ART. 6. TAXONOMY AND DISTRIBUTION OF THE GENUS *PIERELLA* (LEPIDOPTERA)

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These large dark-winged satyrids are found in the deep tropical rain forest. A few of the species stray into the subtropical forest but their true home is hot and humid. There they flit along the trails and slip into the protection of the thickets at the slightest alarm. Their lazy flight would make them easy to capture in any other environment. When they settle, the cryptic markings on the underside of the wings afford them ample protection from all but the keenest eyes.

Genus Pierella, Westwood, 1851

The first member of the genus to be described was *lena,* by Linneaus in 1767. Since then over thirty forms have been named. The authors of the earliest species included them in the genus *Papilio.* Huebner used *Oreas* in 1807 and Godart used *Satyrus* in 1823. Neither of these names are available. In the *Genera of Diurnal Lepidoptera,* 2:365, 1851, Westwood proposed *Pierella* as a subgenus, "Section 2, *Haetera* Fabricius." In this he placed the species then known. Herrich-Schaeffer (*Prodromus* 1:55, 1864) was the first to use *Pierella* as the name of a full genus. He has been followed by all except Hewitson, Erichson and Felder who rigidly adhered to *Haetera.*

In 1868, Butler (*Ent. Mo. Mag.* 4:195) specified *nereis* Drury as the type of *Pierella.* This was a particularly happy selection since that species was figured by its author and thus there can be no question as to what the name stands for.

[1] During 1940 and 1941 I prepared several papers based upon my collections made in Ecuador during 1938 and 1939. This series, of which this will be the sixth paper, was interrupted by the war. Upon returning to my laboratory in the summer of 1946, I decided to continue with the Neotropical Satyrids but to enlarge the scope of the papers. This is the first of the enlarged papers.

During the preparation of this paper the following men and museums have given me advice and loaned me material: Mr. William P. Comstock and Dr. Charles D. Michener at the American Museum of Natural History, Mr. Richard D. Fox formerly at the Reading Public Museum and now at the Carnegie Museum, the late Capt. Roswell C. William of the Academy of Natural Sciences, Philadelphia, and Dr. William C. Field at the United States National Museum. Without their aid this study could not have been made.

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The genus *Pierella* may be described as follows:

Head: The antennae are rather stout with clubs only slightly heavier than the shafts. They range in length from about two-thirds to the same length as the cell of the forewing, and consist of 48 (*rubecola*) to 66 (*nereis*) joints.

The eyes are glabrous.

The palpi are large: the distal joint the shortest, the middle joint the longest (*see* fig. 1650 a).* In *nereis* the proportions are about 23:110:40; in *hyalinus* 20:108:37; and in *lesbia* 30:110:40.

Thorax: The male prothoracic legs have a single tarsal joint, a little longer than either the tibia or femur (*see* fig. 1650 b). The female prothoracic legs have a tarsus made up of five joints, the basal one being longer than the combined length of the others (*see* fig. "♀ lena"). The second most distad joint is the shortest. The mesothoracic and metathoracic legs are perfectly normal in both sexes. The legs bear no spurs.

The tegulae are large. There is a long spur sweeping backward from the body (*see* fig. 1651 c).

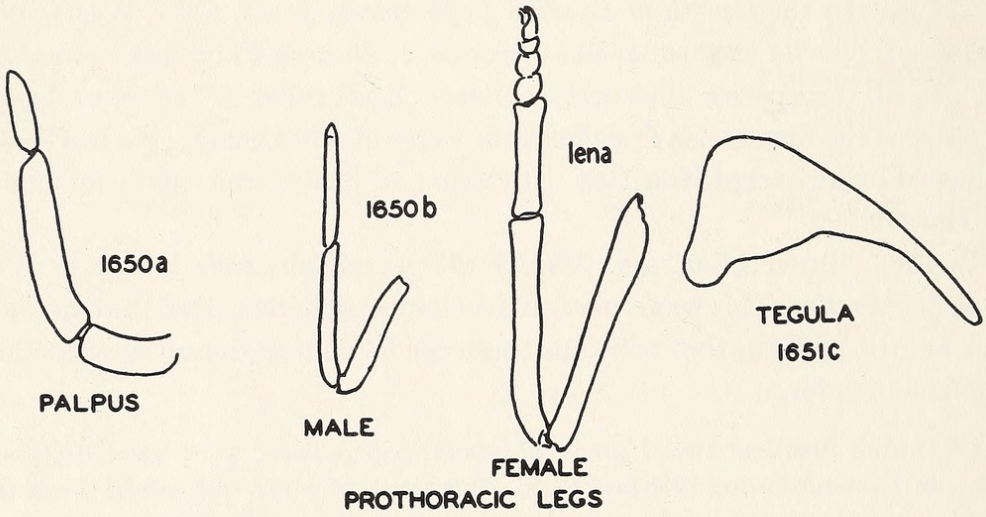

FIG. 1. Appendages of head and thorax.

The venation of the forewings: The basal portions of Sc, Cu, and A_2 are inflated. The radial is five branched; R_1 and R_2 arise before the end of the cell. The origin of R_2 is closer to that of R_1 than to the end of the cell. M_1, R_{3+4+5} and the UDC are conate or nearly so. The origin of R_3 is variable but usually about half-way from the end of the cell to the apex. There is a spur on A_2 that arises just beyond the end of the swelling

*The figure numbers used refer to the serial numbers of my dissections.

and is sharply recurved. There are three strong recurrent veins in the cell. Another trace lies between Cu_2 and A_2 (*see* fig. 1651 a).

The venation of the hindwings: The Sc and R_s are free at the base. The Sc is sharply angled at the origin of H. The H is a short straight spur. M_3 and Cu_1 branch from a common vein well beyond the end of the cell. The UDC is shorter than the MDC which is about equal to the weak LDC in length. The LDC meets the Cu_s just beyond the origin of the Cu_2 (*see* fig. 1651 b).

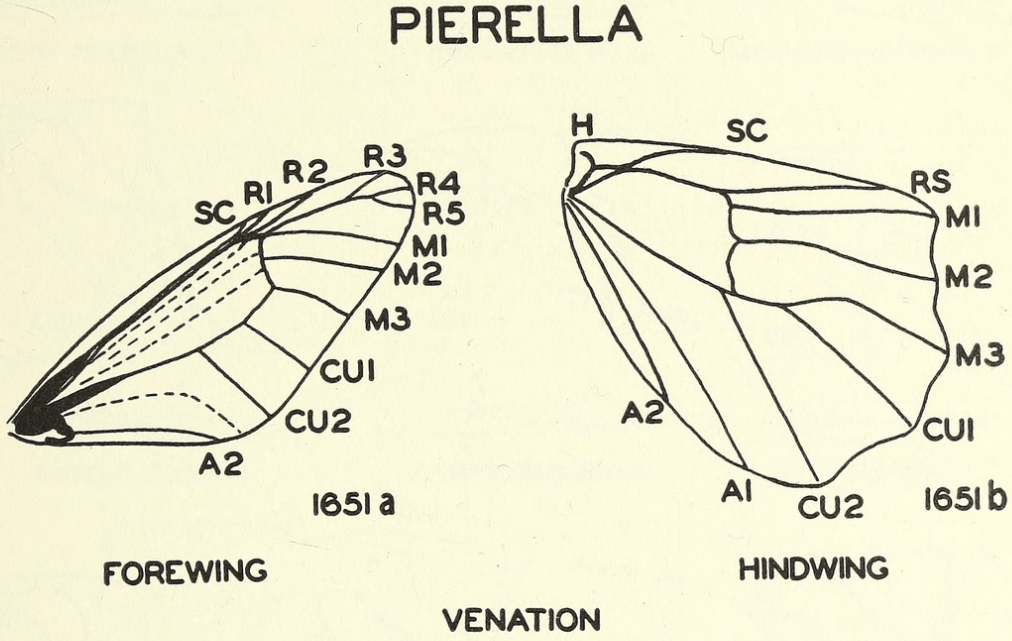

FIG. 2. Venation in *Pierella*.

The scalation of *nereis* is weak. In all other species it is normal.

Male Genitalia: The tegumen is subtriangular in shape, usually about half the total dorso-ventral dimension of the genitalia in depth and varying from less than to more than that in anterior-posterior dimension. The subuncal processes that are usually present on the *Satyridae* are absent.

The uncus is simple, slender and curved, and from just short of to equal to the anterior-posterior dimension of the tegumen.

The vinculum is slender (rather broad in *nereis* and *hortona*) and almost as long as the depth of the tegumen.

The saccus is slender and about as long as to a little longer than the vinculum.

The annuli are less than half as long as the vinculum and are lanceolate.

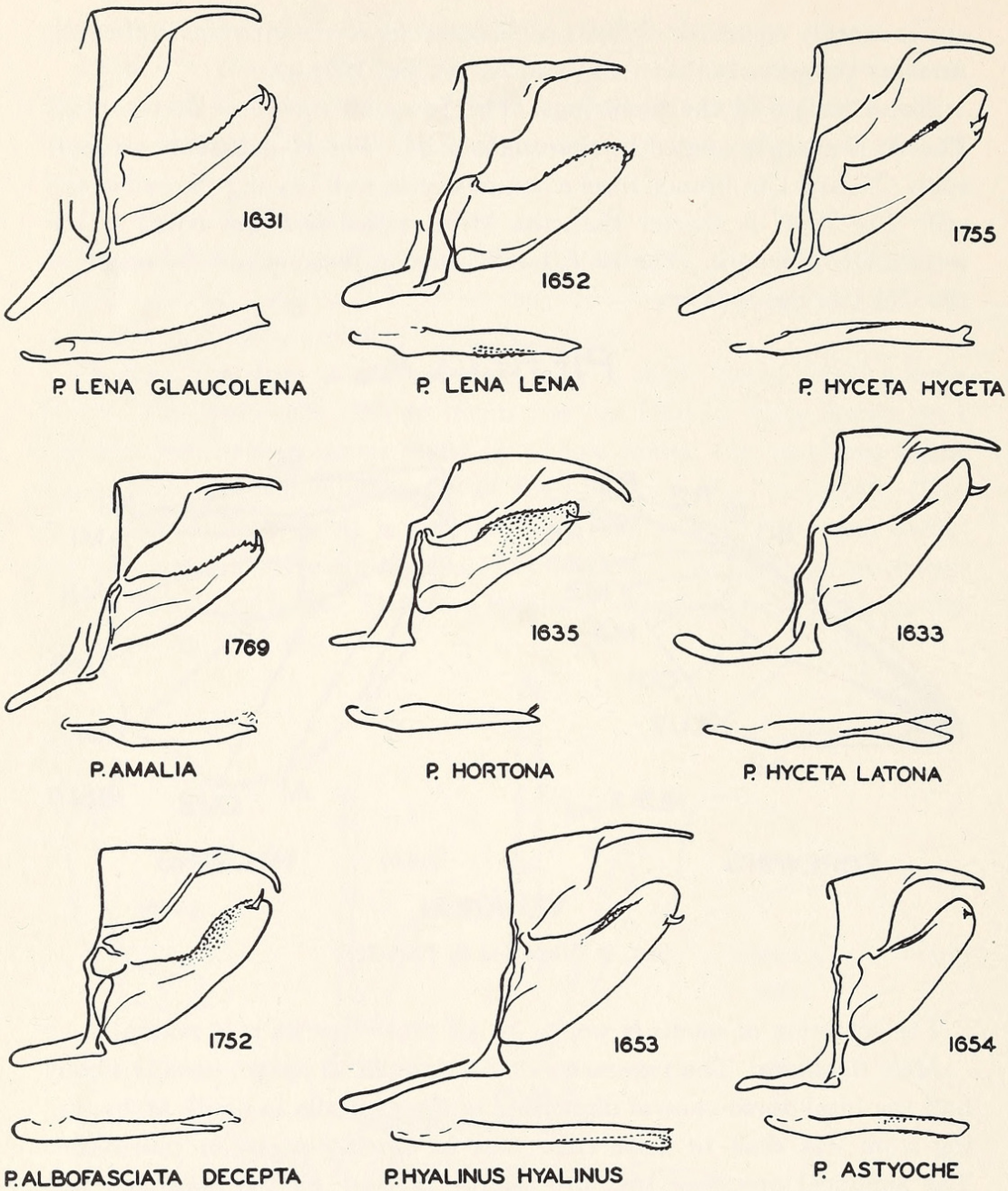

FIG. 4. Male genitalia of *Pierella*.

