The Pierid Butterflies of the Genera *Hypsochila* Ureta, *Phulia* Herrich-Schäffer, *Infraphulia* Field, *Pierphulia* Field, and *Piercolias* Staudinger

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The Pierid Butterflies of the Genera *Hypsochila* Ureta, *Phulia* Herrich-Schäffer, *Infraphulia* Field, *Pierphulia* Field, and *Piercolias* Staudinger

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ABSTRACT

Field, William D., and José Herrera. The Pierid Butterflies of the Genera *Hypsochila* Ureta, *Phulia* Herrich-Schäffer, *Infraphulia* Field, *Pierphulia* Field, and *Piercolias* Staudinger. *Smithsonian Contributions to Zoology,* number 232, 64 pages, 198 figures, 5 maps, 1977.—The Andean genera *Hypsochila, Phulia, Infraphulia, Pierphulia,* and *Piercolias* are revised. Keys to the genera, species, and subspecies are provided. *Infraphulia* and *Pierphulia* are raised from subgeneric to generic status. *Infraphulia ilyodes* (Ureta) and *Pierphulia rosea* (Ureta) are raised from subspecific to specific status and *Piercolias coropunae* (Dyar) is raised from synonymy. The new taxa are: *Phulia paranympha ernesta, P. garleppi, Infraphulia madeleinea, Pierphulia rosea maria, P. rosea annamariea, P. isabela,* and *Piercolias forsteri.* The natural history, zoogeography, and classification are discussed. The species and subspecies are reviewed regarding their taxonomic history, identity, morphology, natural history, and distribution. Photographs of the adults and drawings of the male and female genitalia, venation, and claws are given. Maps illustrating the distribution of the genera and species are included.

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Contents

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William D. Field
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Introduction

This is the third and last in a series of papers by the authors treating the "Tatocheilae-Phulia" branch (Klots, 1933) of the pierid family tree. Of this branch of nine genera two, *Theochila* Field and *Tatochila* Butler, have been revised earlier by Herrera and Field (1959) and a third recently described genus, *Reliquia* Ackery (1975), closely related to *Tatochila,* are not further discussed here. A fourth genus, *Baltia* Moore, found in the Himalayan Mountains of Asia was redefined in the first of this series of papers (Field, 1958) and is outside the scope of the present treatment. In this paper we are presenting revisions of the five remaining New World genera: *Hypsochila* Ureta, *Phulia* Herrich-Schäffer, *Infraphulia* Field, *Pierphulia* Field, and *Piercolias* Staudinger.

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We wish to acknowledge the assistance of Mrs. Vera Milbank, a former museum technician for bibliographic aid. Mr. George L. Venable of our staff of professional artists prepared all of the drawings, the maps, and the painting (Figure 105).

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Mr. Victor E. Krantz of the Smithsonian Institution photo laboratory made all of the photographs.

Natural History

There is no recorded information concerning adult dispersal, mate selection, and courtship behavior of the 19 species we assign to these 5 genera. The life histories are also unknown for these species. Even the food plants are unknown except that there are suspected food plants for two species. Several species have had their flight and resting habits recorded and several have been observed as adults visiting a few flowers. Observations have been made upon a number of species as to the type of terrain and environment they seem to prefer as life habitats. The season of adult flight expressed by the names of the months in which they have been captured are given under "Distribution" for the various species. What little other natural history that is known is given under the "natural history" heading in the treatments of the following species and subspecies: *Hypsochila galactodice, H. wagenknechti wagenknechti, H. wagenknechti sulfurodice, H. penai, Phulia nymphula nymphula, P. paranympha paranympha, Infraphulia illimani, I. ilyodes, Pierphulia nysias nysias, P. rosea rosea, P. rosea annamariea,* and *Piercolias huanaco.*

Zoogeography

These particular pierid butterfly genera are peculiar to the fauna of the high Andes. According to Forster (1958) and Mani (1968) they are the result of the migration of boreal elements from the Holarctic region to the high altitudes on the tropical mountains of Peru, Bolivia, Chile, and Argentina with the last of these migrations occurring as late as the post-Pleistocene. Mani (1968:193) states:

> The faunal movements were perhaps not as extensive as they have been in the Old World, due to the Pleistocene conditions in South America. The occurrence of such genera like *Phulia* Herrich-Schäffer and *Piercolias* Staudinger on the Bolivian Andes and [*Baltia*] on the Pamirs Region evidently indicate pre-Pleistocene differentiation of these genera. The numerous closely related species of these genera from the Bolivian Andes represent, however post-Pleistocene origin. The great similarity of the High Andes species to those from the Pamirs and other Middle Asiatic mountains must either be due to true faunal affinity or must be attributed to convergent evolution of related groups under comparable conditions of ecology.

In support to there being a true affinity between the pierid fauna of the Himalayan mountains and the High Andes or between *Baltia* of the former region and *Piercolias, Pierphulia, Infraphulia,* and *Phulia* of the latter region we cite the resemblance in wing habitus and the similarity in venation, in the shape of the claws, and in characters of the male and female genitalia of all of these genera (see Field, 1958). In this connection we call attention especially to the great similarity in the female genitalia of *Pierphulia* (present paper, Figures 157, 158) with the female genitalia of *Baltia* (Field, 1958, fig. 33).

For the known geographical and altitudinal distribution see the discussion under each of the genera and species treated below.

Classification

The relationships between the five genera treated in this paper were found to be very complex. Collectively they display four types of unci, two distinct types of valvae, two types of venation, two types of claws, two distinctly different signae, and three different types of color patterns.

The use of any one of these kinds of characters alone gives an alignment at variance with the alignment that results from the use of any of the other kinds of characters taken alone. Thus, a consideration of the uncus (in the male genitalia) alone shows *Phulia, Infraphulia, Pierphulia,* and *Piercolias* to be quite distinct from one another, while *Hypsochila* and *Phulia* would be considered very close to each other. Considering the valvae (in the male genitalia) alone, the genera *Piercolias, Hypsochila,* and *Phulia* would seem to be nearly identical, having these structures acuminate, while the genera *Infraphulia* and *Pierphulia* would be placed an inordinate distance from them because of their rounded valvae. Again, if we placed too much emphasis upon the claws we would place *Infraphulia* an unreasonable distance from all of the other genera. A consideration of the radial veins taken by itself would give us the unnatural alignment of having *Hypsochila* and *Piercolias* at one end with four radial veins and one species of

Infraphulia at the other end with two radial veins, while the remaining two species of *Infraphulia* and the genera *Phulia* and *Pierphulia* would be in the middle with three radial veins. If we considered wing habitus alone, *Hypsochila, Phulia,* and *Piercolias* would be considered very distinct from each other and *Infraphulia* would not be considered distinctly different from *Phulia* nor would *Pierphulia* be considered distinctly different from *Piercolias,* in spite of their very different genitalia and other characters.

It became obvious, if we were going to attain a natural classification, that all possible characters had to be considered and used. The result was that sometimes special importance was given to a single structure in one genus or in several genera and that much less importance had to be given that character in another genus or in several other genera.

All five of the genera treated in this paper lack the tibial spurs usually found on the middle and hind legs in the Pieridae. The lack of these tibial spurs caused Ureta (1963:97) to erect a new subfamily in the Pieridae, which he called Hypsochilinae. We do not recognize this subfamily, as the genera *Theochila* Field, *Tatochila* Butler, and *Reliquia* Ackery, which do not lack these tibial spurs, are much too closely related to these five genera to warrant their being removed to another subfamily. We follow Klots (1933) and place all of these genera in the tribe Pierini of the subfamily Pierinae.

Key to the Genera

1. Forewing with 4 radial veins (Figures 162–167, 178–180) 2
   Forewing with 2 or 3 radial veins (Figures 168–177) 3
2. Forewing with vein R_2 from apex of discal cell (Figures 178–180); with humeral angle of hind wing greatly produced; male genitalia with subscaphium large and heavily sclerotized, bifurcate distally and sharply pointed at opposite end (Figures 141–143); uncus slender and gradually produced into a long finger-like process (Figures 141–143) ..... ***Piercolias*** Staudinger
   Forewing with vein R_2 from discal cell distinctly before apex of this cell (Figures 162–167); with humeral angle of hind wing not greatly produced; male genitalia with subscaphium absent or if present (Figure 126) weakly sclerotized and not shaped as described above; uncus short and broad, not elongated as described above (Figures 126–131) ..... ***Hypsochila*** Ureta
3. Hind wing below with a narrow black bar through middle of discal cell, a long black streak in interspace Cu_2 and black streaks on each side of the veins, at least on outer margin (Figures 45–48, 69–88, 106–110); male genitalia with subscaphium absent, with clasper flap on inner face of valva present (Figures 132–138) 4
   Hind wing below not as described above, heavily irrorated with black and white scales and sometimes with pink scales having a gray or pinkish gray appearance (Figures 105, 111–119, 122–125); male genitalia with subscaphium present and without a clasper flap on inner face of valva (Figures 139, 140) ..... ***Pierphulia*** Field
4. Claw in lateral view greatly curved along dorsal margin (Figures 191–193); male genitalia with valva broadly produced apically and lacking the apical process, uncus in ventral view with lateroventral wall not at all folded inward (Figures 136–138); female with eighth tergite of abdomen unsclerotized in dorsal region forming 2 subtriangular lateral plates (Figures 154–156); female genitalia with inner genital plate greatly reduced and smooth (not setulose) and lacking a posterior finger-like process (Figures 154–156) ..... ***Infraphulia*** Field
   Claw in lateral view not as greatly curved along dorsal margin (Figures 187–190); male genitalia with valva having a strong distal process, uncus in ventral view with lateroventral wall folded inward and closely appressed upon its inner side (Figures 132–135); female with eighth tergite of abdomen entirely sclerotized and semiannulate (Figures 150–153); female genitalia with inner genital plate consisting of a broad subtriangular-shaped anterior lobe and a smaller finger-like projection posterior to this, both of these structures thickly setulose on their outer faces (Figures 150–153) ..... ***Phulia*** Herrich-Schäffer

Genus *Hypsochila* Ureta

FIGURES 1–27, 37–39, 126–131, 144–149, 162–167, 181–186; MAP 1

Hypsochila Ureta, 1955:58–69, pl. 1: figs. 1–3, pl. 2: figs. 1–4; 1956:160–161.—Field, 1958:104, 105, 106, 110, figs. 3, 11, 19, 27, 36.—Ureta, 1963:97–98.—Hemming, 1967:228.—Peña, 1968:140–141.

Hypsochila (*Chionanema*) Ureta, 1955:66–67, pl. 1: fig. 3, pl. 2: fig. 4.—Field, 1958:112.—Ureta, 1963:97–98. [New synonymy.]

Hypsochila (*Hypsochila*).—Field, 1958:111, 112.

Hypsochila (*Chianomema* [sic]).—Peña, 1963:215.

Chionanema.—Hemming, 1967:111. [Listing in a Nomenclator, not a raise in status.]

Hypsochila (*Chianonema* [sic]).—Peña, 1970:262; 1974b:39.

TYPE-SPECIES.—*Tatochila microdice* f. *wagenknechti* Ureta = *Hypsochila wagenknechto* (Ureta). Type by original designation.

This genus differs from all the related genera in having a silvery sheen on base of forewing extending to near middle of discal cell, especially noticeable in the male sex. From *Tatochila* Butler and *Theochila* Field (Field, 1958; Herrera and Field, 1959) it differs in lacking tibial spurs on the mid and hind legs. From *Phulia, Pierphulia,* and *Infraphulia* it differs in having four radial veins present on the forewing and from *Infraphulia, Pierphulia,* and *Piercolias* it differs in structures of the male and female genitalia.

Wings above (Figures 1–12, 25–27) with ground color white in the male sex, white, yellowish white to brown or gray in the female sex, and in both sexes with the silvery sheen at base extending throughout most of the discal cell of the forewing, otherwise similar to *Tatochila,* having the discal spot present on forewing on both surfaces and having the black marginal sagittate markings in apex of forewing, with a submarginal series of spots or a solid band inward from these markings. Undersurfaces (Figures 13–24, 37–39) with ground color of hind wing and apex of forewing yellow with veins in these areas overlaid with white or sometimes with black and with adjacent fuscous stripes.

Leg with claw (Figures 181–186) directed outward with its dorsal margin only gradually curved downward and relatively long, three or nearly three times as long as width at base. Tooth divergent from main portion of claw, originating from near the middle of claw and relatively small, having its dorsal margin less and usually much less than width of claw at base. Pulvillus relatively broad with distal subsegment not setulose at base. Paronychium long, much more than one-half length of claw.

Venation of *Hypsochila* (Figures 162–167) similar to that of *Tatochila* and *Theochila,* differing in having M_2 of forewing from apex of discal cell or from very near apex of this cell. Forewing with four radial veins, R_5 having anastomosed with R_4 and thus distinctly different from *Phulia* (Figures 168–171), *Infraphulia* (Figures 172–174), and *Pierphulia* (Figures 175–177), where the radial veins are further reduced to three. In *Hypsochila* only M_1 is anastomosed with the stem of $R_3 + R_{4+5}$ for a short distance beyond the apex of discal cell, while in *Phulia, Infraphulia,* and *Pierphulia* both M_1 and M_2 are anastomosed with the stem of the last radial vein from apex of this cell and for some distance beyond.

Male genitalia (Figures 126–131) with uncus, valva, and anellus very similar to those of *Tatochila* and *Phulia;* valva with a strong distal process; subscaphium absent or sometimes very faintly indicated; lateroventral wall at base of uncus well folded inward and closely appressed upon its inner side; aedeagus in lateral view about as broad distally as through the middle, deeply incised both dorsally and ventrally from one-third to more than one-half its entire length and similar to that of the *Xanthodice* group of *Tatochila* (Herrera and Field, 1959, figs. 39, 40).

Female genitalia (Figures 144–149) with ductus bursae very similar to *Tatochila,* differing chiefly in the reduced sclerotization, being either not at all sclerotized or having very small sclerotized areas immediately anterior to the ostium. Eighth tergite and sternite as in *Tatochila* and *Phulia,* with inner genital plate not reduced, divided into a broad subtriangular-shaped anterior lobe and a smaller finger-like projection posterior to this and with both of these parts entirely and thickly setulose on their outer faces.

The species of *Hypsochila* are all very similar in the male and female genitalia and are figured in this paper mainly to show their great similarity.

SYNONYMICAL NOTE.—*Chionanema* Ureta was erected as a subgenus with *Hypsochila penai* Ureta as its type-species and sole included species. This proposed subgenus was described as differing from the nominate subgenus in having a straighter costal

margin on forewing with a narrower discal cell as well as in certain susposed venational characters. In the senior author's earlier treatment of *Hypsochila* (1959:110–112), *Chionanema* was retained as a subgenus principally because specimens were not available for study. This author's doubts were expressed, however, as the characters selected by Ureta for this subgenus did not seem to him to be of more than specific value. A thorough study of specimens representing both sexes by the present authors show that none of the characters mentioned by Ureta are of more than specific value and some of them represent only individual variation; we therefore synonymize *Chionanema* to *Hypsochila*.

ETYMOLOGY.—The name *Hypsochila* is a feminine noun derived from the Greek classical words *hypsos* meaning "height" and *cheilos* meaning "a margin, lip, or brim." The spelling "*chila*" has come to be used as an ending for the names of a number of genera of pierid butterflies.

This genus (see Map 1) is found only in the southern half of South America, with species that are distributed from Tierra del Fuego north through the Andes of southern and western Argentina into the Province of Mendoza, Argentina, and north through the Andes of Chile almost to the border between Chile and Peru. This genus is represented by species *(H. argyrodice, H. microdice)* that fly at lower elevations in the southern part of the Continent and by species that fly at higher and still higher elevations northward. *Hypsochila huemul* flies near Lake Aluminé, Territory of Neuquén at about 1200 meters and at Lonquimay, Province of Malleco, Chile between 1500 and 1800 meters. *Hypsochila galactodice* flies together with *H. huemul* in the southernmost part of its range and farther north flies at about 2000 meters. *Hypsochila wagenknechti wagenknechti* flies in the mountains of the Province of Colchagua, Chile at an elevation of about 2200 meters and in the Province of Coquimbo between 3200 and 3700 meters, while farther north *H. wagenknechti sulfurodice* flies in the mountains of the Province of Antofagasta, Chile at from 3200 to 3900 meters and still farther north in the Province of Tarapacá at from 2800 to 4500 meters. *Hypsochila penai* known from one population in the western part of the Province of Antofagasta close to the extreme southwest border of Bolivia flies at from 5000 to 5200 meters.

The genus *Hypsochila* contains six species: *H. argyrodice* (Staudinger), *H. microdice* (Blanchard), *H. huemul* Peña, *H. galactodice* Ureta, *H. wagenknechti* (Ureta), and *H. penai* Ureta. We divide *H. wagenknechti* into two subspecies: *H. wagenknechti wagenknechti* (Ureta) and *H. wagenknechti sulfurodice* Ureta. Five of the six species of *Hypsochila* (that is all but *H. penai*) are very closely related and could be considered subspecies of a single widely distributed species. However, since two of these species are known to fly at the same time in at least two of the same localities and since almost nothing is known of the natural history of any species in this genus, we have taken what we consider to be a conservative approach and have allowed these five taxa to stand as species as they were originally described.

Key to the Species and Subspecies of *Hypsochila*

1. Males 2
   Females 8
2. Hind wing on uppersurface entirely white 3
   Hind wing on uppersurface with black scaling on the veins at the outer margin extending inward for a short distance (Figure 5) ..... 3. ***H. huemul*** Peña
3. Black spot at end of discal cell on uppersurface of forewing large (Figures 7, 25) ..... ***4. H. galactodice*** Ureta
   Black spot at end of discal cell on uppersurface of forewing small (Figures 1, 3, 9, 11, 26) 4
4. Apex of forewing on uppersurfaces covered with a large amount of black or fuscous coloring; ground color of wings on undersurfaces white (Figures 26, 38) ..... 6. ***H. penai*** Ureta
   Apex of forewing on uppersurfaces with a much smaller amount of black or fuscous; ground color of wings on undersurfaces yellow (Figures 1, 3, 9, 11, 13, 15, 21, 23) 5
5. Subapical row of black spots on uppersurface of forewing extending into interspace M_3 (Figure 3) ..... 2. ***H. microdice*** (Blanchard)
   Subapical row of black spots on uppersurface of forewing not extending below interspace M_3 (Figures 1, 9, 11) 6

6. Forewing apically rounded not greatly produced; uppersurface of forewing with a small black spot on the margin at end of vein Cu_1 (Figures 9, 11) ..... 5. ***H. wagenknechti*** (Ureta) 7

Forewing apically produced and pointed; uppersurface of forewing lacking this black spot (Figure 1) ..... 1. ***H. argyrodice*** (Staudinger)

7. Ground color of hind wing on undersurface pale yellow ..... 5a. ***H. wagenknechti wagenknechti*** (Ureta)

Ground color of hind wing on undersurface darker sulphur yellow ..... 5b. ***H. wagenknechti sulfurodice*** Ureta

8. Veins on undersurface of hind wing covered with fuscous scales (Figure 39) ..... 6. ***H. penai*** Ureta

Veins on undersurface of hind wing covered with white scales (Figures 14, 16, 18, 20, 22, 24) 9

9. Black spot at end of discal cell on uppersurface of forewing large (Figure 8) ..... 4. ***H. galactodice*** Ureta

Black spot at end of discal cell on uppersurface of forewing small (Figures 2, 4, 6, 10, 12) 10

10. Ground color of uppersurfaces of wings pale brown (Figure 2) ..... 1. ***H. argyrodice (Staudinger)***

Ground color of uppersurfaces of wings white, yellowish white or yellow (Figures 4, 6, 10, 12) 11

11. Basal one-half or more of uppersurfaces of wings lacking dark scaling along veins (Figures 10, 12) ..... 5. ***H. wagenknechti*** (Ureta) 12

Basal one-half or more of uppersurface of wings with dark scaling along veins (Figures 4, 6) 13

12. Ground color of hind wing on undersurface pale yellow ..... 5a. ***H. wagenknechti wagenknechti*** (Ureta)

Ground color of hind wing on undersurface darker sulphur yellow ..... 5b. ***H. wagenknechti sulfurodice*** Ureta

13. Apex of broad lobe of inner genital plate folded inward, ventral margin of this lobe only slightly infolded (Figure 146) ..... 3. ***H. huemul*** Peña

Apex of broad lobe of inner genital plate not folded inward, ventral margin of this lobe greatly infolded (Figure 145) ..... 2. ***H. microdice*** (Blanchard)

1. *Hypsochila argyrodice* (Staudinger)

FIGURES 1, 2, 13, 14, 126, 144, 162, 181; MAP 1

Tatochila argyrodice Staudinger, 1899:5, 6, 14–17, 18, [119], pl. [1]: fig. 11.—Elwes, 1903:292 [in part].—Röber, 1908:56, pl. 18: fig. *c*–4; 1909b:56, pl. 18: fig. *c*–4.—Giacomelli, 1915: 405, 406, 411, 414, 415; 1916:44, 46, 54–55, 57, pl. 3: fig. 5.—Jörgensen, 1916:439, 440, 443, 457, 469–470.—Giacomelli, 1917:378.—Talbot, 1932:58.—Breyer, 1939:30.—Hayward, 1951:92.

Hypsochila (Hypsochila) argyrodice.—Field, 1958:111.

MALE (Figures 1, 13, photographs of a specimen from "Patagonia").—This is a relatively large species, distinctly larger than any of the other species except *H. galactodice*. The forewings are apically produced and more pointed than in the other *Hypsochila* species, with fuscous or black markings on the apical area of this wing greatly reduced. On the undersurfaces the wings are more intense yellow than in the other species except *H. galactodice* and it differs from all the other species in having orange streaks between the veins on the apex of the forewing and along costal margin of hind wing.

Length of forewing, 25–27 mm.

FEMALE (Figures 2, 14, photographs of the lectotype).—Wings with fuscous markings and scaling above and below even more extensive than in either *H. microdice* or *H. huemul*.

Length of forewing, 22 mm.

VENATION (Figure 162).—Similar to that of *H. microdice* (Figure 163) except that vein M_2 in the forewing arises from distinctly below apex of cell.

CLAW, PARONYCHIUM, AND PULVILLUS (Figure 181).—Claw with ventral tooth short as in *H. huemul* (Figure 183) but with base of claw wider, paronychium similar to all the other species of *Hypsochila*, pulvillus with tip larger than in the other species.

GENITALIA (Figure 126, male, drawn from preparation WDF 5752; Figure 144, female, drawn

from preparation WDF 5751).—Very similar to the male and female genitalia of the other species in this genus.

TYPE DATA.—The type locality is "Ushuaia," Territory of Tierra del Fuego, Argentina. This subspecies was described from two females (syntypes) captured on 20 November and 14 December, 1892 by Dr. Johann Wilhelm Michaelsen and now in the collection of the Zoological Museum, Humboldt University, East Berlin. The syntype illustrated in the present paper (Figures 2, 14), the specimen collected on 14 December 1892, is hereby designated the lectotype and has been so labeled.

ETYMOLOGY.—The name *argyrodice* is a feminine noun in the nominative singular in apposition with the generic name. "Argyro" is derived from the Greek *argyros* meaning "silver." The "dice" ending of this name is a commonly used suffix or compounding element often used for the names of pierid butterflies (see under *H. microdice* for additional explanation). The silver refers to the reflections found on the base of the forewing, present in all species of *Hypsochila*.

DISTRIBUTION (see Map 1).—This species is known at present only from the extreme southern part of Tierra del Fuego, Argentina, and from southern Chile.

MATERIAL EXAMINED.—We had for study, in addition to the two female syntypes, a male simply labeled "Patagonien" (collected by C. Berg) and a male and a female from Cerro Castillo, Province of Magallanes, Chile (January) (collected by J. Herrera).

2. *Hypsochila microdice* (Blanchard), new combination

FIGURES 3, 4, 15, 16, 127, 145, 163, 182; MAP 1

Pieris microdice Blanchard, 1852:14.—Kirby, 1871:451.
Tatochila microdice.—Jörgensen, 1916:439, 440, 443, 449, 451–452, 460, 465.—Hayward, 1951:93 [in part].—Herrera and Field, 1959:488 [in part].—Hayward, 1962:21 [in part].
Tatochila microdice microdice.—Ureta, 1938a:272 [in part]; 1938c:123 [in part].
Hypsochila argyrodice.—Peña, 1964:153 [not Staudinger, a misidentification].

MALE (Figures 3, 15, photographs of the lectotype).—This species closely resembles *H. huemul*, differing in being slightly smaller and in lacking the black scaling on the veins at the outer margin of the hind wing on the uppersurface. Undersurface of hind wing and apex of forewing with ground color yellow and with veins pale gray, nearly white, outlined on both sides by lilac gray and with a white spot over the lower discocellular vein and adjacent area. Submarginal sagittate markings on this surface of hind wing and in the apex of the forewing dark brown or black and rather indistinct.

Length of forewing, 18–20 mm (average 19 mm).

FEMALE (Figures 4, 16, photographs of the allolectotype).—Wings on uppersurface white or yellowish white with dark markings, sometimes extensive and sometimes nearly lacking on their bases. These dark markings not as extensive as in *H. argyrodice*. Undersurface of wings as in the male except with all dark scaling more extensive.

Length of forewing, 17–22.5 mm (average 19.8 mm).

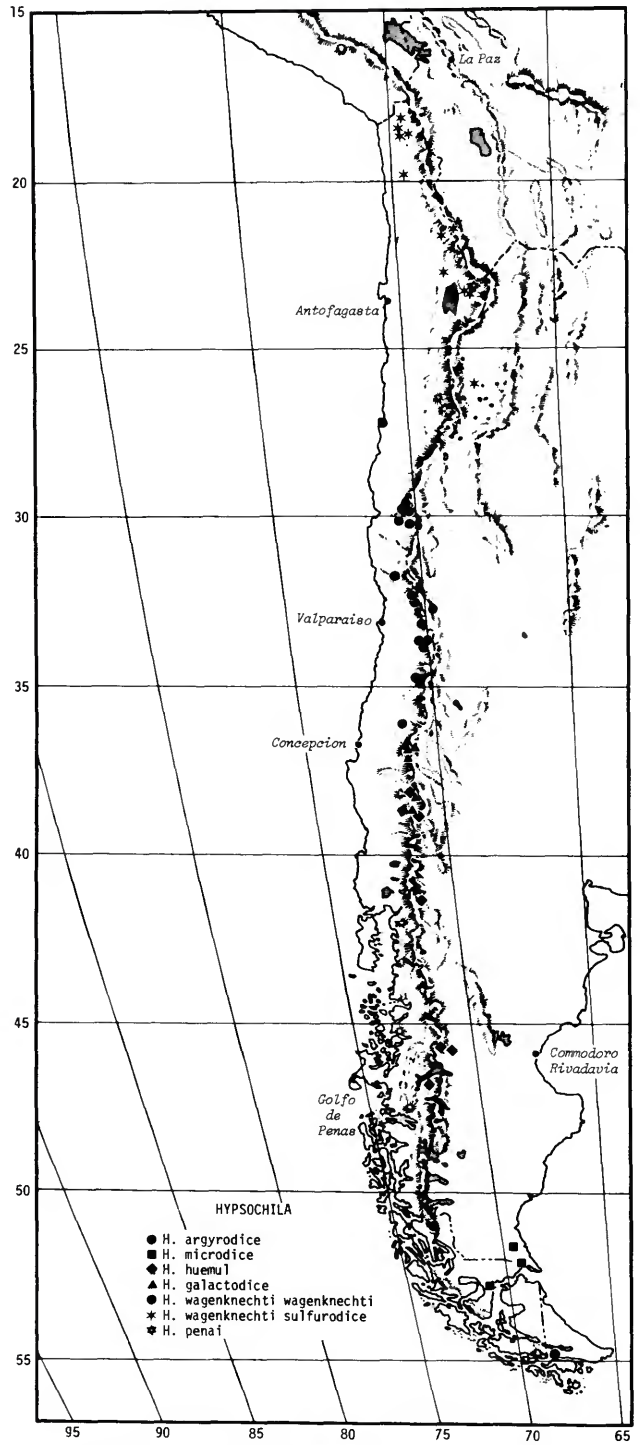
VENATION (Figure 163).—Similar to that of *H. argyrodice* (Figure 162) except vein M_2 in the forewing arises from apex of cell.

CLAW, PARONYCHIUM, AND PULVILLUS (Figure 182).—Claw with ventral tooth rather large and with main element of claw more slender than in the other species of *Hypsochila*, paronychium similar to all the other species of *Hypsochila*, pulvillus small about as in *H. galactodice* (Figure 184) and *H. wagenknechti* (Figure 185).

GENITALIA (Figure 127, male, drawn from preparation WDF 6637; Figure 145, female, drawn from preparation WDF 6640).—Very similar to the other species in the genus. *Hypsochila microdice* differs from *H. huemul* in the female genitalia in having the apex of the broad lobe of inner genital plate not folded inward and with ventral margin of this lobe greatly folded inward.

TYPE DATA.—The type-locality is "Estrecho de Magallanes al havre Pulket [sic]" = Harbor of Pecket, Territory of Magallanes, Chile. This species was described from one male and one female in the Boisduval collection, now in the collection of the British Museum (Natural History). The male is hereby designated the lectotype and the female is hereby designated the allolectotype and these specimens have been so labeled.

MISIDENTIFICATION NOTES.—Herrera and Field (1959:488–490) identified and used the name *microdice* for a species belonging to the genus *Tatochila* because the Blanchard syntypes were thought to be lost and the characters given in the Blanchard description seemed to apply to that



MAP 1.—Distribution of the Genus *Hypsochila* Ureta.

Tatochila species. Later two Blanchard syntypes representing his *Pieris microdice* were discovered in the Boisduval collection of the British Museum (Natural History) and were studied by the senior author (see "Type-Data" above). The genitalia of these syntypes (both sexes were present) show that Blanchard's species belongs to the genus *Hypsochila* and not to the species in *Tatochila* with which we had identified it. Ackery (1975:5) as first reviser of the *Tatochila* species chose the name *Tatochila sterodice* Staudinger for the species we formerly called *T. microdice* (Blanchard).

ETYMOLOGY.—The name *microdice* is a feminine noun in the nominative singular in apposition with the generic name. "Micro" is derived from the Greek *mikros* meaning "small." The "dice" ending of this name is a suffix or compounding element derived from *dike* meaning "law, order, right." This ending has often been used as the ending of names of pierid butterflies and was probably derived from its early use in names such as *daplidice,* a Linnaean name, or *philodice,* a Godart name.

DISTRIBUTION (see Map 1).—This species is found from the west and north bank of the Strait of Magellan, Province of Magallanes, Chile north into the southern part of the Province of Santa Cruz, Argentina.

MATERIAL EXAMINED (10 males, 5 females).—CHILE: *Province of Magallanes,* Harbor of Pecket, Peninsula of Brunswick; Monte Aymond (November). ARGENTINA: *Province of Santa Cruz,* Río Gallegos (July, October).

3. *Hypsochila huemul* Peña

FIGURES 5, 6, 17, 18, 128, 146, 164, 183; MAP 1

Tatochila autodice.—Elwes, 1903, pl. 12: fig. 2 [not Hübner, a misidentification].

Hypsochila (Hypsochila) huemul Peña, 1964:151–154, 3 figs.; 1970:262.

MALE (Figures 5, 6, photographs of paratype).—Wings with ground color white, with inwardly directed sagittate spots at the ends of the veins on the uppersurfaces of both pair of wings, prominent and with discal spot of forewing especially on the uppersurface larger and more distinct than in *H. microdice.* Both pair of wings on the undersurface similar to those of *H. microdice,* differing in having the gray scaling along the veins forming wider stripes.

Length of forewing, 21–24 mm (average 22.5 mm).

FEMALE (Figures 6, 18, photographs of paratype).—As in the male sex the female is slightly larger than the female of *H. microdice* with discal, marginal, and submarginal brown spots on the uppersurface larger. Ground color of wings yellowish white or pale dirty-white.

Length of forewing, 21–23 mm (average 22 mm).

VENATION (Figure 164).—Similar to that of *H. microdice* (Figure 163) in having vein M_2 of forewing arising from apex of cell.

