

A GENERIC REVISION OF
THE NEW WORLD NACOPHORINI
(LEPIDOPTERA, GEOMETRIDAE)

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ABSTRACT

The present paper is the first attempt to define the genera of the New World Nacophorini. Owing to the very large number of species of the Ennominae, to which the Nacophorini belong, an almost complete lack of previous revisionary studies, and no earlier effort to delimit this tribe for the entire New World, the results of the present paper must be considered provisional at best; hopefully, a good starting point has been established for continuing research and understanding of the Nacophorini.

A total of 187 species was studied, and 161 columns of data were obtained for each of them based on external morphology and the male and female genitalia. In a number of cases it was possible to establish the relative plesiomorphy or apomorphy for these character states. A grouping of the species resulted in their being placed in 40 genera; some of their more important characters are listed in several tables, are fully described, and are separable by using the keys to the adults based on external morphology and male genitalia. Illustrations for adults and genitalia of all genera are included.

Ceratomyx, *Yermoia*, and *Dentinalia*, all previously revised by me, were found to be polyphyletic and have been subdivided. The following new genera are proposed; the type species is given only when it is described as new in this revision: *Papago*, *Salasaca* (*S. spinea*), *Hildalgo*, *Cundinamarca* (*C. parallela*), *Aragua*, *Azuayia*, *Tarma*, *Charca* (*C. triquetra*), *Nazca*, *Rucana*, *Achagua* (*A. obsoleta*), *Quillaca* (*Q. earina*), *Anischnopteris*, *Canelo* (*C. constrictus*), *Aconcagua*, *Arauco*, *Omaguacua*, *Huapianus* (*H. obater*), and *Poya*.

The following changes in status are proposed: *Mallomus*, described by E. Blanchard in the Hepialidae, was found to belong to the Nacophorini; this name takes priority over *Salpis* Mabille and its several synonyms. *Dasystole* Warren is also placed in the synonymy of *Mallomus*. *Ischnopterix* Hübner and *Amblurodes* Warren are synonymized under *Ischnopteris* Hübner. *Catophoenissa* Warren and *Calvertia* Warren are transferred to the Lithinini; *Talca catophoenissoides* Angulo is placed as a synonym of *Calvertia fumipennis* Warren.

The tribe is divided into four groups based on a combination of characters including, among others, the presence or absence of a functional proboscis, a simple or complex uncus in the male genitalia, and present-day distribution. An analysis of the character states with regard to which are relatively more primitive or more derived suggests that the two most plesiotypic groups are found primarily in North America and in Chile and southern Argentina.

In the New World the Nacophorini are found from southern Canada to Chile and southern Argentina, plus the Greater Antilles and the Galapagos Islands. The tribe is also known from Australia and Tasmania. This Chilean-southern South American and Australian distribution strongly suggests that the Gondwanian fragmentation contributed to the present-day distribution of the tribe. These Gondwanian elements, plus plesiotypic components in North America, indicate an ancestral distribution of perhaps pre-Gondwanian age. The Greater Antillean-Galapagos distribution, found in *Thyrinteina*, can possibly be explained by the ancestral moths being present on the proto-Antilles in the late Mesozoic when this volcanic archipelago connected North and South America; subsequent plate tectonic events formed the Greater Antilles in an eastern movement and the Galapagos in a southwestern shift in the middle or late Tertiary. The present distribution of *Holochroa* is in the southwestern United States, western Mexico, and the Tres Marias Islands; the group is not known from Baja California. This peninsula was originally part of western Mexico; it began to separate from the mainland at least four million years ago. The Tres Marias Islands are undoubtedly a fragment of the original peninsula that broke off during the rafting of the latter; the separation of Baja California was completed by Late Miocene and Early Pliocene. Presumably, representatives of the ancestral *Holochroa* were in western Mexico prior to the splitting; they, for whatever reasons, separated into two species on the Tres Marias but apparently did not survive on the Baja California peninsula.

INTRODUCTION

I published my first revisionary paper in 1961 on the New World Nacophorini, therein the typical section of the tribe was included. Little did I realize then how small a por-

tion of the tribe was included in that initial paper. This became increasingly evident over the succeeding years as I continued my research on the New World Ennominae. Some

of the results were published in a series of eight papers from 1969 to 1975; these included all the North American genera containing more than a single species, plus the genera and species that I knew from Chile and Argentina. However, the tribe is not restricted to the temperate portions of the two hemispheres, as the moths are well represented in warmer areas of Central and South America. The purpose of the present paper is to combine information I have already published, to include as many Neotropical genera as possible, and to give this information in a workable form in a single paper. I make no pretense that this tribe is completely and exhaustively covered; the Neotropical geometrid fauna is simply so large and so poorly known that any other view would be fallacious. I hope that this paper will serve as a starting point for future work on this tribe.

The largest of all Geometridae subfamilies is the Ennominae (Fletcher, 1979); they are particularly well represented in the New World, especially in tropical areas. I know of no accurate estimate of the numbers of described species; based on personal experience, the total number is certainly much larger than the literature indicates. One major problem in working with this subfamily is that there are practically no modern revisionary studies published on this very large group of moths. The literature consists almost entirely of original descriptions of species; the widely scattered descriptions range from inadequate to practically useless, with the majority being published in the last century and the first quarter of this one. Genitalic dissections and descriptions were un-

known to early workers; without using the genitalic characters it is difficult to accurately place a species in its proper genus. The early describers had vague and generalized generic concepts, often using large genera to include a host of unrelated species; this paper, concerns a single tribe and includes three genera and three species originally described in the Hepialidae (Blanchard, 1854), Liparidae (now Lymantriidae; Dyar, 1908), and Notodontidae (Heimlich, 1956).

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I also thank Mr. Juan C. Barberis, of the Department of Graphics, American Museum of Natural History, for preparing the graph and genitalic drawings, and for mounting all the figures. The adults were photographed by the author.

MATERIALS AND METHODS

A portion of the present paper contains data from my published works, which included specimens from a number of museums and private collections; these papers have complete, specific revisions for all included species. The other portion is based on an extensive survey of the material in the collection of the American Museum of Nat-

ural History, aided by a limited number of moths from other museums. As the aim of the present paper is to determine generic limits, I have not borrowed as extensively as when I required complete revisionary data for all species. By using this method it is possible that a number of interesting and valuable species and genera have been over-

looked; considering the chaotic state of our knowledge of the New World Ennominae, it would be surprising if this were not so. When specific revisions are made of the primarily Neotropical genera reported in this paper, it may become necessary to alter the descriptions as they are given herein; this, too, is to be expected. When studying the specimens on which I based this paper, I not only dissected and slide-mounted (in Canadian balsam) the genitalic structures but also cleared and mounted at least one antenna and a complete set of legs of both sexes of every species available to me; in some cases this was not possible due to lack of material or the poor condition of same. For my earlier papers I had not mounted antennae and legs, so this had to be done for those groups. As valuable characters may be present in these structures, I now automatically mount a set of them whenever I do a genitalic dissection.

For this paper I made a much more detailed set of observations and analyses than any time in the past. My data sheets include 61 columns of observations or measurements on the external portion of the adults, 83 on the male genitalia, and 17 on the female genitalia. A number of these are presence or absence of a given structure; both have been counted in the above totals. This extensive research was done for every species in every genus available to me; the specific data were summarized on data sheets for each of the 40 genera included in this revision. As a result I have in excess of 6400 items of data to work with. When I began this study I had planned to do a cladistic analysis of the members of the tribe, but the amount of information available at the end was such that this was not feasible. My alternative approach was to select 13 characters on the external portion of the adults, 11 for the male genitalia, and eight for the female genitalia. These 32 were then defined by their plesiomorphic and apomorphic states, and the data for all genera listed in a series of tables. My usage of plesiomorphic and apomorphic conditions is based on more than a 20-year study of the Nacophorini, plus my background of more than 30 years research on the Ennominae and the resulting published revisionary and descriptive papers on this subfamily. In nearly

all cases it should be possible to determine a given species as to its genus using these 32 characters. Note that they work better for relatively plesiotypic genera than for some of the more highly apomorphic ones. Perhaps a more satisfactory way of separating the genera is by using the keys to the adults and to the male genitalia that are in this paper. No key to the female genitalia is included; while these structures often have diagnostic characters it was believed that the time expended in trying to make a workable key was not commensurate with the value of the end results. Some genera are easily recognized and definable, whereas others have such a range of specific variability that it would become necessary to key out many individual species in order to include all the forms found in a given genus.

The generic descriptions contained in the present paper are based on the data I have accumulated while doing the basic research for this revision. Notwithstanding the fact that I have previously described 19 of the genera included in the present paper, every one has been completely redescribed, utilizing the much more complete data now available to me. In so doing, it has become necessary to split two of what I had previously considered monophyletic groups into three and four genera, respectively; the five new segregates are a portion of the 19 new genera described herein. In addition, four new synonyms are proposed; one became necessary when a generic name was transferred from the Hepialidae to this tribe and it proved to be the oldest available name for a previously existing genus, whereas the three other synonyms resulted from my studies. In a few generic descriptions one or two characters may be lacking; this is not because I forgot to include them but because complete and adequate material was not available.

The order in which the descriptions appear reflect my opinion on the relative plesiotypy and apotypy of each genus; I start with the more plesiotypic genera and finish with the more apotypic ones. This, in at least some cases, places more closely related genera near each other, which I consider to be of importance in that this not only indicates possible relationships but makes it easier to distin-

guish between some of the more closely related taxa—for me it is much more convenient to have the descriptions of similar genera adjacent for comparative purposes than to use any other type of arrangement.

When the genitalic drawings were started I had hoped that it would be possible to have every one of each sex drawn to the same scale and to have an equal reduction of the drawings within each of the four groups (described below) when they were printed. The reason for this is that the size differences, especially in the males, are not only remarkable but diagnostic, and I wanted to emphasize this. The first problem that arose was the very small female genitalia of *Yermoia perplexata* McDunnough (fig. 49); these had to be drawn

twice as large as any other of the female structures in order to be comparable and to show the necessary details. It was not possible to have equal reductions of the males within each of the four groups in every case. The exceptions are as follows: In group 1, figures 12–14 are reduced 1.5 times more than figures 15–17 and 18–20; in group 3, figure 84 is reduced 1.4 times more than the other male members of that group; and, in group 4, figure 113 is reduced 2.6 times more than figures 105–112, and figure 114 is 1.1 times more than the same comparable figures. The females have equal reductions within groups 1, 3, and 4, although the amounts differ from group to group. In group 2, figures 54–57 have twice the reduction of figures 49–53.

CHARACTERS

The following is a complete listing of the characters that have been studied for this paper. When a given character is preceded by a number it has been used in the accompanying tables; the tables give the plesiomorphic and apomorphic states for each. In observations not included in the tables, it is sometimes possible to indicate or describe the plesiomorphic (P) or apomorphic (A) conditions; in other cases this is not feasible, or the character proved to be of little or no value.

EXTERNAL CHARACTERS (tables 1 and 2): Tongue. (1). Fully developed and presumably functional (P) or mostly or greatly reduced and presumably non-functional (A).

Palpi. (a). Average height in relation to eye; in general, the more plesiotypic genera have more horizontal palpi whereas the apotypic genera tend to have more erect palpi. (b). Length in millimeters of second and third segments; in general, longer palpi are associated with the more apotypic genera. (c; 2). Ratio of the length of the third segment to second; one-half or less (P) compared with more than one-half length of middle segment (A). (d). Nature of scaling on third segment, whether loosely scaled, often with elongate ventral scaling (P) or tightly scaled (A). (e). Position of third segment, whether extending

above the horizontal plane (P) or decumbent (A). (f; 3). Comparison of female and male palpi; whether those of the females are as large as or longer than the males (P) or whether they are smaller (A).

Front. (a; 8). General shape, whether flat, not or barely extending beyond eyes (P) or variably swollen, conical, or otherwise raised (A). (b). When raised, are the males and females of equal size and shape (P) or do the females have a larger swelling (A)? (c). When raised, how far beyond the anterior margin of the eyes does it extend; in some cases the front may be two-thirds to four-fifths the diameter of the eye. (d). Presence (A) or absence (P) of a low horizontal liplike rim near the ventral margin of the front.

Antennae. (a). Number of segments (see fig. 1); in general, the more plesiotypic genera have fewer segments than do the more apotypic genera, and pectinate antennae fewer than non-pectinate. There is considerable variation within any species; a series of 13 male *Gabriola dyari* ranges from 41 to 48 segments, with an average of 45, and nine *G. sierrae* range from 50 to 61, averaging 53. (b; 4). Type of male antennae, whether pectinate (P) or non-pectinate (A); usually all the species within a given genus will have the same type (P) but this is not always the case (A). (c).

TABLE 1
Nature of External Characters in the Nacophorini

	Plesiomorphic State	Apomorphic State
1. Tongue	Fully developed, functional	Reduced or vestigial, presumably non-functional
2. Third segment of palpi	One-half or less length of middle segment	More than one-half length of middle segment
3. Female palpi	As large as, or longer than, those of males	Smaller than males
4. Male antennae	Bipectinate	Fasciculate or simple
5. Origin of antennal pectinations	Basal	Median or distal
6. Simple segments at end of male antennae	None	From about two to 28
7. Enlarged seta(e) at end of each pectination of male antennae	None	One or two
8. Front	Flat	Raised or swollen
9. Metathoracic tufts	Present	Absent
10. Dorsal abdominal tufts	Present	Absent
11. Row of setae ventrally on third segment of male abdomen	Absent	Present
12. Pairs of spurs on hind tibia	Two	One
13. Hair pencil on male hind tibia	Absent	Present

Type of female antennae, simple (P) or non-simple (A). (d; 5). Origin of pectinations of male antennae, whether they arise basally on their originating segments (P) or whether medially or distally (A). (e). Length of longest male pectinations in millimeters; this ranges from about 0.1 to 3.1 mm. (f). Ratio of length of longest male pectinations to the length of their basal segments; this ranges from 1:1 up to 14:1. The figures in the last two categories (e, f) can be helpful in defining a genus. (g; 6). Number of simple segments at end of pectinate male antennae; most do not have any (P) but the number may run as high as about 28 (A), or nearly one-third the length of the antennae. (h; 7). Thickened seta(e) at end of male segments; usually absent (P) but some genera with one or two such setae (A).

Thorax. (a). The usually prominent patagia may either be a mixture of spatulate or flattened scales and hairlike scales (P) or consist of hairlike scales only (A). (b; 9). The presence (P) or absence (A) of the metathoracic tuft of scales.

Fore legs. (a). Presence or absence of the epiphysis; this structure is absent in both sexes

of two species of *Animomyia* and in the female of one species of *Thyrintaina* and hence should be considered a specific character only. (b). Point of origin of epiphysis in males; usually in the basal one-half of the tibia in the more plesiotypic genera and at or distad of the middle in apotypic genera. (c). Point of origin of epiphysis in females; generally more distad than males in plesiotypic genera and about the same point of origin in apotypic genera. (d). Length of male epiphysis; it ranges from three-fourths to one and one-quarter times the length of the tibia. Most plesiotypic groups tend to have longer epiphyses than do the apotypic ones. (e). Length of female epiphysis; nearly always shorter than in the male of the same sex. It varies from one-fifth to three-fifths the length of the tibia, and the difference between plesiotypic and apotypic genera is not as marked as in the corresponding males.

Hind legs. (a; 12). Two pairs (P) or a single pair (A) of tibial spurs. (b; 13). Presence (A) or absence (P) of a hair pencil on the hind tibia of the males.

Abdomen. (a; 10). Presence (P) or absence

TABLE 2
Presence or Absence of External Characters
(Numbers at tops of columns are those of table 1.)

	1	2	3	4	5	6	7	8	9	10	11	12	13
GROUP 1													
<i>Aethaloida</i>	+	-	+	-	-	-	+	-	+	-	-	-	-
<i>Animomyia</i>	+	+	+	-	+	-	-	-	+	+	-	-	-
<i>Betulodes</i>	+	-	?	-	-	-	+	-	-	-	-	-	-
<i>Gabriola</i>	+	-	+	-	-	+	-	-	-	-	-	-	-
<i>Holochroa</i>	+	±	+	-	-	-	+	±	-	-	-	+	-
<i>Papago</i>	+	-	-	-	±	±	-	+	-	±	-	-	+
<i>Parexcelsa</i>	+	-	+	-	-	-	+	+	+	+	-	-	-
<i>Phaeoura</i>	+	-	+	-	-	-	+	+	-	-	-	+	-
<i>Thyriniteina</i>	+	-	+	-	-	+	+	-	+	-	-	+	-
GROUP 2													
<i>Aragua</i>	-	-	-	+	0	0	0	+	+	+	+	-	+
<i>Azuayia</i>	-	-	-	±	-,0	+,0	-,0	+	+	+	±	-	+
<i>Cargolia</i>	-	-	-	-	-	+	-	-	-	-	-	-	±
<i>Ceratonyx</i>	-	-	-	-	-	+	-	+	+	+	-	-	-
<i>Cundinamarca</i>	-	+	?	-	-	+	-	+	+	-	+	-	+
<i>Hidalgo</i>	-	-	+	-	+	+	-	+	-	+	-	-	-
<i>Mallomus</i>	-	±	-	±	-,0	+,0	-,0	+	+	+	-	-	±
<i>Salasaca</i>	-	+	-	+	0	0	0	+	-	+	+	-	+
<i>Tarma</i>	-	+	-	+	0	0	0	+	+	-	+	-	+
<i>Yermoia</i>	-	-	-	+	0	0	0	+	-	+	-	-	-
GROUP 3													
<i>Achagua</i>	-	+	?	-	-	+	-	-	-	-	+	-	+
<i>Anischnopteris</i>	-	±	-	+	0	0	0	+	-	-	+	-	+
<i>Canelo</i>	-	-	?	?	?	?	?	+	-	+	?	-	?
<i>Charca</i>	-	-	-	+	0	0	0	+	-	-	+	-	+
<i>Chrysomima</i>	-	-	?	?	?	?	?	+	-	-	?	-	?
<i>Cidariophanes</i>	-	-	-	+	0	0	0	+	-	-	+	-	+
<i>Ischnopteris</i>	-	±	±	+	0	0	0	+	±	-	+	-	+
<i>Nazca</i>	-	-	-	+	0	0	0	+	-	-	+	-	+
<i>Quillaca</i>	-	-	-	+	0	0	0	+	-	-	+	-	+
<i>Rucana</i>	-	+	?	+	0	0	0	+	-	-	+	-	+
<i>Trichostichia</i>	-	-	?	+	0	0	0	+	-	-	+	-	+
GROUP 4													
<i>Aconcagua</i>	-	-	-	±	-,0	+,0	-,0	+	-	-	-	-	-
<i>Arauco</i>	-	+	-	-	-	-	-	+	+	+	-	-	-
<i>Catocalopsis</i>	-	+	-	+	0	0	0	+	-	-	-	-	+
<i>Dentinalia</i>	-	+	-	-	-	-	-	+	-	+	-	-	-
<i>Huapianus</i>	-	+	-	-	-	+	-	-	+	-	-	-	-
<i>Malleco</i>	-	+	-	+	0	0	0	-	-	-	-	-	+
<i>Omaguacua</i>	-	±	-	+	0	0	0	+	+	+	-	-	-
<i>Poya</i>	-	+	-	+	0	0	0	+	-	+	-	-	+
<i>Praeantarctia</i>	-	+	-	-	-	±	-	+	-	-	-	-	+
<i>Talca</i>	-	+	-	-	-	-	-	+	-	+	-	-	+

Symbols: +, apomorphic state; -, plesiomorphic state; ±, both found in same taxon; 0, not applicable; ?, data not available.

(A) of a row of dorsal abdominal tufts. (b; 11). Presence (A) or absence (P) of a row of setae ventrally on the third segment of the male. In many cases the presence of this setal

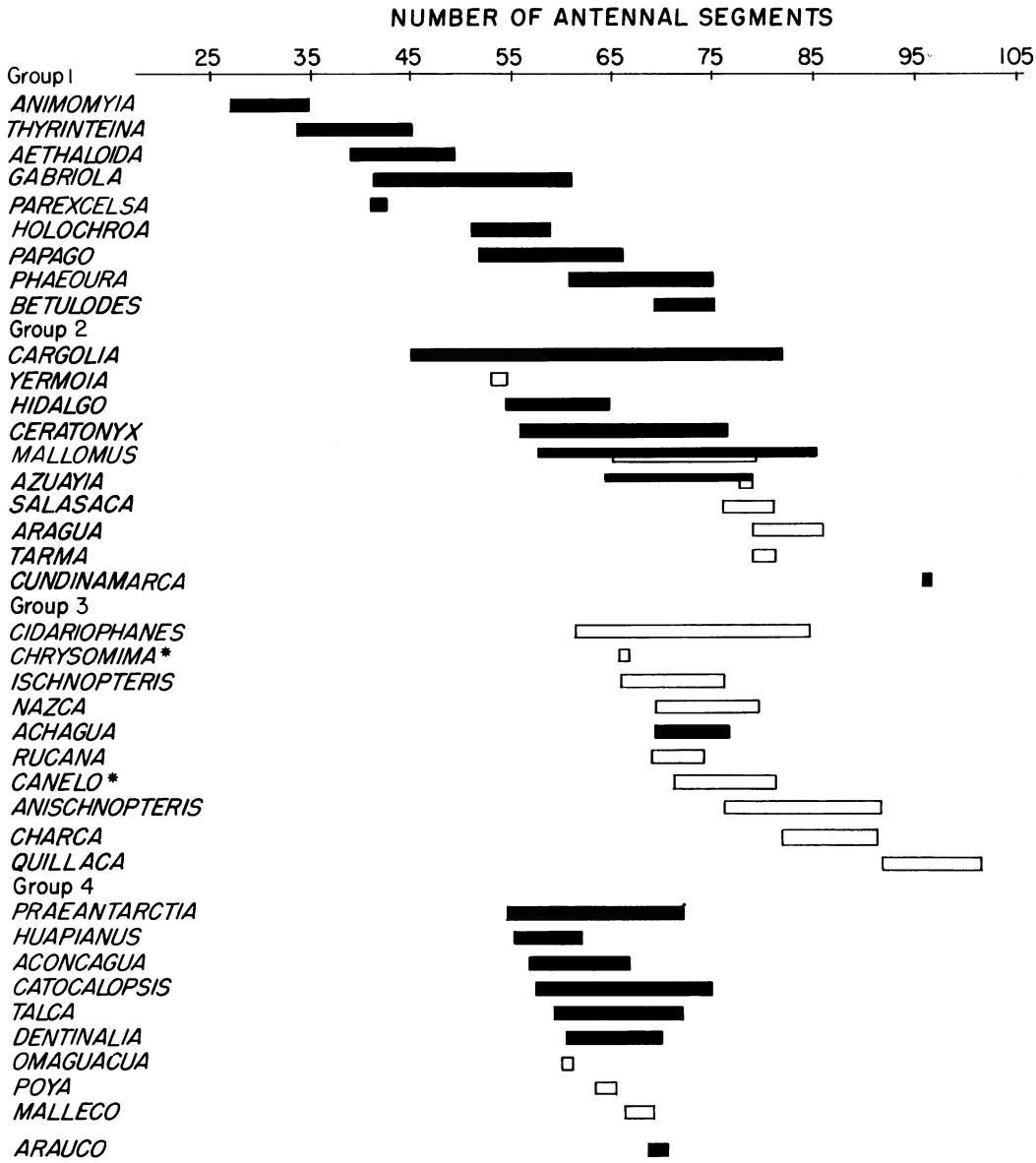


FIG. 1. Number of antennal segments. Legend: Solid bars, males with pectinate antennae; open bars, males with non-pectinate antennae; *, males unavailable, but assumed to have the type indicated. No specimens of *Trichostichia* (group 3) were available with complete antennae, so the genus is omitted.

row is associated with the presence of the hind tibial hair pencil but this is not always so.

Forewings. (a). Number of veins; all genera had 12. (b). Accessory cell; it is either absent or there are one or two cells. The number may differ within a genus, between the sexes

within a genus, within a given species or, rarely, from one forewing to the other in a single individual. (c). Vein R_1 may originate from R or from the top of the accessory cell, and it may or may not shortly coalesce with vein Sc . (d). Vein R_2 is variable, being free, arising from the end of the accessory cell, or stalked

TABLE 3
Nature of Male Genitalic Characters in the Nacophorini

	Plesiomorphic State	Apomorphic State
14. Type of uncus	Simple, straight	Variously modified
15. Length of uncus	1.0 mm. or less	More than 1.0 mm.
16. Socius	Present	Absent
17. Shape of socius	Low, padlike	Digitate or elongate
18. Gnathos	Present	Absent
19. Shape of gnathos	Square or U-shaped	V-shaped, pointed medially, or with two median projections
20. Nature of valves	Simple, without projections	Complex, with costal arm, median arm, spinose setae, or transverse sclerotized ridge
21. Processes of anellus	Prominent, sclerotized	Greatly reduced or absent
22. Length of processes of anellus compared to length of uncus	Longer	Equal to or shorter
23. Anellus with posteromedian extension	Absent	Present
24. Spines or sclerotized rod in vesica	Present	Absent

with R_{3+4} or R_{3+5} . (e). Veins R_{3+4} are usually stalked, with the length of the coalescence being variable; rarely R_3 and R_4 are adjacent but not stalked. (f). Vein R_5 arises from the end or bottom of the accessory cell when the latter is present, or from R_{3+4} in the absence of the cell. (g). Vein udc arises at an angle of between 45° and 75° to the radial vein; the most common angle is about 60° . (h). Veins mdc and ldc may be straight, curved, angled, or biconvex; their conformation is usually more or less consistent within a genus. (i). The length of the male forewings varies from 11 to 30 mm., and of fully winged females from 12 to 49 mm. The wings of the females in one genus are greatly reduced or vestigial, and are 3 to 4 mm. long. The males and females of a given genus may have approximately the same wing length, or the differential between the sexes may become increasingly large so that the females are about twice as large as the males. (j). The outer margin varies from smoothly rounded, straight, or angled to dentate or scalloped.

Hind wings. (a). Number of veins; all genera had seven. (b). Ratio of vein Sc to cell; it varies from one-tenth to three-fifths length of cell. This character is diagnostic for some genera. (c). Veins mdc and ldc may be straight, curved, or variously angled. (d). Presence (P)

or absence (A) of fully winged females; the greatly reduced state is present in only one genus. (e). Similarity of color and pattern to the forewings; varies from being very similar (P) to completely different (A). (f). Color: May be brown, white, gray (P) or combinations of white and black, orange or yellow and dark brown or black, or red and black (A).

MALE GENITALIA (tables 3 and 4): Uncus. (a; 14). General shape, whether with simple straight shaft (P) or variously modified (A). (b). Dorsoventral shape of simple shaft, whether sides are parallel (except for apex), tapering, or with apex swollen. (c; 15). Length of shaft, in millimeters. This varies from 0.25 to 1.90 mm.; a convenient, although arbitrary, division can be made as to whether the length is 1.0 mm. or less (P) or more than 1.0 mm. (A). (d). Width of base, in millimeters. With one exception, the shaft is longer than the width of the base, often two or three times as long. (e). With a modified uncus, the presence of numerous elongate setae from the dorsal surface or a variably sized pseudouncus. (f). Nature of apex of shaft, whether terminating in a single point (P), a transverse ridge or in two points (A); a short longitudinal keel-like structure may also be present.

Socius. (a; 16). Presence (P) or absence (A).

TABLE 4
Presence or Absence of Male Genital Characters
(Numbers at tops of columns are those of table 3.)

	14	15	16	17	18	19	20	21	22	23	24
GROUP 1											
<i>Aethaloida</i>	-	-	+	0	-	-	-	-	-	+	-
<i>Animomyia</i>	-	-	+	0	-	+	-	+	0	±	+
<i>Betulodes</i>	-	-	-	-	-	-	+	-	-	-	+
<i>Gabriola</i>	-	-	-	-	-	+	-	-	+	-	+
<i>Holochroa</i>	-	-	-	-	-	-	±	-	+	+	±
<i>Papago</i>	-	±	-	-	-	+	-	-	+	±	-
<i>Parexcelsa</i>	-	-	-	-	-	+	-	+	0	-	-
<i>Phaeoura</i>	-	±	-	-	-	-	+	-	±	-	+
<i>Thyrinteina</i>	-	-	±	-0	+	0	-	-	+	±	±
GROUP 2											
<i>Aragua</i>	-	+	-	-	-	+	-	-	+	+	-
<i>Azuayia</i>	-	+	-	+	-	+	-	-	+	+	-
<i>Cargolia</i>	-	-	-	+	-	+	-	-	-	±	-
<i>Ceratomyx</i>	-	+	-	-	-	+	-	-	+	+	-
<i>Cundinamarca</i>	-	-	-	+	-	-	-	-	+	+	-
<i>Hidalgo</i>	-	±	-	+	-	+	-	-	+	-	+
<i>Mallomus</i>	-	±	-	±	-	±	±	-	+	±	-
<i>Salasaca</i>	-	-	-	-	-	+	+	-	+	±	+
<i>Tarma</i>	-	+	-	+	-	+	+	-	+	+	+
<i>Yermoia</i>	-	-	-	-	-	-	-	+	0	-	-
GROUP 3											
<i>Achagua</i>	+	-	-	+	-	+	+	-	+	+	+
<i>Anischnopteris</i>	+	+	-	+	-	+	±	-	+	±	-
<i>Canelo</i>	?	?	?	?	?	?	?	?	?	?	?
<i>Charca</i>	+	+	-	+	-	+	-	-	-	+	-
<i>Chrysomima</i>	?	?	?	?	?	?	?	?	?	?	?
<i>Cidariophanes</i>	+	±	-	-	-	-	+	+	0	-	-
<i>Ischnopteris</i>	+	±	-	+	-	+	±	-	±	+	-
<i>Nazca</i>	+	+	-	+	-	+	-	-	+	+	-
<i>Quillaca</i>	+	+	-	+	-	+	-	-	+	+	+
<i>Rucana</i>	+	-	-	+	-	+	-	-	+	+	-
<i>Trichostichia</i>	+	+	-	+	-	+	+	-	+	+	-
GROUP 4											
<i>Aconcagua</i>	-	±	-	±	-	+	-	-	+	+	-
<i>Arauco</i>	-	-	-	-	-	+	-	+	0	+	+
<i>Catocalopsis</i>	+	+	-	+	-	+	-	-	-	+	-
<i>Dentinalia</i>	-	±	-	-	-	+	+	+	0	-	-
<i>Huapianus</i>	-	-	-	-	-	+	+	-	-	-	-
<i>Malleco</i>	-	+	-	+	-	-	-	-	+	+	-
<i>Omaguacua</i>	-	-	-	-	-	+	-	+	0	-	-
<i>Poya</i>	-	±	-	-	-	+	-	+	0	+	-
<i>Praeantarctia</i>	-	+	-	+	-	±	-	-	+	-	-
<i>Talca</i>	-	-	-	-	-	+	-	-	-	-	-

Symbols: +, apomorphic state; -, plesiomorphic state; ±, both found in same taxon; 0, not applicable; ?, data not available.

(b; 17). When present, its shape, whether it is a low padlike structure (P), shortly digitate or an elongate projection (A). (c). The number of setae on each side; this varies from one

or two to very numerous. (d). Size and length of setae; variable, from thin and short to thicker and very long.

Gnathos. (a; 18). Presence (P) or absence (A). (b; 19). General shape, whether square or U-shaped (P), V-shaped, more or less rounded with a median projection, W-shaped, square or H-shaped and having two lateral projections (A). (c). If square or U-shaped, presence or absence of median swelling, and median swelling with or without various spining. (d). If more or less rounded with a median projection, is the latter a simple tapering structure, is it spinose, is it truncate instead of elongate, or recurved to form a W-shaped gnathos? (e). If V-shaped, is the apex simple or spinose, is it truncate instead of elongate, or is the apex very long, pointed and recurved? (f). The ratio of the length of the gnathos to that of the uncus; this may vary from about three-tenths to one and one-half times as long as the uncus.

Valves. (a; 20). Simple (P) or complex, having costal or median projections, spinose setae, or sclerotized transverse ridge (A). (b). Presence (A) or absence (P) of an area with thickened and often elongate spines. (c). Presence (A) or absence (P) of an apical spine. (d). A sclerotized costa; present in all genera but a few are only weakly sclerotized and some are heavily so. A few genera have the distal portion variably swollen or enlarged. (e). Presence (A) or absence (P) of a costal arm; this can be either a specific or a generic character when it is present. (f). Presence (A) or absence (P) of a median arm, located on the inner face of the valve; also either a specific or generic character when present. (g). Presence (A) or absence (P) of the valve being swollen or enlarged apically. (h). Presence (A) or absence (P) of a raised, sclerotized, transverse ridge across the inner face of the valve; when present, this is a character of generic level.

Processes of the anellus. (a; 21). Prominent and heavily sclerotized (P) or greatly reduced or absent (A); of generic value. (b). A single pair (P) or two pairs of processes (A). (c). Whether the surface of the processes are smoothly sclerotized (P) or whether it is setose or spinose (A), at least in part. (d). The general shape, whether straight, curved, an-

gled, bifurcate, or something else. (e). Symmetrical (P) or asymmetrical (A). (f). The length of the processes in millimeters; when prominent, they may range from about 0.1 to 1.7 mm. (g; 22). The ratio of the length of the processes to the length of the uncus, whether shorter, equal to, or longer than. This can be either of specific or generic value.

Anellus. (a). General shape, whether round, ovate or elliptical. (b; 23). The nature of the posterior margin, whether rounded with two or three variously sized projections (P), or with slender, elongate median extension (A). (c). When present, the shape of the median extension, whether straight (P) or curved (A), with smooth (P) or spinose (A) margins. (d). The maximum length of the anellus, in millimeters; this can vary from 0.3 to 2.8 mm. In some instances the length can be of generic value. (e). The comparison of the length of the anellus with the length of the uncus; this varies from about one-third to three times as long.

Aedeagus. (a). Length, in millimeters; this ranges from 1.0 to 5.4 mm. (b). Width, in millimeters; this varies from 0.1 to 0.7 mm. (c). The general shape is a simple tube, but it may be straight, angled, curved, or weakly S-shaped. (d). The form of the apex, whether rounded or pointed. (e). Presence (A) or absence (P) of a sclerotized strip at the apical end, or whether most of the end is sclerotized. Some species and genera have the sclerotized strip or end with a dentate or serrate row or area, or with a single large spine. (f). The shape of the anterior basal area is usually rounded (P), but some species have a keel-like structure (A).

Vesica. (a; 24). Presence (P) or absence (A) of spines or a sclerotized rod. (b). When present, their number; this varies from one to a broad, elongate group in which it is impossible to count. Some spines are solidly attached to the vesica, whereas others are easily deciduous; this has to be borne in mind when examining the spinose area. (c). Length, in millimeters, of the longest spines; this varies from 0.2 to 1.7 mm. (d). The length of the longest spines in relation to the length of the aedeagus; this goes from 2 percent to one-half the length. (e). When (and if) the vesica is exerted, is it a more or less simple tube,

TABLE 5
Nature of Female Genital Characters in the Nacophorini

	Plesiomorphic State	Apomorphic State
25. Point of attachment of apophyses posteriores to papillae anales	Anterior	Median
26. Length of ductus bursae	Longer than wide	Shorter than wide, or equal
27. Length of corpus bursae compared with apophyses posteriores	Twice as long or less	More than twice as long
28. Striations on posterior portion of corpus bursae	Absent	Present
29. Shape of corpus bursae	Rounded, oval or elliptical	Posterior portion narrowed, anterior portion swollen
30. Signum	Present	Absent
31. Shape of signum on surface of corpus bursae	Round, with outer edge evenly dentate	Not round, with outer edge partially dentate or without rays
32. Shape of signum inside corpus bursae	Flat, on surface only	Ridge, purse-shaped, digitate, or hollow

extending straight or at an angle (P) or is it complex (A)? (f). The angle of exertion; this may be a straight continuation of the aedeagus, to a complete 180° reversal.

FEMALE GENITALIA (tables 5, 6): The apophyses. (a). Length, in millimeters, of the apophyses posteriores; these vary from 0.6 to 3.8 mm. (b). Length, in millimeters, of the apophyses anteriores; 0.1 to 2.3 mm. Both sets of measurements can be useful, in some cases, on the generic and specific levels. (c; 25). The point of attachment of the apophyses posteriores to the papillae anales, whether it is antieriad (P) or posteriad (A).

The sterigma. I was unable to quantify the lamellae; they are described for each genus and are often characteristic.

The ductus bursae. (a). Sclerotized or membranous; in some cases both conditions, and intermediate states, may occur within a genus. (b; 26). Ratio of length to width, whether longer than wide (P) or equal or shorter than broad (A). This character is sometimes difficult to judge, especially if the ductus bursae has tapering lateral margins.

The corpus bursae. (a; 27). The length (assuming it is fully inflated) compared with the length of the apophyses posteriores; an arbitrary division is twice as long or less (P) compared with more than twice as long (A). The range of variation is from slightly shorter to about nine times as long. (b; 29). General

shape, whether rounded, oval or elliptical (P), or with posterior portion narrowed and with the anterior end variably swollen (A). (c). Posterior portion sclerotized or membranous; sometimes one surface may be one and the opposite surface the other. (d; 28). Posterior portion with (A) or without (P) longitudinal striations; these vary in number and depth.