P. lena glaucolena	1631	Rio Jondachi, E. Ecuador, 800 m., Nov. 1939, *F.M.B.*
P. lena lena	1652	Bartica, British Guiana, *A.M.N.H.*
P. hyceta hyceta	1755	Arima, Rio Purús, Brazil, November 1922, *C.M.*
P. amalia	1769	Macayacu, Colombia, March 1946, *A.M.N.H.*
P. hortona	1635	Rio Jondachi, E. Ecuador, Nov. 1939, *F.M.B.*
P. hyceta latona	1633	Puyo, E. Ecuador, 1000 m., Dec. 1938, *F.M.B.*
P. albofaciata decepta	1752	Rio Japacani, E. Bolivia, Sept. 1914, Paratype in *C.M.*
P. hyalinus hyalinus	1653	Cayenne, French Guiana, December 1903, *A.M.N.H.*
P. astyoche	1654	Kamadusa, British Guiana, October 1922, *A.M.N.H.*

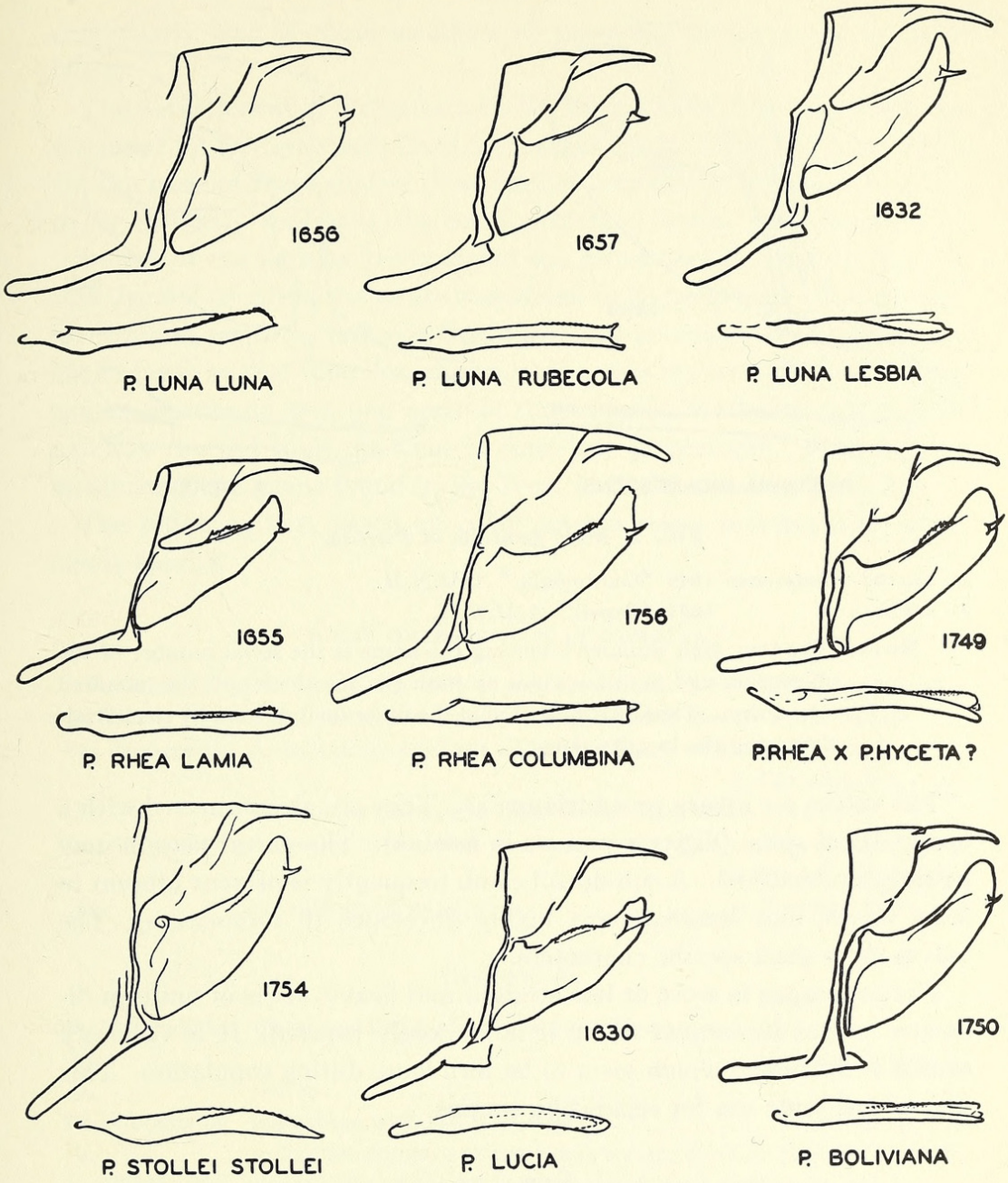

FIG. 5. Male genitalia of *Pierella*.

P. luna luna	1656	Barro Colorado, Canal Zone, March 1926, *A.M.N.H.*
P. luna rubecola	1657	Tezonapa, Vera Cruz, Mexico, *A.M.N.H.*
P. luna lesbia	1632	No data, *A.M.N.H.*
P. rhea lamia	1655	Para, Brazil, *A.M.N.H.*
P. rhea columbina	1756	"Colombia," *A.M.N.H.*
P. rhea x *P. hyceta* ?	1749	Arima, Rio Purús, Brazil, September 1922, *C.M.*
P. stollei stollei	1754	Munez Freire, Espiritu Santo, Brazil, *C.M.*
P. lucia	1630	Canelos, Eastern Ecuador, December 1938, *F.M.B.*
P. boliviana	1750	Rio Japacani, Eastern Bolivia, August 1913, *C.M.*

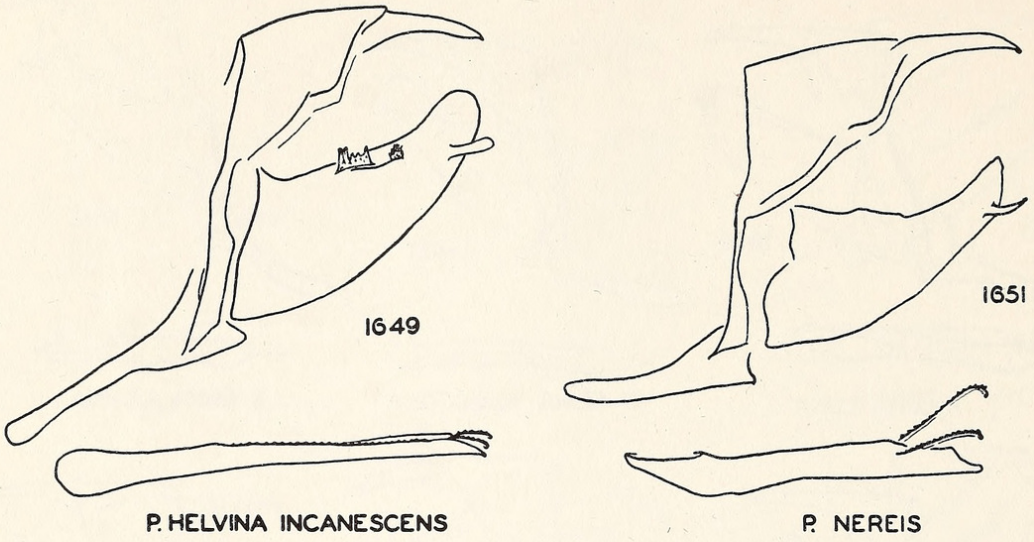

FIG. 3. Male genitalia of *Pierella*.

P. helvina incanescens 1649 "Guatemala," *A.M.N.H.*
P. nereis 1651 "Brazil," *A.M.N.H.*

NOTE: The four digit number following the name is the serial number of the dissection and is to be found on both the specimen and the mounted dissection. These are deposited at the museum indicated by the initials following the locality data.

The valves are lobate to subtriangular. They are always armed with a heavy distal spine (digitate process in *helvina*). The dorsal margin may be simple or toothed. A sub-dorsal comb frequently is present (absent in *luna*, *nereis*, and *hortona;* most highly developed in *incanescens*). The valves show good specific characters.

The aedaeagus is more or less straight and heavy. It is of uniform diameter except in *hortona* where it is markedly tapered. It is variously armed with cornuti which seem to be torn loose during copulation. This organ is of some use for separating species.

REMARKS

In recent years the named forms of *Pierella* have been distributed among twelve or thirteen "species." I am inclined to believe that there are fewer biologic species than this in the genus. Until the life histories of the various named forms that compose the bulk of this genus are known, the true number of species will remain in doubt. The male genitalia indicate that there are either several groups of very closely related species or several species that have developed ecological subspecies. This is

particularly true of those members of the genus found in the Amazon basin.

The development of the pattern on the wings has been fully studied and discussed by Schwanwitsch (*Zeit. Wiss. Biol.*, Abt. A., 10:433-532, 1928). On the basis of these studies those species included in Division B in this paper probably represent the most primitive forms. The present distribution of the various forms within the genus does not wholly support this thesis if primitive forms are considered to be peripheral. The present distribution seems to indicate that the genus antedates the Andean uplift and that at that time the genus ranged across the area affected. Those species now found west and north of the Andes in South America are apparently derived from the Central American progenitors. There are no members of the genus found in the West Indies[2] (excepting Trinidad).

The following key, based on color pattern refers to acceptable taxonomic species.

A KEY TO THE SPECIES OF PIERELLA

Reference is made in this key only to species. Methods for separating the subspecies and forms will be found in the discussion of each species in the genus.

1a. Underside: a dark-bordered light transverse band on BOTH WINGS ..... 3. Division A (p. 56)
b. : three dark transverse lines on the HINDWING ..... 2.
2a. Upperside: forewing with a blue spot or a white spot on the discocellulars ..... 12. Division C (p. 80)
b. : no such band or spot ..... 9. Division B (p. 70)

DIVISION A

3a. Upperside: distal portion of the hindwing with an ochraceous area ..... *nereis* (p. 57)
b. : not so ..... 4.
4a. Upperside: hindwings with red markings ..... *helvina* (p. 57)
b. : no red markings or at most only a rusty flush on the hindwings ..... 5.
5a. Hindwing: the margin of the wing deeply excavated anterior to M_3 ..... *hyalinus* (p. 62)
b. : lacking this excavation ..... 6.
6a. Upperside: a large white spot at or near the margin of the hindwing ..... 7.
b. : no such spot, at most only small interneural white spots ..... 8.

[2] Series of *P. hyalinus*, *lena*, and *lamia*, in the Mengel Collection at the Reading (Pennsylvania) Public Library and Museum, are ticketed "Bath, Jamaica." The Mengel Collection contains many specimens with obviously incorrect data so I do not consider these specimens as West Indian in origin.

7a. Upperside: white spot on hindwing touches or almost touches the margin. *lucia* (p. 69)
b. : the white spot separated from the margin by about ½ the diameter of the spot..... *amalia* (p. 68)
8a. Upperside: three transverse rows of blue spots, sometimes white centered or whitish on the hindwing..... *lena* (p. 65)
b. : no such series..... *astyoche* (p. 69)

DIVISION B

9a. Upperside: two large black submarginal ocelli at the inner angle of the hindwing (rarely up to five, then the specimen is from northern Central America) ..... *luna* (p. 78)
b. : four or five submarginal ocelli on the hindwing (rarely three, then from S. Brazil or Bolivia)..... 10.
10a. Upperside: hindwing with large ochraceous or reddish brown areas. *hyceta* (p. 76)
b. : no such areas..... 11.
11a. Upperside: basic color greyish faun..... *stollei* (p. 73)
b. : basic color dark grey brown or blackish..... *rhea* (p. 71)

DIVISION C

12a. Underside: transverse light band on the forewings crossed by a similar band at the discocellulars..... *albofaciata* (p. 82)
b. : transverse light band only slightly enlarged at discocellulars. *hortona* (p. 80)

DIVISION A

Characteristics: There is a distinct, narrow, light band with dark marginal lines across the underside of both wings. A third dark line crosses both wings basad of the light band.