CLAW, PARONYCHIUM, AND PULVILLUS (Figure 183).—Claw with ventral tooth about as in *H. argyrodice* (Figure 181), not as curved and with base of claw not as wide as in that species, paronychium similar to the other *Hypsochila* species, pulvillus intermediate in size between *H. microdice* (Figure 182) and *H. argyrodice.*

GENITALIA (Figure 128, male, drawn from preparation WDF 6582; Figure 146, female, drawn from preparation WDF 6643).—As illustrated, quite similar to the other species of *Hypsochila. Hypsochila huemul* differs from *H. microdice* in the female genitalia in having the apex of the inner genital plate folded inward and with ventral margin of this lobe only slightly folded inward.

TYPE DATA.—The type-locality is "Chile-Chico," Province of "Aysén, Chile." This species was described from the male holotype, female allotype, and 17 male and 8 female paratypes all from the same locality, collected between 24 and 31 December 1960. The holotype and majority of paratypes are in the collection of Luis E. Peña, Santiago, Chile. The allotype and two paratypes are in the collection of the National Museum of Natural History, Santiago, Chile. Other paratypes are in the "Miguel Lillo" Institution of Tucuman, Argentina, and in the National Museum of Natural History, Washington, D. C.

MISIDENTIFICATION NOTE.—Elwes (1903, pl. 12: fig. 2) figures a females of this species from Quillén, Province of Cautín, Chile as *Tatochila autodice* (Hübner).

ETYMOLOGY.—The name *huemul* is an American Indian name treated as a noun in the nominative singular in apposition to the generic name. It is derived from the Araucanian Indian verb "huemin" meaning "to follow someone" and is the popular name of a species of small deer found in the same general region as the butterfly.

DISTRIBUTION (see Map 1).—This species is known at present from Chile-Chico, Province of Aysén, Chile near the border between Chile and Argentina, northeast to Valle Lago Blanco, Territory of Chubut, Argentina and north in Chile into the Province of Cautín to Lago Quillén and east from there into the Territory of Neuquén, Argentina, where it flies near the Río Agrio and at Lake Aluminé at about 1219 meters elevation (Elwes, 1903:292). This species and *H. galactodice* occur together in the Province of Malleco, Chile and in the Province of Neuquén, Argentina.

MATERIAL EXAMINED (14 males, 9 females).—CHILE: *Province of Aysén,* Chile-Chico (December, January). *Province of Malleco,* Lonquimay, Cordillera Las Raíces (December, 1500–1800 meters). ARGENTINA: *Territory of Chubut,* Portezuelo, Río Guenguel (March). *Territory of Neuquén,* Lake Aluminé (February, 1219 meters); Río Agrio. *Nahuel Huapi National Park,* Cerro Catedral, Bariloche (December).

4. *Hypsochila galactodice* Ureta

FIGURES 7, 8, 19, 20, 25, 37, 129, 147, 165, 184; MAP 1

Tatochila microdice f. *sterodice.*—Ureta, 1938a: pl. 12: fig. 5 [not Staudinger, a misidentification].

Hypsochila galactodice Ureta, 1955:65–66, figs. 1, 3; 1956:161, pl. 1: fig. 3*a*.—Field, 1958:111.—Ureta, 1963:97.—Peña, 1964:153.

MALE (Figures 7, 8, photographs of a specimen from Termas, Chillán, Chile; Figures 25, 37, photographs of a specimen from Termas, Río Blanco, Malleco, Chile).—This species differs from all other species of *Hypsochila* in having the forewing broader and in having the black spot at the end of the discal cell on both surfaces of this wing unusually large. On the uppersurface of forewing the series of marginal black spots ends at vein Cu_1, and the series of subapical black spots ends in interspace M_2 or sometimes in interspace M_1.

Length of forewing, 23–37 mm (average 25 mm).

FEMALE (Figures 8, 20, photographs of a specimen from Termas, Chillán, Chile).—Wings on uppersurfaces with ground color white, contrasting greatly with the black color pattern. As in the male with the spot at end of discal cell on forewing unusually large. Differing from the male in having subapical black spots on uppersurfaces of forewing continued as a submarginal row to the hind margin and as a nearly continuous band on this surface of hind wing.

Length of forewing 25–27 mm.

VENATION (Figure 165).—Similar to that of *H. argyrodice* (Figure 162) in having vein M_2 of forewing arising from just below apex of cell but arising closer to stem of vein $R_3+R_{4+5}+M_1$ than in that species.

CLAW, PARONYCHIUM, AND PULVILLUS (Figure 184).—Claw with ventral tooth small, not as small as in *H. penai* (Figure 186) and not as curved as in *H. huemul* (Figure 183), with main element of claw about as in the latter species, paronychium not differing from the other species, pulvillus about the size of *H. microdice* (Figure 182).

GENITALIA (Figure 129, male, drawn from preparation WDF 6661; Figure 147, female, drawn from preparation WDF 6655).—As illustrated and much like the other species in the genus.

TYPE DATA.—The type-locality is "El Roble, origen del Río Ñuble (Chillan)" = El Roble, source of the Río Ñuble, Department of Chillán, Province of Ñuble, Chile. This species was described from the holotype male and from one male paratype, both collected in January 1936 by Emilio Ureta. These specimens are in the collection of the National Museum of Natural History, Santiago, Chile.

MISIDENTIFICATION NOTE.—Ureta at an early date (1938a, pl. 12:fig. 5) identified the present species from El Roble, Chile as *Tatochila microdice* f. *sterodice.*

ETYMOLOGY.—The name *galactodice* is a feminine noun in the nominative singular in apposition with the generic name. "Galacto" is derived from the Greek *galaktos* meaning "milk" and refers to the white ground color of the uppersurface of the wings in this species. The "dice" ending of this name is a commonly used suffix or compounding element often used for the names of pierid butterflies.

NATURAL HISTORY.—The imago has a very strong rapid flight and is said to be wary of man. It is known to visit the yellow flowers or *Quinchamalium* sp.

DISTRIBUTION (see Map 1).—This species flies from Termas Río Blanco and Lonquimay, Province of Malleco, Chile north through the Andes into the Province of Ñuble, Chile and east into the Territory of Neuquén, Argentina. It occurs together with *H. huemul* in the Province of Malleco, Chile and in the Territory of Neuquén, Argentina.

MATERIAL EXAMINED (11 males, 2 females).—CHILE: *Province of Malleco,* Termas Río Blanco (March). *Province of Ñuble,* El Roble; Las Trancas (February); Termas Chillán (January, February, 2000 meters). ARGENTINA: *Territory of Neuquén,* Lagunas de Epulafquén (January).

5. *Hypsochila wagenknechti* (Ureta)

FIGURES 9–12, 21–24, 130, 148, 166, 185; MAP 1

For references see under the subspecies.

MALE (Figures 9, 21, photographs of *H. wagenknechti wagenknechti* from El Yeso, Chile; Figures 11, 23, photographs of *H. wagenknechti sulfurodice* from Mamiña, Tarapacá, Chile).—This species is relatively smaller than *H. galactodice* and has a much smaller black spot at the end of the discal cell on the forewing. It resembles the latter in having subapical series of black spots on uppersurface of forewing ending in interspace M_2 and differs from that species in having this series of spots located closer to the apex.

Length of forewing, 19–26 mm (average 20.2 mm).

FEMALE (Figures 10, 22, photographs of *H. wagenkneckti wagenknechti* from Río Seco, Chile; Figures 12, 24, photographs of *H. wagenknechti sulfurodice* paratype from Putre, Tarapacá, Chile).—This species in this sex is also relatively smaller than *H. galactodice* and has a smaller black spot at the end of the discal cell on the forewing. The subapical and submarginal spots on uppersurface of forewing are closer to the outer margin than in *H. galactodice.* Some females lack the submarginal row of spots on this surface of hind wing and when present they are not as prominent as they are in *H. galactodice.*

Length of forewing, 19–23 mm (average 20.3 mm).

VENATION (Figure 166).—With vein M_2 connate with stem of veins $R_3+R_{4+5}+M_1$.

CLAW, PARONYCHIUM, AND PULVILLUS (Figure 185).—Claw with ventral tooth about as in *H. galactodice* (Figure 184), not as small as in *H. penai* (Figure 186), paronychium not distinctly different from the other species, pulvillus smaller than in the other species except *H. penai,* which has a still smaller pulvillus.

GENITALIA (Figure 130, male, drawn from preparation WDF 6644; Figure 148, female, drawn from preparation WDF 6656).—As illustrated, very much like the other species of *Hypsochila* and figured mainly to show its similarity.

ETYMOLOGY.—The name *wagenknechti* is a masculine noun in the genitive case, a patronym after Rodolfo Wagenknecht, the collector of part of the type series of this species.

DISTRIBUTION (see Map 1).—This species including both subspecies ranges from the Cordillera de Parral, Province of Linares north through central Chile and northern Chile almost to the boundary between Peru and Chile and in the mountains of the Province of Mendoza, Argentina.

This species flies at lower elevations in the southern part of its range and at higher and higher elevations northward. In the southern part of its range it flies at from between 2200 and 2700 meters, gradually being found at higher elevations up to 4500 meters in the Province of Tarapacá, Chile.

5a. *Hypsochila wagenknechti wagenknechti* (Ureta)

FIGURES 9, 10, 21, 22, 130, 148, 166, 185; MAP 1

Tatochila microdice.—Elwes, 1903, pl. 12: fig. 5 [not Blanchard, a misidentification].—Gigoux, 1927:1433 [a misidentification]; 1936:263 [a misidentification].—Ureta, 1936:32 [a misidentification]; 1937:110 [a misidentification].

Tatochila microdice f. *wagenknechti* Ureta, 1938a:278–283, pl. 12: figs. 3, 4; 1938b:123.—Breyer, 1939:29.—Ureta, 1939:297.—Hayward, 1951:93.—Hemming, 1967:228.

Hypsochila wagenknechti wagenknechti.—Ureta, 1955:58, 60–63, figs. 1, 2; 1956:160, pl. 1: fig. 1; 1963:98.—Peña, 1970: 262.

Hypsochila wagenknechti.—Field, 1958:110, 111, 122, 124, 126, 128, 130, figs. 3, 11, 19, 27, 36.

MALE (Figures 9, 21, photographs of a specimen from El Yeso, Chile).—Wings with uppersurfaces white with dark brown or black markings at end of discal cell and in apex of forewing very distinct. Undersurfaces of wings with ground color in apex of forewing and over hind wing much lighter yellow than in *H. wagenknechti sulfurodice,* with veins heavily outlined on both sides by gray scaling in these yellow areas.

Length of forewing, 19–26 mm (average 22.4 mm).

FEMALE (Figures 10, 22, photographs of a specimen from Río Seco, Chile).—Wings on uppersurface white to yellowish white with dark brown or black markings as illustrated. Hind wings varying in amount of these dark markings from having them small and without a submarginal series to having a prominent series of the latter, as well as having the marginal markings more prominent.

Wings on undersurface very similar to the male, with all gray scaling along veins more prominent.

Length of forewing, 20–23 mm (average 22 mm).

TYPE DATA.—The type-locality is "Río Seco, Cordillera de Elqui (Prov. de Coquimbo)," Chile. This species was described from the holotype male (20 February 1937), allotype female (19 February 1937) and from 9 male and 13 female paratypes. Holotype, allotype, 8 male, and 10 female paratypes in the collection of the National Museum of Natural History, Santiago, Chile. Two female paratypes in the Alberto Breyer collection of the National Museum of Natural Sciences, La Plata, Argentina. One male and one female paratypes in the collection of Rodolfo Wagenknecht of Santiago, Chile. Additional "paratypes" designated by Ureta in 1955 (page 62) are metatypes not paratypes.

MISIDENTIFICATION AND OTHER NOTES.—Elwes (1903, pl. 12: fig. 5) identifies as *Tatochila microdice* a "male" specimen from "Juncal," 9000 feet (= 2744 meters) elevation, Province of Aconcagua, Chile. We have examined this specimen and find it to be a female not a male specimen of *H. wagenknechti wagenknechti.*

Although Ureta (1938a:276) first used the term "forma" for the taxon he named *wagenknechti,* it is clear from the context of his description that his use of this term comes within the meaning of the term "subspecies." In 1955 (pages 58, 60–63) Ureta, believing that his earlier name (*Tatochila microdice* f. *wagenknechti*) was not available as first published (because the taxon was not clearly designated a subspecies with a strict trinominal name formula), redescribed this as a new species.

NATURAL HISTORY.—This subspecies, as does *H. wagenknechti sulfurodice,* flies from between 10 in the morning and 3 in the afternoon. It is an extremely swift-flying butterfly and has been observed visiting the flowers of *Aploppapus bailahuen* and *Senecio* sp.

DISTRIBUTION (see Map 1).—This is the subspecies found in the mountains of the Province of Linares in the middle of Chile north through the Provinces of Colchagua, O'Higgins, Santiago, Aconcagua, and Coquimbo and in the mountains of the Province of Mendoza, Argentina.

It flies at about 2200 meters in the Province of Colchagua, up to 3000 meters in the Province of Santiago, up to 3700 meters in the Province of Coquimbo, and has been recorded as occurring at 3863 meters in the Province of Aconcagua.

MATERIAL EXAMINED (14 males, 10 females).—CHILE: *Province of Linares,* Estero de Leiva, Cordillera de Parral. *Province of Colchagua,* La Leonera, Codegua (December, 2200 meters). *Province of O'Higgins,* El Yeso (October). *Province of Santiago,* Baños del Yeso; El Volcán (January, February); Embalse El Yeso (November, 3000 meters); La Yesera, Cajón de San José de Maipo (January, February, 2600 meters). *Province of Aconcagua,* Caracoles (November); Juncal (2744 meters); Portillo (February, March). *Province of Coquimbo,* Baños del Toro (January, 3350 meters); El Toro (3500 meters); Embalse La Laguna (3350 meters); Hacienda Illapel (November, 2600 meters); Mineral Las Hediondas (3400 meters); Quebrada de Bañados, Elqui (March); Río Seco, Cordillera de Elqui (February, 3200–3700 meters). ARGENTINA: *Province of Mendoza,* Las Cuevas; Quebrada de Los Horcones (February).

5b. *Hypsochila wagenknechti sulfurodice* Ureta

FIGURES 11, 12, 23, 24; MAP 1

Hypsochila wagenknechti sulfurodice Ureta, 1955:63–65, fig. 2; 1956:161, pl. 1: figs. 2[*a*]–2[*c*]; 1963:98.

Hypsochila (Hypsochila) wagenknechti sulfurodice.—Peña, 1970:262.

MALE (Figures 11, 12, photographs of a specimen from Mamiña, Tarapacá, Chile).—Wings on both surfaces with dark markings as illustrated, differing from *H. wagenknechti wagenknechti* in being smaller, in having these markings reduced in size, and in having the ground color of the undersurface of hind wing and apex of forewing sulphur yellow.

Length of forewing, 19–20 mm (average 19 mm).

FEMALE (Figures 12, 24, photographs of a paratype from Putre, Tarapacá, Chile).—As does the male, in the female sex this subspecies differs from *H. wagenknechti wagenknechti* in being slightly smaller and in having the dark markings reduced in size with the ground color of the uppersurface of wings yellowish white and with this color on undersurface of hind wing and on apex of forewing a sulphur yellow. The females differ from the males in having the submarginal row of fuscous spots on both surfaces of forewing extending to below vein Cu_1, and in having this submarginal row of spots present also on the hind wing.

Length of forewing, 19–20 mm (average 19 mm).

TYPE DATA.—The type-locality is "Lequena, San Pedro, 3,900 m., Prov. de Antofagasta." This subspecies was described from the holotype male 8 May 1955); allotype female (Putre, Province of

Tarapacá, 3600 meters, 23 November 1952) and from 24 male and 12 female paratypes from various localities in the Provinces of Antofagasta and Tarapacá. Holotype, allotype, and 14 male and 6 female paratypes in the collection of the National Museum of Natural History, Santiago, Chile. Three male and two female paratypes in the collection of Luis E. Peña. Six male and three female paratypes in the collection of S. Barros; one male and one female paratypes in the collection of Sr. Heimlich.

ETYMOLOGY.—The name *sulfurodice* is a feminine noun in the nominative singular in apposition with the generic name. "Sulfur" is the Latin *sulfur* meaning "brimstone" and refers to the yellow color of the undersurfaces of the wings of this subspecies. The "dice" ending of this name is a commonly used suffix or a compounding element often used for the names of pierid butterflies and is derived from the Greek *dike* meaning "law, order, right."

NATURAL HISTORY.—The females of this subspecies like the males of *H. penai* fold their wings together and lie with one side close to the ground when resting. The males repeatedly fly over the same area, from 10 in the morning until 3 in the afternoon, seemingly following the same route near the ground from the top to the bottom of a hill and back. It has been observed at the flowers of *Senecio wernerioides* Weddell.

DISTRIBUTION (see Map 1).—This subspecies is found in northern Chile from the mountains of the Province of Antofagasta north through the Province of Tarapacá almost to the border between Chile and Perú. It flies at 3200–3900 meters elevation in the Province of Antofagasta and at 2800–4500 meters elevation in the Province of Tarapacá.

MATERIAL EXAMINED (20 males, 4 females).—CHILE: *Province of Antofagasta,* Chinina, Camino Talabre (October); Lequena, San Pedro de Conchi (May, July, 3900 meters); Llano de Quimal (March, 3200 meters); Ollagüe; Talabre (December, 3200 meters); Tumbre (December, February, 3200 meters). *Province of Tarapacá,* Belén, Arica (October); Chuzmisa (November); Mamiña (September, 2800 meters); Parca, Arica (February); Putre (November, 3600–4500 meters); Río Seco, Arica (October, November, 4200 meters). ARGENTINA: *Province of Catamarca,* Antofagasta de la Sierra (January).

6. *Hypsochila penai* Ureta

FIGURES 26, 27, 38, 39, 131, 149, 167, 186; MAP 1

Hypsochila (Chionanema) peñai [sic] Ureta, 1955:67, 69, figs. 3, 4; 1956:161, pl. 1: figs. 3*b*, 3*c*.—Field, 1958:112.—Ureta, 1963:98.

Hypsochila (Chianomema [sic]) *peñai* [sic].—Peña, 1963:215.

Hypsochila (Chianonema [sic]) *peñai*.—Peña, 1974a:262 [required correction in spelling of specific name]; 1974b:39.

MALE (Figures 26, 38, photographs of a topotype).—Wings above and below white in ground color with dark markings as illustrated. This is the only species in the genus to have the ground color of hind wing and of the apex of the forewing white on the undersurface. It differs from *H. wagenknechti wagenknechti* in being much smaller and it is the same size as males of *H. wagenknechti sulfurodice*. The fuscous dark markings on both surfaces of apex of forewing cover a greater area than they do in the other species and are nearly confluent. The fuscous markings on the undersurface of hind wing are nearly black in color and are more extensive than in the other species of *Hypsochila*.

Length of forewing, 19–20 mm.

FEMALE (Figures 27, 39, figures of a topotype).—This sex differs from the females of the other species of *Hypsochila* in the same ways that the males do. It has all dark markings on the wings even more extensive and unlike the male it has the white ground color on both surfaces of wings faintly tinged with yellow.

Length of forewing, 20 mm.

VENATION (Figure 167).—Similar to that of *H. argyrodice* (Figure 162) in having vein M_2 of the forewing arising from distinctly below apex of cell.

CLAW, PARONYCHIUM, AND PULVILLUS (Figure 186).—Claw with ventral tooth very small, smaller than in any of the other species, paronychium not distinctly different from the other species, pulvillus the smallest of any other species in the genus.

GENITALIA (Figure 131, male, drawn from preparation WDF 6578; Figure 149, female, drawn from preparation WDF 6651).—Similar to the other species in the genus.

TYPE DATA.—The type-locality is given in the original description as "Laguna Verde, 5200 m., Cordillera de Antofagasta," = east of Volcán Hékar, Province of Antofagasta, Chile. This is not the Laguna Verde in the southwest corner of Bolivia. Luis E. Peña on a map sent to the senior author of the present paper shows this type-locality to be not far from the Salar de Atacama. This species was described from the holotype and one paratype, both males collected by Luis E. Peña at 5200 meters, 13

December 1953 (holotype) and at 5000 meters, 14 December 1953 (paratype). The holotype is in the collection of the National Museum of Natural History, Santiago, Chile, and the paratype is in the collection of Luis E. Peña. The female was later described by Peña (1974b:39) from the same locality.

ETYMOLOGY.—The name *penai* is a masculine noun in the genitive case, a patronym after Luis E. Peña, the collector of the original series and the preeminent and indefatigable collector of the fauna of the Andes.

NATURAL HISTORY.—Ureta (1955:69) reports that Peña has observed that this species (observations on the male sex), when resting on the ground, folds all four wings together and inclines them to one side close to the ground. This perhaps affords the least possible resistance to the strong winds that are common where these butterflies are found. Also perhaps by exposing their undersurfaces with their dark vein pattern they may absorb heat from the sun. The butterflies fly very rapidly and compete admirably against the strong prevailing winds. They visit the flowers of *Perezia atacamensis* (Philippi) and this plant may be the food plant of the larvae (Peña, 1963:215).

DISTRIBUTION (see Map 1).—This species fiies at the highest elevations of any species of *Hypsochila,* occurring between 4500 and 5200 meters elevation. As far as is known at present *H. penai* and *H. wagenknechti* do not overlap in horizontal distribution and it is certain that they do not overlap in altitudinal distribution.

MATERIAL EXAMINED.—We had for study three males (4 January 1958; November 1961) and one female (20 January 1974), all topotypes.

Genus *Phulia* Herrich-Schäffer

FIGURES 33–36, 45–63, 69–83, 132–135, 150–153, 168–171, 187–190; MAP 2

Phulia Herrich-Schäffer, 1867:101, 104–105, 144.—Butler, 1870:38, 52.—Kirby, 1871:505.—Scudder, 1875:249.—Reed, 1877:655, 656–657.—Staudinger, 1885:46.—Shatz and Röber, 1886:55.—Garlepp, 1892:273, 274, 275.—Dixey, 1894:307, 323, 324, 325.—Staudinger, 1894:43–46.—Elwes, 1895:lxv–lxvi.—Bartlett-Calvert, 1898:98.—Grote, 1900:19, 20, 22.—Röber, 1909a:97–98, pl. 28.—Dixey, 1910:xciv, xcix, cxxxiv.—Röber, 1910:97–98, pl. 28.—Giacomelli, 1915:404; 1916:43.—Jörgensen, 1916:428, 432, 434, 515–517.—Giacomelli, 1917:384, 385.—Röber, 1924a:1024, pl. 192; 1924b: 1024, pl. 192.—Köhler, 1928:1.—Talbot, 1932:59–60.—Klots, 1933:154, 158, 219–220, 230, 238, pl. 12: fig. 89.—Talbot, 1935:627.—Ureta, 1938a:283–287; 1938b:124.—Breyer, 1939: 46–47.—d'Almeida, 1943:97.—Ureta, 1947:50–52.—Hayward, 1951:95.—Zischka, 1951:29–30.—Herrera, 1954b:52.—Ureta, 1955:57, 69.—Herrera and Etcheverry, 1956:284.—Ehrlich, 1958:325.—Field, 1958:103, 104, 105, 112–114, figs. 4, 12, 20, 28, 37.—Forster, 1958:845–846.—Hughes, 1958:7–8.—Ureta, 1963:98–99.—Hemming, 1967:361.

Phulia (*Phulia*).—Field, 1958:104, 105, 106, 114, figs. 4, 12, 20, 28, 37.

TYPE-SPECIES.—*Pieris nymphula* Blanchard = *Phulia nymphula* (Blanchard). Type by reason of being the sole included species.

Phulia differs from the other genera treated in this paper except *Infraphulia* in wing habitus and from all except *Pierphulia* in the claws. From *Hypsochila* and *Piercolias* it differs in having a reduced number of radial veins in the forewing, being similar in this respect to *Infraphulia* and *Pierphulia.* From the latter genera it differs in the uncus and valva of the male genitalia and in the signum, accessory bursa, and inner genital plates of the female genitalia. From *Piercolias* it differs in the form of the uncus of the male genitalia and in the form of the inner genital plates of the female genitalia.

Wings above white in the male sex (Figures 33, 35, 49, 50, 53–55, 58, 60, 62) and white, yellowish white to yellow in the female sex (Figures 34, 36, 51, 56, 57, 59, 61, 63), lacking the silvery sheen present in the base of discal cell of forewing in *Hypsochila* and usually with at least a few sagittate markings in apex of forewing. Female usually much darker with many more markings on the upper-surfaces. Wings below in both sexes (Figures 45–48, 69–83) with dark pattern as shown, differing markedly from *Hypsochila* in this pattern in the intenseness of black of the cellular bar and in the marginal and submarginal spots on this wing. Species of *Phulia* are very much smaller than those of *Hypsochila.*

Legs with claw (Figures 187–190) directed downward more than outward and with dorsal margin greatly curved downward, but not as greatly convex along the dorsal margin as in *Infraphulia* (Figures 191–193). Tooth large and nearly parallel to main portion of claw and from middle or from beyond middle of claw. Pulvillus (Figures 187–190) with distal subsegment narrow and entirely setulose. Paronychium (Figures 187–190) short to relatively long, usually not much over one-half the length of claw.

Venation of *Phulia* (Figures 168–171) similar to

that of *Infraphulia* (Figures 172–174) and *Pierphulia* (Figures 175–177) with the number of radial veins reduced to three, R_{4+5} having anastomosed with R_3. These genera thus differ greatly from *Hypsochila* (Figures 162–167) and *Piercolias* (Figures 178–180), which retain four radial veins. In *Phulia, Infraphulia,* and *Pierphulia* M_1 and M_2 are anastomosed for a distance with R_{3+4+5}, M_1 being anastomosed to just before the apex of wing and M_2 for a short distance beyond apex of discal cell. Vein M_2 in both *Hypsochila* and *Piercolias* is either entirely free, originating at or near apex of discal cell, or sometimes connate with base of vein M_1.

Male genitalia (Figures 132–135) with lateroventral wall at base of uncus well folded inward and closely appressed upon its inner side and thus similar to *Hypsochila* (Figures 126–131); subscaphium absent in *Phulia,* present and small in *Pierphulia* (Figures 139, 140), large in *Piercolias* (Figures 141–143); valva having a strong distal process and a weakly sclerotized clasper flap on inner face near middle as in *Hyposchila* and *Piercolias.* This last structure also present in *Infraphulia* (Figures 136–138) is absent in *Pierphulia.*

Female genitalia (Figures 150–153) with ductus bursae colorless and nonsclerotized, with accessory pouch present and large. In *Infraphulia* this accessory pouch is absent (Figures 154, 155) or greatly reduced in size (Figure 156). In *Phulia* the signum is of the common pierid type, being a single long bilobed and heavily dentate bar on the inner face of the ventral surface of bursa near opening of ductus bursae. The eighth tergite in *Phulia* is entire and semiannulate; eighth sternite with inner genital plate not reduced, divided into a broad subtriangular-shaped anterior lobe and a smaller finger-like projection posterior to this and with

Key to the Species and Subspecies of *Phulia*

1. Hind wing with costal margin sinuate and humeral angle expanded (Figure 168) ..... 1. ***P. nymphula*** (Blanchard) 2
   Hind wing with costal margin straight or slightly curved outward, not at all sinuate, humeral angle not expanded (Figures 169–171) 3
2. Wings with all dark markings smaller and less prominent; with a smaller wing expanse, not exceeding 33 mm (Figures 35, 36, 47–52, 69–72) ..... 1a. ***P. nymphula nymphula*** (Blanchard)
   Wings with all dark markings larger and more prominent; with a larger wing expanse, 35 mm or larger (Figures 33, 34, 45, 46) ..... 1b. ***P. nymphula nympha*** Staudinger
3. Undersurface of hind wing with scales along veins yellowish brown, not contrasting greatly with the yellow ground color; with marginal black streaks faint and short, submarginal black spots below vein M_2 rounded or quadrate in shape, about as broad as long (Figures 78–81); female with uppersurface of hind wing lacking most of the dark scaling along the veins (Figures 59, 61) 4
   Undersurface of hind wing with scales along veins darker, brownish gray or brown, contrasting greatly with yellow ground color and with strong marginal black streaks and strong submarginal black spots below vein M_2, these being much longer than broad (Figures 73–76, 82, 83); female with uppersurface of hind wing having a greater amount of dark scaling along the veins (Figures 56, 57, 63) 5
4. Undersurface of hind wing with submarginal black spots below vein M_2 rounded (Figures 78, 79) ..... 2b. ***P. paranympha ernesta,*** new subspecies
   Undersurface of hind wing with submarginal black spots below vein M_2 quadrate or semiquadrate in shape (Figures 80, 81) ..... 3. ***P. nannophyes*** *Dyar*
5. Uppersurface of forewing in the male sex with a strong discal spot present at the end of the cell and with apical and subapical dark pattern not reduced in size (Figures 53–55); female with this discal spot not reduced in size and with dark pattern on both surfaces of wings darker and more contrasting with the ground color (Figures 56, 57, 76, 77) ..... 2a. ***P. paranympha paranympha*** Staudinger
   Uppersurface of forewing in the male sex lacking discal spot at the end of the cell or with this spot greatly reduced in size and with apical and subapical dark pattern also reduced in size (Figure 62); female with this discal spot greatly reduced in size and with dark pattern on both surfaces of wing much paler and less contrasting with the ground color (Figures 63, 83) ..... 4. ***P. garleppi,*** new species

both of these parts thickly setulose on their outer faces.

ETYMOLOGY.—The name *Phulia* is a feminine noun, the Greek classical word for "a kind of wild olive."

The genus *Phulia* contains four species: *P. nymphula* (Blanchard), *P. paranympha* Staudinger, *P. nannophyes* Dyar, and *P. garleppi,* new species. We divide *P. nymphula* into the subspecies *P. nymphula nymphula* (Blanchard) and *P. nymphula nympha* Staudinger and *P. paranympha* into the subspecies *P. paranympha paranympha* Staudinger and *P. paranympha ernesta,* new subspecies.

The species of this genus (see Map 2) live in the highland plains at elevations between 2600 to 5000 meters and occupy vast regions of the Puna in the Andes of Peru, Bolivia, Chile, and Argentina.

1. *Phulia nymphula* (Blanchard)

FIGURES 33–36, 45–52, 69–72, 132, 150, 168, 187; MAP 2

For references see under the subspecies.

MALE (Figures 33, 45, photographs of lectotype of *P. nymphula nympha;* 35, 47, photographs of topotype of *P. nymphula nymphula;* 49, 69, photographs of lectotype of *P. altivolans,* synonym of *P. nymphula nymphula;* 50, 70, photographs of lectotype of *P. nymphaea,* synonym of *P. nymphula nymphula*).—This species is easily distinguished from *P. paranympha* (Figures 53, 58, 73, 78) in spite of its very similar wing pattern on both surfaces by having a small but distinct white spot at the end of the black stripe dividing the discal cell on undersurface of hind wing and by having the humeral angle of this wing greatly expanded, so much so that the costal margin is sinuate, being concave before vein $Sc+R_1$ and convex after that vein. In *P. paranympha* this white spot is absent and the humeral angle is not at all expanded with the costal margin nearly straight.

Length of forewing, 12–20 mm (average 17 mm).

FEMALE (Figures 34, 46, photographs of topotype and probably syntype of *P. nymphula nympha;* 36, 48, photographs of a topotype of *P. nymphula nymphula;* 51, 71, photographs of allolectotype of *P. altivolans,* synonym of *P. nymphula nymphula;* 52, 72, photographs of specimen of *P. nymphula nymphula* from Achocalla, La Paz, Bolivia).—This sex differs from the males in having many more fuscous markings on the uppersurfaces of the wings. It differs from *P. paranympha* in the same ways that the males differ from that species.

Length of forewing, 12–18 mm (average 16.7 mm).

VENATION (Figure 168).—Similar to the venation of *P. paranympha* (Figure 169), differing in having vein M_2 of the forewing from apex of discal cell and separate from the base of vein $R_{3+4+5}+M_1$ or at the most anastomosed with base of that vein for only a very short distance. In the hind wing vein $Sc+R_1$ terminates much closer to vein R_s than it does in *P. paranympha.*

TIBIA OF FORELEG.—Shorter than first tarsal subsegment. In *P. paranympha* this tibia is longer than first tarsal subsegment.

