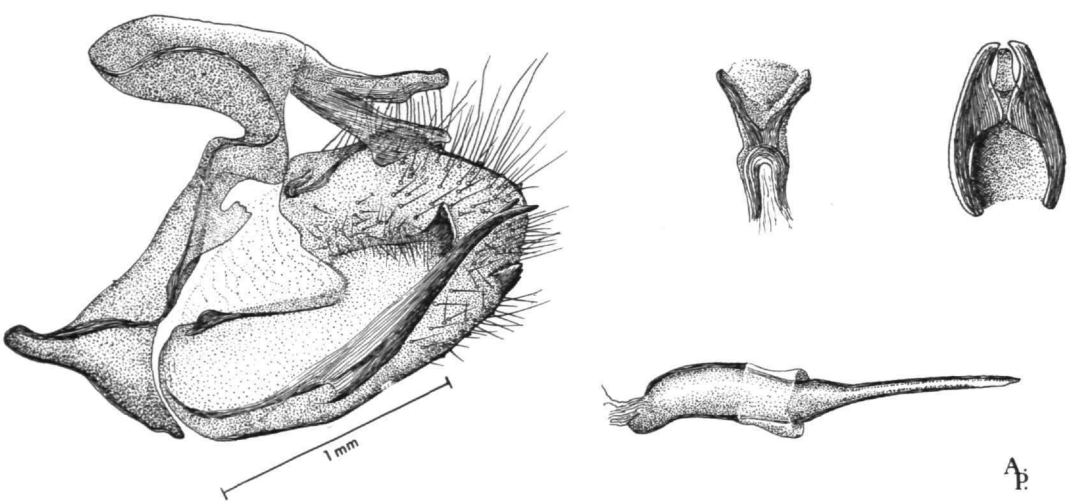


10 Cynthia virginiensis

FIGURES 9–10.—Male genitalia consisting of lateral view (on the left side of each figure) of tegumen, vinculum, uncus, gnathos, and the right valva; ventral element of anellus in ventral view; gnathos and uncus in ventral view aedeagus in latera view. 9, *Cynthia kershawi* (drawn from preparation number 6098); 10, *Cynthia virginiensis* (drawn from preparation number 6122).

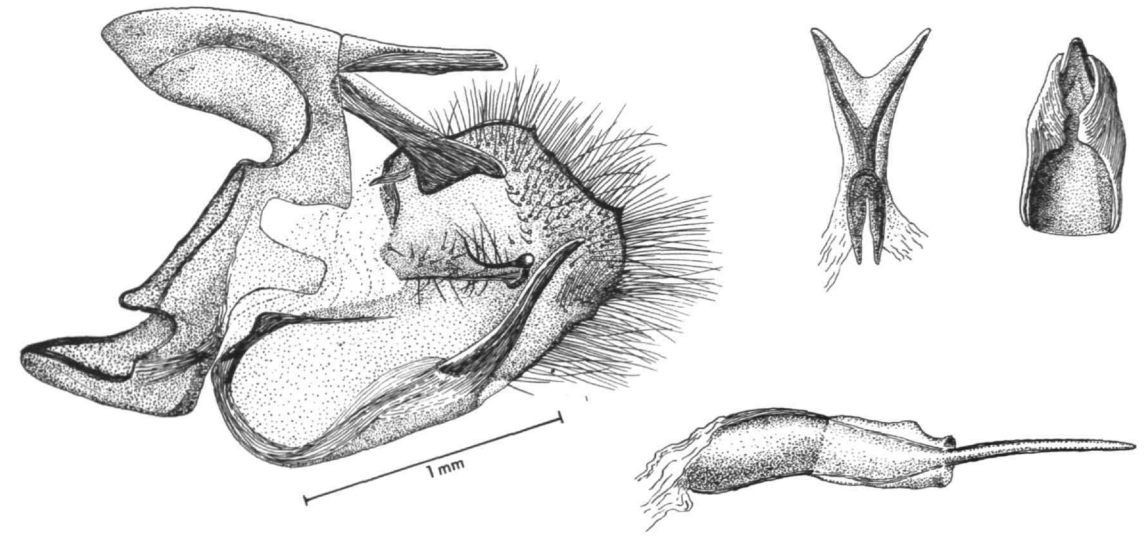


11 Cynthia altissima

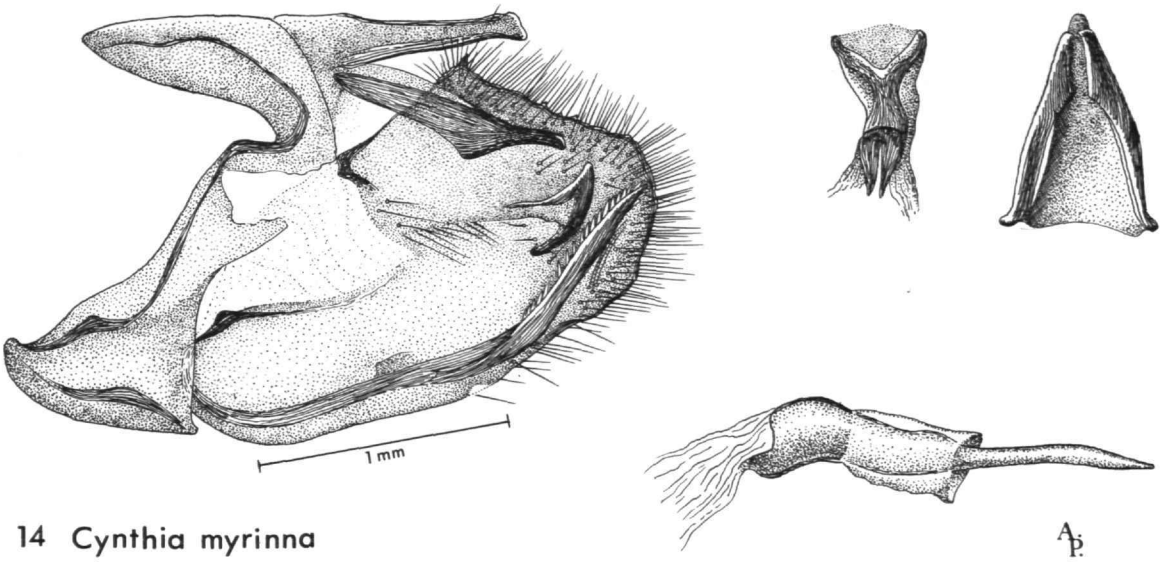


12 Cynthia braziliensis

FIGURES 11–12.—Male genitalia consisting of lateral view (on the left side of each figure) of tegumen, vinculum, uncus, gnathos, and the right valva; ventral element of anellus in ventral view; gnathos and uncus in ventral view; aedeagus in lateral view. 11, *Cynthia altissima* (drawn from preparation 6141); 12, *Cynthia braziliensis* (drawn from preparation 3663).

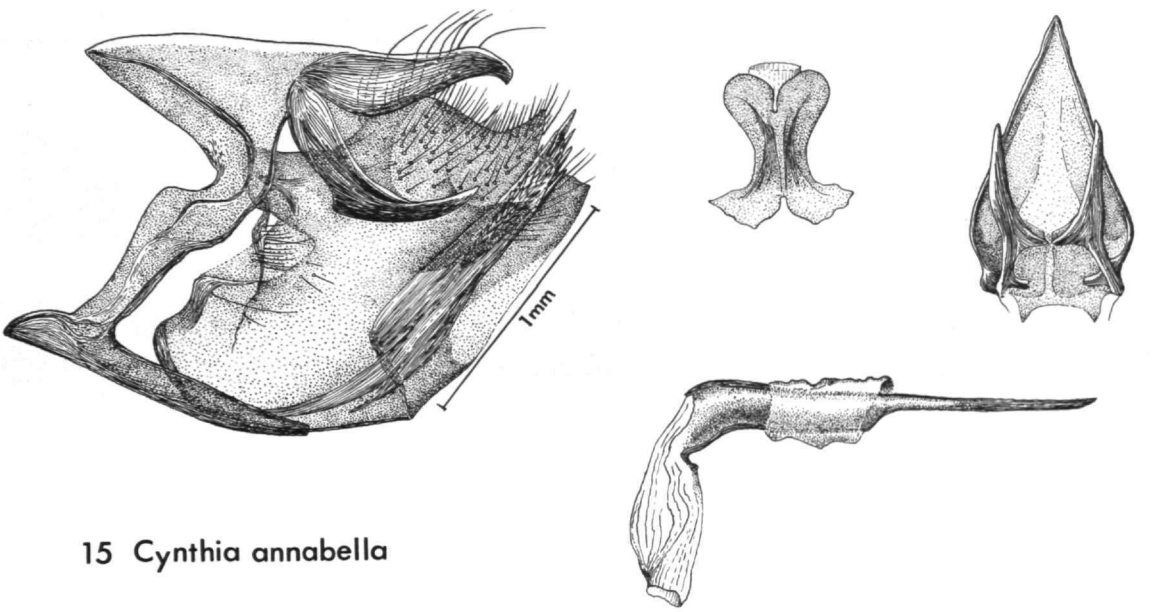


13 Cynthia terpsichore

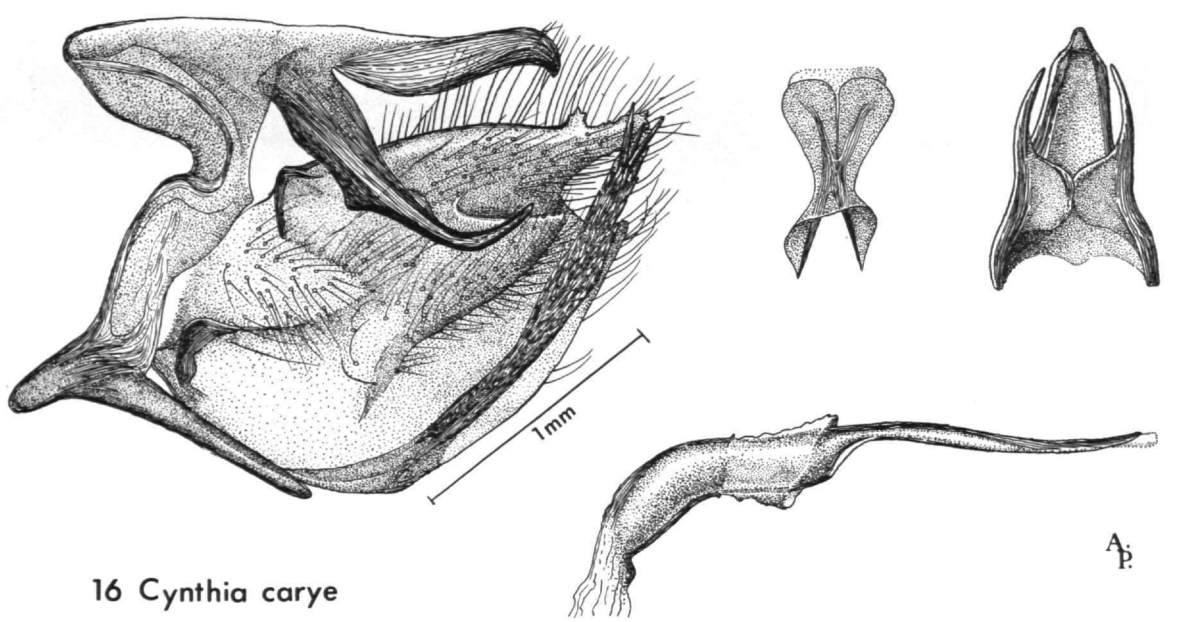


14 Cynthia myrinna

FIGURES 13–14.—Male genitalia consisting of lateral view (on the left side of each figure) of tegumen, vinculum, uncus, gnathos, and the right valva; ventral element of anellus in ventral view; gnathos and uncus in ventral view; adeagus in lateral view. 13, *Cynthia terpsichore* (drawn from preparation number 3665); 14, *Cynthia myrinna* (drawn from preparation number 6147).