The signum. (a; 30). Presence (P) or absence (A). (b; 31). Shape on surface of corpus bursae, whether round and with the outer edge evenly dentate (P) or not round and with the outer edge partially dentate or without rays (A). (c; 32). Shape or form within the corpus bursae, whether flat and on the surface only (P) or variously invaginated, being purse-shaped, digitate, or hollow (A). There is considerable variation within the latter category.

EARLY STAGES: Since I have not worked with them, all that can be done is to report the observations of other workers.

Eggs. Forbes (1948, p. 84) stated that the Nacophorini “resemble the Bistonini in the heavy body and short tongue, but differ wholly in the early stages (egg and pupa particularly)”; apparently there were no amplifying remarks about the eggs. Comstock (1963) described and figured the eggs of *Aethaloida*, Peterson (1968) did the same for *Holochroa*, and McGuffin (1981) for *Phaeoura*.

Larvae. Only the caterpillars of *Aethaloida*,

TABLE 6
Presence or Absence of Female Genitalic Characters
(Numbers at tops of columns are those of table 5.)

	25	26	27	28	29	30	31	32
GROUP 1								
<i>Aethaloida</i>	+	-	-	-	-	-	-	-
<i>Animomyia</i>	+	+	-	-	+	+	0	0
<i>Betulodes</i>	?	?	+	-	-	-	+	-
<i>Gabriola</i>	-	-	-	-	-	+	0	0
<i>Holochroa</i>	+	+	-	-	±	-	±	+
<i>Papago</i>	+	-	±	-	±	-	+	+
<i>Parexcelsa</i>	-	-	-	+	+	-	+	+
<i>Phaeoura</i>	+	-	-	-	-	±	-,0	-,0
<i>Thyrinteina</i>	+	+	+	±	-	-	+	-
GROUP 2								
<i>Aragua</i>	-	-	±	+	-	-	+	+
<i>Azuayia</i>	-	-	+	+	-	-	+	+
<i>Cargolia</i>	±	-	-	+	+	-	±	+
<i>Ceratomyx</i>	+	-	-	±	±	-	+	-
<i>Cundinamarca</i>	?	?	?	?	?	?	?	?
<i>Hidalgo</i>	-	±	-	+	+	-	±	-
<i>Mallomus</i>	±	±	±	±	±	-	±	+
<i>Salasaca</i>	+	-	+	±	+	±	+,0	-,0
<i>Tarma</i>	-	-	+	+	+	-	+	+
<i>Yermoia</i>	-	-	-	-	+	+	0	0
GROUP 3								
<i>Achagua</i>	?	?	?	?	?	?	?	?
<i>Anischnopteris</i>	+	±	+	±	+	-	-	±
<i>Canelo</i>	-	+	+	+	+	-	-	+
<i>Charca</i>	+	+	+	+	-	-	+	-
<i>Chrysomima</i>	+	±	-	-	+	-	+	±
<i>Cidariophanes</i>	-	±	-	±	+	-	-	+
<i>Ischnopteris</i>	+	-	+	+	-	-	-	-
<i>Nazca</i>	-	-	+	+	+	+	0	0
<i>Quillaca</i>	+	-	+	+	+	-	+	-
<i>Rucana</i>	?	?	?	?	?	?	?	?
<i>Trithostichia</i>	?	?	?	?	?	?	?	?
GROUP 4								
<i>Aconcagua</i>	+	-	-	+	-	-	+	-
<i>Arauco</i>	-	±	+	+	+	-	+	-
<i>Catocalopsis</i>	±	-	+	+	-	-	+	+
<i>Dentinalia</i>	-	+	-	+	+	-	-	+
<i>Huapianus</i>	-	-	-	+	+	+	0	0
<i>Malleco</i>	±	+	+	+	+	+	0	0
<i>Omaguacua</i>	-	+	+	-	-	-	+	+
<i>Poya</i>	±	+	+	+	+	+	0	0
<i>Praeantarctia</i>	±	+	+	+	+	-	+	+
<i>Talca</i>	±	+	+	+	+	-	+	+

Symbols: +, apomorphic state; -, plesiomorphic state; ±, both found in same taxon; 0, not applicable; ?, data not available.

Papago (= *Ceratomyx*, in part), *Phaeoura* (= *Nacophora*), and *Holochroa* have been described and illustrated from the New World, and *Thalaina* from Australia and Tasmania (McQuillan, 1981). Heitzman ("1981" [1982]) gave some comparisons for the larvae known to him.

Pupae. Forbes (1948) placed the Nacophorini in his major subdivision of the Ennominae which has the cremaster ending in eight hooked setae. This apparently holds true for *Aethaloida* (Comstock, 1963) and *Phaeoura* (McGuffin, 1981); *Gabriola* lacks all setae (McGuffin, 1981); and *Thalaina* has either two or from six to eight hooked setae (McQuillan, 1981). Insofar as can be told from a figure, *Thyrinteina* has six setae (Comstock and Vazquez, "1963" [1964], fig. 18). Nothing has been published on the pupa of *Holochroa*.

FOOD PLANTS: The known North American groups feed on conifers, hard wood trees, and shrubs; *Thalaina* feeds on *Acacia*; and *Thyrinteina* feeds on the introduced *Eucalyptus* and citrus in Brazil, with the native host(s) being unknown.

During the course of my studies on the Nacophorini, I have had access to 4586 adults (3757 males, 829 females), 567 genitalic dissections (405 males, 162 females), and 283 slide preparations of antennae and legs (180 males, 103 females). I did not subject every adult to a complete analysis for all the above characters, but I did study a representative sample of every species. All genitalic dissections and antennal-leg preparations were fully studied. An analysis of all the data, based on the 187 species produced what I consider to be 40 monophyletic genera.

These genera can be combined into several groups. One of these includes those species that have a mostly or greatly reduced and presumably non-functional tongue. This is group 1, and it consists of nine genera and 33 species.

A second group is one that is restricted in its distribution to Chile and/or southern Argentina (group 4). This may be a somewhat arbitrary criterion for separation, but the included genera have a high percentage of plesiomorphic characters, as does group 1. The included genera, 10 in number, containing 18

species, have the male genitalia with a simple uncus, with the exception of the setose one found in *Malleco*, and the strongly complex structure of *Catocalopsis*; these two types of variations are not homologous. *Mallomus*, the largest genus in the tribe, is found primarily in Chile and Argentina, but additional species occur in the Andes as far north as Colombia and Venezuela; for this reason, it is excluded from group 4.

Of the remaining genera, the species of one group have a simple uncus, whereas the others have either a complex uncus or one with a strongly developed group of elongate setae rising from the dorsal surface of the uncus. Group 2 includes those taxa with the simple uncus; 10 genera and 74 species have been studied. They occur from the southern United States as far south as Bolivia, Chile, and southeastern Brazil. The Chilean component is *Mallomus*, discussed above in group 4; it belongs in group 2.

Group 3 has the most apomorphic uncus characters in the tribe. The more plesiomorphic uncus is one with dorsal setae basically similar to the Chilean *Malleco*. It seems likely that these setae became fused, thus forming the elongate, spatulate dorsal process (the pseudouncus) that may be longer than the uncus itself. The second type of complex uncus has the posterior portion of that structure enlarged and enclosing a variable number of short setae. This group contains 11 genera and at least 62 species.

It is easier to define the species, genera, and groups of the Nacophorini than it is to delimit the tribe itself. This is due to the amount of variability of all the characters studied. Venation, a favorite character of earlier workers, is of little value, as it is variable, even within a given genus and, sometimes, in a single specimen, where the right forewing may differ from the one on the left side. The attempt by Forbes (1948) to utilize the cremaster has been shown, in the light of subsequent knowledge, to be of little or no value. However, Forbes did point out what he termed the "complex developments of the transtilla" (1948, p. 84) as being characteristic; I call this structure the processes of the anellus.

They are present as variously shaped, large, sclerotized structures in nearly all of the genera of the Nacophorini (see table 4, character 21); in some taxa they are variously reduced, sometimes to the point of almost being absent. The reduction in size of this structure has apparently occurred independently a number of times, as it is present in all four groups. Notwithstanding the reduction of the processes of the anellus in several genera, it is the presence of this structure that is diagnostic for the tribe.

Two additional tribes, the Lithinini and the Anogogini (as defined by Forbes, 1948), have paired processes of the anellus. In these two groups, the processes are usually long, slender, often with terminal setae, and are of about the same width for the length of the structure; the anellus tends to be reduced in size and is situated dorsally in relation to the inner surface of the valves. In the Nacophorini, the paired processes are nearly always much shorter, have a wide base, usually curve and taper to a sharp point; the anellus tends to be large, often has a posteromedian extension, and is situated ventrally. In my opinion these two different types of processes were derived independently; they may or may not be homologous.

In addition to the male genitalic characters, there may be a difference in the spining of the tarsi between the Nacophorini and Lithinini; this possibility is in the process of being investigated, as are the other characters of the Lithinini.

In my 1971 paper I included *Catophoenissa* Warren as a member of the Nacophorini; I am now placing it in the Lithinini, based primarily on the above characters. Similarly, the genus *Calvertia* Warren is also transferred to the Lithinini. The type species of this genus is *fumipennis* Warren; I have studied the type of this taxon (in USNM). Angulo (1977a) described *Talca catophoenissoides* from Chile; he was kind enough to deposit a pair of his paratypes in the American Museum of Natural History. My examination of this new species showed that it was incorrectly placed as to genus, and that it is a synonym of *Calvertia fumipennis* Warren (new synonymy).

DISTRIBUTION

For the New World genera, both the geographical and temporal distributions have been summarized in tables 7 and 8. As discussed above I have divided the tribe into four groups: group 1 is basically North American, group 4 is wholly Chilean and Argentinian, and groups 2 and 3 are both primarily Central and South American. An overview of the characters defining groups 1 and 4 indicates they are relatively more plesiotypic than those of the other two groups. Concerning the diversity of character states by which the four groups of New World Nacophorini can be subdivided into genera, groups 1 and 4 contain about the same number of genera as do the other two (19 as compared with 21), but included only 51 described species, whereas groups 2 and 3 have 136; the last number will undoubtedly show a considerable increase when the included genera are revised. On the other hand, very little change is expected for group 1, and group 4 will probably have a moderate increase resulting from additional collecting and study. I have published revisionary studies of the genera included in groups 1 and 4; only three genera in group 2, and none in group 3, have been so treated. The data presented in tables 7 and 8 are of unequal completeness, due to whether or not the individual genera have been revised; the data for groups 1 and 4 are probably almost complete, whereas that for groups 2 and 3 is undoubtedly incomplete.

As presently understood, the Nacophorini are widely distributed in the New World, from southern Canada to Chile and southern Argentina, and in Australia and Tasmania. The present paper summarizes the known genera and their ranges from North, Central and South America. The Australian fauna is less well known, as a revision of only one of the several included genera has been published (McQuillan, 1981); the complete distributional pattern of the Australian Region must await further studies. Nevertheless, this Chilean-southern South American and Australian pattern strongly suggests that the Gondwanian fragmentation contributed to the present-day distribution of the tribe.

Some biogeographical comments are sug-

gested from the data obtained from this study. Gondwanian elements in the distribution of the tribe, and plesiotypic components in North America, indicate an ancestral distribution of perhaps pre-Gondwanian age. Considering the Gondwanian and other elements in the distribution, it seems likely that the ancestral forms were widely distributed when North and South America, by displacement of an initial Central America eastward to become the Antilles, split the moths into two sections; these formed the basis for present-day groups 1 and 4. Consequently, the northern component of the ancestral assemblage presumably began to lose its use of the proboscis, resulting in today's characteristic vestigial tongue in group 1. However, it is possible that this loss occurred at an earlier date, as discussed below.

In the southern section, relatively more plesiotypic components are indicated in the taxa of Chile and Argentina, forming group 4. Groups 2 and 3 probably developed as a result of the diverse geographical histories of Central America and central and northern South America subsequent to their initial disjunction. In South America, distributions centered on Chile and Argentina are exemplified by members of the genus *Mallomus*. Today this genus contains 47 described species; of these, 40 are restricted to Chile and Argentina, whereas the remaining ones are distributed northward in the Andes from Bolivia to Colombia and Venezuela. Many other groups, however, show diversity in the central and northern areas of South America with no members in Chile and Argentina.

Note that the group primarily restricted to North America, which presumably had a relatively early reduction and loss of the functional tongue, has evidently made very little subsequent contribution to the southern fauna. The only exceptions are some taxa with the reduced proboscis in South America related to the Antillean and Central American components of the Nacophorini. These could represent either a southern dispersal from the northern and Antillean components or, more likely, radiation from an early non-functional tongue component in place at the time of the

TABLE 7
Geographical Distribution of the New World Nacophorini

	Canada	United States	Mexico	Greater Antilles	Central America	Colombia	Venezuela	Guianas	Brazil	Uruguay	Ecuador	Peru	Bolivia	Paraguay	Argentina	Chile
GROUP 1																
<i>Aethaloida</i>	—	x	x	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>Animomyia</i>	x	x	x	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>Betulodes</i>	—	—	x	—	x	x	—	x	x	—	x	x	x	x	—	—
<i>Ceratomyx</i>	—	x	x	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>Gabriola</i>	x	x	x	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>Holochroa</i>	—	x	x	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>Papago</i>	—	x	x	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>Parexcelsa</i>	—	x	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>Phaeoura</i>	x	x	x	—	x	—	—	—	—	—	—	—	—	—	—	—
<i>Thyriniteina</i>	—	x	x	x	x	x	x	x	x	x	—	x	x	x	x	—
GROUP 2																
<i>Aragua*</i>	—	—	—	—	—	x	x	—	—	—	—	x	x	—	—	—
<i>Azuayia*</i>	—	—	—	—	—	x	—	—	—	—	x	—	—	—	—	—
<i>Cargolia*</i>	—	—	x	—	—	x	—	—	—	—	x	x	x	—	x	—
<i>Ceratomyx</i>	—	x	x	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>Cundinamarca*</i>	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—	—
<i>Hidalgo*</i>	—	—	x	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>Mallomus</i>	—	—	—	—	—	x	x	—	—	—	—	x	x	—	x	x
<i>Salasaca*</i>	—	—	—	—	—	—	—	—	—	—	x	x	x	—	—	—
<i>Tarma*</i>	—	—	—	—	—	—	—	—	x	—	x	x	x	—	—	—
<i>Yermoia</i>	—	x	—	—	—	—	—	—	—	—	—	—	—	—	—	—
GROUP 3																
<i>Achagua*</i>	—	—	—	—	—	x	—	—	—	—	x	—	—	—	—	—
<i>Anischnopteris*</i>	—	—	x	—	x	—	x	x	x	—	—	x	x	—	x	—
<i>Canelo*</i>	—	—	—	—	—	—	—	—	—	—	x	x	x	—	—	—
<i>Charca*</i>	—	—	x	—	—	x	—	—	—	—	x	—	x	—	—	—
<i>Chrysomima*</i>	—	—	x	—	—	x	—	—	—	—	—	x	—	—	—	—
<i>Cidariophanes*</i>	—	—	—	—	—	—	—	—	x	—	x	x	x	x	—	—
<i>Ischnopteris*</i>	—	—	x	—	x	x	—	x	—	—	x	—	x	—	—	—
<i>Nazca*</i>	—	—	—	—	—	—	—	—	—	—	x	x	x	—	—	—
<i>Quillaca*</i>	—	—	—	—	—	—	—	—	—	—	—	x	x	—	—	—
<i>Rucana*</i>	—	—	—	—	—	—	—	—	—	—	—	x	—	—	—	—
<i>Trichostichia*</i>	—	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—
GROUP 4																
<i>Aconcagua</i>	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	x
<i>Arauco</i>	—	—	—	—	—	—	—	—	—	—	—	—	—	—	x	x
<i>Catocalopsis</i>	—	—	—	—	—	—	—	—	—	—	—	—	—	—	x	x
<i>Dentinalia</i>	—	—	—	—	—	—	—	—	—	—	—	—	—	—	x	x
<i>Huapianus</i>	—	—	—	—	—	—	—	—	—	—	—	—	—	—	x	x
<i>Malleco</i>	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	x
<i>Omaguacua</i>	—	—	—	—	—	—	—	—	—	—	—	—	—	—	x	—
<i>Poya</i>	—	—	—	—	—	—	—	—	—	—	—	—	—	—	x	x
<i>Praeantarctia</i>	—	—	—	—	—	—	—	—	—	—	—	—	—	—	x	x
<i>Talca</i>	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	x

Symbols: x, specimens examined; —, no specimens seen; *, data probably incomplete because genus has not been revised.

TABLE 8
Temporal Distribution of the New World Nacophorini

	January	February	March	April	May	June	July	August	September	October	November	December
GROUP 1												
<i>Aethaloida</i>	—	x	x	x	x	x	x	x	x	x	x	x
<i>Animomyia</i>	x	x	x	x	x	x	x	x	x	x	x	—
<i>Betulodes</i>	x	x	x	x	x	x	x	—	x	x	x	x
<i>Ceratomyx</i>	—	x	x	x	x	x	x	x	x	x	—	—
<i>Gabriola</i>	x	x	x	x	x	x	x	x	x	x	x	x
<i>Holochroa</i>	—	x	x	x	x	x	x	x	x	x	—	—
<i>Papago</i>	—	—	—	—	x	x	x	x	—	—	—	—
<i>Parexcelsa</i>	—	—	—	—	—	—	x	—	x	x	x	—
<i>Phaeoura</i>	x	x	x	x	x	x	x	x	x	—	x	—
<i>Thyrinteina</i>	x	x	x	x	x	x	x	x	x	x	x	x
GROUP 2												
<i>Aragua*</i>	—	x	x	x	—	—	—	—	—	—	—	—
<i>Azuayia*</i>	—	x	x	—	—	—	—	—	—	—	—	—
<i>Cargolia*</i>	x	x	x	x	x	x	x	x	x	x	x	x
<i>Ceratomyx</i>	—	x	x	x	x	x	x	x	x	x	—	—
<i>Cundinamarca*</i>	—	—	—	—	—	—	—	x	—	—	—	—
<i>Hidalgo*</i>	—	—	—	—	x	—	x	x	x	—	x	—
<i>Mallomus</i>	x	x	x	x	x	—	x	—	x	x	x	x
<i>Salasaca*</i>	—	x	—	—	—	—	—	x	—	x	—	x
<i>Tarma*</i>	x	x	x	x	—	x	x	x	x	x	x	—
<i>Yermoia</i>	x	x	x	x	x	—	—	?	—	—	—	x
GROUP 3												
<i>Achagua*</i>	—	—	—	—	—	—	—	x	—	—	—	—
<i>Anischnopteris*</i>	x	x	x	x	x	x	x	x	x	x	—	x
<i>Canelo*</i>	—	x	x	—	—	—	—	—	x	—	x	—
<i>Charca*</i>	—	x	—	—	—	—	—	x	x	x	—	—
<i>Chrysomima*</i>	—	—	—	—	—	—	—	—	—	x	x	—
<i>Cidariophanes*</i>	—	x	x	x	—	—	x	x	x	x	—	x
<i>Ischnopteris*</i>	x	—	x	—	x	x	x	x	x	x	—	x
<i>Nazca*</i>	x	x	—	—	—	—	—	—	x	x	x	x
<i>Quillaca*</i>	x	—	—	—	—	—	—	—	—	x	x	—
<i>Rucana*</i>	—	—	—	—	—	—	—	x	—	—	x	—
<i>Trichostichia*</i>	—	—	x	—	x	—	x	—	—	—	—	—
GROUP 4												
<i>Aconcagua</i>	x	—	—	—	—	—	—	—	—	x	x	x
<i>Arauco</i>	—	—	—	—	—	—	—	—	—	x	x	x
<i>Catocalopsis</i>	x	x	x	x	—	—	—	—	—	—	—	—
<i>Dentinalia</i>	x	x	x	—	—	—	—	—	—	x	x	x
<i>Huapianus</i>	—	—	—	—	—	—	—	—	—	—	x	—
<i>Malleco</i>	x	x	—	—	—	—	—	—	—	—	—	x
<i>Omaguacua</i>	—	x	—	—	—	—	—	—	—	—	—	x
<i>Poya</i>	x	—	—	—	—	—	—	—	x	x	x	x
<i>Praeantarctia</i>	x	x	—	—	—	—	—	—	—	—	—	x
<i>Talca</i>	x	x	—	—	—	—	—	—	—	—	x	x

Symbols: x, specimens examined; —, no specimens seen; *, data probably incomplete because genus has not been revised; ?, dubious record.

Antillean dispersal. If the latter did occur, it would indicate that the reduction of the proboscis must have taken place at an earlier time than indicated above.

Two genera of group 1 are of biogeographical interest. One is *Thyrinteina*, containing seven species occurring today from the southern United States to southern South America, plus the Greater Antilles (Cuba, Hispaniola, and Puerto Rico, but not Jamaica) and the Galapagos Islands; two species occur in the Galapagos archipelago. This distribution possibly can be explained by the model outlined by Rosen (1976) where the proto-Antilles in the late Mesozoic formed a volcanic archipelago between North and South America. Subsequent plate tectonic events formed the Greater Antilles in an eastern movement and the Galapagos in a southwestern shift in the middle to late Tertiary. As stated above, I believe that the northern segregate of the ancestral Nacophorini was both widespread in early North America, and that it was undergoing the reduction and consequent functional loss of the tongue; perhaps that was already accomplished prior to the tectonic movements described above. The ancestral *Thyrinteina* could very well have been present in the proto-Antillean area in the late Mesozoic; subsequent tectonic movements of the associated islands would explain the present insular distribution of the genus, which could have reinvaded South America or left a small component there when the first Central America was displaced.

Holochroa, the second genus to be consid-

ered, is a small genus of four species. Its present distribution is the southwestern United States (Colorado, Arizona, New Mexico, and western Texas) and west central Mexico (Sinaloa, Colima, Guerrero, and Morelos), plus the Tres Marias Islands. No specimens have been seen from Baja California, and the genus may not occur there today. Although the distributional pattern is well known in the United States, the same cannot be said of Mexico, due to a lack of intensive collecting. Originally the present-day peninsula was part of mainland Mexico, extending south of Puerto Vallarta, Jalisco (Moore and Buffington, 1968). The separation began at least four million years ago (Larson, Menard, and Smith, 1968; Moore and Buffington, 1968; Elders et al., 1972) along the Tamayo Fracture Zone. The Tres Marias Islands are undoubtedly a fragment of the original peninsula; both the islands and southern Baja California lie between the Tamayo Fracture Zone and the 1000-fathom curve. The peninsula rafted to the northwest, while the islands remained behind; it is possible that Baja California may have been shortened, from south to north, as well (Elders et al., 1972). The separation was complete by Late Miocene or Early Pliocene (Moore and Buffington, 1968). Representatives of the ancestral *Holochroa* are presumed to have been in western Mexico prior to the above splitting; they, for whatever reasons, separated into two species on the Tres Marias Islands but apparently did not survive on the Baja California peninsula.

SYSTEMATIC DESCRIPTIONS

The Nacophorini have been characterized in the section on Characters both in writing and in the accompanying tables. It is difficult to make a valid comparison with other tribes because not a single one that is assumed to be closely related has been studied, using modern techniques, and defining apomorphic characters. When other tribes are studied and properly characterized, it will then be possible to give a more complete and meaningful definition of the Nacophorini.

KEY TO GENERA

BASED ON EXTERNAL CHARACTERS

- 1. Hind tibia with one pair of spurs 2
Hind tibia with two pairs of spurs . . . 4
- 2(1). Metathoracic tuft present 3
Metathoracic tuft absent . . . *Thyrinteina*
- 3(2). Antennae with from 61 to 75 segments;
longest pectinations of male antennae
1.4 to 1.8 mm. in length . . . *Phaeoura*
Antennae with from 52 to 58 segments;

- longest pectinations of male antennae
0.9 to 1.0 mm. *Holochroa*
- 4(1). Tongue reduced or vestigial 5
Tongue fully developed 10
- 5(4). Metathoracic tuft present 6
Metathoracic tuft absent 8
- 6(5). Hair pencil present on hind tibia of male
..... *Papago*
Hair pencil absent on hind tibia of male
..... 7
- 7(6). Male antennae with from 10 to 18 simple
segments at end *Gabriola*
Male antennae with pectinations extend-
ing to end of structure *Betulodes*
- 8(5). Antennae with from 27 to 34 segments;
longest pectinations of male antennae
3.1 mm. in length *Animomyia*
Antennae with from 38 to 49 segments;
longest pectinations of male antennae
1.1 to 1.5 mm. 9
- 9(8). Abdomen with dorsal abdominal tufts;
front flat *Aethaloida*
Abdomen without dorsal abdominal tufts;
front swollen dorsally *Parexcelsa*
- 10(4). Patagia with mixture of flattened and
hairlike scales 17
Patagia with hairlike scales only 11
- 11(10). Metathoracic tufts present 12
Metathoracic tufts absent 16
- 12(11). Dorsal abdominal tufts present 13
Dorsal abdominal tufts absent 14
- 13(12). Males with simple antennae; hind wings
with upper surface red with black bor-
der *Catocalopsis*
Males with pectinate antennae; hind wings
with upper surface white or grayish
white *Praeantarctia* (in part)
- 14(12). Hind wings with vein Sc extending 55 to
60 percent of length of cell; forewings
15 to 17 mm. long *Poya*
Hind wings with vein Sc extending 20 to
50 percent of length of cell; forewings
16 to 29 mm. long 15
- 15(14). Hind wings with vein Sc extending 20 per-
cent of length of cell; forewings 22 to
29 mm. long, above pale grayish white
with dull brown apex *Tarma*
Hind wings with vein Sc extending 40 to
50 percent of length of cell; forewings
17 to 22 m. long, unicolorous brown
..... *Mallomus* (in part)
- 16(11). Males with simple antennae; length of
forewings 15 to 16 mm. . . *Omaguaca*
Males with pectinate antennae; length of
forewings 17 to 20 mm. *Arauco*
- 17(10). Metathoracic tuft present 18
Metathoracic tuft absent 30
- 18(17). Hind tibia of males with hair pencil . . 19
Hind tibia of males without hair pencil
..... 28
- 19(18). Front flat 20
Front swollen 21
- 20(19). Upper surface of hind wings pale brown
..... *Mallomus* (in part)
Upper surface of hind wings white
..... *Achagua*
- 21(19). Upper surface of hind wings blackish
brown, with scale tuft near base on anal
margin and with thick dual row of slen-
der setae along each vein, arranged
transversely to veins . . . *Trichostichia*
Upper surface of hind wings not as above
..... 22
- 22(21). Length of forewings 13 to 15 mm.
..... *Rucana*
Length of forewings 16 to 24 mm. . . 23
- 23(22). Upper surface of hind wings white with
broad black border; antennae of about
96 segments *Cundinamarca*
Upper surface of hind wings gray or dark
grayish brown; antennae of from 64 to
92 segments 24
- 24(23). Males with setose lobe on basal half of
anal margin of hind wings; larger species
(length of forewings 18 to 24 mm.) with
slender brownish or grayish brown
wings *Ischnopteris*
Males without lobe on anal margin of hind
wings; smaller species (length of fore-
wings 16 to 21 mm.) with broader wings
..... 25
- 25(24). Forewings with upper surface having
smoothly rounded cross lines or elon-
gate translucent area; front extending
beyond eyes one-fifth to one-third di-
ameter of eyes 26
Forewings with upper surface having den-
tate cross lines broadly shaded with
brown or green, without translucent
area; front extending beyond eyes one-
third to one-half diameter of eyes . . .
..... 27
- 26(25). Forewings with upper surface having white
cross lines or elongate translucent area;
abdomen with dorsal tufts . . *Azuayia*
Forewings with upper surface having black
cross lines; abdomen without dorsal
tufts *Salasaca*
- 27(25). Front conical, extending beyond eyes one-
third diameter of eyes . . *Cidariophanes*
Front strongly swollen ventrally, with
ventral transverse ridge, extending be-
yond eyes almost one-half diameter of
eye *Nazca*

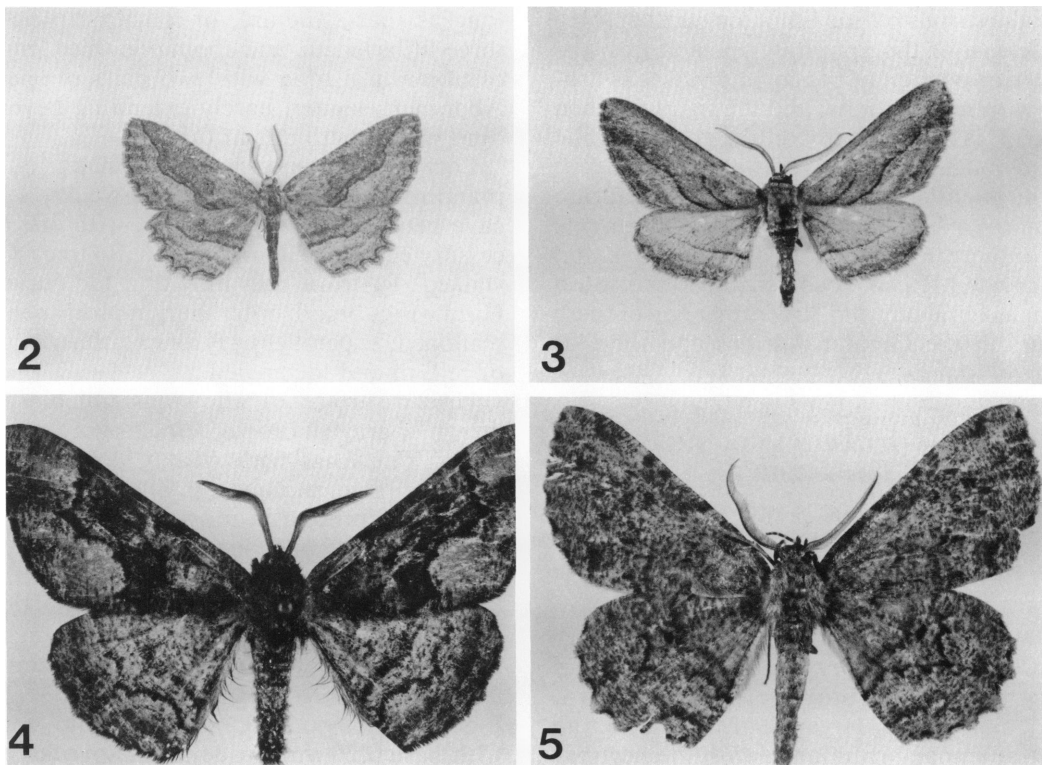
- 28(18). Male antennae simple; antennae of both sexes with about 53 or 54 segments . . . *Yermoia*
Male antennae bipectinate; antennae of both sexes with 55 to 77 segments . . . 29
- 29(28). Front flat; dorsal abdominal tufts absent . . . *Huapianus*
Front swollen; dorsal abdominal tufts present . . . *Ceratomyx*
- 30(17). Dorsal abdominal tufts present . . . 35
Dorsal abdominal tufts absent . . . 31
- 31(30). Hind wings with upper surface white, having complete, prominent black border . . . *Canelo*
Hind wings not as above . . . 32
- 32(31). Males with bipectinate antennae . . . *Hidalgo*
Males with serrate, fasciculate or simple antennae . . . 33
- 33(32). Males with epiphysis of fore tibia 70 to 75 percent of length of tibia . . . 34
Males with epiphysis of fore tibia 40 to 60 percent of length of tibia . . . *Mallomus* (in part)
- 34(33). Hind tibia of males with hair pencil . . . *Talca*
Hind tibia of males without hair pencil . . . *Dentalia*
- 35(30). Hind wings with upper surface white or pale grayish white . . . 36
Hind wings with upper surface dark gray, grayish brown, red or bicolored . . . 39
- 36(35). Male with row of setae ventrally on third abdominal segment . . . 37
Male without row of setae ventrally on third abdominal segment . . . 38
- 37(36). Antennae with about 78 segments; length of forewings 20 to 23 mm. long . . . *Aragua*
Antennae with from 57 to 66 segments; length of forewings 12 to 19 mm. long . . . *Aconagua*
- 38(36). Palpi with third segment more than one-half length of middle segment; antennae with about 72 segments . . . *Praeantarctia* (in part)
Palpi with third segment less than one-half length of middle segment; antennae with from 45 to 68 segments . . . *Cargolia*
- 39(35). Upper surface of fore and hind wings with same pattern and color; hind wings with vein Sc extending one-half to two-thirds length of cell . . . *Malleco*
Upper surface of fore and hind wings with different pattern and color; hind wings with vein Sc extending one-third to one-half length of cell . . . 40
- 40(39). Forewings with outer margin strongly projecting at vein M_3 ; outer margin of both wings deeply concave between veins . . . *Chrysomima*
Forewings with outer margin rounded; outer margin of both wings weakly dentate or rounded . . . 41
- 41(40). Males with epiphysis of fore tibia 30 to 35 percent of length of tibia . . . *Charca*
Males with epiphysis of fore tibia 40 to 50 percent of length of tibia . . . 42
- 42(41). Antennae with from 66 to 92 segments; length of forewings of males 18 to 23 mm., of females 18 to 26 mm. . . . *Anischnopteris*
Antennae with from 92 to 101 segments; length of forewings of males 23 to 24 mm., of females 25 to 26 mm. . . . *Quillaca*

BASED ON MALE GENITALIA¹

1. Uncus simple, straight, with apex having either one or two points, and without numerous setae on dorsal surface . . . 12
Uncus variously modified . . . 2
- 2(1). Uncus with large vertical setose process and dorsal pair of divergent processes . . . *Catocalopsis*
Uncus not as above . . . 3
- 3(2). Uncus slender, apex with dorsal and ventral processes, thickly setose . . . *Quillaca*
Uncus not as above . . . 4
- 4(3). Uncus with large, prominent dorsal pseudouncus, or with dorsal swelling and both types having dorsal group of capitate scales . . . 5
Uncus not as above . . . 8
- 5(4). Pseudouncus with terminal area broadly swollen . . . *Achagua*
Pseudouncus not as above . . . 6
- 6(5). Anellus with prominent lateral processes . . . 7
Anellus with lateral processes minute or absent . . . *Cidariophanes*
- 7(6). Uncus with either dorsal swelling or pseudouncus, both having prominent group of capitate scales . . . *Rucana*
Uncus with elongate pseudouncus, without capitate scales . . . *Nazca*
- 8(4). Gnathos U- or H-shaped and having two

¹ Males of *Chrysomima* and *Canelo* have not been studied and hence are not included.

- prominent sclerotized ventral processes 11
 Gnathos without ventral processes ... 9
 9(8). Uncus simple, tapering to pointed apex,
 with numerous elongate setae on dorsal
 surface 10
 Uncus with parallel-sided or hoodlike
 apical portion filled with numerous
 short setae *Ischnopteris*
 10(9). Gnathos with distal one-half spinose ...
 *Malleco*
 Gnathos not as above *Charca*
 11(8). Uncus with pair of elongate groups of setae
 extending ventrally across posterior
 end of that structure ... *Trichostichia*
 Uncus without these groups of setae ...
 *Anischnopteris*
 12(1). Processes of anellus prominent, sclero-
 tized 19
 Processes of anellus greatly reduced or ab-
 sent 13
 13(12). Gnathos V-shaped, heavily sclerotized,
 very attenuate, apically pointed, at least
 as long as uncus 14
 Gnathos not as above 17
 14(13). Anellus with very long slender posterior
 projection, narrowed and pointed api-
 cally, approximately equal in length to
 length of uncus *Poya*
 Anellus broad, without elongate posterior
 projection 15
 15(14). Valve with costa broadly swollen ... 16
 Valve with costa not swollen ... *Arauco*
 16(15). Costa triangular, evenly and broadly
 swollen apically, apex rounded or
 slightly angled *Omaguacua*
 Costa with apex of swelling narrowed,
 curved and either dentate or spinose
 *Dentinalia*
 17(13). Uncus very slender, with parallel sides;
 socius present 18
 Uncus broad, swollen apically; socius ab-
 sent *Animomyia*
 18(17). Gnathos with spinose median area; ae-
 deagus 1.2 to 1.4 mm. long .. *Yermoia*
 Gnathos without spines on median point;
 aedeagus 1.7 mm. long ... *Parexcelsa*
 19(12). Valves complex, having basal spine,
 transverse raised ridge, median projec-
 tion or median ridge 20
 Valves simple 26
 20(19). Valves with large basal spine
 *Holochroa* (in part)
 Valves without basal spine 21
 21(20). Valves with prominent transverse ridge
 22
 Valves without transverse ridge 23
 22(21). Aedeagus 0.4 to 0.6 mm. wide; valves with
 pointed apex *Betulodes*
 Aedeagus 0.2 to 0.3 mm. wide; valves with
 rounded apex *Phaeoura*
 23(21). Process of anellus Y-shaped, with fused
 bases *Huapianus*
 Processes of anellus separate 24
 24(23). Valves with median triangular sclerotized
 projection near costa; socius very long,
 digitate *Tarma*
 Valves and socius not as above 25
 25(24). Valves with median or distal arm
 *Mallomus* (in part)
 Valves with longitudinal setose ridge ...
 *Hidalgo*
 26(19). Gnathos present 27
 Gnathos absent *Thyrintina*
 27(26). Anellus with lateral processes symmetri-
 cal 28
 Anellus with right lateral process at least
 twice as wide as one on left side
 *Aragua*
 28(27). Anellus with lateral processes having sin-
 gle, posteriorly directed point 29
 Anellus with lateral processes bifurcate .
 *Holochroa* (in part)
 29(28). Anellus with lateral processes equal to or
 shorter than length of uncus 31
 Anellus with lateral processes longer than
 uncus 30
 30(29). Uncus 0.4 mm. in length; anellus with
 very long median process .. *Aethaloida*
 Uncus 0.8 mm. in length; anellus without
 median process *Talca*
 31(29). Uncus with apex slightly broadened and
 having two apical spines or weakly bi-
 furcate apex *Papago*
 Uncus tapering to single point 32
 32(31). Gnathos with broad median area having
 prominent curved lateral processes at
 each end *Cundinamarca*
 Gnathos not as above 33
 33(32). Vesica without spines 34
 Vesica with spines 35
 34(33). Valves with costal fold bearing two to sev-
 en long (0.35 to 0.50 mm.) spines ...
 *Salasaca*
 Valves without costal fold and without
 spines *Gabriola*
 35(33). Gnathos with spinose median area
 *Cargolia*
 Gnathos with simple pointed median area
 36
 36(35). Anellus with processes 0.25 to 0.50 mm.
 long, straight, thick *Ceratonyx*
 Anellus with processes 0.40 to 1.50 mm.