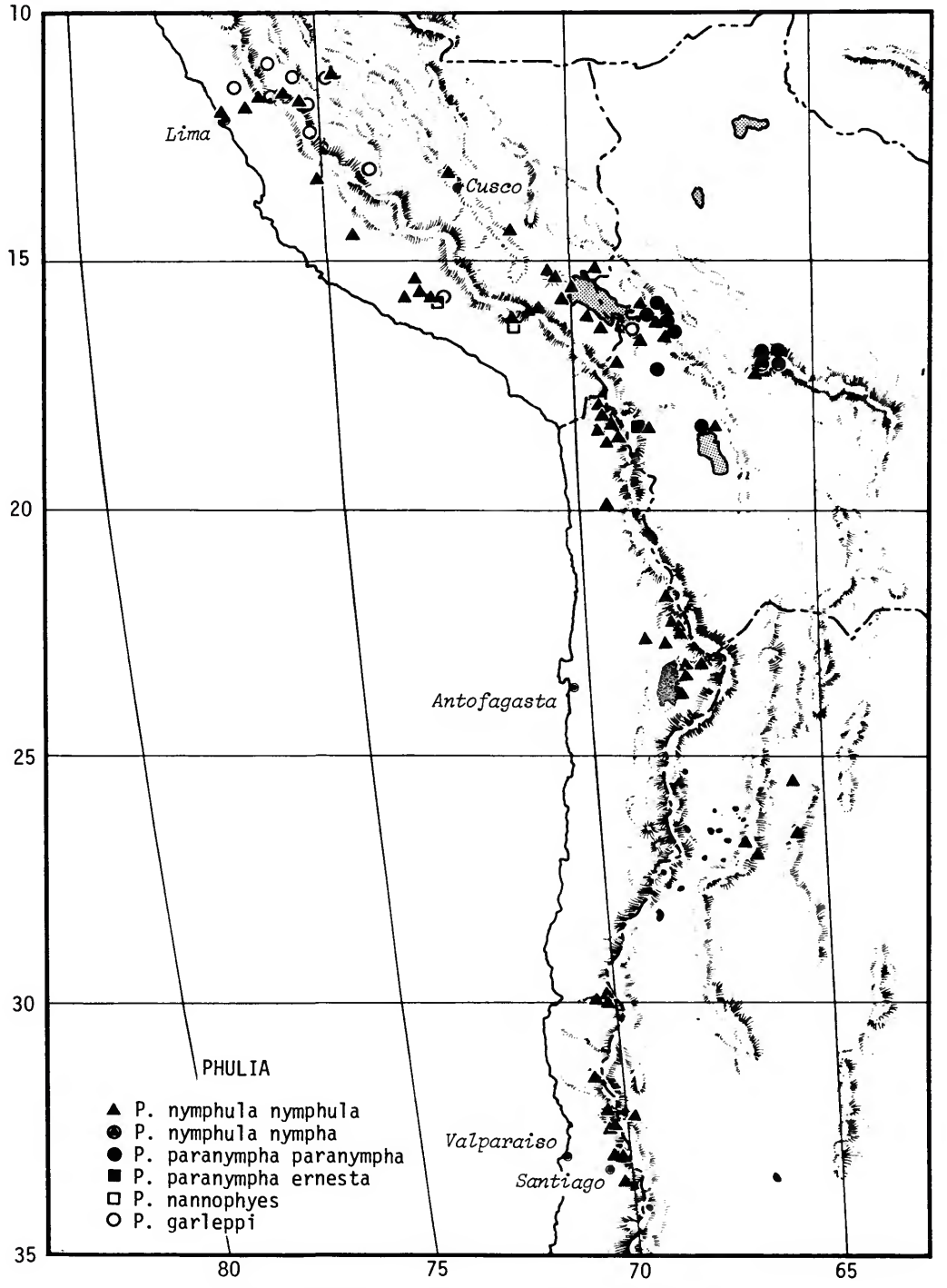
CLAW, PARONYCHIUM, AND PULVILLUS (Figure 187).—Paronychium much shorter than in *P. paranympha,* claw quite similar to the claw of *P. paranympha.*

MALE GENITALIA (Figure 132, drawn from preparation WDF 6647, a specimen of *P. nymphula nymphula*).—As illustrated, similar to the genitalia *P. paranympha* (Figure 133), with costal margin of valva not evenly rounded.

FEMALE GENITALIA (Figure 150, drawn from preparation WDF 6648, a specimen of *P. nymphula nymphula*).—Similar to the genitalia of *P. paranympha* (Figure 151) and the other species of *Phulia.*

ETYMOLOGY.—The name *nymphula* is a feminine noun in the nominative singular in apposition to the genus name and is derived from the Latin word *nympha* meaning "a demigoddess of the sea, rivers, woods, etc." and the Latin diminutive suffix *ula.*

DISTRIBUTION (see Map 2).—This species, in one of its subspecies *P. nymphula nymphula,* is distributed over a great area in the Andes from the Province of Santiago, Chile and the Province of Mendoza in Argentina north through southern Bolivia and Perú. In its southernmost range it flies at from 2600 to 3200 meters, gradually being found at higher elevations to the north, so that in Bolivia and Peru it flies at from 3900 to 4500 meters. The subspecies *P. nymphula nympha* has a very restricted distribution, being found only at Huallatani and Cocapata, Province of Cochabamba, Bolivia flying at between 4000 and 5000 meters elevation. A relatively low-flying population of the nominate subspecies occurs at Colahuasi, Province of Arequipa, Peru at about 2700 meters. Whether this



MAP 2.—Distribution of the Genus *Phulia* Herrich-Schäffer.

population represents the original lowest habitat or is a secondary adjustment to this lower elevation remains to be ascertained.

SUBSPECIATION.—As indicated above we divide this species into two subspecies: *P. nymphula nymphula* and *P. nymphula nympha*. We have strong reservations that *P. nymphula nympha* is anything more than an isolated, very local, high elevation (5000 meters) population (found at Huaillatani and Cocapata near Cochabamba, Bolivia) that perhaps like G. G. Simpson's "demes" differ so little that it would be better not to recognize them as a nameable taxonomic unit. *Phulia nymphula nympha* may be a homogenous population at its type-locality but *nympha*- like individuals are found at other localities flying with *P. nymphula nymphula*. We are maintaining the name *P. nymphula nympha* as a subspecies until further thorough field work (at the type-locality and at other localities where individuals occur similar to those found at the type-locality can more definitely establish their evolutionary significance and taxonomic value.

An examination of the male and female genitalia, of legs and venation as well as of other structures, failed to disclose any morphological characters separating *P. nymphula nympha* from *P. nymphula nymphula* and we have concluded that we cannot maintain these two entities as species as has always been done by all workers up to this time. Indeed as mentioned above we have doubts that the former name can even be maintained as a subspecies when all the facts are known.

1a. *Phulia nymphula nymphula* (Blanchard)

FIGURES 35, 36, 47–52, 69–72, 132, 150, 168, 187; MAP 2

Pieris nymphula Blanchard, 1852:14–15, pl. 1: figs 3*a*, 3*b*.—Bartlet-Calvert, 1886:313.

Phulia nymphula.—Herrich-Schäffer, 1867:144.—Butler, 1870: 52.—Kirby, 1871:505.—Reed, 1877:648, 656–657, 734.—Hopffer, 1879:84.—Schatz and Röber, 1886:72, pl. 7: fig. [8].—Staudinger, 1884, pl. 23: fig. [*f*–3]; 1885:46.—Weymer, 1890:125.—Weymer and Maassen, 1890:97–98.—Dixey, 1894:307.—Bartlett-Calvert, 1898:98.—Grote, 1900:20.—Elwes, 1903:292, 299.—Röber, 1909a:97, pl. 28. figs. *c*–3, *c*–4; 1910:97, pl. 28: figs. *c*–3, *c*–4.—Giacomelli, 1915:404; 1918:340, 341, 342.—Reed, 1918:313–314.—Köhler, 1923:19.—Röber, 1924a:1024; 1924b:1024.—Köhler, 1928:1.—Talbot, 1932:59.—Klots, 1933:154, 219, 220, 242, pl. 12: fig. 89.—Ureta, 1934:78.—Talbot, 1935:627.—Ureta, 1938a:284–287, pl. 12: figs. 9, 10; 1938b:124; 1939:297.—d'Almeida, 1943:97.—Hayward, 1951:95.—Zischka, 1951:29.—Herrera, 1954b:42, 52, pl. 5: figs. 3, 4.—Herrera and Etcheverry, 1956:275, 284.—Forster, 1955:136, 137.—Field, 1958:112, 114, 122, 124, 126, 128, 131, figs. 4, 12, 20, 28, 37.—Hughes, 1958:7.—Ureta, 1963:99.—Hemming, 1967:361.

Phulia nymphaea Staudinger, 1894:49–51, pl. 1: fig. 11.—Röber, 1909a:97, pl. 28: fig. *d*–2; 1910:97, pl. 28: fig. *d*–2.—Talbot, 1932:59.—Zischka, 1951:29.—Forster, 1955:136.—Hughes, 1956:250. [New synonymy.]

Phulia nymphea [sic.]—Elwes, 1903:292.

Phulia altivolans Dyar, 1913:628–629.—Talbot, 1932:60. [New synonymy.]

Phulia aconquijae Jörgensen, 1916:432, 439, 515–517, figs. 12, 13.—Giacomelli, 1917:384, 385; 1918:341.—Röber, 1924a:1024, pl. 192: figs. *d*–3, *d*–4; 1924b:1024, pl. 192: figs. *d*–3, *d*–4.—Talbot, 1932:60. [New synonymy.]

Phulia reedi Giacomelli, 1918:341–342.—Hayward, 1951:95 [as a synonym of *P. nymphula*].—Ureta, 1963:99 [as a synonym of *P. nymphula*].

Phulia nymphula forma *reedi*.—Röber, 1924a:1024; 1924b:1024.—Talbot, 1932:59.

Phulia joergenseni Röber, 1924a:1024; 1924b:1024. [New synonymy.]

Phulia nymphula fa. *aconquijae*.—Hayward, 1951:95.

Phulia nymphula nymphae [sic].—Herrera, 1954a:140, 147; 1954b:57.—Herrera and Etcheverry, 1956:284, 289.

Phulia nymphula nymphaea.—Field, 1958:128.

MALE (Figures 35, 47, photographs of topotype; 49, 69, photographs of lectotype of the synonym *P. altivolans;* 50, 70, photographs of lectotype of the synonym *P. nymphaea).*—Wings as illustrated showing considerable variation in the fuscous markings on both surfaces. This subspecies differs from *P. nymphula nympha* in being usually smaller and in having all markings on both surfaces lighter in color and less distinct. The original series of *P. nymphula nympha* composed of about one hundred specimens had a wing expanse of from between 30 and 41 millimeters. We find that *P. nymphula nymphula* has a wing expanse of between 29 and 36 millimeters. We have seen large specimens of *P. nymphula nymphula* taken at a number of localities (in the Andes of Bolivia, Peru, northern Chile, and Argentina) that have a wing expanse of from 34 to 36 millimeters and that are almost as dark and some that are quite as dark as *P. nymphula nympha*. These large, dark specimens are found in some localities along with the smaller and lighter marked *P. nymphula nymphula,* and as stated before we doubt the validity of *P. nymphula nympha* as a subspecies, suspecting that this size difference and the difference in the darkness of maculation may only represent normal individual variation within the larger population of *P. nymphula*.

Length of forewing, 11–18 mm (average 15.7 mm).

FEMALE (Figures 36, 48, photographs of a topotype; 51, 71, photographs of allolectotype of the synonym *P. altivolans;* 52, 72, photographs of specimen from Achocalla, La Paz, Bolivia).—Wings as shown in these figures with considerable maculation variation as is true of the male sex. It differs from the male in having more dark markings on the uppersurface of the wings. What we have written above about the male sex in the two so-called subspecies applies also to the female sex.

Length of forewing, 12–18 mm (average 15.5 mm).

TYPE DATA.—The type-locality is "provincia de Coquimbo," Chile. This was described apparently from a single specimen that is apparently lost. The original figure is of the male sex and especially the undersurface is rather poorly drawn and colored. As this is the only species of the genus *Phulia* to occur in Chile this far south, we have no uncertainty about our identification and this agrees with the opinion of all modern workers writing upon the Chilean fauna. We do not feel that a neotype designation is necessary at this time.

SYNONYMICAL NOTES.—*Phulia nymphaea* Staudinger, 1894: Type-locality, "Illimani aus Bolivien" = Illimani, Province of Cochabamba, Bolivia. This was described from a series of four males and seven females from the Stübel collection of the Zoological Museum, Humboldt University of Berlin and from one male collected by Mr. Buckley in Bolivia, now in the collection of the British Museum (Natural History). Staudinger, following his earlier (1894: 44–46) misdetermination of Blanchard's species *P. nymphula,* placed his manuscript name *Phulia paranympha* in the synonymy of *P. nymphula* and redescribed the true *P. nymphula* under the name *P. nymphaea.* He was led astray by his complete lack of material from Chile and by the poor and oversized original figure of *P. nymphula.* His observation that the basal portion of the hind wing in *P. nymphaea* is greatly produced definitely confirms the junior synonymy of *P. nymphaea* to *P. nymphula.* Unfortunately Blanchard's illustration (1852; pl. 1: fig. 3*b*) does not show this greatly produced humeral angle. We know the Blanchard illustration is in error because, as stated before the only species found in the Province of Coquimbo, Chile has this greatly produced humeral angle. According to the late Dr. E. M. Hering there are in the Stübel collection of the Zoological Museum, Humboldt University of Berlin, four male and five female syntypes from Illimani, Bolivia. One of these male syntypes was loaned to us for study and we have selected it as the lectotype (Figures 50, 70) and have labeled it accordingly.

Phulia altivolans Dyar, 1913: Described from "Cotypes.—Three males, two females, Cat. No. 15600, U.S.N.M., Cotahuasi, 9,000 feet, October, 1911; Coropuna, 14,500 feet, October, 1911." We select as the lectotype the male labeled "Type" in the collection of the National Museum of Natural History (Washington, D. C.) and have pinned an appropriate label with it. The lectotype and the remainder of the type series clearly represent the subspecies *Phulia nymphula nymphula.*

Phulia aconquijae Jörgensen, 1916: This name was erected for a supposed species described from material in the Jörgensen collection from: "cumbres de Aconquija (cerro Medio, alt. 3700 m., cerro de la Tambillo o de la Ciénaga, alt. 3750 m., cerro de Yutoyaco, alt. 3500 m., cerro Negro, alt. 3500 m.)," Province of Catamarca, Argentina. The number of specimens and number of each sex are not specified in the original description, nor was a holotype designated. Topotypes are present in the collection of the National Museum of Natural History (Washington, D. C.) and indeed these specimens may represent syntypes (although they are not so labeled). A lectotype designation is not needed at the present time. A study of the original description and of topotypes show that this name is a junior synonym of *Phulia nymphula nymphula.*

Phulia reedi Giacomelli, 1918: Being misled by the misidentification made by Staudinger (1894) of the Chilean species (from Coquimbo) as being the species we now call *Phulia paranympha* Staudinger (and which Staudinger thought was *Phulia nymphula*) and not being familar with the species occurring in Chile, Giacomelli mistakenly describes as new, this population, of which he had 15 males and 5 females from "Las Cuevas (Mendoza)," Argentina. The location of the syntypes is unknown to the present writers. It is clearly a junior synonym of *Phulia nymphula nymphula* and was so treated by Hayward (1951:95).

Phulia joergenseni Röber, 1924: Röber being misled by Staudinger (1894), and apparently in addition being thoroughly confused, proposed this name for "die Boliviaform" if Jörgensen's *P.*

aconquijae turned out to be synonymous with *P. nymphula*. That the Bolivian population had already been named *P. nymphaea* and that the latter name was a junior synonym of the true *P. nymphula* as opposed to the species Staudinger misidentified as *P. nymphula* was not understood by Röber. He mentions no specimens and type specimens were not considered necessary by Röber as he thought of his name as a replacement name.

NATURAL HISTORY.—This subspecies prefers wet swampy areas. The adults settle after flight with their wings outspread to both sides of their bodies and closely appressed to the ground. Reed (1918: 314) states that the food-plant may be *Tropaeolum polyphyllum* Cavanilles as he observed gravid females upon this plant as well as a chrysalis attached to the base of one of them.

DISTRIBUTION (see Map 2).—The nominate subspecies, *P. nymphula nymphula,* has the greatest distribution of any species or subspecies in the genus *Phulia* and for that matter of any species treated in this paper. It is found in the Andes from the Province of Santiago and Valparíso in central Chile and from the Province of Mendoza in Argentina north through Chile and through west-central Bolivia into Peru through the Departments of Arequipa and Puno to the Departments of Huancavélica, Cusco, and Junín.

MATERIAL EXAMINED (266 males, 123 females).—CHILE: *Province of Santiago,* Caracoles (November, 3800 meters); Farallones (October); La Engorda (February). *Province of Valparaiso,* exact locality?. *Province of Aconcagua,* Río Blanco, Laguna de Castro (December, 3200 meters). *Province of Coquimbo,* Baños El Toro (January, February, 3500 meters); Hda. Illapel (November, 2600–2800 meters); Río Seco, Elqui (February). *Province of Antofagasta,* Andes Range (December, 3000–5000 meters); Catarape, Salar de Atacama (December, January, 3000–3500 meters); Corral Blanco (December); Geyser del Tatio (December); Hekar (December); Inacaliri (December); Laguna Legia (November, December, 4400 meters); Alto de Laguna Verde (October, November, December, February, 4400–5000 meters); Ojalar (December); Siloli (December); Tumbre (September-December, 3700–4000 meters; Toconce (July); northwest of Volcán Laskar (September-December, 3700–4000 meters). *Province of Tarapacá,* Alcérreca (November, 3600–3700 meters); Belén (November, 3200 meters); Chapiquiña (November, 3370 meters); Cotacotani (February, 4500 meters); Guayatire (November, 4500 meters); Parinacota (December, February, 4350–4500 meters); Putre (November, December, February, 3530–3650 meters); Socoroma (March, 3600 meters). ARGENTINA: *Province of Mendoza,* Las Cuevas (February). *Province of San Juan,* Paso del Inca (3400 meters). *Province of Catamarca,* Yura Yaco (January). *Province of Tucumán,* Laguna El Negrito, Department of Tafí; Río de Puerta, San José, Department of Tafí (December, 3900 meters). *Province of Salta,* Calchaquí (December, 4500 meters); La Ollada. PERU: *Department of Arequipa,* Cotahuasi (October, 2742 meters); Coropuna (October, 4418 meters); El Fraile (June, 4300 meters); Quenche (January, 4265 meters); San Ignacio de Cailloma (September, November); Sumbay (June, 3500 meters). *Department of Puno,* Cabanillas (April, 4000 meters); Capachica (January, 4100 meters); Desaguadero (November); Hda. Collacachi, near Puno (November); Hda. Lagunillas, Province of San Román (October, 4200 meters); Puno (July, 4875 meters); Tiroya (April, 4600 meters); Yunguyo (January). *Department of Cusco,* Ruins near Paso de Amparaes, Province of Urubamba (October, 4000 meters). *Department of Huancavélica,* Pairomane (November, 4000 meters). *Department of Junín,* La Oroya (3656 meters) Pamay, near Satipo (July, 3900 meters). *Department of Ayacucho,* Reserva Pampa Galeras, Lucanas (April, 4000 meters). BOLIVIA: *Department of Oruro,* Nevado de Sajama; Oruro (January, March, July, 4000 meters). *Department of La Paz,* Belén Experiment Station (May, 3961 meters); Estación La Cumbre (February); near Huanaco (4875 meters); Illimani; La Paz (March, 4000–5000 meters); 35 kilometers southwest of La Paz (June, 3961 meters); Rio Mauri, General Campero (February, 3960 meters); Sicasica (October); Songotal, Cuticucha (July, 4500 meters); Tiahuanaco (March, June, 3961 meters). *Department of Cochabamba,* Tunari (December, 4000 meters).

1b. *Phulia nymphula nympha* Staudinger, new status

FIGURES 33, 34, 45; MAP 2

Schmetterlinge Nr. 3.—Garlepp, 1892:273, 274.—Staudinger, 1892:273, 274.

Phulia nympha Staudinger, 1894:46–49, pl. 1: figs. 6, 13, 15, 52, 54.—Röber, 1909a:97, pl. 28: figs. *c*–5, *d*–1; 1910:97, pl. 28: figs. *c*–5, *d*–1.—Dyar, 1913:628.—Jörgensen, 1916:517.—Talbot, 1932:59.—Zischka, 1951:29.—Forster, 1955:137.—Ureta, 1963:99.

Phulia olympia Staudinger, 1894:46. [A manuscript name in synonymy of *P. nympha.*]

MALE (Figures 33, 45, photographs of lectotype).—This subspecies differs from *P. nymphula nymphula* in being larger and in having all markings on both surfaces of wings darker in color, more extensive, and more contrasting with the white ground color. We recognize this subspecies only provisionally and apply the name only to the population found between 4000 and 5000 meters elevation at Huaillatani and nearby Cocapata, Province of Cochabamba, Bolivia. We have studied typical *P. nymphula nymphula* from 4000 meters elevation taken near Tunari, which is only about 30 kilometers (map measurement) west of Huaillatani and about 25 kilometers south of Cocapata.

Individuals similar to *P. nymphula nympha* are found in a number of localities over the range of the nominate subspecies, and we consider these to represent normal variation in that subspecies. It is difficult for us to believe that these so-called subspecies do not fly together at the same time in these localities near Cochabamba, Bolivia and thus likewise only represent individual variation. Biological studies and careful field observation are needed to solve this problem.

Length of forewing, 19–20 mm (average 18.4 mm).

FEMALE (Figures 34, 46, photographs of topotype and probable syntype).—Wings with habitus as illustrated and as in the male larger and darker than in the nominate subspecies.

Length of forewing, 17.5–18 mm (average 17.8 mm).

TYPE DATA.—This subspecies was described by Staudinger from a large series of about 100 specimens of both sexes from "Huallatani" (=Huaillatani), Bolivia taken between January 10th and the beginning of March 1892 by Gustav Garlepp at about 4000 meters and from an unspecified number of males and one female from "Cocapata," Bolivia. Staudinger reported that these localities were in the Department of Las Paz; however, modern maps show them to be in the Department of Cochabamba, Bolivia. According to the late Dr. Erich M. Hering (in a letter) there are in the Staudinger collection of the Zoological Museum, Humboldt University of Berlin, one male from Huaillatani and nine male and seven female syntypes from Cocapata. Since Staudinger in his original description states that he had only one female from the latter locality, six of these seven females cannot be regarded as syntypes. We select as the lectotype the single remaining male from Huaillatani (Figures 33, 45) and have so labeled this specimen. Staudinger was a famous dealer in insects and undoubtedly sold most of this large series of syntypes (probably without proper identifying labels).

SYNONYMICAL NOTE.—*Phulia olympia* Staudinger, 1894: Staudinger often labeled and sold butterflies under his own manuscript names. Later when describing one of these species as new he would sometimes choose a different name for the butterfly involved. This subspecies was described as a species with name given as "*Phul. Nympha* Stgr. *(Olympia* Stgr. in litt.)" Since the name "*nympha*" is a new name, the name "*olympia*" is stillborn (being proposed in synonymy) and an unavailable name.

ETYMOLOGY.—The name *nympha* is a feminine noun in the nominative singular in apposition with the genus name and is the Latin word for "nymph."

DISTRIBUTION (see Map 2).—This subspecies as we "restrict" and "understand" it is found only at Huaillatani and Cocapata, Department of Cochabamba, Bolivia. It flies at about 4000 meters elevation at the latter locality and at about 5000 meters elevation at the former locality.

MATERIAL EXAMINED.—We had for study five males and two females, all from the type-locality.

2. *Phulia paranympha* Staudinger

FIGURES 53–59, 73–79, 133, 151, 169, 188; MAP 2

For references see under the subspecies.

MALE (Figures 53, 73, photographs of lectotype of *P. paranympha paranympha;* 58, 78, photographs of allotype of *P. paranympha ernesta).*—This species is easily distinguished from *Phulia nymphula* by lacking the small and distinct white spot found in the latter species on the undersurface of hind wing at the end of the black stripe dividing the discal cell and by having the humeral angle of this wing not at all expanded and with its costal margin straight. In *P. paranympha* this black stripe runs to the end of the discal cell where it joins a small thin blackcross bar that delineates the end of that cell.

Length of forewing, 12.5–17 mm (average 14.3 mm).

FEMALE (Figures 56, 76, photographs of a topotype of *P. paranympha paranympha;* 57, 77, photographs of a specimen of *P. paranympha paranympha* from Sicasica, Bolivia; 59, 79, photographs of holotype of *P. paranympha ernesta).*—This sex differs from females of *P. nymphula* in the same ways that the male sex differs from that species. It differs from the male sex in having more and larger fuscous markings on the uppersurfaces of the wings.

VENATION (Figure 169).—Similar to the venation of *P. nymphula* (Figure 168), differing in having vein M_2 of the forewing anastomosed with base of $R_{3+4+5}+M_1$ for some distance. In the hind wing vein $Sc+R_1$ terminates much farther from vein R_s than it does in *P. nymphula.*

TIBIA OF FORELEG.—Longer than the first tarsal

subsegment. In *P. nymphula* this tibia is shorter than the first tarsal subsegment.

CLAW, PARONYCHIUM, AND PULVILLUS (Figure 188).—Paronychium longer than in *P. nymphula,* claw quite similar to that species.

MALE GENITALIA (Figure 133, drawn from preparation WDF 6665, a specimen of *P. paranympha paranympha*).—As illustrated, similar to the genitalia of *P. nymphula* (Figure 132) with costal margin of valva evenly rounded.

FEMALE GENITALIA (Figure 151, drawn from preparation WDF 6686, a specimen of *P. paranympha paranympha*).—As illustrated, similar to the genitalia of *P. nymphula* (Figure 150).

ETYMOLOGY.—The name *paranympha* is a feminine noun in the nominative singular in apposition with the genus name and is derived from the Greek prefix *para* meaning "near or parallel" and the Latin *nympha* meaning "nymph."

DISTRIBUTION (see Map 2).—This species occurs only in Bolivia, ranging from the Nevado de Sajama east to Oruro, northeast through the Sierra de Cochabamba, west from there through the Cordillera Real, and south to the Serannía de Sicasica. It flies at between 4000 and 5000 meters elevation.

SUBSPECIATION.—We recognize two subspecies: *P. paranympha paranympha* and *P. paranympha ernesta,* new subspecies. The former has the broader distribution, the latter appearing to be an isolated population found only on the Nevado de Sajama.

2a. *Phulia paranympha paranympha* Staudinger

FIGURES 53–57, 73–77, 133, 151, 169, 188; MAP 2

Schmetterlinge Nr. 2.—Garlepp, 1892:273.—Staudinger, 1892:273.

Phulia nymphula Blanchard (?) (*Paranympha* Stgr. in litt).—Staudinger, 1894:44–46, 47, 48, 52, 54, 56. [A misidentification of *Phulia nymphula* and a manuscript name published in the synonymy of this misidentification.]

Phulia nymphagoga Röber, 1909a:97, pl. 28: figs. *d*–4, *d*–5; 1910:97, pl. 28: figs. *d*–4, *d*–5.—Talbot, 1932:59.—Zischka, 1951:29.—Field, 1958:114.—Hughes, 1958:7. [New synonymy.]

Phulia paranympha.—Forster, 1955:136–137 [name made available as of the original author and date; see Article 11 (d), *International Code of Zoological Nomenclature,* 2nd edition, 1964].—Field, 1958:114.—Forster, 1958:846.

MALE (Figures 53, 73, photographs of lectotype; 54, 55, 74, 75, photographs of specimens from La Paz, Bolivia).—Wings as illustrated, ground color greenish yellow underneath with veins bordered on each side by a dark grayish brown line, these veins black and their borders enlarged at the margins. Marginal markings large and very distinct. Black spot at end of cell on forewing on both surfaces always present. Some specimens have a small amount of pink or red along costal margin of hind wing underneath. This is the most strongly marked of the two subspecies as the figures indicate. The dark markings of the undersurface of the hind wing show through on the uppersurface and in some males there are in addition black scales overlying the veins.

Length of forewing, 12.5–17 mm average 14.4 mm).

FEMALE (Figures 56, 76, photographs of a topotype; 57, 77, photographs of a specimen from Sicasica, Bolivia).—As illustrated with some variation in the amount of dark markings but with these markings extensive on both surfaces. Some females have a small amount of pink along the costal margin of the hind wings below.

Length of forewing, 13–16 mm (average 14.3 mm).

TYPE DATA.—The type-locality is "bei Huallatani" = near Huaillatani, 4000 meters, Department of Cochabamba, Bolivia. This subspecies was described from about 75 males and 25 females collected by Gustav Garlepp, mainly in February 1892. Most of this series was undoubtedly sold by Staudinger, who was a famous dealer in insects, so that many collections probably contain syntypes (unlabeled as to that status). According to the late Dr. E. M. Hering there remain in the Staudinger collection of the Zoological Museum, Humboldt University of Berlin, 10 males and 7 females. One of these males was sent to the senior author for study and is here designated the lectotype (Figures 53, 73) and has been so labeled. In addition to the above series, Staudinger in his original description mentioned one male from near Cocapata, Bolivia (only about 26 kilometers distance from Huaillatani and at a similar elevation). This syntype is apparently lost.

MISIDENTIFICATION AND SYNONYMICAL NOTES.—This species was first discovered by Gustav Garlepp (1882) and was labeled by him as "Schmetterlinge Nr. 2." Staudinger (1892:273 referred to this as a new *Phulia* near *nymphula.* In 1894 (page 44) he identified it as "*Phulia nymphula* Blanchard (?) (*Paranympha* Stgr. in litt.)" Staudinger not having

material from Chile depended upon Blanchard's rather poor original colored figure (1852, pl. 1: figs. 3*a*, 3*b*), which does not show the greatly expanded humeral angle of the hind wing that is the diagnostic character of Blanchard's species. In addition Blanchard's figure is very poorly drawn and colored, particularly in dark markings of the undersurfaces. Staudinger placed a question mark after the identification heading in his description and covering all eventualities; in addition he cited his manuscript name in the synonymy of his questioned identification. Dr. Walter Forster (1955:136) first used this name as of the original author and date and it thus became the valid name for this species (and nominate subspecies) (see Article 11 (d), *International Code of Zoological Nomenclature,* 2nd edition, 1964).

Röber (1909a) describes *Phulia nymphagoga* as a new species from at least two specimens (both sexes) from Cocapata, Bolivia (the same locality from which Staudinger had one syntype of his *P. paranympha*). These Röber syntypes are apparently lost. The late Dr. E. M. Hering wrote (to the senior author) that "no specimen in the Staudinger and Rober collections are labeled as coming from Cocapata." He also stated that there were 19 males and 8 females from Sajama in the Staudinger collection standing under this Röber name (and Staudinger manuscript name), and one male specimen from this series was loaned to us as a possible lectotype candidate. This specimen is not eligible for lectotype designation as it is not a syntype and is not from the type-locality. This specimen, in fact, represents a different subspecies described below as *P. paranympha ernesta.* The original description of *P. nymphagoga* fits many paler and less well-marked specimens of *P. paranympha paranympha,* and we therefore list *P. nymphagoga* as a junior synonym of that subspecies. We see no need for a neotype selection at the present time.

Natural History.—The adults of this subspecies rest upon the ground with their wings outspread.

Distribution (Map 2).—This subspecies is found in Bolivia, occurring from the Cordillera Real and the Serranía de Sicasica, Department of La Paz south to Oruro and in the Sierra de Cochabamba, Department of Cochabamba.

Material Examined (35 males, 20 females).—BOLIVIA: *Department of Cochabamba,* Huaillatani (February, 5000 meters). *Department of La Paz:* La Paz (March, 4800 meters); west slope Illimani (April, 4500–5000 meters); Illimani (January, 4400 meters); Cordillera Real, Chacaltaya (March, 4700 meters); Estación Cumbre (February); Hichacota (June, 4500 meters); Sicasica (October). *Department of Oruro,* Oruro (January, 4100 meters).

2b. *Phulia paranympha ernesta,* new subspecies

Figures 58, 59, 78, 79; Map 2

Phulia nymphagoga.—Forster, 1955:137 [not Röber, a misidentification].

Male (Figures 58, 78, photographs of allotype).—Wings as figured with ground color above white, faintly tinged with yellow and with dark markings in apex and along outer margin of forewing very much smaller than in *P. paranympha paranympha.* The subapical brown spots not reaching below vein M_3 and represented by a very small dot in interspace M_2. Discal spot on forewing very thin. Ground color of undersurfaces yellow with all markings more faint than in *P. paranympha paranympha.*

Length of forewing, 13–14 mm.

Female (Figures 59, 79, photographs of holotype).—Similar to the male with wings as illustrated and having brown markings only slightly larger than in that sex. The white ground color on both surfaces tinged with yellow as in the male.