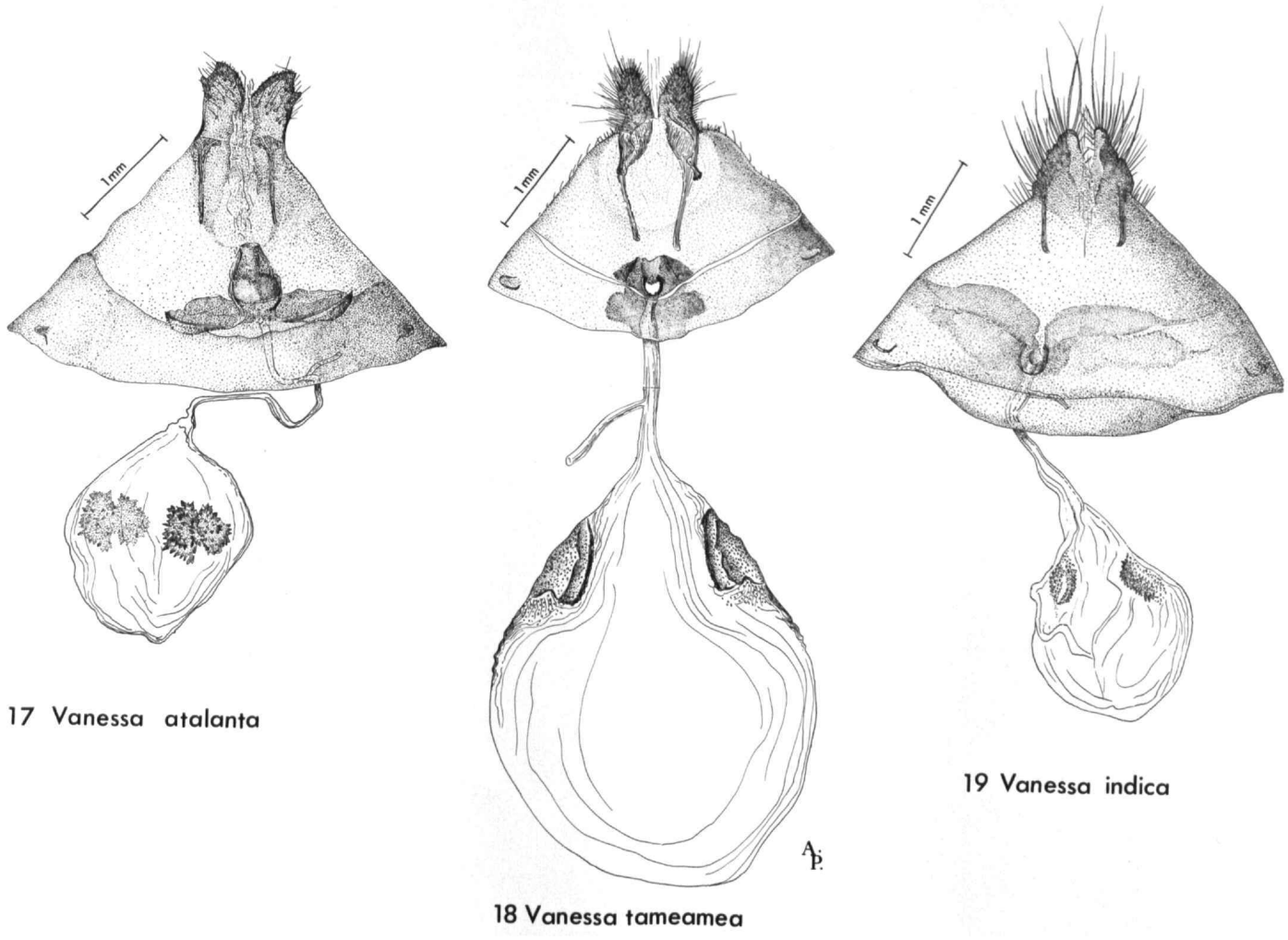


15 Cynthia annabella

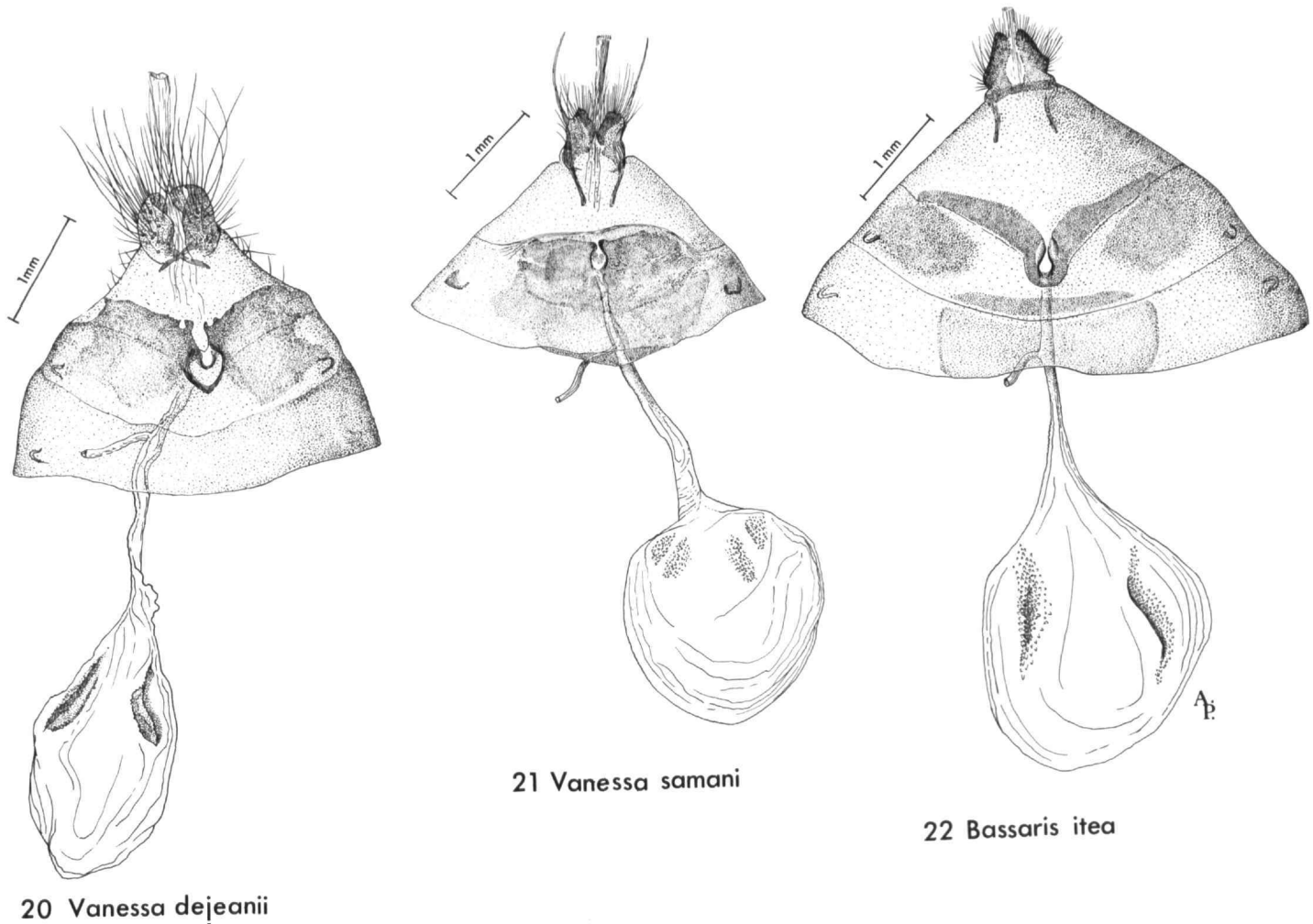


16 Cynthia carye

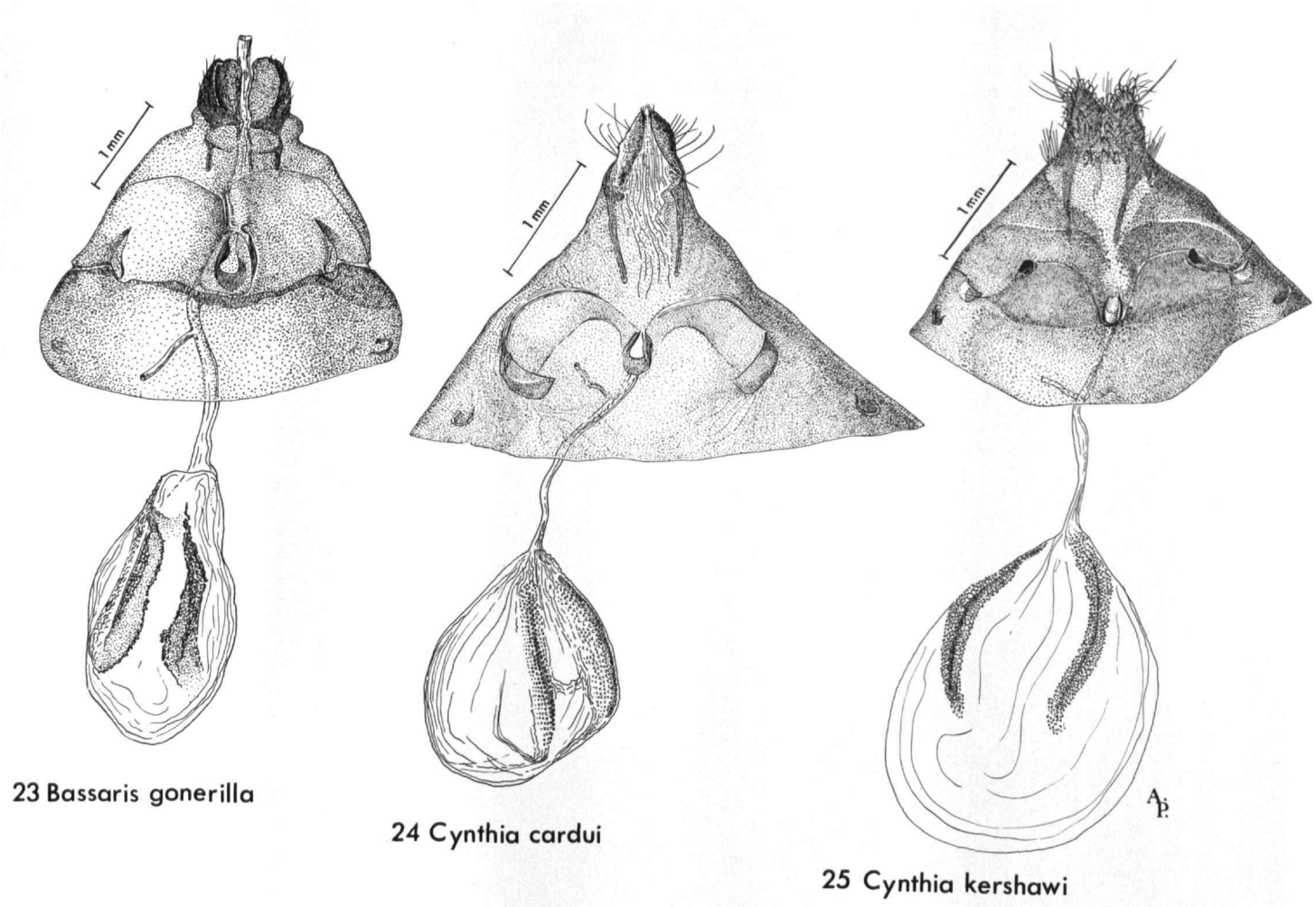
FIGURES 15–16.—Male genitalia consisting of lateral view (on the left side of each figure) of tegumen, vinculum, uncus, gnathos, and the right valva; ventral element of anellus in ventral view; gnathos and uncus in ventral view; aedeagus in lateral view. 15, *Cynthia annabella* (drawn from preparation number 3716); 16, *Cynthia carye* (drawn from preparation number 3660).