I. The *nereis* group.

Characteristics: There is a brightly colored, transverse band across the limbal area of the upperside of the hindwings.

This group contains two species, *nereis* the genotype, and *helvina*. The former has a bright ochraceous patch on the upperside of the hindwings, the latter a red patch. The two species are strictly congeneric. No other species in the genus is so closely related to the genotype as is *helvina*. These species occupy widely separate ranges. *P. nereis* is restricted to southeast Brazil and *helvina* to Central America and that part of South America west and north of the Andes.

1. **Pierrella nereis** (Drury)

Original description: 1782, *Illustr. Exot. Ent.*, pl. 35, f. 2, 3.

Earliest figure: in original description.

Other figures:[3] 1835, Lucas, *Lepid. Exot.*, pl. 8a, f. 1. 1911, Weymer, *Seitz's Macrolepid.*, 5: pl. 42, line d.

Material seen: 17♂♂, 3♀♀.

Range: S.E. Brazil in the rain forest.

This species is distinctive and quite constant in its appearance. Nowhere does it seem to be common. Most of the specimens seen came from Petropolis, Sta. Caterina, and Rio de Janeiro.

2. **Pierella helvina**

This is a plastic species. It is quite probable that no two local populations are alike. This poses a taxonomic quandary. To dignify each of those populations with a varietal name would obscure the apparent development that is in progress in the species. If and when the genetics of the species are studied, there will be time enough for further additions to the nomenclature. There are three reasonably well established foci of development, each with a basic form distinguishable from the other two. These occupy different geographic areas but are only partially isolated. The numbers of specimens seen, from a large number of stations, have been by no means sufficient to do more than sketch the relationships of the forms. Unfortunately the species seems to center in the worst possible areas as far as disease and the ease of travel is concerned. At least one collector has lost his life in search of butterflies in those regions.

The species has not been found in the basins of the Orinoco and Amazon Rivers. Typical *helvina helvina* is found in northern Colombia. West of the Andes, from the Rio Guayas in Ecuador to the Canal Zone, the race found is *helvina ocreata*. The Central American form is *helvina incanescens*. The latter is considered a full species by Weymer (*Seitz's Macrolepid.*, 5:176-179, 1911) and Gaede (*Lepid. Cat.*, 29:422, 1931). Of these subspecies, *ocreata* is the most distinctive and the most variable.

The subspecies may be separated on the following bases:

a. Those specimens having considerable white on the colored band across the upperside of the hindwings are *ocreata;*

b. those specimens with no white in the colored band on the hindwings, with the red extending to or about to the costal margin

[3] All species are figured in Schwanwitsch, *Zeit. Wiss. Biol.*, Abt. A., 10:433-532. 1928. No specific citations are made to these.

and with little more than a trace of white submarginal spots in M_2-M_3 and M-$_3$-Cu_1 are *helvina;*

c. those specimens with no white on the colored band on the hindwings, with the red usually extending no further toward the costal margin than M_1 and with well-developed submarginal spots in M_2-M_3, M_3-Cu_1 and occasionally in Cu_1-Cu_2 are *incanescens.*

2a. **Pierella helvina helvina** (Hewitson)

Original description: 1860, *Exot. Butt.*, 2: *Haetera*, pl. 1, f. 4.

Earliest figure: in original description.

Other figures: 1911, Weymer, *Seitz's Macrolepid.*, 5: pl. 42, line d.

Material seen: 14 ♂♂, 10 ♀♀.

Range: In tropical rain forests of northern Colombia, especially east of the Rio Cauca, and west of the Cordillera Oriental.

P. h. helvina is the most stable of the three races of the species. The forewing generally exhibits an ocellus in M_1-M_2, and white spot in R_5-M_1, M_2-M_3 and M_3-Cu_1; the latter mark is the least constant. The hindwing bears an ocellus in M_1-M_2, and white spots in R_5-M_1 and traces of white spots in M_2-M_3 and M_3-Cu_1. The extent of the red on the hindwings is somewhat variable, on the majority of specimens it reaches or almost reaches the costal margin. On a few specimens it does not quite reach M_1 and in this respect these specimens resemble *incanescens.*

2b. **Pierella helvina incanescens** Godman & Salvin

Original description: 1877, *Proc. Zool. Soc. London*, p. 61.

Earliest figure: 1880[4], Godman & Salvin, *Biol. Cent.-Amer., Rhop.*, 3: pl. 6, f. 5, 6.

Other figures: 1911, Weymer, *Seitz's Macrolepid.*, 5: pl. 42, line d. 1925, Schwanwitsch, *Entomologist*, 58: 266.

Material seen: 25 ♂♂, 11 ♀♀.

Range: In the tropical rain forests of Central America from Guatemala to Chiriqui, Panama.

This subspecies is a little more variable than *h. helvina.* As has been pointed out, some authors take the position that it is a separate species from *helvina.* I can find no support for this view. The anatomy of the

[4] Dates used for Cramer, *Pap. Exot.* and Godman & Salvin, *Biologia*, are according to Brown: *Ann. Ent. Soc. Amer.*, 34:127-138, 1941.

two forms clearly indicate a single species and the wing pattern of each varies toward that of the other.

The forewing of *incanescens* is marked like that of *helvina*. The hindwing exhibits a tendency toward a well-developed submarginal series of white spots. Only traces of this series are found on *helvina*. The red on the hindwing is expanded toward the inner margin. As a result of this expansion a black line perpendicular to the inner margin appears in the red between Cu_2 and A_1. This line is rarely absent or obscure on *incanescens* and rarely visible on *helvina*.

A pair of unusually small specimens of this race was collected by Schaus on the Rio Sixaola in south-eastern Costa Rica near the Panama border. The red on the hindwings is limited anteriorly as on *incanescens* and posteriorly as on *helvina*. Such limitation is more like the pattern of *helvina* than *incanescens*. The submarginal row of white spots is well developed and places the specimens in the subspecies *incanescens*. Curiously the male displays a white spot in Cu_1-Cu_2, usually found only on females and the female lacks this spot!

These two specimens might be included under Niepelt's form *costaricana* (*Int. Ent. Zeit.*, 21:50, 1927) described from Turrialba, C.R. This name was applied to specimens that resemble *helvina* in the extent of the red markings on the hindwings. The types and all specimens that I have seen come from the valley of the Rio Reventazón where they fly with typical *incanescens*.

2c. **Pierella helvina ocreata** Godman & Salvin

Original description: 1868, *Ann. & Mag. Nat. Hist.*, (4) 2:143.

Earliest figure: 1880, Godman & Salvin, *Biologia Cent.-Amer., Rhop.*, 3: pl. 6, f. 7-9.

Material seen: 3 ♂♂, 6 ♀♀.

Range: In the tropical rain forests from the Canal Zone eastward through the Isthmus of Darien and then south along the coast to the Rio Guayas, Ecuador, west of the Cordillera Occidental.

This race is highly variable. It may be recognized always by the white area in the colored band on the upper-side of the hindwings. The other markings are much like those found on *helvina* and *incanescens*.

The males that I have seen are all alike, the females are each different from the others. These represent various degrees and combinations of three lines of variation:

a. replacement of the ocellus on the forewings by a white spot;

b. a color change of the submarginal spots from white to red;

c. restriction of the red area in the colored band on the hindwing.

This tendency to vary has lead so far to the proposal of four varietal names. Without doubt at least as many more will be proposed! The Panamanian specimens that I have seen are reasonably constant. I am inclined to believe that the race has invaded the South American part of its range in recent geologic times and is responding to new environmental pressures. I believe that every female from the Pacific coast of Colombia that has reached Germany has been dubbed with a separate varietal name!

The currently named varieties are these:

♀ f. **hymettia** Staudinger, (*Exot. Tagf.*, 1:220, 2: pl. 77, 1888) from "Choco, Colombia" represents all three changes noted above. It is the most divergent from the "normal" of all of the so-far named varieties.

♀ f. **werneri** Hering and Hopp, (*Iris*, 39:191, 1925) from Rio Micay, Choco, Colombia, and ♀ f. **johnsoni** Talbot, (*Bull. Hill Mus.*, 4:196, 1930-32) from Torqueral, N. Colombia, demonstrate the reduction of red on the hindwings. On *werneri* the white extends posteriorly to M_2; on *johnsoni* beyond that nervule. These two names should be considered synonyms.

f. **pacifica** Niepelt, (*Int. Ent. Zeit.*, 17:137, 1924) from Pacifico, S. Colombia, partially demonstrates the change from white to red submarginal spots. Some of the spots are red, and some red, centered with white.

For the benefit of those with limited material, the following analysis of minor variations among the three races is presented:

a. On the forewing there is an apical submarginal row of spots, usually four in number. The spot in M_1-M_2 is variable:

1. on *helvina* it is small, black, and surrounded by a narrow brown iris;
2. on *incanescens* it is large, black, and surrounded by a narrow grey iris;
3. on *ocreata* it is variable in size, black and surrounded by a narrow brownish grey iris. Among the females there is a tendency toward the development of a white spot rather than an ocellus. One in the U. S. National Museum has a normal spot on the right wing and just a few white scales on the left wing. Forms *hymettia*, *werneri*, and *pacifica*, each has a white spot in this position.

b. On the hindwings there always are at least two spots flanking the ocellus:
   1. on *helvina* the posterior of these two spots is obsolescent;
   2. on *incanescens* there are four or five spots, two anterior to and two or three posterior to the ocellus;
   3. on *ocreata* there are always two and often three spots: The variable spot is in M_2-M_3.

c. Some forms have the posterior part of the red on the hindwing extended and show a black line in this red:
   1. on *helvina* and *ocreata* this line, when present, extends from A to Cu_1;
   2. on *incanescens* this line is almost always present and extends from A to Cu_2 and thence along that nervule to the margin.

d. The anterior extension of the red on the hindwing is variable:
   1. on *helvina* the red usually extends to the costal margin, where it is heavily dusted with dark brown scales: there is no white in the band;
   2. on *incanescens* the anterior margin of the red varies between M_2 and R_s: there is no white in the band;
   3. on *ocreata* there is white anterior to the red: the boundary for the two colors lies between M_1 and Cu_1: it lies near M_1 on *hymettia* and *pacifica*, near M_2 on *werneri*, near M_3 on *ocreata* and near Cu_1 on *johnsoni:* the anterior margin of the white is usually the costa where it is obscured by brown scales.

e. The posterior terminus of the red on the hindwing is,
   1. on *helvina* and *ocreata* anterior to A, occasionally at Cu_2, and the inner margin of the colored band lies at or close to the end of the cell;
   2. on *incanescens* almost always at A, and the inner margin is well outside the cell.

II. The *hyalinus* group.

Characteristics: The upperside of the hindwings have a submarginal series of spots or ocelli and lack a brightly colored transverse band.

Weymer in *Seitz's Macrolepidoptera* (5:177, 1911) and Gaide in *Lepidopterorum Catalogus* (29: 421-423, 1931) recognize only three taxonomic species in this group. There are really five co-equal taxonomic units when the anatomy of the forms is considered. All of these are confined to

the tropical rain forests east of the Andes. They are rarely found above 1000m. On the basis of the collections thus far made, the center for these species is the middle Amazon basin. In the triangle between Manaos, Brazil; Iquitos, Peru; and Leticia, Colombia; all five species are found.

FIG. 6. Ranges of *Pierella nereis, helvina,* and *hyalinus.*

3. Pierella hyalinus

This species is usually cited under Huebner's name, *dracontis.* It forms a rather weak connecting-link between the *nereis*-group and this group of species. It is easily recognized by its abberant wing-form. The margin of the hind-wing anterior to M_3 is "excavated." This "excavation" is an exaggeration of the angular shape of the hindwing of *helvina.* There are two subspecies found on the continent of South America. Typical examples of these are readily identified but there is a broad zone where the two meet in which all sorts of intermediates fly. A third subspecies is

confined to the island of Trinidad and is a continuation of the variation shown by the more northeastern mainland race.