Length of forewing, 13 mm.

Type Data.—Described from the female holotype, the male allotype, and one male and one female paratypes, all from the Nevado de Sajama, Bolivia. These specimens were probably all collected by Gustav Garlepp in September 1896 at 4000 meters elevation and the male paratype, which is better labeled than the rest, was definitely so labeled. Holotype in the collection of the National Museum of Natural History, Washington, D. C. and has been given the type number 73644. The allotype and the female paratype are in the collection of the Field Museum of Natural History, Chicago, Illinois. The male paratype is in the collection of the Zoological Museum, Humboldt University of Berlin, Germany, where there are nine additional male and seven additional female topotypes, all mistakenly standing under the name *P. nymphagoga.*

Misidentification Note.—Forster (1955:137) overlooking the fact that the type-locality of *P. nymphagoga* Röber (a junior synonym of *P. paranympha paranympha*) is Cocapata not Sajama, Bolivia, makes the mistake of regarding the material

he had for study from the Berlin Museum as true syntypes of the Röber species. They are not syntypes of the Röber species as explained above and are topotypes of *P. paranympha ernesta.*

ETYMOLOGY.—The name *ernesta* is a feminine noun in the nominative singular in apposition with the generic name and is based upon the given name of the wife of the junior author.

DISTRIBUTION (see Map 2).—This is an isolated subspecies known at present only from the Nevado de Sajama, Bolivia, flying at 4000 meters elevation.

3. *Phulia nannophyes* Dyar

FIGURES 60, 61, 80, 81, 134, 152, 170, 189; MAP 2

Phulia nannophyes Dyar, 1913:629.—Talbot, 1932:60.

MALE (Figures 60, 80, photographs of lectotype).—This is the smallest of the four species of *Phulia* measuring 23–25 millimeters in wing expanse (Dyar mistakenly gives this expanse as 19–21 mm). Wings with ground color white above, secondaries faintly yellowish. Very similar to *P. paranympha ernesta* on this surface but with spot at end of cell in the forewing much more distinct. Wings below with ground color or hind wing and apical area of forewing yellow. Black submarginal row of spots on hind wing on this surface below vein M_2 quadrate or semiquadrate in shape and very distinct and contrasting strongly with other markings and the ground color. The black bar found in the middle of the cell on this surface in the hind wing also very distinct and contrasting with ground color.

Length of forewing, 11–12 mm.

FEMALE (Figures 61, 81, photographs of allolectotype).—Similar to the male with dark markings above slightly more extensive.

Length of forewing, 10–11.5 mm.

VENATION (Figure 170).—Similar to the venation of *P. paranympha* (Figure 169), differing in having vein R_3 and R_{4+5} + M_1 almost completely anastomosed, the free part of vein R_3 being very short.

CLAW, PARONYCHIUM, AND PULVILLUS (Figure 189).—Paronychium about as in *P. paranympha,* claw with ventral tooth from closer to tip of claw than in *P. nymphula* and *P. paranympha* and similar to that of *P. garleppi* but with dorsal margin of main element of claw more evenly curved.

MALE GENITALIA (Figure 134, drawn from preparation JH 182).—As illustrated, similar to that of *P. paranympha* with costal margin of valva more projected outwardly and with apical projection small and slightly upturned.

FEMALE GENITALIA (Figure 152, drawn from preparation JH 181).—As illustrated, similar to the genitalia of *P. paranympha* (Figure 151) and with dorsal process of inner genital plate smaller.

TYPE DATA.—The type-locality is "Coropuna, 14,500 feet" (= 4418 meters), Department of Arequipa, Peru. This was described from two syntype "males" collected in October 1911 by the Yale Peruvian Expedition. One of these specimens is a female, not a male. The male is hereby designated the lectotype and the female the allolectotype and have been so labeled. Both were assigned the type number 15601 by Dyar and are in the collection of the National Museum of Natural History, Washington, D. C.

ETYMOLOGY.—The name *nannophyes* is an invariable adjective in the nominative singular. The name is derived from the Greek words *nannos* (dwarf) and *phyē* (growth). Thus the name refers to this species as being of the stature of a dwarf.

DISTRIBUTION (see Map 2).—This is an isolated species known only from the Cordillera Occidental, Department of Arequipa, Peru.

MATERIAL EXAMINED.—We had for study in addition to the lectotype and allolectotype three males and two females from San Ignacio de Cailloma, Department of Arequipa, Peru (September, 4418 meters).

4. *Phulia garleppi,* new species

FIGURES 62, 63, 82, 83, 135, 153, 171, 190; MAP 2

MALE (Figures 62, 82, photographs of holotype).—This is a relatively large species, larger than *P. paranympha ernesta* and *P. nannophyes,* averaging 29 millimeters in expanse. The ground color of the wings below is very pale yellow except for the disk of forewing, which is white. The markings on both sides of the veins on the undersurface of hind wing are composed of a greenish yellow, darker than the ground color and greatly suffused with gray scales. The black spot at the end of the cell on forewing is usually absent or only faintly indicated above and nearly always absent below. The subapical dark spots on forewing on both surfaces are either entirely absent or only

faintly indicated. These characters consisting of a lack of the normal markings found in other species in this genus give this species its very distinctive appearance.

Length of forewing, 13–16 mm (average 14.6 mm).

FEMALE (Figures 63, 83, photographs of allotype).—This species in this sex varies from being very pale to being very dark in appearance, with markings as shown.

Length of forewing, 12–15 mm (average 13.6 mm).

VENATION (Figure 171).—Similar to the venation of *P. paranympha* (Figure 169), with veins R_3 and R_{4+5} separating from each other much farther down their stem toward cell than in that species.

CLAW, PARONYCHIUM, AND PULVILLUS (Figure 190).—Paronychium about as in *P. paranympha*, claw similar to that of *P. nannophyes* with ventral tooth somewhat larger and with dorsal margin of main element of claw not as evenly curved as in that species.

MALE GENITALIA (Figure 135, drawn from preparation JH 172).—As illustrated, similar to the genitalia of *P. paranympha* (Figure 133) with aedeagus in lateral view less downwardly bent in the middle.

FEMALE GENITALIA (Figure 153, drawn from preparation JH 173).—As illustrated, similar to the genitalia of *P. paranympha* (Figure 151).

TYPE DATA.—Described from the male holotype, the female allotype, and one female paratype, all from Huancayo, Department of Junín, Peru, taken at 4570 meters, 18 December 1922, by D. E. Bullock. The holotype has been assigned the type number 73643 and this specimen together with the allotype and female paratype mentioned above are in the collection of the National Museum of Natural History, Washington, D. C. Additional paratypes, all from Peru, are: two females collected between La Oroya and Tarma, Department of Junín, 4200 meters, 5 August 1955, leg. Koepcke (in the Zoological Collection of Bavaria, Munich); one male, collected in the puna above Orocas, 4000 meters, Department of Ayacucho, 4 October 1957, J. H. Robert (in the collection of the National Museum of Natural History, Washington, D. C.); one male from Capillacocha (between Carhuamayo and Paucartambo), 4400 meters, 25 November 1951, Sr. Blancas (in the National Museum of Natural History, Santiago, Chile); three males from Ticlio, Department of Lima, 4200 and 4600 meters, June and November (in collection "Javier Prado" Natural History Museum, Lima, Peru).

We also had for study a number of other specimens from Peru (not labeled as to more exact locality), collected at 3900 meters, and a large series from near Huanaco, Province of Omasuyos, Department of La Paz, Bolivia, March, 4875 meters. We specifically exclude from the paratype series this poorly labeled Peruvian series. We also exclude from the paratype series the series from Bolivia because they were found at such a great distance from the holotype locality.

ETYMOLOGY.—The name *garleppi* is a masculine noun in the genitive case, a patronym after Gustav Garlepp, who collected and supplied to Dr. Staudinger a great amount of material from the highlands of Bolivia. From the latter, Staudinger described a number of new species. This very careful and indefatigable collector in his letter to Staudinger, which the latter published (1892), shows his great interest and pleasure in field work and we cannot resist quoting from it (translation): "I have already said a hundred times that if anyone offered me a fortune on condition that I go home and politely sit still, I would refuse it. I would also refuse it if the results of my journeys were as little advantageous for me as they have been recently, but in spite of all difficulties I am hanging on to my calling [field collector] with body and soul."

DISTRIBUTION (see Map 2).—This species occurs in Peru from the Department of Junín south along the Cordillera Central to near Ayachucho, Department of Ayachucho and in Bolivia near Huanaco.

MATERIAL EXAMINED.—We had for study a total of 43 males and 18 females all listed above under "type-data."

Genus *Infraphulia* Field, new status

FIGURES 64–68, 84–93, 106–110, 136–138, 154–156, 172–174, 191–193; MAP 3

Phulia.—Weymer, *in* Weymer and Maassen, 1890:98 [in part].—Röber, 1909a:97–98, pl. 28 [in part]; 1910:97–98, pl. 28 [in part].—Talbot, 1932:59–60 [in part].—Zischka, 1951:29–30 [in part].—Herrera, 1954b:52 [in part].—Ureta, 1955:57, 69 [in part].—Herrera and Etchevery, 1956:284 [in part].—Ureta, 1963:98–99 [in part].

Phulia (*Infraphulia*) Field, 1958:104, 105, 106, 114–115, figures 5, 13, 21, 29, 38.

Infraphulia.—Hemming, 1967:232. [Listing in a Nomenclator, not a raise in status.]

TYPE-SPECIES.—*Phulia nymphula* var. *illimani* Weymer = *Infraphulia illimani* (Weymer), new combination. Type by original designation.

Infraphulia differs from the other genera treated herein except *Phulia* in habitus of the wings and from all the other genera in the claws. It has a reduced number of radial veins in the forewing, being similar in this respect to *Phulia* and *Pierphulia* and thus differs from *Hypsochila* and *Piercolias*. In one species only two radial veins remain, a situation not known to the present authors to occur in any other genus of butterflies. From *Phulia* it also differs in the uncus and valva of the male genitalia and in the eight tergite of the female and in the signum, accessory bursa, and inner genital plates of the female genitalia. From *Pierphulia* and *Piercolias* it differs in the uncus of the male genitalia and in the signum, accessory bursa, and inner genital plates of the female genitalia.

Wings above white in the male sex (Figures 64, 67, 68, 90, 91) and white, yellowish white to yellow, or sometimes even fuscous in the female sex (Figures 65, 66, 89, 92, 93), lacking a silvery sheen on the base of the forewing, and usually with at least a few sagittate markings in the apex, with discal spot very small or absent on this wing. Females usually much darker than the males and with many more markings on the uppersurfaces. Wings below in both sexes (Figures 84–88, 106–110) as shown, with the same dark pattern found in *Phulia* (Figures 45–48, 68–83), differing from that genus only in usually having small pink streaks between the veins and sometimes on the margin in the apex of undersurface of forewing.

Leg with claw (Figures 191–193) greatly curved downward, somewhat like the claw of *Phulia* but with dorsal margin more robustly curved than in any of the other genera. Tooth similar to that of *Phulia*, nearly parallel to main portion of claw and from near middle of claw. Pulvillus with distal subsegment narrow and entirely setulose. Paronychium relatively long, over one-half the length of claw.

Venation of *Infraphulia* similar to that of *Phulia* (Figures 168–171) and *Pierphulia* (Figures 175–177) in the two of its species (*I. illimani*, Figure 172; *I. ilyodes*, Figure 174), with the number of radial veins in forewing reduced to three, vein R_3 having anastomosed with R_{4+5}. In these two species also vein M_1 is anastomosed with the base of vein R_{3+4+5} to just before apex of wing. In the third species (*I. madeleinea*, Figure 172) the number of radial veins is reduced to two, R_{3+4+5} having anastomosed with vein R_2. In this species veins M_1 and M_2 are free beyond their common base.

Male genitalia (Figures 136–138) with latero-ventral wall at base of uncus not at all folded inward as is the case in *Phulia* (Figures 132–135) and *Hypsochila* (Figures 126–131); subscaphium only slightly sclerotized in *Infraphulia*, large in *Piercolias* (Figures 141–143), and absent in *Phulia;* valva broadly produced apically and lacking the apical process found in *Hypsochila, Phulia,* and *Piercolias,* with a weakly sclerotized clasper flap on inner face near middle.

Female genitalia (Figures 154–156) with bursa copulatrix about as in *Phulia* (Figures 150–153) but with accessory pouch absent (Figures 154, 155) or very greatly reduced in size (Figure 156). In *Phulia* this pouch is always present and relatively large. In *Infraphulia* the signum is reduced in size and has very few dentations (Figures 155, 156) or is entirely smooth, consisting of a semicircular plate (Figure 154). As in *Pierphulia* (Figures 157–159) the eighth tergite is not sclerotized in the dorsal region and forms two subtriangular-shaped lateral plates, thus differing greatly from *Phulia, Hypsochila,* and *Piercolias,* where the eighth tergite is entire and semiannulate. The inner pair of genital plates is greatly reduced, each being a narrow sclerotized smooth band and lacking the figger-like process found in all of the other genera except *Pierphulia.*

Key to the Species of *Infraphulia*

1. Forewing with two radial veins present (Figure 173) ..... 2. ***I. madeleinea,*** new species
   Forewing with three radial veins present (Figures 172, 174) 2
2. Both sexes with dark markings small in size and indistinct (Figures 67, 68, 89, 106) ..... 3. ***I. ilyodes*** (Ureta)
   Both sexes with dark markings large and distinct (Figures 64–66, 85, 86) ..... 1. ***I. illimani*** (Weymer)

ETYMOLOGY.—The name *Infraphulia* is a feminine noun formed from the Latin prefix *infra,* meaning "underneath," and the generic name *Phulia.*

The species of this genus (see Map 3) live in the highlands of the Andes, always above 3000 meters and up to 5000 meters elevation. They are found only in Bolivia, Peru, and northern Chile.

1. *Infraphulia illimani* (Weymer), new combination

FIGURES 64–66, 84–86, 136, 154, 173, 191; MAP 3

Phulia nympula var. *illimani* Weymer, *in* Weymer and Maassen, 1890:98.—Weymer, 1890:125, pl. 4: fig. 2.—Hemming, 1967:232.

Phulia illimani.—Staudinger, 1894:49, 51–54.—Röber, 1909a:97, pl. 28: fig. *d*–3; 1910:97, pl. 28: fig. *d*–3.—Dyar, 1913:628.—Talbot, 1932:59.—Zischka, 1951:29.—Herrera, 1954a:140, 147; 1954b:52, 57.—Forster, 1955:137.—Herrera and Etcheverry, 1956:284, 289.

Phulia jllimani [sic].—Staudinger, 1895, pl. 1: figs. 8, 14.

Phulia (Infraphulia) illimani.—Field, 1958:114, 115, 122, 124, 126, 128, 131, figs. 5, 13, 21, 29, 38.

Phulia illimani illimani.—Ureta, 1963:98.

MALE (Figures 64, 84, photographs of a topotype).—Wings with ground color on both surfaces white and with dark markings as illustrated. Uppersurfaces similar to *Phulia garleppi* with discal spot sometimes absent on forewing or if present very small. Subapical spots of forewing larger, more confluent and with markings along outer margin at apex larger and more distinct than in *P. garleppi.* Wings below also somewhat similar to that species with ground color slightly more yellowish on disc and in base of hind wing and differing from that species on this surface in having fine red or pinkish lines between the veins on apex of forewing and sometimes with red along the costal margin of hind wing. All dark markings below darker than in *P. garleppi.*

Length of forewing, 13–15 mm (average 14 mm).

FEMALE (Figures 65, 85, photographs of a topotype; Figures 66, 86, photographs of a specimen from Hichucota, Bolivia).—Wings with ground color white or yellowish white on disc and in the light submarginal area of forewing above and usually on this surface of hind wing. Dark markings extensive in this sex. Undersurfaces similar to the male with dark markings usually more distinct.

Length of forewing, 12.5–14 mm (average 13.5 mm).

VENATION (Figure 172).—Forewing with three radial veins, R_{4+5} having completely anastomosed with vein R_3.

CLAW, PARONYCHIUM, AND PULVILLUS (Figure 191).—Claw with ventral tooth larger than in *I. madeleinea* and *I. ilyodes.*

MALE GENITALIA (Figure 136, drawn from preparation WDF 5384).—As illustrated and differing slightly from other species in having valva more rounded at the apex.

FEMALE GENITALIA (Figure 154, drawn from preparation WDF 5385).—As illustrated with a signum that is entirely smooth and with bursa copulatrix lacking accessory pouch.

TYPE DATA.—The type-locality is "Illimani (Bolivien) 4600 m." This species was described from a single female specimen, the holotype, which is in the Stübel collection of the Zoological Museum, Humboldt University, East Berlin.

ETYMOLOGY.—The name *illimani* is a noun in apposition with the generic name and is the name of the type-locality of this species.

NATURAL HISTORY.—This species has a strong rapid flight and flies at high elevations where it is exposed to strong winds.

DISTRIBUTION (see Map 3).—This species is found at Illimani north through the Cordillera Real of Bolivia, at Málaga (to the northeast of Cochabamba) and at Puno, Peru.

MATERIAL EXAMINED (22 males, 12 females).—BOLIVIA: *Department of La Paz,* Illimani (January, 4400 meters); La Paz (January); Estacion Cumbre (February); Hichucota (June, 4300 meters). *Department of Cochabamba,* Málaga. PERU: *Department of Puno,* Puno (4875 meters).

2. *Infraphulia madeleinea,* new species

FIGURES 90–93, 107–110, 137, 155, 173, 192; MAP 3

MALE (Figures 90, 107, photographs of holotype; 91, 108, photographs of paratype from Campamento Turpi, Peru).—Wings on uppersurfaces similar to those of *I. illimani,* markings between the veins on border of apical portion of forewing less distinct and with one less of these markings due to the loss of the radial vein R_{3+4+5} and of the consequent loss of the interspace that would have been found below this vein. This wing relatively more narrow also because of the loss of this vein. Wings below similar

to *I. illimani* with markings covering veins darker.

Length of forewing, 11–15 mm (average 13 mm).

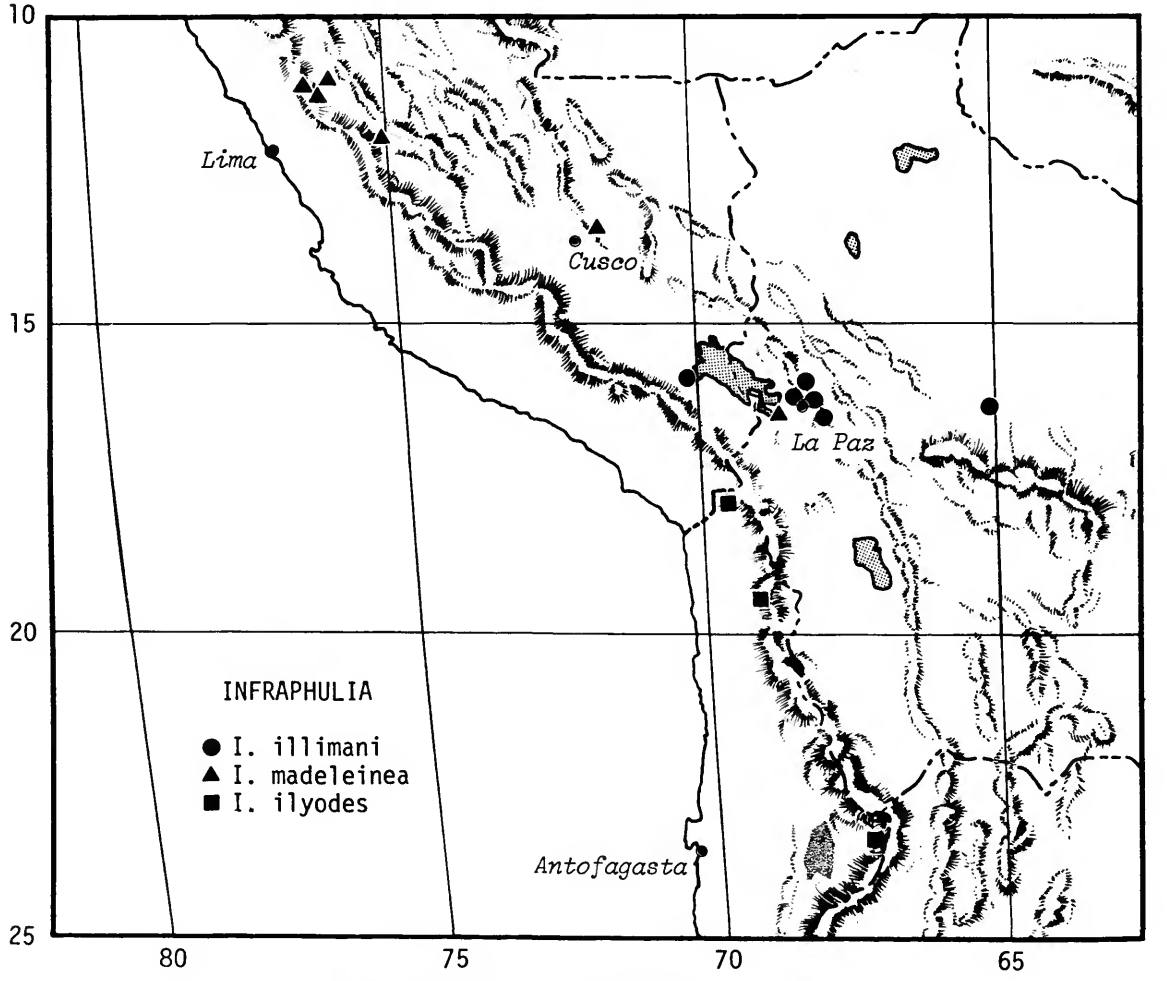
FEMALE (Figures 92, 109, photographs of paratype from Capillacocha, Peru; 93, 110, photographs of allotype).—Ground color above brownish yellow and dark markings brown in color. Disc of forewing with ground color yellowish white. Apex of forewing and the hind wing on undersurface with a pale yellow ground color. With narrow red lines between the veins in apex of forewing. As in the male the forewing is relatively more narrow than it is in the other species due to the missing radial vein.

Length of forewing, 11–14 mm (average 12.3 mm).

VENATION (Figure 173).—Differing markedly from the other species in having only two radial veins, vein R_{3+4+5} having anastomosed completely with vein R_2.

CLAW, PARONYCHIUM, AND PULVILLUS (Figure 192).—Claw with ventral tooth smaller than in *I. illimani* (Figure 191), about the same size as in *I. ilyodes* (Figure 193), and slightly more separated from main portion of claw than in the latter species.

MALE GENITALIA (Figure 137, drawn from preparation of the holotype).—As illustrated with valva slightly more concave on dorsal margin before apex than in the other species.



MAP 3.—Distribution of the Genus *Infraphulia* Field.

FEMALE GENITALIA (Figure 155, drawn from preparation of the allotype).—As illustrated with signum having a few dentations, bursae copulatrix with accessory pouch absent, and with anterior process of inner genital plate (Figure 155*b*) broader than in *I. illimani* (Figure 154*b*).

TYPE DATA.—Described from the male holotype, female allotype, and eight male and two female paratypes with data as follows: male holotype, San José (near Minas Huarn), Department of Junín, Peru, 14 November 1949, F. Blancas, in collection of National Museum of Natural History, Washington, D. C., type number 73642; female allotype, Campamento Turpi, upper Río Mantero (near Huarmicocha, near Pugio, near Huancayo), Department of Junín, Peru, 4300 meters January 1939, Otto Gutzwiller, in collection Natural History Museum, Basel, Switzerland; one male paratype, same locality and data as allotype, in collection Natural History Museum, Basel, Switzerland; one male and one female paratypes, Capillacocha (between Carhuamayo and Paucartambo), Department of Junín, Peru, 4400 meters, F. Blancas, male paratype in collection "Javier Prado" Natural History Museum, Lima, Peru, female paratype in collection José Herrera, Santiago, Chile; two male paratypes, Canchacuchu (between Junín and Huayllay), Department of Junín, Peru, 4300 meters, 7 August 1941, in collection "Javier Prado" Natural History Museum, Lima, Peru; two male paratypes, Ticlio, Department of Lima, Peru, 4758 meters, 6 August 1969, José Herrera, both in collection of José Herrera, Santiago, Chile; one male and one female paratypes, Junín, Department of Junín, Peru, 4200 meters elevation, July 1947, F. Blancas, male in collection "Javier Prado" Natural History Museum, Lima, Peru, female in collection José Herrera, Santiago, Chile; one male paratype, Hacienda Ulcun, Province of Paucartambo, Department of Cusco, Peru, 4500 meters, December 1947, December 1947, in collection "Javier Prado" Natural History Museum, Lima, Peru.

We also had for study three males from Peru (not labeled as to precise locality) collected at 3900 meters and eight males from near Huanaco, Province of Omasuyos, Department of La Paz, Bolivia, March 1922, collected at 4875 meters. We specifically exclude from the paratype series these poorly labeled Peruvian specimens and the series from Bolivia. The later are excluded because of the great distance between their locality and the holotype locality.

ETYMOLOGY.—The name *madeleinea* is a feminine noun in the nominative singular in apposition to the generic name and is based upon the given name of the wife of the senior author.

DISTRIBUTION (see Map 3).—This species occurs in Peru in the Cordillera Central, Department of Junín and in the Department of Cusco. It occurs also in Bolivia near Huanaco, where it flies together with *Phulia garleppi*.

3. *Infraphulia ilyodes* (Ureta), new status, new combination

FIGURES 67, 68, 87, 88, 89, 106, 138, 156, 174, 193; MAP 3

Phulia illimani ilyodes Ureta, 1955:69–71; 1956:161, pl. 1: figs. 4*a–c*; 1963: 99.—Peña, 1970:262.

MALE (Figures 67, 68, 87, 88, photographs of topotypes).—Wings as shown, differing from *I. illimani* and *I. madeleinea* on the uppersurfaces in having a much smaller fuscous area at the base and differing on the undersurface in having all dark markings greatly reduced in size and in being much paler.

Length of forewing, 12.5–15 mm (average 13.5 mm).

FEMALE (Figures 89, 106, photographs of a paratype).—Wings as illustrated with ground color on upper and undersurface yellow except on the disc of forewing, where this color is yellowish white. As in the male all dark markings although more extensive than in that sex are reduced in size.

Length of forewing, 12–14 mm (average 13 mm).

VENATION (Figure 174).—Forewing with three radial veins, very similar to the venation of *I. illimani*.

CLAW, PARONYCHIUM, AND PULVILLUS (Figure 193).—Claw with ventral tooth smaller than in *I. illimani* (Figure 191), about the same size as in *I. madeleinea* (Figure 192), and closer to main portion of claw than in the latter.

MALE GENITALIA (Figure 138, drawn from preparation WDF 6603).—With apex of valva longer and more projected outward than in the other species of *Infraphulia*.

FEMALE GENITALIA (Figure 156, drawn from preparation WDF 6596).—With signum having at least twice as many dentations as in *I. madeleinea*

(Figure 155), with a small accessory pouch on bursa copulatrix and with anterior process of inner genital plate (Figure 156*b*) anteriorly projected and downwardly curved, not as broad as in *I. madeleinea* (Figure 155*b*) and decidedly broader than in *I. illimani* (Figure 154*b*).

TYPE DATA.—The type-locality is "Mucar, Cordillera de Antofagasta," Chile. Described from the holotype male, 18 December 1952, Luis E. Peña, and from 16 male and 13 female paratypes with similar data; allotype female, Lever, Cordillera de Antofagasta, 20 December 1952, Luis E. Peña and eight male and three female paratypes with similar data; one female paratype from Loyoquis, Cordillera de Antofagasta, 24 December 1952, Luis E. Peña. Holotype, allotype, and eight male and eight female paratypes in the collection of the National Museum of Natural History, Santiago, Chile. Other paratypes in the collection of Luis E. Peña and S. Barros.

ETYMOLOGY.—The name *ilyodes* is a compound adjective in the nominative singular with an invariable ending in Latin. "Ily" is derived from the Greek *ilys* meaning "mud" and "odes" is the Greek suffix *odes* meaning "like."

NATURAL HISTORY.—This species flies in damp swampy areas, where it is less exposed to winds. It has a slow weak flight and is observed on the wing between the hours of 10 in the morning and 3 in the afternoon. When it settles on the ground it extends its wings to an outspread position on both sides of its body and closely appresses them to the ground. We believe that this species may be larviparous since we have several times observed larvae within the oviducts of females we were dissecting.

DISTRIBUTION (see Map 3).—Found only in the Cordillera of the Provinces of Antofagasta and Tarapacá, Chile.

MATERIAL EXAMINED.—We had for study 35 males and 10 females from all of the localities mentioned under "Type Data" above and one pair from General Lagos (November, 4000 meters), Province of Tarapacá and one male from Poroma (March, 3000 meters), Province of Tarapacá.

Genus *Pierphulia* Field, new status

FIGURES 94–105, 111–125, 139, 157–159, 175–177, 194; MAP 4

Phulia.—Röber, 1909a:97–98, pl. 28 [in part]; 1910:97–98, pl. 28 [in part].—Jörgensen, 1916:515 [in part].—Köhler, 1923:19 [in part]; 1928:1 [in part].—Talbot, 1932:59–60 [in part].—Hughes, 1958:7–8 [in part].

Piercolias.—Herrera, 1954b:52.—Forster, 1955:138 [in part].—Herrera and Etcheverry, 1956:284.—Ureta, 1956:163; 1963:99.—Peña, 1974a:262.

Piercolias (*Pierphulia*) Field, 1958:104, 105, 106, 117, figs. 6, 14, 22, 30, 39.—Peña, 1967:215.

Pierphulia.—Hemming, 1967:362. [Listing in a Nomenclator, not a raise in status.]

TYPE-SPECIES.—*Phulia nysiella* Röber = *Pierphulia nysias nysiella* (Röber).

Pierphulia differs from all other genera treated in this paper except *Piercolias* in the habitus of the wings. Its claws are similar to those of *Phulia* and differ from those of *Infraphulia* and *Piercolias*. From *Piercolias* and *Hypsochila* it differs in having three instead of four radial veins in the forewing and in structures of the male and female genitalia.

Wings above white in the male (Figures 94, 96, 97, 99, 100, 103) and white to pale yellow in the female (Figures 95, 98, 101, 102, 104, 105, 120, 121) with small black marginal and subapical markings on the forewing and with a very small discal spot on this wing. Wings below (Figures 105, 111–119, 122–125) with secondaries and apex of forewing heavily irrorated with black scales and sometimes with pink scales, producing a gray or pinkish gray appearance and with a white spot at end of cell on hind wing and a small black spot in this same position on the forewing. Females with all black or dark markings usually more prominent on the uppersurfaces than in the males. The color and pattern of *Pierphulia* is similar to that displayed in *Piercolias* (Figures 28–32, 40–44) except for the continuous dark marginal band and larger discal spot on the uppersurface of the forewing of the latter.

Legs with claw (Figures 194, 195) directed outward, with dorsal margin only gradually curved downward and relatively long, about three times as long as width of claw at its base and similar to that of *Hypsochila*. Tooth from before middle of main part of claw, sometimes relatively long (Figure 194), sometimes short (Figure 195). Pulvillus with distal subsegment narrow and entirely setulose. Paronychium (Figures 194, 195) less than one-half length of claw to more than one-half this length.

Venation of *Pierphulia* (Figures 175–177) similar to that of *Phulia* (Figures 168–171) and *Infraphulia* (Figures 172–174) with the number of radial veins

reduced to three, R_{4+5} having anastomosed with R_3. These genera thus differ greatly from *Hypsochila* (Figures 162–167) and *Piercolias* (Figures 178–180), which both retain four radial veins. In *Pierphulia, Infraphulia,* and *Phulia* M_1 and M_2 are anastomosed with R_{3+4+5}, M_1 being anastomosed to just before the apex of wing and M_2 for a short distance beyond apex of cell. The latter vein in both *Hypsochila* and *Piercolias* is free, originating at or near apex of cell or sometimes connate with base of vein M_1.

Male genitalia (Figures 139, 140) with uncus slender and gradually produced into a finger-like process, similar to that of *Piercolias* (Figures 141–143) except that it is very much shorter and with the ventral opening for anal tube about two-thirds length of entire uncus; lateroventral walls at base of uncus neither infolded nor possessing internal ridges; subscaphium small and weak and consisting of two parallel sclerotized plates; valva broadly produced apically, without apical process and thus similar to that of *Infraphulia* (Figures 136–138) and differing from the latter in lacking a clasper flap or lobe on its inner face.