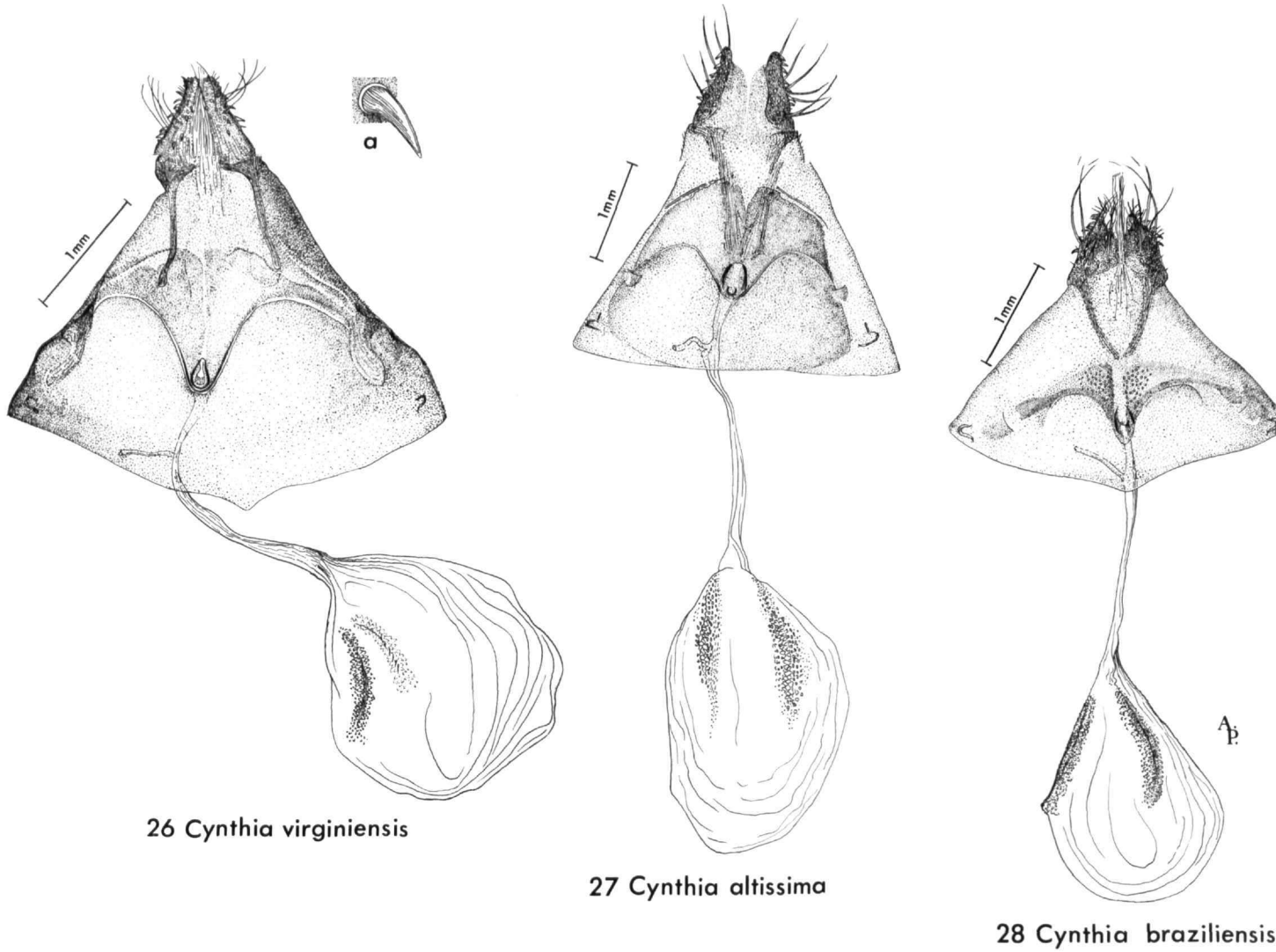
FIGURES 17–19.—Ventral aspect of seventh and eighth abdominal segments and ovipositors showing female genitalia consisting of genital plates, ostium bursae, ductus bursae, bursa copulatrix, and signa. 17, *Vanessa atalanta* (drawn from preparation number 3667); 18, *Vanessa tameamea* (drawn from preparation number 6265); 19, *Vanessa indica* (drawn from preparation number 6298).



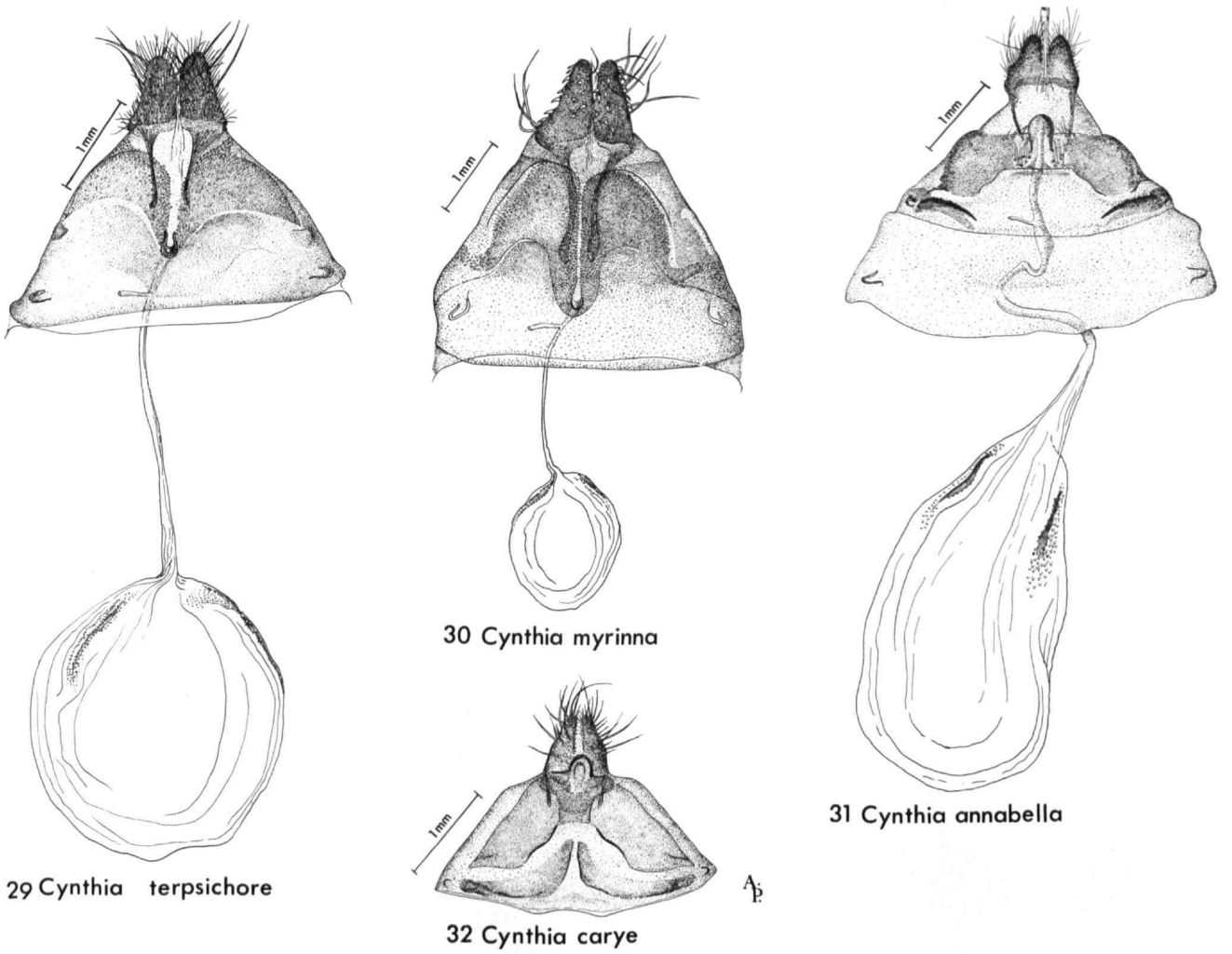
FIGURES 20–22.—Ventral aspect of seventh and eighth abdominal segments and ovipositors showing female genitalia consisting of genital plates, ostium bursae, ductus bursae, bursa copulatrix, and signa. 20, *Vanessa dejeanii* (drawn from preparation number 6257); 21, *Vanessa samani* (drawn from preparation number 6282); 22, *Bassaris itea* (drawn from preparation number 6273).



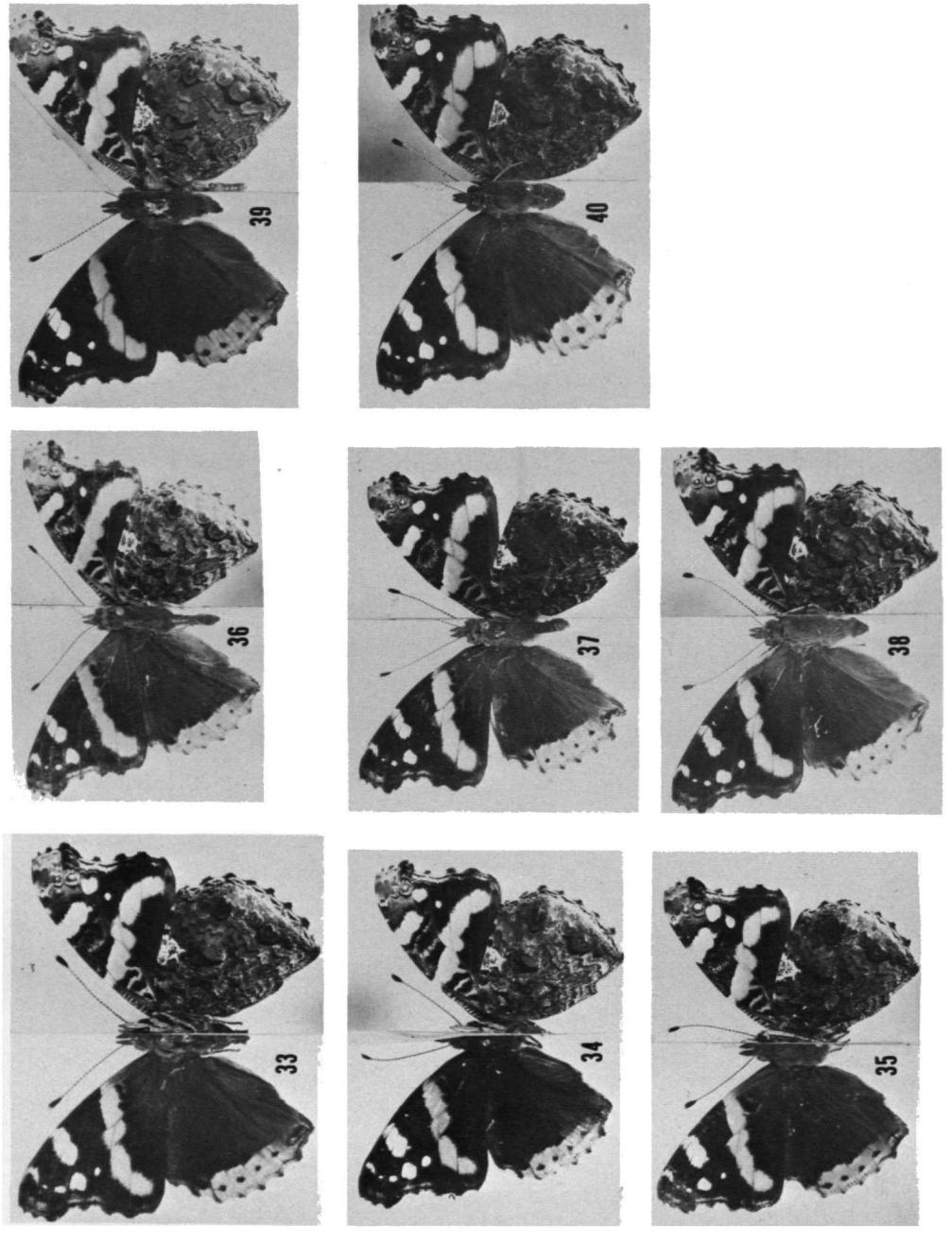
FIGURES 23–25.—Ventral aspect of seventh and eighth abdominal segments and ovipositors showing female genitalia consisting of genital plates, ostium bursae, ductus bursae, bursa copulatrix, and signa. 23, *Bassaris gonerilla* (drawn from preparation number 6194); 24, *Cynthia cardui* (drawn from preparation number 3675); 25, *Cynthia kershawi* (drawn from preparation number 6071).