The three races are recognizable by the following characteristics:

1. *hyalinus* has light, metallic blue spots on the upperside of the hindwings. Several of these spots are fused to adjacent spots in the same series on the males. Such fusion occurs much less frequently among the females.
2. *dracontis* has deep, blue spots on the upperside of the hindwings. These spots are well defined and separate. The ground color of the wings tends to be much darker on this race than in either of the others.
3. *fusimaculata* has light, almost silvery, blue spots on the upperside of the hindwings. These spots are frequently fused and the three series in turn tend to fuse. Fusion reaches a higher degree among the females than among the males. This is contrary to the condition in *hyalinus*.

A short series of specimens of *h. hyalinus* in the Academy of Natural Sciences at Philadelphia have labels "San Juan Evangelista, Vera Cruz, Mexico." I have examined numerous collections made in the state of Vera Cruz, some from San Juan Evangelista and have not seen this species among them. Hoffman's list of Mexican Butterflies (*Annales Inst. Biol.*, 11:666, 1940) does not mention the species from Mexico. Godman and Salvin in the *Biologia* do not record the species from anywhere in Central America.

3a. **Pierella hyalinus hyalinus** (Gmelin)

Original description: 1788-91, *Syst. Nat.*, I, 5:2259.

Earliest figure: 1780, Cramer, *Pap. Exot.*, 4:5, pl. 291A, B (♀) as *lena*.

Other figures: (1813) Huebner, *Samm. Exot. Schmett.*, pl. 83 (♀) as *lena*. 1835, Lucas, *Hist. Nat. Lepid. Exot.*, pl. 79, f. 3 as *lena*.

Material seen: 32 ♂♂, 11 ♀♀.

Range: The rain forests of the three Guianas, Venezuela primarily in the Orinoco basin, and adjacent parts of N.E. Brazil, in the region north of the Amazon.

This form has long been considered among *nomina incognita*. Masson and Weymer used it in *Lepidopteren Stubel's Reise*, p. 87, for *h. dracontis* and Kaye used it in *Trans. Ent. Soc. Lond.*, 1904, p. 179, for the specimens he had from Trinidad. Kaye's use of the name for what I call *fusimaculata* may invalidate my name in the view of some taxonomists. However,

Gmelin's specimens in all probability come from the Guianas and it is for that form of the species that I retain *hyalinus*.

The Orinocan-Guiana specimens of the species are recognizable by the lighter color of the blue spots on the upperside of the hindwings and by the tendency toward fusion of these spots on the males. The tendency toward fusion is greatly reduced among the females of *hyalinus*. The few specimens that I have seen from the coastal area of Brazil, north of the Amazon, are intermediate to *hyalinus* and *dracontis*.

3b. **Pierella hyalinus dracontis** Huebner

Original description: 1816, *Verz. bek. Schmett.*, p. 53.

Earliest Figure: (1851) Westwood. *Gen. Diurn Lepid.*, 2: p. 62, f. 2 as *lena*.

Other figures: 1888, Staudinger. *Exot. Tagf.* 2, pl. 77.

Material seen: 14 ♂♂, 7 ♀♀.

Range: Amazon basin, especially south of the Amazon River and west of the Rio Negro. Very rarely found upstream from the "fall line." The westernmost specimens that I have seen with wholly reliable data come from Leticia, Colombia.

The race is darker and has smaller, better-defined, blue spots on the hindwings than either of the other races. The maximum reduction in size of the blue spots occurs around São Paulo de Olivença in the southwestern part of the range of the race. A female, with no definite locality, in the collection of the Carnegie Museum has the limbal and discal row of spots on the hindwing white instead of blue.

Weymer (*Seitz's Macrolepidoptera*, 5:177, 1911) validated the Staudinger manuscript name *extincta* for a minor variation of this race. The name applies to those specimens on the underside of which the transverse light band of the forewing is broken into two or more fragments.

3c. **Pierella hyalinus fusimaculata,** subsp. nov.

This race from the island of Trinidad is more closely related to *hyalinus* than to *dracontis*. The upperside of the hindwings of the species exhibits three rows of pale blue spots, submarginal, limbal, and discal. On typical *dracontis* the spots composing each row and the rows themselves are clearly defined and isolated. On *hyalinus* the spots are larger and less well-defined than in *dracontis*. There is a tendency toward fusion of the spots in each row, especially in the males. On *fusimaculata* the spots of each

row, except the terminal spots, are fused and on many specimens, especially females, the rows of spots are partially fused. Some specimens demonstrate this to so high a degree that the hindwing appears to be silvery blue with a dark base. On the most completely fused specimens of *hyalinus* that I have seen, there is a large dark area between the limbal and discal rows between M_3 and Cu_2. On *fusimaculata* this dark area is reduced to two interneural spots, M_3-Cu_1, and Cu_1-Cu_2.

Holotype: ♂, Hololo Rd., St. Ann's, Trinidad, Aug. 16, 1933 (Pinckus), Carnegie Museum.

Allotype: ♀, Arima, Trinidad, (E.W. Rorer), U. S. Nat. Mus.

Paratypes: 1. ♂, same data as holotype; 2. ♀, same data as holotype; 3. ♀, same locality as holotype, Aug. 12, 1933; 4. ♀, Tacariqua, Trinidad, XL. 32 (Katwara) Carnegie Museum; 5. ♀, Carenage, Trinidad, Aug. 12, 1909 (Carricker), Carnegie Museum; 6. ♂, St. Ann's, Trinidad, Feb. 28, 1933 (Pinckus), Carnegie Museum; 7. ♀, St. Ann's, Trinidad, March 7, 1933 (Pinckus), Carnegie Museum; 8. ♀, St. Ann's, Trinidad, March 4, 1933 (Pinckus), Carnegie Museum; 9. ♀, Lady Charwell's Rd., St. Ann's, Trinidad, April 21, 1933 (Pinckus), Carnegie Museum; 10. ♀, same as 9, March 4, 1933; 11. ♂, Carenage Trinidad, Aug. 14, 1909 (Carricker), Carnegie Museum; 12. ♂, same as 11, Aug. 18. 1909; 13. ♀, same as 12, Aug. 18, 1909; 14. ♀, Port of Spain, Trinidad LV. 33 (Pinckus), Carnegie Museum; 15. ♀, Mt. Taber, Trinidad, (Netting) Carnegie Museum; 16. ♀, Tondes Amande Rd., St. Ann's, Trinidad, March 12, 1933 (Pinckus), Carnegie Museum; 17. ♂, Sta. Cruz Valley, Trinidad, March 29, 1929 (Huntington), Am. Mus. Nat. Hist.; 18. ♀, Trinidad, Reading Public Museum.

4. Pierella lena

This species and the preceding one were confused for many years by the older students of butterflies. Cramer, Huebner, Lucas, and Hewitson, all figured *hyalinus* forms as *lena*. Beginning with Hewitson's *Exotic Butterflies* and Butler's "catalogues" the species has been properly recognized. The species resembles *hyalinus* in pattern but the hindwing is rounded and not excavated as is that of *hyalinus*.

The species flies throughout the tropical rain forest area of South America, east of the Andes. There are two well-defined races that. anatomically at least, are approaching independence as taxonomic species, One of these, *glaucolena*, produces a form, *brasilensis*, that approaches the other, *lena*. Unfortunately the name *brasilensis* antedates *glaucolena*.

A fourth named form, *amalia*, has been considered a member of this species-complex. I believe this form to have equal claim with *lena* to specific standing and treat it as such.

The two races differ from each other in the blue spots on the hindwings. These are white-centered on *lena* and solid blue on typical *glaucolena*.

4a. **Pierella lena lena** (Linnaeus)

Original description: 1767, *Syst. Nat.*, XII:487.
Earliest figure: 1779, Cramer, *Pap. Exot.*, 3: pl. 198 f, D. E.
Other figures: 1911, Weymer, *Seitz's Macrolepid.*, 5: pl. 42, line e.
Material seen: 53 ♂♂, 49 ♀♀.
Range: Tropical rain forests of lower Rio Orinoco, the Guiana and the eastern half of the Amazon basin, westward to around Santarem.

Specimens from Mengel's collection in the Reading Public Museum are labelled from "Muzo, Colombia," "Bath, Jamaica," and "Port-of-Spain, Trinidad." The Jamaican data is certainly incorrect and the other two localities are very doubtful.

This race is reasonably constant. About fifty percent of the specimens seen bear on the forewings a black dot in M_1-M_2 flanked by white dots in the adjoining interspaces. This marking is constant among the females and occurs occasionally on the males. The white spots composing the inner two rows of spots on the hindwings are very rarely circled with blue. The sex patch on the inner margin of the hindwings of the males is almost invariably wholly yellow in *lena lena*.

4b. **Pierella lena brasilensis** (Felder)

Original description: 1862, *Wein. Ent. Mon.*, 6:126. There is no published figure of this form.
Material seen: 30 ♂♂, 12 ♀♀.

f. **glaucolena** Weymer

Original description: 1911, *Seitz's Macrolepid.*, 5:177.
Earliest figure: 1911, Weymer, 1.c., pl. 42, line e.
Material seen: 47 ♂♂, 27 ♀♀.
Range: P. brasilensis is found in the rain forests of the southwestern part of the Amazon basin extending into Bolivia, usually not found above 600m. The form *glaucolena* has a greater range northward into Colombia and ranges higher into the Andean foothills to a little above 1000m.

It is unfortunate that the name *brasilensis* antedates and must take precedence over *glaucolena* as the name of the race. The latter insect is the more typical of the two forms and has by far the greater range.

The decoration of the upperside of the hindwings of *brasilensis* approaches that of *lena*. However the "white spots" on *brasilensis* are better described as blue spots with white centers while those on *lena* rarely show the slightest trace of blue at the periphery. The black dot practically universal in its occurrence in M_1-M_2 on the forewing of female *lena* and less frequently on males, occurs only cocasionally on *brasilensis* and then only on females. On *glaucolena* this spot is invariably white on the males and usually so on the females. The flanking dots of white found on *lena* are absent or obsolete on *glaucolena*. The male sex patch on *glaucolena* is frequently dark brown with a yellow border. This condition is more often found on specimens from the eastern part of the range than from the western. On these the inner and outer zones on the underside are more nearly concolorous.

The form *brasilensis* is further differentiated from *lena* by often having a powdering of blue scales at the base of the hindwings. There are occasionally small interneural marginal spots on the forewings of the females. The underside of *brasilensis* is intermediate to *lena* and *glaucolena*, less contrasting than the former and more so than the latter.

The three forms fly together in the vicinity of Ariã on the Rio Purús in the southern drainage of the Amazon.

A striking variant of *glaucolena* occurs across the central part of the range of this form.

f. **obsoleta** forma nova

This is a form in which the tendency of form *glaucolena* is carried almost to completion. The blue spots on the upper-side of the hindwings are obsolescent. On the holotype the marginal and submarginal rows of spots are lacking and those composing the limbal and discal rows of spots are reduced to a few bluish purple scales. The basic color of the wings is darker than usual. On the underside the markings are partially obscured by dark scales.

Holotype: ♂, Nova Olinda, Rio Purús, Brazil, May 1922 (S. M. Klages), Carnegie Museum.

Three other specimens before me approach this form. Two are from the collections of the Carnegie Museum, one purchased by Holland from Staudinger in 1885 and the other caught by Klages at São Paulo de

Olivença in January, 1923. The other is in my own collection. MacIntyre caught it on Dec. 12, 1938, at Canelos on the Rio Bobonaza in eastern Ecuador. On these the marginal series of spots is missing, the submarginal series faintly present, the limbal spots reduced and the discal spots obsolescent. The under surfaces are much more normal, being only a little darker than is usual in *glaucolena*.