Female genitalia (Figures 157–159) with ductus bursae colorless and nonsclerotized as in *Phulia* (Figures 150–153) and *Infraphulia* (Figures 154–156). As in *Infraphulia* the eighth tergite is not sclerotized in the dorsal region, forming two triangular lateral plates; outer genital plate large and reticulated; inner genital plate reduced in size and subtriangular in shape and sometimes slightly setulose and lacking a posterior finger-like process or bilobed and more thickly setulose with upper lobe short and broad, not at all finger-like in shape as it is in *Phulia, Hypsochila,* and *Piercolias.*

ETYMOLOGY.—The name *Pierphulia* is a feminine noun formed from *Pier,* an element from the genus name "Pieris," used as a prefix and from the genus name *Phulia.*

The genus *Pierphulia* contains three species: ***P. nysias*** (Weymer), ***P. rosea*** (Ureta), and ***P. isabela,*** new species.

This genus (see Map 4) is known from the Andes of southern Peru, Bolivia, and Chile, where it is found as far south as the Nevado Ojos del Salado, Province of Atacama. The species fly at between 3000 and 5000 meters elevation.

Key to the Species and Subspecies of *Pierphulia*

1. Hind wing on uppersurface with a series of three submarginal fuscous spots, one each in interspaces R_s, M_1 and M_2 (Figures 105, 120, 121) ..... 3. ***P. isabela,*** new species
   Hind wing on uppersurface lacking these submarginal fuscous spots (Figures 94–104) 2
2. Ground color of undersurface of hind wing and of apex of forewing light gray or dark gray, not at all pink (Figures 111–113) ..... 1. ***P. nysias*** (Weymer), 3
   Ground color of undersurface of hind wing and of apex of forewing with a pinkish cast (Figures 114–119, 122, 123) ..... 2. ***P. rosea*** (Ureta), 4
3. Ground color of undersurface of hind wing and of apex of forewing dark gray (Figures 111, 112) ..... 1a. ***P. nysias nysias*** (Weymer)
   Ground color of undersurface of hind wing and of apex of forewing light gray (Figure 113) ..... 1b. ***P. nysias nysiella*** (Röber)
4. Undersurface of hind wing with a small fuscous spot on humeral area (Figures 116, 118) ..... 2b. ***P. rosea maria,*** new subspecies
   Undersurface of hind wing lacking this fuscous spot on humeral area (Figures 114, 115, 119, 122, 123) 5
5. Ground color of undersurface of hind wing very pale, not heavily irrorated with fuscous scales (Figures 119, 122, 123) ..... 2a. ***P. rosea rosea*** (Ureta)
   Ground color of undersurface of hind wing darker, heavily irrorated with fuscous scales (Figures 114, 115) ..... 2c. ***P. rosea annamariea,*** new subspecies

1. *Pierphulia nysias* (Weymer), new combination

FIGURES 94–96, 111–113, 139, 157, 175, 194; MAP 4

For references see under the subspecies.

MALE (Figures 94, 111, photographs of topotype of *P. nysias nysias;* 96, 113, photographs of lectotype of *P. nysias nysiella*).—Wings white above, forewing with black bar at end of cell, marginal black spots at end of veins and a subapical series of black spots extending from costal margin into interspace M_2. Forewing with undersurface dark or light gray in apical area and with this same color over entire

undersurface of hind wing, this color formed by a heavy irroration of black scales over a creamy background. Forewing on this surface with a black bar, sometimes a very thin one at end of cell. On the hind wing on this surface there is a faint white spot at the end of the cell, a faint series of small submarginal black spots, and an additional black spot above the middle of the cell. This species differs in habitus from *P. rosea* chiefly in lacking any suggestion of pink on the undersurfaces of wings.

FEMALE (Figures 95, 112, photographs of lectotype of *P. nysias nysias*).—The female of *P. nysias nysiella* is unknown to the present authors. Differing from the male in having dark markings on both surfaces of the forewing larger and differing on the uppersurface of this wing by having the subapical and submarginal row of fuscous spots extending into interspace Cu_2. Undersurfaces with hind wing and apex of forewing as in the male.

VENATION (Figure 175).—With stalk of vein $M_1+M_2+R_3+R_{4+5}$ longer than in *P. isabela* and about the length it is in *P. rosea*.

CLAW, PARONYCHIUM, AND PULVILLUS (Figure 194).—Claw with ventral tooth long and close to and nearly parallel with the upper element and with paronychium relatively long and pointed.

MALE GENITALIA (Figure 139, drawn from preparation WDF 6613, a specimen of *P. nysias nysias*).—Differing from genitalia of *P. rosea* (Figure 140) in the shape of the subscaphium, which is divided and with each element distinctly pointed posteriorly. Differing also from that species in having vinculum attached to saccus along its full length dorsally. There are no differences in male genitalia in the two subspecies.

FEMALE GENITALIA (Figure 157, drawn from preparation of lectotype of *P. nysias nysias*).—With inner genital plate completely devoid of setae and thus differing from both *P. rosea* (Figure 158) and *P. isabela* (Figure 159).

ETYMOLOGY.—The name *nysias* is a feminine noun in the nominative singular in apposition with the generic name. It is a Latin word meaning "Nysaean," of or belonging to Nysa, one of three classical cities of that name.

DISTRIBUTION (see Map 4).—This species including its two subspecies has been found only at three localities in Bolivia: *P. nysias nysias* being known to occur at 4600 meters at Illimani, Department of La Paz; at 5000 meters at Huailatani, Department of Cochabamba; and *P. nysias nysiella* being known only at 3000 meters at Cillutincara, Department of La Paz (a locality close by and to the northeast of Illimani).

1a. *Pierphulia nysias nysias* (Weymer)

FIGURES 94, 95, 111, 112, 139, 157, 194; MAP 4

Phulia nysias Weymer, *in* Weymer and Maassen, 1890:98.—Weymer, 1890:125, pl. 4: fig. 11.—Staudinger, 1892:274; 1894:54–56, pl. 1: figs. 9, 17.—Röber, 1909a:97–98, pl. 28: fig. *e*–1; 1910:97–98, pl. 28: fig. *e*–1.—Köhler, 1928:1.—Talbot, 1932:60.—Ureta, 1947:50–52 [in part].

Schmetterlinge Nr. 5.—Garlepp, 1892:274.—Staudinger, 1892:274.

Phulia nycias [sic].—Jörgensen, 1916:515.

Pierocolias nysias.—Forster, 1955:138.

Piercolias nyssias [sic].—Ureta. 1956:181.

Piercolias (Pierphulia) nysias.—Field, 1958:117, 126, fig. 22.

MALE (Figures 94, 111, photographs of topotype).—This subspecies has all dark markings on uppersurface of forewing larger with subapical black spots and the spots along the outer margin confluent or nearly so. On the undersurfaces the hind wing and the apex of the forewing are very much darker gray than in *P. nysias nysiella*.

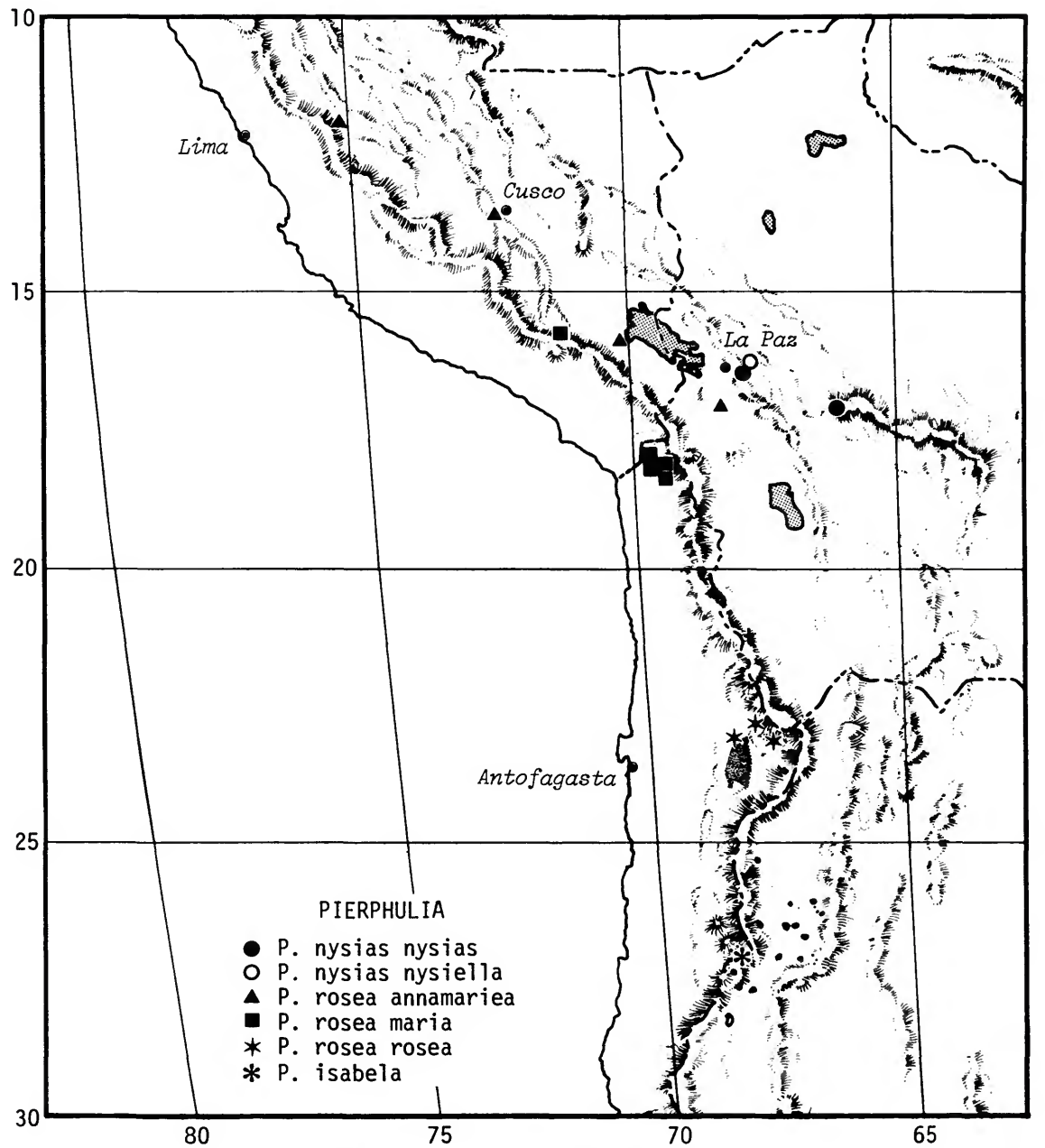
Length of forewing, 15–16 mm.

FEMALE (Figures 95, 112, photographs of lectotype).—With dark markings on both surfaces of the forewing larger and on the uppersurface with the subapical and submarginal row of fuscous spots extending into interspace Cu_2. Undersurface of hind wing and apex of forewing very dark gray as in the male.

Length of forewing, 15 mm.

TYPE DATA.—The type-locality is "Illimani in Bolivien 4600 m." According to Weymer this subspecies was described from two females (=syntypes) collected between October and December 1876 by A. Stübel. These two specimens were loaned to the present revisers for study by the late Dr. E. M. Hering, former curator of the Zoological Museum, Humboldt University, East Berlin. We select as the lectotype, the female specimen labeled "Illimani" and have attached to its pin a designating label. The second specimen is a male, not a female as described, and is labeled simply "Bolivia." This specimen is certainly not from Illimani and is *P. rosea annamariea*.

NATURAL HISTORY.—Gustav Garlepp (1892:274)



MAP 4.—Distribution of the Genus *Pierphulia* Field.

reports that this butterfly flies on the grassless and bare rocky ridges, but here and there a small leaved plant with nearly sessile white flowers presses itself against the earth. Apparently unable to cope with the wind it flies uneasily and close to the ground during the times that the sun is out and the wind

is quiet for the moment. When the butterflies alight they press themselves close to the ground with their wings outspread.

DISTRIBUTION (see Map 4).—This subspecies is known at present only from two localities in Bolivia: Illimani (4600 meters), Department of La Paz and Huailatani (5000 meters), Department of Cochabamba.

MATERIAL EXAMINED.—We had for study only four males and the lectotype female.

1b. *Pierphulia nysias nysiella* (Röber), new status, new combination

FIGURES 96, 113; MAP 4

Phulia nysiella Röber, 1909a:98, pl. 28: fig. *d*-6; 1910:98, pl. 28: fig. *d*-6.—Talbot, 1932:60.—Ureta, 1947:51 [a misidentification, in part].—Zischka, 1951:29–30.—Hemming, 1967: 363.

Phulia nysias.—Ureta, 1947:50, 51 [a misidentification, in part.]

Piercolias nysiella.—Forster, 1955:138 [in part.]

Piercolias (Pierpulia) nysiella.—Field, 1958:117, 124, 128, 131.

Pierphulia nysiella.—Hemming, 1967:363 [listing in a Nomenclator, not a new combination].

MALE (Figures 96, 113, photographs of lectotype).—This subspecies has all dark markings on uppersurface of forewing smaller, with the subapical fuscous spot in interspace M_2 separate and with these spots along the outer margin also separate. On the undersurfaces the hind wing and the apex of the forewing are very much lighter gray than in *P. nysias nysias.*

Length of forewing 11.5 mm.

FEMALE.—Unknown to the present authors.

TYPE DATA.—The type-locality is "Cillutincara, 3,000 m.," Department of La Paz, Bolivia. This subspecies was described from the male sex, number of specimens not stated, collected by Gustav Garlepp in January 1896. There are four male and one female syntypes (the female was thought by Röber to be a male) in the Staudinger collection, all collected by Garlepp at the type-locality. One of these males (Figures 90, 110) was loaned to us for study by the late Dr. E. M. Hering, former curator of the Zoological Museum, Humboldt University, East Berlin. We designate this specimen the lectotype, having attached to it an appropriate label.

ETYMOLOGY.—The name *nysiella* is a noun in the nominative singular with a feminine ending. The name is derived from the species name *nysias* and the Latin diminutive suffix *ellus, ella, ellum,* thus giving the meaning "little Nysaean" or "little Nysias."

DISTRIBUTION (see Map 4).—This subspecies is known at present only from the type-locality, Cillutincara, Province of Nor Yungas, Department of La Paz, Bolivia at 3000 meters elevation.

2. *Pierphulia rosea* (Ureta), new status, new combination

FIGURES 97–104, 114–119, 122, 123, 140, 158, 176; MAP 4

For references see under the subspecies.

MALE (Figures 97, 114, photographs of holotype of *P. rosea annamariea;* 99, 116, photographs of holotype of *P. rosea maria;* 100, 117, photographs of paratype of *P. rosea maria* from Taipicahua, Chile; 103, 122, photographs of topotype of *P. rosea rosea*).—Wings white above, forewing with vein closing end of cell black with marginal black spots at end of veins, and a subapical series of black spots extending from costal margin into interspace M_2. The uppersurfaces are thus quite similar to *P. nysias.* Undersurfaces with a distinct pink cast over the hind wing and apex of the forewing, thus differing from P. nysias.

Length of forewing, 8–16 mm (average 12.6 mm).

FEMALE (Figures 98, 115, photographs of allotype of *P. rosea annamariea;* 101, 118, photographs of allotype of *P. rosea maria;* 102, 119, photographs of *P. rosea rosea* from Ojo del Putana, Antofagasta, Chile; 104, 123, photographs of topotype of *P. rosea rosea*).—Differing from the male in the same way that the female of *P. nysias* differs from the male of that species in having the dark markings on both surfaces larger and more extensive. As in the male the female differs from *P. nysias* in the pink cast on the hind wing and in apex of forewing.

Length of forewing, 9–15 mm (average 12 mm).

VENATION (Figure 176).—With the stalk of vein $M_1+M_2+R_3+R_{4+5}$ about the same length as in *P. nysias* and longer than in *P. isabela.*

CLAW, PARONYCHIUM, AND PULVILLUS.—Not illustrated, quite similar to those structures in *P. nysias.*

MALE GENITALIA (Figure 140, drawn from preparation WDF 6620, a specimen of *P. rosea rosea*).—Differing from these structures in *P. nysias* (Figure 139) in the shape of the subscaphium, which while

divided has each element distinctly blunted posteriorly. It differs also from that species in having vinculum attached to saccus only about up to the middle of that structure. The subspecies show no differentiating characters in the male genitalia.

FEMALE GENITALIA (Figure 158, drawn from preparation WDF 6676, a specimen of *P. rosea rosea*).—With inner genital plate having posterior process reduced to a small triangularly shaped lobe and having anterior process with a number of setae along its ventral margin.

ETYMOLOGY.—The name *rosea* is an adjective in the nominative singular with a feminine ending and agreeing in gender with the generic name. It has the following gender endings: "us," masculine; "a," feminine; "um," neuter. The name is derived from the Latin word *rosa* meaning "rose" and refers to the ground color of the undersurfaces of the secondaries and apex of the primaries.

DISTRIBUTION (see Map 4).—This species including its subspecies ranges at widely separated localities in the Cordillera of northern Chile (Provinces of Antofagasta and Tarapacá), in Bolivia (Sicasica, Province of Sicasica, Department of La Paz), and in the Cordillera of Peru north into the Department of Junín.

2a. *Pierphulia rosea rosea* (Ureta)

FIGURES 102–104, 119, 122, 123, 140, 158, 176; MAP 4

Piercolias nysiella.—Herrera, 1954b:52 [a misidentification, in part].—Herrera and Etcheverry, 1956:284 [a misidentification, in part].

Piercolias nysias rosea Ureta, 1956:163–164, fig. 5, pl. 1: figs. 5*a*–5*d* [a misidentification, in part]; 1963:99.—Peña, 1970:262.

Piercolias (Pierphulia) nysias rosea.—Peña, 1963:215.

MALE (Figures 103, 122, photographs of topotype).—Uppersurfaces as illustrated with ground color white, fuscous spots on apex of forewing variable in amount. Wings below pale pink on secondaries and in apical area of primaries. This subspecies is characterized by having the undersurface of the hind wing and apex of forewing much paler, much less heavily irrorated with black scales.

Length of forewing, 10.5–16 mm (average 13.9 mm).

FEMALE (Figures 102, 119, photographs of specimen from Ojos del Putana, Antofagasta, Chile; 104, 123, photographs of topotype).—Similar to the male with fuscous submarginal markings on apex of forewing larger and with ground color white or yellow. Wings below quite similar to the male, disc of forewing sometimes whitish yellow.

Length of forewing, 12–15 mm (average 13.6 mm).

TYPE DATA.—The type-locality is given as "Alto de Laguna Verde, Cord. de Antofagasta," Chile. This type-locality citation refers to the small lagoon east of the Volcán Hékar in the Province of Antofagasta, not to Laguna Verde in the southwest corner of Bolivia. This subspecies was described from the holotype male, allotype female, and two male and three female paratypes, all from this locality, 24 December 1952, 5000 meters, Luis E. Peña collector. Five male and two female paratypes from Parinacota, Province of Tarapacá, and one male paratype from Apacheta de Chapiquiña, Province of Tarapacá, are not this subspecies but are *P. rosea maria,* new subspecies. The holotype, allotype, and four male topotypical paratypes are in the collection of the National Museum of Natural History, Santiago, Chile. The remaining paratypes are in the collections of Luis E. Peña and G. Heimlich.

NATURAL HISTORY.—The natural habitat of this subspecies is arid areas in the high planes.

DISTRIBUTION (see Map 4).—This subspecies is found only in the Cordillera de Antofagasta at from 3300 to 5000 meters elevation.

We had for study 15 males and 7 females from the holotype locality and one male and two females from Ojos del Putana, Province of Antofagasta (3 December 1959).

2b. *Pierphulia rosea maria,* new subspecies

FIGURES 99–101, 116–118; MAP 4

Phulia nysias.—Ureta, 1947:50–52 [a misidentification, in part].

Piercolias nysiella.—Herrera, 1954b:52 [a misidentification, in part].—Herrera and Etcheverry, 1956:284 [a misidentification, in part].

Piercolias nysias rosea.—Ureta, 1956:164 [a misidentification, in part]; 1963:99 [a misidentification, in part].

Piercolias (Pierphulia) nysias rosea.—Peña, 1963:215 [a misidentification, in part].

MALE (Figures 99, 116, photographs of the holotype; 100, 117, photographs of a paratype from Taipicahua, Chile).—Wings above white, fuscous markings most similar to those of *P. nysias nysiella.* Hind wing and apex of forewing gray with a faint suffusion of pink and a series of distinct fuscous

spots in the middle of the hind wing and with one such spot in the humeral area of this wing.

Length of forewing, 8–12.5 mm (average 11 mm).

FEMALE (Figures 101, 118, photographs of the allotype).—Similar to the male, fuscous markings on forewing larger, with ground color on upper-surfaces yellowish white or white (white in the allotype), with ground color gray on under-surface of hind wing, apex of forewing suffused with pink, and with markings on these surfaces as in the male.

Length of forewing, 9–12 mm (average 10.8 mm.)

TYPE DATA.—This subspecies is described from the holotype male, allotype female, and five male and two female paratypes from Parinacota, Province of Tarapacá, Chile, 4500 meters, 27 February 1948; two male and two female paratypes, same data except 28 and 29 February, G. Kuschel; three male and two female paratypes, same data except 8 December 1946; two male and one female paratypes from Taipicagua, Province of Tarapacá, 4000 meters, 6 December 1946, G. Kuschel; one male and three female paratypes, Taipicagua, Province of Tarapacá, 3500 meters, 16 November 1966, J. Herrera; one male paratype, Chungará, Province of Tarapacá, 17 November 1966, Maria Etcheverry and from one male and two female paratypes, Cota-Cotani, Province of Tarapacá, 4500 meters, 28 February 1948.

Holotype, allotype, three male and three female paratypes in the National Museum of Natural History, Santiago, Chile. Other paratypes distributed to the National Museum of Natural History, Washington, D. C., the British Museum (Natural History), London, the Natural History Collection of Bavaria, Munich, the Carnegie Museum of Natural History, Pittsburg, Pennsylvania, Center for Entomological Studies, University of Chile and the collection of José Herrera, Santiago, Chile.

One male and one female from Sumbay, Department of Arequipa, Peru, (3500 meters, 8 June 1971) are excluded from the paratype series because they are from such a great distance from the type-locality.

As mentioned before, five male and two female paratypes of *P. rosea rosea* from the Province of Tarapacá, Chile are not that subspecies and belong to the present subspecies.

ETYMOLOGY.—The name *maria* is a feminine noun in the nominative singular in apposition with the generic name and is based upon the given name of María Etcheverry, who has contributed much to our knowledge of the Andean fauna.

DISTRIBUTION (see Map 4).—This subspecies is known only from the Cordillera Occidental of the Andes, Department of Arica, Province of Tarapacá, Chile and from Sumbay, Department of Arequipa, Peru.

2c. *Pierphulia rosea annamariea*, new subspecies

FIGURES 97, 98, 114, 115; MAP 4

Piercolias nysiella.—Forster, 1955:138 [a misidentification, in part].

Phulia nysiella.—Hughes, 1958:8 [a misidentification].

MALE (Figures 97, 114, photographs of the holotype).—This subspecies has the undersurface of the apex of the forewing and of the entire hind wing a pink color with the usual dark markings, which are very small and less distinct than they are in *P. rosea maria*.

Length of forewing, 11–15 mm (average 13 mm).

FEMALE (Figures 98, 115, photographs of the allotype).—Ground color of wings above white (as in the paratype) or pale yellow (as in the allotype) with fuscous markings as figured. Wings below as in the male with fuscous spots even more faint and disc of forewing sometimes yellowish white (as in the allotype).

Length of forewing, 11–12.5 mm (average 12 mm).

TYPE DATA.—Described from the holotype male, allotype female, and from five male and two female paratypes, all from Sicasica, Province of Sicasica, Department of La Paz, Bolivia, elevation not known, 1 October 1899, collected by A. G. Weeks, Jr. Holotype, allotype, and four male and one female paratypes in the collection of the Museum of Comparative Zoology, Cambridge, Massachusetts. One male and one female paratype in the collection of the National Museum of Natural History, Washington, D. C. Three male specimens from three widely separate localities in Peru are not included in the type series because of their great distance from the type-locality.

ETYMOLOGY.—The name *annamariea* is a feminine noun in the nominative singular in apposition with the generic name and is based upon the given name of the mother of the senior author.

NATURAL HISTORY.—The adults occur near small marshes and damp areas.

DISTRIBUTION (see Map 4).—This subspecies is known at present from four widely separated localities. In addition to being found at Sicasica, Bolivia, we have examined a number of males from Peru (one each from Puno, Department of Puno, 4875 meters, from Cusco, Department of Cusco, 4000 meters, and from Campamento Turpi, January, 4380 meters, Department of Junín).

3. *Pierphulia isabela*, new species

FIGURES 105, 120, 121, 124, 125, 159, 177, 195; MAP 4

We hesitated at first to describe this species because it is known at present from only a single battered female specimen. However, because we are attempting a complete treatment of this genus, because the genitalia are in perfect shape and quite different from the genitalia of any other species studied by us, because of the distinctive dark markings found on the uppersurface of the hind wing, and because other specimens are not likely to be collected in the near future we decided to name and describe this unique species.

MALE.—Unknown at present.

FEMALE (Figure 105, a painting based upon the hind wings of the holotype and upon the forewings of females of *P. nysias* and *P. rosea*, which *P. isabela* is quite likely to resemble; 120, 121, photographs of uppersurface of holotype; 124, 125, photographs of undersurface of holotype).—The female of this species differs from the females of *P. nysias* and of *P. rosea* in having a series of submarginal fuscous spots, one each in interspaces R_5, M_1, and M_2 on uppersurface of hind wing. On the undersurface of this wing there is a slightly pink tinge to the pale whitish ground color and a light scattering of black scales.

Length of forewing, 16 mm.

VENATION (Figure 177).—With the stalk of vein $M_1+M_2+R_3+R_{4+5}$ shorter than in *P. nysias* or *P. rosea*.

CLAW, PARONYCHIUM, AND PULVILLUS (Figure 195).—Claw with ventral tooth relatively short and divergent from the upper element of claw and with paronychium short and rounded.

FEMALE GENITALIA (Figure 159).—Differing markedly from *P. nysias* and *P. rosea* in having posterior process of inner genital plate large, only slightly smaller than the anterior process and with both of these processes heavily setulose on their outer surfaces.

TYPE DATA.—Described from the holotype female, the only known specimen, from Nevado Ojos del Salado, Province of Atacama, Chile, 5400 meters, 18 December 1970, collected by José Herrera and deposited in the Herrera collection.

ETYMOLOGY.—The name *isabela* is a feminine noun in the nominative singular in apposition with the generic name and is the given name of the mother of the junior author.

DISTRIBUTION (see Map 4).—This species is known only from the holotype specimen taken on the slopes of the world's highest active volcano, Nevado Ojos de Salado, Province of Atacama, Chile.

Genus *Piercolias* Staudinger

FIGURES 28–32, 40–44, 141–143, 160, 161, 178–180, 196–198; MAP 5

Trifurcula Staudinger, 1894:43, 56–59, pl. 1: figs. 7, 16, 18 [preoccupied by *Trifurcula* Zeller, 1848]; 1895:ii [preoccupation noted and substitute name *Andina* proposed].—Grote, 1900:20, 22, pl. 2: fig. 13; 1903:139 [preoccupation noted and name placed in synonymy of *Piercolias*].—Talbot, 1932:60 [in synonymy of *Piercolias*].—Klots, 1933:218, 238 [in synonymy of *Piercolias*].—d'Almeida, 1943:104 [in synonymy of *Piercolias*].—Field, 1958:115 [in synonymy of *Piercolias*].—Hemming, 1967:448 [in synonymy of *Piercolias*].

Piercolias Staudinger, 1894:56 [a manuscript in synonymy of *Trifurcula*].—Grote, 1903:139 [homonomy of *Trifurcula* Staudinger, 1894 with *Trifurcula* Zeller, 1848 noted and *Piercolias* Staudinger, 1894 substituted in place of the former, see Article 11 (d), *International Code of Zoological Nomenclature*, second edition, 1964].—Talbot, 1932:60.—Klots, 1933:154, 159, 218–219, 230, 238.—Talbot, 1935:627.—d'Almeida, 1943:97.—Herrera, 1954b:52.—Herrera and Etcheverry, 1956:284.—Field, 1958:103, 104, 115–117, figs. 7, 15, 23, 31, 40.—Forster, 1958:845–846.—Hemming, 1967:362 [name attributed to Grote!].

Andina Staudinger, 1895:ii [homonomy of *Trifurcula* Staudinger, 1894 with *Trifurcula* Zeller, 1848 noted and *Andina* proposed as the replacement name, the latter name invalidated by Grote, 1903 (see above under *Piercolias*)].—Röber, 1909a:97, pl. 28: fig. *c*–2; 1910:97, pl. 28: fig. *c*–2.—Jörgensen, 1916:517.—Talbot, 1932:60 [in synonymy of *Piercolias*].—Klots, 1933:218, 236 [in synonymy of *Piercolias*].—d'Almeida, 1943:74.—Zischka, 1951:29.—Field, 1948:115 [in synonymy of *Piercolias*].—Hemming, 1967:44 [in synonymy of *Piercolias*].

Piercolias (Piercolias).—Field, 1958:104, 106, 118, figs. 7, 15, 31, 40.

TYPE-SPECIES.—*Trifurcula huanaco* Staudinger =

Piercolias huanaco (Staudinger). Type by reason of being the sole included species.

Piercolias differs from all the other genera treated in this paper except *Pierphulia* in the color and habitus of the wings. It differs from all but the genus *Hypsochila* in having four radial veins on the forewing, and differs in venation from the latter in the position of vein R_2. It differs from all these genera including *Pierphulia,* its closest relative, in structures of the male and female genitalia.

Wings above as shown, white in the male (Figures 28, 30, 31) and pale yellow in the female (Figures 29, 32) with a black marginal band and subapical black markings on the forewing and with a relatively large discal spot on this wing. Wings below (Figures 40–44) with secondaries and apex of forewing heavily irrorated with dark gray giving an allover gray appearance and with a white spot at end of cell on hind wing and a relatively large black spot in this position on the forewing. Female on undersurface (Figures 41, 44) with black or dark markings more prominent than in the male. The color and pattern of *Piercolias* are similar to those displayed in *Pierphulia* (Figures 94–105, 111–125) except for the smaller discal spots and the lack of the continuous dark marginal band (replaced by a marginal row of separate spots) on the uppersurfaces of the forewing of the latter.

Legs with claw (Figures 196–198) having a large tooth which is either nearly parallel to main part of claw (Figure 196) or divergent (Figures 197, 198). Pulvillus (Figures 196–198) either large or small and entirely setulose. Paronychium (Figures 196–198) relatively narrow and long, more than one-half the length of claw.

The venation of *Piercolias* (Figures 178–180) differs from that of *Phulia, Infraphulia,* and *Pierphulia* (Figures 168–177) in having four radial veins on the forewing with only M_1 anastomosed with stem of R_3+R_{4+5}, M_2 being entirely free and from apex or from very near apex of cell. In *Phulia, Infraphulia,* and *Pierphulia,* as mentioned before, the bases of both M_1 and M_2 are anastomosed with the stem of these radial veins. In *Piercolias* also on the forewing, R_2 has moved to the apex of the cell. It was the character of vein R_2, the stem of $R_3+R_{4+5}+M_1$, and of vein M_2, all apparently originating from apex or very near apex of cell that caused Staudinger (1894:43, 56–59) to name this genus *Trifurcula* (meaning a "three-pronged fork"), a good descriptive name for the genus that was later shown to be preoccupied. In the hind wing in *Piercolias* vein M_1 originates from the cell a considerable distance before the origin of M_2 while in *Pierphulia* vein M_1 originates much closer to the origin of M_2.

Male genitalia (Figures 141–143) with uncus very slender and gradually produced into a long finger-like process, similar to the uncus of *Pierphulia* (Figures 139, 140) except that it is much longer, as long as length of tegumen and with the ventral opening for the anal tube about one-fourth length of entire uncus; subscraphium large and heavily sclerotized, bifurcate distally and sharply pointed at the opposite end; valva with an apical process and a large clasper lobe near middle on inner face. In *Pierphulia,* perhaps the nearest relative of *Piercolias,* the uncus is short and slender, shorter than the length of the tegumen and with the opening for the anal tube about two-thirds of the length of entire uncus; the subscaphium is small and weak and completely divided, the valva is broadly produced apically, lacking the apical process and lacking a clasper lobe or flap on its inner face.