FIGS. 2-5. Adult males. 2. *Aethaloida packardaria* (Hulst), San Diego, California, March 31, 1910 (L. E. Ricksecker; AMNH). 3. *Holochroa dissociaria dissociaria* Hulst, Southwestern Research Station of the AMNH, Arizona, August 9, 1956 (E. Ordway; AMNH). 4. *Phaeoura mexicanaria* (Grote), Horseshoe Springs Camp, New Mexico, July 30, 1961 (F., P., and J. Rindge; AMNH). 5. *Betulodes crebraria* (Guenée), Region Chapare, Bolivia, August 1950 (AMNH). All $\times 1.3$.

- long, when shorter than 0.50 mm., not straight and thick 37
- 37(36). Anellus 0.4 to 0.6 mm. long; gnathos V-shaped *Aconcagua*
Anellus 0.7 to 1.8 mm. long; gnathos either wishbone- or W-shaped 38
- 38(37). Gnathos wishbone-shaped, and from one-half to equal to length of uncus .. 39
Gnathos W-shaped, and one-third length of uncus *Praeantarctia*
- 39(38). Aedeagus 1.9 to 2.8 mm. long; vesica with single sclerotized piece *Azuayia*
Aedeagus 3.5 to 4.0 mm. long; vesica with numerous spines ... *Mallomus* (in part)

GROUP 1

The species of the included genera can be recognized when having most of the follow-

ing characters: Adults with the tongue reduced or vestigial; female palpi reduced, smaller than those of the males of the same species; male antennae bipectinate, some genera having one or two enlarged setae at the end of each pectination; patagia with broad scales overlying some hairlike scales; males without a row of setae ventrally on the third abdominal segment and usually without a hair pencil on the hind tibia; and members of three genera having only one pair of hind tibial spurs. In the male genitalia the uncus is always simple and it is usually 1 mm. or less in length; members of three genera are without any socius, and when this structure is present it is low and padlike. In the female genitalia the apophyses posteriores usually have a median attachment to the papillae an-

ales; the corpus bursae is not longer than twice the length of the apophyses posteriores; the posterior portion of the corpus bursae is usually without striations; and the signum, when present, is flat and only on the surface of the corpus bursae.

The members of the included genera are primarily Nearctic in distribution, occurring in southern Canada, the United States and temperate Mexico. Two genera extend south as far as Paraguay and Argentina; one of these occurs in the Greater Antilles and the Galapagos Islands.

GENUS *AETHALOIDA* MCDUNNOUGH

Figures 1, 2, 12, 21

Aethalodes Hulst, 1896, p. 321 (preoccupied by *Aethalodes* Gahan, 1888, p. 270).

Aethaloidea McDunnough, 1920, p. 37 (replacement name for *Aethalodes* Hulst).

DIAGNOSIS: Moths of this genus are recognized by the upper surface of the wings being unicolorous brown or grayish brown, the females being larger than the males, the male antennae bipectinate, with the pectinations extending to the apex, each pectination having one enlarged seta at its end, and the hind tibia with two pairs of spurs. The male genitalia are without a socius, the gnathos is U-shaped and weakly sclerotized, and the anellus has a posteromedian extension. In the female genitalia the apophyses anteriores have a median attachment to the papillae anales, and the signum is round and flat.

ADULTS: Head with eyes of both sexes large, those of female smaller than those of male; front flat, slightly wider in females, having weak transverse ridge ventrally; palpi of male with second segment about 0.5 mm. long, third segment 0.2 mm., of female smaller; antennae of 38 to 49 segments, with female tending to have more segments than male, bipectinate in male, simple in female; males with longest antennal pectinations about 1.5 mm. long, seven to eight times as long as basal segments, pectinations arising basally on segments, extending to apex, each pectination having double row of slender setae below and with one thicker, angled seta at apex. Thorax slender, without metathoracic tufts; fore tibia with epiphysis of male arising at about one-fifth length of tibia, and nearly as

long as that structure, of female arising at three-fifths length, and about one-third length of tibia; hind tibia with two pairs of spurs. Abdomen slender, barely extending beyond hind wings, with dorsal tufts.

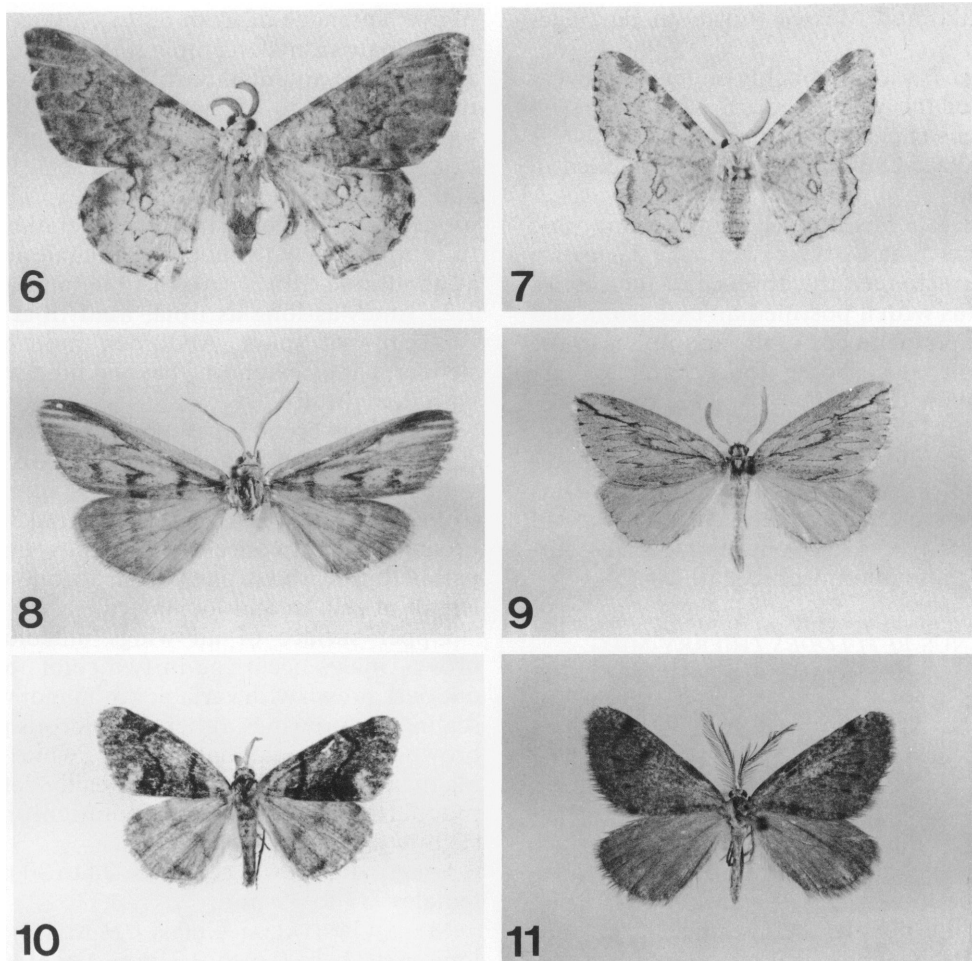
Forewings broad, apex angulate, outer margin rounded, tending to be weakly concave between veins in females; with one accessory cell; vein R_1 joining Sc, R_2 free, R_{3+4} stalked, R_5 from cell; mdc and ldc curved. Hind wings broad, outer margin prominently scalloped; Sc paralleling R for one-third length of cell; m and ldc angled.

Upper surface of all wings unicolorous brown or grayish brown, females grayer than males; forewings with weakly defined t. a. line, complete, sinuous t. p. line, small white discal spot present in most specimens; hind wings with complete extradiscal line. Under surface unicolorous, similar to upper surface but with broader, less sinuate outer cross lines and dark discal spots present on all wings.

Length of Forewings: Males, 12 to 17 mm.; females, 14 to 21 mm.

MALE GENITALIA: Uncus 0.25 mm. long, with base 0.20 mm. wide, broad, weakly tapering to point, ventral surface with elongate setae; socius absent; gnathos membranous, U-shaped; valves simple, costa sclerotized, apex rounded; processes of anellus elongate, slender, straight, each apex narrowed, posterior and anterior sections of approximately same length, former wider than latter, anterior end attached to basal portion of anellus; anellus heavily sclerotized, digitate, twice as long as uncus, arising anteriorly in two lateral depressions, tapering posteriorly, apex rounded or bluntly pointed; tegumen without median thickening; saccus bluntly angled anteriorly; aedeagus 1.8 to 2.1 mm. long, 0.1 mm. wide, posterior end with slender sclerotized strip; vesica with single spine 0.2 mm. long.

FEMALE GENITALIA: Sterigma membranous, ostium bursae funnel-shaped, lamella antevaginalis a very slender rodlike antero-ventral structure; ductus bursae sclerotized, slender, elongate, three or four times longer than wide; ductus seminalis arising on right side from small digitate sac; corpus bursae membranous, rounded, about 1.25 times longer than apophyses posteriores; signum large, flat, with elongate rays, having elliptical



FIGS. 6-11. Adult males. 6. *Thyriniteina arnobia arnobia* (Stoll), Kartabo, British Guiana, June 4, 1920 (AMNH). 7. *Thyriniteina arnobia quadricostaria* (Herrich-Schäffer), Sierra Maestra, Cuba, January 30, 1930 (AMNH). 8. *Papago arizonensis* (Capps), paratype, Chiricahua Mountains, Arizona (AMNH). 9. *Parexcelsa ultraria* Pearsall, cotype, San Diego, California, October 14, 1911 (L. E. Ricksecker; AMNH). 10. *Gabriola dyari dyari* Taylor, Dayton, Oregon, July 12, 1960 (R. Albright; AMNH). 11. *Animomyia smithii smithii* (Pearsall), Palm Springs, California, March 17, 1943 (A. H. Rindge; AMNH). All $\times 1.25$.

opening on outer surface of corpus bursae. Papillae anales somewhat rectangular in lateral view, with longitudinal median ridge; apophyses with median attachment; apophyses posteriores 1.2 to 1.5 mm. long, apophyses anteriores 1.0 to 1.3 mm. in length.

EARLY STAGES: These have been described and illustrated by Comstock ("1937" [1938], p. 114, pl. 47 [mature larva]; 1963, p. 195, fig. 1A-D [egg, first and last instar larvae, pupa]).

FOOD PLANTS: *Ceanothus* (Rhamnaceae) and *Adenostoma* (Rosaceae; both from Comstock, *op. cit.*).

TYPE SPECIES: *Hemerophila packardaria* Hulst; by original designation (for *Aethalodes* Hulst, 1896). *Aethaloida* was proposed as the objective replacement name for *Aethalodes* and hence has the same type species.

DISTRIBUTION: United States (California, including the Channel Islands off southern

California) and Mexico (northern Baja California).

FLIGHT PERIOD: Probably on the wing every month of the year although I have seen no specimens caught in January.

REMARKS: Only one species is included in this genus.

Aethaloida has the following apomorphic characters that distinguish it: the lack of a metathoracic tuft, the absence of the socius, an anellus with a postmedian extension, and a median attachment of the apophyses to the papillae anales. These four characters are shared with many of the species of *Animomyia* and *Thyriniteina*; however, the former genus has nine additional apomorphic states not found in *Aethaloida*, and *Thyriniteina* has eight (see tables 2, 4, and 6). *Animomyia* and *Thyriniteina* have only one character in common in these apomorphic states.

GENUS *BETULODES* THIERRY-MIEG

Figures 1, 5, 13

Betulodes Thierry-Mieg, 1904, p. 183. Rindge, 1961b, pp. 95–102, pl. 18, figs. 1–7, pl. 19, figs. 1, 2, text figs. 19–22, 30, 31.

DIAGNOSIS: The included moths are recognized by their large size, the upper surface of the wings being a unicolorous dark to medium brown with varying amounts of white scaling, the females being much larger and having more white scaling above than the males, the male antennae bipectinate, the very long pectinations extending to the apex, each pectination having two enlarged setae at its end, and the hind tibia with two pairs of spurs. The male genitalia have the gnathos U-shaped and partly to completely sclerotized, the broad valves have a transverse sclerotized ridge, the anellus has three points posteriorly, and the vesica is unarmed. The female genitalia have the apophyses anteriores with a median attachment to the papillae anales, the corpus bursae is more than twice the length of the apophyses posteriores, and the signum is large and well sclerotized.

ADULTS: Head with eyes of both sexes large; front flat or weakly convex; palpi of male rising to middle of eyes, second segment 1.0 to 1.5 mm. long, third segment 0.2 to 0.4 mm., of female smaller, not reaching middle

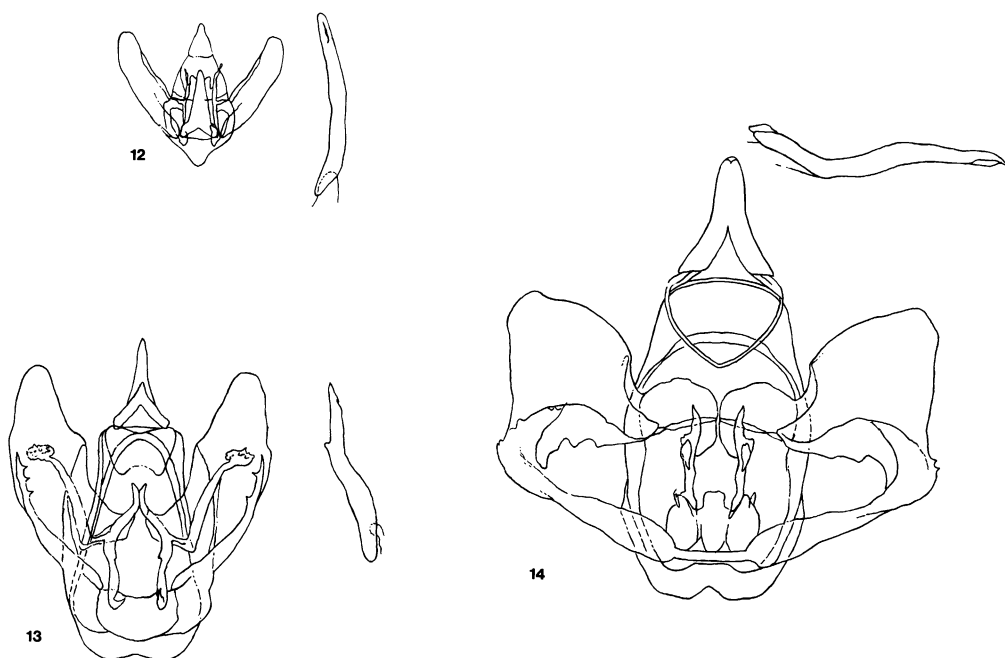
of eye; antennae of from 68 to 75 segments, bipectinate in male, simple in female; males with longest antennal pectinations 1.5 to 2.8 mm. long, 10 to 15 times as long as basal segments, extending to apex, each pectination having double row of slender setae below and with two thicker setae at apex. Thorax moderately slender, with small metathoracic tufts, fore tibia with apophysis of male arising at about one-fifth length of tibia, and about 1.25 times as long as tibia; hind tibia with two pairs of spurs. Abdomen moderately slender, barely extending beyond hind wings, with dorsal tufts.

Forewings broad, apex blunt, weakly concave between veins; with one accessory cell; vein R_1 joining Sc, R_2 free, R_{3+4} stalked, R_5 from cell; mdc and ldc curved. Hind wings broad, strongly concave between veins; Sc paralleling R about one-fourth to one-third length of cell; m and ldc angled.

Upper surface of all wings unicolorous brown, males occurring in two color forms, one dark brown with variable amount of white scaling on forewings, other unicolorous paler brown, with females having more white scaling than males; all wings with weakly defined maculation. Under surface unicolorous, slightly paler than upper surface.

Length of Forewings: Males, 24 to 30 mm.; females, 37 to 49 mm.

MALE GENITALIA: Uncus 0.9 to 1.0 mm. long, with base 0.6 to 0.7 mm. wide, either broad or slender, tapering to apex, lateral margins straight or concave; socius small, padlike, with from 10 to 20 setae; gnathos membranous or partly sclerotized, very slender laterally, U-shaped; valves complex, broad, costa broadly swollen basally, heavily sclerotized, not attaining pointed apex of valve, with elongate, diagonal, raised, sclerotized ridge, sacculus enlarged basally, extending as far as diagonal ridge; processes of anellus heavily sclerotized, slender, posterior arm elongate, curved, bare or with closely appressed setae, median arm either straight and projecting ventrally or curved and partially combined with posterior arm, latter relatively short, connected to lateral points from anellus; anellus wider than long, with pair of lateral points and with or without small median projection; tegumen with partial or com-



FIGS. 12–14. Male genitalia. 12. *Aethaloida packardaria* (Hulst), Hat Creek Ranger Station, California, July 3, 1947 (F. H. Rindge; AMNH). 13. *Betulodes crebraria* (Guenée), Panama (AMNH). 14. *Phaeoura mexicanaria* (Grote), Spring Creek, Oregon, June 14, 1955 (J. H. Baker; AMNH).

plete median thickening; saccus rounded or truncate anteriorly; aedeagus 2.1 to 3.3 mm. long, 0.4 to 0.6 mm. wide, varying from a simple tube to a slightly curved object with lateral projection and heavily sclerotized, flat apex; vesica unarmed.

FEMALE GENITALIA: Sterigma with sclerotized lamellae extending antieriad of ostium bursae; ductus bursae sclerotized, short, tapering anteriorly, twice as long as wide; ductus seminalis arising at junction of ductus bursae and corpus bursae either dorsally or on right side; corpus bursae membranous, elongate, about 2.5 to 3.0 times longer than apophyses posteriores; signum large, flat, lateral and anterior margins with short to moderate projections. Papillae anales with median attachment to apophyses posteriores.

EARLY STAGES: Unknown.

FOOD PLANTS: Unknown.

TYPE SPECIES: *Amphidasys crebraria* Guenée; by original designation.

DISTRIBUTION: From southern Mexico to Brazil, Paraguay, and Bolivia.

FLIGHT PERIOD: Probably on the wing every month of the year although I have seen no specimens caught in August.

REMARKS: Four species are included in this genus (see Rindge, 1961b, for generic revision and descriptions of species).

Betulodes is distinguished by the following apomorphic characters: two elongate setae at the end of each male antennal pectination, complex valves, absence of spines in the vesica, the corpus bursae being more than twice as long as the apophyses posteriores, and by the shape of the signum. Most or all the species of *Phaeoura* and *Holochroa* may have the first four of these states; both of these two genera have but one spine on the hind tibia, whereas *Betulodes* has two. In addition, *Phaeoura* has a swollen front; *Holochroa* differs from both *Betulodes* and *Phaeoura* by the apomorphic characters of having the length of the processes of the anellus shorter than the length of the uncus, by having a posterior extension of the anellus, and by the differently shaped signum.

GENUS *PHAEOURA* HULST

Figures 1, 4, 14, 22

Phaeoura Hulst, 1896, p. 359. Rindge, 1961b, pp. 102–131, pl. 19, figs. 3–11, pl. 20, figs. 1–8, pl. 21, figs. 1–5, 7, text figs. 1–17, 23, 24, 32–40. McGuffin, 1981, p. 86.

Nacophora Hulst, 1896, p. 360. Rindge, 1961b, p. 102 (placed as synonym of *Phaeoura*).

DIAGNOSIS: The moths of this genus are recognized by the upper surface of the wings being various shades of unicolorous brown or brownish black, rarely black (melanistic form) or with basal and outer areas white (females of some species), with median area of forewing tending to be darker than adjacent areas, the females being larger than the males, the male antennae bipectinate, with the pectinations extending to the apex, each pectination having one enlarged seta at its end, and the hind tibia with terminal pair of spurs only. The male genitalia have a socius, the slender gnathos is U-shaped and sclerotized, the broad valves have a heavily sclerotized, dentate transverse structure medially, and the vesica is unarmed. In the female genitalia the apophyses posteriores have a median attachment to the papillae anales, and are without a signum.

ADULTS: Head with eyes of both sexes large, somewhat elliptical, those of female tending to be slightly smaller than those of males; front weakly swollen; palpi of male with second segment 0.7 to 1.0 mm. long, third segment 0.3 to 0.5 mm., of female smaller; antennae of 60 to 75 segments, bipectinate in male, simple or shortly bipectinate in female; males with longest antennal pectinations 1.4 to 1.8 mm. long, seven to 12 times as long as basal segments, pectinations arising basally on segments, extending to apex, each pectination having double row of slender setae below and with one thicker seta at apex. Thorax moderately stout, with metathoracic tuft; fore tibia with epiphysis of male arising between one-fourth and one-half length of tibia, and being between 0.7 and 1.25 times as long as tibia, of female arising between middle and two-thirds length of tibia, and between one-fifth and one-ninth length of segment; hind tibia with terminal pair of spurs

only. Abdomen barely extending beyond hind wings, with prominent dorsal tufts.

Forewings broad and pointed, outer margin oblique, smooth; venation variable, usually with one accessory cell, sometimes without any or with two; vein R_1 either joining Sc or uniting with R_2 , R_2 either free or forming R_{1+2} , R_{3+4} stalked, R_5 from cell; mdc and ldc angled. Hind wings broad, outer margin weakly scalloped; Sc approximate to R for one-fourth to two-fifths length of cell; m and ldc angled.

Upper surface of all wings various shades of unicolorous brown or brownish black, rarely black (melanistic form) or with basal and outer areas white (females of some species); forewings with median area tending to be darker than adjacent areas, set off by dark angulate or curved t. a. and t. p. lines; hind wings with dark extradiscal line. Under surface unicolorous, either same color as upper surface or gray, with cross lines repeated. Females either similar in color to males or dimorphic, with prominent white areas above.

Length of Forewings: Males, 17 to 28 mm.; females, 22 to 35 mm.

MALE GENITALIA: Uncus 0.6 to 1.4 mm., with base 0.5 to 1.0 mm. wide, either slender with parallel sides or moderately broad with tapering sides, apex curved and terminating in sclerotized point, dorsal and ventral surfaces finely setose, some species with elongate setae from anterodorsal area; socius small, padlike, with from 12 to 40 setae; gnathos narrow, sclerotized, U-shaped, with or without slight median extension or narrow gap; valves complex, short, broad, costa broadly swollen basally, heavily sclerotized, not attaining rounded apex of valve, with prominent, dentate, heavily sclerotized transverse structure, sacculus enlarged basally, extending as far as sclerotized structure, posterior end of sacculus either slightly swollen or with small rounded swelling; processes of anellus heavily sclerotized, either in form of vertical, apically bifurcate, bare process or as elongate arms, posterior ones with closely appressed setae; anellus wider than long, with pair of lateral points and with or without median projection; tegumen without median thick-

ening; saccus broad, anterior margin truncate or weakly concave medially; aedeagus 1.6 to 3.1 mm. long, 0.2 to 0.3 mm. wide, apex rounded or pointed; vesica unarmed.

FEMALE GENITALIA: Sterigma with sclerotized quadrate or elongate lamella postvaginalis, lamella antevaginalis either a weakly sclerotized strip or membranous; ductus bursae sclerotized, short, slightly tapering anteriorly, twice as long as wide; ductus seminalis arising dorsally or on right side from posterior end of corpus bursae; corpus bursae membranous, swollen, 1.0 to 1.5 times as long as apophyses posteriores; signum absent, rarely weakly indicated. Papillae anales elongate, with pointed apex and narrowed anteriorly in lateral view, slender and with posterior portion concave in ventral view; apophyses with median attachment; apophyses posteriores 1.7 to 2.6 mm. long, apophyses anteriores 0.9 to 1.8 mm. in length.

EARLY STAGES: Described for *Phaeoura quernaria* (J. E. Smith), *cristifera* Hulst (references to both in Rindge, 1961b), *kirkwoodi* Rindge (McGuffin, 1967, p. 1224, figs. 1–8), and *mexicanaria* (Grote) (Grant, 1962, p. 56; Sugden, 1968, pl. 27; Dewey, 1972, p. 306, fig. 1B–D). McGuffin (*op. cit.*; 1981, figs. 158b, g–k, 173h, 186g–j, 187d) has presented generic characteristics for the early stages.

FOOD PLANTS: *Quercus*, *Betula*, *Salix*, *Populus* (*quernaria*; McGuffin, 1981), *Salix* (*cristifera*), *Alnus* (*kirkwoodi*), *Pinus ponderosa* Douglas (*mexicanaria*).

TYPE SPECIES: *Eubyja mexicanaria* Grote for *Phaeoura*; by original designation. *Phalaena quernaria* J. E. Smith for *Nacophora*; by original designation.

DISTRIBUTION: Southern Canada, United States, Mexico, and Central America (Guatemala, Belize).

FLIGHT PERIOD: Every month of the year except October and December.

REMARKS: Twelve species are included in this genus (see Rindge, 1961b, for generic revision and descriptions of species).

Phaeoura is distinguished by the following apomorphic characters: a swollen front, one pair of spurs on the hind tibia, complex valves, and with the signum reduced or absent. No

other genus has this combination of characters.

GENUS *HOLOCHROA* HULST

Figures 1, 3, 15, 23

Holochroa Hulst, 1896, p. 352. Rindge, 1961b, pp. 140–145, pl. 23, figs. 3–8, text figs. 18, 28, 29, 45, 46; 1970, pp. 1–7, figs. 1–7.

Gloduria Dyar, 1924, p. 18. Rindge, 1961b, p. 140 (placed as synonym of *Holochroa*).

DIAGNOSIS: Moths of this genus are recognized by the upper surface of the wings being gray or brown, with the hind wings either concolorous with or paler than the forewings, the females being larger than the males, the male antennae bipectinate, with the pectinations extending to the apex, each pectination having one enlarged seta at its end, and the hind tibia with the terminal pair of spurs only. The male genitalia have a small socius, the gnathos is U-shaped, weakly sclerotized or partially obsolete, and the anellus has a short median posterior extension. In the female genitalia the apophyses posteriores have a median attachment to the papillae anales, and the ductus bursae is shorter than wide.

ADULTS: Head with eyes of both sexes large, of approximately equal size; front either flat and rounded, or raised and extending well beyond eyes; palpi of male rising to about one-third diameter of eyes, with second segment 0.5 to 0.6 mm. long, third segment 0.2 to 0.6 mm., of female usually smaller; antennae of 52 to 58 segments, bipectinate in male, simple in female; males with longest antennal pectinations 0.9 to 1.0 mm. long, six to eight times as long as basal segments, pectinations arising basally on segments, extending to apex, each pectination having double row of slender setae below and one thicker elongate seta at apex. Thorax moderately slender, with metathoracic tuft; fore tibia with epiphysis of male very long, arising at one-third length of tibia, and from four-fifths to as long as that structure, of female arising at middle, and about one-half length of tibia; hind tibia with terminal pair of spurs only. Abdomen moderately slender, extending slightly beyond hind wings, with dorsal tufts.

Forewings either broad with rounded outer margin or elongate with oblique outer margin; with one accessory cell; vein R_1 joining Sc, R_2 free, R_{3+4} stalked, R_5 from cell; mdc and ldc angled. Hind wings broad to elongate, outer margin weakly scalloped; Sc paralleling R to about middle of cell; m and ldc angled.

Upper surface of broad-winged species concolorous pale gray or brown, of elongate-winged species either unicolorous gray or with dark gray forewings and whitish gray hind wings having darkened median area; forewings with weakly defined t. a. line and more prominent t. p. line, discal spots prominent or obsolescent; hind wings with complete or partial extradiscal line. Under surface concolorous pale gray or pale brown, with either outer cross lines and large discal spots present in broad winged and unicolorous gray species or maculation obsolescent in darker colored species.

Length of Forewings: Males, 12 to 20 mm.; females, 18 to 25 mm.

MALE GENITALIA: Uncus 0.4 to 0.7 mm. long, with base 0.5 to 0.6 mm. wide, tapering, apex variable, in form of sharp point, flattened ridge, or ridge plus point, with a few thin setae along shaft; socius absent or weakly represented; gnathos weakly sclerotized, U-shaped, complete or with median portion apparently absent; valves simple or with prominent, larger mediobasal and smaller saccular spines, costa sclerotized, not attaining rounded or bluntly pointed apex of valve, sacculus slightly swollen; processes of anellus heavily sclerotized, either as a terminally bifurcate ventral projection or with posteriorly directed arms only; anellus with elongate, tapering median process; tegumen without median thickening; saccus broad, anterior margin truncate or weakly concave medially; aedeagus 1.6 to 2.6 mm. long, 0.25 to 0.35 mm. wide, posterior end round or sharply pointed; vesica either unarmed, with small weakly sclerotized strip or with large curved cornutus.

FEMALE GENITALIA: Sterigma weakly sclerotized or membranous, with lamella antevaginalis U-shaped, either broad and flat or as U-shaped rod, extending anteriorly of ostium; ductus bursae sclerotized, short, broad,

being about twice as wide as long; ductus seminalis arising dorsally at junction of ductus bursae and corpus bursae; corpus bursae membranous, ovoid, with or without short posterior narrowed area, varying in length from about 1.3 to 2.0 times longer than apophyses posteriores; signum large, flat, anterior margin variably rayed. Papillae anales tapering posteriorly in lateral view, concave medially in ventral view; apophyses with median attachment to sclerotized band; apophyses posteriores 1.6 to 1.8 mm. long, apophyses anteriores 0.6 to 0.7 mm. in length.

EARLY STAGES: Peterson (1968) has published a photograph and brief description of the eggs of *Holochroa dissociaria*. Heitzman ("1981" [1982]) has described and illustrated the mature larva of the same species.

FOOD PLANTS: *Juniperus* spp. (Cupressaceae) for the above species (Heitzman, *op. cit.*).

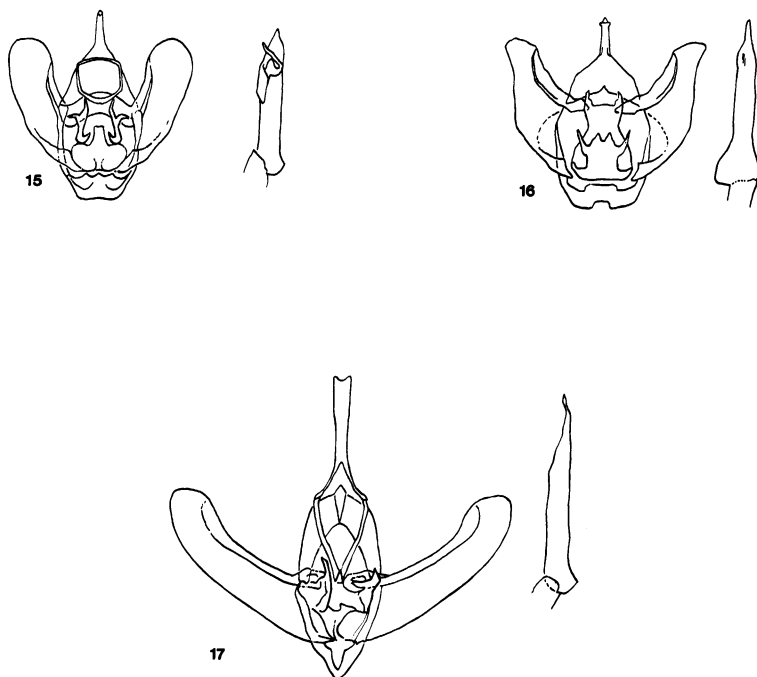
TYPE SPECIES: *Tornos dissociarius* Hulst for *Holochroa*; by original designation. *Gloduria dyslogista* Dyar for *Gloduria*; by monotypy. *G. dyslogista* is a synonym of *unicolor* (Druce) (Rindge, 1961b).

DISTRIBUTION: United States (southwestern) and western Mexico, including the Tres Marias Islands.

FLIGHT PERIOD: February through October.

REMARKS: Four species are included in this genus (see Rindge, 1961b, 1970 for generic revision and descriptions of species). Two endemic species occur on the Tres Marias Islands, a group of small islands 100 km. west of Nayarit, Mexico; both have been captured on the two larger islands, namely María Madre Island and María Magdalena Island.

Holochroa can be recognized by the following apomorphic characters: the presence of the posteromedian extension of the anellus, and the ductus bursae being shorter than wide. Other apomorphic states are present in some or most of the included species, and these include one pair of spurs on the hind tibia, the third segment of the palpi being more than one-half the length of the middle segment, the front raised and extending well beyond the eyes, and the absence of the socius.



FIGS. 15–17. Male genitalia. 15. *Holochroa dissociaria dissociaria* (Hulst), Garden Canyon, Arizona, July 30, 1949 (W. J. and J. W. Gertsch; AMNH). 16. *Thyrinteina arnobia arnobia* (Stoll), Blumenau, Brazil, January (Pohl; AMNH). 17. *Papago arizonensis* (Capps), Ramsey Canyon, Arizona, May 3, 1968 (R. F. Sternitzky; AMNH).

GENUS *THYRINTEINA* MÖSCHLER

Figures 1, 6, 7, 16, 24

Thyrinteina Möschler, 1890, p. 268. Rindge, 1961b, pp. 131–140, pl. 21, fig. 6, pl. 22, figs. 1–8, pl. 23, figs. 1, 2, text figs. 25–27, 41–44; 1969, pp. 39, 40, figs. 5, 6; 1973a, pp. 26–29, figs. 15–18, 35, 36, 47, 48.

DIAGNOSIS: The included species are recognized by the upper surface of the wings being concolorous white, gray or brown, the females being much larger than the males, the male antennae bipectinate, with the apex of each antenna having from seven to 10 simple segments, each pectination having one enlarged seta at its end, and the hind tibia with the terminal pair of spurs only. The male genitalia may or may not have a weakly defined socius, have a membranous gnathos, possess simple valves, have two pairs of processes of the anellus, and the posterior margin

of the anellus has two projections. In the female genitalia the apophyses posteriores have a median attachment to the papillae anales, the corpus bursae is more than twice as long as the apophyses posteriores, and the signum is elliptical.

ADULTS: Head with eyes of both sexes large; front weakly convex, wider in female than in male; palpi of male rising to middle of eye, second segment 0.7 to 0.8 mm. long, third segment 0.2 mm., of female smaller; antennae of 35 to 45 segments, bipectinate in male, simple or shortly serrate in female; males with longest antennal pectinations 1.3 to 1.5 mm. long, six to eight times as long as basal segments, pectinations arising basally on segments, with terminal seven or eight segments simple, each pectination having double row of slender setae below and with one thicker, angled seta at apex. Thorax moderately slender, without metathoracic tuft; fore tibia of

male with epiphysis elongate, arising between one-fourth and one-third length of tibia, and equal in length to that segment, of female either with or without epiphysis, when present arising near middle of segment and being about two-fifths its length; hind tibia with terminal pair of spurs only. Abdomen of male as long as hind wings, of female slightly longer, and with small dorsal tufts in some species.

Forewings of male short, broad, and triangular, of female much larger and somewhat more pointed, outer margin evenly rounded; with one accessory cell; vein R_1 joining Sc, R_2 free, R_{3+4} stalked, R_5 from cell; mdc and ldc straight. Hind wings broad, outer margin more or less scalloped; Sc paralleling R for about one-tenth length of cell; m and ldc straight.

Upper surface of all wings unicolorous white, gray or brown, except for some South American males with forewings browner than hind wings; forewings with dark, slender, curved or angulate t. a. and t. p. lines, and many specimens with white discal spot; hind wings with angulate extradiscal line and large discal spot. Under surface unicolorous white, gray, or brown and white, with maculation reduced or absent.

Length of Forewings: Males, 15 to 20 mm.; females, 25 to 32 mm.