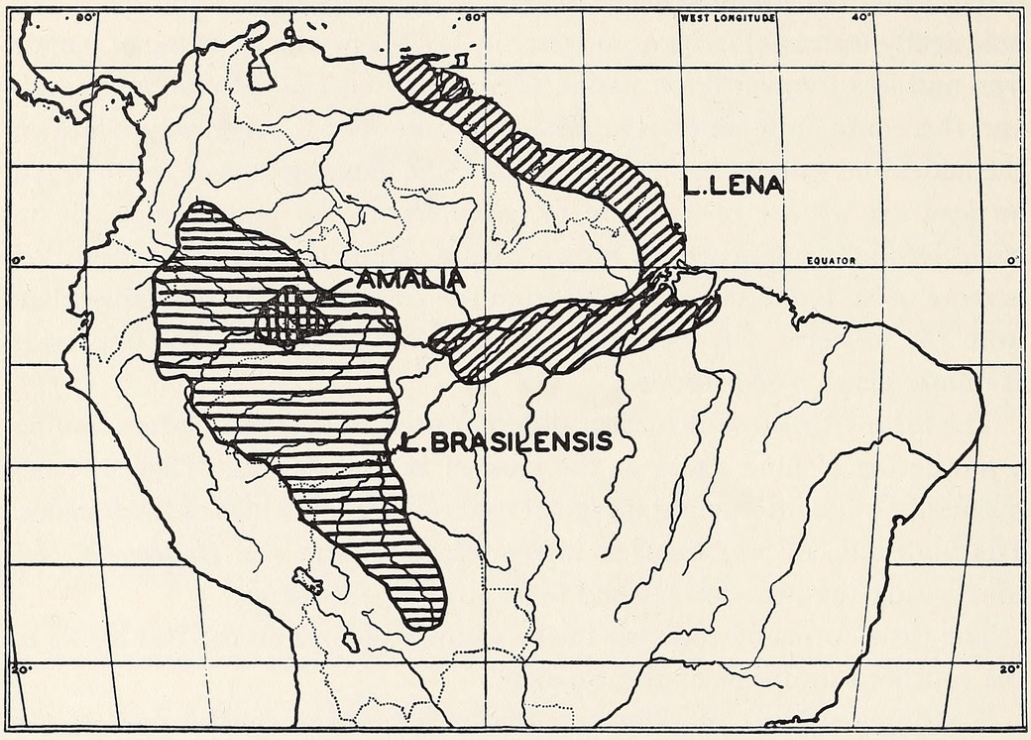

FIG. 7. Ranges of *Pierella lena* and *amalia*.

5. **Pierella amalia** Weymer

Original description: 1885, *Stettiner Ent.* Zeit., 46:285.

Earliest figure: 1860, Hewitson, *Exot. Butt.*, 2: Haetera 1, f. 2. as *lena var.*

Other figures: 1888, Staudinger, *Exot. Tagf.*, 2: pl. 77 as *leucospila.* Also in volume 1:220.

Material seen: 1 ♂, 1 ♀.

Range: The tropical rain forest on the upper Amazon. All specimens have come from the region west of Pebas and north of the Rio Marañon.

It is probable that this rare insect is not a race or form of *lena* as it has been considered ever since Hewitson first figured it in 1860. Its restricted range falls within the range of the western races of *lena*. It has

been taken in company with *glaucolena*. I believe that *amalia* is a "recently" established species formed from a mutant of ancestral *lena*.

The male genitalia are very much like those of *lena*. The most noticeable differences are at the distal end of the valve. This area is truncate with a strongly toothed margin in *amalia*. The figures show this and the other more subtle differences.

P. amalia and the following species, *lucia*, resemble each other in having a large white patch on the outer half of the upperside of the hindwing. This patch is well basad of the outer margin on *amalia* and touches or almost touches the outer margin of the wing on *lucia*.

6. **Pierella lucia** Weymer

Original description: 1885, *Stettiner Ent. Zeit.*, 46:285.

Earliest figure: 1860, Hewitson *Exot. Butt.*, 2: *Haetera* 1, f. 5. as *astyoche var.*

Other figures: 1888, Staudinger, *Exot. Tagf.*, 2: pl. 77, as *albomaculata* (also in volume 1:129). 1911, Weymer, *Seitz's Macrolepid.*, 5: pl. 42, line e.

Material seen: 36 ♂♂, 15 ♀♀.

Range: The tropical rain forests of the upper Amazon, westward from Pebas into S.E. Colombia, E. Ecuador, and N.E. Peru, rarely above 700 m altitude.

Previous students of this genus have followed Hewitson and considered *lucia* to be a race or form of *astyoche*. It is sufficiently different in pattern and anatomy to rank as a taxonomic species in this genus.

This species seems to be much more abundant south of the Rio Marañon than north of the river. This is probably an illusion caused by the wealth of material in the Bassler collections at the American Museum of Natural History. The zone in which this species flies is in general very poorly represented in collections. Every large collection that I have examined from within the range of this species contains specimens of *lucia*.

7. **Pierella astyoche** (Erichson)

Original description: 1848, in Schomburgk's *Reisen Br. Guayana*, 3:599.

Earliest figure: 1851, Doubleday and Hewitson, *Gen. Diurn. Lepid:* pl. 62, f. 1, as *larymna* (also on p. 365).

Other figures: 1911, Weymer, in *Seitz's Macrolepid.*, 5: pl. 42, line e.

Material seen: 22 ♂♂, 28 ♀♀ (and material in U. S. Nat. Mus.).

Range: Wherever there is tropical rain forest, in the whole of the Amazon basin below 700m., and in the Guianas.

There is very little variation in this species. That which does occur is of very minor importance. The three apical spots on the upperside of the forewing all tend to be white on Guiana specimens while the majority of the Amazonian specimens have a small ocellus in one of the interspaces. Specimens from around São Paulo de Olivença, Brazil, at Arimã on the Rio Purús, and on the lower Rio Ucayali in Peru, are darker than usual and the white spots on the hindwings are reduced, occasionally they are obsolete.

The bluish sheen seen on the hindwings in a certain light is more common on Guiana and upper Amazon material than on lower Amazon specimens.

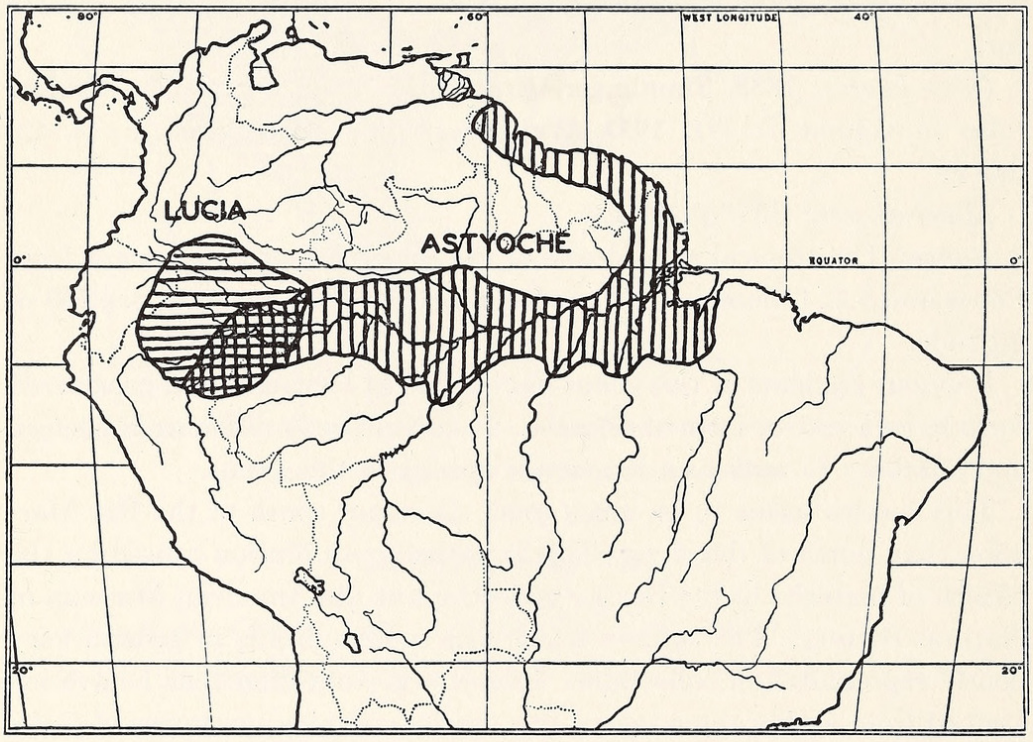

FIG. 8. Ranges of *Pierella lucia* and *astyoche*.

DIVISION B

Characteristics: The undersides of both wings are marked with three almost parallel straight dark lines. There is no marked dilution of the base color between the outer two lines as there is on species of Division A.

III. The *rhea* group.

Characteristics: the same as for the division.

The species of this group have the greatest range of the various groups. Schwanwitsch considers the patterns of these species to be the most primitive. These two items suggest that the species of the *rhea* group may represent the stock from which the genus has developed. One species, *luna*, is found from Mexico south into Ecuador and eastward to the Guianas. The others are all restricted to the region east of the Andes.

Except in the cases of *rhea*, *lamia*, and *chalybaea*, I agree with Weymer in his grouping the forms in species-complexes. I believe that the three forms named are members of a single species. This taxonomic species, *rhea*, is very confusing and probably deserves more thorough study than I have given it. I did not see enough material from the eastern part of the range.

8. **Pierella rhea**

Five names have been applied to forms of this species. Only one of these names is a strict synonym, *dindymene* Cramer, 1779, is the same insect as *lamia* Sulzer, 1776.

The characteristics that I have selected to use for separating the four named forms are these:

a. *rhea* has the uppersides of the forewings and hindwings more or less concolorous and no steely blue reflections on the hindwings. There are well-developed ocelli on the hindwings.

b. *lamia* has the hindwings darker than the forewings, especially toward the outer margin and there is usually a steely blue reflection on the basal part of the hindwings. There are well developed ocelli on the hindwings.

c. *chalybaea* is like *lamia* but the steely blue reflections cover almost the entire hindwings and the submarginal ocelli appear as white dots, the iris being obscured by the dark margin.

d. *columbina* is like *chalybaea* but generally lacks the broadly developed steely blue gloss.

I have found no populations that are really pure. The tendency is for Guiana material to be *lamia*, lower Amazonian, especially north of the river to be *rhea*, Middle Amazonian, especially south of the river to be *chalybaea*, and material from above "fall-line" from Colombia to Bolivia to be *columbina*. I have a feeling that *rhea* and *lamia* are forms of one

subspecies or two poorly-differentiated ones and that the same is true of *chalybaea* and *columbina*. I shall treat these forms as such until proven wrong.

There is a specimen in the collection of the Carnegie Museum that is very puzzling. It was taken by S. M. Klages at Arimã on the Rio Purús in west-central Brazil in November, 1922. It looks like a *rhea*-form with a flush of dull reddish brown on the upperside of the hindwings. It appears as one might expect a natural hybrid between *rhea* and *hyceta*. The male genitalia bears on the dorsal margin of the valves a strongly developed comb as in *rhea*. The valves themselves are much more "rectangular" than in any *rhea* specimens that I have examined. Some future worker with more material than I have seen will have to decide what to do taxonomically with this specimen.

8a. **Pierella rhea rhea** (Fabricius)

Original description: 1775, *Syst. Ent.*, p. 467.
Earliest figure: 1911, Weymer, *Seitz's Macrolepid.*, 5: pl. 43, line a.
Material seen: 4 ♂♂, 1 ♀.
Range: The tropical rain forests of the Amazon east of Santarem, Brazil.

f. **lamia** (Sulzer)

Original description: 1776, *Gesch. Ins.*, pl. 18, f. 1.
Earliest figure: in original description.
Other figures: 1779, Cramer, *Pap. Exot.*, 3: pl. 198. f. F, G as *dindymene*. 1911, Weymer, *Seitz's Macrolepid.*, 5: pl. 43, line a.
Material seen: 8 ♂♂, 7 ♀♀.
Range: The tropical rain forests of the Orinoco basin, the Guianas, and the northern part of the Amazon basin.

This race is characterized by having distinct ocelli on the hindwings. These are white pupilled and have black irises. The hindwings of f. *lamia* are darkest on the margin but not so deeply colored as to obscure the iris of the ocelli. This form differs from *rhea* in having a steely blue gloss on the hindwings, at least at the base.

There are specimens of *lamia* in the Mengel collection labeled "Bath, Jamaica," "Cristobal Colon, Panama" and "Coachi, Colombia." The Jamaica and Panama data I consider false, the Colombian record very doubtful.