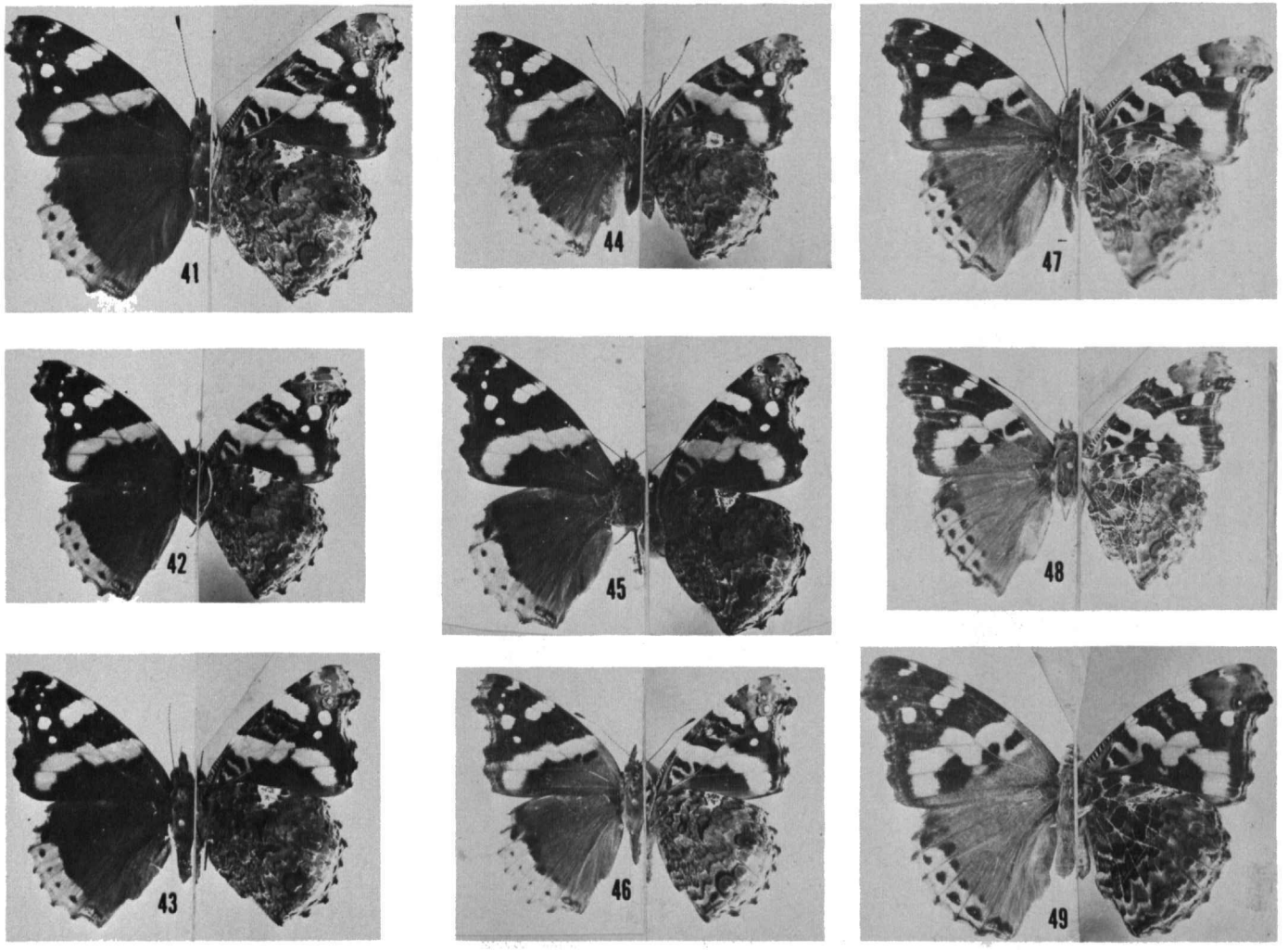
FIGURES 26–28.—Ventral aspect of seventh and eighth abdominal segments and ovipositors showing female genitalia consisting of genital plates, ostium bursae, ductus bursae, bursa copulatrix, and signa. 26, *Cynthia virginiensis* (drawn from preparation number 3679); 27, *Cynthia altissima* (drawn from preparation number 6465); 28, *Cynthia braziliensis* (drawn from preparation number 3680).



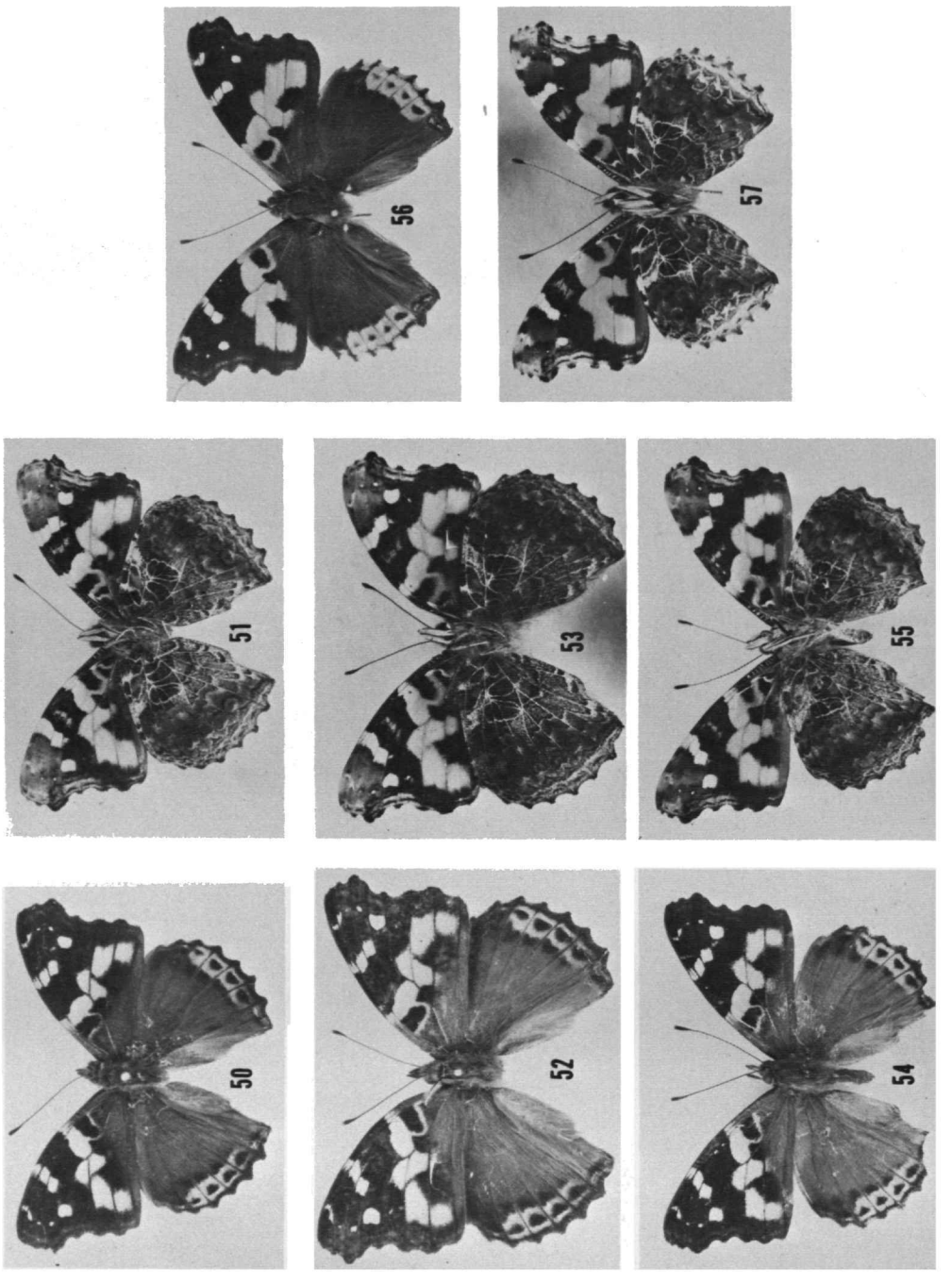
FIGURES 29–32.—Ventral aspect of seventh and eighth abdominal segments and ovipositors showing female genitalia consisting of genital plates, ostium bursae, ductus bursae, bursa copulatrix, and signa. 29, *Cynthia terpsichore* (drawn from preparation number 6438); 30, *Cynthia myrinna* (drawn from preparation number 6441); 31, *Cynthia annabella* (drawn from preparation number 6445); 32, *Cynthia carye* (with ductus bursae and bursa copulatrix removed, drawn from preparation number 3678).



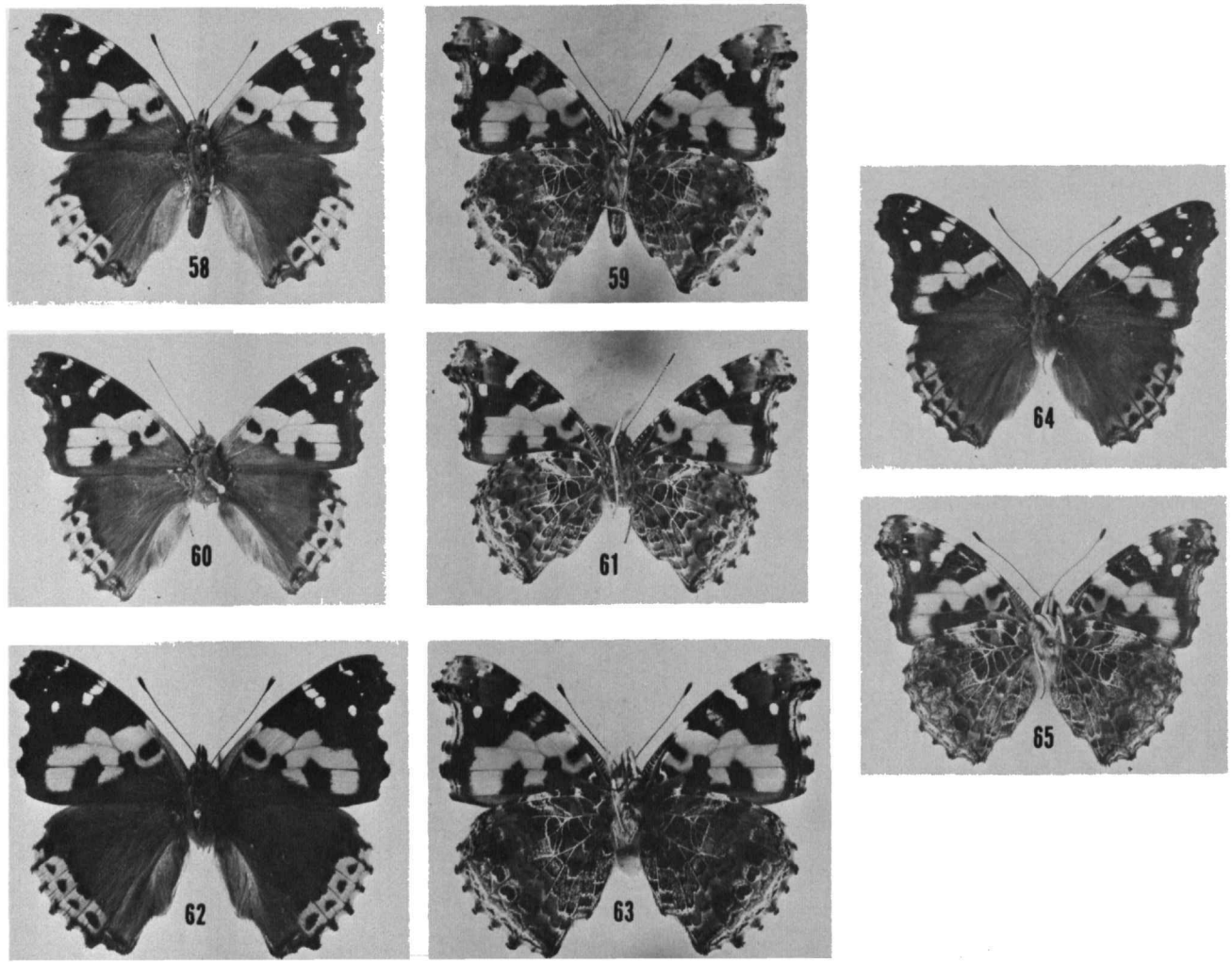
FIGURES 33–40.—*Vanessa atalanta atalanta:* 33, ♂ (Royan, France); 34, ♂ (Falgamácsu, Hungary); 35, ♂ (Segovia, Spain). *Vanessa atalanta rubria:* 36, ♂ (Eureka, Kansas); 37, ♂ (Cooney Lake, Washington); 38, ♂ (Green Sea, Virginia); 39, ♂ (Botanical Gardens, Brooklyn, New York); 40, ♂ (Jamaica, Long Island, New York).