MALE GENITALIA: Uncus variable, either elongate and terminating in single point, or short, subtriangular, and with two apical points, 0.3 (latter) to 0.6 (former) mm. long, with base 0.8 to 1.0 mm. wide; socius weakly represented or absent, when present bearing up to seven setae; gnathos membranous or absent; valves short, very wide basally, costa broadly swollen basally, heavily sclerotized, not attaining bluntly pointed apex of valve, inner face of valve and sacculus either undifferentiated or with area of short, thick setae and sacculus enlarged basally; processes of anellus heavily sclerotized, either as single, short, posteriorly or posteromedially curved arms or as elongate, straight posterior arms and with short ventral spur on each side; anellus variable, either with elongate bifurcate projection or with four pointed projections (accompanying short anellus processes), or with single, elongate, tapering process (accompanying long processes); tegumen either without median thickening or with partial

one; saccus broad, apically truncate or weakly concave medially; aedeagus 1.2 to 1.7 mm. long, 0.25 to 0.30 mm. wide, varying from simple tube to having broadly swollen anterior end, posteriorly with ventral surface sclerotized, sharply pointed apically; vesica with either a spine having a large base or a weakly sclerotized piece, dentate or with terminal spines.

FEMALE GENITALIA: Sterigma with elongate, slender lamella postvaginalis, lamella antevaginalis a slender, sclerotized U-shaped rod extending anteriorly to encircle ostium, complete or partially obsolescent medially; ductus bursae evenly sclerotized, broad, with length approximately equal to width; ductus seminalis arising dorsally or on right side; corpus bursae with posterior end weakly sclerotized and with longitudinal striations, much larger anterior portion membranous, ovate, entire corpus bursae approximately twice as long as apophyses posteriores; signum either absent or small, flat, weakly sclerotized, tending to be round or quadrate, usually with lateral portions extended as small, inwardly directed points. Papillae anales with posteroventral angle when seen laterally, ventrally with median ridge, concave posteriorly; apophyses with median attachment to sclerotized band; apophyses posteriores 1.5 to 2.5 mm. long, apophyses anteriores 1.0 to 2.3 mm. in length.

EARLY STAGES: Apparently undescribed, except for the pupa of *T. arnobia picta* Rindge (Comstock and Vazquez, "1963" [1964], p. 263, fig. 18).

FOOD PLANTS: *Eucalyptus* spp. and citrus (Silva et al., 1968, p. 209) for *Thyriniteina arnobia arnobia*. Both of these are introduced plants; apparently the native host is not known.

TYPE SPECIES: *Boarmia quadricostaria* Herrich-Schäffer; by monotypy. *B. quadricostaria* is considered to be a subspecies of *Phalaena arnobia* Stoll (Rindge, 1961b).

DISTRIBUTION: From the United States (southern Texas) to Brazil and Argentina; it also occurs in the Greater Antilles (Cuba, Hispaniola, and Puerto Rico), and on the Galapagos Islands.

FLIGHT PERIOD: Every month of the year.

REMARKS: Seven species are known in this genus, which was revised by Rindge; four

species, one with several subspecies, are described in my papers (1961b, 1969). Poole (1968) described *trica* from Venezuela. Herbulot named two taxa from the Galapagos Islands; these were reviewed, redescribed, and both given specific status by Rindge (1973a).

Thyriniteina can be recognized by the apomorphic characters of having the pectinations of the male antennae not attaining the apex of that structure, the absence of the metathoracic tuft, only one pair of spurs on the hind tibia, the gnathos being absent or membranous, and the corpus bursae being more than twice as long as the apophyses posteriores.

PAPAGO, NEW GENUS

Figures 1, 8, 17, 25

Stenocharis, in part: Capps, 1950, pp. 12–14, pl. 4.

Ceratomyx, in part: Rindge, 1975, pp. 1–16, figs. 1–6, 13–15, 21–28, 40 (Group I only).

DIAGNOSIS: The included moths are recognized by their elongate wings, the hind wings being paler than the forewings, the females being larger than the males, the male antennae bipectinate, with the pectinations extending to, or nearly to, the apex, each pectination with small enlarged terminal seta at its apex, and the hind tibia with two pairs of spurs. The male genitalia are without a socius, the gnathos is V-shaped and has a pointed, recurved apex, and the processes of the anellus are broadly triangular. In the female genitalia the apophyses posteriores have a median attachment to the papillae anales, and the posterior portion of the corpus bursae is striated.

ADULTS: Head with eyes of both sexes large; front prominently raised, conical in male, less strongly so in female; palpi of male rising to one-third height of eye, second segment 0.5 to 0.8 mm. long, third segment 0.2 to 0.4 mm., of female larger; antennae of from 53 to 66 segments, bipectinate in male, serrate or shortly pectinate in female; males with longest antennal pectinations 0.5 to 0.6 mm. long, from 3.5 to 4.0 times as long as basal segments, pectinations arising basally or posteriorly on segments, extending to, or nearly to, the apex, each pectination having double

row of slender setae below and one slightly thicker seta at apex. Thorax slender, with small metathoracic tuft; fore tibia with epiphysis of male arising at about two-fifths length of tibia, and about two-thirds as long as that structure, of female arising at three-fifths length, and slightly less than half length of tibia; hind tibia with two pairs of spurs. Abdomen slender, extending beyond hind wings, dorsal tufts absent in male, present in female.

Forewings elongate, apex attenuate, outer margin straight or weakly rounded; with or without one accessory cell; vein R_1 free, vein R_2 either free, stalked with R_{2+5} or with R_{2+4} , R_3 either stalked or free; mdc and ldc curved or straight. Hind wings elongate, outer margin smooth; Sc paralleling R for about one-half length of cell; m and ldc angled.

Upper surface of forewings gray or grayish brown, with variable amounts of white scaling, females either similar to males or with more brown and less white scales, both sexes with t. a. and t. p. lines present; hind wings paler than forewings, with or without extradiscal line. Under surface of forewings gray or grayish brown, of hind wings white or grayish white, with cross lines absent and discal dots sometimes present.

Length of Forewings: Males, 12 to 19 mm.; females, 16 to 21 mm.

MALE GENITALIA: Uncus 0.85 to 1.15 mm. long, with base 0.4 to 0.6 mm. wide, dorso-ventrally curved, apex either flattened and having two widely separated points or ventral surface flattened and with two small more closely set points; socius padlike, with about 10 to 18 setae; gnathos heavily sclerotized, slender, V-shaped, with median area pointed and recurved; valves simple, slender, costa sclerotized, slightly widened distally, not reaching rounded apex of valve, sacculus weakly sclerotized, slightly swollen; processes of anellus single, arising from broad base, short, about one-half length of uncus, each sharply pointed apex curved posteriorly; anellus with posterior margin either bilobed or with median extension; tegumen with X-shaped median thickening; saccus tapering, bluntly pointed anteriorly; aedeagus 1.7 to 2.4 mm. long, 0.13 to 0.25 mm. wide, posterior end sclerotized and pointed ventrally; vesica unarmed.

FEMALE GENITALIA: Sterigma weakly sclerotized, scarcely differentiated, lamella anteginalis variable, either not differentiated, slightly asymmetrical, or as sclerotized, U-shaped rod extending antieriad of ostium; ductus bursae either heavily sclerotized, square or about twice as long as wide, or membranous and more elongate; ductus seminalis arising ventrally near junction of ductus bursae and corpus bursae; corpus bursae membranous, with or without weakly striated, narrowed posterior portion, anterior section ovate or elongate; signum present or absent, when present about 0.3 mm. wide, posteriorly rounded, concave anteriorly, with lateral indented points. Papillae anales short, rounded; apophyses with median attachment; apophyses posteriores 1.5 to 2.2 mm. long; apophyses anteriores 0.4 to 0.7 mm. in length.

EARLY STAGES: The last instar caterpillar and pupa of *arizonensis* were described and illustrated by Franclemont (1967), and summarized by Rindge (1975).

FOOD PLANT: *Vigueria multiflora* (Nuttall) Blake (Compositae; for *P. arizonensis*).

TYPE SPECIES: *Stenocharis arizonensis* Capps.

DISTRIBUTION: United States (Arizona) and Mexico (Durango to Hidalgo and Oaxaca).

FLIGHT PERIOD: May through August.

REMARKS: The five included species were treated as Group I in my 1975 revision of *Ceratonyx*, and were described in that paper. The species are *Papago arizonensis* (Capps), *P. crassus* (Rindge), *P. rhadinarius* (Dyar), *P. cornifrons* (Dyar), and *P. hoplitarius* (Dyar); all the preceding are new combinations.

Papago can be recognized by the following apomorphic characters: the presence of a hair pencil on the hind tibia of the male, the processes of the anellus being about half the length of the uncus, no spines in the vesica, and by the median point of attachment of the apophyses posteriores to the papillae anales.

ETYMOLOGY: The generic name is that of an Indian tribe of Arizona; its gender is masculine.

GENUS *PAREXCELSA* PEARSALL

Figures 1, 9, 18, 26

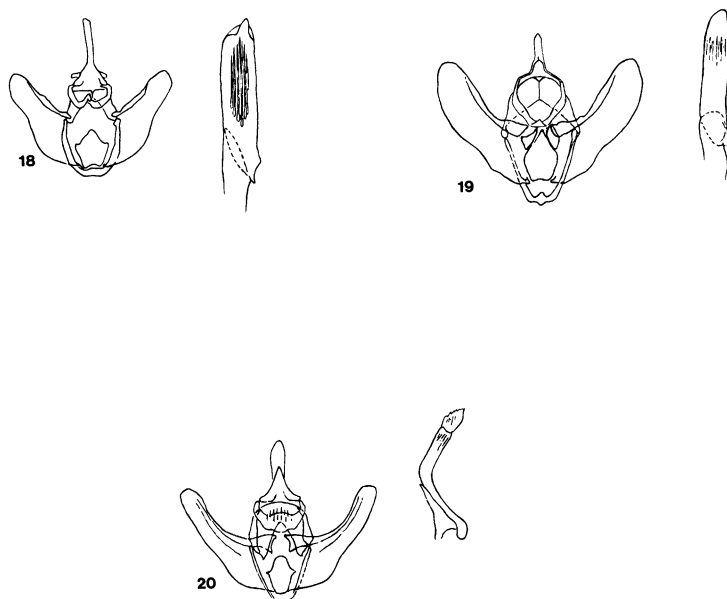
Parexcelsa Pearsall, 1912, p. 100. Sperry, 1948, p. 88.

DIAGNOSIS: Moths of this genus are recognized by the upper surface of the forewings being gray and the hind wings pale grayish white, the sexes having somewhat different forewing patterns, the females being slightly larger than the males, the male antennae bipectinate, with the pectinations extending to the apex, each pectination having one moderately large seta at its end, and the hind tibia with two pairs of spurs. The male genitalia have a small socius, the gnathos is V-shaped with its apex pointed and recurved, and the processes of the anellus are lacking. In the female genitalia the apophyses posteriores have an anterior attachment to the papillae anales, the corpus bursae has posterior striations and the anterior portion is swollen.

ADULTS: Head with eyes large, those of females smaller than those of males; front flat medially, swollen dorsally; palpi of male with second segment about 0.6 mm. long, third segment 0.2 mm., of female smaller; antennae of about 42 or 43 segments, bipectinate in male, simple in female; males with longest antennal pectinations about 1.1 mm. long, six times as long as basal segments, pectinations arising basally on segments, extending to apex, each pectination having double row of slender setae below and with one moderately thicker seta at apex. Thorax slender, without metathoracic tufts; fore tibia with epiphysis of male arising at one-third length of tibia and three-fourths length of that structure, of female arising in middle of tibia and one-half its length; hind tibia with two pairs of spurs. Abdomen slender in male, thicker in female, extending beyond hind wings, without dorsal tufts.

Forewings elongate, apex pointed, outer margin evenly rounded; with one accessory cell; vein R_1 free, R_2 from end of cell, free, R_{3+4} stalked, R_5 from cell; mdc and ldc angled. Hind wings broad in males, narrower in females, outer margin very weakly concave between veins; Sc paralleling R for one-half length of cell; m and ldc weakly angled.

Upper surface of forewings pale gray, with obsolescent cross lines extremely jagged, some males with dull black stripe just antieriad of vein Cu in cell and with second, bent stripe extending to apex, females without stripes; hind wings grayish white in males, dull white in females, without maculation except for ter-



FIGS. 18–20. Male genitalia. 18. *Parexcelsa ultraria* Pearsall, holotype, San Diego, California, October 9, 1910 (L. E. Ricksecker; AMNH). 19. *Gabriola dyari dyari* Taylor, 2 mi. NE Inverness, California, May 15, 1970 (J. A. Powell; AMNH). 20. *Animomyia smithii smithii* (Pearsall), Palm Springs, California, March 31, 1955 (A. H. Rindge; AMNH).

minal line. Under surface of forewings pale gray, of hind wings dull white or pale grayish white, without maculation except for terminal line.

Length of Forewings: Males, 14 to 17 mm.; females, 16 to 18 mm.

MALE GENITALIA: Uncus 0.7 mm. long, with base 0.45 mm. wide, slender, elongate, with parallel sides, dorsoventrally curved, apex with small point; socius small, not prominent, padlike, with from 8 to 10 setae; gnathos heavily sclerotized, slender and flattened laterally, V-shaped, apex pointed, slightly recurved, valves simple, costa sclerotized but not reaching rounded apex of valve, sacculus angled; without processes of anellus; anellus widened mediolaterally, extended posteriorly, 0.4 mm. long; tegumen with anterodorsal margin extended posteriorly to form transverse narrow strip below uncus; saccus broadly rounded; aedeagus 1.7 mm. long, 0.35 to 0.40 mm. wide, anterior end with slight projection, posteriorly with ventral surface lightly sclerotized and projecting; vesica with about 20 slender spines 0.2 to 0.6

mm. long in middle of aedeagus, when exerted vesica extending at about 45° angle.

FEMALE GENITALIA: Sterigma membranous, ostium bursae shallowly funnel shaped; ductus bursae sclerotized, short, slightly tapering anteriorly, twice as long as wide; ductus seminalis arising ventrally from posterior end of corpus bursae; corpus bursae elongate, curved, posterior end narrow, elongate, and with longitudinal ridges, anterior end swollen, short, squatly ovate, entire corpus bursae about twice as long as apophyses posteriores; signum in form of transverse ellipse, with elongate projection on each side anterolaterally. Papillae anales with posterior end pointed in lateral view, rounded in ventral view; apophyses with anterior attachment; apophyses posteriores 1.4 mm. long, apophyses anteriores 0.9 to 1.0 mm. in length.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPE SPECIES: *Parexcelsa ultraria* Pearsall; by original designation.

DISTRIBUTION: United States (California).

FLIGHT PERIOD: September, October, No-

vember, and one July record noted (possibly in error?).

REMARKS: Only one species is included in this genus.

Parexcelsa can be recognized by the following apomorphic characters, including the lack of tufts on both the metathorax and abdomen, the lack of processes of the anellus, the presence of striations on the posterior portion of the corpus bursae, and by the signum being in the form of a transverse ellipse and having anterolateral projections on each side. *Animomyia* lacks both sets of tufts and the processes, but differs in other characters. The only other group to have a striated posterior portion of the corpus bursae is found in some species of *Thyriniteina*; otherwise this latter genus has none of the listed apomorphic characters found in *Parexcelsa*.

GENUS *GABRIOLA* TAYLOR

Figures 1, 10, 19, 27

Gabriola Taylor, 1904, p. 255. Rindge, 1974a, pp. 1-24, figs. 1-26. McGuffin, 1981, p. 89.

DIAGNOSIS: Moths of this genus are recognized by the upper surface of the forewings being various shades of gray or brown, with the median area often paler, set off by prominent cross lines, and with the hind wings paler and having indistinct maculation, the sexes of the same size, the male antennae bipectinate but with the terminal one-fourth simple, pectinations without any enlarged seta at apex, and the hind tibia with two pairs of spurs. In the male genitalia the gnathos is pointed medially and the vesica has either a longitudinal sclerotized area or a row of small spines. In the female genitalia the apophyses posteriores have an anterior attachment to the papillae anales and the signum is absent.

ADULTS: Head with eyes of both sexes large, of equal size in both sexes; front flat; palpi of male with second segment about 0.5 mm. long, third segment 0.1 mm., of female smaller; antennae of 42 to 61 segments, bipectinate in male, of female simple or shortly serrate; males with longest pectinations 1.0 to 1.5 mm. long, 6.5 to 9.0 times as long as basal segments, pectinations arising basally on segments, terminal 10 to 18 simple, each pectination having double row of slender setae

below and without apical seta. Thorax slender, with large metathoracic tuft; fore tibia with epiphysis of male arising between middle and three-fifths length of tibia, and between two-fifths and one-half length of that structure, of female arising between five-eighths and three-fourths length, and from three-tenths to two-fifths length of tibia; hind tibia with two pairs of spurs. Abdomen slender, extending to or slightly beyond hind wings, with prominent dorsal tufts.

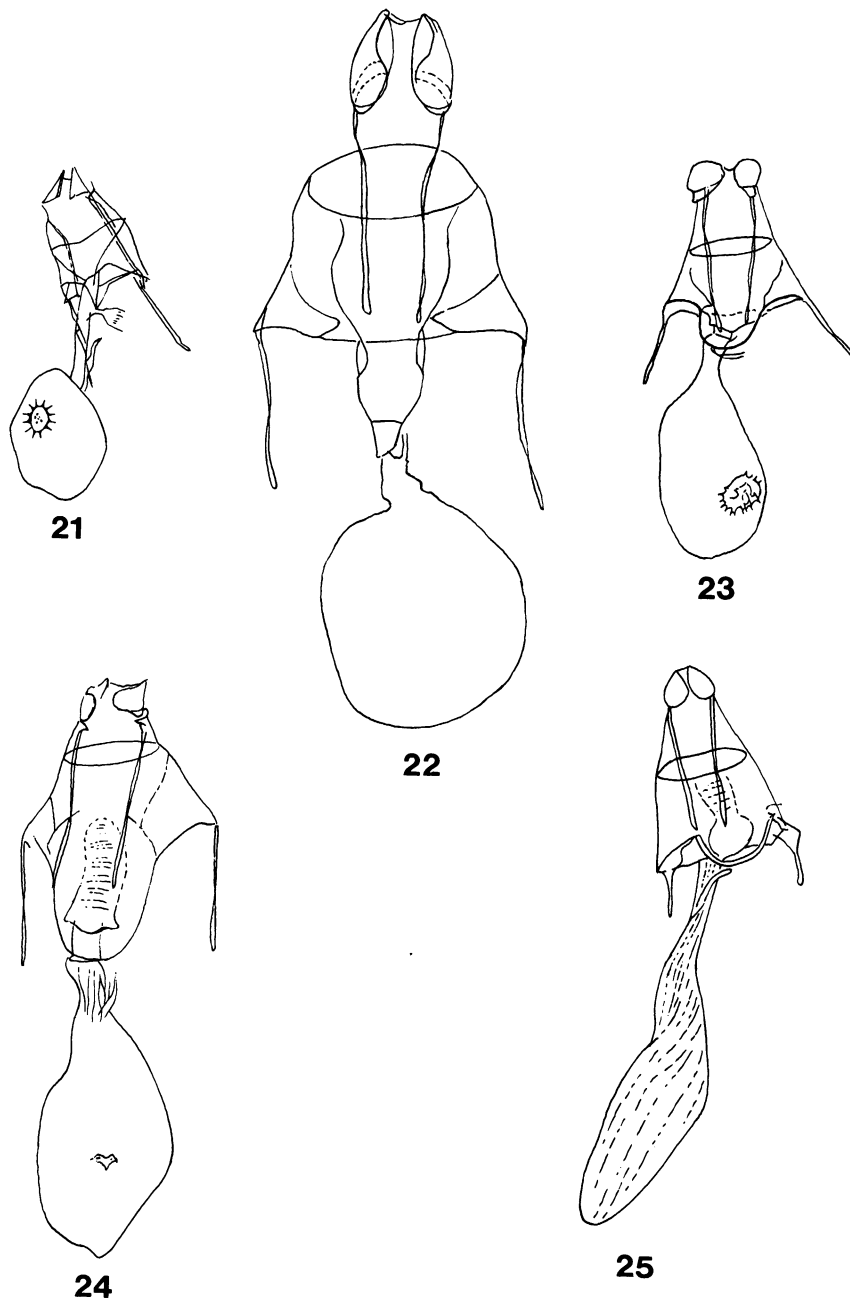
Forewings relatively short and broad, alike in both sexes, apex pointed, outer margin weakly curved; without accessory cell; vein R_1 free or stalked with R_2 , R_{3+4} stalked, R_5 from R_{3+4} ; mdc and ldc straight. Hind wings broad, outer margin either rounded or weakly concave between veins; Sc paralleling R for about one-half length of cell; m and ldc angled.

Upper surface of forewings various shades of gray or brown, sexes similar, with median area often paler and bounded by prominent, complete, black t. a. and t. p. lines; hind wings paler than forewings, with indistinct maculation. Under surface gray or grayish brown, with reduced maculation.

Length of Forewings: Males, 11 to 16 mm.; females, 12 to 17 mm.

MALE GENITALIA: Uncus 0.5 to 0.7 mm. long, with base 0.4 to 0.5 mm. wide, slender medially, apex weakly swollen, ventrally flattened, with small transverse ridge; socius padlike, with from 8 to 18 setae; gnathos V-shaped, well sclerotized, each side slightly tapering ventrally, and with small median enlargement; valves simple, broad, costa sclerotized basally, sacculus swollen; processes of anellus single, relatively slender, each apex curving posteriorly; anellus with posteromedian projection; tegumen with median thickening with sides fused anteriorly, separated posteriorly; saccus tapering anteriorly; aedeagus 1.2 to 2.0 mm. long, 0.15 to 0.40 mm. wide, posterior end weakly sclerotized and bluntly pointed; vesica, when exerted, extending at obtuse angle to aedeagus, with area of longitudinal striations or row of small spines.

FEMALE GENITALIA: Sterigma membranous or weakly sclerotized, scarcely differentiated; ductus bursae sclerotized laterally, sides par-



FIGS. 21–25. Female genitalia. 21. *Aethaloida packardaria* (Hulst), Glen Ivy, California, October 7, 1937 (D. Bulgrin; AMNH). 22. *Phaeoura mexicanaria* (Grote), Reuter Canyon Camp, Wyoming, July 13, 1959 (F. P. and B. Rindge; AMNH). 23. *Holochroa dissociaria dissociaria* (Hulst), Southwestern Research Station of AMNH, Arizona, June 25, 1957 (M. Statham; AMNH). 24. *Thyriniteina arnobia arnobia* (Stoll), Nova Teutonia, Brazil, July 23, 1948 (F. Plaumann; AMNH). 25. *Papago* sp., Tepic, Mexico, August 1938 (C. C. Hoffmann; AMNH).

allel or slightly tapering, two to three times longer than wide; ductus seminalis arising midventrally at posterior end of corpus bursae; corpus bursae membranous, sides more or less parallel, in length 1.3 to 1.6 times longer than apophyses posteriores; signum absent. Papillae anales either short and rounded or slightly attenuate; apophyses with anterior attachment; apophyses posteriores 1.4 to 2.0 mm. long, apophyses anteriores 0.1 to 1.0 mm. in length.

EARLY STAGES: The caterpillar of one species (*dyari* Taylor) has been described (Sugden, 1968; McGuffin, 1981, figs. 173i, 186k-m, 187c).

FOOD PLANTS: The one species that has been reared appears to be a general feeder on conifers (Sugden, *op. cit.*; McGuffin, 1981, p. 92).

TYPE SPECIES: *Gabriola dyari* Taylor; by original designation and sole included species.

DISTRIBUTION: Southern Alaska, western Canada, the western United States, and south into the Mexican state of Durango.

FLIGHT PERIOD: Every month of the year.

REMARKS: This genus contains six species, two of which are polytypic. The genus was revised, and the taxa described, by Rindge (1974a).

Gabriola has the following distinguishing apomorphic characters: the male antennae have the terminal 10 to 18 segments simple, the gnathos is V-shaped, and there is no signum. No other genus in group 1 has so many simple segments at the end of the male antennae, as *Papago* has one or two, and *Thyrinteina* seven or eight; *Parexcelsa* is the only other genus to have a V-shaped gnathos; and *Animomyia* and *Phaeoura* share with *Gabriola* the lack of a signum.

GENUS ANIMOMYIA DYAR

Figures 1, 11, 20, 28

Animomyia Dyar, 1908, p. 53. Rindge, 1974b, pp. 1-23, figs. 1-23.

Graefia Pearsall, 1910, p. 330. McDunnough, 1917, p. 233 (placed as synonym of *Animomyia*).

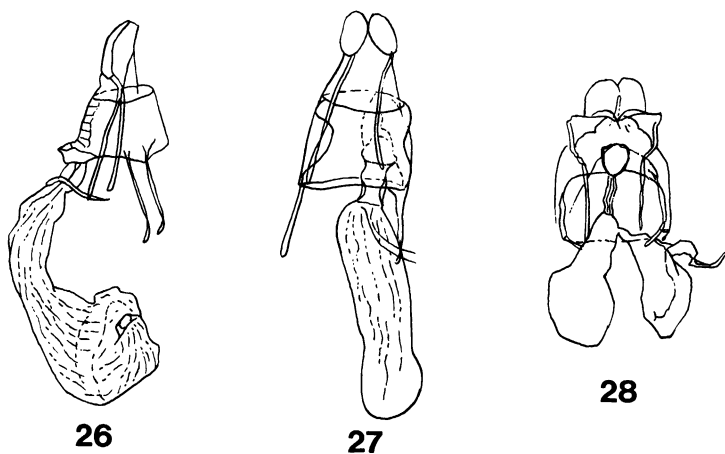
DIAGNOSIS: The included moths are recognized by the females having greatly reduced wings, whereas the males have broad brown wings, the male antennae have a reduced number of elongate segments, with the

long pectinations extending to the end of the antenna, the male hind tibia has two pairs of spurs, whereas the females have the upper pair reduced or absent. The male genitalia lack the socius, the gnathos is very large and heavily sclerotized, the lateral processes of the anellus are greatly reduced, and the aedeagus is sharply curved. In the female genitalia the apophyses posteriores have a median attachment to the papillae anales, and the signum is absent.

ADULTS: Head with eyes of male large, of female reduced; front flat, wider in female than in male and former having a ventrad unscaled lip; palpi of male with second segment about 0.4 mm. long, third segment 0.2 to 0.3 mm., of female smaller; antennae of from 27 to 34 segments, bipectinate in male, longest pectinations up to 3.1 mm. long, basal segments more or less increasing in length posteriorly, with some terminal segments up to 0.5 mm. in length, pectinations extending to end of antenna and arising from basal segments medially at base and posteriorly at central and distal portions, shaft thickly covered with long scales, pectinations scaled, with double row of elongate, very slender setae ventrally, and without terminal seta; antennae of female as thick as legs, heavily scaled except for narrow, naked ventral strip, segments decreasing in length posteriorly, shortly bipectinate to end, with pectinations hidden by scaling. Thorax slender, without metathoracic tuft; fore tibia variable, with or without epiphysis, when present in male arising between one-sixth and one-fourth length of tibia, extremely thin, and four-fifths to nine-tenths length of segment; hind tibia with two pairs of spurs in male, upper pair reduced or absent in female and often covered with scales. Abdomen slender in male, extending to anal angle of hind wings, without dorsal tufts, in female broad.

Males with forewings broad, outer margin rounded; venation variable, with or without accessory cell; Sc and R_1 connected, R_{2+3} stalked, R_4 variable, appearing separate, coming off R_3 , or with cross vein to R_5 ; mdc and ldc variably curved or angled. Hind wings of male broad, outer margin evenly rounded; Sc and R approximate at base only, for one-fifth length of cell; m and ldc angled.

Males with upper surface of forewings var-



FIGS. 26–28. Female genitalia. 26. *Parexcelsa ultraria* Pearsall, 5 mi. N Beverly Hills, California, October 3, 1956 (N. McFarland; AMNH). 27. *Gabriola dyari dyari* Taylor, Dayton, Oregon, July 24, 1960 (R. Albright; AMNH). 28. *Animomyia smithii smithii* (Pearsall), Cochise Co., Arizona, May 24, 1977 (AMNH).

ious shades of pale brown, grayish brown, or reddish brown, unicolorous; cross lines usually present, sometimes reduced, with discal spot present; hind wings slightly paler than forewings, with or without weakly represented extradiscal line. Under surface of all wings unicolorous pale brown or pale gray, with maculation obsolescent or absent.

Length of Forewings: 11 to 18 mm.

Females with forewings greatly reduced, 3 to 4 mm. in length and 0.8 to 1.2 mm. wide, straplike, rounded apically; concolorous with body; hind wings absent.

MALE GENITALIA: Uncus 0.5 to 0.7 mm. long, with base 0.3 to 0.4 mm. wide, shaft relatively thick, apical portion weakly swollen and with ventral surface flattened, apex with transverse ridge; socius absent; gnathos large, heavily sclerotized, apex curved ventrally into median enlargement, latter bulbous and with variable number of posteriorly pointing spines; valves simple, costa sclerotized, extending to rounded apex of valve, valves widest basally due to swollen sacculus; processes of anellus either reduced to small, flat sclerotized areas or absent; anellus with rounded median posterior projection; tegumen with short anteromedian thickening or medially X-shaped; saccus with sclerotized lateral margins not united anteromedially; aedeagus 1.0 to 1.4 mm. long, 0.10 to 0.15

mm. wide, dorsoventrally sharply curved or angled; vesica variable, either unarmed, with minutely spiculate band, or with or without small patch or row of very small cornuti.

FEMALE GENITALIA: Sterigma simple, with slight ridge around ostium bursae; ductus bursae sclerotized, approximately as wide as long, posterior end slightly broadened, anteriorly rounded; ductus seminalis arising at posterior end of corpus bursae; corpus bursae membranous, with long slender posterior section, anterior portion broadly elliptical; signum absent. Papillae anales weakly sclerotized, rather poorly defined; apophyses with median attachment; apophyses posteriores 1.1 mm. long.

EARLY STAGES: Undescribed except for a brief note on the pupa (Rindge, 1974b).

FOOD PLANTS: The one species that has been reared (*smithii* Pearsall) fed on *Franseria dumosa* Gray (Compositae).

TYPE SPECIES: For *Animomyia*, *morta* Dyar; the sole included species. For *Graefia*, *smithii* Pearsall; by original designation.

DISTRIBUTION: Xerophytic areas of Canada (southwestern Saskatchewan), the western United States, and Mexico (Sonora, Baja California).

FLIGHT PERIOD: Every month of the year except December.

REMARKS: This genus contains nine species,

one of which is polytypic. The genus was revised and the taxa described by me (1974b).

Animomyia can be recognized by the autotopomorphic character of having greatly reduced wings in the females; additional characteristic apomorphic states include the antennal pectinations of the male arising medially and posteriorly from their basal segments and by the processes of the anellus being greatly reduced or absent.

GROUP 2

The species of the included genera can be recognized by having most of the following characters: Adults with a fully developed tongue; front raised or swollen; female palpi as large as or longer than those of the males of the same species; male antennae bipectinate, fasciculate, or simple; patagia with either broad scales overlying hairlike scales or of hairlike scales only; males with or without both row of setae ventrally on third abdominal segment and hair pencil on hind tibia; and with two pairs of spurs on hind tibia. In the male genitalia the uncus is simple, and often may be 1.0 mm. or more in length; the socius is present; the gnathos is V-shaped; the length of the processes of the anellus are equal to, or shorter than, the length of the uncus; and the anellus has a posteromedian extension. In the female genitalia the apophyses posteriores may have either a median or anterior attachment to the papillae anales; the corpus bursae is variable in length, being from equal to the length of the apophyses posteriores to about nine times their length; the narrowed posterior portion of the corpus bursae usually has longitudinal striations, and the anterior portion is swollen; and the signum, when present, is in the form of a ridge or an indentation that is digitate or purse-shaped.

Group 2 includes genera that are found in the southern United States and Mexico, are apparently absent from Central America, but occur in the Andes from Venezuela and Colombia as far south as Bolivia and Chile and in southeastern Brazil. A problem arises as to the proper place for *Mallomus*, as the majority of its species are known from Chile and Argentina; however, using the redefinition of this genus in the present paper, included

species are also known from all other Andean countries, from Bolivia north to Colombia and Venezuela. Consequently, *Mallomus* is placed in group 2.

GENUS *YERMOIA* MCDUNNOUGH

Figures 1, 29, 39, 49

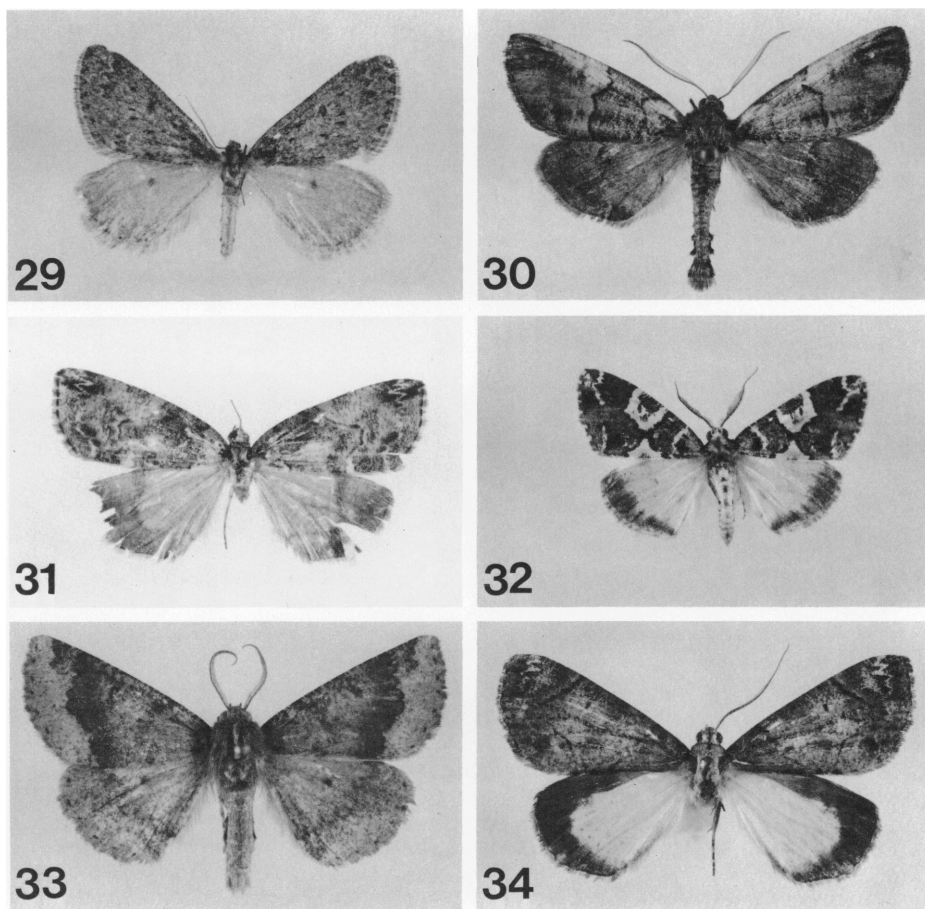
Yermoia McDunnough, 1940, p. 93. Rindge, 1961a, p. 4 (in part), figs. 6, 9.

DIAGNOSIS: The included moths are recognized by the gray, almost patternless forewings, the hind wings paler than the forewings, the simple antennae and swollen front of both sexes, and by the absence of metathoracic and abdominal tufts. The male genitalia are without the lateral processes of the anellus. In the female genitalia the apophyses posteriores have an anterior attachment to the papillae anales, and there is no signum.

ADULTS: Head with eyes of both sexes large, those of females smaller than those of males; front strongly swollen, slightly wider in females; palpi of males with second segment about 0.5 mm. long, third segment 0.1 mm., of females equal or larger in size; antennae of about 53 or 54 segments, simple in both sexes. Thorax slender, patagia with elongate flattened scales overlying hairlike scales, without metathoracic tufts; fore tibia with epiphyses of both sexes arising at about two-thirds length of tibia, and being two-fifths as long as that structure; hind tibia of males without hair pencil. Abdomen slender, scarcely extending beyond hind wings, without dorsal tufts.

Forewings broad, apex angulate, outer margin weakly rounded; venation variable, with one or two accessory cells; vein R_1 either free or from top of second accessory cell, R_{2+4} stalked, R_5 from cell; mdc and ldc gently curved. Hind wings broad, outer margin rounded; Sc paralleling R for one-half length of cell; m and ldc weakly angled.

Upper surface of forewings unicolorous gray, with obsolescent pattern, often with small discal spot; hind wings paler than forewings, with extradiscal line absent or weakly indicated; females tending to have slightly darker wings than males. Under surface unicolorous white or pale grayish white, without maculation except for small discal dots on all wings.