8b. **Pierella rhea chalybaea** Godman

Original description: 1905, *Trans. Ent. Soc. Lond.*, p. 185. There are no published figures.

f. **columbina** Krueger

Original description: 1925, *Ent. Rundschau*, 42: 17.

Material seen: chalybaea 18 ♂♂, 7 ♀♀ ; intermediate 31 ♂♂, 12 ♀♀ ; *columbina* 6 ♂♂, 2 ♀♀ .

Range: The tropical rain forests of the southern and western Amazon basin.

These two forms blend so completely that the majority of the specimens that I have seen can be placed in either category. Generally specimens from east of the Rio Huallaga are closer to *chalbyaea* than to *columbina.* They show more of the blue gloss on the hindwings the farther east the habitat. Those from west of the Rio Huallaga progressively approach close to *columbina* the higher the altitude of the habitat. I have seen good *columbina* from Colombia, Ecuador, Peru, and Bolivia, and good *chalybaea* only from Brazil and Peru.

The blue gloss on typical *chalybaea* is almost silvery. The gloss when noticeable on *columbina* has purplish lights. Most specimens of *columbina* lack some of the ocelli toward the anal angle and the iris are totally obscured on those present. Most specimens of *chalybaea* show all of the ocelli and there is usually a faint trace of the iris.

9. **Pierella stollei**

This recently discovered species of *Pierella* seems to differ from *rhea* sufficiently to be accorded good standing. Miranda-Ribiero in describing the species likened it to *astyoche.* A careful reading of his description seems to identify a single pair in the Carnegie Museum collections. These prove to be more closely related to *rhea.* My remarks about *stollei* are based upon these specimens. A long series of an unnamed Bolivian *Pierella* is apparently a western race of the species. I have called these *boliviana.*

This species resembles *luna* and *hyceta* in having a strong green iridescence on the cell of the forewing on the upperside. The iridescent area on *stollei* is very large and almost covers the entire wing. The females of *stollei* are unique in having a rather broad and sharply defined dark margin on the upperside of the forewing. The race *boliviana* has the iridescent

patch on the males restricted to the cell and immediately adjacent areas and the females lack the sharply defined dark margin on the forewings.

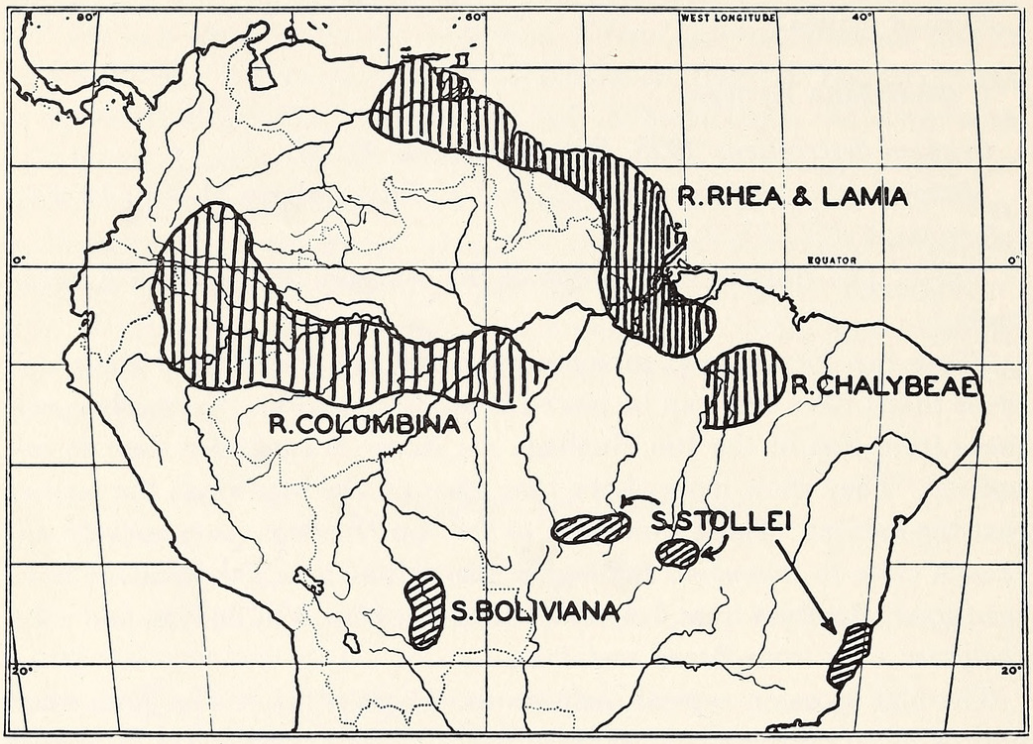

FIG. 9. Ranges of *Pierella rhea* and *stollei*.

9a. **Pierella stollei stollei** Miranda-Ribiero

Original description: 1931, *Bol. Mus. Nac. Rio de Janiero*, 7:32. No figure has been published.

Material seen: 1 ♂, 1 ♀.

Range: Southeastern Brazil, probably in wooded areas of the tropical savannahs.

Only five specimens of this form are known to me: two cotypes from Jamary, Matto Grosso, one cotype from Rio Tapajóz, and the above pair from Munez Freire, Espiritu Santo. The two specimens that I have seen differ from the original description in one point. They are dull grey-brown while the types are described as olive-brown ("castanho olivaceo").

9b. **Pierella stollei boliviana,** subsp. nov.

Upperside: dull grey-brown; a greenish iridescent patch on the cell of the forewings of the males extending marginad: hindwings darker toward the margin, very rarely with the barest hint of bluish gloss. The

apex of the forewing bears up to three minute, white points between R_{4+5}-M_1, M_1-M_2, M_2-M_3. The complete series is rare in males and more common in females. A series up to five submarginal ocelli on the hindwings: R_S-M_1 small, sometimes only a white point, occasionally absent; M_1-M_2 largest of all, white with a broad black iris; M_2-M_3 usually absent, when present a white point with or without a narrow black iris; M_3-Cu_1 second largest rarely absent, white with a broad black iris; Cu_1-Cu_2 small, usually present, white with a broad black iris, rarely lacking the white pupil. The usual dark lines for the *rhea* group are present on the forewings and the hindwings. The innermost line is broken in the cell on the forewing and faint on the hindwing. The middle line emerges from the cell of the forewing at or near the origin of Cu_2 and crosses the hindwing outside of the origins of M_1 and Cu_2. The outermost line is the heaviest and runs from near the origin of R_{4+5} to the inner margin close to the inner angle on the forewing, and on the hindwing from directly below the termination on the forewing to near the terminus of A_1.

Underside: Pale brown occasionally with a slight purplish tinge, irrorate with darker brown. The ocelli of the upperside are repeated as small, inconspicuous, white points. The lines on the upperside are repeated and in addition, on the forewings, there is a short line outside the cell that roughly parallels the discocellular nervules. There is a small, black spot in the base of the cell on the forewing and two, sometimes three, in the base of the cell of the hindwing. There is another basal spot on the hindwings between Cu_S and A_1 and a spot on the weak *ldc.*

There is a small dark-centered sex patch on the males between A_1 and A_2.

The margin of the hindwing is rounded and undulate.

Holotype: ♂, Rio Yapacani, 600m. E. Bolivia (Steinbach), Sept., 1915.

Allotype: ♀, same data.

Paratypes: 1-5. ♂♂, same data; 6. ♀, same data; 7-10. ♀♀, same locality, March, 1915; 11. ♂, same locality, Feb., 1915; 12. ♀, same locality, Feb., 1915; 13-23. ♂♂, same locality, Aug. 1913; 24-25. ♀♀, same locality, Aug. 1913.

Additional specimens used but not labelled "paratype" are: 3 ♂♂, 3 ♀♀, Rio Surutu, 350m., E. Bolivia (Steinbach), March to April, 1915; 6 ♂♂, 3 ♀♀, Buena Vista, Prov. Sara, 400m., E. Bolivia (Steinbach) March, 1921, May and June, 1915; 8 ♂♂, 4 ♀♀, Prov. Sara, 450m., E. Bolivia (Steinbach) May, 1910; 3 ♀♀, Portachuelo, Rio Palmatillas, E. Bolivia (Steinbach) April, 1915.

10. **Pierella hyceta**

The western Amazon basin is the stronghold of this species. It ranges higher into the Andean foothills than do most species of the genus, occasionally being found as high as 1200m. There are two clearly defined races of the species. One of these, *latona*, with deep rust-red on the disc of the hindwings, is found in the foothills from Colombia to Bolivia. The other, *hyceta*, with ocher-yellow on the disc, is found at a lower altitude in a more restricted area in the central-eastern part of the range of the species. The foot-hill material may represent two races. I prefer to consider these specimens as a single race exhibiting a color cline from north to south. The northern form *latona* is less heavily marked on the hindwing than the southern form *cercye*. The racial name is *latona*[5] and *cercye* is here considered a form of it.

10a. **Pierella hyceta hyceta** (Hewitson)

Original description: 1860, *Exot. Butt.*, 2: (83), pl. *Haetera*, fig. 1.
Earliest figure: in original description.
Other figures: 1911, Weymer, *Seitz's Macrolepid.*, 5: pl. 43, line b.
Material seen: 6 ♂♂, 3 ♀♀.
Range: Rain forest of upper Amazon basin below the "fall line." (All specimens known to me are from below 300m.)

This form is relatively uncommon in the collections that I have seen. Bassler's extensive collection from the lower rivers in northern Peru contains a single specimen from Iquitos. The large collections made by Klages on the Rio Purús in Brazil, just east of the area collected in by Klug for Bassler, contain the rest of the material noted above.

10b. **Pierella hyceta latona** (Felder)

Original description: 1869, *Reise Novara, Lep.*, 3:459. No figure known to me.

[5] I am not sure of the date of publication of Hewitson's rare *Bolivian Butterflies* in which *cercye* was described. It must be later than 1869, the date of Felder's name *latona*, since it is based on Buckley's collection made early in the 1870's. The *Ent. Monthly Mag.*, 6:219, 1870, reports Buckley at a meeting of the Entomological Society of London on Jan. 3, 1870, after his first South American trip to Ecuador: *Ent. Mo. Mag.*, 9:65, 1874, states "Mr. Buckley, who has just been out to Bolivia for me———" W. C. H.

f. **cercye** (Hewitson)

Original description: (1870) *Bol. Butt:* 10.

Earliest figure: 1911, Weymer, *Seitz's Macrolepid.*, 5: pl. 43, line b.

Material seen: latona—7 ♂♂, 2 ♀♀; intermediate 21 ♂♂, 3 ♀♀; *cercye*—2 ♂♂, 1 ♀.

Range: Rain forests of the western Amazon basin above "fall line." (All specimens known to me come from between 700m. and 1200m.)

Typical *latona* is found from Colombia southward to the Rio Marañon. Typical *cercye* is found from Bolivia northward to the Sani Beni region of Peru. Intermediate specimens are found from the Rio Napo, Ecuador, south at least to the Rio Marañon in Peru.