Female genitalia (Figures 160, 161) somewhat similar to *Pierphulia* (Figures 156–158) with ductus bursae colorless and nonsclerotized and with a larger accessory pouch. The eighth tergite is entire and semiannulate; eighth sternite with outer genital plates large and smooth, inner genital plates not at all reduced, setulose, and each divided into a broad outwardly dentate anterior section and a large club-shaped posterior process. The signum in *Piercolias* is more heavily dentate than is true in *Pierphulia.* As mentioned before, the eighth tergite is not developed in the dorsal region in *Pierphulia* and the inner genital plate lacks the large club-shaped posterior process found in *Piercolias.*

SYNONYMICAL NOTES.—*Trifurcula* Staudinger, 1894: This genus was erected with *Piercolias* as a manuscript name in its synonymy and with *Trifurcula huanaco* Staudinger as its type-species. The name *Trifurcula* Staudinger is preoccupied by *Trifurcula* Zeller, 1848.

Andina Staudinger, 1895: Soon after the original description of *Trifurcula,* Staudinger discovered that his name was preoccupied by *Trifurcula* Zeller and he proposed the substitute name *Andina* to replace the former, overlooking or preferring

not to use his manuscript name *Piercolias*. Röber (1909a, 1910) is the only author to the present time, including Hemming (1967), to see the 1895 note by Staudinger, and he used the name *Andina* for this genus, correctly attributing its authorship to Staudinger. Unfortunately Grote had already invalidated this name as explained below. All later authors using the name *Andina,* being unaware of the 1895 note by Staudinger, attribute the name *Andina* to Röber.

Piercolias Staudinger, 1894: Grote in 1903 invalidated the replacement name *Andina* Staudinger without even being aware of its existence by noting the preoccupation of *Trifurcula* Staudinger with *Trifurcula* Zeller and using the name *Piercolias* Staudinger for this genus. The latter, which up to Grote's time (1903) was still a manuscript name in synonymy, became by this action the correct name for this genus (see Article 11 (d), *International Code of Zoological Nomenclature,* second edition, 1964).

ETYMOLOGY.—The name *Piercolias* is a feminine noun formed from *Pier,* an element from the genus name *Pieris,* used as a prefix and from the genus name *Colias. Pieris,* in turn, in classical Latin was the name for a daughter of *Pierus,* a Muse, while *Colias* was the classical Greek name for a mountain on which there was a temple dedicated to Aphrodite and is therefore an epithet of the goddess.

The genus *Piercolias* contains three species: *P. huanaco* (Staudinger), *P. forsteri,* new species, and *P. coropunae* (Dyar). These species fly between 4800 and 5000 meters on the tops of three widely separated mountains in the Andes of Bolivia and Peru (see Map 5).

Key to the Species of *Piercolias*

1. Uppersurface of forewing with discal spot at end of cell and subapical fuscous spots small, fuscous border along outer margin narrow (Figure 30) ..... 3. ***P. coropunae*** (Dyar)
   Uppersurface of forewing with discal spot at end of cell and subapical fuscous spots large, fuscous border along outer margin broader (Figures 28, 29, 31, 32) 2
2. Fuscous border along outer margin on uppersurface of forewing extending almost to vein 2^dA (Figures 31, 32) ..... 2. ***P. forsteri,*** new species
   Fuscous border along outer margin on uppersurface of forewing not extending more than one-half the distance between Cu_2 and 2^dA (Figures 28, 29) ..... 1. ***P. huanaco (Staudinger)***

1. *Piercolias huanaco* (Staudinger)

FIGURES 28, 29, 40, 41, 143, 160, 178, 196; MAP 5

Schmetterlinge Nr. 6.—Garlepp, 1892:275.—Staudinger, 1892:275.

Trifurcula huanaco Staudinger, 1894:43, 56–59, pl. 1: figs. 7, 16, 18.—Elwes, 1895:lxv.—Grote, 1900:20–21.—d'Almeida, 1943:104.—Hemming, 1967:448.

Piercolias huanaco.—Staudinger, 1894:56.—Grote, 1903:139.—Talbot, 1932.60.—Klots, 1932:218, 219.—d'Almeida, 1934:97.—Forster, 1955:138 [in part].—Field, 1958:115, 118, 124, 126, 128, 131, figs. 7, 15, 23, 31, 40.

Andina huanaco.—Röber, 1909a:97, pl. 28: fig. *c*–2; 1910:97, pl. 28: fig. *c*–2.—Dyar, 1913:629.—d'Almeida, 1943:74.—Ureta, 1947:50.—Zischka, 1951:29.

Piercolias coropunae.—Forster, 1955:138 [a misidentification, in part].

Piercolias andina [sic].—Forster, 1958:846 [a lapsus mentis, a nomen nudum].

Piercolias huanace [sic.].—Hemming, 1967:362.

Trifurcula huanace [sic].—Hemming, 1967:362.

MALE (Figures 28, 40, photographs of lectotype).—This species as illustrated with uppersurface of wings white and with a large dark bar at end of cell in forewing and large apical and subapical dark markings. The dark border on the forewing on this surface extends below vein Cu_2 only about one-half the distance to vein 2^dA thus differing from *P. forsteri* where this border extends to vein 2^dA or almost to that vein. In *P. huanaco* also there is more white scaling in interspaces R_1, R_2 and R_3+R_{4+5} on this wing than in *P. forsteri.* Undersurface of hind wing and apex of forewing more uniformly gray in color than in *P. forsteri* with submarginal row of fuscous spots on hind wing faint or absent and with a faint white spot at the end of the cell. This gray ground color formed by a light tan that is heavily irrorated with black scales.

Length of forewing, 18–21 mm.

FEMALE (Figures 29, 41, photographs of one of the probably original syntypes).—As illustrated and similar to the male with dark markings on uppersurfaces more extensive and with a white to yellow

ground color. Wings on undersurfaces with dark markings more extensive than in the male and differing from the female of *P. forsteri*, as the male does, in having the dark border on uppersurface of forewing extending only about one-half the distance to vein $2^{d}A$.

Length of forewing, 19 mm.

VENATION (Figure 178).—With characters as given in the description of the genus. Staudinger (1894: 56) selected the genus name *Trifurcula* (which unknown to him at the time was preoccupied) because of the venation, which as he says (translation from the German) "three veins arise almost from one point like a trident from the upper corner of the cell of the forewing and this occurs in this way in no pierid genus known to me."

CLAW, PARONYCHIUM, AND PULVILLUS (Figure 196).—As illustrated with claw differing from that of *P. coropunae* (Figure 198) and *P. forsteri* (Figure 197) in having the ventral tooth closer to upper element and with paronychium slightly broader than in *P. coropunae*.

MALE GENITALIA (Figure 143, drawn from preparation of lectotype).—As illustrated and similar to that of *P. forsteri* with subscaphium having its anterior process shorter and slightly blunt.

FEMALE GENITALIA (Figure 160, drawn from preparation WDF 5346).—As illustrated, differing from *P. forsteri* in the shape of the inner genital plate, having the posterior process rounded at the end and with ventral margin of anterior process longer than the posterior margin of this process.

TYPE DATA.—The type-locality is "Bolivien . . . Huallatani" (= Huaillatani), near Cocapata, Province of Ayopayo, Department of La Paz, Bolivia. This species was described by Staudinger from 30 males and 7 females collected by Gustav Garlepp between 10 January and the beginning of March 1892. Most of this series was sold by Staudinger and many collections contain unlabeled syntypes. There are four male and four female syntypes remaining in the Staudinger collection in the Zoological Museum, Humboldt University, East Berlin. The late Dr. E. M. Hering sent us for study the male specimen figured by Staudinger (1892, pl. 1: fig. 16), and we designate this specimen as the lectotype and have placed upon its pin a designating label.

MISIDENTIFICATION NOTE.—As stated below under *P. forsteri*, Forster regarded *P. coropunae* as a junior synonym of *P. huanaco* and his study specimens were of both the Illimani and Huaillatani populations. We continue to recognize *P. coropunae* as a distinct species.

SYNONYMY.—Dr. Forster in a paper given at the Tenth International Congress of Entomology in 1956 (1958:846) refers to this species as being found in the East Cordillera of Bolivia under the name *Piercolias andina* Staudinger. Dr. Staudinger never described a species under this name, which is a nomen nudum and a name resulting from a lapse of memory with the resulting confusion. This probably occurred because the species *P. huanaco* was known for many years by the name *Andina huanaco*.

ETYMOLOGY.—The name *huanaco* is an Amerind name treated as a noun in the nominative singular in apposition to the genus name. It is derived from a vernacular name *huanaco* (or *guanaco*) and is the Quechua speaking Indian name for the wild mammal related to the domesticated llama. This name seems to us to be singularly appropriate since Gustav Garlepp reports (1892:275) that he could only reach the high elevations (up to 5000 meters, mistakenly reported by Garlepp as 5800 meters) where this species of butterfly occurred by making use of the paths made by these mammals, the guanacos.

NATURAL HISTORY.—According to Gustav Garlepp this species flies only on the highest peaks of the cordilleras in nearly desert-like fields of rocks and boulders where there is almost daily snow and ice, where vegetation is nonexistent [!], and where the condor flies.

DISTRIBUTION (see Map 5).—Known at present only from Huaillatani, Province of Ayopayo, Department of Cochamba, Bolivia.

MATERIAL EXAMINED.—We had for study in addition to the lectotype, four males and one female.

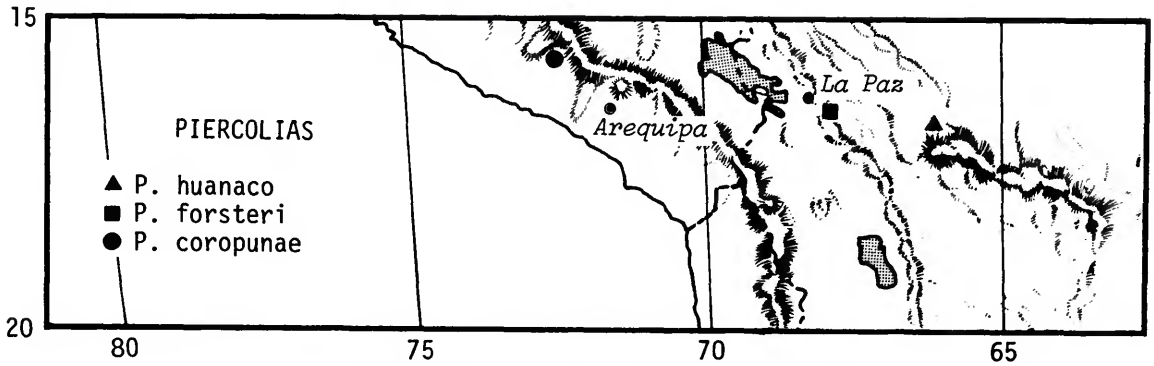
2. *Piercolias forsteri*, new species

FIGURES 31, 32, 43, 44, 142, 161, 179, 197; MAP 5

Piercolias huanaco.—Forster, 1955:138 [a misidentification, in part].

Piercolias coropunae.—Forster, 1955:138 [a misidentification, in part].

MALE (Figures 31, 43, photographs of holotype).—As illustrated, differing from *P. huanaco* in this sex in having the narrow dark border on upper-



MAP 5.—Distribution of the Genus *Piercolias* Staudinger.

surface of forewing extending almost to vein 2^dA, in having less white scaling in interspaces R_1, R_2, and R_3+R_{4+5}, and in having the outer halves of the hind wing on the undersurface paler, more contrasting with the ground color at the base of this wing.

Length of forewing, 17–21 mm.

FEMALE (Figures 32, 44, photographs of allotype).—As illustrated, differing from females of *P. huanaco* in the same characters that differentiate the males and differing from the males in having dark markings on uppersurfaces more extensive and in having a yellow ground color on the uppersurfaces.

Length of forewing, 17.5–19 mm.

VENATION (Figure 179).—As illustrated, with characters as given for the genus and not differing from that of *P. huanaco* and *P. coropunae*.

CLAW, PARONYCHIUM, AND PULVILLUS (Figure 197).—As illustrated, with claw differing from that of *P. huanaco* (Figure 196) in having ventral tooth more separated from upper element, being even more separated than in *P. coropunae* (Figure 198), with paronychium broad.

MALE GENITALIA (Figure 142, drawn from holotype).—As illustrated, differing from that of *P. huanaco* and *P. coropunae* especially in having the subscaphium with its anterior process long and sharply pointed.

FEMALE GENITALIA (Figure 161, drawn from preparation of paratype).—As illustrated, differing from *P. huanaco* in the shape of the inner genital plate, having the posterior process not distinctly rounded at the end, with ventral margin of anterior process shorter than the posterior margin of this process, and with the latter margin concave.

TYPE DATA.—Described from the holotype male, allotype female, and three male and one female paratypes. All of these are from the west slope of Illimani, Bolivia, taken between 5000 and 5300 meters elevation on 14 and 27 April 1950 by Dr. Walter Forster. Holotype, allotype, and two male paratypes in the Zoological Collection of Bavaria, Munich, Germany. One male and one female paratype in the collection of the National Museum of Natural History, Washington, D. C.

MISIDENTIFICATION NOTE.—Dr. Walter Forster (1955:138) because one of his specimens (one of the paratypes of *P. forsteri*) displays a reduced maculation on the uppersurfaces of the forewing mistakenly suggested that *P. coropunae* Dyar was a synonym of *P. huanaco* (Staudinger). While this specimen shows some reduction in maculation it does not display the great reduction in maculation that occurs in *P. coropunae,* and we consider the latter to be a distinct species.

ETYMOLOGY.—The name *forsteri* is a masculine noun in the genitive case, a patronym after Dr. Walter Forster, the collector of the type series, director of the Zoological Collections of Bavaria and a worker who has contributed a great deal to our knowledge of Andean butterflies.

DISTRIBUTION (see Map 5).—This species is known only from the type series taken at from between 5000 and 5300 meters elevation at Illimani, Province of Sud Yungas, Department of La Paz, Bolivia.

3. *Piercolias coropunae* (Dyer), resurrected species

FIGURES 30, 42, 141, 180, 198; MAP 5

Andina coropunae Dyar, 1913:629.
Piercolias coropunae.—Talbot, 1932:60.—Forster, 1955:138 [in part].
Piercolias (Piercolias) coropunae.—Field, 1958:118.

MALE (Figures 30, 42, photographs of holotype).—With maculation as shown, similar to *P. huanaco* and *P. forsteri,* differing in having the fuscous maculation on the uppersurface of forewing very greatly reduced, the subapical row of spots being reduced to two (those in interspaces M_1 and R_2), and with the dark marginal border greatly reduced in width. In *P. coropunae* as in *P. huanaco* this border does not extend more than one-half the distance between veins Cu_2 and 2^dA. In *P. coropunae* also there is a distinct marginal white spot in interspace R_1. Hind wing and apex of forewing on undersurfaces very pale gray with a slight pink overcast that is lacking in the other species.

Length of forewing, 18 mm.

FEMALE.—Unknown.

VENATION (Figure 180).—With characters as given in the description of the genus and not differing from that of *P. huanaco* and *P. forsteri.*

CLAW, PARONYCHIUM, AND PULVILLUS (Figure 198).—As illustrated, with claw most similar to that of *P. forsteri* (Figure 197), having ventral tooth slightly separated from the upper element, with paronychium long and narrow, distinctly longer than in the other species.

MALE GENITALIA (Figure 141, drawn from preparation of the holotype).—As illustrated, differing from that of *P. forsteri* in having the subscaphium with its anterior process short and not sharply pointed and differing from both other species in having valva with a very short apical process.

ETYMOLOGY.—The name *coropunae* is a noun in the genitive case formed from the name of the type-locality, Coropuna, Peru.

TYPE DATA.—As mentioned above, the type-locality is Coropuna, Peru. This species was described from one specimen, sex not indicated in the original description. This specimen, the holotype, is a male and was taken in October 1911 between 4875 and 5180 meters elevation on the Yale Peruvian Expedition. This specimen is in the collection of the National Museum of Natural History, Washington, D. C. and bears the type number 15602.

MISIDENTIFICATION NOTE.—Forster (1955:138) suggests that *P. coropunae* (Dyar) is a synonym of *P. huanaco* (Staudinger). As we have stated above we regard *P. coropunae* as a species distinct from both *P. huanaco* and from *P. forsteri.*

DISTRIBUTION (see Map 5).—This species is known at present only from the holotype from Coropuna, Department of Arequipa, Peru.

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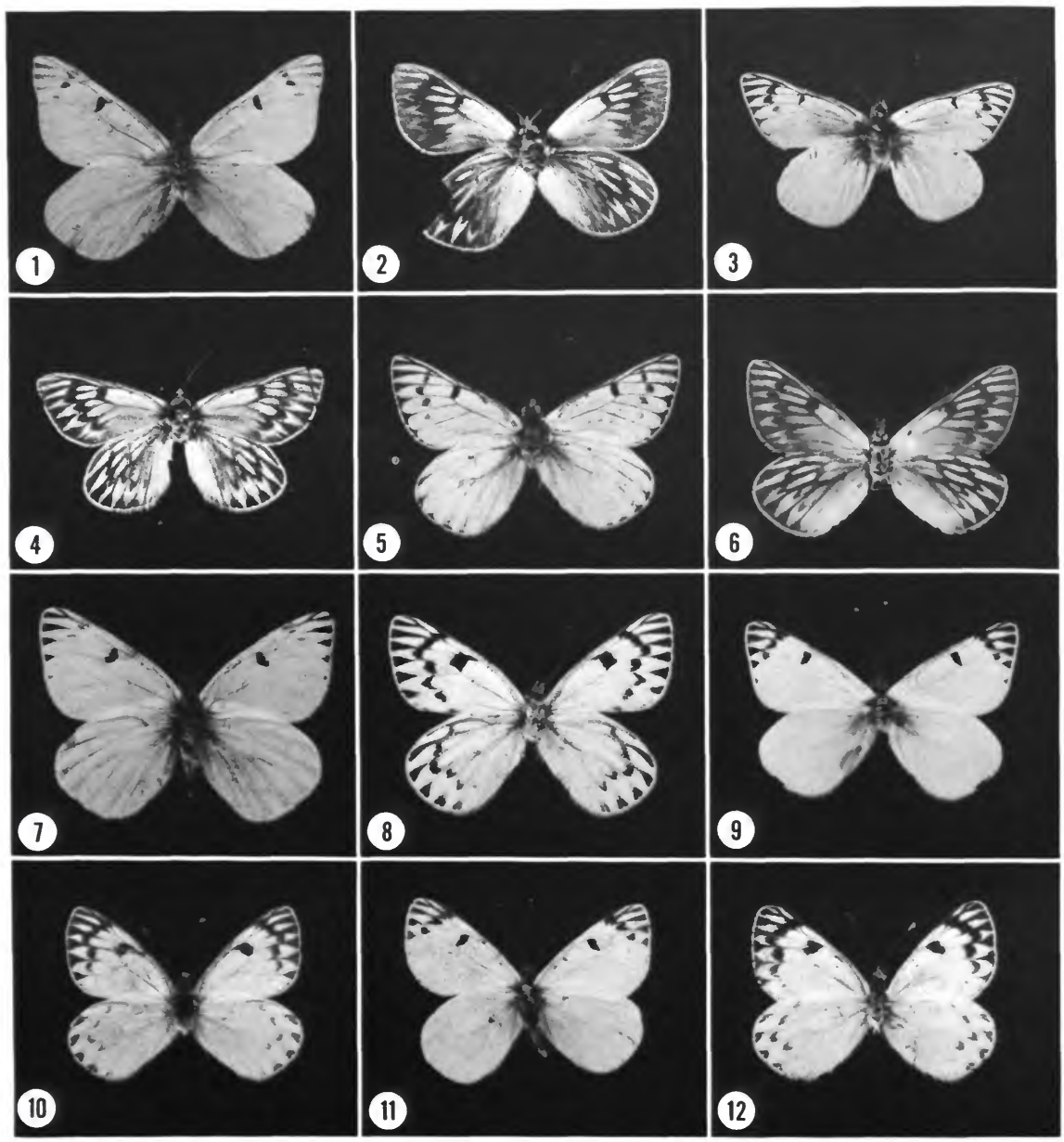
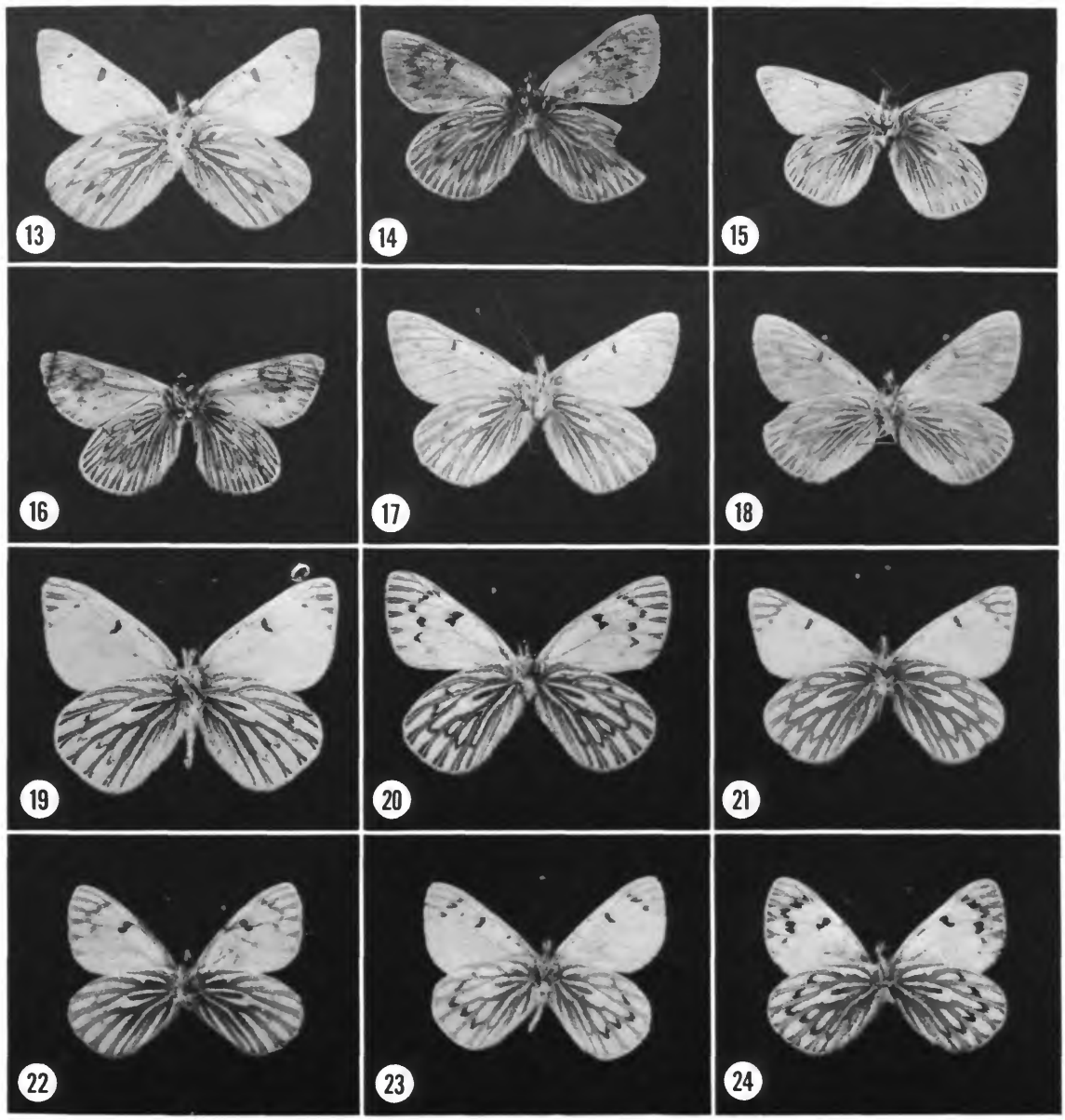
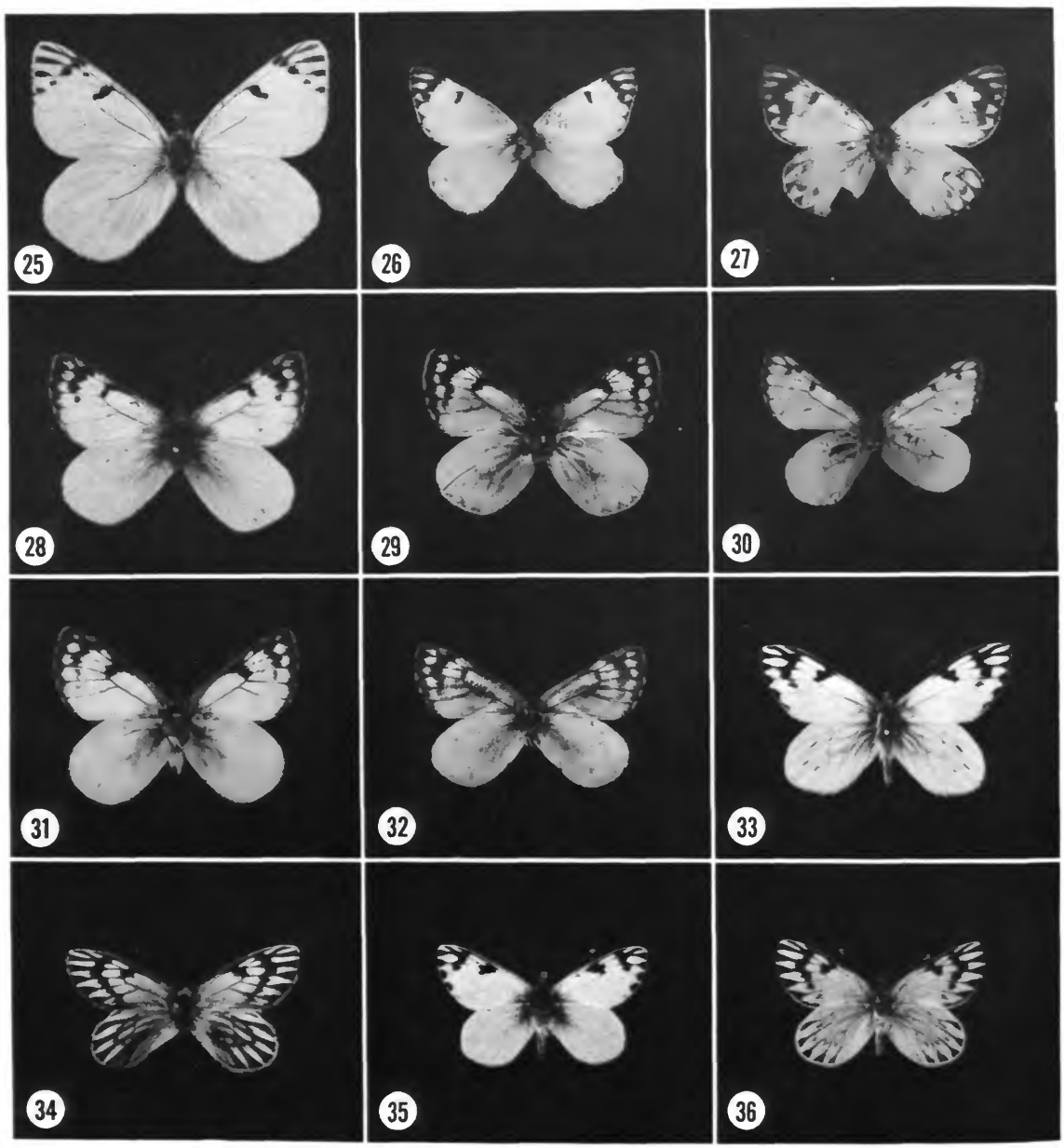


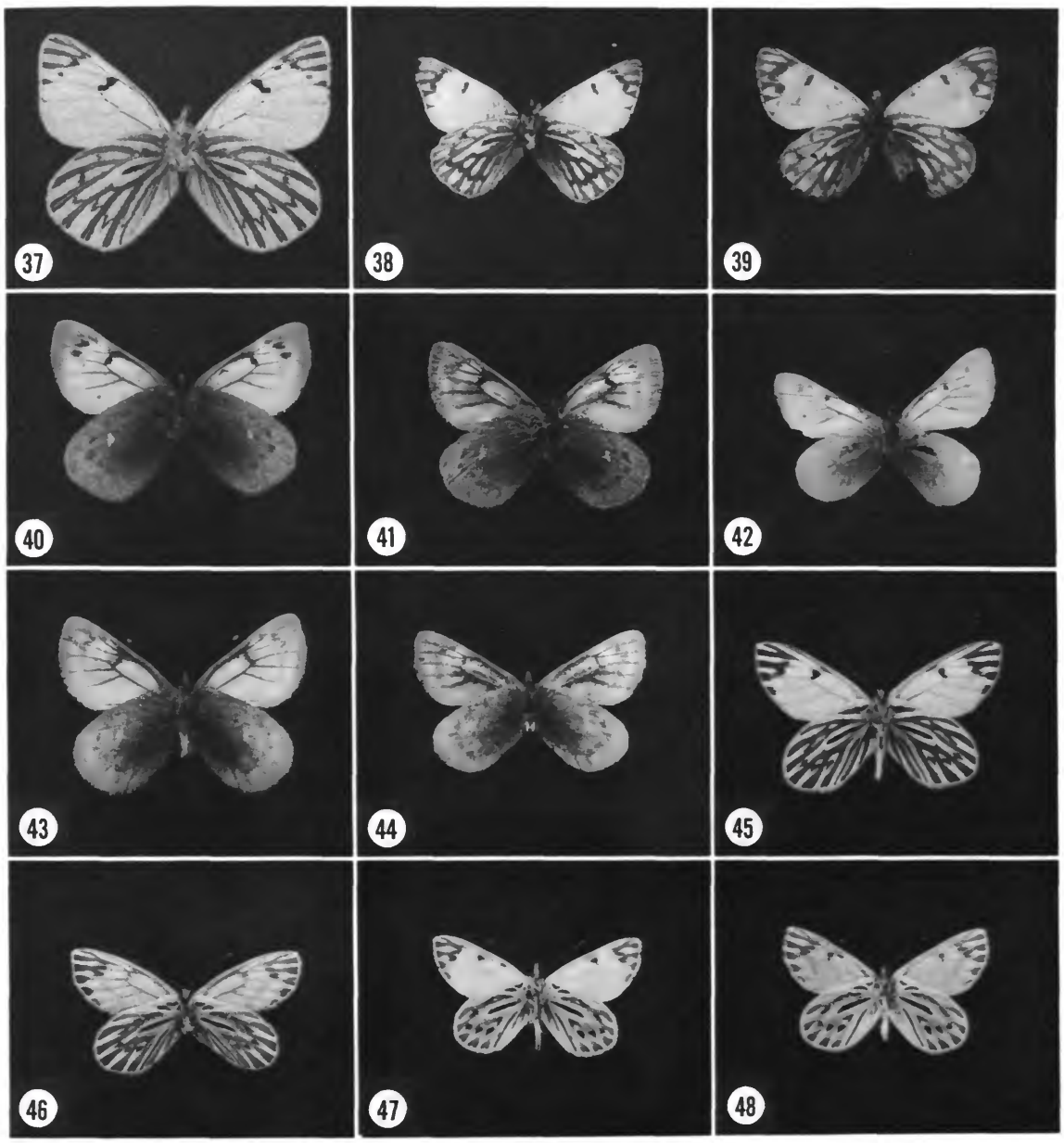
FIGURES 1–12.—Habitus figures (× 1), uppersurfaces. *Hypsochila argyrodice:* 1, male, "Patagonien," C. Berg; 2, female, lectotype. *H. microdice:* 3, male, lectotype; 4, female, allolectotype. *H. huemul:* 5, male, paratype; 6, female, paratype. *H. galactodice:* 7, male, Termas, Chillán, Chile; 8, female, same locality. *H. wagenknechti wagenknechti:* 9, male, El Yeso, Chile; 10, female, Río Seco, Chile. *H. wagenknechti sulfurodice:* 11, male, Mamiña, Tarapacá, Chile; 12, female, Putre, Tarapacá, Chile, paratype.