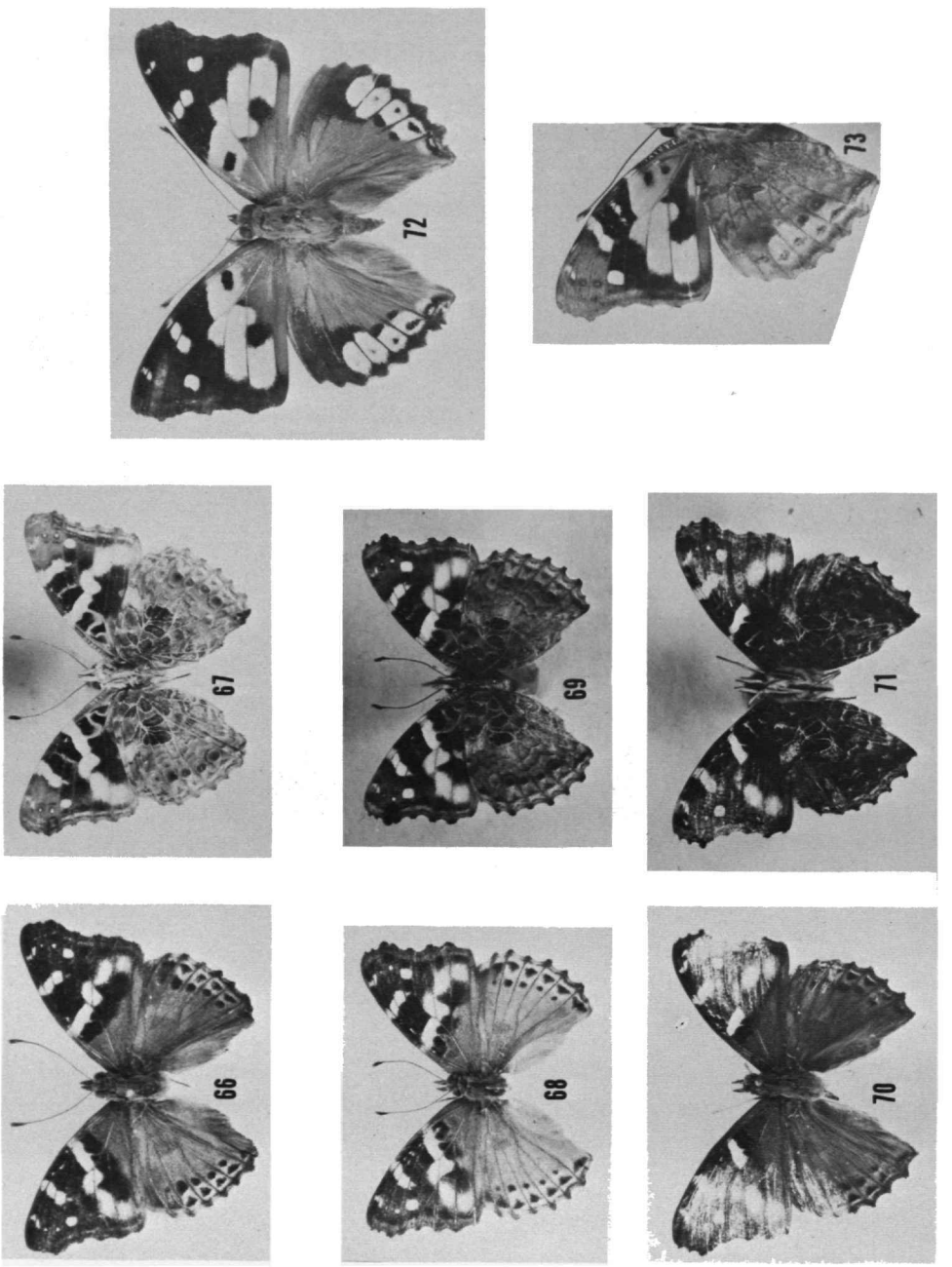
FIGURES 41–49.—*Vanessa atalanta atalanta:* 41, ♀ (Friedland, Czechoslovakia); 42, ♀ (Baja, Hungary); 43, ♀ (Segovia, Spain). *Vanessa atalanta rubria:* 44, ♀ (Eureka, Kansas); 45, ♀ (Salem, Virginia); 46, ♀ (Palm Beach, Florida). *Vanessa indica indica:* 47, ♂ (Teesta Valley, Dikkim, India); 48, ♂ (Coorg, India); 49, ♀ (Darjeeling, India).



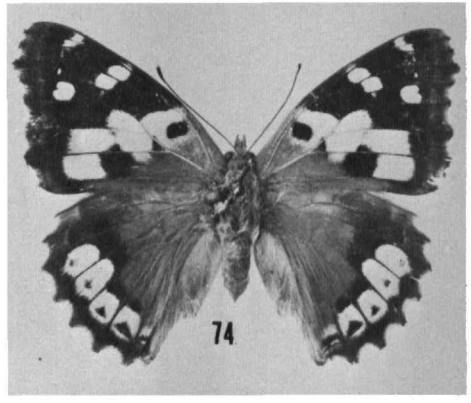
FIGURES 50–57.—*Vanessa indica nubicola:* 50, ♂ (Haldummulla, Ceylon); 51, underside of 49; 52, ♀ (Ceylon); 53, underside of 52. *Vanessa indica pholoe:* 54, ♀ (Kodaimanal, south India); 55, underside of 54. *Vanessa indica vulcania:* 56, ♂ (Canary Islands); 57, underside of 56.

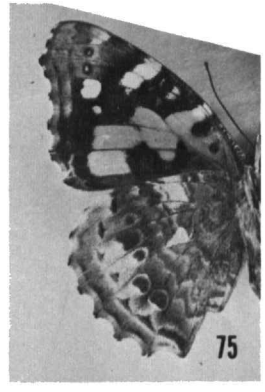


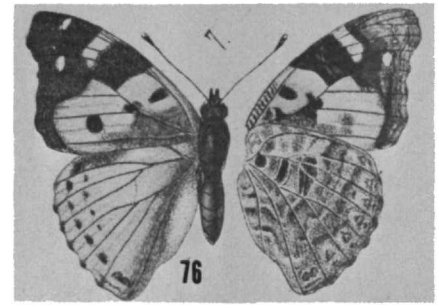
FIGURES 58–65.—*Vanessa indica vulcania:* 58, ♀ (Canary Islands); 59, underside of 58; 60, ♂ (Madeira Islands); 61, underside of 60; 62, ♀ (Madeira Islands); 63, underside of 62. *Vanessa indica buana:* 64, ♂ (Bonthain Mountain, south Celebes, 4,000 ft); 65, underside of 64.

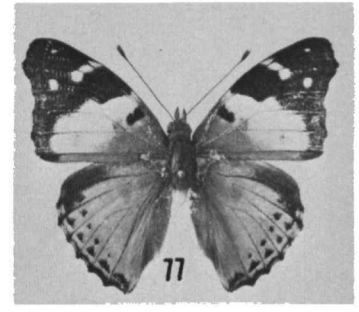


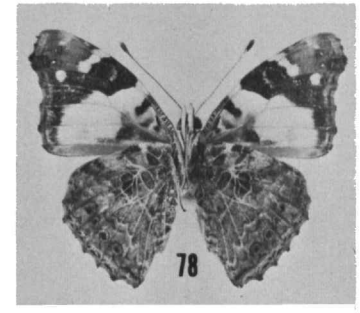
FIGURES 66–73.—*Vanessa dejeanii dejeanii:* 66, ♂ (Java); 67, underside of 66; 68, ♀ (Java); 69, underside of 68. *Vanessa dejeanii mounseyi;* 70, ♂ (Mount Apo, Mindanao, Philippine Islands); 71, underside of 70. *Vanessa tameamea:* 72, ♂ (Hawaii); 73, underside of 72.