The mahogany-red on the disc of the hindwings of *cercye* is darker than on *latona*. The dark border on the upperside of the hindwings of *latona* does not involve the row of ocelli; on *cercye* it engulfs these markings and

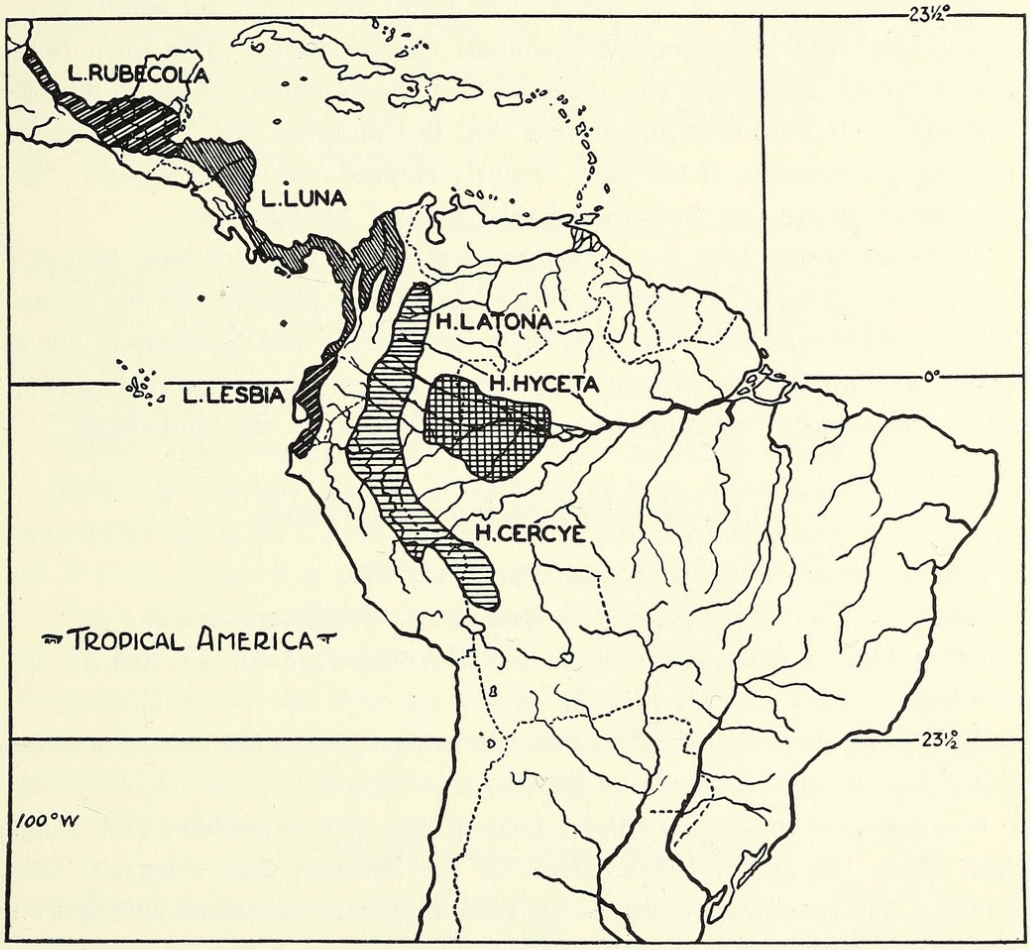

FIG. 10. Ranges of *Pierella hyceta* and *luna*.

obliterates some of them. The great majority of the specimens I have seen are neither typical *latona* nor *cercye* but are about half-way between the two of them. In the regions where *latona* and the intermediate to *cercye* fly, I have found that the intermediate forms are more common at the upper limits of the altitudinal range of the race, and *latona* more common in the lower altitudes. I suspect that the deepening of the color, etc., is a response to heavier rainfall.

11. **Pierella luna**

Pierella luna is the only species of this group that is found west of the Andes and in Central America. It resembles *hyceta* in general markings. The two species differ in the number of ocelli on the upperside of the hindwing, *luna* bearing two, rarely three, and *hyceta* four or five, rarely three. I am inclined to believe that the two groups of forms represent a single biologic species of the pre-Andean uplift era. I am not wholly convinced that they represent independent species today. The form *luna luna* probably resembles the ancestral form more closely than do any of the others. It is interesting to note that in Colombia this form tends to vary in the direction of the more brightly-colored race *lesbia* found in the equatorial forests and thus toward the "species" *hyceta*.

There are three easily recognized races of *luna*. The race *luna*, occupying the central part of the species-range has more or less concolorous wings. The northern race *rubecola* (*heracles*) from Mexico and Guatemala has a rusty flush on the hindwings. The southern race from western Ecuador and southwestern Colombia has a bright rust disc on the hindwings.

11a. **Pierella luna luna** (Fabricius)

Original description: 1793, *Ent. Syst.*, 3(1):109.

Earliest figure: 1850, Hewitson, *Exot. Butt.*, 2: *Haetera* 1, f. 3.

Other figures: 1911, Weymer, *Seitz's Macrolepid.*, 5: pl. 43, line a.

Material seen: 44 ♂♂, 13 ♀♀.

Range: In the tropical rain forests from eastern Honduras to northern Colombia; rarely found above 1000m.

Godman and Salvin described a form of this race as *pallida* (*Ann. Mag. Nat. Hist.*, (4) 2:142, 1868). Later in the *Biologia* they relegated this name to the synonymy of *luna*. In 1896, Oberthur described and figured an albinic specimen and dubbed it *albina* (*Etudes d'Ent.*, 20:32, pl. 2, f. 10). As has been noted above, some of the specimens of *luna* from

Colombia bear a dusting of rusty red scales on the upper side of the hindwing. This is most highly developed on females but also occurs on males. These specimens are not intergrades to *lesbia*. The general impression given by these specimens is of evolution toward a form similar to *rubecola*. I believe that the form is worth taxonomic recognition but name it with some misgivings.

f. **rubra** forma nova

A form of *luna luna* differing from typical specimens in this respect: the upperside of the hindwings bear a light dusting of rusty red scales.

Holotype: ♀, Quindio, Colombia (Fassl), Reading Public Museum.

Paratypes: 1. ♀, "Bogota," Colombia, Carnegie Museum; 2-3. ♂♂, "Colombia" (Ovalle), American Museum of Natural History; 4. ♀, same data as 2 and 3.

There is an interesting aberrant specimen in the collection of the Carnegie Museum. It is a male collected in May at Don Diego, Colombia. On it the middle dark line on the underside of the hindwing is irregular and shifted toward the outer line in the vicinity of the cell (see Schwanwitsch *loc. cit.* for a detailed discussion of such shifts).

11b. **Pierella luna rubecola** Godman and Salvin

Original description: 1868, *Ann. Mag. Nat. Hist.*, (4) 2:142.

Earliest figure: 1880, Godman & Salvin, *Biologia Cent-Amer., Rhop.*, 3: pl. 6, f. 10, 11.

Material seen: 7 ♂♂, 4 ♀♀.

Range: Tropical rain forests from Mexico southward to Honduras.

This race is often referred to as *heracles* Bdv. Boisduval's description was published in 1870 in his account of Lepidoptera received by him from M. d'Orza. Thus it is antedated two years by *rubecola*.

There is some variation in the row of ocelli on the upper side of the hindwing. Typical specimens show two white-pupilled black ocelli. Occasional specimens bear up to five, the anterior two being large, the others small. Some specimens have one, two, or three, white dots posterior to the normal complement of ocelli.

11c. **Pierella luna lesbia** Staudinger

Original description: 1888, *Exot. Tagf.*, 1:219.

Earliest figure: 1911, Weymer, *Seitz's Macrolepid.*, 5: pl. 43a.

Material seen: 12 ♂♂, 4 ♀♀.

Range: The tropical rain forests on the western slope of the Cordillera Occidental in Ecuador and S. Colombia.

The only Colombian specimens of which I know are Staudinger's type from the Rio San Juan and a female from "Colombia" in the Ovalle collection at the American Museum of Natural History. It appears to be common in Ecuador.

DIVISION C

Characteristics: The species that compose this division bear a pattern on the upperside that is abberrant to this genus. On the underside they are sufficiently close to the other species to be included in *Pierella*. Structurally this division is clearly *Pierella*. The division is characterized by bearing large blue or blue and white areas on the upperside of the hindwings and smaller areas on the forewings. Beneath, the characters of the two preceding divisions are combined. The forewing resembles Division A in that there is a light transverse band margined with dark lines. The hindwings are like Division B and bear three straight parallel dark lines.

IV. the *hortona* group.

Characteristics: those of the division.

The group is restricted to the western part of the Amazon basin in the tropical rain forests. Two species are generally recognized in the group, *hortona* and *albofaciata*. Typical specimens of these are easily recognized but each produces forms that approximate the other. It is quite possible that there is only one biologic species in this group. The two taxonomic species may be separated on the appearance of the underside. The outer part of the wings of *hortona* are essentially the same color as the basal part. These areas are strongly contrasting in *albofaciata* except among the males of the race *decepta* described below.

12. **Pierella hortona** (Hewitson)

Original description: 1854, *Trans. Ent. Soc. London*, (2)2:246, pl. 23, f. 1.

Earliest figure: in original description.

Other figures: 1888, Staudinger *Exot. Tagf.*, 2: pl. 77. 1911, Weymer, *Seitz's Macrolepid.*, 5: pl. 43 b.

f. **hortensia** (Felder)

Original description: 1862, *Wiener Ent. Mon.*, 6: 125. No figure known to me.

Material seen: 30 ♂♂, 9 ♀♀.

Range: The rain forest of the west-central Amazon basin from S. Colombia to N. Peru below 1100m. and eastward as far as the junction of the Rio Negro and Rio Amazon.

This species is quite variable, hardly two specimens being exactly alike. The variation shows two trends—one, toward elimination of the blue patch at the end of the cell on the upperside of the forewing, the other toward enlargement of the blue areas and replacement of the blue scales with white.

Typical *hortona* has a well-developed blue spot on the forewing and a larger one on the hindwing.

Typical *hortensia* has the spot on the forewing greatly reduced, on some specimens it is almost gone, and the spot on the hindwing contains a large area of white scales.

A third form with large white areas in the blue patches on both wings approaches *albofaciata* in the appearance of the upperside. I call this form *albopunctata.*

f. **albopunctata** forma nov.

This form differs from typical *hortona* in having a large white area within the sub-apical patch on the upperside of the forewings and a large white center to the blue area on the hindwings. It differs from *hortensia* in having a large colored area on the upperside of the forewings.

Beneath, this form is typical of *hortona* both in coloration and disposition of the dark lines in the apico-cellular area of the forewings.

Holotype: ♂, Upper Rio Huallaga, Peru (Klug) *ex* Bassler, f 6107, July 20, 1928, American Museum of Natural History.

Allotype: ♀, same data as holotype but caught on August 19, 1928.

Paratypes: 1. ♂, Juanguy, Upper Rio Huallaga, Peru, Nov. 1935, (Klug) *ex* Mengel, Reading Public Museum. 2. ♀, Rio Tsaya, Amazonas, Peru, Oct. 1927, (Klug) *ex* Mengel, Reading Public Museum. 3. ♂, Manacapuru, Brazil, Sept. 1925, (Klages) Carnegie Museum.

These three forms intergrade completely and have no definite geographic restrictions. The form *hortensia* tends to be more common in the northeastern part of the range, *albopunctata* in the southeastern part.

There are several other minor variations that do not warrant names. A good series in the Carnegie Museum indicates that a local form flies around São Paulo de Olivença on which the underside is materially darker than on specimens from farther west.

One of the differences between *hortona* and *albofaciata* is the presence, on the latter, of a bar across the costal end of the characteristic dark flanked light band on the underside of the forewing. This bar is light in color and flanked by dark lines. There is a specimen of *hortona* in the Mengel collection at Reading, taken by Klug at San Gabriel on the Upper Amazon in Brazil, which resembles *albofaciata* in this one respect.

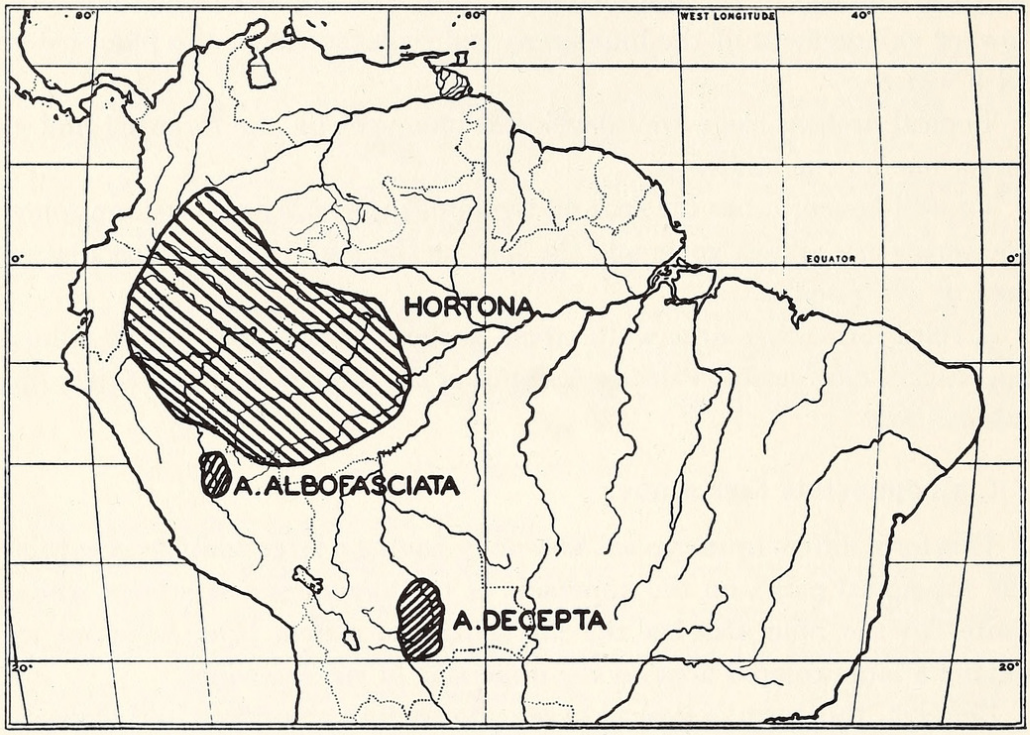

FIG. 11. Ranges of *Pierella hortona* and *albofaciata*.