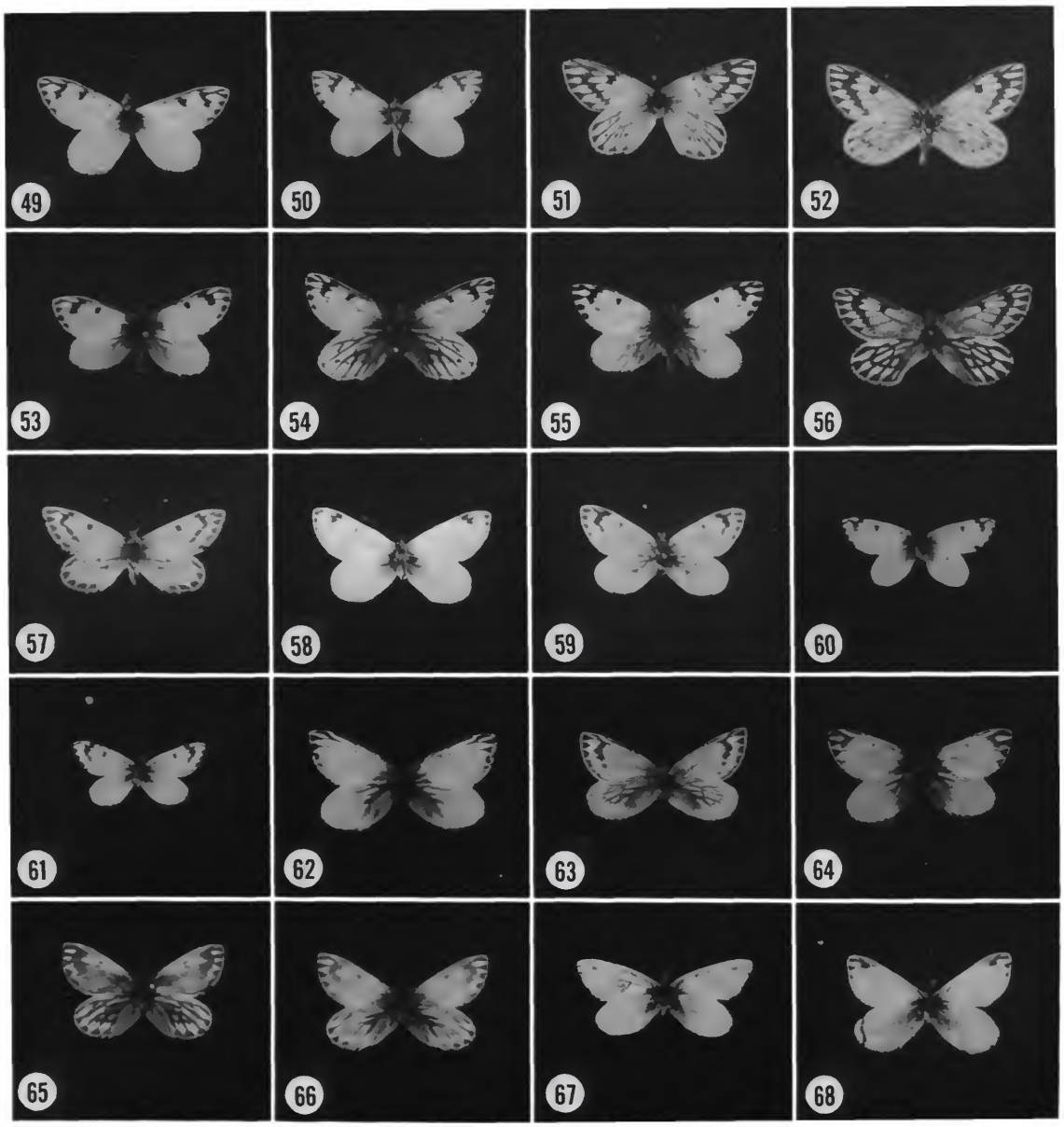
FIGURES 13–24.—Habitus figures (× 1), undersurfaces of specimens shown in Figures 1–12 (in the same positions).



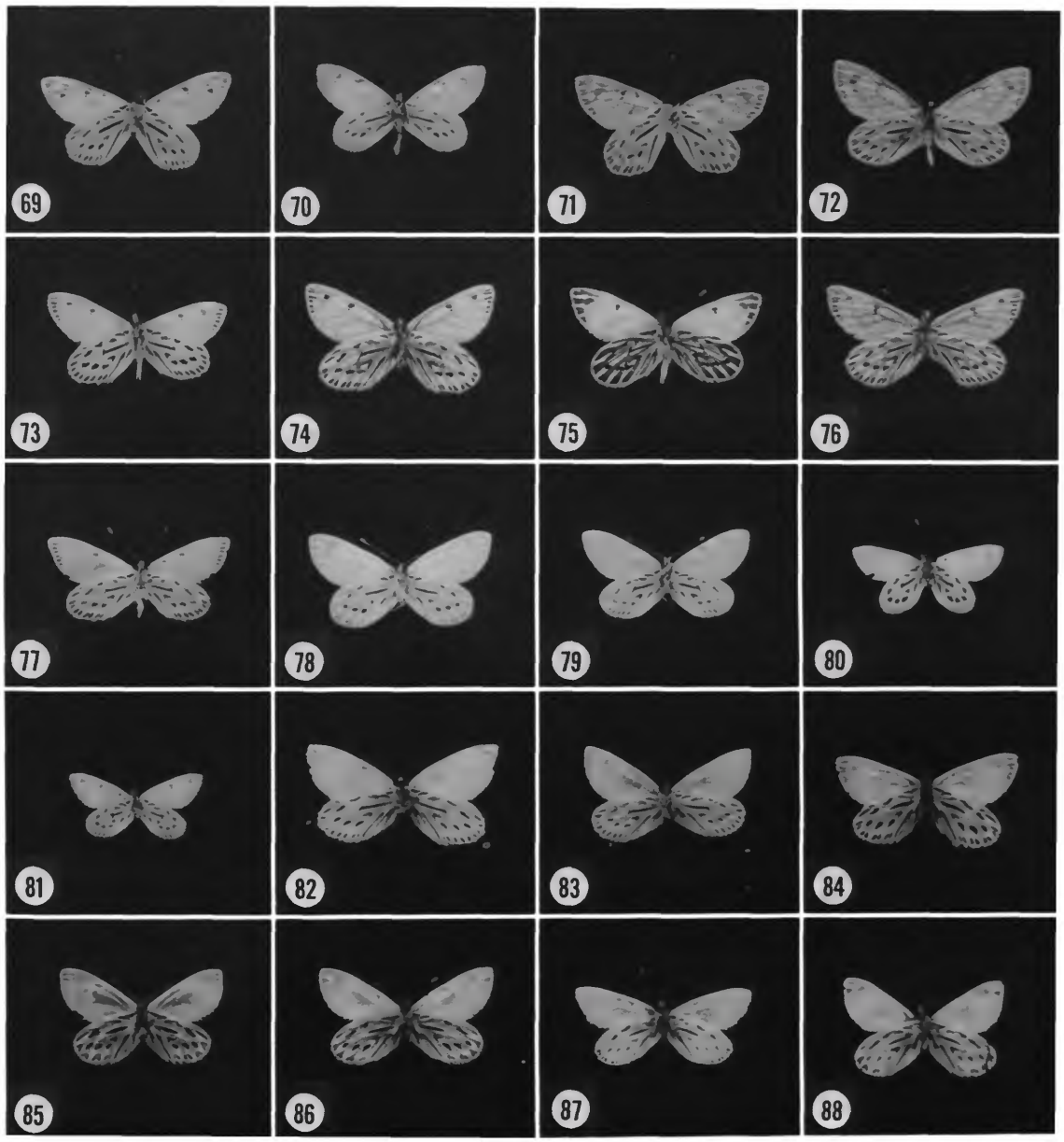
FIGURES 25–36.—Habitus figures (× 1), uppersurfaces. *Hypsochila galactodice:* 25, male, Malleco, Termas, Río Blanco). *H. penai:* 26, male, topotype; 27, female, topotype. *Piercolias huanaco:* 28, male, lectotype; 29, female, allolectotype. *P. coropunae:* 30, male, holotype). *P. forsteri:* 31, male, holotype; 32, female, allotype. *Phulia nymphula nympha:* 33, male, lectotype; 34, female, topotype and probable syntype. *P. nymphula nymphula:* 35, male, topotype; 36, female, topotype.



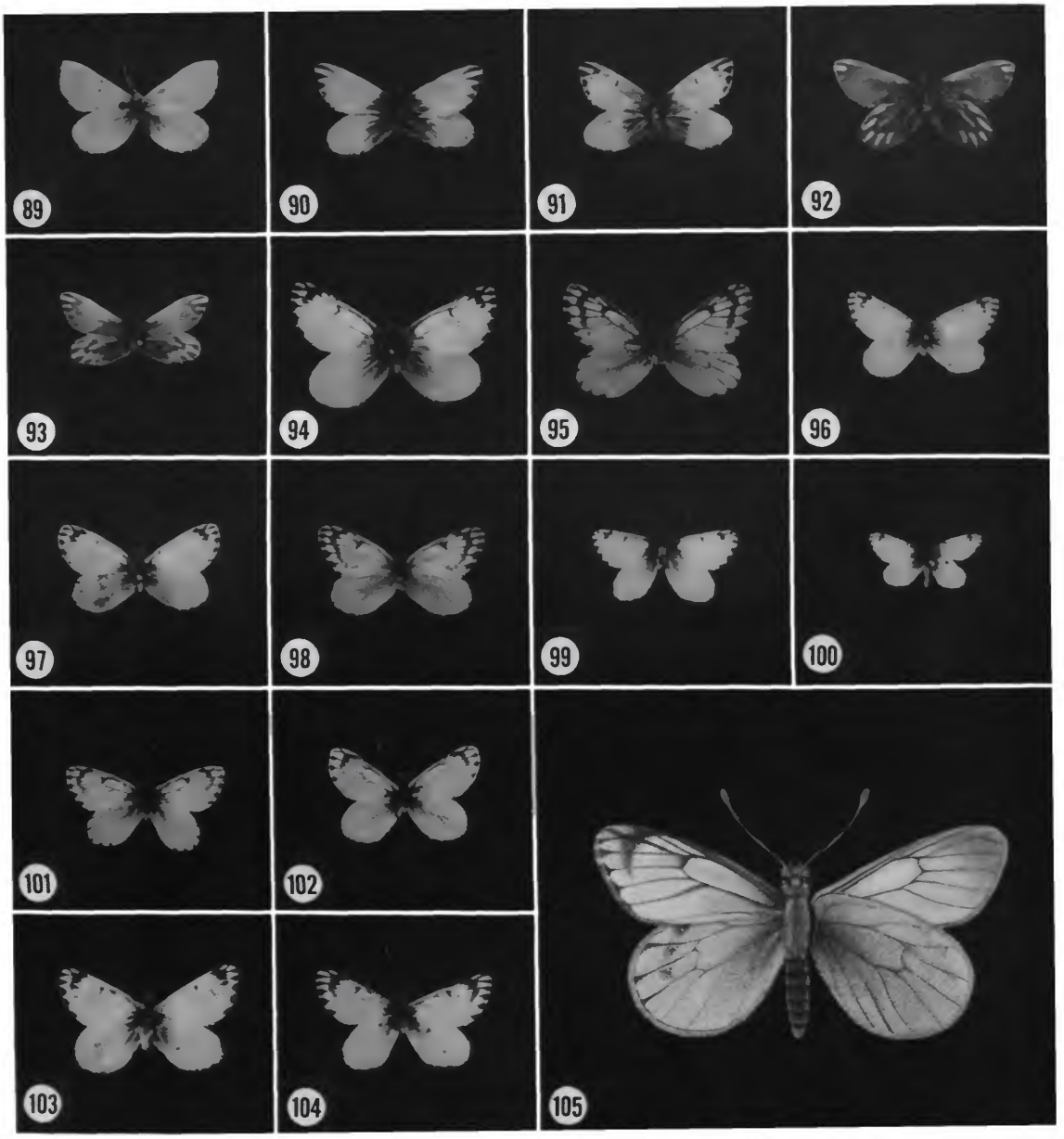
FIGURES 37–48.—Habitus figures (× 1), undersurfaces of specimens shown in Figures 25–36 (in the same positions).



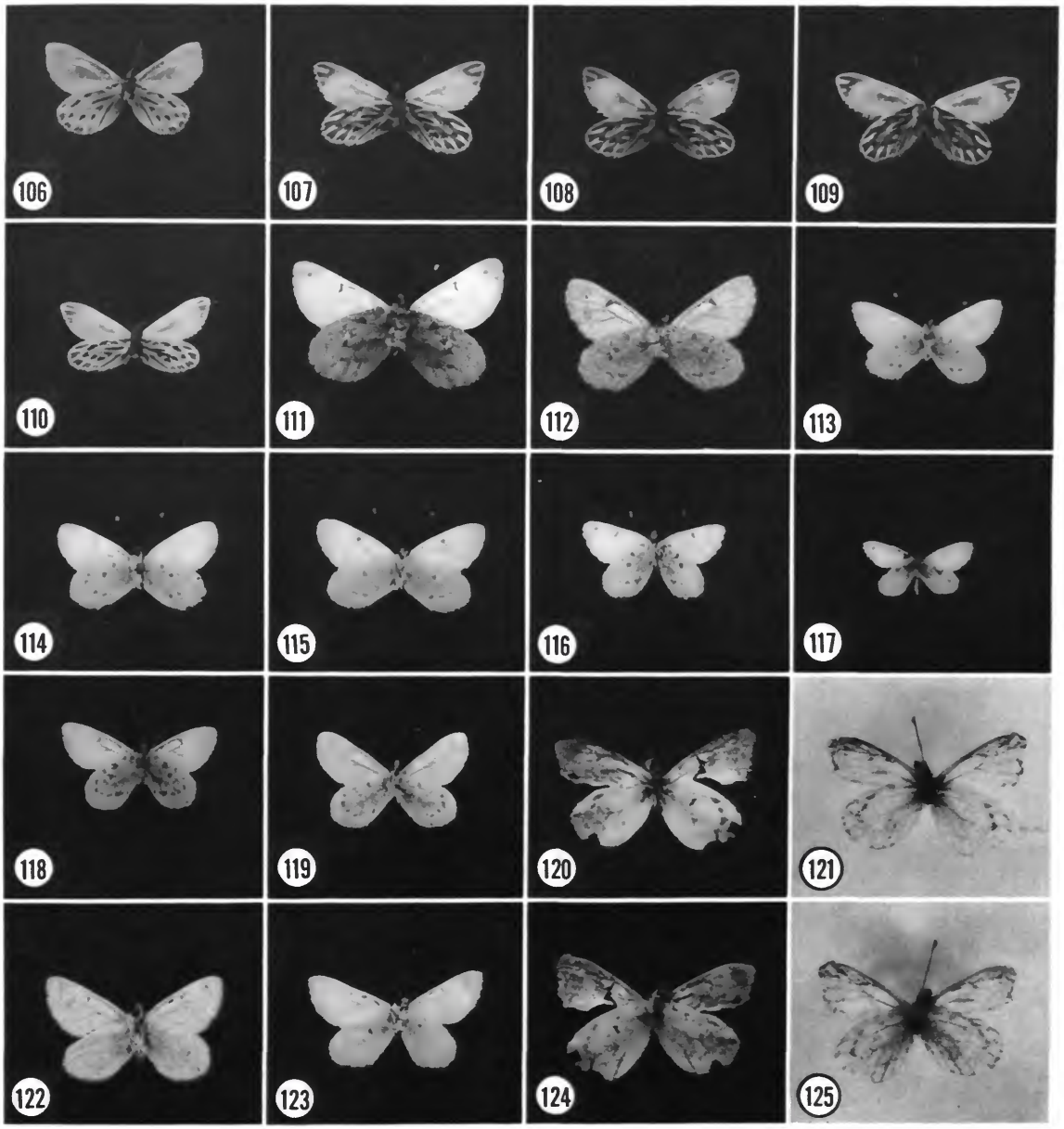
FIGURES 49–68.—Habitus figures (× 1), uppersurfaces. *Phulia nymphula nymphula:* 49, male, lectotype of the synonym *P. altivolans;* 50, male, lectotype of the synonym *P. nymphaea;* 51, female, allolectotype of the synonym *P. altivolans;* 52, female, Achocalla, La Paz, Bolivia. *P. paranympha paranympha:* 53, male, lectotype; 54, male, La Paz, Bolivia; 55, male, same locality; 56, female, topotype; 57, female, Sicasica, Bolivia. *P. paranympha ernesta:* 58, male, allotype; 59, female, holotype. *P. nannophyes:* 60, male, lectotype; 61, female, allolectotype. *P. garleppi:* 62, male, holotype; 63, female, allotype. *Infraphulia illimani:* 64, male, topotype; 65, female, Huallatani, Bolivia; 66, female, Hichucota, Bolivia. *I. ilyodes:* 67, 68 males, topotypes.



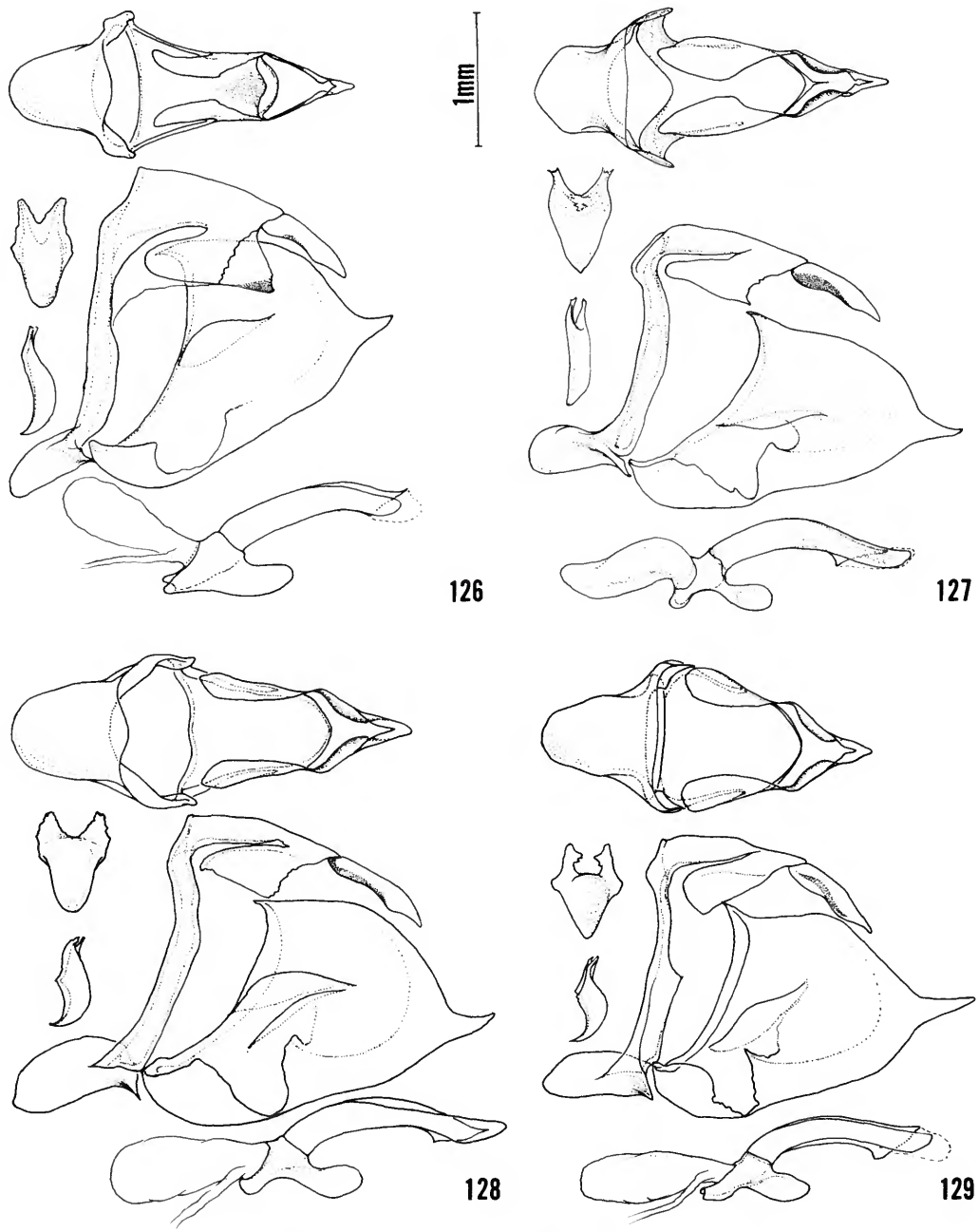
FIGURES 69–88.—Habitus figures (× 1), undersurfaces of specimens shown in Figures 49–68 (in the same positions).



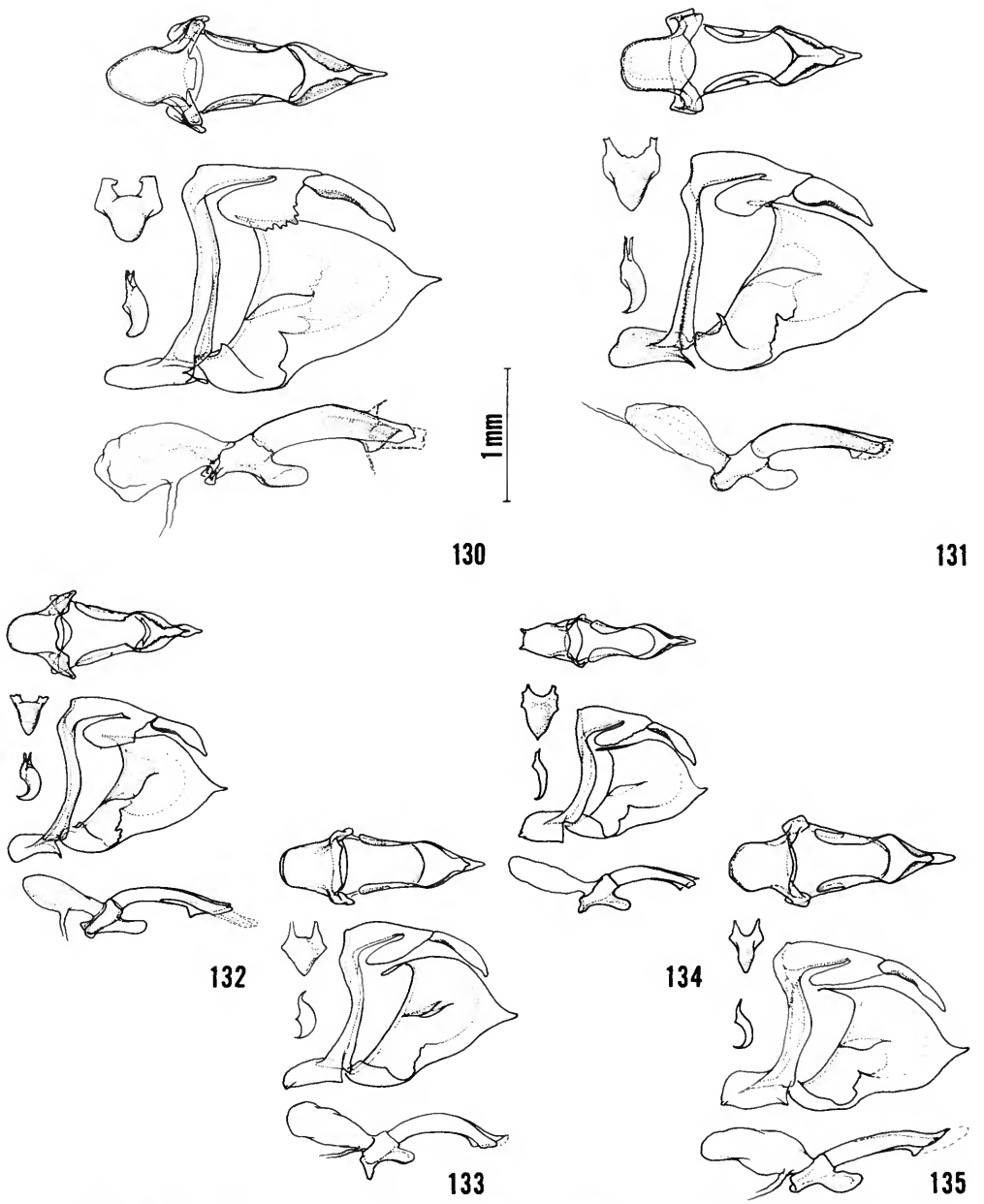
FIGURES 89–105.—Habitus figures (× 1), uppersurfaces. *Infraphulia ilyodes:* 89, female, paratype. *I. madeleinea:* 90, male, holotype; 91, male, paratype; 92, female, paratype; 93, female, allotype. *Pierphulia nysias nysias:* 94, male, topotype; 95, female, lectotype. *P. nysias nysiella:* 96, male, lectotype. *P. rosea annamariea:* 97, male, holotype; 98, female, allotype. *P. rosea maria:* 99, male, holotype; 100, male paratype, Tápicahua, Chile; 101, female, allotype. *P. rosea rosea:* 102, female, Antofagasta, Ojos del Putana; 103, male, topotype; 104, female, topotype). Habitus figure, artists' restoration (× 2), uppersurface on the left, undersurface on the right, *Pierphulia isabela:* 105, female, holotype.



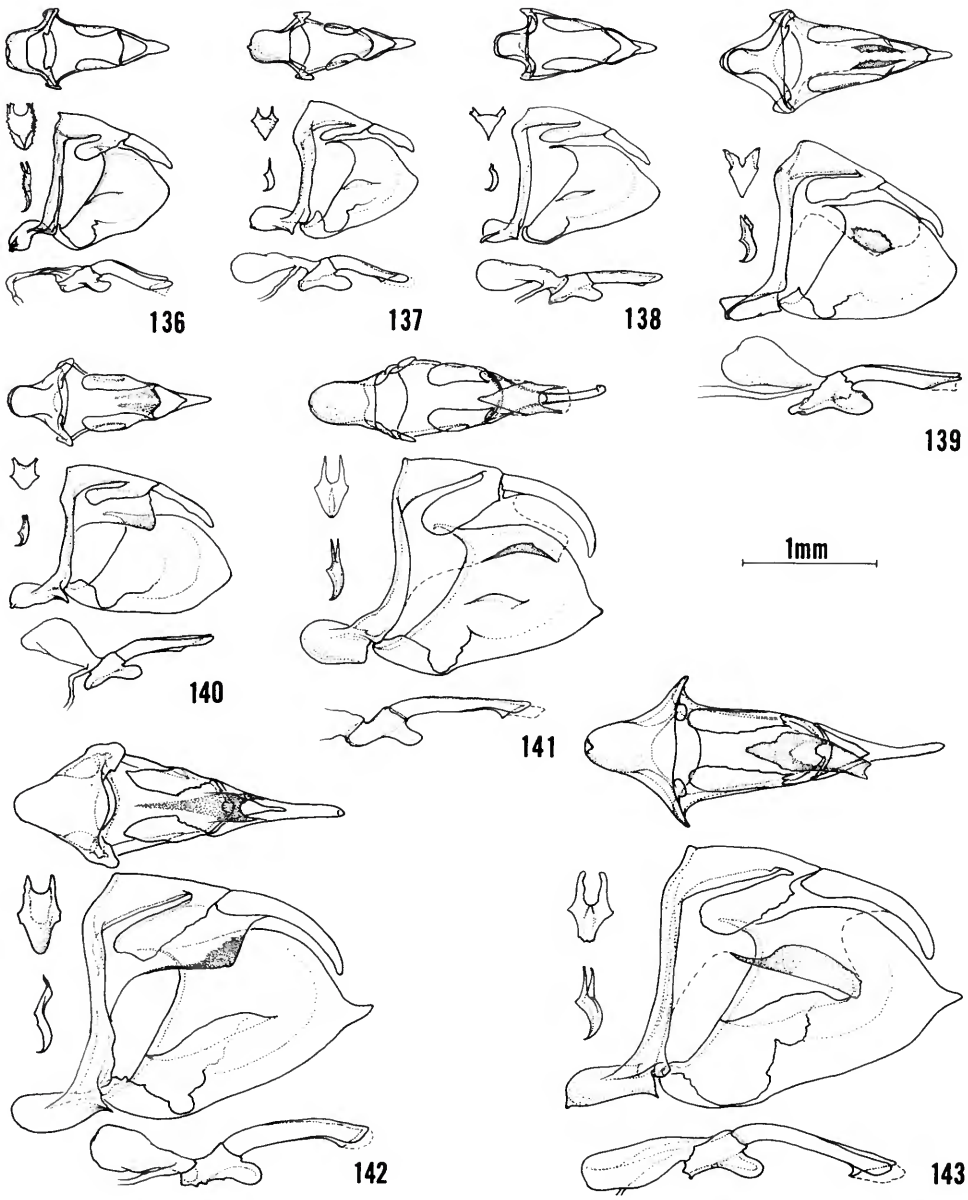
FIGURES 106–125.—Habitus figures (× 1). 106–119, 122, 123, Undersurfaces of specimens shown in Figures 89–104 (in the same positions). *Pierphulia isabela* (holotype), with both dark and light backgrounds: 120, 121, uppersurfaces; 124, 125, undersurfaces.



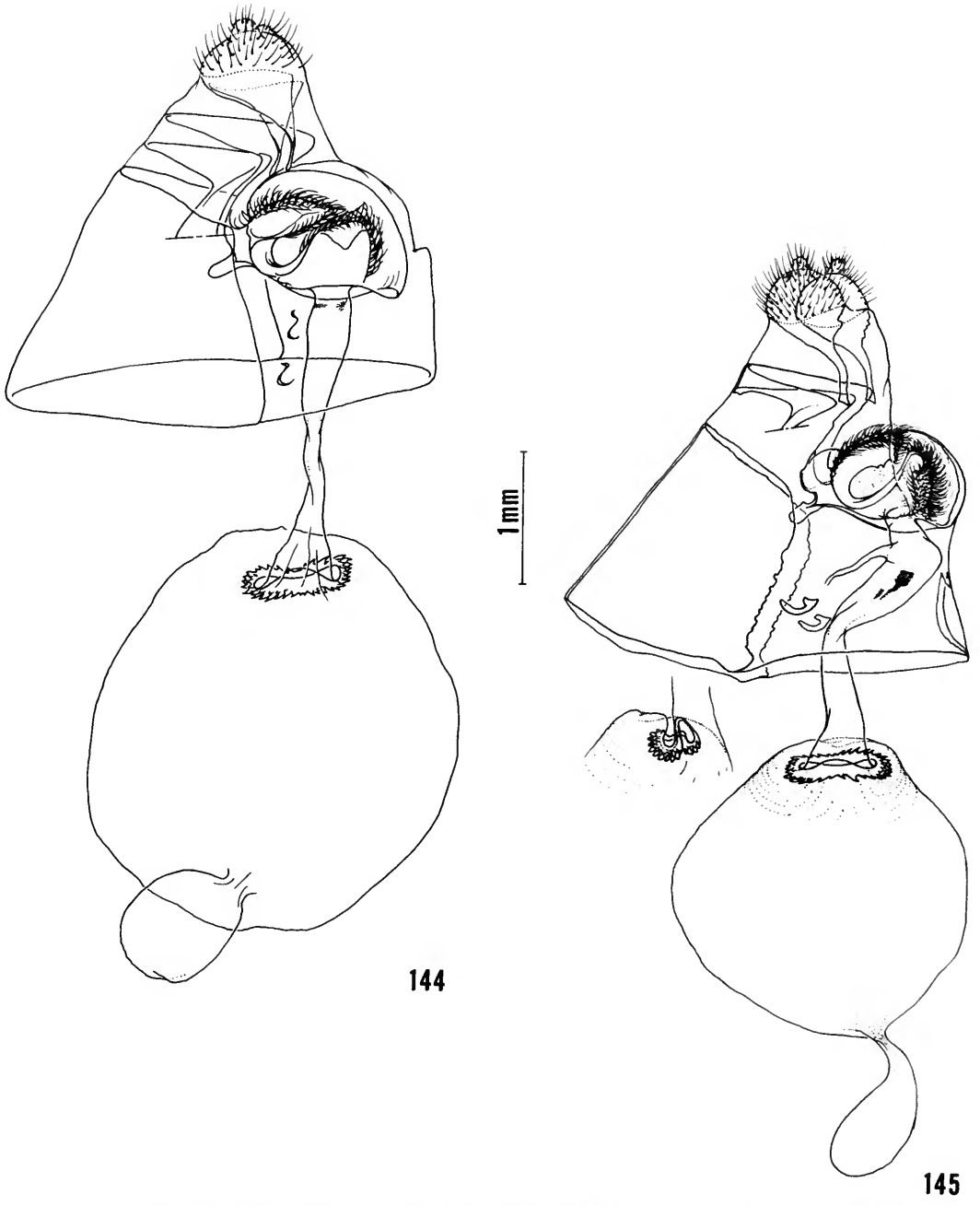
FIGURES 126–129.—Male genitalia consisting of ventral views (at top of each figure) of uncus, tegumen, vinculum, and saccus; of lateral view (in center of each figure) of genital capsule with left valva, anellus, and aedeagus removed; of ventral and lateral view of anellus (at the central left of each figure); and of aedeagus in lateral view (at bottom of each figure): 126, *Hypsochila argyrodice* (drawn from preparation WDF 5752); 127, *H. microdice* (drawn from preparation WDF 6637); 128, *H. huemul* (drawn from preparation WDF 6582); 129, *H. galactodice* (drawn from preparation WDF 6661).