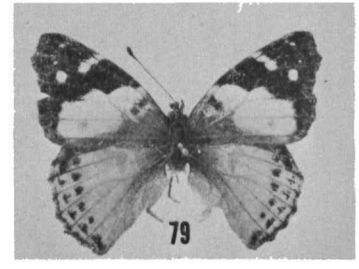


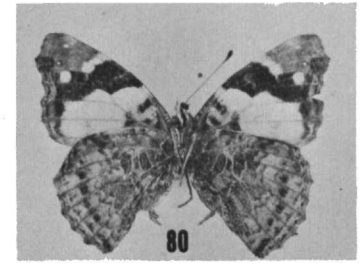




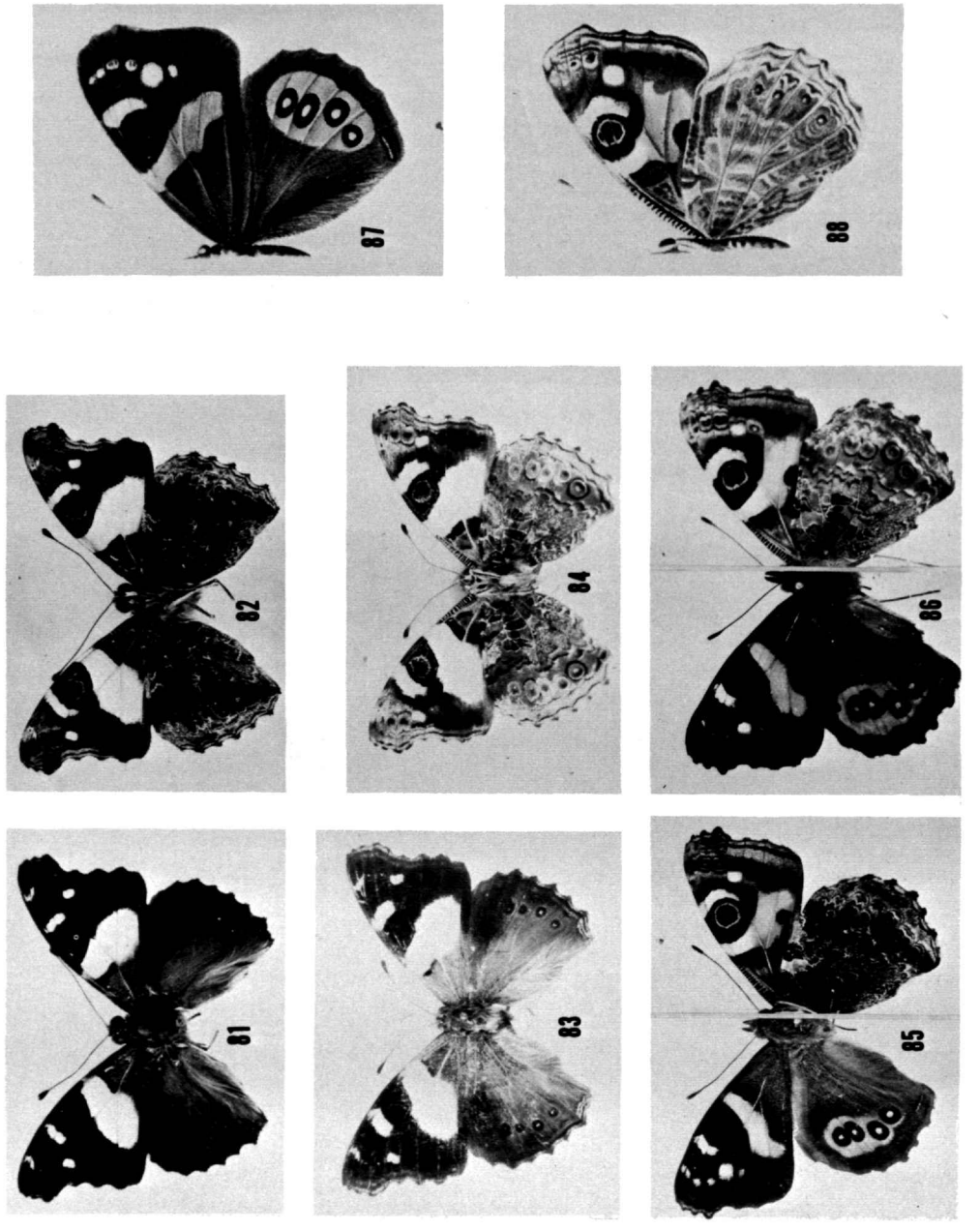




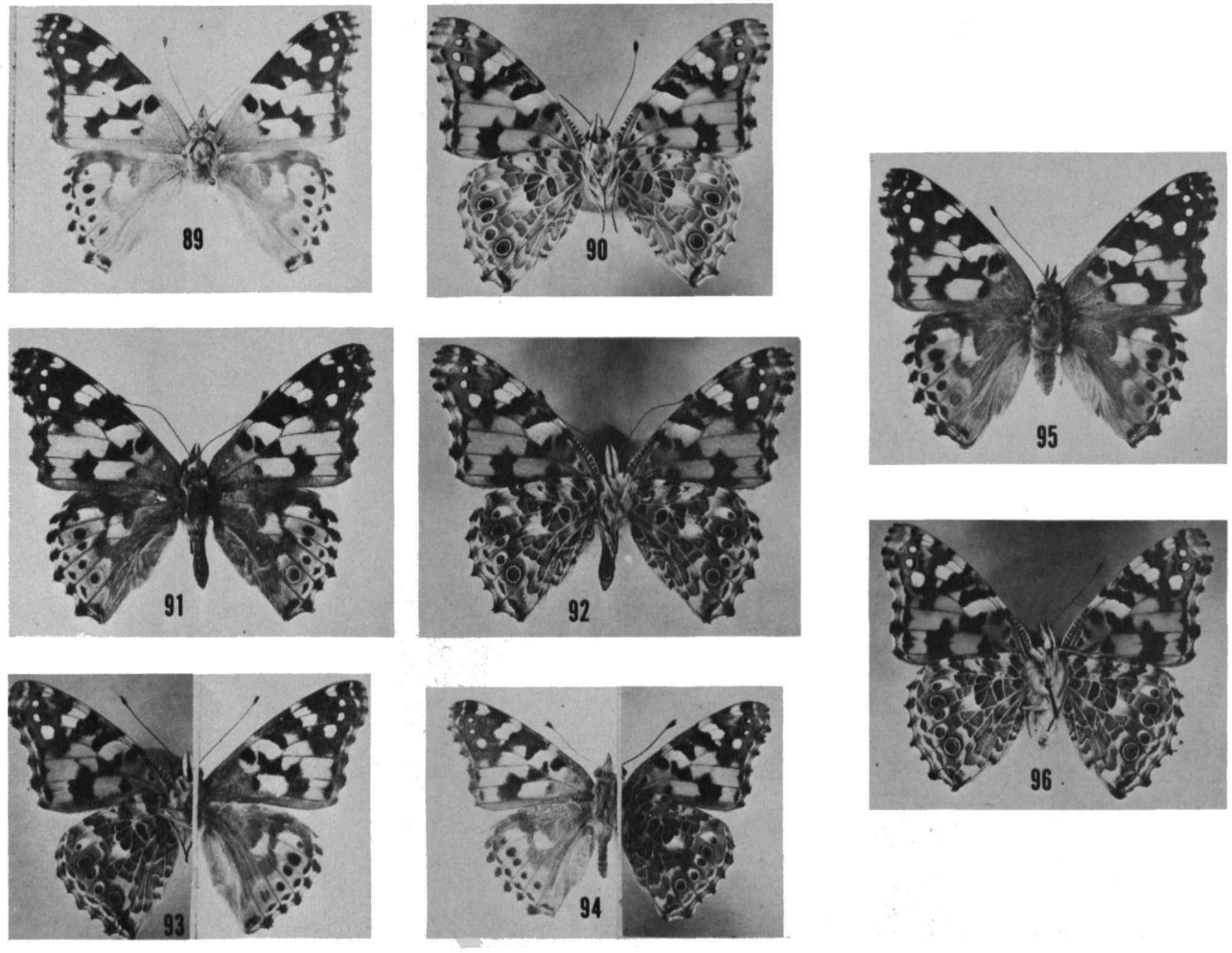




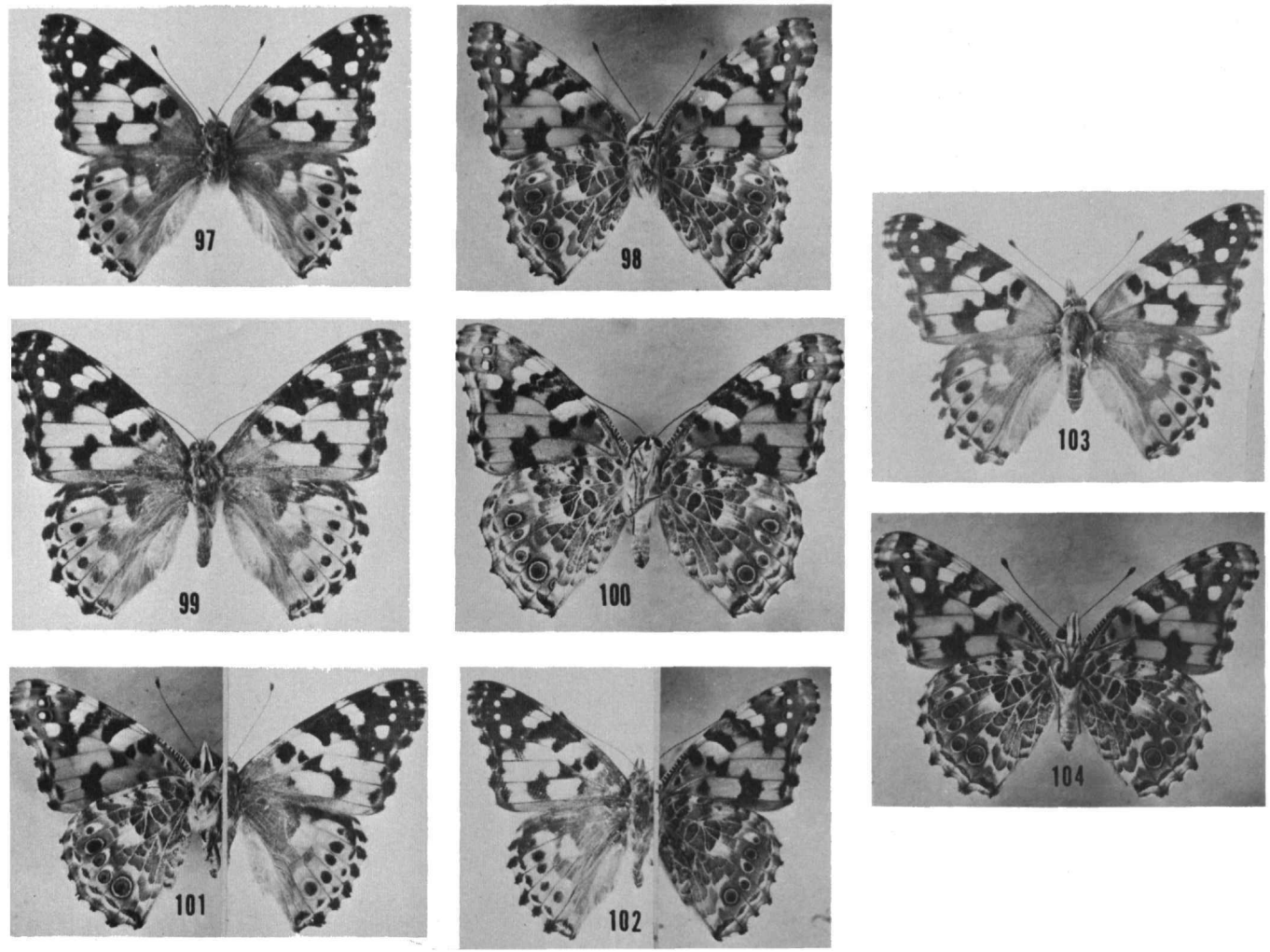
FIGURES 74–80.—*Vanessa tameamea:* 74, ♀ (Tantalus, Oahu, Hawaii); 75, underside of 74. *Vanessa samani:* 76, ♀ (Karo Mountains, Sumatra, from lithograph published by Hagen, 1896); 77, ♂ (Sungei, Sumatra); 78, underside of 77; 79, ♀ (foot of Korintji Peak, Sumatra); 80, underside of 79.



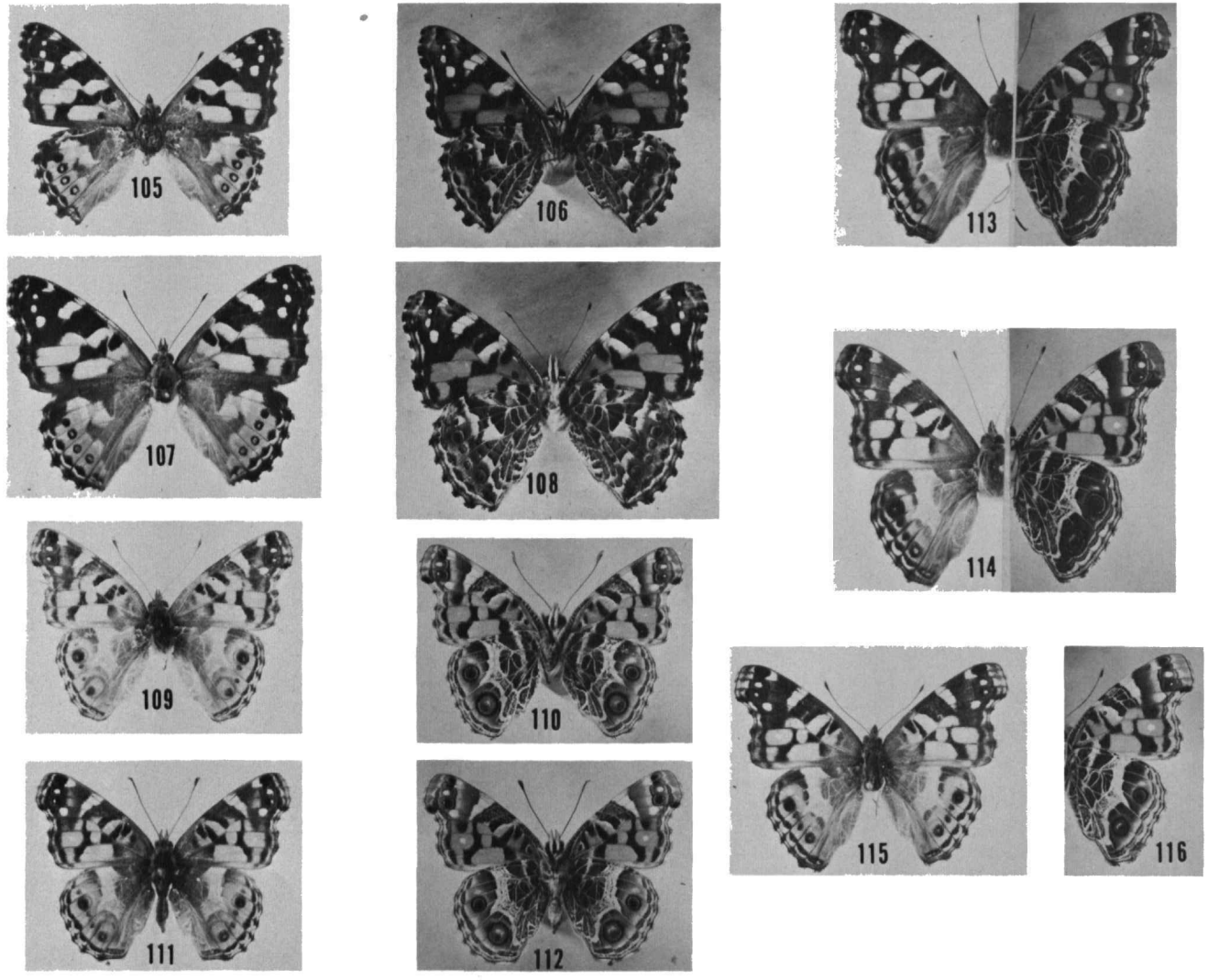
FIGURES 81–88.—*Bassaris itea:* 81, ♂ (Colo Vale, New South Wales, Australia); 82, underside of 81; 83, ♀ (Sandringham, Victoria, Australia); 84, underside of 83. *Bassaris gonerilla gonerilla:* 85, ♂ (New Zealand); 86, ♀ (Canterbury, New Zealand). *Bassaris gonerilla ida:* 87, ♀? (Chatham Islands, New Zealand, from lithograph published by Alfkan, 1903); 88, (underside of 87, from same lithograph).