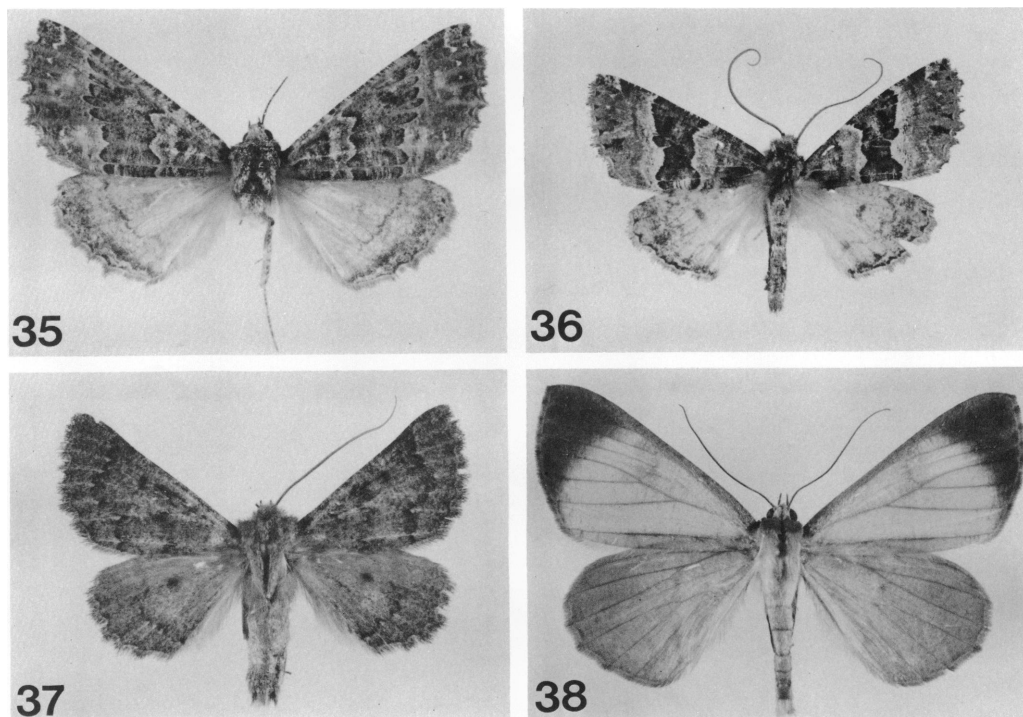
FIGS. 29–34. Adult males. 29. *Yermoia perplexata* McDunnough, Palm Springs, California, February 11, 1955 (A. H. Rindge; AMNH). 30. *Ceratonyx satanaria* Guenée, Bovina, Mississippi, March 4, 1974 (B. Mather; AMNH). 31. *Salasaca spinea*, new species, holotype, Loja to Zamora, Ecuador, October 26–27, 1977 (L. E. Peña; AMNH). 32. *Cargolia arana* (Dognin), Jujuy, Argentina, March 1950 (AMNH). 33. *Hidalgo agonaria* (Dyar), Zacualpan, Mexico, July 1914 (C. C. Hoffmann; AMNH). 34. *Cundinamarca parallela*, new species, holotype, Finca San Pablo, Colombia, August 1–12, 1967 (P. and B. Wygodzinsky; AMNH). All $\times 1.3$.

Length of Forewings: Males, 14 to 17 mm.; females, 12 to 16 mm.

MALE GENITALIA: Uncus 0.55 to 0.70 mm. long, with base 0.3 to 0.4 mm. wide, shaft very slender, apex with transverse ridge; socius small, padlike, having about 18 setae; gnathos broad, U-shaped, arms slender, median area slightly swollen and spinose; valves simple, broad, costa lightly sclerotized, not attaining rounded apex of valve; processes of anellus absent; anellus rounded posteriorly; tegumen with slender X-shaped median

thickening; saccus bluntly pointed anteriorly; aedeagus 1.2 to 1.4 mm. long, 0.2 mm. wide, anterior end slender, posterior end longitudinally striate, apex pointed; vesica unarmed.

FEMALE GENITALIA: Sterigma membranous, simple; ductus bursae lightly sclerotized, straight, slender, three times longer than wide; ductus seminalis arising from posterior end of corpus bursae; corpus bursae membranous, bilobed, with larger ovoid lobe extending anteriorly and with smaller rounded lobe ventrally or on right side; signum absent.



FIGS. 35–38. Adult males. 35. *Aragua mamestrina* (Warren), Yungas del Palmar, Bolivia, February 12, 1949 (AMNH). 36. *Azuayia stigmatalis* (Dognin), Cerro Tinajillas, Ecuador, March 20, 1965 (L. E. Peña; AMNH). 37. *Mallomus antennata* (Mabille), Chapelka, Argentina, February 26, 1952 (N. Perrowsky; AMNH). 38. *Tarma theodora* (Thierry-Mieg), La Merced, Peru, August 29, 1951 (Rivas; AMNH). All $\times 1.3$.

Papillae anales slender, rounded; apophyses with anterodorsal attachment to sclerotized band; apophyses posteriores 0.6 to 0.8 mm. long, apophyses anteriores 0.6 to 0.8 mm. in length.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPE SPECIES: *Yermoia perplexata* McDunnough; by original designation.

DISTRIBUTION: Southwestern United States.

FLIGHT PERIOD: December through May, with one August record (possibly an error in labeling).

REMARKS: In 1961 I described *Y. glaucina* as a new species, and called attention to the rather large differences between it and *perplexata*, especially in the genitalia. This led to a redefinition of the genus, as a broadening of the generic concept was necessary if *glaucina* were to be included. When analyzing the

data for the present paper it became obvious that I had created a group that was not monophyletic; as a result I have restricted *Yermoia* to its type species. Additional study is necessary before *glaucina* can be placed in its proper genus.

Yermoia has the following apomorphic characters that distinguish it: the male antennae are simple, the processes of the anellus are absent, as is the signum. The only other genus to have these three character states is *Poya*, described in group 4, below. The latter genus has the additional apomorphic characters of the third segment of the palpi being more than one-half the length of the second segment, a hair pencil on the hind tibia of the males, a V-shaped gnathos, a short ductus bursae, the corpus bursae at least twice as long as the apophyses posteriores, and this structure having posterior striations.

GENUS *CERATONYX* GUENÉE,

REVISED STATUS

Figures 1, 30, 40, 50

Ceratomyx Guenée, 1857, p. 193.*Ceratomyx*, in part: Rindge, 1975, pp. 1-6, 22-30, figs. 10-12, 17-20, 30-33, 37-41 (Group II, in part).*Stenocharis* Grossbeck, 1912, p. 399. Franclemont, 1967, p. 12 (placed as synonym of *Ceratomyx*).

DIAGNOSIS: Moths of this genus are recognized by having elongate forewings, the hind wings are usually paler than the forewings, the male antennae are bipectinate, the pectinations not reaching the apex, the female antennae being either simple or weakly serrate, and the hind tibia without a hair pencil. The male genitalia have an elongate uncus, 1.2 to 1.5 mm. long, a V-shaped gnathos with a pointed, recurved apex, and the processes of the anellus are short, wide and straight. In the female genitalia the apophyses posteriores have a median attachment to the papillae anales, and the signum is flat with either anterolateral points or a simple median projection.

ADULTS: Head with eyes of both sexes large, those of females smaller than those of males; front raised, strongly so in some males, flatter in females; palpi of males with second segment from 0.7 to 1.1 mm. long, third segment 0.3 to 0.4 mm., of females equal or larger in size; antennae of from 56 to 77 segments, bipectinate in males, simple or weakly serrate in females; males with longest antennal pectinations 0.45 to 0.60 mm. long, from 2.75 to 4.00 times as long as basal segments, pectinations arising basally on segments (medio-basally in one species), not reaching apex, having terminal one to three segments simple, each pectination having double row of slender setae below. Thorax slender, patagia with mixture of flattened and hairlike scales, with metathoracic tufts; fore tibia with epiphysis of males arising near middle of segment, and being from one-half to two-thirds length of that structure, of females arising about three-fifths length, and being from two-fifths to one-half length of tibia; hind tibia of males without hair pencil. Abdomen slender in males, thicker in females, extending beyond hind wings, with dorsal tufts; males without ventral row of setae on third segment.

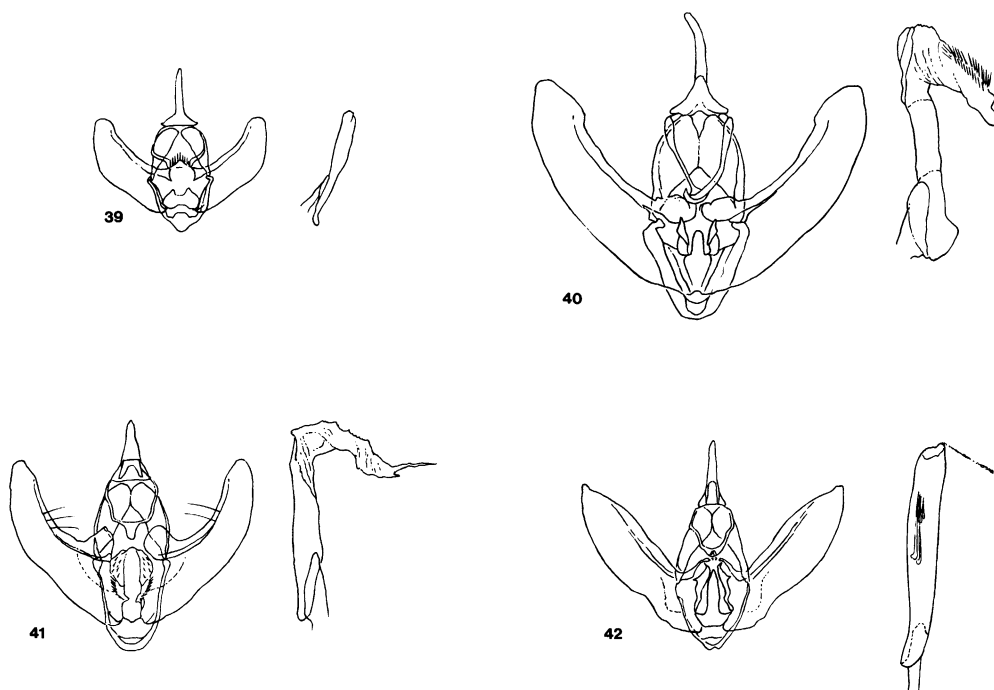
Forewings elongate, outer margin either bluntly rounded or oblique, even; with or without one accessory cell, some specimens with cell on one forewing only; vein R_1 free, R_{2+4} stalked, R_5 from cell; mdc and ldc angled or curved. Hind wings elongate, outer margin smooth; Sc paralleling R for one-half length of cell; m and ldc curved.

Upper surface of forewings brown or gray, females tending to be slightly paler, median area slightly darkened and set off by more or less well-defined cross lines, cross lines of males closer together than those of females; hind wings somewhat paler than forewings, with obsolescent maculation. Under surface unicolorous brown or gray, with obsolescent maculation.

Length of Forewings: Males, 16 to 22 mm.; females, 18 to 24 mm.

MALE GENITALIA: Uncus 1.2 to 1.5 mm. long, with base 0.3 to 0.7 mm. wide, tapering, very slender, apex with slender ridge or two minute points; socius small, padlike, with from about 10 to 15 setae; gnathos elongate, V-shaped, heavily sclerotized, apex simple, curved ventrally; valves simple, costa sclerotized, weakly swollen apically, not attaining rounded apex of valve, sacculus lightly sclerotized, slightly swollen; processes of anellus in form of short, broad, simple arm on each side, extending posteriorly and with pointed apex; anellus recessed dorsally, with postero-median extension; tegumen with median thickening, united for varying lengths; saccus tapering, bluntly pointed or rounded anteriorly; aedeagus 1.9 to 2.9 mm. long, 0.2 to 0.3 mm. wide, apex sclerotized and weakly striate ventrally; vesica, when exerted, extending at from 120° to 140° angle to aedeagus, and having variable number of slender setae, ranging from about six to 50.

FEMALE GENITALIA: Sterigma membranous, lamella antevaginalis partially or completely sclerotized, partially or completely extending across or including ventral rim of ductus bursae; ductus bursae variable, either membranous and poorly defined, membranous and rectangular and with or without narrow sclerotized ventral lip, or heavily sclerotized laterally and slightly longer than wide; ductus seminalis arising ventrally from posterior end of corpus bursae; corpus bursae membranous, elongate, elliptical, or with narrow striated posterior portion and ovate



FIGS. 39–42. Male genitalia. 39. *Yermoia perlexata* McDunnough, Palmdale, California, February 11, 1947 (C. I. Smith; AMNH). 40. *Ceratonyx satanaria* Guenée, Tennessee Colony, Texas, March 5, 1967 (A. and M. E. Blanchard; AMNH). 41. *Salasaca spinea*, new species, holotype, Loja-Zamora, Ecuador, October 26–27, 1977 (L. E. Peña; AMNH). 42. *Cargolia* sp., La Alegria, Ecuador, September 14, 1977 (L. E. Peña; AMNH).

or elongate anterior section, corpus bursae varying from being equal to, to four times as long as, apophyses posteriores; signum small, variously rayed or with single internal projection. Papillae anales small, rectangular in lateral view; apophyses with median attachment; apophyses posteriores 1.6 to 2.4 mm. long, apophyses anteriores 0.4 to 0.8 mm. in length.

EARLY STAGES: The eggs and first instar larva have been described for *Ceratonyx permagnaria*, and the mature larva of *C. satanaria* (see Rindge, 1975).

FOOD PLANTS: *Liquidamber* (Hamamelidaceae) and “*Quercus*” *dentata* for *permagnaria* (Rindge, *op. cit.*).

TYPE SPECIES: For *Ceratonyx*, *satanaria* Guenée; designated by Franclemont (1967). For *Stenocharis*, *permagnaria* Grossbeck; by original designation and sole included species.

DISTRIBUTION: United States and Mexico.

FLIGHT PERIOD: February through October. *Ceratonyx satanaria* is known to fly in February and March; *permagnaria*, the most commonly collected species, flies from February through October; *constantia* is apparently double brooded; *tora* may also have two generations per year but we lack material to verify this.

REMARKS: The four included species, listed above, were treated as the ones from the United States and Mexico in Group II in my 1975 revision of *Ceratonyx*; they were described and illustrated in that paper.

Ceratonyx has the following combination of apomorphic characters that are unique: the apex of the male antennae have from one to three simple segments, the uncus is from 1.2 to 1.5 mm. long, the apophyses posteriores have a median attachment to the papillae anales, and the signum is flat with either anterolateral points or a single median projec-

tion. In comparison, *Hidalgo*, a member of group 2, has three or four simple segments at the end of the male antennae, the uncus is from 1.2 to 1.9 mm. long, the signum is absent or weakly represented, and the apophyses have an anterior attachment to the papillae anales.

SALASACA, NEW GENUS

Figures 1, 31, 41, 51

DIAGNOSIS: The included moths have elongate wings, the upper surface of the forewings has dimorphic pattern and coloration, the antennae are simple in both sexes and the males have a hair pencil on the hind tibia. The male genitalia have a ridge along or near the inner margin of the costa, at or near the end of which are from two to seven elongate setae projecting away from the valve, the processes of the anellus are spinose and attached to the median extension of the anellus, and the vesica is unarmed. In the female genitalia, the apophyses posteriores have a median attachment to the papillae anales, the corpus bursae is very long and either has a small, rayed ovate signum or this structure is absent.

ADULTS: Head with eyes of both sexes large, those of females smaller than those of males; front swollen, extending beyond eyes by one-fourth (males) to one-half (females) diameter of eyes; palpi of males with second segment 0.3 to 0.4 mm. long, third segment 0.2 to 0.3 mm. long, with both loose and tight scales, weakly decumbent, of females slightly longer; antennae of approximately 77 to 81 segments, simple in both sexes. Thorax slender, patagia with mixture of flattened and hairlike scales, with small metathoracic tuft; fore tibia of males with epiphyses arising at three-fifths length of segment and being two-fifths to one-half its length, of females arising at about two-thirds length and being about one-third length of segment; hind tibia of males with hair pencil. Abdomen slender in males, thicker in females, extending beyond hind wings, without dorsal tufts; males with row of setae on ventral surface of third segment.

Forewings elongate, apex almost square, outer margin straight anteriorly, rounded posteriorly, with either smooth margin or being concave between veins; either without

(males) or with (females) one accessory cell; males with vein R_1 free, R_{2+5} stalked, females with R_1 from top of cell, R_2 and R_{3+4} from end of cell, R_5 from near end of cell; mdc and ldc biconvex. Hind wings elongate, slightly angled at vein Cu_1 , concave between veins; Sc paralleling R for about two-fifths length of cell; m and ldc curved.

Upper surface of forewings dimorphic in pattern and color; males with t. p. line in middle of wing, strongly curved outwardly, dark brown or olivaceous basad of line, dark brown distally, with curved, incomplete, white s.t. line; females with t. p. line in normal position, basal and distal areas dark brown, large median area grayish white to reddish brown, and with whitish or reddish brown area in middle of outer portion of wing; hind wings of both sexes similar, grayish or grayish white, with slender extradiscal line, becoming dark gray distally. Under surface of all wings light to dark grayish brown, forewings of males with t. p. line either as on upper surface or in normal position, both sexes with or without white apical spot and white area in middle of outer margin, hind wings with extradiscal line and dark border.

Length of Forewings: Males, 16 to 18 mm.; females, 16 to 18 mm.

MALE GENITALIA: Uncus 0.7 mm. long, base 0.4 mm. wide, curved, tapering, apex with rounded point; socius small, padlike, with about 10 setae; gnathos U-shaped, either with slender median projection extending ventrally, apex bluntly pointed or with very slender dorsal strip flanked on each side by large triangular points; valves simple, costa sclerotized, slender or one-half width of valve, having ridge along valvula for one-half to two-thirds length of valve, with two to seven, elongate (0.35 to 0.50 mm. long) setae at or near end of ridge, projecting away from valve, valvula with longer setae medially and distally, setae shorter along outer portion, sacculus lightly sclerotized, swollen basally; processes of anellus completely attached to median extension of anellus and manica, dentate, either elongate and curved medially or as pair of posterior, triangular processes; anellus either rounded anteriorly, with rectangular median extension, posterior end of extension with ventral longitudinal ridge or broad, subtriangular; cristae absent with first

type of anellus, numerous and long in broad type; tegumen with elongate median fusion; saccus slightly longer than tegumen, wide, anterior end rounded and with short dorsal median projection; aedeagus 2.1 to 2.5 mm. long, 0.3 mm. wide, ventrally lightly sclerotized, posterior end pointed; vesica, when exerted, extending dorsally at from 90° to 120° angle to aedeagus, with or without basal striations, and unarmed.

FEMALE GENITALIA: Sterigma with lamella antevaginalis sclerotized, either widest anteriorly, posterolateral margins tapered inwardly, posteriorly broadly V-shaped, or transverse band; ductus bursae sclerotized, 0.2 to 0.6 mm. long, gradually increasing in width anteriorly; ductus seminalis arising ventrally from small digitate projection at posterior end of corpus bursae; corpus bursae membranous, elongate, slender posterior end either with longitudinal striations and small, poorly defined, weakly sclerotized area or smooth, with sclerotized area posteriad of middle, increasing in width anteriorly, anterior end of corpus bluntly pointed, corpus bursae with length between four and five times that of apophyses posteriores; signum either small, ovate, flat, outer margin with rays, medially raised and U-shaped or absent. Papillae anales small; apophyses with median attachment to sclerotized strip; apophyses posteriores 1.0 to 1.2 mm. long, apophyses anteriores 0.4 mm. in length.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPE SPECIES: *Salasaca spinea*, new species.

DISTRIBUTION: Ecuador, Peru, and Bolivia.

FLIGHT PERIOD: August, October, November, and February.

REMARKS: This genus is represented by three species. One (Peru) is known only from a single male, and another (Bolivia) from a single female; it is possible that these might represent a single species.

Salasaca has the following apomorphic characters: the third segment of the palpi is almost as long as the second segment, the male antennae are simple, there are no spines in the vesica, and the corpus bursae is from four to five times as long as the apophyses posteriores. *Tarma*, another member of group 2, shares these characters, although the cor-

pus bursae is shorter, being from 2.5 to 4.0 times as long as the apophyses posteriores; additional apomorphic states for *Tarma* are the lack of metathoracic tufts but having abdominal tufts (the reverse is true for *Salasaca*), a longer uncus (1.0 mm. as compared with 0.7 mm.), complex valves, a median attachment of the apophyses posteriores to the papillae anales, and a long slender signum.

ETYMOLOGY: The generic name is that of an Indian tribe of Ecuador; its gender is feminine.

***Salasaca spinea*, new species**

Figures 31, 41, 51

DIAGNOSIS: This species can be recognized by the upper surface of the forewings of the male having the enlarged basal portion olivaceous, with the broad area distally faintly reddish brown, and in the females by the broad, grayish white or buff median area. The male genitalia have a rounded gnathos with an elongate, slender median extension, and the processes of the anellus are elongate and spinose, being fused to the sides of the anellus. The female genitalia have a broad tapering lamella antevaginalis, a large heavily sclerotized ductus bursae, and a signum.

ADULTS: Head with vertex gray, front dark brown, palpi grayish brown. Thorax dark brown above; collar of broad, apically flattened grayish brown scales; patagia either gray (male) or brown with gray tips (females); metathorax laterally and with tuft buff; below grayish white; legs grayish white, with increasing amount of dark brown scaling distally, tarsi with apices of segments grayish white. Abdomen grayish brown, paler below.

Upper Surface of Wings: Male: Forewings with slender, black cross lines, t. a. line arising on costa about one-sixth length of wing, with outward angle below costa, then more or less straight, outwardly angled above inner margin; t. p. line arising on costa two-fifths length of wing, curving outward to near origin of vein M_3 , angled and at right angle to inner margin to vein Cu_2 , then concave to inner margin two-thirds of length from base, terminating in white patch; s. t. line white, sharply zigzag below costa, then becoming

curved, faint in middle of wing, concave above outer margin, terminating in white patch; basal and median areas olivaceous, with variable number of black scales; subterminal area broad, with mixture of pale brown, reddish brown, and green scales, with variable number of black and dark brown scales; apex of wing dull black, bisected by s. t. line; distal area paler in middle of wing, with increasing number of dark brown scales posteriorly; terminal line black, narrowly bisected by whitish gray at vein endings; fringe dark gray, paler opposite vein endings. Hind wings gray, paler basad of curved dark gray extradiscal line, darker gray distally; terminal line black; fringe grayish white.

Females: Forewings with t. a. line similar to that of male but more sharply angled outwardly; median shade line arising at one-third length of costa, broad, diffuse, brown, biangulate; t. p. line from just beyond middle of costa, broadly outcurved, then convex to meet inner margin three-fifths distance from base; subterminal line similar to that of male; basal area dark brown; median area white to ochraceous white, with some grayish brown scaling anteriorly; outer portion of wing dark brown, with broad area in center concolorous with median area and extending to outer margin; outer margin more concave between veins than in male; terminal line scarcely interrupted opposite veins; fringe more concolorous with wing than in male. Hind wings similar to those of male but with extradiscal line tending to be double, and with narrower dark outer area, plus some pale scaling along outer margin in lower part of wing.

Under Surface of Wings: Forewings pale gray (females) to dark gray (male), with traces of most cross lines, and with small white patch at apex and larger white area at middle of outer margin; hind wings paler gray than forewings, with extradiscal line and dark outer border; terminal lines and fringes similar to those of upper surface.

Length of Forewings: Holotype, allotype, and paratype, each 18 mm.

MALE GENITALIA: Uncus slightly curved, tapering; gnathos with slender median projection extending ventrally, apex bluntly pointed; costa slender, with ridge along valvula for one-half length of valve, with two

(right valve) or three (left valve) elongate setae at or near end of ridge, each seta 0.35 to 0.40 mm. long, projecting away from valve; processes of anellus completely attached to median extension of anellus and manica, modified processes heavily sclerotized anteriorly, distal portion triangular, outer surface shortly dentate, posteriorly extending medially, membranous, dentate; anellus rounded anteriorly, with rectangular median extension, posterior end of extension with ventral longitudinal ridge; cristae absent; aedeagus 2.1 mm. long; exerted vesica without striations basally.

FEMALE GENITALIA: Sterigma with lamella antevaginalis widest anteriorly, posterolateral margins tapered inwardly, posteriorly broadly V-shaped; ductus bursae 0.6 mm. long, anterior end about twice as wide as posterior margin, lateral margins very slender; corpus bursae with posterior two-fifths having longitudinal striations, anterior portion slightly enlarged medially, tapering towards anterior end; signum small, ovate, flat, outer margin with rays, medially raised and U-shaped. Apophyses posteriores 1.2 mm. long, apophyses anteriores 0.4 mm. in length.

TYPES: Holotype, male, Loja to Zamora (Santiago-Zamora Province), 2800 m., in Loja Province, Ecuador, October 26–27, 1977 (L. E. Peña); allotype and paratype, both females, Macará to Catacocha, 650 m., Loja Province, Ecuador, August 13–14, 1977 (L. E. Peña). The holotype has its genitalia mounted on slide FHR 19043A, with the right antenna (in part) and one set of legs on slide 19043B; the allotype has its genitalia mounted on slide 18998A, with its left antenna and four legs on slide 18998B.

The holotype, allotype, and paratype are in the collection of the American Museum of Natural History.

DISTRIBUTION: Known only from the type series from Loja Province, Ecuador.

FLIGHT PERIOD: August and October.

REMARKS: Three specimens and two genitalic dissections have been studied. To separate this species from the other two that are known to me as occurring in *Salasaca*, see the Diagnosis.

ETYMOLOGY: The specific name is from the Latin *spineus*, made of thorns or thorny, in

reference to the spinose nature of the processes of the anellus.

GENUS *CARGOLIA* SCHAUS

Figures 1, 32, 42, 52

Cargolia Schaus, 1901, p. 249. Covell, 1964, pp. 111-115, figs. 1-4.

DIAGNOSIS: Moths of this genus are recognized by the upper surface of the forewings being mainly several shades of dark brown and having varying amounts of white scaling, the hind wings a contrasting white, the females being larger than the males, and the male antennae bipectinate but having 10 to 16 simple segments terminally. The male genitalia have an elongate socius, and the outer margin of the valves are constricted medially. In the female genitalia the corpus bursae has longitudinal striations on the posterior portion, anteriorly this structure is rounded, and the signum is an elongate, slender invagination.

ADULTS: Head with eyes of both sexes large, those of females smaller than those of males; front flat, slightly wider in females; palpi of males with second segment about 0.5 mm. long, third segment 0.2 mm., tightly scaled, decumbent, those of both sexes of about same size; antennae of 45 to 68 segments, bipectinate in males, simple in females; males with longest antennal pectinations about 1.2 to 1.5 mm. long, six to 10 times as long as basal segments, pectinations arising basally on segments, 10 to 16 segments simple at end of antennae, each pectination having double row of slender setae below. Thorax slender, patagia with flattened scales overlying hairlike scales, with metathoracic tuft; fore tibia with epiphysis of males arising between middle and three-fifths length of segment and being from two-fifths to three-fifths length of that structure, of females arising medially to three-fifths length of segment and about two-fifths to one-half length of tibia; hind tibia of males with or without hair pencil. Abdomen moderately slender, barely extending beyond hind wings, with dorsal tufts, without ventral row of setae on third segment of males.

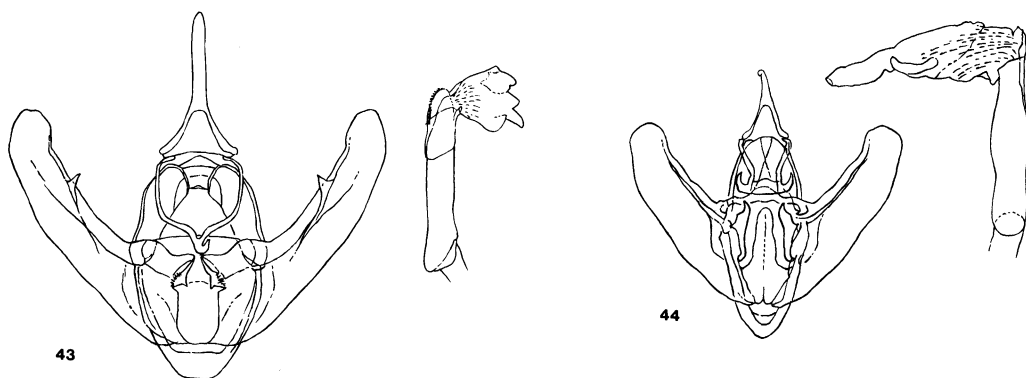
Forewings broad, apex bluntly rounded, outer margin rounded, either evenly or tending to be weakly concave between veins in

females; without accessory cell; veins R_1 and R_2 both free, R_{3+4} stalked, R_5 from R_{3+4} ; mdc and ldc biconvex. Hind wings broad, outer margin rounded, similar to that of forewing; Sc paralleling R for one-half length of cell; m and ldc curved.

Upper surface of forewings various shades of dark brown, with varying amounts of white scaling, usually representing cross lines or concentrated in median area, females tending to be slightly grayer or paler than males; forewings with curved t. a. and sinuate t. p. lines varying from very prominent to weakly defined, black discal dot present; hind wings contrastingly white, usually without cross lines but with varying amounts of dark scaling distally. Under surface of forewings with mixture of white and dark brown scales, latter placed anteriorly on wing, without well defined cross lines, some species with broad white apical spot, of hindwings similar to upper surface.

Length of Forewings: Males, 14 to 17 mm.; females, 16 to 21 mm.

MALE GENITALIA: Uncus 0.6 to 0.8 mm. long, with base 0.4 mm. wide, either slender and elongate or shorter and triangular, apex with one or two minute points; socius small, padlike or slightly elongate, with from about eight to 15 setae; gnathos elongate, either slender and with spinose attenuate apex or with broad lateral margins and with rasplike truncate apex; valves with costa sclerotized, convex, apex of valve bluntly pointed or with small sclerotized point from extension of costa, valvula uniformly covered with slender setae, basally with anterolateral, slender and flat or slightly raised ridge, sacculus lightly sclerotized, swollen, with more or less deep constriction distad of valvular ridge; processes of anellus short to moderate, flattened, each apex curved and tapering to point; anellus variable in shape, either with broad, anteriorly rounded base and median extension or quadrangular with posterior portion larger than anterior; tegumen with median thickening united for varying lengths; saccus broad, anteriorly rounded or somewhat elongate; aedeagus 2.1 to 2.5 mm. long, 0.25 mm. wide, apex rounded or bluntly pointed, weakly sclerotized; vesica either with about nine to 12 spines in one group, or from about seven



FIGS. 43, 44. Male genitalia. 43. *Hidalgo agonaria* (Dyar), Chapala, Mexico, November 1938 (C. C. Hoffmann; AMNH). 44. *Cundinamarca parallela*, new species, paratype, Finca San Pablo, Colombia, August 1–12, 1967 (P. and B. Wygodzinsky; AMNH).

or eight longer and more slender spines in two overlapping groups.

FEMALE GENITALIA: Sterigma variable, with lamella antevaginalis sclerotized, broad to slender, widest posteriorly, with broadly U-shaped median indentation, lamella postvaginalis either membranous or with pair of lateral, longitudinal, weakly sclerotized areas; ductus bursae sclerotized or membranous, 0.2 to 1.1 mm. long, widest posteriorly, tapering anteriorly; ductus seminalis arising ventrally from end or side of small digitate projection at or near posterior end of corpus bursae; corpus bursae with slender posterior end with from few and membranous to many and lightly sclerotized longitudinal striations, with or without additional small dentate sclerotized area posteriorly, anterior portion of corpus enlarged, either gradually or with swollen transverse fold, membranous, rounded, area surrounding signum with or without concentric ridges, corpus bursae varying in length from equal to, to twice length of apophyses posteriores; signum large, small and round at surface of corpus bursae, without rays, deeply invaginated, 0.25 to 1.00 mm. long, flat or slightly concave, edges serrate. Papillae anales small; apophyses with either median or anterior attachment; apophyses posteriores 1.7 to 1.9 mm. long, apophyses anteriores 1.0 to 1.2 mm. in length.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPE SPECIES: *Cargolia albipuncta* Schaus; by monotypy.

DISTRIBUTION: Mexico; Colombia, Ecuador, Peru, Bolivia, and Argentina.

FLIGHT PERIOD: Every month of the year.

REMARKS: Covell (1964) listed eight species in this genus; I have studied six taxa.

Cargolia can be recognized by the following combination of apomorphic characters: the male antennae have from 10 to 16 simple segments at the end of each antennae, the valves have the outer margin constricted medially, the signum is deeply invaginated, and the upper surface of the hind wings is white, sharply contrasting with the forewings. No other genus has all of the above characters.

HIDALGO, NEW GENUS

Figures 1, 33, 43, 53

DIAGNOSIS: The included species have the upper surface of all wings a concolorous brown or grayish brown, with the outer area paler than the rest of the wings, and the females are slightly larger than the males; the male antennae are pectinate, the pectinations arising medially on their basal segments, there are three or four simple segments at the end of the structure, and the female antennae are simple or very shortly pectinate; the males do not have a hair pencil on the hind tibia. The male genitalia have a raised, setose, longitudinal ridge on the inner surface of the

valves, and are without any spines in the vesica. The elongate corpus bursae either lacks a signum or has a small, flat one.

ADULTS: Head with eyes of both sexes large, either of equal size in both sexes or those of females slightly smaller; front slightly swollen; palpi of males with second segment 0.8 to 1.0 mm. long, third segment 0.3 to 0.4 mm., with a combination of mostly tightly appressed scales and some looser ones, erect, those of females slightly smaller; antennae of 54 to 64 segments, bipectinate in males, simple or partially very shortly pectinate in females; males with longest antennal pectinations 0.4 to 0.6 mm. long, three to four times as long as basal segments, pectinations arising medially on segments, with three or four simple segments at end of each antenna, each pectination having prominent double row of elongate setae below. Thorax moderately slender, patagia with mixture of flattened and hairlike scales, with metathoracic tuft; fore tibia with epiphysis of both sexes arising at two-fifths length of segment, those of males being between three-fifths and seven-tenths length of that structure, of females one-half or slightly less in length; hind tibia of males without hair pencil. Abdomen moderately slender in males, thicker in females, in both sexes extending slightly beyond hind wings, without dorsal tufts, and without ventral row of setae on third segment of males; females with thick band of black scales laterally and ventrally at posterior end of abdomen.

Forewings broad, apex pointed, outer margin rounded, slightly to noticeably concave between veins; with one accessory cell; vein R_1 free, R_2 from end of cell, R_{3+4} stalked, R_5 from bottom of cell; mdc and ldc biconvex. Hind wings broad, outer margin rounded, slightly concave between veins; Sc paralleling R for one-half length of cell; m and ldc angled.

Upper surface of all wings concolorous brown or grayish brown, cross lines usually distinct, discal spots with white centers on forewings, smaller and unicolorous on hind wings, outer areas of all wings paler than basal portion. Under surface of all wings concolorous yellowish brown or pale grayish brown, outer cross lines and discal spots present, outer areas paler than basal portion.

Length of Forewings: Males, 17 to 20 mm.; females, 19 to 22 mm.

MALE GENITALIA: Uncus 1.2 to 1.9 mm. long, with base 0.5 to 0.9 mm. wide, base with ventrolateral edges weakly enlarged, protruding, shaft slender, sides parallel or slightly tapered, apex curved, pointed; socius swollen or shortly digitate, with from about 25 to 35 setae; gnathos elongate, shorter than uncus, either with extended slender pointed median projection having finely spinose apex or mediolaterally with two points, apical region curving posteroventrally and terminating in blunt point; valves only slightly tapered distally, apex rounded, costa sclerotized, not attaining apex of valve, valvula swollen, with slender, raised setose ridge extending longitudinally and partly obliquely for one-fifth to one-fourth length of valve, valvula with median and posterior surface with slender setae, sacculus weakly sclerotized; processes of anellus short to moderate in length, 0.1 to 0.4 mm. long, apically pointed, either smoothly sclerotized or with posterolateral surface finely denticulate; anellus rectangular or triangular, without median process; cristae of about 24 to 30 elongate slender setae on each side; tegumen with short median fusion; saccus broad, rounded anteriorly; aedeagus 1.9 to 2.0 mm. long, 0.25 to 0.30 mm. wide, posterior end rounded, having finely dentate, slender sclerotized band curving around apex; vesica unarmed, when exerted extending at about 60° angle to aedeagus, swollen, with longitudinal striations, apically narrowed.

FEMALE GENITALIA: Sterigma lightly sclerotized, with either small lateral ridge of lamella antevaginalis or with complete rounded ridge extending dorsally to join lamella postvaginalis, latter with lateral rounded areas connected medially by flat, lightly sclerotized band; ductus bursae partially sclerotized, 0.35 to 0.50 mm. long, widest posteriorly, tapering anteriorly; ductus seminalis arising from small digitate projection on right side of posterior end of corpus bursae; corpus bursae membranous, ovate to elongate with anterior portion only slightly enlarged, posterior end with short area of longitudinal striations, corpus bursae with length 1.5 to 2.0 times that of

apophyses posteriores; signum absent or weakly represented (sometimes both conditions present in same species), when present, varying from slight thickening of wall of corpus bursae to somewhat ovate structure, slightly invaginated into corpus bursae and with a few small rays. Papillae anales elongate; apophyses with anterior attachment; apophyses posteriores 1.7 to 2.0 mm. long, apophyses anteriores 0.8 to 1.2 mm. in length.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPE SPECIES: *Digonodes agonaria* Dyar.

DISTRIBUTION: Mexico.

FLIGHT PERIOD: May, July, August, September, and November.

REMARKS: The two species that are presently included in this genus are *Hidalgo agonarius* Dyar and *H. maidienus* Dyar. Both these specific names were proposed in *Digonodes*; they form new combinations with the new generic name, and the endings of both have been changed to masculine to agree with the generic name.