13. Pierella albofaciata

This species from south of the Rio Marañon is much less frequently found in collections than is *hortona*. Its characteristics have been pointed out above. There are two races of the species, *albofaciata* from Peru and *decepta* from Bolivia. These are alike on the upper surface but differ materially on the underside.

13a. **Pierella albofaciata albofaciata** Rosenberg

Original description: 1913, *Trans. Ent. Soc. Lond.*, p. 678.
Material seen: 3 ♂♂, 2 ♀♀.
Range: Tropical rain forest of the tributaries to the Amazon in N. Peru.
On the underside of *albofaciata* the outer half of the wings is very dark

brown and the inner half dun-colored with a slight pearly luster. On the upperside there is a large rectangular white bar across the discocellular of the forewing.

13b. **Pierella albofaciata decepta** subsp. nov.

Upperside: like *albofaciata* in both sexes.

Underside: differs from *albofaciata* in these respects:

Male forewing: dilute dark brown marginad of the light transverse band and as a suffusion along the inner margin of that band; the basal half of the wing is a light sand color with a pearly luster; there are two black points in the cell.

Male hindwing: almost entirely of the light sand color with a strong pearly luster; the three dark lines are not strong, one crosses the wing through the middle of the cell, the middle one crosses just outside of the cell and the outer one passes through the sharp bend in M_3; costad of M_3 the outer line is suffused margined with dark brown; there is a series of minute black submarginal dots between the nervules from R_5 to Cu_2; there are black dots in the base of the cell and between Cu_5 and A_1 at the base.

Females approach the typical coloration of *albofaciata* on this surface: They are a little lighter and more pearly.

Holotype: ♂, Rio Yapacani, E. Bolivia, March 1915 (Steinbach), Carnegie Museum.

Allotype: ♀, the same data except caught in February 1915.

Paratypes: 1-2. ♂♂, same data, caught in August 1913. 3-5. ♂♂, same data, caught in September 1914. 6. ♀, same data, caught in February 1915.

CHECK-LIST OF THE GENUS PIERELLA.

1. *nereis* (Drury)
2. *helvina*
   - a. *helvina* (Hewitson)
   - b. *incanescens* Godman and Salvin
     - f. *costaricana* Niepelt
   - c. *ocreata* Godman and Salvin
     - ♀ f. *hymettia* Staudinger
     - ♀ f. *werneri* Hering & Hopp
     - ♀ f. *johnsoni* Talbot
     - f. *pacifica* Niepelt

3. *hyalinus*
   a. *hyalinus* (Gmelin)
   b. *dracontis* (Huebner)
      f. *extincta* Weymer
   c. *fusimaculata* Brown
4. *lena*
   a. *lena* (Linnaeus)
   b. *brasilensis* (Felder)
      f. *glaucolena* Weymer
         f. *obsoleta* Brown
5. *amalia* Weymer
6. *lucia* Weymer
7. *astyoche* (Erichson)
8. *rhea*
   a. *rhea* (Fabricius)
      f. *lamia* (Sulzer)
   b. *chalybaea* Godman
      f. *columbina* Krueger
9. *stollei*
   a. *stollei* Miranda-Ribiera
   b. *boliviana* Brown
10. *hyceta*
   a. *hyceta* (Hewitson)
   b. *latona* (Felder)
      f. *cercye* (Hewitson)
11. *luna*
   a. *luna* (Fabricius)
      ab. *albina* Oberthur
      f. *rubra* Brown
   b. *rubecola* Godman and Salvin
   c. *lesbia* Staudinger
12. *hortona* (Hewitson)
      f. *hortensia* (Felder)
      f. *albopunctata* Brown
13. *albofaciata*
   a. *albofaciata* Rosenberg
   b. *decepta* Brown

NOTES ON ECUADORIAN PIERELLA.

The species marked with an asterisk in the following list are here reported from Ecuador for the first time. The major portion of the Brown collection is now at the American Museum of Natural History.

*2c. **Pierella helvina ocreata** G. & S.

1 ♀, Hacienda Lorena, near Santa Domingo de los Colorados, 550m., Feb. 19, 1941 (D. B. Laddey) coll. F. M. Brown.

An abberant specimen of f. *pacifica* Niepelt that approaches ♀ f. *hymettia* Staudinger.

*4b. **Pierella lena brasilensis** Felder

1 ♂, Canelos, Oriente, 700m., Dec. 12, 1938 (W. C. MacIntyre), coll. F.M.B.

1. ♂, Rio Jondachi, near Archidona, Oriente, 800 m., Nov. 1939 (W.C.M.), coll. F.M.B.

1 ♂, Rio Toachi, Pichincha 800m., Nov. 1939 (W.C.M.), coll. F.M.B.

1 ♂, Puyo, Oriente, 1000m., Dec. 5, 1938 (F.M.B.), coll. F.M.B.

3 ♂♂, Sarayacu, Oriente, 500m. (Schaus) U.S.N.M.

1 ♂, Rio Arajuna, Oriente 1000m., April 27, 1941 (W.C.M.), coll. F.M.B.

The Rio Toachi record is very doubtful. MacIntyre purchased the material from a Quito bird collector who had visited both Rio Jondachi and Rio Toachi in November 1939. I firmly believe the specimen is from east of the Andes.

*6. **Pierella lucia** Weymer.

1 ♂, Canelos, Oriente, 700m., Dec. 12, 1938 (W.C.M.), coll. F.M.B.

2 ♂♂, Sarayacu, Oriente, 500m., (Schaus) U.S.N.M.

4 ♂♂, 1♀ Zumbi, Oriente, 700m., Oct. 28, 1911, Nov. 1941 (D.B.L.), coll. F.M.B.

*8b. **Pierrella rhea chalybaea** Godman

1 ♂, Rio Jondachi, near Archidona, Oriente, 800m., Nov. 1939 (W.C.M.), coll. F.M.B.

3 ♂♂, Sarayacu, Oriente, 500m.

These are typical f. *columbina* Krueger in darkness of color and disposition of ocelli; they tend to *chalybaea* in that there is a faint bluish gloss on the hindwings.

10. **Pierella hyceta latona** (Felder)

10 ♂♂, Puyo, Oriente, 1000m., Feb. 6, Dec. 1938 (F.M.B.), coll. F.M.B.

1 ♂, Rio Tutenongoza, Oriente, 800m., Feb. 10, 1939 (F.M.B.), coll. F.M.B.

1 ♂, 2 ♀♀, Huagra-yacu, Oriente, 900m., March 7, April 6, 1941 (W.C.M.), coll. F.M.B.

1 ♂, 1 ♀ Rio Arajuna, Oriente, 1000m., April 23-26, 1941 (W.C.M.), coll. F.M.B.

5 Hacienda La Mascota, Oriente, 1250m., (Coxey) A.N.S.P.

1 ♂, Rio Pastaza, Oriente, Oct. 1, 1936 (W.C.M.), U.S.N.M.

1 ♂, 1 ♀, Macas, Oriente, Jan. 26 (Feyer?), *ex* Mengel coll., Reading Public Museum.

1 ♂, Zumbi, Oriente 700m., Nov. 11, 1941 (D.B.L.), coll. F.M.B.

1 ♂, 1♀, Zamora, Oriente, 1000m., Dec. 20, 1941 (D.B.L.), coll. F.M.B.

3 ♂♂, "Pacific Slope" (E. W. Rorer), U.S.N.M.

Stübel collected this species at Pintuc (Puyo). These were reported as *cercye* by Weymer in his account of Stübel's collection. All of the Ecuadorian material with locality data except the Zumbi and Zamara specimens are intermediate to *cercye*. The three excepted specimens are typical *latona* as are the three "Pacific Slope" specimens in the U.S.N.M. I gravely doubt the veracity of that data. I know Mrs. Rorer and know that while living on the Pacific Slope, she frequently collected in the "Oriente." I feel sure that some slipshod preparator put a "Pacific Slope" label on the specimen without reference to Mrs. Rorer's locality data.

11c. **Pierella luna lesbia** Staudinger

1 ♂ Balzapamba, 630m., June 1938 (W.C.M.), coll. F.M.B.

1 ♂, Playas de Montalvo, 30m., April 1938 (W.C.M.), coll. F.M.B.

2 ♂♂, Santo Domingo de los Colorados, 500m., Dec. 12-19, 1940 (D.B.L.), coll. F.M.B.

1 ♀, La Lorena, 550m., Feb. 25, 1941 (D.B.L.), coll. F.M.B.

1 ♂, Rio Toachi, 800m., Sept. 1938 (W.C.M.), coll. F.M.B.

2 ♀♀, Palmar, 200m., March 31, April 15, 1941 (D.B.L.), coll. F.M.B.

1 ♂, Rio Maizito, near Palmar, 200m., May 7, 1941 (D.B.L.), coll. F.M.B.

Huigra, March 11 (S. N. Rhoads), A.N.S.P. and R. P. M.

3 ♂♂, Dos Puentes (Coxey) A.N.S.P.

Zaruma (*ex* Dognin) U.S.N.M.

Las Guayas (Rorer) U.S.N.M.

In addition to these specimens of the race *lesbia*, there are three specimens of the race *luna* in the Mengel collection at the Reading Public Museum. One of these is labelled "Guayaquil," the other two are labelled "Cuenca." The latter locality is certainly incorrect. I have collected in the Cuenca area and it is quite impossible that *Pierella* is to be found there. It is totally wrong for the genus climatically, being semi-arid and cool. The climatic conditions near Guayaquil are better suited to the genus. However the suitable areas there are well occupied by the race *lesbia*. Six excellent collectors, Rhoads, Rorer, Coxey, Laddey, MacIntyre and Feyer have collected in this region and have not turned up *luna* unless Feyer caught the Mengel specimen. Since Mengel's collection contains numerous mislabelled specimens I am inclined to doubt the validity of the Guayaquil label.

Dognin in his report of the lepidoptera from the environs of Loja did not report *lesbia*. He did report *hyceta*. There are no *hyceta* in that part of the Dognin collection at the U. S. National Museum. Possibly he misidentified the Zaruma specimen as *hyceta*.

*12. **Pierella hortona** (Hewitson)

1 ♂, 1♀, Canelos, Oriente, 800m., Dec. 12, 1938 (W.C.M.), coll. F.M.B.

2 ♂♂, Rio Jondachi, Oriente, 800m., Nov. 1939 (W.C.M.), coll. F.M.B.

1 ♂, Rio Tutenongoza, Oriente, 800m., Feb. 10, 1939 (F.M.B.), coll. F.M.B.

Hacienda La Mascota, Oriente, 1250m., (Coxey), A.N.S.P.

3 ♂♂, Sarayacu, Oriente, 500m., (Schaus) U.S.N.M.

1 ♂, Macas, Oriente, 1050m., (L. M. Higgins) U.S.N.M.

1 ♂, Macas, Oriente, (Feyer?) R.P.M.

1 ♂, "Ecuador" (*ex* Johnson), U.S.N.M.

These are typical *hortona* except the two from Macas and the "Ecuador" specimen which are *hortensia* (Felder).