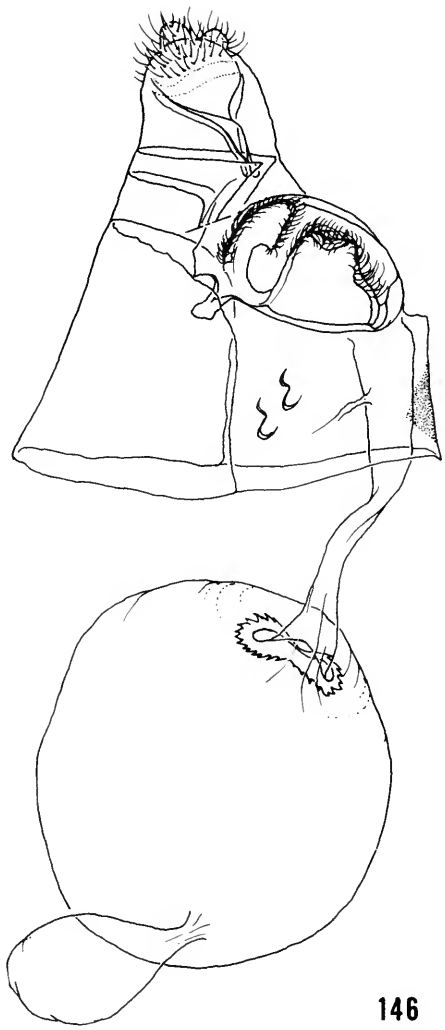
FIGURES 130–135.—Male genitalia consisting of ventral views (at top of each figure) of uncus, tegumen, vinculum, and saccus; of lateral view (in center of each figure) of genital capsule with left valva, anellus, and aedeagus removed; of ventral and lateral view of anellus (at the central left of each figure); and of aedeagus in lateral view (at bottom of each figure): 130, *Hypsochila wagenknechti wagenknechti* (drawn from preparation WDF 6644); 131, *H. penai* (drawn from preparation WDF 6578); 132, *Phulia nymphula nymphula* (drawn from preparation WDF 6647); 133, *P. paranympha paranympha* (drawn from preparation WDF 6665); 134, *P. nannophyes* (drawn from preparation JH 182); 135, *P. garleppi* (drawn from preparation JH 172).

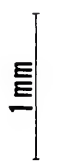


FIGURES 136–143.—Male genitalia consisting of ventral views (at tope of each figure) of uncus, subcaphium (when present), tegumen, vinculum, and saccus; of lateral view (in center of each figure) of genital capsule with left valva, anellus, and aedeagus removed; of ventral and lateral view of anellus (at the central left of each figure); and of aedeagus in lateral view (at bottom of each figure): 136, *Infraphulia illimani* (drawn from preparation WDF 5384); 137, *I. madeleinea* (drawn from preparation WDF 6601); 138, *I. ilyodes* (drawn from preparation WDF 6603); 139, *Pierphulia nysias nysias* (drawn from preparation WDF 6613); 140, *P. rosea rosea* (drawn from preparation WDF 6620); 141, *Piercolias coropunae* (drawn from preparation JH 156, the holotype); 142, *P. forsteri* (drawn from preparation WDF 6681); 143, *P. huanaco* (drawn from preparation WDF 6622, the lectotype).



FIGURES 144, 145.—Female genitalia consisting of lateral views of inner surfaces of inner and outer genital plates of right sides (these plates having been removed from the left sides) with each bursa copulatrix rotated to show signum in ventral view: 144, *Hypsochila argyrodice* (drawn from preparation WDF 5751); 145, *H. microdice* (drawn from preparation WDF 6640; inset figure to the left is of signum in lateral view).





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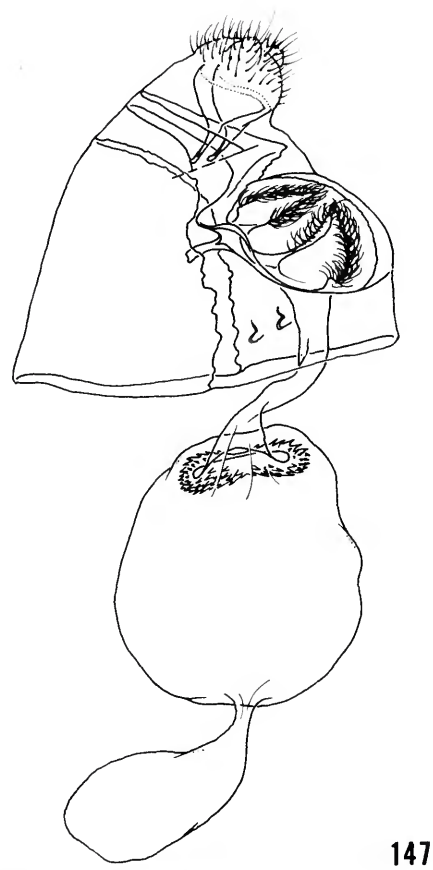

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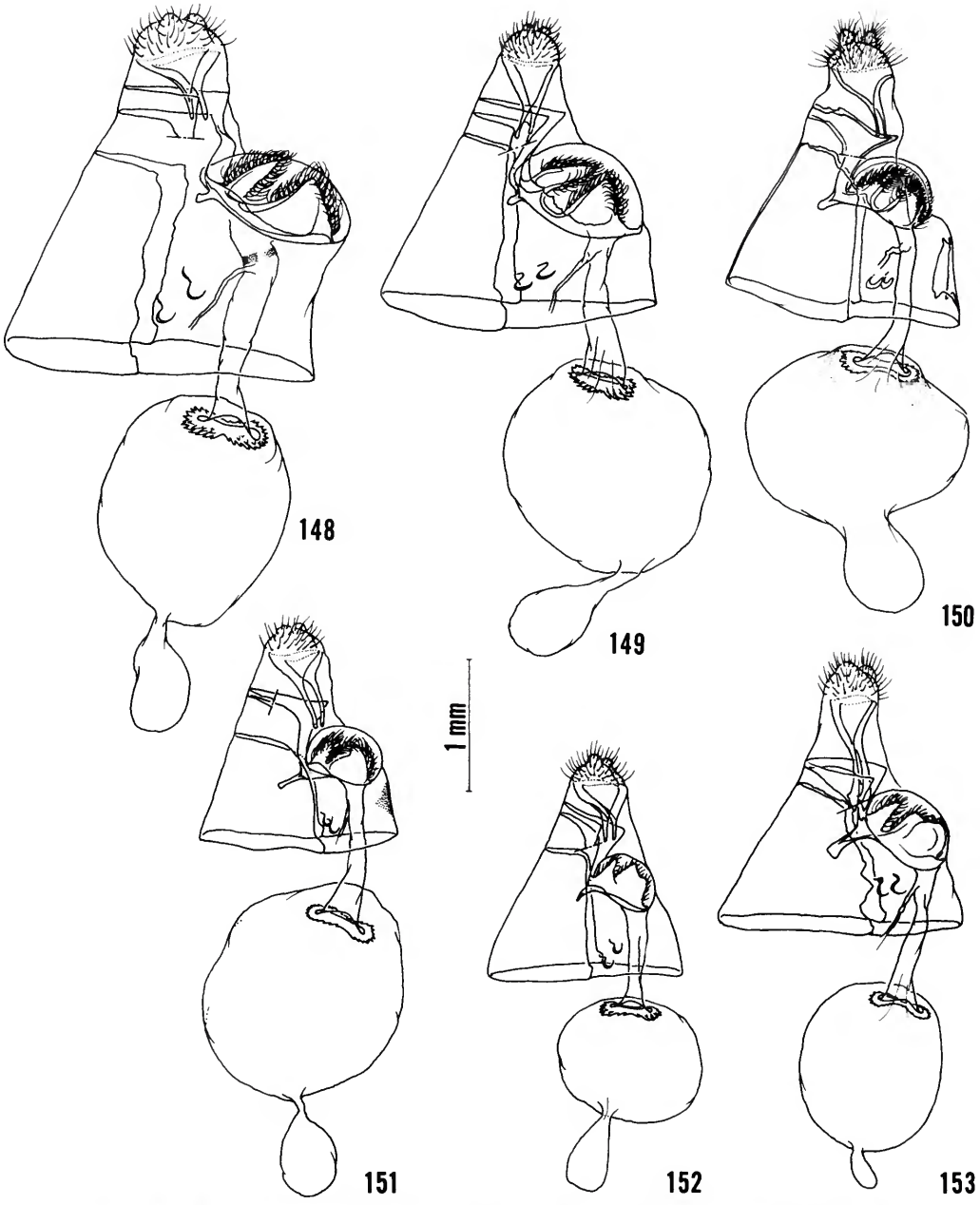
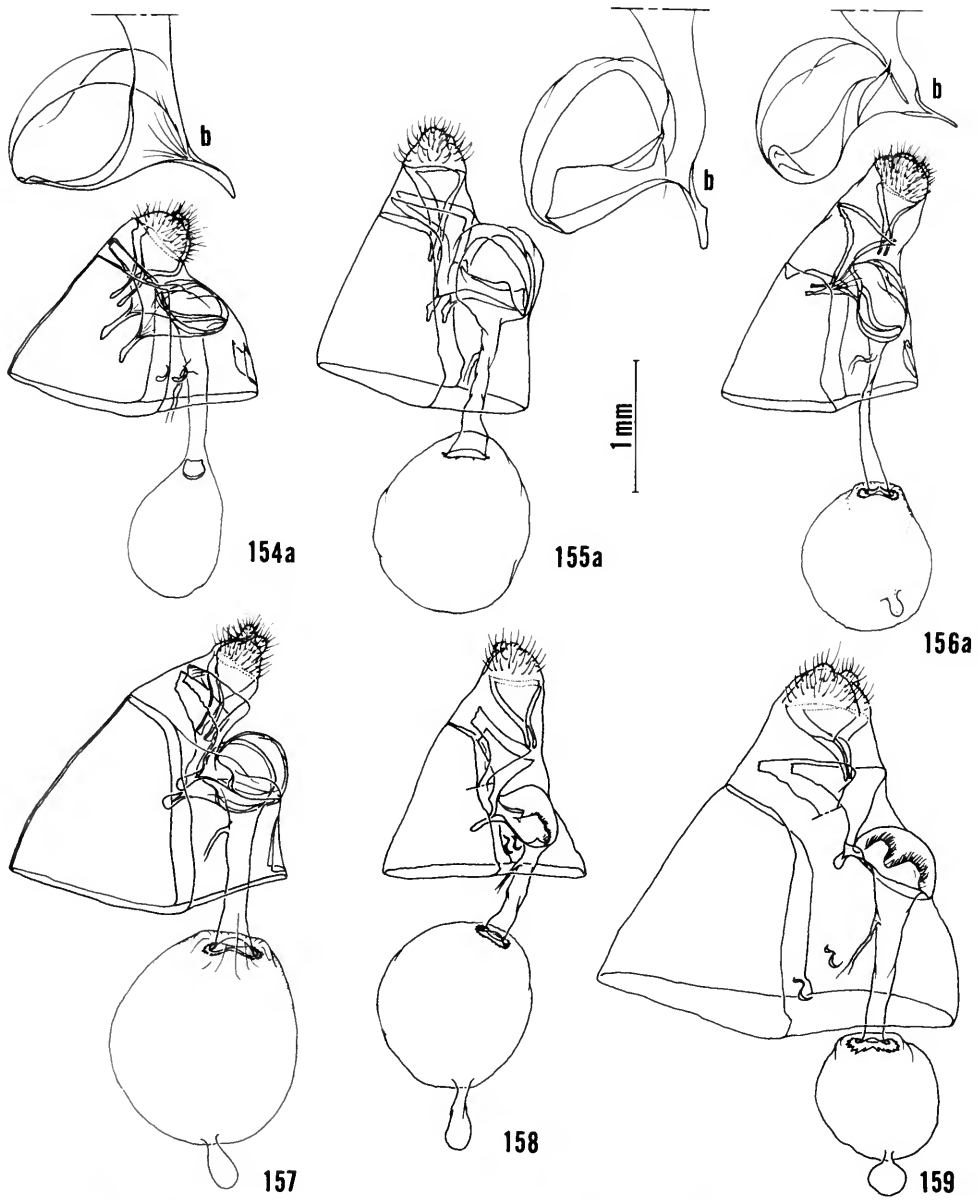
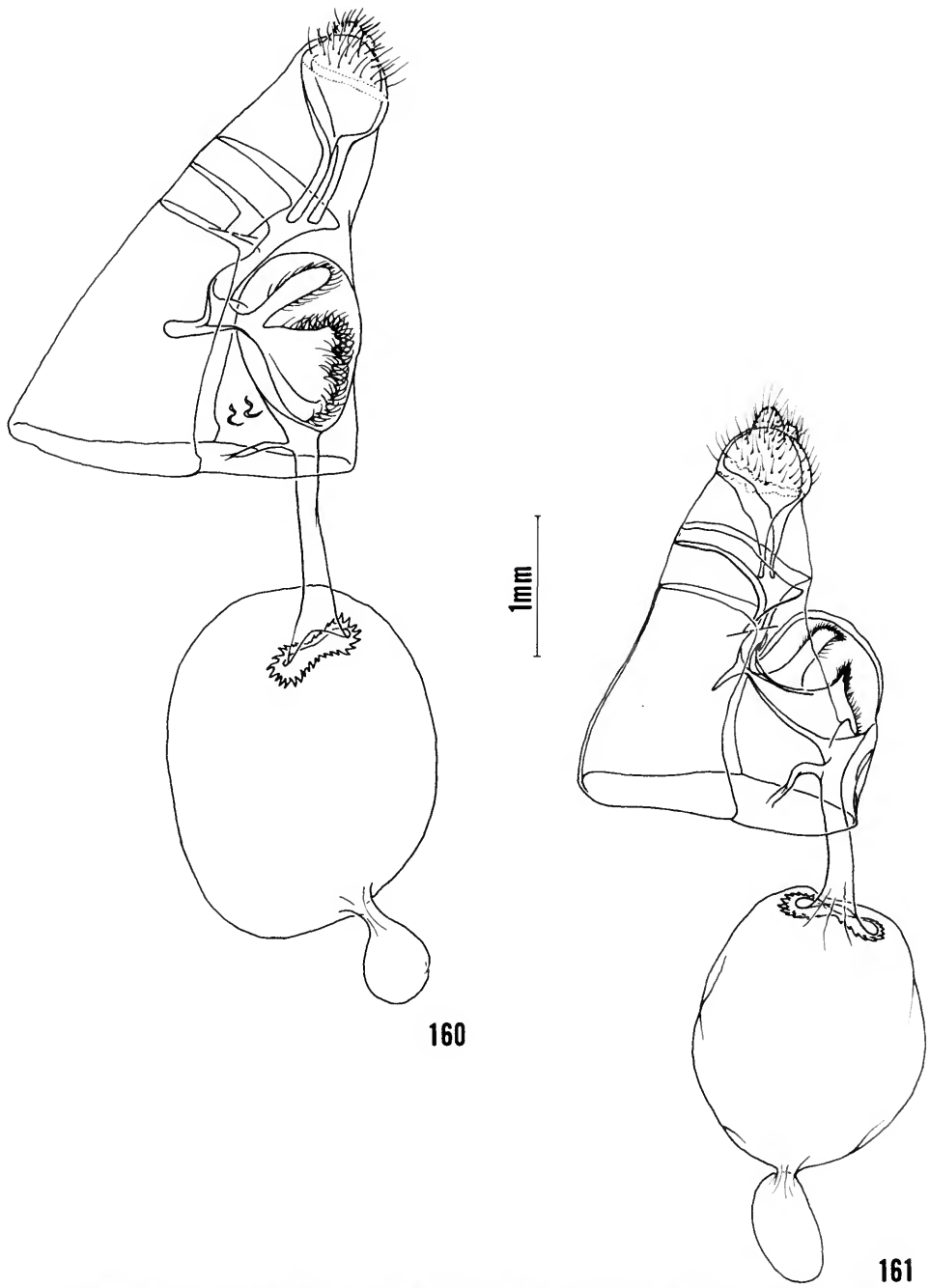
FIGURES 146, 147.—Female genitalia consisting of lateral views of inner surfaces of inner and outer genital plates of right sides (these plates having been removed from the left sides) with each bursa copulatrix rotated to show signum in ventral view: 146, *Hypsochila huemul* (drawn from preparation WDF 6643); 147, *H. galactodice* (drawn from preparation WDF 6655).



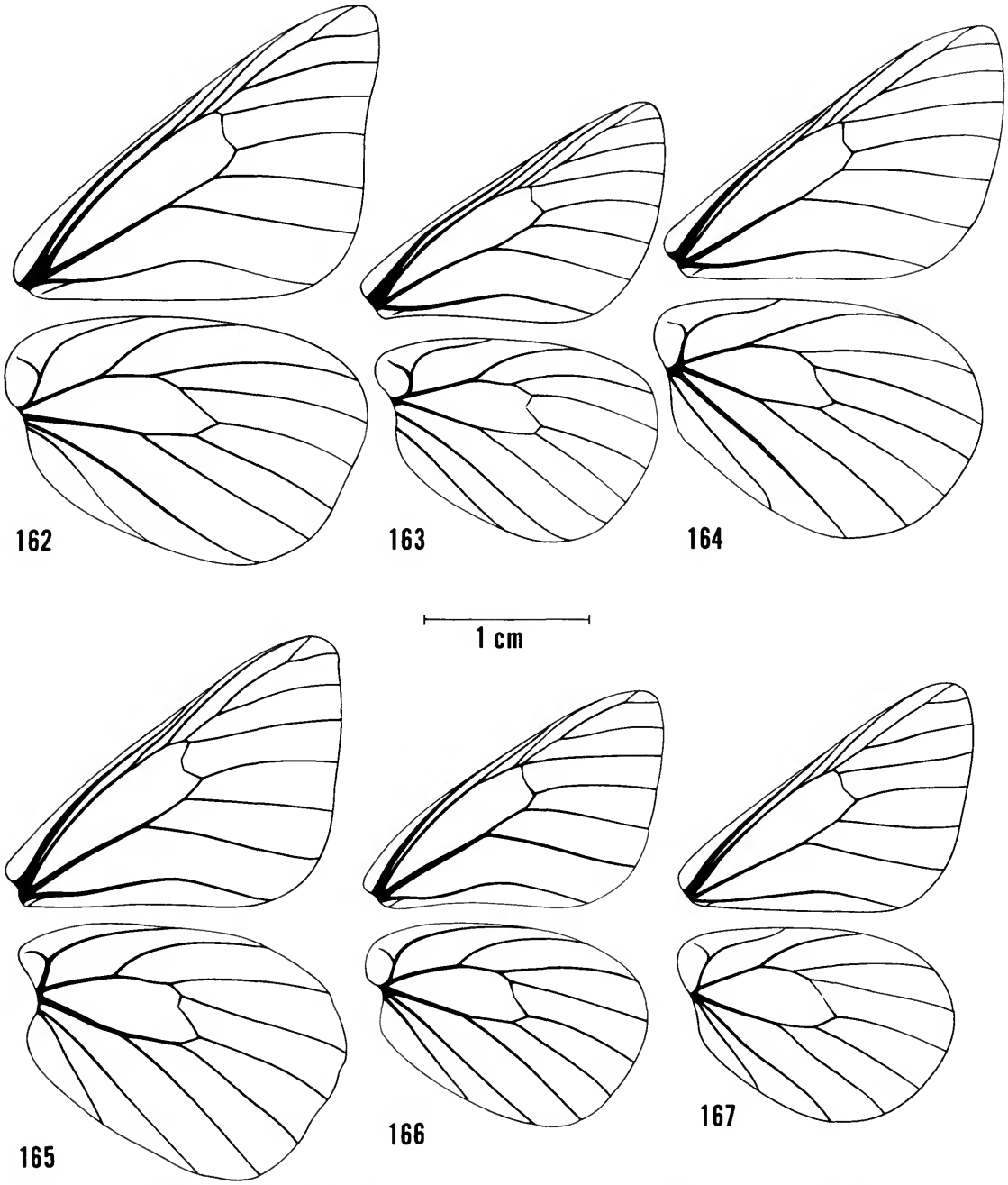
FIGURES 148–153.—Female genitalia consisting of lateral views of inner surfaces of inner and outer genital plates of right sides (these plates having been removed from the left sides) with each bursa copulatrix rotated to show signum in ventral view: 148, *Hypsochila wagenknechti wagenknechti* (drawn from preparation WDF 6656); 149, *H. penai* (drawn from preparation WDF 6651); 150, *Phulia nymphula nymphula* (drawn from preparation WDF 6648); 151, *P. paranympha paranympha* (drawn from preparation WDF 6686); 152, *P. nannophyes* (drawn from preparation JH 181); 153, *P. garleppi* (drawn from preparation JH 173).



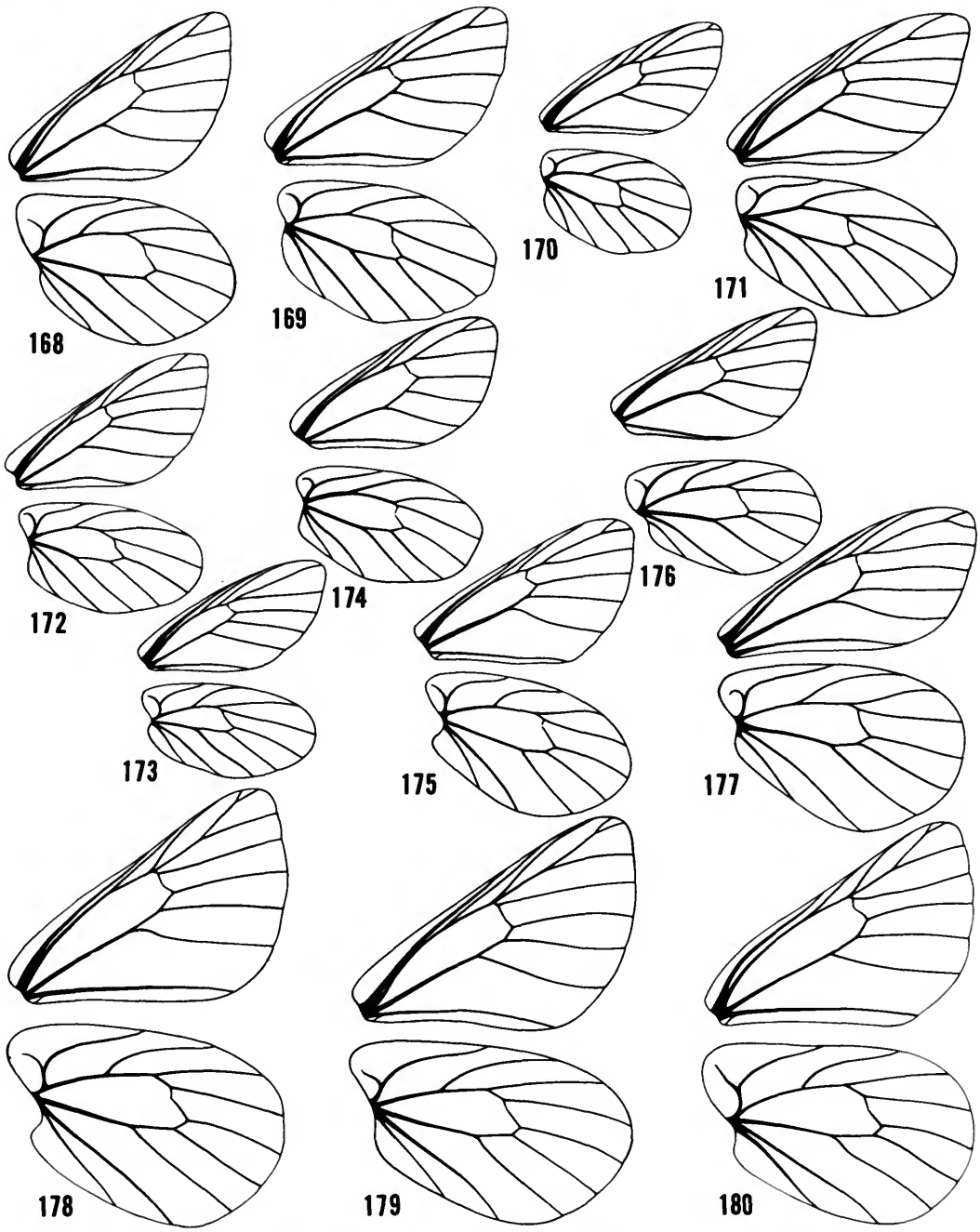
FIGURES 154–159.—Female genitalia consisting of lateral views with each bursa copulatrix rotated to show ventral view of each signum; with inner faces of outer and inner genital plates of left sides shown greatly enlarged (in Figures 154*b*, 155*b*, 156*b*): 154, *Infraphulia illimani* (drawn from preparation WDF 5385); 155, *I. madeleinea* (drawn from preparation WDF 6554); 156, *I. ilyodes* (drawn from preparation WDF 6596); 157, *Pierphulia nysias nysias* (drawn from preparation WDF 6614). Female genitalia consisting of lateral views of inner surfaces of inner and outer genital plates of right sides (these plates having been removed from the left sides) with each bursa copulatrix rotated to show signum in ventral view: 158, *Pierphulia rosea rosea* (drawn from preparation WDF 6676); 159, *P. isabella* (drawn from preparation WDF 6675, the holotype).



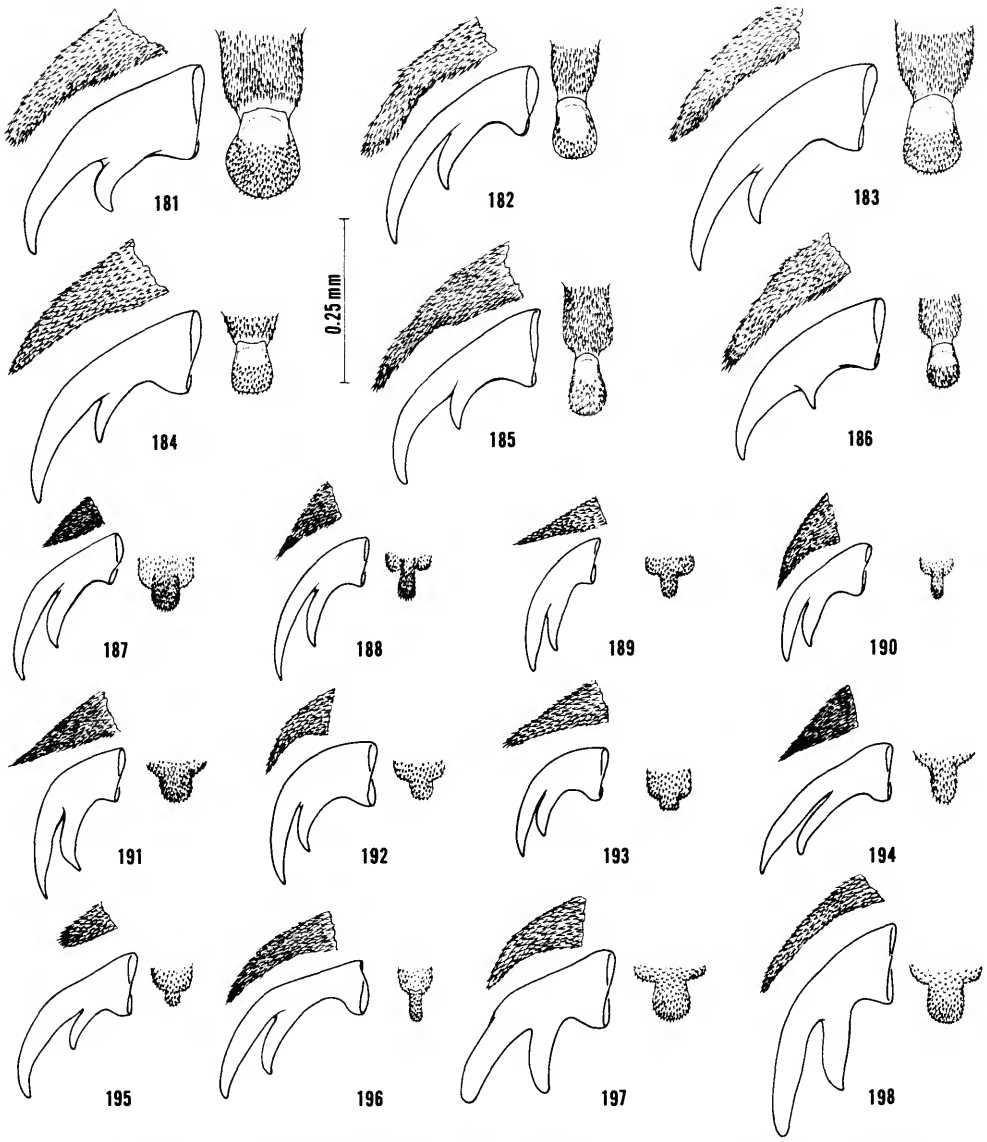
FIGURES 160, 161.—Female genitalia consisting of lateral views of inner surfaces of inner and outer genital plates of right sides (these plates having been removed from the left sides) with each bursa copulatrix rotated to show signum in ventral view: 160, *Piercolias huanaco* (drawn from preparation WDF 5346); 161, *P. forsteri* (drawn from preparation WDF 6625).



FIGURES 162–167.—Wing venation: 162, *Hypsochila argyrodice* (drawn from wing slide 2426); 163, *H. microdice* (drawn from wing slide 1182); 164, *H. huemul* (drawn from wing slide 1183); 165, *H. galactodice* (drawn from wing slide 1160); 166, *H. wagenknechti wagenknechti* (drawn from wing slide 1159); 167, *H. penai* (drawn from wing slide 6578).



FIGURES 168–180.—Wing venation: 168, *Phulia nymphula nymphula* (drawn from wing slide 114); 169, *P. paranympha paranympha* (drawn from wing slide 194); 170, *P. nannophyes* (drawn from holotype); 171, *P. garleppi* (drawn from wing slide 5378); 172, *Infraphulia illimani* (drawn from wing slide 169); 173, *I. madeleinea* (drawn from wing slide 5363); 174, *I. ilyodes* (drawn from wing slide 6633); 175, *Pierphulia nysias nysias* (drawn from wing slide 180); 176, *P. rosea rosea* (drawn from wing slide 1184); 177, *P. isabela* (reconstructed drawing based upon holotype); 178, *Piercolias huanaco* (drawn from wing slide 155); 179, *Piercolias forsteri* (drawn from wing slide 6623); 180, *P. coropunae* (drawn from holotype).



FIGURES 181–198.—Paronychia (at the top of each figure), claws (at the bottom of each figure), pulvilli (at the right of each figure): 181, *Hypsochila argyrodice* (drawn from slide no. 5751); 182, *H. microdice* (drawn from slide no. 6637); 183, *H. huemul* (drawn from slide no. 6581); 184, *H. galactodice* (drawn from slide no. 6680); 185, *H. wagenknechti wagenknechti* (drawn from slide no. 5753); 186, *H. penai* (drawn from slide no. 6580); 187, *Phulia nymphula nymphula* (drawn from slide no. 1172); 188, *P. paranympha paranympha* (drawn from slide no. 1171); 189, *P. nannophyes* (drawn from slide no. 6668); 190, *P. garleppi* (drawn from slide no. 1170); 191, *Infraphulia illimani* (drawn from slide no. 1169); 192, *I. madeleinea* (drawn from slide no. 5380); 193, *I. ilyodes* (drawn from slide no. 6590); 194, *Pierphulia nysias nysias* (drawn from slide no. 6613); 195, *P. isabela* (drawn from slide no. 6675); 196, *Piercolias huanaco* (drawn from slide no. 1167); 197, *P. forsteri* (drawn from slide no. 6681); 198, *P. coropunae* (drawn from slide no. 1176).

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