Hidalgo has two autapomorphic characters for group 2, namely that the female palpi are slightly smaller than these structures in the males, and that the pectinations of the male antennae arise medially on their basal segments. Other apomorphic characters include the male antennae having from three to four simple segments at the end of each antennae, and the vesica being unarmed. The first of the last two states is shared with *Ceratomyx*, which has from one to three simple segments, and *Cundinamarca*, with about 28; both *Salasaca* and *Tarma* have unarmed vesicas.

There might be some question as to whether *Hidalgo* should be placed in group 1 or 2, as it is sometimes difficult to judge the size and length of the proboscis. In most specimens that I have examined the tongue is well concealed by the palps, reminiscent of group 1; however, in one male of *agonarius* and one female of *maidienus* (both in AMNH) the tongue is extended and reaches to the middle or end of the thorax. Based on this I have placed *Hidalgo* in group 2. The color and type of maculation in this genus are similar to those found in *Aethaloida*, *Betulodes*, *Phaeoura*, and *Thyrinitea*, all members of group 1, than

it is to any other genus in group 2. *Hidalgo* possesses the following apomorphic characters not present in those four genera: male antennae with pectinations arising medially on their basal segments, the absence of abdominal tufts, the presence of striations on the posterior portion of the ductus bursae, and with that structure swollen anteriorly from an elongate slender posterior portion.

ETYMOLOGY: The generic name is that of a Mexican state; its gender is masculine.

CUNDINAMARCA, NEW GENUS

Figures 1, 34, 44

DIAGNOSIS: Males of this genus are recognized by the upper surface of the forewings being dark gray with obscure maculation, the hind wings white with a complete black border, and the antennae bipectinate, with very many segments, the terminal one-third having simple segments. The male genitalia have an angulate gnathos with the median transverse portion having a large curved process at each of the anterolateral angles.

ADULTS: Head with eyes of males large; front broadly swollen, extending one-third diameter of eye in front of eye, and having ventral transverse ridge; palpi of males with second segment 0.5 mm. long, third segment 0.3 mm., tightly scaled, decumbent; antennae of males with about 96 segments, bipectinate, longest pectinations 0.5 mm. long, three times as long as basal segments, pectinations arising basally on segments, end of each pectination slightly swollen, triangular, with 28 simple segments at end of antennae, each pectination having short row of double setae below. Thorax slender, patagia with mixture of flattened and hairlike scales, with prominent metathoracic tuft; fore tibia with epiphysis of males arising about three-fifths length of segment and being one-half length of that structure; hind tibia of males with hair pencil. Abdomen slender, extending beyond hind wings, with prominent dorsal tufts, and with ventral row of setae on third segment of males.

Forewings broad, apex bluntly angled, outer margin rounded, smooth; males with one accessory cell; vein R_1 from top of cell, R_2 either short stalked with R_{3+4} or free, R_5 from

end of cell; mdc and ldc weakly curved. Hind wings broad, outer margin rounded, slightly concave between veins; Sc paralleling R for one-half length of cell; m and ldc weakly angled.

Upper surface of forewings of males dark unicolorous gray, with faint black cross lines, t. a. line angled outwardly, t. p. line more or less paralleling t. a. line to vein R_3 , then angled basad, with s. t. line white, sharply angulate, represented near costa; hind wings white with broad dull black border on outer and costal margins, narrowing and disappearing on anal margin. Under surface of forewings pearly white, with slender dull black cross line medially and with terminal one-third black except for white patch in middle of outer margin; hind wings white, with broad black outer margin having narrow white patch in middle of wing on outer margin, and with incomplete extradiscal line.

Length of Forewings: Males, 19 to 21 mm.; females, unknown.

MALE GENITALIA: Uncus 0.8 to 0.9 mm. long, base 0.5 to 0.6 mm. wide, curved, tapering to slender posterior end, apex pointed; socius shortly digitate, with about 15 to 20 setae; gnathos with wide, almost parallel lateral arms, medially broadly truncate, with large sclerotized, outwardly curved process from each anterolateral portion; valves with broad, well-sclerotized costa, continued medially into curved transtilla, concave distally along length of valve, apically slightly curved, valvula with rectangular membranous base, medially and distally with numerous setae, sacculus sclerotized, weakly swollen; processes of anellus subtriangular, more heavily sclerotized distally, curved posteriorly; anellus tapered anteriorly, with median incision, medial ridge extending length of both anellus and elongate, apically rounded median process; tegumen with short median fusion; saccus longer than tegumen, with tapering sides, anterior end bluntly pointed; aedeagus 2.3 to 2.5 mm. long, 0.4 to 0.5 mm. wide, posterior end bluntly pointed, sclerotized; vesica, when exerted, extending at about 100° to 110° angle to aedeagus, basal portion longitudinally striate, tapering distally, and armed with very large number of deciduous, barbed setae completely filling aedeagus, loosely attached

to elongate, slightly curved, weakly sclerotized plate.

FEMALE GENITALIA: Unknown.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPE SPECIES: *Cundinamarca parallela*, new species.

DISTRIBUTION: Colombia.

FLIGHT PERIOD: August.

REMARKS: The type species is the only one included in this genus.

The following combination of apomorphic characters will separate *Cundinamarca* from all other genera except *Achagua*: the male palpi with the third segment more than one-half the length of the second segment, 28 simple segments at the end of the male antennae, with a row of setae ventrally on the third abdominal segment of the male, and the anellus with a posteromedian extension. Compared with *Achagua* (placed in group 3), *Cundinamarca* lacks metathoracic tufts, and has the U-shaped gnathos with a large curved process at each of the anterolateral angles. *Achagua* has a complex uncus, the gnathos is V-shaped, the valves have a projecting arm from the costa, and lacks spines in the vesica. In both *Cundinamarca* and *Achagua* the females are unknown to me.

ETYMOLOGY: The generic name is that of a department in Colombia; its genera is feminine.

***Cundinamarca parallela*, new species**

Figures 1, 34, 44

DIAGNOSIS: As for the genus.

ADULTS: Head with vertex white laterally, faintly greenish gray and grayish brown medially; front with mixture of gray and dark brown scales, narrowly white around lateral and ventral margins; palpi with mixture of gray and dark brown scales. Thorax with collar concolorous with posterior portion of head, patagia elongate, anterior portion faintly greenish gray, medially and posteriorly with mixture of white and brownish black scales, thorax laterally white, posterior tuft greenish gray and brownish black; below white and pale grayish white; legs with each femur grayish white with a few scattered grayish brown scales, tibia grayish white and brownish black,

tarsi broadly banded grayish white and brownish black. Abdomen above with mixture of greenish gray, gray, and brownish black scales, tufts brownish black; below with elongate white scales basally, with mixed gray and brown scales medially, and with increasing number of brown scales distally.

Upper Surface of Wings: Forewings evenly suffused with mixture of faintly greenish gray, gray, and blackish brown scales; cross lines narrow, black, partially obsolescent; t. a. line arising on costa about one-fifth distance from base, going straight to inner margin at one-half its length; discal spot black, small; t. p. line arising on costa about three-fifths distance from base, paralleling t. a. line to vein M_3 , angled posteriorly, becoming thinner or obsolescent, meeting inner margin about seven-tenths its length; s. t. line white, zigzag below costa, faint to obsolescent posteriorly; veins black at outer margin; fringe concolorous with wing, narrowly white opposite veins. Hind wings white, with costa grayish black, outer margin broadly black except for some grayish white scaling along outer margin posteriorly, anal angle narrowly black, anal margin white; fringe grayish black.

Under Surface of Wings: All wings white, with broad dull black outer margin; forewings with costa having mixed black and grayish white scales, with complete curved median shade line, small discal spot, grayish white near apex, and with large white area at middle of outer margin; hind wings with incomplete extradiscal line represented by small venular spots, grayish black scaling along costa, and with white area along outer margin; fringes concolorous with wings.

Length of Forewings: Holotype, 21 mm.; paratypes, 19 to 21 mm.

MALE GENITALIA: As given for the genus.

FEMALE GENITALIA: Unknown.

TYPES: Holotype, male, Finca San Pablo, 1800 m., 3 km. north of Alban, Cundinamarca, Colombia, August 1–12, 1967 (P. and B. Wygodzinsky). Paratypes: four males, same data. The genitalia of the holotype are mounted on slide FHR 19045A, with the left antenna and left legs on slide 19045B.

The holotype and paratypes are in the collection of the American Museum of Natural History.

REMARKS: Five specimens, two genitalic dissections, and one antenna and leg mount have been studied.

ETYMOLOGY: The specific name is from the Latin *parallelus*, in reference to the course of the cross lines on the anterior portion of the upper surface of the forewings.

ARAGUA, NEW GENUS

Figures 1, 35, 45, 54

DIAGNOSIS: Moths of this genus are large (length of forewings 21 to 24 mm.), have the upper surface of the forewings brown to dark brown, with distinct cross lines, the hind wings being whitish or grayish white with an extradiscal line, and the very long antennae three-fourths as long as forewings, being simple in both sexes. The male genitalia have the end of each costa swollen, very long and asymmetrical processes of the anellus, and a needle-like median extension of the anellus that is about the same length as the processes. The female genitalia have the lamella antevaginalis very large and very heavily sclerotized, 1.5 mm. long, with a posteroventral cleft, the corpus bursae is set at an angle to the ductus bursae and has a large invaginated signum.

ADULTS: Head with large eyes, equal in size in both sexes or slightly smaller in females; front prominently raised, extending one-half diameter of eye in front of eye, and having ventral transverse ridge; palpi of males with second segment 0.6 to 1.0 mm. long, third segment 0.4 to 0.5 mm., tightly scaled, in females slightly longer; antennae of both sexes very long, three-fourths length of forewings, of from 78 to 86 segments, simple in both sexes. Thorax moderately slender, patagia with mixture of flattened, triangular-tipped scales and hairlike scales, with prominent metathoracic tuft; fore legs with epiphysis of males arising at three-fifths length of segment and being one-third to one-half its length, of females arising between three-fifths and two-thirds length of segment and being about two-fifths its length; hind tibia of males with hair pencil. Abdomen of males moderately slender, extending beyond hind wings, of females thicker and shorter, both with dorsal tufts;

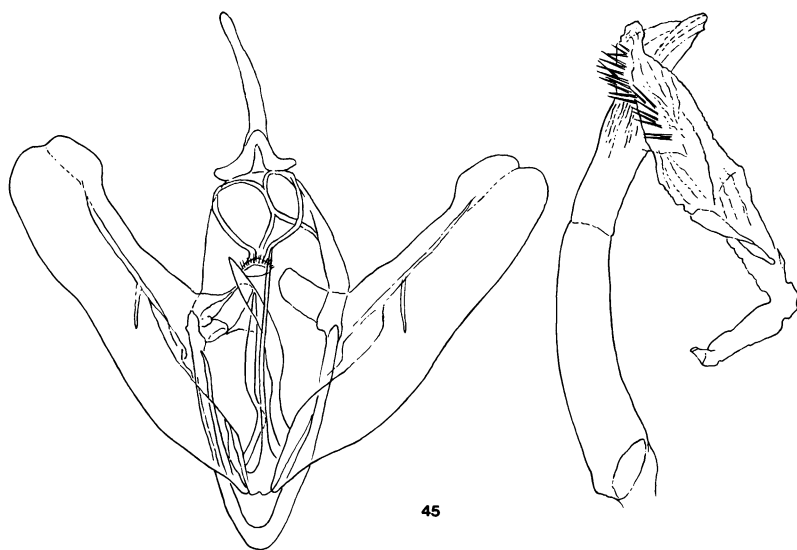


FIG. 45. Male genitalia of *Aragua mamestrina* (Warren), Yungas del Palmar, Bolivia, February 12, 1949 (AMNH).

males with row of setae on ventral surface of third segment.

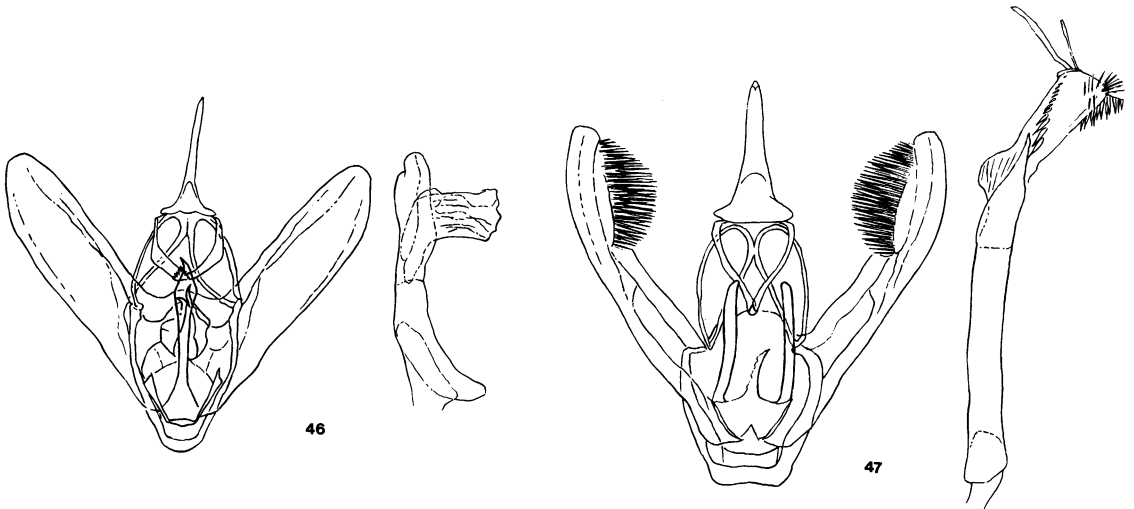
Forewings triangular, apex bluntly pointed, outer margin curved, dentate; with one accessory cell or with none; either vein R_1 free, R_2 stalked with R_{3+4} , R_5 from bottom of cell, or R_1 and R_2 free, R_5 from R_{3+4} ; mdc and ldc biconvex. Hind wings broad, triangular, outer margin oblique, weakly to strongly concave between veins; Sc paralleling R for one-third to two-fifths length of cell; m and ldc angled.

Upper surface of forewings brown or dark brown, with biconvex t. a. line and dentate t. p. lines setting off darker brown median area and its discal spot, and with incomplete white s. t. line; sexes similar in maculation; hind wings whitish or grayish white, with extradiscal line and incomplete s. t. line. Under surface of wings of males pale gray with brown and yellowish brown scaling, of females heavily covered with dark brown scales, both sexes with all discal dots, t. p. and extradiscal lines.

Length of Forewings: Males, 21 to 23 mm.; females, 24 to 28 mm.

MALE GENITALIA: Uncus 1.7 to 1.8 mm. long, with base 0.9 to 1.0 mm. wide, slender, elongate, with parallel sides, apex either

bluntly pointed or as transverse ridge; socius small, raised, with approximately 24 setae; gnathos heavily sclerotized, rounded, constricted medially, apex swollen, elongate, densely spinose; valves with broad, well sclerotized costa, straight or swollen medially, apically swollen, with indentation between swelling and equal sized, rounded apex of valve, valvula densely covered with slender setae distally, membranous basally, sacculus lightly sclerotized, slightly swollen basally; processes of anellus very long, noticeably longer than uncus, asymmetrical, right one longer and wider than left one, both slightly curved, evenly tapering apically, extending posteriorly as far as median swelling of gnathos; anellus with small triangular base, very long and slender, in length about equal to its processes; tegumen elongate, with median thickening united posteriorly; saccus elongate, tapering; aedeagus elongate, slightly curved, 4.3 to 5.4 mm. long, 0.6 to 0.7 mm. wide, posterior end bluntly pointed, sclerotized laterally; vesica, when exerted, extending at about 120° angle to aedeagus, tapering distally, and armed with row of about 24 short thick spines adjacent to aedeagus, some slender lightly sclerotized ridges, and a large sclerotized piece distally.



FIGS. 46, 47. Male genitalia. 46. *Azuayia stigmatalis* (Dognin), Cerro Tinajillas, Ecuador, March 20, 1965 (L. E. Peña; AMNH). 47. *Mallomus antennata* (Mabille), Comodora Rivadavia, Argentina, December 2, 1952 (J. Foerster; AMNH).

FEMALE GENITALIA: Sterigma with large, heavily sclerotized lamella antevaginalis, widening posteriorly to cover entire segment, 1.5 mm. long, with median deeply U-shaped indentation in posterior margin; ductus bursae sclerotized, either tubular and partly encircled by lamella antevaginalis or slender posteriorly, broadly widened anteriorly; ductus seminalis arising ventrally from ventral lobe of corpus bursae near ductus bursae; corpus bursae entirely membranous or with small, weakly sclerotized area posteriorly, posterior end curved ventrally, extending beyond ductus bursae, having longitudinal striations, entire corpus of approximately equal diameter, anterior end rounded or bluntly pointed, corpus bursae with length about 1.5 times that of apophyses posteriores; signum large, elliptical on surface of corpus bursae, with raised rim, invaginated, 0.8 to 1.1 mm. long, flattened, elongate ovate in shape, edges serrate, flattened surface sparsely dentate. Papillae anales long and slender; apophyses with anterior attachment; apophyses posteriores 3.0 to 3.8 mm. long, apophyses anteriores 1.5 to 1.6 mm. in length.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPE SPECIES: *Cidariophanes mamestrina* Warren.

DISTRIBUTION: Venezuela, Colombia, Peru, and Bolivia.

FLIGHT PERIOD: February, March, and April.

REMARKS: I have examined three species that are included in this genus.

Aragua shares a number of apomorphic characters with both *Salasaca* and *Tarma* in group 2. *Aragua* can be separated from those genera by the low, slightly raised socius and by the very long and asymmetrical processes of the anellus.

ETYMOLOGY: The generic name is that of a state in Venezuela; its gender is feminine.

AZUAYIA, NEW GENUS

Figures 1, 36, 46, 55

DIAGNOSIS: The species of this genus are characterized by the upper surface of the forewings being brown or black, with partial or complete cross lines, the hind wings white or brownish white, the females slightly larger than the males, the males with either pectinate or simple antennae, the ventral surface of the third abdominal segment in the males with a row of setae, and with scale tufts being present on both the metathorax and abdomen. The male genitalia have a long slender uncus 1.2 to 1.3 mm. long, and a reduced

anellus with a very long, slender median extension ending either in two sclerotized points or with a bulbous area having an asymmetrical single point. The female genitalia have a very large sclerotized ostium bursae, a small sclerotized ductus bursae, and a very large curved corpus bursae having a long slender digitate signum.

ADULTS: Head with eyes of both sexes large, those of females either same size as males or slightly smaller; front flat, slightly raised above front rim of eyes, and covered with moderate group of scales; palpi of males with second segment 0.6 mm. long, third segment 0.4 to 0.5 mm. long, tightly scaled, straight or decumbent, those of females equal in size or slightly longer; antennae of 64 to 78 segments, either bipectinate or simple in males, simple in females; bipectinate antennae with longest pectinations 0.9 mm. long, five times as long as basal segments, pectinations arising basally on segments, about nine segments simple at end of each antenna, and each pectination having double row of setae below. Thorax slender, patagia with flattened scales overlaying hairlike scales, with prominent metathoracic tuft; fore tibia with epiphysis of males arising near three-fifths length of segment and being one-half its length; hind tibia of males with hair pencil. Abdomen moderately slender, extending beyond hind wings, with dorsal tufts, and with ventral row of setae on third segment of males.

Forewings broad to slightly narrowed, apex oblique to bluntly pointed, outer margin slightly to moderately rounded, smooth to weakly concave between veins; with one accessory cell; vein R_1 free, R_2 short stalked with R_{3+4} , R_5 from cell; mdc and ldc curved. Hind wings broad, outer margin oblique to weakly rounded, smooth to weakly concave between veins; Sc paralleling R for two-fifths length of cell; m and ldc curved.

Upper surface of forewings various shades of brown or black, with or without approximately parallel cross lines, median area, when present, tending to be differently colored than adjacent wing areas, with varying amounts of white scales, either on outer margins of cross lines or as longitudinal areas; hind wings mostly white or brownish white, with reduced maculation; females tending to have

slightly browner forewings and darker hind wings than males. Under surface basically similar to upper surface, duller in color, with distinct cross lines and discal spots.

Length of Forewings: Males, 16 to 20 mm.; females, 18 to 21 mm.

MALE GENITALIA: Uncus 1.2 to 1.3 mm. long, with base 0.6 mm. wide, elongate, slender, with parallel sides, apical region either rounded or laterally flattened, apex bluntly pointed; socius digitate, with from about 10 to 15 setae; gnathos elongate, tapering to blunt point, having posterior surface serrate or with thickly set short setae; valves with costa sclerotized, straight or medially convex, valvula with median and distal portions thickly covered with slender setae, basally membranous, varying from very slender to moderately wide strip, sacculus lightly sclerotized, swollen, with moderate to slight median constriction; processes of anellus moderate, about one-half length of uncus, laterally flattened, each posterior end tapering to curved point; anellus with small triangular base, median process very long, 1.0 to 1.8 mm. in length, slender, apex either bulbous with asymmetrical single protruding point or with two elongate, well-separated points; tegumen elongate, with broad median thickening united for varying lengths; saccus relatively broad, rounded anteriorly; aedeagus 1.9 to 2.8 mm. long, 0.3 to 0.4 mm. wide, straight or curved, apical portion sclerotized, apex bluntly pointed; vesica, when exerted, extending at from 45° to 60° angle to aedeagus, tapering, either unarmed or with single, irregularly shaped sclerotized piece longer than width of aedeagus.

FEMALE GENITALIA: Sterigma with lamella antevaginalis sclerotized, broad, rounded anteriorly, posterior margin irregular or with shallow median indentation, lamella postvaginalis either a small, U-shaped continuation of lamella antevaginalis or as large as lamella antevaginalis, with lateral, diagonal, indented, slender ridges; ductus bursae small, 0.3 mm. long, sclerotized, slightly longer than wide; ductus seminalis either arising from small ventral sac posteriorly on corpus bursae or from end of large posterodorsal continuation of corpus bursae on right side of ductus bursae, with ductus seminalis semicircular, passing dorsad of corpus bursae; corpus bur-

sae membranous, posterior portion slender, as described above or with conical section connecting ductus bursae and corpus bursae, surface minutely granular, then swollen ventrally, posterior portion of both forms with longitudinal striations, latter either simple and shallow or deep and partly finely denticulate, anterior portion of corpus slightly enlarged, anterior end rounded, corpus bursae with length 2.0 to 3.5 times that of apophyses posteriores; signum large, ovoid on surface of corpus bursae, with slightly raised rim, invaginated, 0.55 to 0.65 mm. long, concave or flattened, elongate ovate or digitate in shape, edges serrate, flattened surface more or less sparsely dentate. Papillae anales elongate; apophyses with anterior attachment; apophyses posteriores 2.5 to 3.1 mm. long, apophyses anteriores 1.0 to 1.7 mm. in length.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPE SPECIES: *Cidariophanes stigmatalis* Dognin.

DISTRIBUTION: Colombia and Ecuador.

FLIGHT PERIOD: February and March.

REMARKS: Three species have been placed in this genus. From the very limited material examined, the moths appear to fly at higher elevations, from 2900 to 3200 m.

Azuayia shares with *Aragua* and *Tarma* many apomorphic characters, but all three are quite distinct. *Azuayia* is distinguished from *Aragua* by its smaller size, different wing color, fewer antennal segments, smaller genitalia, especially in the males, symmetrical processes of the anellus, the costa not being swollen, the vesica having only a sclerotized piece or unarmed, and a simple straight corpus bursae. Most of these characters can be used to separate *Azuayia* from *Tarma*; the former has curved processes of the anellus (*Tarma* has straight ones), and does not have complex valves.

ETYMOLOGY: The generic name is that of a province in Ecuador, Azuay, plus the Latin ending *-ia*; the gender is feminine.

GENUS *MALLOMUS* E. BLANCHARD

Figures 1, 37, 47, 56

Mallomus Blanchard, 1854, p. 70.

Salpis Mabille, 1885, p. 65. Rindge, 1971, pp.

320–374, figs. 12–94; 1973b, pp. 18–41, figs. 16–35. NEW SYNONYMY.

Lasiops Warren, 1895, p. 143 (*nec* Meigen, 1838, p. 323).

Pseudosalpis Staudinger, "1898" [1899], p. 82. Prout, 1910, p. 319 (synonymy).

Dasystole Warren, 1907, p. 301. Poole, 1969, pp. 276–285, figs. 1–21. NEW SYNONYMY.

Salpis (*Microdontopera*) Prout, 1910, p. 320 (replacement name for *Lasiops* Warren). Rindge, 1971, p. 320 (placed as synonym of *Salpis*).

Salpis (*Antygophanes*) Prout, 1910, p. 320. Rindge, 1971, p. 320 (placed as synonym of *Salpis*).

DIAGNOSIS: The adults of this genus have the upper surface of the forewings gray or brown, usually with reduced or inconspicuous maculation, the hind wings may be either concolorous with the forewings or paler, the patagia are either made up entirely of hairlike scales or have a few slender flattened scales intermixed, and the metathoracic tuft is present but the abdominal tufts are absent. The male genitalia have a simple uncus, the gnathos is either pointed or V-shaped, the valves may be simple or have either or both a costal arm and a median arm from the face of the the valves, the processes of the anellus are prominent and curved, and the spines of the vesica may be in one or two groups. The female genitalia have the apophyses posteriores with an anterior point of attachment to the papillae anales, and the corpus bursae is swollen anteriorly and has a flattened signum.

ADULTS: Head with eyes moderate to large, either of equal size in both sexes or those of females slightly smaller; front either flat or swollen, varying from barely extending beyond front of eyes to four-fifths diameter of eye; palpi of both sexes about equal in size, second segment 0.5 to 1.4 mm. long, third segment 0.3 to 1.0 mm., tightly scaled and decumbent in most species, rarely loosely scaled and erect; antennae of from about 57 to 89 segments, bipectinate, fasciculate, serrate or simple in males, simple or serrate in females; males with longest antennal pectinations 0.3 to 1.5 mm. long, from equal to length of basal segments to six times as long, pectinations arising basally on segments, not attaining apex, having from one to nine simple segments at distal end. Thorax slender to moderate, patagia of hairlike scales or com-

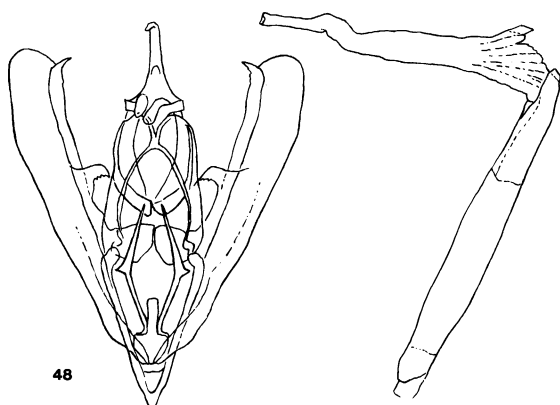


FIG. 48. Male genitalia of *Tarma* sp., Nova Teutonia, Brazil, July 24, 1948 (F. Plaumann; AMNH).

bined with some slender flattened scales, and with metathoracic tuft; fore tibia with epiphysis of males arising between one-half and three-fifths length of segment and being two-fifths to three-fifths length of that structure, of females arising between one-half and two-thirds length of segment and being one-fourth to three-fifths length of tibia; hind tibia of males with or without hair pencil. Abdomen moderate, extending to or beyond hind wings, without dorsal tufts; males with or without row of setae on third segment ventrally.

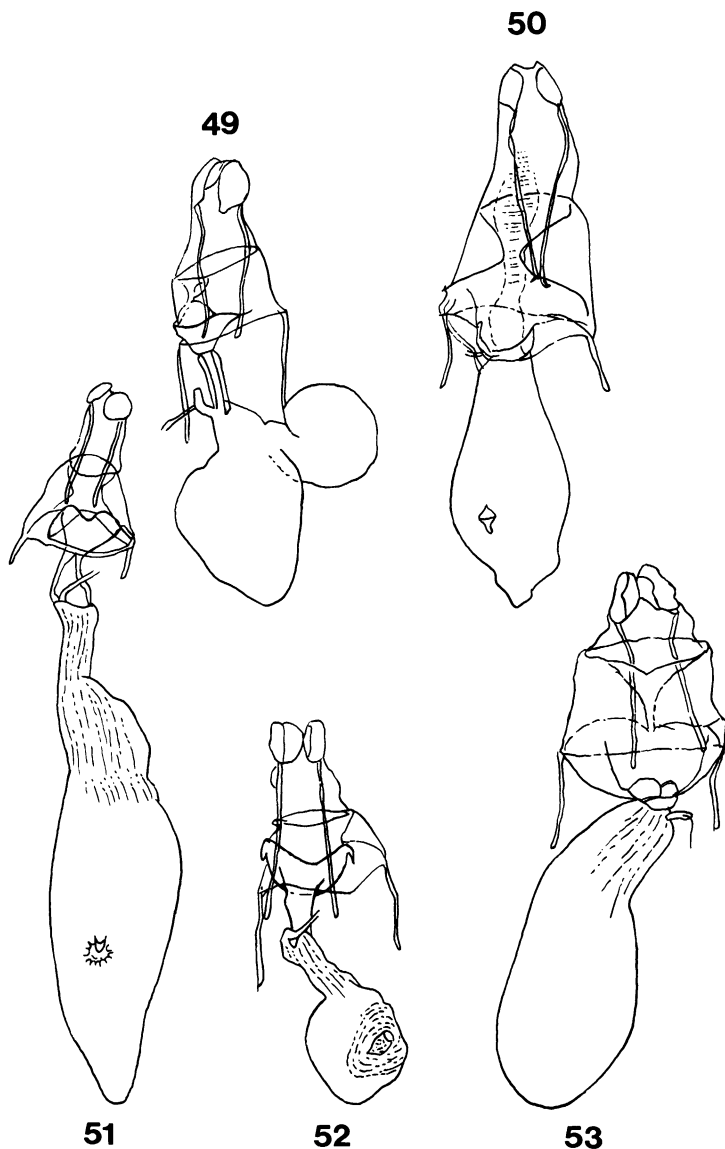
Forewings variable in shape, elongate to triangular and broad, outer margin oblique, convex or slightly rounded, shallowly to deeply concave between veins; without accessory cell or with one or two; vein R_1 free or from top of second accessory cell, R_2 free or stalked with R_{3+4} , R_5 from R_{3+4} or bottom of cell; mdc and ldc variably biconvex. Hind wings elongate to broad, outer margin concave between veins; Sc paralleling R from one-fifth to over one-half length of cell; m and ldc rounded or angled.

Upper surface of forewings gray or brown, usually with reduced or inconspicuous maculation, sexes similar; hind wings either concolorous with forewings or paler, with discal dot and extradiscal line usually present. Under surface paler than upper surface, with maculation more distinct in some species.

Length of Forewings: Males, 11 to 24 mm.; females, 16 to 25 mm.

MALE GENITALIA: Variable; uncus 0.7 to 1.7 mm. long, base 0.5 to 0.9 mm. wide, tapering, with parallel sides, or with slight swelling, apex with one or two points; socius padlike or shortly digitate, with from approximately 10 to 40 setae; gnathos either rounded and attenuate medially or V-shaped, medially pointed or bluntly rounded, smooth or with numerous short setae; valves with sclerotized costa, with or without costal arm, valvula with or without median or distal projection, median and distal portions with thin to moderately stout setae, sparsely to densely covered, saccus either unmodified or lightly sclerotized and swollen; processes of anellus 0.3 to 1.5 mm. long, of various forms, bare or partially setose; anellus quadrangular, posteriorly with two short points, or with moderate to prominent median extension; tegumen elongate, slender, either with thin median thickening shortly united posteriorly or without such thickening; saccus broad, truncate or broadly rounded anteriorly; aedeagus 1.4 to 4.0 mm. long, 0.2 to 0.5 mm. wide, straight or curved, posterior end rounded or bluntly pointed, variably sclerotized; vesica, when exerted, extending as continuation of aedeagus or at various angles up to 90° to that structure, as simple tube or having some slight swellings on posterior surface, and armed with variable number of spines, in one or two groups, with some being deciduous.

FEMALE GENITALIA: Variable; sterigma variable, lamella antevaginalis slender, rod-like to broad band of various shapes, rounded, projecting or digitate, symmetrical or asymmetrical, lamella postvaginalis membranous, striated, or weakly sclerotized; ductus bursae weakly to heavily sclerotized, tapering or rectangular, symmetrical or asymmetrical, varying from much wider than long to twice as long as wide; ductus seminalis arising ventrally or laterally from posterior end of corpus bursae, either from side of small sac or from tapering, curved continuation of corpus; corpus bursae symmetrical or asymmetrical, posterior portion membranous, weakly or strongly sclerotized, with or without longitudinal striations, anterior portion of corpus variably enlarged, membranous, corpus bursae with length varying from equal to up to five times as long as apophyses pos-



FIGS. 49–53. Female genitalia. 49. *Yermoia perplexata* McDunnough, Tub Canyon, California, January 1947 (N. Crickmer; AMNH); this one drawn twice as large as all others. 50. *Ceratonyx permagnaria* (Grossbeck), Sierra Vista, Arizona, July 1, 1965 (R. F. Sternitzky; AMNH). 51. *Salasaca spinea*, new species, allotype, Macara-Catacocha, Ecuador, August 13–14, 1977 (L. E. Peña; AMNH). 52. *Cargolia* sp., Cerro Tinajillas, Ecuador, March 20, 1965 (L. E. Peña; AMNH). 53. *Hidalgo agonaria* (Dyar), Copete Mine, Mexico (F. C. Nichols; AMNH).

teriores; signum a small ovoid thickening to large, invaginated, heavily sclerotized, flattened structure, edges serrate and surface dentate. Papillae anales short to elongate;

apophyses with anterior or median attachments; apophyses posteriores 1.1 to 3.7 mm. long, apophyses anteriores 0.2 to 1.0 mm. in length.

EARLY STAGES: Apparently undescribed, although at least two species (*endora* Prout and *tumida* Rindge) have been collected as pupae, both being found under rocks (Rindge, 1971).

FOOD PLANT: Unknown.

TYPE SPECIES: For *Mallomus*: *Mallomus ciliatus* E. Blanchard; by monotypy. For *Salpis*: *Salpis antennata* Mabilie; designated by Prout, 1910, p. 320. For *Lasiops* Warren (*nec* Meigen): *Colotois chilendaria* C. Felder and Rogenhofer; by original designation. For *Pseudosalpis*: *Salpis albipunctaria* Mabilie; designated by Rindge, 1971, p. 320. For *Dasystole*: *Homoptera thoracica* Walker; by original designation. For *Microdontopera*: *Colotois chilendaria* C. Felder and Rogenhofer; this name was proposed as the objective replacement name for *Lasiops* Warren, and hence has the same type species. For *Antygophanes*: *Salpis (Antygophanes) orbifera* Prout; by monotypy.

DISTRIBUTION: From Venezuela and Colombia, south in the Andes to southern Chile and Argentina.

FLIGHT PERIOD: Every month of the year except June and August.

REMARKS: Dr. E. S. Nielsen (in letter) asked my opinion of the identity of *Mallomus ciliatus* Blanchard. This moth was described (1854, p. 71, pl. 6, fig. 5) in the Hepialidae from the Province of Coquimbo, Chile. Dr. P. Viette kindly lent me the holotype (in MNHN) of this species. The type is in poor condition, lacking both right wings and nearly all the antennae and legs; the contents of the abdomen, including the genitalia, have been completely destroyed. This species was placed in the wrong family when it was described; it belongs in the Geometridae, and there can be little doubt that it is a *Salpis*. It most likely goes in my Group IV of that genus (Rindge, 1971, p. 360). The holotype is a male with simple antennae and without a tibial hair pencil; the length of the forewing is 17 mm. Its closest relatives appear to be *glabra* Rindge and *clarkei* Sperry, as these two species have the two characters listed in the previous sentence; the length of the forewings of the males of these species is from 18 to 21 mm. The wings of *ciliatus* are a unicolorous pale brown with extremely faint maculation;

the pattern appears to be similar to that of *glabra*. *Mallomus ciliatus* can be distinguished from its presumed relatives by the length of the third segment of the palpus; in *ciliatus* it is 1.0 mm. long, whereas in *glabra* it is 0.7 to 0.8 mm., and in *clarkei* it is 0.6 to 0.8 mm. It is possible that *ciliatus* may prove to be a smaller species than the other two.

Due to the above placement, Blanchard's generic name becomes a senior subjective synonym of the more widely known *Salpis*.

Forty-seven species are included in this large and complex genus (see Rindge, 1971 1973b; Poole, 1969), heretofore known as *Salpis*. Of these, 41 were described in my two papers, five were treated by Poole in his revision of *Dasystole*, and one is added in the present paper. Angulo (1977b) described the males of two species that were unknown to me; his sexual associations definitely need to be verified. The genitalia place both of his described species in my Group III, but neither of the specific names he used were included therein in my 1971 revision. Angulo's usage of *unica* Rindge is incorrect, as I described the male in 1973b; this species and *variata* Rindge are placed in a separate genus in the present paper. It is possible that the two males described by Angulo represent new species.

Mallomus is a difficult genus to define, as many species are included and they tend to have a variety of characters; refer to the Diagnosis for a summary. In working up the data for my 1971 paper I tried to form groups for the included species, but did not achieve anything that could be used for a generic division. When preparing the present paper I repeated the process but used many more characters; each species available to me underwent the same analysis that every genus did in the present revision. Presumably Prout (1910) had attempted something similar; he subdivided *Salpis* into three subgenera. Neither of my analyses agreed with his, probably because I used more and different characters particularly the genitalia; I used four groups in 1971.