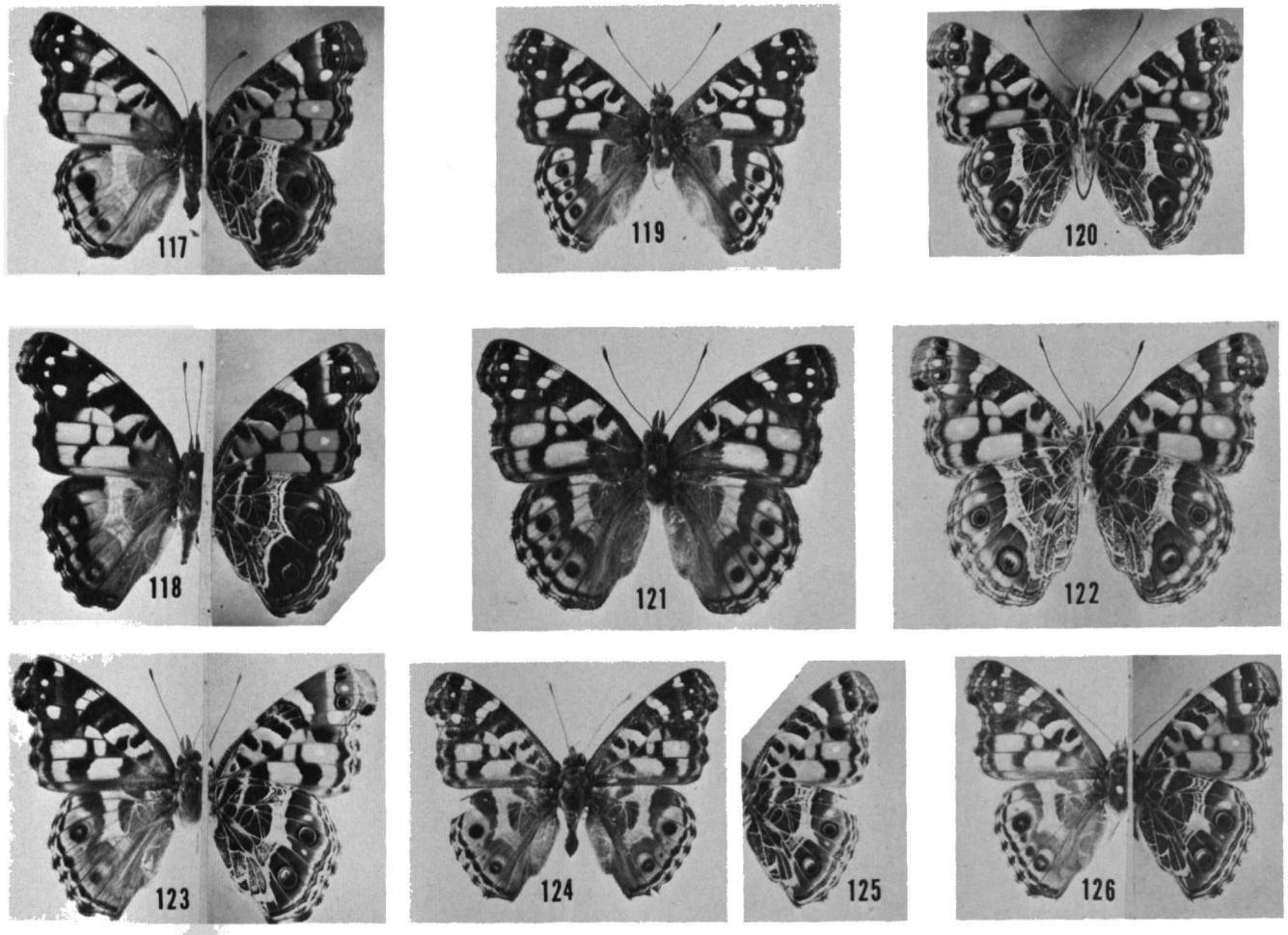
FIGURES 89–96.—*Cynthia cardui*, males: 89 (Friedland, Czechoslovakia); 90, underside of 89; 91 (Spetsai Island, Greece); 92, underside of 91; 93 (Japan); 94 (Madagascar); 95 (Washington, District of Columbia); 96, underside of 95.



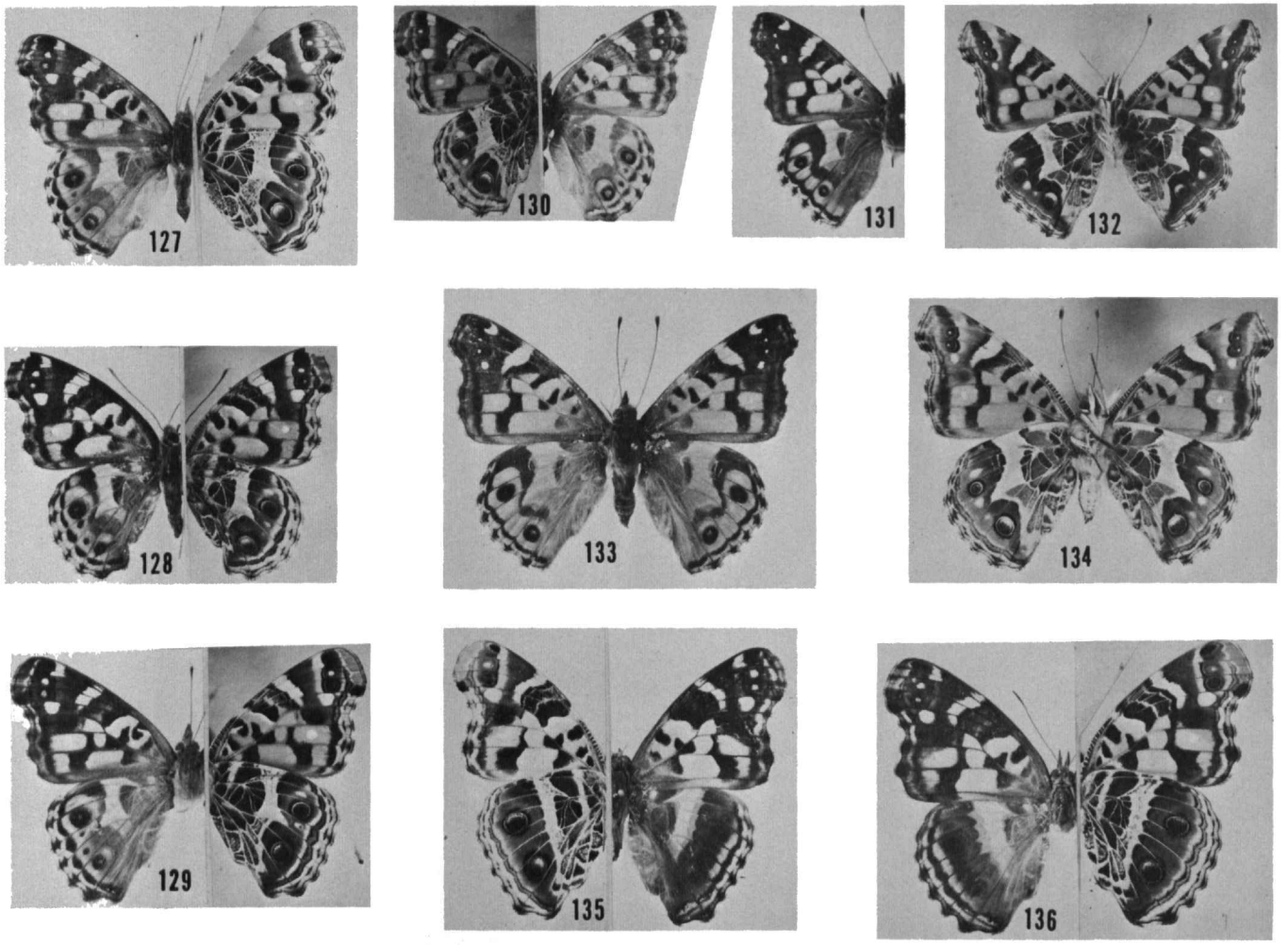
FIGURES 97–104.—*Cynthia cardui*, females: 97 (Friedland, Czechoslovakia); 98, underside of 97; 99 (Spetsai Island, Greece); 100, underside of 99; 101 (Oeda, Japan); 102 (Madagascar); 103 (Washington, District of Columbia); 104, underside of 103.