When Poole published his revision of *Dasystole* he stated that this group is "probably closely related to the genus *Salpis*, but a comparison of these two genera must wait

TABLE 9
Species Groups of *Mallomus*

Characters	Group 1	Group 2	Group 3	Group 4	Group 5
Front swollen	±	—	±	±	+
Male antennae bipectinate	+	—	+	±	—
Patagia of hairlike scales	±	—	±	±	—
Hair pencil on hind tibia of male	—	+	—	±	+
Males with ventral row of setae on third abdominal segment	—	+	—	±	—
Uncus with parallel sides	±	±	+	±	—
Valves with costal arm	—	—	—	—	+
Valves with median arm	—	—	+	±	+
Anellus processes shorter than uncus	+	+	+	±	—
Spines of vesica in two groups	±	—	±	+	+
Corpus bursae swollen anteriorly	±	±	+	+	+

Legend: +, character present; —, character absent; ± character present or absent.

for a generic revision of the Nacophorini, particularly the Chilean genera” (1969, p. 277). This comparison has now been made, and the results were compared with those from *Mallomus*. *Dasystole* does have the apomorphic character of the valves having a costal arm, a state not found in any of the four species groups of *Mallomus*. The pronounced expanded lamella vaginalis thought by Poole to be diagnostic is found in varying degrees in several species placed in my groups 1, 3, and 4; thus this character is of specific value rather than at the generic level. Finding no other distinguishing characters, *Dasystole* is placed as a synonym of *Mallomus*. As it forms a recognizable group, I have placed it as group 5; see table 9 for some of the character states where these groups are summarized.

TARMA, NEW GENUS
Figures 1, 38, 48, 57

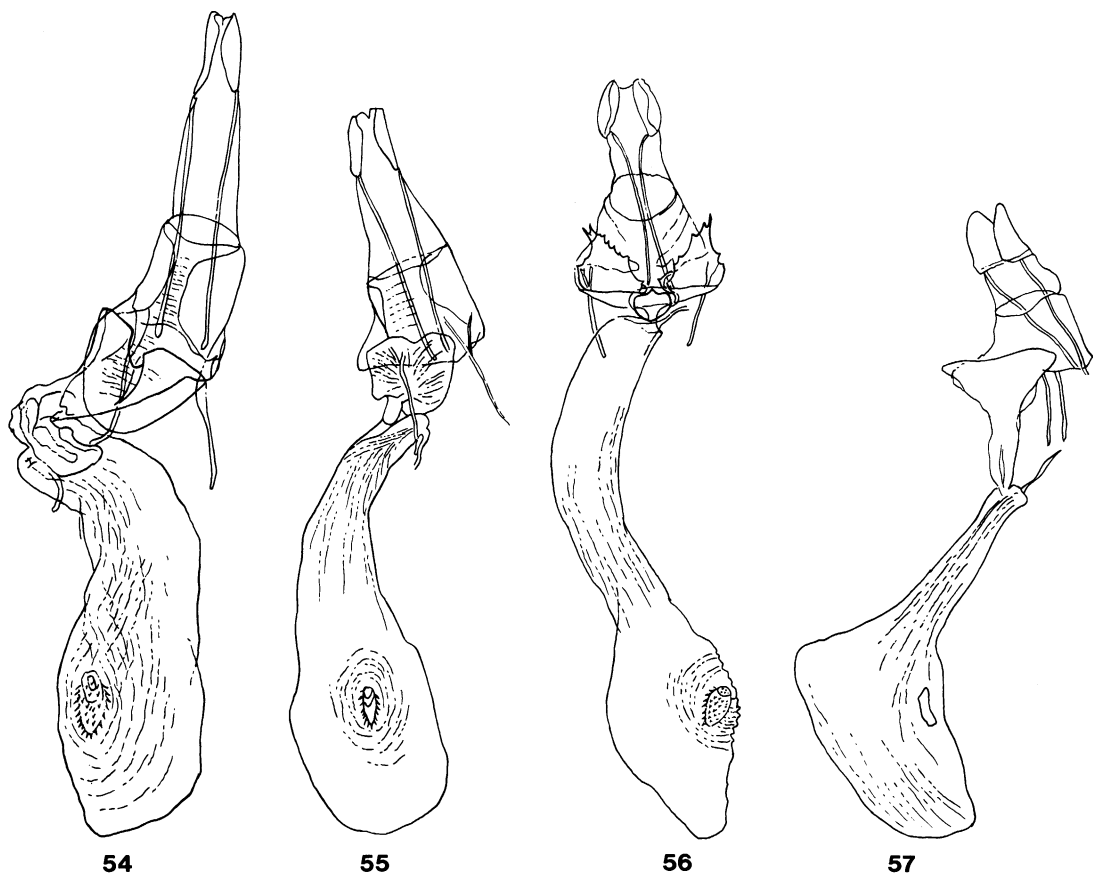
DIAGNOSIS: Moths of this genus are recognized by their large size (length of forewings, 22 to 29 mm.), the upper surface of the forewings of both sexes being white with a dark brown apex, of the hind wings white with some scattered brown scaling, the patagia with hairlike scales, the antennae being simple in both sexes, and by the very long palpi. The male genitalia have a very long curved uncus, each socius is elongate and digitate, each valve has a median curved pro-

cess, and the vesica is without spines. The female genitalia have a broad ostium bursae, a long slender ductus bursae, and an asymmetrical corpus bursae with a long slender signum.

ADULTS: Head with both sexes having large eyes of equal size; front of males flat, barely exceeding front rim of eyes, of females slightly swollen, extending beyond eyes by one-fifth their diameter; palpi elongate, males with second segment 1.0 mm. long, third segment 0.8 mm., tightly scaled, decumbent, of females slightly longer; antennae of from about 76 to 81 segments, simple in both sexes. Thorax moderately stout, patagia with hairlike scales, and with small metathoracic tuft; foretibia of both sexes arising at three-fifths length of tibia and being three-tenths length of segment. Abdomen moderately stout in males, reaching or just exceeding hind wings, thicker in females, not attaining anal angle of hind wings; without dorsal tufts; males with ventral row of setae on third segment.

Forewings broad, somewhat attenuate, apex bluntly pointed, outer margin rounded, smooth; with one accessory cell but some specimens without this cell; vein Sc with cross vein to top of cell, R₁ and R₂ free, R₃₊₄ stalked, R₅ from cell; mdc and ldc curved. Hind wings broad, outer margin rounded and weakly concave between veins; Sc paralleling R for one-fifth length of cell; m and ldc angled.

Upper surface of forewings dull white, veins and apex dark brown, with last quite broad



FIGS. 54-57. Female genitalia. 54. *Aragua mamestrina* (Warren), Incachaca, Bolivia (J. Steinbach; USNM). 55. *Azuayia stigmatalis* (Dognin), Monte Colima, Colombia (Fassl; USNM). 56. *Mallomus antennata* (Mabille), San Martin de los Andes, Argentina, February 22, 1952 (AMNH). 57. *Tarma* sp., Nova Teutonia, Brazil, April 1953 (F. Plaumann; AMNH).

and narrowly extending to outer angle, without cross lines; hind wings dull grayish or brownish white, without cross lines, veins narrowly brown, outer portion of wing slightly darkened; sexes alike in maculation. Under surface of forewings white, with broad brown apex, paler than on upper surface, with elongate discal mark and scattered brown scaling in cell; hind wings brown, with incomplete extradiscal line.

Length of Forewings: Males, 22 to 26 mm.; females, 23 to 29 mm.

MALE GENITALIA: Uncus strongly curved, about 1.0 mm. long, base 0.6 to 0.7 mm. wide, apex evenly tapering to single point;

socius sclerotized, very long, digitate, thickly setose; gnathos lightly sclerotized, with broad, flat lateral margins, narrowed medially to form elongate, slender, more heavily sclerotized point; valves with broad sclerotized costa terminating in projecting point near apex of valve, valvula with prominent, sclerotized projection medially, curved, varying from slender to broad basally, median and outer areas of valvula with numerous slender setae, sacculus swollen, lightly sclerotized, without median constriction; processes of anellus elongate, slender, shallowly V-shaped, posterior arms straight, tapering to narrow point, entire structure longer than uncus;

anellus with triangular or five-sided anterior portion, and with digitate median process about equal to, or slightly longer than, its anterior portion; tegumen elongate, slender, with slender median thickening shortly united anteriorly; saccus elongate, slender, evenly tapering to blunt point; aedeagus 3.8 to 3.9 mm. long, 0.45 to 0.50 mm. wide, straight, apex lightly sclerotized and bluntly pointed; vesica, when exerted, extending at about 90° angle to aedeagus, with small projection on posterior surface, tapering to end; vesica unarmed.

FEMALE GENITALIA: Sterigma with funnel-shaped ostium bursae, lamella antevaginalis with slender sclerotized posterior rim and two membranous lateral lobes; ductus bursae membranous, not clearly separable from ostium bursae, elongate, becoming narrower anteriorly; ductus seminalis arising from posterior blunt end of corpus bursae; corpus bursae membranous, posterior end truncate, with ductus bursae entering from one margin, elongate posterior portion slender, with longitudinal striations, anterior portion of corpus swollen or transversely elliptical, weakly striate, corpus bursae with length 2.5 to 4.0 times that of apophyses posteriores; signum flat, invaginated, wider than deep, subrectangular to semicircular, inner edge serrate, surface smooth. Papillae anales elongate, with truncate anterior margin; apophyses with anterior attachment; apophyses posteriores 2.0 to 2.1 mm. long, apophyses anteriores 1.2 to 1.5 mm. in length.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPE SPECIES: *Inca theodora* Thierry-Mieg.

DISTRIBUTION: Ecuador, Peru, Bolivia, and southeastern Brazil.

FLIGHT PERIOD: Every month of the year except May and December.

REMARKS: Two closely allied species are included in this genus, one occurring in the Andes and the other in southeastern Brazil.

Tarma shares many apomorphic characters with *Aragua* and *Azuayia*; this situation was discussed under Remarks for the last genus. *Tarma* is recognized by its large size, color, the large number of antennal segments, the complex valves, the broad ostium bursae, an elongate ductus bursae, and the symmetrical corpus bursae.

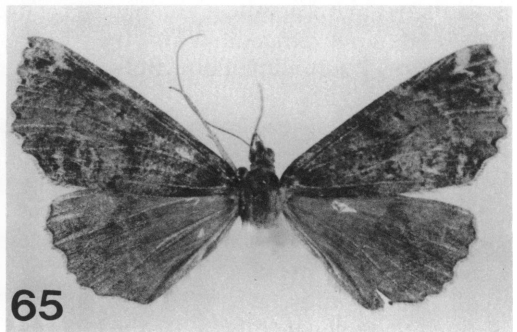
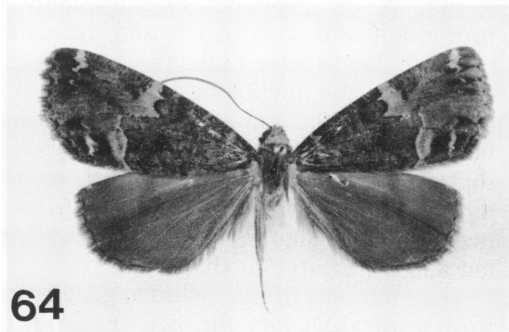
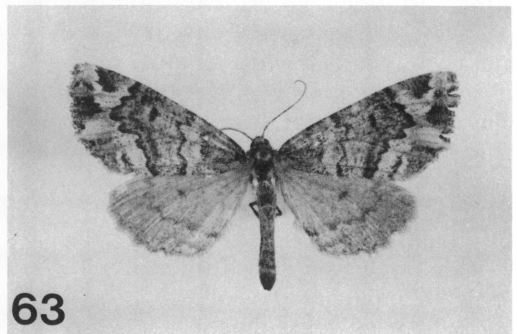
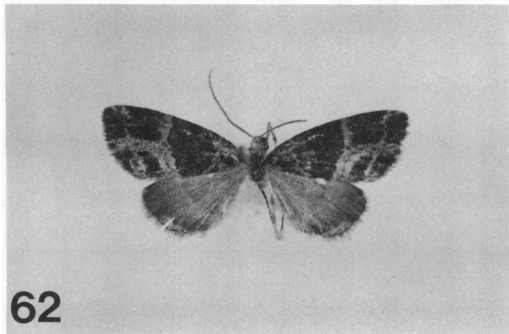
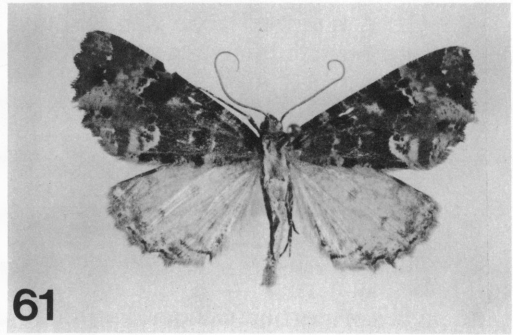
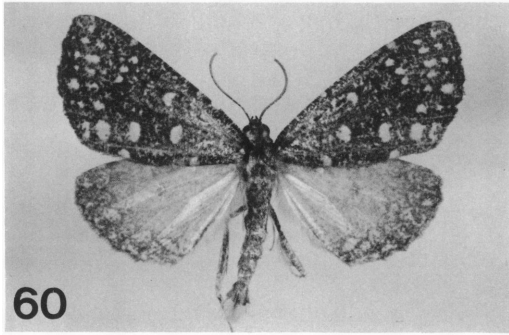
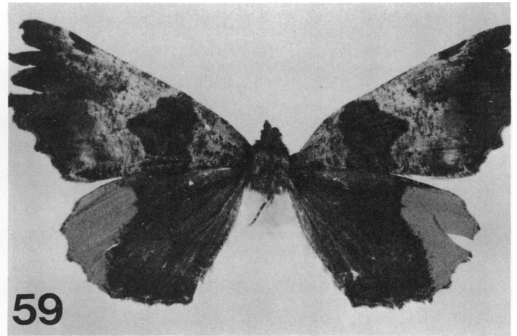
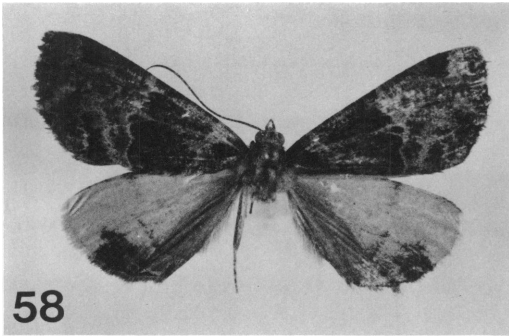
ETYMOLOGY: The generic name is that of an Indian tribe of Peru; its gender is feminine.

GROUP 3

Included in this section are those genera that either have a complex uncus or a simple uncus with a strongly developed group of elongate setae arising from the uncus on the dorsal surface. It seems likely that these setae became fused, thus forming the elongate, spatulate dorsal process (the pseuduncus) that may be longer than the uncus itself. A second type of complex uncus has the posterior portion of that structure enlarged, enclosing a variable number of short setae. There is a third type of complex uncus, having a large trifid posterior portion, that is found in *Catocalopsis*; in the introductory statements to group 4 this problem is addressed, and the genus in question is placed in that group.

Additional characters include the adults having a fully developed tongue; the third segment of the palpi is usually one-half or less the length of the middle segment; the male antennae are often simple but some are pectinate; the front is usually swollen or raised; metathoracic and dorsal abdominal tufts are usually present; and both the row of setae ventrally on the third abdominal segment of the male and the hair pencil on the male hind tibia are present. In addition to being complex, the uncus of the male genitalia is usually more than 1.0 mm. long; the socius is digitate or elongate; the gnathos is V-shaped; the processes of the anellus are prominent and sclerotized, and are usually equal to, or shorter than, the length of the uncus; and the anellus has a posteromedian extension. In the female genitalia the corpus bursae is usually more than twice as long as the apophyses posteriores, its narrowed posterior section is striated and the anterior part is swollen; the signum is nearly always present and is variable in shape.

The members of the included genera occur from tropical Mexico, through Central America, south in the Andes as far as Bolivia and Argentina, in the Guianian region, and in southeastern Brazil. None of the included genera has been revised; when these studies are made it may be found that this group also



FIGS. 58–65. Adults. 58. *Charca triquetra*, new species, holotype, male, Yungas del Palmar, Bolivia, September 1950 (AMNH). 59. *Chrysomima semilutearia* (C. Felder and Rogenhofer), female, Colombia (AMNH). 60. *Nazca zofra* (Dognin), male, Cosnipata, Peru, December 3, 1951 (F. L. Woytkowski; AMNH). 61. *Nazca* sp., male, Paracati, Bolivia, February 1–5, 1976 (L. E. Peña; AMNH). 62. *Rucana abnormipalpis* (Warren), male, Santo Domingo, Peru (AMNH). 63. *Cidariophanes ischnopterata* Warren,

occurs in more of the lowland tropics of South America than indicated above.

CHARCA, NEW GENUS

Figures 1, 58, 74, 85

DIAGNOSIS: Moths of this genus are large (length of forewings 21 to 30 mm.), have two accessory cells in the forewings, the upper surface of those wings being various shades of brown, often with a slightly darker brown median area that is usually in the basal half of the wing, the hind wings are either a combination of yellow and brown or grayish, both sexes have simple antennae and a strongly raised front. The male genitalia have elongate setae arising dorsally at the base of the uncus, the gnathos has the apical region curved ventrally and making the structure W-shaped, the costa is heavily sclerotized and either has the median portion broadly swollen or the distal end curved and slightly projecting, the lateral processes of the anellus have a straight outer margin and are longer than the anellus, and a band of elongate cristae are present. The female genitalia have a heavily sclerotized lamella antevaginalis, a very long (9 to 10 mm.) and thick corpus bursae, and a conical, slightly asymmetrical signum with a minutely rayed margin.

ADULTS: Head with both sexes having large eyes; front swollen, extending one-third to one-half diameter of eyes in front of eyes, and having small, ventral transverse ridge; palpi of males with second segment 0.6 to 1.0 mm. long, third segment 0.5 to 0.7 mm., tightly scaled, decumbent, of females about same size, one female with segments 1.0 and 0.9 mm. long (male unknown); antennae of both sexes simple, of from about 82 to 91 segments. Thorax slender, patagia with mixture of flattened and hairlike scales, and with metathoracic tuft; fore legs with epiphysis of both sexes arising three-fifths to two-thirds length of segment and being three-tenths to

one-half its length; hind tibia of males with hair pencil. Abdomen moderate, of males extending beyond hind wings, with dorsal tufts; males with row of setae on ventral surface of third segment.

Forewings broad, apex bluntly pointed, outer margin rounded, weakly to moderately concave between veins; with two accessory cells; vein R_1 from top of cell, R_2 from end of cell, R_{3+4} stalked, R_5 from cell; mdc and ldc weakly biconvex. Hind wings broad to somewhat elongate, outer margin rounded, becoming more strongly concave between veins posteriorly; Sc paralleling R for two-fifths length of cell; m and ldc angled.

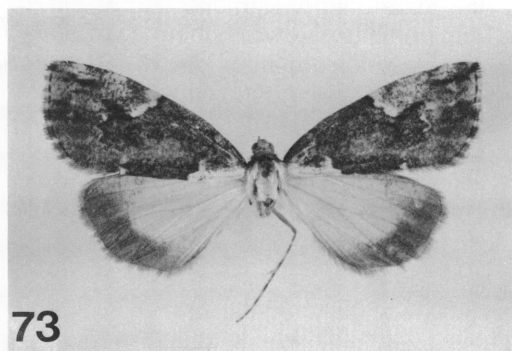
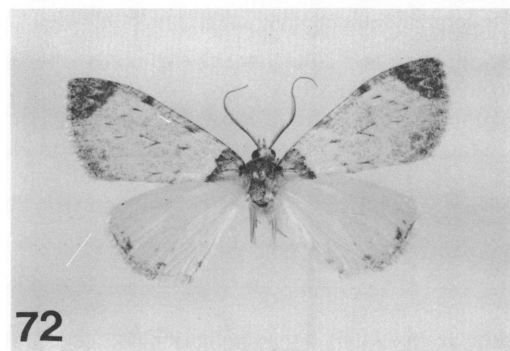
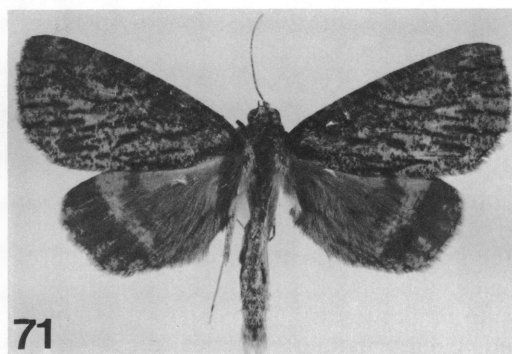
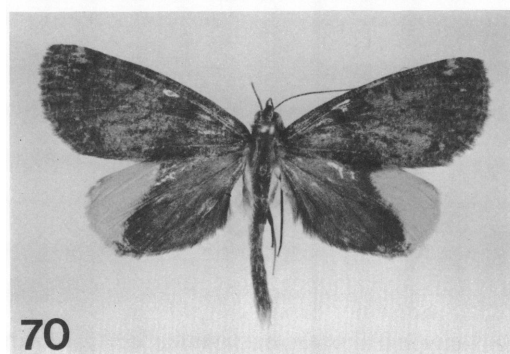
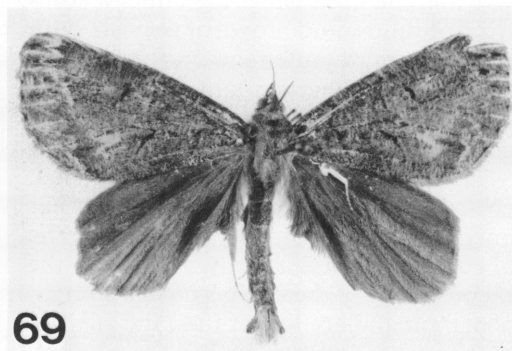
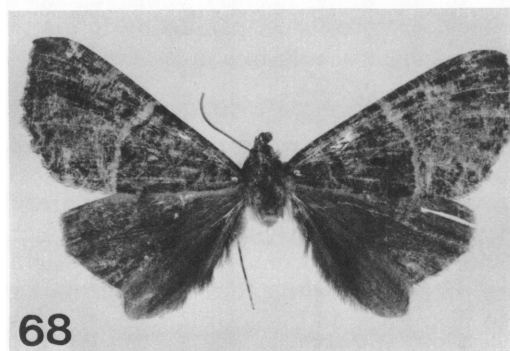
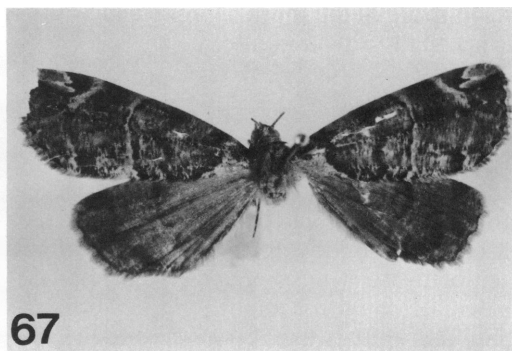
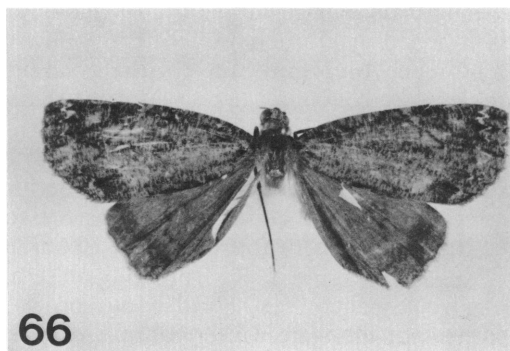
Upper surface of forewings various shades of brown, t. a. and t. p. lines either weakly represented, enclosing dark brown median area, this area either in basal portion of wing or medially, with dark brown costal area before apex, distally with paler brown area, or with prominent creamy yellow cross lines, complete, and with additional pale markings to near apex and outer margin; hind wings variable, either a combination of dark yellow and brown or grayish or variably gray to grayish brown. Under surface of the species with yellow hind wings with yellow forewings having straight, complete, brown median band, wider brown distal portion, and paler apical area, and with hind wings yellow, thickly mixed with dark brown scales; those species with grayish hind wings with dark gray forewings becoming dull black distally and with creamy apical area, and with hind wings gray, with indistinct broad outer band.

Length of Forewings: Males, 21 to 24 mm.; females, 24 to 30 mm.

MALE GENITALIA: Uncus 1.1 to 1.6 mm. long, base 0.7 to 0.9 mm. wide, curved ventrally, with large group of very long, slender setae arising from dorsal surface near base, in length slightly longer than uncus, latter very slightly narrowed medially, dorsally with short setae, apex pointed; socius shortly dig-

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female, Nova Teutonia, Brazil, August 24, 1946 (F. Plaumann; AMNH). 64. *Quillaca earina*, new species, holotype, male, Cosnipata, Peru, November 15, 1951 (F. L. Woytkowski; AMNH). 65. *Quillaca earina*, new species, allotype, female, Cosnipata, Peru, November 12, 1951 (F. L. Woytkowski; AMNH). All $\times 1.4$.



FIGS. 66-73. Adults. 66. *Ischnopteris chlorata* Hübner, male, Kamakusa, British Guiana, December 1922 (AMNH). 67. *Ischnopteris fabiana* (Stoll), male, St. Jean de Maroni, French Guiana (BM). 68. *Ischnopteris commixta* (Warren), male, Chapare, Bolivia, August 16, 1949 (Peña; AMNH). 69. *Tri-*

itate, with numerous setae; gnathos about as long as uncus, with slender lateral arms, median area curved ventrally, terminating in sharp point, thus making entire structure shallowly W-shaped; valves with sharply delimited sclerotized costa, either curved and slightly swollen apically or with broad median swelling, valvula with slender membranous base bounded distally by S-shaped thickening, medially and distally with numerous setae, posterodistally thickly covered with more numerous, thicker setae, saccus lightly sclerotized; processes of anellus each arising from elongate triangular base, apically shortly extended posteriorly; anellus broad, tapering anteriorly, anterior margin with small median indentation, with median digitate process slightly longer than length of base of anellus; cristae numerous, very long, arising from base of valve or edge of anellus; tegumen elongate, slender, with very short median fusion; saccus longer than tegumen, sides subparallel or slightly tapered, anterior end bluntly pointed; aedeagus 3.5 to 3.7 mm. long, 0.6 mm. wide, lightly sclerotized, posteriorly heavily sclerotized, with curved, tapering, elongate apex having lateral denticulate area on right side; vesica, when exerted, extending at about 90° to 140° angle to aedeagus, with or without small sac opposite apex of aedeagus, tapering distally, and with median, elongate sclerotized piece having 40 to 50 deciduous, elongate (about 1.5 mm. long), finely barbed, slender setae.

FEMALE GENITALIA: Sterigma with very large, heavily sclerotized lamella antevaginalis, incorporating much or all of ventral surface of segment eight and extending over all or part of ductus bursae, of varying shapes, with slight to deep median indentation, lamella postvaginalis membranous to lightly sclerotized, dorsal and lateral surfaces of segment eight variably sclerotized; ductus bur-

sae heavily sclerotized, wide, with width about equal to length, sides parallel or narrowed anteriorly; ductus seminalis from or near end of ventral extension of corpus bursae on right side of ductus bursae; corpus bursae very long, posterior end narrowed, lightly sclerotized, longitudinally striate, anterior portion of corpus slightly widened, end weakly curved and bluntly pointed, surface with concentric ridges around signum, corpus bursae with length four to five times that of apophyses posteriores; signum large, with small, rounded or slightly elliptical opening in wall of corpus bursae, invaginated and enlarged, conical inner circumference elliptical, margin with numerous small teeth, surface weakly dentate. Papillae anales small; apophyses with median attachment; apophyses posteriores 1.8 to 2.0 mm. long, apophyses anteriores 0.1 to 0.8 mm. in length.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPE SPECIES: *Charca triquetra*, new species.

DISTRIBUTION: Mexico; Colombia, Ecuador, and Bolivia.

FLIGHT PERIOD: February, August, September, and October.

REMARKS: Eight species are included in this genus.

The species of *Charca* can be recognized by the characters given in the Keys and in the Diagnosis. The easiest way to distinguish the male genitalia is by the large simple uncus terminating in a single point and having a large group of very long slender setae arising anterodorsally; these setae are the plesiomorphic condition for group 3. *Charca* is one of the few genera in the tribe to have two accessory cells in the forewing with regularity, and is unique in having the very long, almost parallel-sided, relatively broad corpus bursae.

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chostichia bifinita (Walker), male, Kartabo, British Guiana, May 28, 1922 (AMNH). 70. *Anischnopteris chryses* (Godman and Salvin), male, San Jeronimo, Mexico, September 25, 1970 (E. C. Welling; AMNH). 71. *Anischnopteris* sp., male, Chapare, Bolivia, August 5, 1949 (AMNH). 72. *Achagua obsoleta*, new species, holotype, male, Finca San Pablo, Colombia, August 1–12, 1967 (P. and B. Wygodzinsky; AMNH). 73. *Canelo constrictus*, new species, holotype, female, Yungas del Palmar, Bolivia, September 3, 1948 (AMNH). All $\times 1.3$.

ETYMOLOGY: The generic name is that of an Indian tribe of Bolivia; its gender is feminine.

***Charca triquetra*, new species**

Figures 58, 74, 85

DIAGNOSIS: This Bolivian species can be recognized by the upper surface of the hind wings being predominantly yellow to yellowish orange, with a variable amount of brown scaling along the anal angle, the male genitalia by the prominent, curved distal end of the costa, by the triangular processes of the anellus, and by the slender, bent and spinose posterior end of the aedeagus, and the female genitalia having a broad (2 mm.) corpus bursae that does not noticeably increase in width anteriorly.

ADULTS: Head with vertex gray laterally and anteriorly, with dark brown scaling medially, and with greenish gray scaling posteriorly; front and palpi with mixture of gray, brown and dark brown scaling. Thorax above with mixture of pale brownish gray, greenish gray, white (laterally), and various shades of brown scaling; below pale brownish gray; legs pale gray with dark brown or grayish brown scaling. Abdomen above similar to thorax but with less pale scaling; below with variable mixture of pale brownish gray and brown scales.

Upper Surface of Wings: Forewings various shades of brown, with dark brown median area; t. a. line broad, grayish green, arising on costa about one-sixth distance from base, outwardly oblique with distally directed projection in cell Cu, meeting inner margin shortly basad of middle; t. p. line arising about middle of costa, grayish green, irregularly curved, meeting inner margin between three-fifths and two-thirds distance from base; discal spot elongate to slightly curved, blackish brown, distad of t. p. line; subterminal area broad, with dark brown semirectangular area on costa next to s. t. line, medially with mixture of grayish green, dark brown, pinkish brown, and grayish white scales; s. t. line weakly represented, partly broadly shaded basally by brown scaling; terminal area broadly brown, pinkish brown and reddish brown basally, distally narrowly with mixture of greenish gray and brownish black

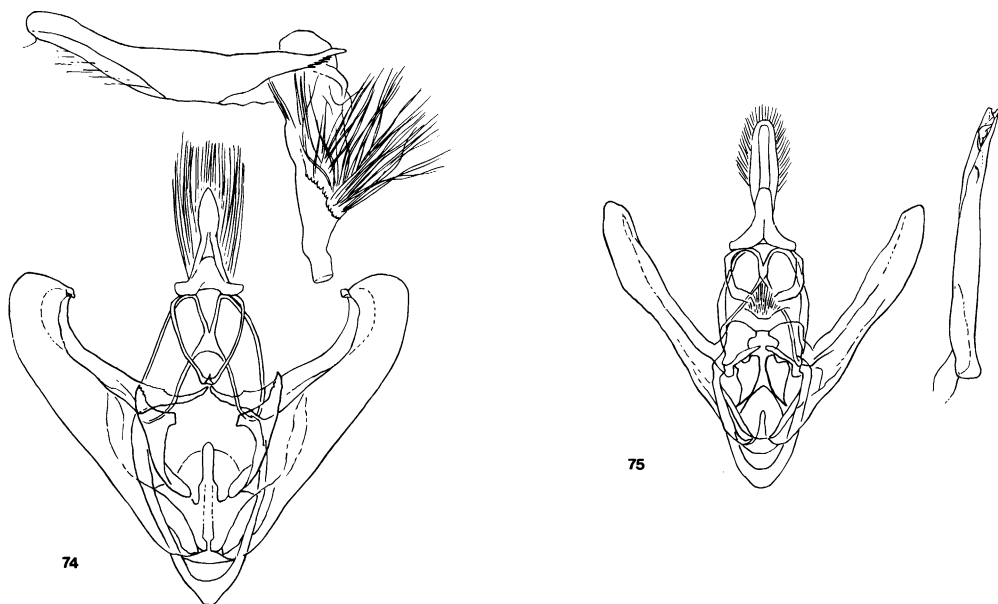
scales; terminal line represented by black cellular spots; fringe dark grayish brown, narrowly paler opposite ends of veins. Hind wings yellow to yellowish orange anteriorly; males with grayish brown scaling between cubital vein and anal margin, and with broad, dark brown terminal area in lower half of wing; females variable, similar to males or lacking dark scaling along anal margin; both sexes with dark discal spot varying from absent to prominent, and with incomplete extradiscal line; fringe concolorous with wing.

Under Surface of Wings: Forewings yellow; broad basal area heavily suffused with gray scales as far as broad, straight dark brown t. a. line; median area clear yellow, with small discal spot; t. a. area broadly dark brown, except for costal pale brown scales; apical area pale brown and grayish white; terminal line with dull black cellular spots; fringe black, paler opposite vein endings. Hind wings yellow, heavily and evenly suffused with dark grayish brown scales, becoming paler along outer margin; discal spot present; extradiscal line represented at costa, and with variable amount of dark scaling along lower portion of s. t. line; fringe concolorous with wing.

Length of Forewing: Holotype, 23 mm.; allotype, 26 mm.; paratypes, 22 to 26 mm.

MALE GENITALIA: Uncus 1.1 mm. long, base 0.8 mm. wide, 0.2 mm. wide at middle of structure; valves with distal portion of each costa curved and terminating in short, ventrally projecting (when valves open) sclerotized point; processes of anellus broad, subtriangular, posterior margin slightly concave and irregular; anellus with median projection longer than base of anellus; aedeagus 3.5 mm. long, posterior end heavily sclerotized, irregularly bent and with a few short thick spines along right side; vesica, when exerted extending at about 90° angle to aedeagus, with small sac opposite apex of aedeagus.

FEMALE GENITALIA: Sterigma large, heavily sclerotized, lamella antevaginalis with broad median indentation, lamella postvaginalis lightly sclerotized, with a few faint transverse striations; ductus bursae with left side straight, right side convex; ductus seminalis from large sac as wide as corpus bursae and almost as long as ductus bursae; corpus bursae 9.5 mm. long, 2 mm. wide, scarcely increasing in width anteriorly; signum with round opening in wall



FIGS. 74, 75. Male genitalia. 74. *Charca triquetra*, new species, holotype, Yungas del Palmar, Bolivia, September 1950 (AMNH). 75. *Nazca zofra* (Dognin), Carnavi-Santa Ana, Bolivia, January 11, 1976 (L. E. Peña; AMNH).

of corpus bursae. Apophyses posteriores 1.8 mm. long, apophyses anteriores 0.1 mm. in length.

TYPES: Holotype, male, Yungas del Palmar, Bolivia, September 1950; allotype, female, Chapare, Bolivia, August 28, 1949 (Peña). Paratypes: two males, four females, all same data as holotype; 2000 m., April 3, 1948, one female; 1000 m., May 3, 1948, one female; 1000 m., September 5, 1948, one female; 1000 m., September 1950, one female; 2000 m., January 29, 1949, one male; 2000 m., February 3, 1950, one male. The genitalia of the holotype are mounted on slide FHR 18945A, with the right antenna and right legs on slide FHR 18945B; the genitalia of the allotype are mounted on slide FHR 18914A, with the right antenna and two legs on slide FHR 18914B. The type series is from the Grace H. and John L. Sperry collection.

The holotype allotype, and paratypes are in the collection of the American Museum of Natural History.

DISTRIBUTION: Known only from the type series from Bolivia.

REMARKS: Eight specimens (three males, five females), one male and one female gen-

italic slides, and one male and one female slide mount of antennae and legs have been studied.

Only one other species is known to me that has predominantly yellow-orange hind wings; this one is represented (in AMNH) by a single male from Antioquia, Colombia. The Colombian species has a more slender process of the anellus and a much broader posterior portion of the aedeagus, when compared with the Bolivian species.

ETYMOLOGY: The specific name is from the Latin *triquetrus*, triangular, in reference to the shape of the processes of the anellus.

GENUS *CHRYSOMIMA* WARREN

Figures 1, 59, 86

Chrysomima Warren, 1894, p. 465.

DIAGNOSIS: The moths of this genus are large (length of female forewing 22 to 26 mm.), have the upper surface of the forewings variably brown with a sharply delimited dark brown median area and a whitish area just distad of it, the hind wings are blackish brown with a broad orange apex, and have a very strongly raised front. The female genitalia

have an elongate transverse lamella antevaginalis, a wide ostium bursae, the corpus bursae has a short posterior neck and the signum varies from a large finger-like invagination to a small, poorly defined patch on the surface of the corpus bursae.