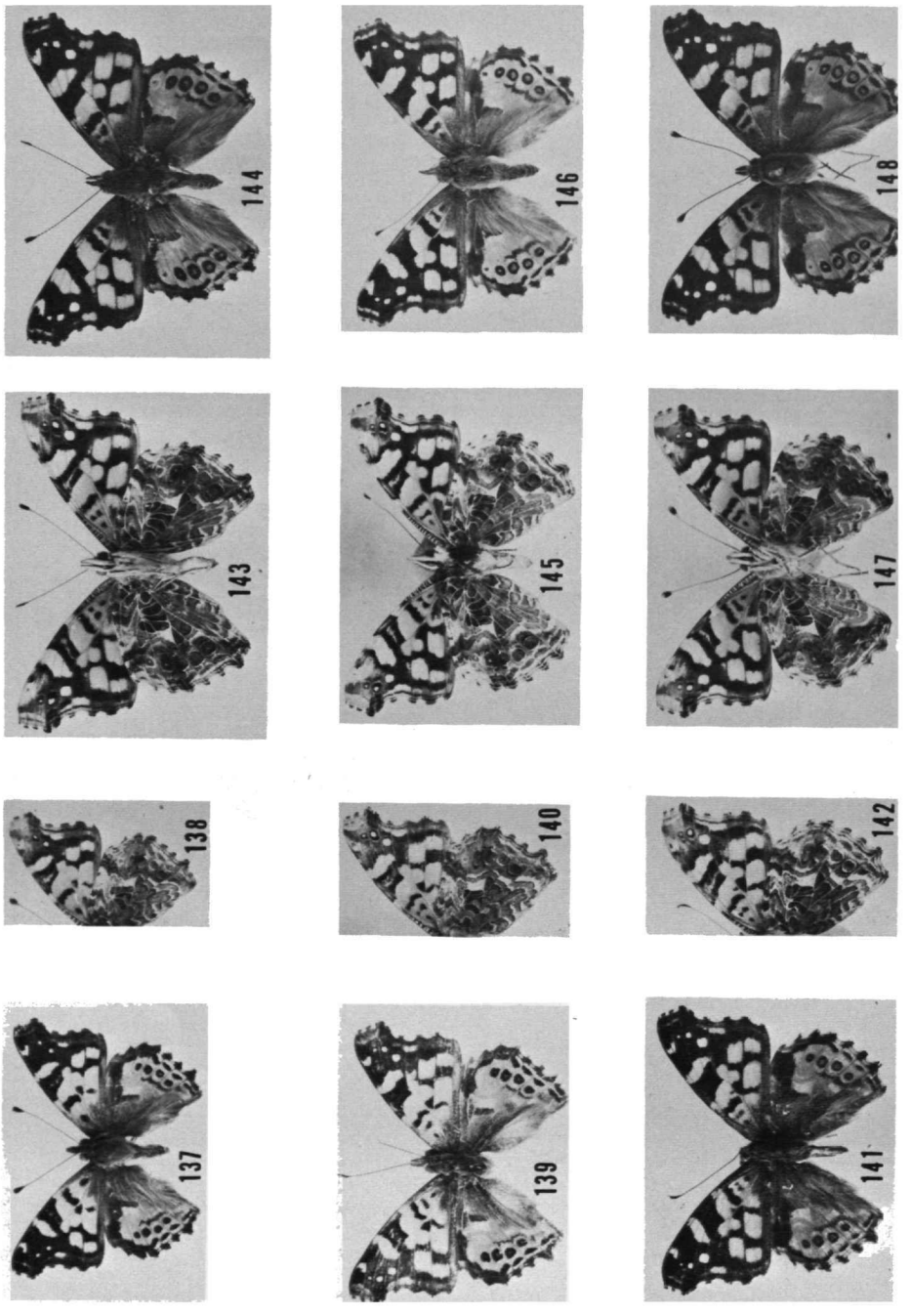
FIGURES 105–116.—*Cynthia kershawi:* 105, ♂ (Colo Vale, New South Wales, Australia); 106, underside of 105; 107, ♀ (Birchip, Australia); 108, underside of 107. *Cynthia virginiensis:* 109, ♂ (Princess Anne, Virginia); 110, underside of 109; 111, ♀ (South Carolina); 112, underside of 111; 113, ♂ (Allegany State Park, New York); 114, ♂ (Princess Anne, Virginia); 115, ♂ (Rio de Janeiro, Brazil); 116, underside of 115.



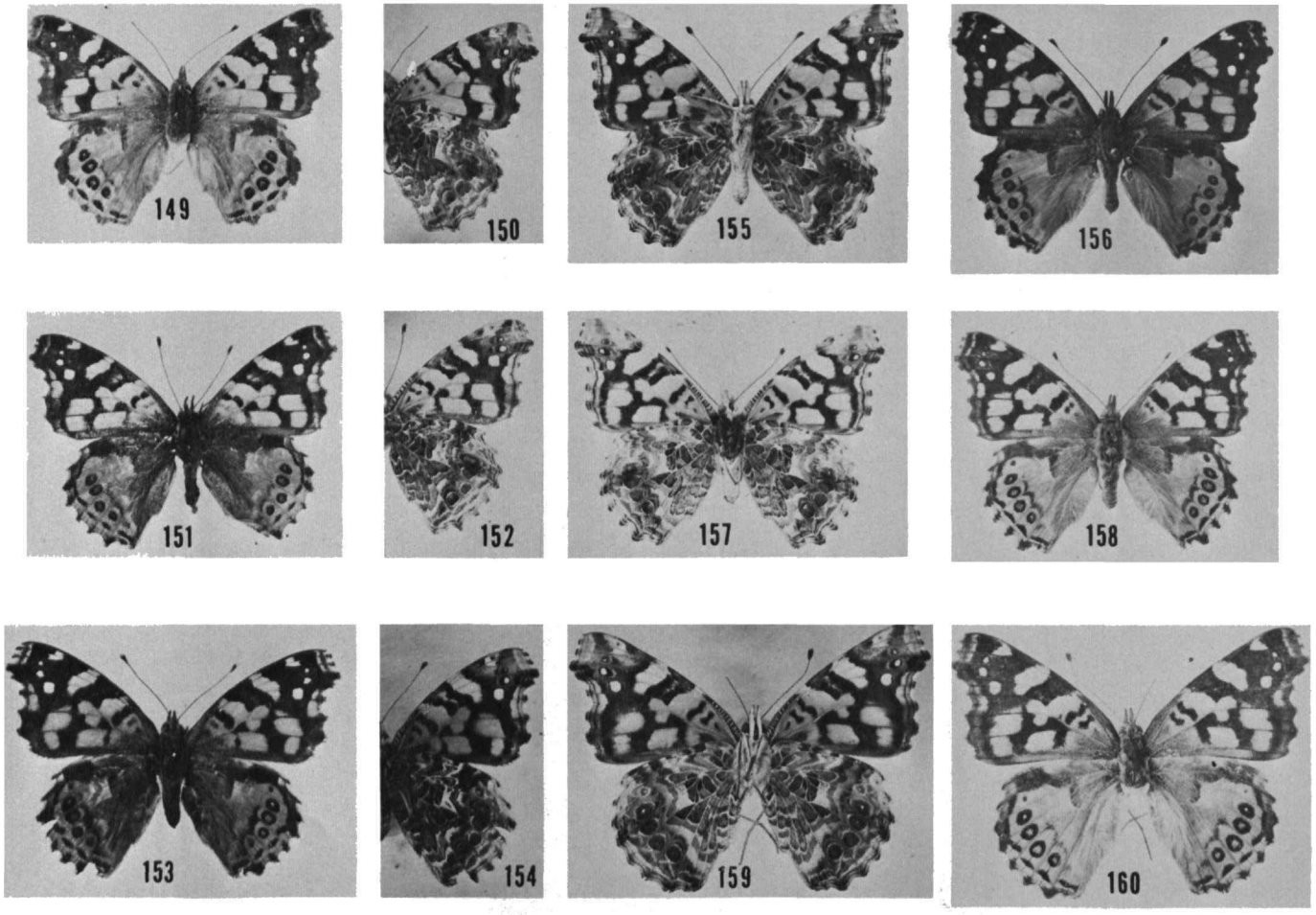
FIGURES 117–126.—*Cynthia virginiensis:* 117, ♀ (Sherando Lake, Virginia); 118, ♀ (Pluckemin, New Jersey). *Cynthia altissima:* 119, ♂ (Agulani, Peru, 9,000 ft, syntype); 120, underside of 119; 121, ♀ (Gusilluni, Bolivia); 112, underside of 121. *Cynthia braziliensis;* 123, ♂ (Brazil); 124, ♂ (Oroya, Peru); 125, underside of 124; 126, ♂ (Boliva).



FIGURES 127–136.—*Cynthia braziliensis:* 127, ♀ (Blumenau, Santa Catarina, Brazil); 128, ♀ (Pelota, Rio Grande do Sul, Brazil); 129, ♀ (Montevideo, Uruguay); 130, ♀ (Cuzco, Peru). *Cynthia terpsichore:* 131, ♂ (Andes of Chile, 6,000 ft); 132, underside of 131; 133, ♀ (Chile); 134, underside of 133. *Cynthia myrinna:* 135, ♂ (Santa Catarina, Brazil); 136, ♀ (Santa Catarina, Brazil).



FIGURES 137–148.—*Cynthia carye*, males: 137 (Macul, Chile); 138, underside of 137; 139 (Temco, Chile); 140, underside of 139; 141 (Belen, Bolivia); 142, underside of 141. *Cynthia annabella*, males: 143 (holotype, Arroyo Verde Park, Ventura, California); 144, upper side of 143; 145, (paratype, San Francisco, California); 146, upper side of 145; 147 (Reno, Nevada); 148, upper side of 147.



FIGURES 149–160.—*Cynthia carye*, females: 149 (Angol, Chile); 150, underside of 149; 151 (Belen Station, Atchacachi, Bolivia); 152, underside of 151; 153 (Masafucra, Las Chozas, Juan Fernández Islands, Chile); 154, underside 153. *Cynthia annabella*, females: 155 (allotype, Arroyo Verde Park, Ventura, California); 156, upper side of 155; 157 (San Francisco, California); 158, upper side of 157; 159 (Godman Springs, Blue Mountains, Washington); 160, upper side of 159.

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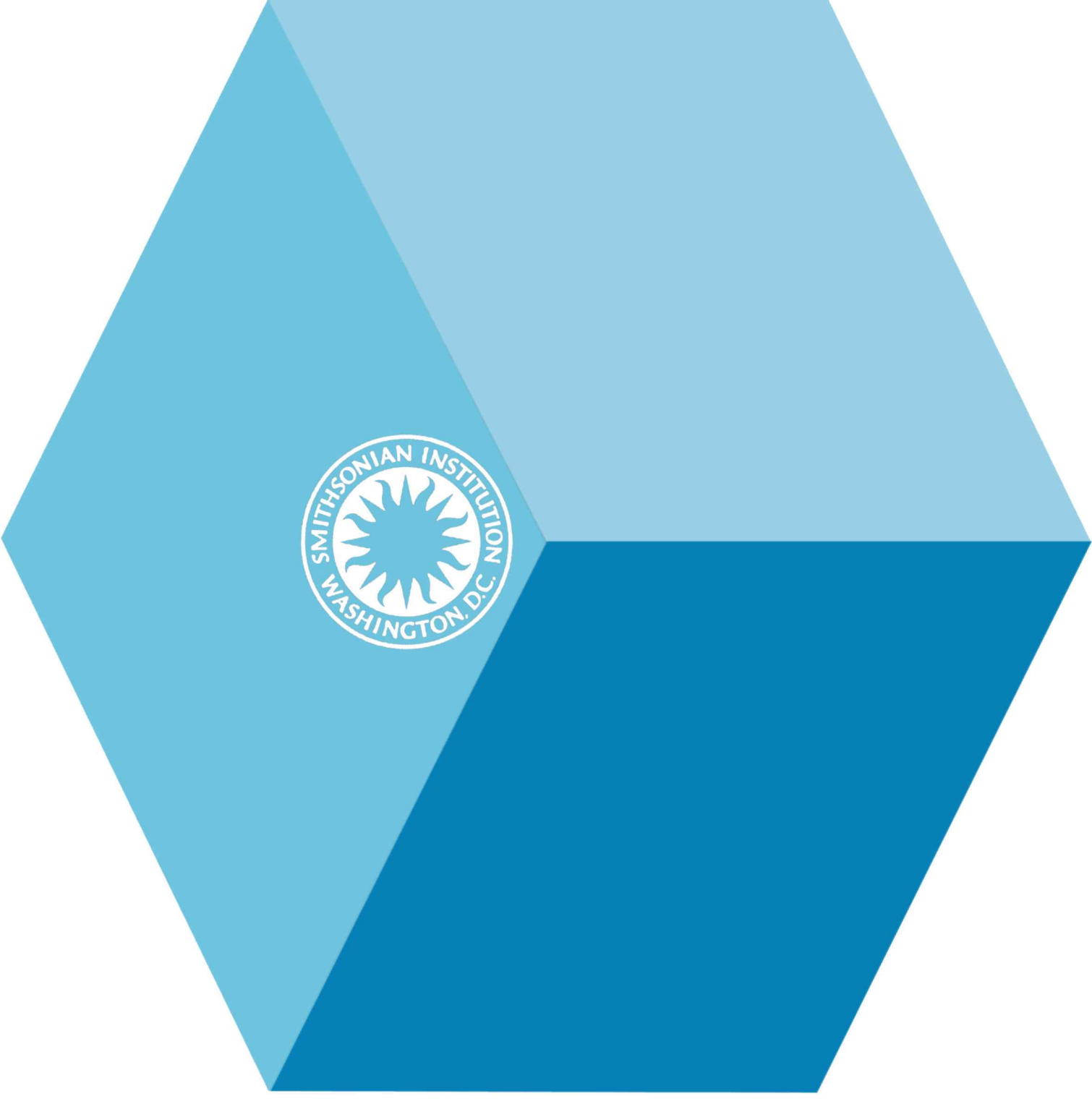
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