ADULTS: Head with medium-sized eyes; front prominently swollen, extending three-fifths diameter of eye in front of eye, and having small ventral transverse ridge; palpi of females with second segment 0.6 mm. long, third segment 0.2 mm., rather loosely scaled, decumbent; antennae of about 66 segments, simple in females. Thorax slender, patagia with mixture of flattened and hairlike scales, with anterior and posterior metathoracic tufts; fore legs with epiphysis of females arising at two-thirds length of segment and being between one-third and two-fifths its length. Abdomen moderate, in females attaining anal angle of hind wings, with dorsal tufts.

Forewings broad, apex attenuate, outer margin angulate, extending outward to veins M_3 and Cu_1 , slightly concave posteriorly, dentate in upper part of wing, concave between veins in lower part of wing; with one accessory cell; veins R_1 and R_2 free, R_{3+4} stalked, R_5 from cell; mdc and ldc strongly biconvex. Hind wings broad, outer margin rounded, weakly dentate; Sc paralleling R from one-third to two-fifths length of cell; m and ldc curved.

Upper surface of forewings of females various shades of brown, t. a. and t. p. lines enclosing sharply delimited dark brown median area, paler basally and more broadly so distally, and with elongate, shallow dark brown costal spot before apex; hind wings blackish brown with broad, prominent orange apex. Under surface of forewings blackish brown with broad orange median area, hind wings finely speckled with brown and gray, faintly reddish brown in apical area, with discal dot and extradiscal line weakly represented.

Length of Forewings: Males, unknown; females, 22 to 26 mm.

MALE GENITALIA: Unknown.

FEMALE GENITALIA: Sterigma membranous except for transverse rod- or bandlike sclerotized lamella antevaginalis; ductus bursae membranous or weakly sclerotized, short,

with length about equal to width; ductus seminalis arising from side of sac ventrally at posterior end of corpus bursae, sac as long as length of ductus bursae; corpus bursae membranous, globular, with or without short narrowed posterior portion, without longitudinal striations but globular portion with varying amount of lengthwise or concentric ridges, corpus bursae with length about 1.2 times that of apophyses posteriores; signum variable, either small, poorly defined patch on surface of corpus bursae or slender, curved, digitate indentation about one-half length of corpus bursae, round or semicircular on surface of corpus. Papillae anales short, only slightly longer than thick; apophyses with median attachment; apophyses posteriores 1.5 to 1.9 mm. long, apophyses anteriores 0.10 to 0.15 mm. in length.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPE SPECIES: *Gonodontis semilutearia* C. Felder and Rogenhofer; by original designation.

DISTRIBUTION: Mexico; Colombia, and Peru.

FLIGHT PERIOD: October and November.

REMARKS: Three species are placed in this genus.

The members of *Chrysomima* can be recognized by the characters given in the Diagnosis. The female genitalia are very distinct in the short corpus bursae and, when present, the elongate curved finger-like signum.

The relationships and position of this genus can only be decided when the male genitalia become available for study. Due to the wing and appendage characters I have no doubt that *Chrysomima* is correctly placed in group 3.

NAZCA, NEW GENUS

Figures 1, 60, 61, 75, 87

DIAGNOSIS: Moths included in this genus have the upper surface of the forewings various shades of brown, either with a more or less distinct median area or with the maculation reduced to a number of white spots, and with the hind wings whitish or grayish white, having the outer portion variably darkened, and both sexes having simple an-

tennae. The male genitalia have an elongate, spatulate process arising dorsally from the base of the uncus that is usually longer than the uncus itself, the median process of the gnathos is heavily sclerotized, narrow, and extends ventrally, and the slender valves have a costa that narrows distally, becomes more heavily sclerotized and may extend as a slender projection. The female genitalia have elongate papillae anales to which the apophyses posteriores are attached anteriorly, a sclerotized lamella, an elongate slender ductus bursae, and very long slender ductus bursae that lack a signum.

ADULTS: Head with both sexes having large eyes; front strongly swollen ventrally and having ventral transverse ridge, extending beyond eyes almost one-half diameter of eye; palpi of both sexes with second segment 0.9 to 1.0 mm. long, third segment 0.4 to 0.5 mm., tightly scaled, more or less decumbent; antennae of both sexes simple, of from about 69 to 79 segments. Thorax slender, patagia with mixture of flattened and hairlike scales, and with metathoracic tuft; forelegs with epiphysis of males arising at three-fifths length of segment and being one-half its length, of females arising two-thirds length of segment and being two-fifths its length; hind tibia of males with hair pencil. Abdomen slender, elongate, extending beyond hind wings in males, and having small dorsal tufts; males with row of setae on ventral surface of third segment.

Forewings broadly elongate, apex bluntly pointed, outer margin rounded, variably concave between veins, more strongly so in females than in males; with one accessory cell; vein R_1 free, R_2 from end of cell, R_{3+4} stalked, R_5 from lower edge of cell; mdc and ldc biconvex. Hind wings broadly triangular, outer margin rounded, shallowly concave between veins; Sc paralleling R for two-fifths length of cell; m and ldc curved.

Upper surface of forewings various shades of brown, either with more or less distinct t. a. and t. p. lines enclosing darker brown median area, or with wings unicolorous dark brown and with maculation reduced to a number of white spots; hind wings whitish or grayish white, outer portion varying from almost unmarked to having broad pale brown

or grayish brown border. Under surface varying from forewings, either being mixture of gray and dark grayish brown, hind wings with less brown scaling, discal spots present on all wings, and t. p. and extradiscal lines outwardly projecting on veins, or with all wings brown, hind wings with more gray scaling, with whitish spotting on forewings, discal spot and extradiscal line present on hind wings.

Length of Forewings: Males, 17 to 23 mm.; females, 20 to 22 mm.

MALE GENITALIA: Uncus 1.0 to 1.4 mm. long, base 0.6 to 0.8 mm. wide, either shallowly constricted medially or with parallel sides, laterally with elongate setae, apically with concave ventral surface, terminally rounded, and with large pseuduncus arising from dorsal surface at or near base, elongate, varying from slightly shorter to longer than uncus, spatulate, bearing numerous setae; socius knoblike to shortly digitate, having from 15 to 30 setae, and with second pair of setose patches near midline of gnathos, padlike, with from several to about 30 elongate setae, much more prominent than setae on socius; gnathos broad posteriorly, tapering anteriorly, more heavily sclerotized medially, forming ventrally produced point or rounded, shortly spinose projection; valves with sharply delimited sclerotized costa, continued basally as prominent transtilla, distally slightly curving, apically narrowed and more heavily sclerotized or continued as slender digitate extension, valvula with slender diagonal membranous base, swollen apically, medially and distally with numerous setae, sacculus weakly sclerotized, slightly swollen; processes of anellus each with wide base, tapering and curving posteriorly, broad or slender, apically rounded or pointed; anellus recessed dorsally, quadrangular, with anteromedian membranous incision, posteriorly tapering to rounded or blunt point; cristae absent or represented by a few setae; tegumen elongate, slender, with short to moderate median fusion; saccus equal to, or longer than, tegumen, tapering, anteriorly bluntly pointed or rounded; aedeagus 2.6 to 3.4 mm. long, 0.3 to 0.4 mm. wide, slightly curved, posterior end lightly sclerotized and pointed; vesica, when exerted, extending at from 75° to 120° angle to aedeagus, with basal longitudinal

striations, distally narrowed, and with variable number of thin to thick deciduous setae.

FEMALE GENITALIA: Sterigma with heavily sclerotized lamella antevaginalis, anterior margin straight, posterolateral margins angled, medially with deep U- or V-shaped indentation, lamella postvaginalis a weakly sclerotized, transversely striate median strip; ductus bursae elongate, very slender, six times as long as wide, with longitudinal or curving striations, thickly set with minute spinules; ductus seminalis arising from end of small sac near posterior end of corpus bursae; corpus bursae scarcely differentiated from ductus bursae, very long and very slender, posterior four-fifths of same diameter, with longitudinal striations, anal end minutely spinulate, anterior end sclerotized and inwardly setose, anterior one-fifth of corpus membranous, elliptical, corpus bursae with length five times that of apophyses posteriores; signum absent. Papillae anales long and slender; apophyses with anterior attachment; apophyses posteriores 2.0 to 2.2 mm. long, apophyses anteriores 0.3 to 0.4 mm. in length.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPE SPECIES: *Syrtodes zofra* Dognin.

DISTRIBUTION: Ecuador, Peru, and Bolivia.

FLIGHT PERIOD: September through February.

REMARKS: Five species are included in this genus.

The species of *Nazca* can be recognized by the characters given in the Keys and in the Diagnosis. *Nazca* has the autopomorphic character of having a pair of setose patches near the midline of the gnathos anteriorly, similar to the *socius* but more prominent. It is one of four genera to have a pseuduncus dorsad of the uncus. Of these, *Achagua* is recognized by the swollen apex of the pseuduncus; the other three genera have the posterior end of this structure rounded. *Cidariophanes* has the median portion of the gnathos slender, elongate and spinose, has the raised process on the cucullus, and the greatly reduced processes of the anellus. *Nazca* can be separated from *Rucana* by the shape of the gnathos, valves, and processes of the anellus; see the descriptions for details. The present genus is unique among the known members

of this group in being without a signum in the female genitalia.

ETYMOLOGY: The generic name is that of an Indian tribe of Peru; its gender is feminine.

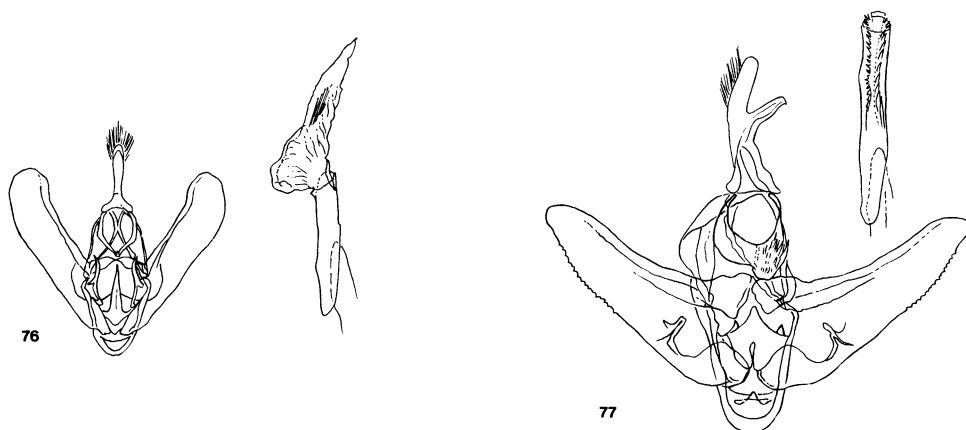
RUCANA, NEW GENUS

Figures 1, 62, 76

DIAGNOSIS: The included moths are small (males with forewings 13 to 15 mm. long), have the forewings with the upper surface mostly dark brown, with pale, relatively straight or angled cross lines, gray hind wings, the third segment of the palpi is either normally short or extremely long and slender, and the males have simple antennae. The male genitalia have either a dorsal swelling or a pseuduncus that is either slightly shorter or longer than the uncus and bearing a prominent tuft of capitate scales, the anellus has an elongate posteromedian process, and the exserted vesica extends diagonally from the aedeagus and has elongate slender setae. (The females are unknown.)

ADULTS: Head with eyes of males very large, each eye (viewed anteriorly) about twice as wide as front; latter swollen, higher than wide; palpi of males with second segment 0.4 to 1.0 mm. long, third segment either short (0.2 mm.) or very long and very slender (0.8 to 1.0 mm. in length), tightly scaled, decumbent; antennae simple, of about 68 to 73 segments. Thorax slender, patagia with mixture of flattened and hairlike scales, and with metathoracic tuft; forelegs with epiphysis of males arising between three-fifths and two-thirds length of segment and being two-fifths its length; hind tibia of males with hair pencil, with or without dense, elongate scaling on coxa and femur. Abdomen slender, elongate, extending well beyond hind wings in males, and having dorsal tufts; males with row of setae on ventral surface of third segment.

Forewings elongate, slender, apex pointed, outer margin rounded or weakly angled, very slightly concave between veins; with one accessory cell; vein R_1 from top of cell, R_2 stalked with R_{3+4} from end of cell, R_5 from end of cell; mdc and ldc curved. Hind wings elongate, outer margin rounded, slightly concave between veins, anal margin with small to moderate setose swelling in basal one-half;



FIGS. 76, 77. Male genitalia. 76. *Rucana abnormipalpis* (Warren), Quincemil, Peru, August 1962, (L. E. Peña; AMNH). 77. *Cidariophanes* sp., W of Sebunoi, Ecuador, September 11, 1977 (L. E. Peña; AMNH).

Sc paralleling R for one-half length of cell; m and ldc angled.

Upper surface of forewings of males dark brown, with pale to obsolescent t. a. and t. p. lines, s. t. line slender, with variable pale connection between t. p. line and outer margin; hind wings gray, with darker gray, slender, extradiscal line, and with outer margin broadly suffused with dark scales. Under surface with all wings grayish brown, with maculation of upper surface more or less repeated.

Length of Forewings: Males, 13 to 15 mm.; females, unknown.

MALE GENITALIA: Uncus 0.7 to 0.9 mm. long, base 0.35 mm. wide, curved or sharply angled, slightly constricted medially, terminal portion with a few slender setae, apex pointed, and with either dorsal swelling or prominent pseuduncus, slightly shorter or considerably longer than angled uncus, bearing large group of elongate setae, each with flattened apex, on dorsal surface; socius slender, digitate, membranous, each having about 10 setae; gnathos broad posteriorly, becoming slender, more heavily sclerotized and V-shaped or elongate anteriorly, with pointed apex curved ventrally; valves with sclerotized costa, basally with large circular areas in transtilla, distally with inner surface concave or angulate, with interior margin raised, apically slightly swollen, valvula with small, curved,

membranous basal area, distally sparsely setose, saccus very slightly sclerotized; processes of anellus Y-shaped or elongate, distally elongate, slender, curving posteriorly; anellus quadrangular, with posterior margins sloping, having elongate median process, variable in length, tapering to point; cristae absent; tegumen with very short median fusion; saccus about equal in length to tegumen, lateral margins weakly S-shaped, anterior end bluntly pointed or rounded; aedeagus 1.7 to 2.4 mm. long, 0.25 mm. wide, posterior end weakly sclerotized and pointed; vesica, when exerted, extending diagonally, at about 30° angle to aedeagus, with swelling on left side at end of aedeagus, tapering posteriorly on right side, and armed with from eight to about 30 long, slender, parallel setae up to 0.7 mm. long, flat on surface of vesica.

FEMALE GENITALIA: Unknown.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPE SPECIES: *Ischnopteris abnormipalpis* Warren.

DISTRIBUTION: Peru.

FLIGHT PERIOD: August and November.

REMARKS: Three species are included in the genus.

This genus can be recognized by the characters given in the Keys and in the Diagnosis. The extremely long and slender third palpal segment is an apomorphic character for the

type species, but this is not a generic character. The male genitalia have either a dorsal swelling or a pseuduncus, and all species have the clump of dorsal capitate scales; see under Remarks for *Nazca* concerning this structure. *Rucana* can be separated from *Nazca* by the much more slender and narrowly pointed gnathos, the processes of the anellus are more slender and less curved, and the anellus has an elongate median extension.

ETYMOLOGY: The generic name is that of an Indian tribe of Peru; its gender is feminine.

GENUS *CIDARIOPHANES* WARREN

Figures 1, 63, 77, 88

Cidariophanes Warren, 1895, p. 130.

DIAGNOSIS: Moths of this genus are large (length of forewings 17 to 27 mm. long), have the upper surface of the forewings with a broad brown to dark brown median area, set off by a narrow white cross line on each side, with each of the latter, in turn, having an adjacent broad greenish band, the hind wings being grayish and having a slender extradiscal line, both sexes have simple antennae and a strongly conical front. The male genitalia have an elongate, spatulate pseuduncus arising dorsally from the base of the uncus that is longer than the uncus itself, the median process of the gnathos is heavily sclerotized, narrow, and extends ventrally, terminating in a finely spinose ridge, the processes of the anellus are greatly reduced or absent, and the basal portion of the valvula has a small raised projection or ridge. The female genitalia have the apophyses posteriores attached anteriorly to the papillae anales, a short ductus bursae, and a short corpus bursae, heavily sclerotized posteriorly, enlarged anteriorly, and a round invaginated signum.

ADULTS: Head with both sexes having large eyes; front strongly conical, extending beyond eyes about one-third diameter of eye, and having prominent ventral transverse ridge; palpi of males with second segment 0.8 to 1.0 mm. long, third segment 0.4 to 0.5 mm., tightly scaled, decumbent, of females equal or slightly longer than those of males; antennae of both sexes simple, flattened, of from about 62 to 84 segments. Thorax slender, patagia with mixture of flattened and

hairlike scales, and with metathoracic tuft; forelegs with epiphysis of males arising between one-half and three-fifths length of segment and being two-fifths to three-fifths its length, of females arising at three-fifths length of segment and being of same length as in males; hind tibia of males with hair pencil. Abdomen of males slender, of females thicker, both extending beyond hind wings, and having small dorsal tufts; males with row of setae on ventral surface of third segment.

Forewings broadly elongate, apex bluntly pointed, outer margin rounded, inwardly oblique, weakly concave between veins; with one or two accessory cells; vein R_1 either free and very close to accessory cell or shortly united thereto, R_2 short stalked with R_{3+4} from end of cell, R_5 from bottom of cell; mdc and ldc biconvex. Hind wings broadly triangular, outer margin slightly rounded, shallowly concave between veins; Sc paralleling R for one-half length of cell; m and ldc angled.

Upper surface of forewings with brown to dark brown basal area, wide median area, and with costal patch before apex, t. a. and t. p. lines white, strongly irregular in course, each bordered by broad greenish band, with incomplete white s. t. line and whitish or pale green spot in cell Cu_1 extending to wing margin; hind wings grayish, with discal dot, more or less complete extradiscal and partial s. t. lines. Under surface of forewings partially greenish, with brown and gray scaling, t. p. line and prominent discal dot; hind wings greenish gray, with prominent discal dot and extradiscal line.

Length of Forewings: Males, 17 to 25 mm.; females, 19 to 27 mm.

MALE GENITALIA: Uncus 0.9 to 1.1 mm. long, base 0.6 to 0.7 mm. wide, slightly tapered, with elongate lateral setae, tip of apex hooked ventrally, entire structure at angle to large pseuduncus, latter arising from base of uncus, variably shaped, extending beyond uncus, bearing dorsal setae; socius padlike or knoblike, with from 15 to 30 setae; gnathos with broad lateral arms, united medially as laterally flattened, longitudinal, spinose sclerotized projection; valves tapered, with sharply delimited sclerotized costa decreasing in width posteriorly, with row of setae along margin of valvula, latter with poorly defined,

large membranous basal area, medially and distally with numerous slender to thick setae, sacculus lightly sclerotized, with raised triangular structure or ridge about one-third length of valve; processes of anellus reduced or absent, when present small, on or near posterolateral margins of anellus; anellus quadrangular, with either small anterior membranous incision or with longitudinal ridge; cristae present, varying from about two or three to 25; tegumen short to moderate in length, with short to medium median fusion; saccus equal to or slightly longer than tegumen, slender, anteriorly with parallel sides or weakly swollen, apically rounded and having longitudinal dorsal ridge; aedeagus 1.8 to 2.9 mm. long, 0.3 mm. wide, lightly sclerotized and bluntly rounded posteriorly, vesica with two parallel rows of short thick setae extending at least one-half length of aedeagus.

FEMALE GENITALIA: Sterigma with slender, transverse, sclerotized lamella antevaginalis, not extending laterally much beyond ductus bursae, lamella postvaginalis an elongate, weakly sclerotized, transversely striate median strip; ductus bursae partly or completely sclerotized, short, with length 0.9 to 1.5 times width, lateral margins parallel or tapering; ductus seminalis arising ventrally from sac at junction of ductus bursae and corpus bursae; corpus bursae with posterior one-third to one-half heavily sclerotized, wide, either smooth or with longitudinal striations, lateral margins tapering posteriorly or parallel, anterior portion of corpus membranous, slightly swollen, corpus bursae with length 1.3 to 1.6 times that of apophyses posteriores; signum with round area on surface of corpus bursae, conical, 0.2 to 0.3 mm. deep, inner margin minutely to coarsely dentate. Papillae anales moderate, about twice as long as wide; apophyses with anterior attachment; apophyses posteriores 1.8 to 2.4 mm. long, apophyses anteriores 0.7 to 1.2 mm. in length.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPE SPECIES: *Cidariophanes ischnopterata* Warren; by original designation.

DISTRIBUTION: Ecuador, Peru, Bolivia, Paraguay, and southeastern Brazil.

FLIGHT PERIOD: February, March, April, July through October, December.

REMARKS: Nine species are placed in this genus.

This genus can be recognized by the characters given in the Keys and in the Diagnosis. The males are the only ones known in this section to have the greatly reduced processes of the anellus in their genitalia. Other diagnostic male genitalic characters, in addition to the elongate pseuduncus, are given under Remarks in the genus *Nazca*.

ACHAGUA, NEW GENUS

Figures 1, 72, 78

DIAGNOSIS: The males of the included species have pectinate antennae, with the distal one-third of that structure with simple segments, the upper surface of the forewings is mainly white, with a brown basal area and apex, and the hind wings are pearly white with a variable amount of dark scaling along the outer margin. The male genitalia have a small, vertical, setose uncus and a much larger, apically swollen and setose pseuduncus, the lateral arms of the gnathos are bowed out medially, the valves have a short costal arm extending at right angles to the costa, and the exerted vesica extends laterally to both sides of the aedeagus, with a short median projection. (The females are unknown.)

ADULTS: Head with males having large eyes; front flat, not extending beyond eyes; palpi of males with second segment 0.9 to 1.0 mm. long, third segment 0.6 to 0.9 mm., tightly scaled, decumbent; antennae of males bipectinate, with from 70 to 77 segments, longest pectinations 0.7 mm. long, being four times as long as basal segments, pectinations arising basally on segments, not reaching apex, having terminal 27 segments simple, each pectination having double row of slender setae below. Thorax slender, patagia with mixture of flattened and hairlike scales, and with metathoracic tuft; forelegs with epiphysis of males arising at middle of segment and being about two-fifths its length; hind tibia of males with hair pencil. Abdomen slender, elongate, extending slightly beyond hind wings in males, and having dorsal tufts; males with row of setae on ventral surface of third segment.

Forewings broad, slightly elongate, apex bluntly pointed; outer margin weakly round-

ed, not concave between veins; without accessory cell; veins R_1 and R_2 free, R_{3+4} stalked, R_5 from R_{3+4} ; mdc and ldc weakly curved. Hind wings broad, outer margin rounded; Sc paralleling R for one-half length of cell; m and ldc curved.

Upper surface of forewings thinly scaled, white, with brown basal area and apex of wing, cross lines obsolescent; hind wings pearly white, without maculation except for variable amount of dark scaling along outer margin. Under surface with all wings concolorous pearly white, forewings with prominent brownish black apex and small discal spot, hind wings with variable amount of dark scaling on outer margin.

Length of Forewings: Males, 19 to 21 mm.; females, unknown.

MALE GENITALIA: Uncus 0.8 to 0.9 mm. long, abruptly widened base 0.3 mm. wide, uncus extending at right angle from slender portion of pseuduncus, slightly enlarged distally, setose, apically rounded, pseuduncus elongate, 1.1 to 1.3 mm. long, with slender anterior portion, broadly capitate apically, 0.4 to 0.7 mm. wide, posterior end bluntly pointed, ventral surface of capitate area with numerous, slender, elongate setae; socius subtriangular, prominent, with about 18 to 24 setae; gnathos elongate, equal in length to length of pseuduncus, posteriorly constricted, widened medially, then sharply narrowed, becoming more heavily sclerotized, forming elongate, pointed, apically curved projection, with from one large to several small dentate points in curve of projection; valves large, somewhat enlarged distally, rounded apically, costa of each valve heavily sclerotized, concave basally, not attaining apex of valve, with short digitate projection extending at right angle to valve near end of costa, valvula with outer portion thickly covered with elongate setae, sacculus swollen; processes of anellus each with broad triangular base, sharply narrowed, extending as heavily sclerotized, flattened processes of equal width, apically curved; anellus with small, dorsally situated, subtriangular or ellipsoid anterior portion, having elongate, slender, median projection, with entire anellus equal in length to length of uncus; cristae absent or represented by a few setae on basal portion of sacculus; tegumen triangular, with

short median fusion near uncus; saccus about equal in length to length of tegumen, wedge-shaped, anterior end curved dorsally; aedeagus 2.0 to 2.5 mm. long, 0.4 mm. wide medially, anterior end wider than remainder, posteriorly with weakly sclerotized projection, rounded apically; vesica, when exerted, in form of three lobes, one on each side of aedeagus, the third extending ventrally, with large denticulate area near end of aedeagus, and with weakly sclerotized area medially.

FEMALE GENITALIA: Unknown.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPE SPECIES: *Achagua obsoleta*, new species.

DISTRIBUTION: Colombia and Ecuador.

FLIGHT PERIOD: August.

REMARKS: Two species are placed in this genus.

The males of *Achagua* are the only ones in this section that are known to have many simple segments at the end of their pectinate antennae; they are also unique in having the apical portion of the pseuduncus swollen.

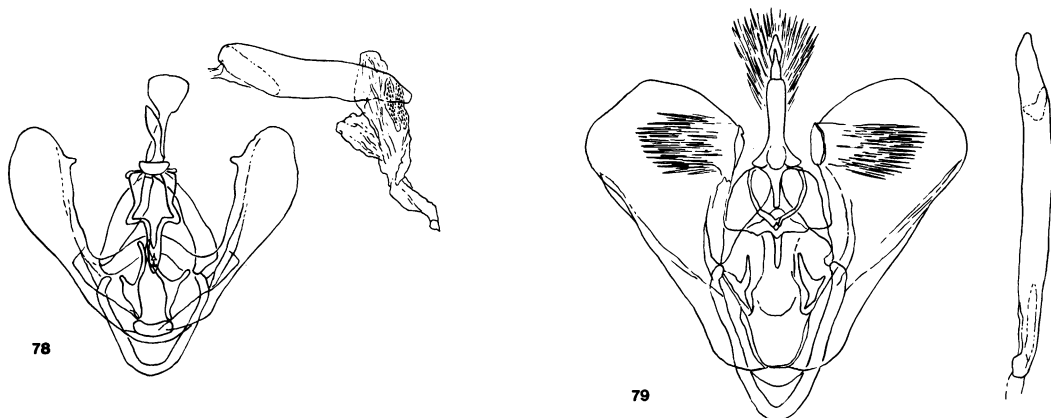
ETYMOLOGY: The generic name is that of an Indian tribe of Colombia; its gender is feminine.

Achagua obsoleta, new species

Figures 72, 78

DIAGNOSIS: This Colombian species can be recognized by the dark border of the upper surface of the hind wings being obsolescent, by the smaller male genitalia, by the more slender processes of the anellus, and by the smaller uncus, when compared with the Peruvian species that belongs in this genus.

ADULTS: Head with vertex white, with a few gray or black scales between antennal bases; front thinly scaled, white; palpi with mixture of white and gray or grayish brown scales on outer surface, white on inner surface. Thorax above, including patagia and tuft, grayish brown, with some white scaling posterolaterally; below white; legs white, with variable amount of grayish black scaling, hair pencil on hind tibia pale brown. Abdomen above with first segment white with pair of black elongate spots dorsally, second segment black with narrowly triangular white median area, third segment brownish black, with dark



FIGS. 78, 79. Male genitalia. 78. *Achagua obsoleta*, new species, paratype, Finca San Pablo, Colombia, August 1–12, 1967 (P. and B. Wygodzinsky; AMNH). 79. *Quillaca earina*, new species, holotype, Cosnipata, Peru, November 15, 1951 (F. L. Woytkowski; AMNH).

scaled area decreasing in width posteriorly, remainder of abdomen with mixture of white, gray, and brown scales; below white.

Upper Surface of Wings: Forewings white with widely scattered grayish black scales; basal area with brown band, having slender black outer lines; median area of wing broad, with obsolescent cross lines, t. a. and t. p. lines indicated by dark areas on costa; apex with mixture of pale and dark brown scales, triangular, having trace of white s. t. line, extending into cell M_2 , outer angle with varying amounts of brown scaling; terminal line represented by black cellular spots; fringe mostly white, darker opposite brown areas, grayish black opposite terminal spots. Hind wings pearly white, without maculation except for small amount of dark scaling along part of outer margin.

Under Surface of Wings: All wings white; forewings with small amount of grayish black scaling along costa, slender discal dash, and black triangular apical area; hind wings with some dark scaling along outer margin, mainly in cell M_1 .

Length of Forewing: Holotype, 20 mm.; paratypes, 19 to 20 mm.

MALE GENITALIA: Pseuduncus 1.1 mm. long; gnathos with lateral areas having C-shaped median swelling, apex with distal and subdistal points; valves evenly enlarged distally, apically rounded; processes of anellus slender, elongate, apically curved; anellus

small, subtriangular, with median process of equal width to bluntly pointed apex; aedeagus 2.0 to 2.2 mm. long; exerted vesica diagonal, with two spinose areas dorsally near end of aedeagus, and with more distal sclerotized areas.

FEMALE GENITALIA: Unknown.

TYPES: Holotype, male, Finca San Pablo, 1800 m., 3 km. north of Alban, Cundinamarca, Colombia, August 1–12, 1967 (P. and B. Wygodzinsky). Paratypes, three males, same data. The genitalia of the holotype are mounted on slide FHR 19129.

The holotype and paratypes are in the collection of the American Museum of Natural History.

DISTRIBUTION: Known only from the type locality.

REMARKS: Four specimens, two genitalic dissections, and one slide mount of antenna and legs have been studied. This species is very similar to one that occurs in Peru; the two can be separated by the characters given in the Diagnosis. The male genitalia of the present species are smaller than those of the Peruvian one; the length, from the uncus to the saccus, in the present species is 3.2 to 3.3 mm., whereas in the more southerly species it is 3.8 mm.

ETYMOLOGY: The specific name is from the Latin *obsoletus*, worn out or obsolete, in reference to the obsolescent dark border of the hind wings.

QUILLACA, NEW GENUS

Figures 1, 64, 65, 79, 89

DIAGNOSIS: This genus of large moths (length of forewings 23 to 26 mm.) is distinguished by the upper surface of the forewings being various shades of brown and having green scaling distad of the t. p. line, the sexes apparently dimorphic in maculation, with the median area of the males being located more basally on the forewings than in the females and having the outer margin of this area of a different shape. The male genitalia have a modified uncus with a ventral and a dorsal apex, a dense cluster of setae dorsally at the base of the uncus and a second large grouping of spreading setae from the dorsal apical region, the valves have a large dense group of elongate, transverse setae arising near the distal end of the costa, the median projection of the anellus is longer than the short processes of this structure, and the vesica is unarmed. The female genitalia have both a long slender ductus bursae and corpus bursae, and a ventral invaginated signum.

ADULTS: Head with both sexes having large eyes; front swollen, with small medioventral enlargement above the rounded transverse ridge, extending beyond eye by from one-third (in males) to one-half (in females) diameter of eye; palpi of both sexes with basal segment having elongate ventral row of scales, second segment about 1.0 mm. long, third segment about 0.7 mm., tightly scaled, decumbent; antennae of both sexes simple, very long, of from about 92 to 101 segments. Thorax slender, patagia with mixture of flattened and hairlike scales, and with metathoracic tuft; forelegs with epiphysis of males arising between one-half and three-fifths length of segment and being about one-half its length, of females arising at two-thirds length of segment and being one-third its length; hind tibia of males with hair pencil. Abdomen slender, elongate, extending well beyond hind wings in males, and having prominent dorsal tufts; males with row of setae on ventral surface of third segment.

Forewings elongate, apex bluntly pointed, outer margin rounded, concave between veins, more strongly so in females than in males; with either one or two accessory cells;

vein R_1 from top of cell; R_2 from end of cell or short stalked with R_{3+4} , R_5 from end of cell; mdc and ldc curved. Hind wings elongate to broad, outer margin rounded, more deeply concave between veins anteriorly than posteriorly; Sc paralleling R for one-third length of cell; m and ldc angled.

Upper surface of forewings various shades of brown and having green scaling distad of t. p. line, sexes dimorphic in color and maculation, males darker brown, median area more basad than in females, with t. p. line going at right angle to costa, then sharply outwardly, forming an angle when turning posteriorly, females with more pale brown scaling, t. p. line arising more distally, extending at obtuse angle to costa and then S-shaped; hind wings of males either uniform dark brown or dark brown with yellow-orange apical area, of females gray to dark gray, with or without extradiscal line. Under surface of species with unicolorous hind wings a mixture of gray, grayish black and dark brown scales, of species with brown and yellow-orange hind wings with forewings of males orange-yellow, with straight dark brown line basad of middle of wing, distal area broadly dark brown, apex grayish, hind wings yellowish gray basally, with broad brown extradiscal line bifurcating medially and extending to outer margin, large apical area orange-yellow (females unknown for species with bicolored hind wings).

Length of Forewings: Males, 23 to 24 mm.; females, 25 to 26 mm.

MALE GENITALIA: Uncus 1.2 to 1.4 mm. long, base 0.5 mm. wide, curved, with slight median constriction, apically bifurcate with dorsal and ventral extensions 0.3 to 0.4 mm. long, ventral extension tapering to sharp point, dorsal extension broadened medially, uncus with posterodistal surface having large group of dorsally projecting, elongate setae, and with thick tuft of very slender setae, longer than uncus, arising dorsally from anterior margin of uncus between posterior lobes of tegumen; socius slenderly digitate, having 20 to 30 setae; gnathos rounded or tapering, arms slender, median portion elongate, tapering to ventrally curved point; valves with narrow base, broadly expanded mediodistally, apically bluntly pointed, costa of valves paral-

leling each other (when valves expanded), slender, sclerotized distally with short vertical ridge bearing numerous dense group of elongate (1.1 mm.) sclerotized setae projecting laterally, straight except for curved ends, valvula with slender membranous basal area, becoming very wide distally, outer portion slightly concave opposite costal setae, surface of valvula sparsely setose, sacculus very slender; processes of anellus each with elongate slender base and short posteriorly directed projection, its dorsal surface with short setae; anellus ellipsoid, somewhat dorsally situated, with median, apically bifurcate projection extending posteriad of lateral arms; cristae not conspicuous, of five to 12 slender setae; tegumen with elongate median fusion, dorsal thickened areas flangelike; saccus longer than tegumen, tapered anteriorly, apically bluntly pointed or rounded; aedeagus 3.8 to 4.0 mm. long, 0.3 to 0.4 mm. wide, narrowed anteriorly, posteriorly lightly sclerotized and bluntly pointed, vesica unarmed.

FEMALE GENITALIA: Sterigma with lamella antevaginalis either membranous or a transverse, heavily sclerotized band, finely and thickly set with very many minute spicules, weakly angled medially, lamella postvaginalis either membranous or a weakly sclerotized, transversely striate, median strip; ostium bursae large, membranous, funnel-shaped; ductus bursae laterally sclerotized, very slender, four to five times as long as wide, lateral margins parallel or slightly increasing in width anteriorly; ductus seminalis arising from side of membranous sac at posterior end of corpus bursae; corpus bursae long and slender, posterior end extending short distance beyond junction with ductus bursae, either ventrally or on right side, posterior portion laterally compressed, with longitudinal striations, either very slender and membranous or thicker, weakly sclerotized, and with minute spicules, anterior portion of corpus membranous, slightly swollen, with either weak longitudinal striations or concentric ridges around signum, corpus bursae with length 3.5 to 4.5 times that of apophyses posteriores; signum large, heavily sclerotized, round at surface of corpus bursae, invaginated, 0.4 to 0.5 mm. long, flattened, ovoid or elliptical, outer margins and flat surface

dentate. Papillae anales short; apophyses with anterior or anteromedian attachment; apophyses posteriores 1.6 to 2.6 mm. long, apophyses anteriores 0.6 to 1.2 mm. in length.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPE SPECIES: *Quillaca earina*, new species.

DISTRIBUTION: Peru and Bolivia.

FLIGHT PERIOD: October, November, and January.

REMARKS: Four species are included in this genus.

The male genitalia of *Quillaca* are autopomorphic in the tribe in the configuration and in the amount and location of the setae of the uncus, and in the dense group of elongate transverse setae near the distal end of the costa. Additional distinguishing characters are given in the Keys and in the Diagnosis.

ETYMOLOGY: The generic name is that of an Indian tribe of Bolivia; its gender is feminine.

***Quillaca earina*, new species**

Figures 64, 65, 79, 89

DIAGNOSIS: Moths of this species can be separated from the other known members of the genus by the upper surface of all wings being dark brown, the forewings having a prominent outer margin of green to the median area and the s. t. line represented at the leading and trailing edges of the wings; the hind wings are unicolorous. The male genitalia have relatively long processes of the anellus, and the female genitalia have a large sac, extending posteriorly from the corpus bursae to near the posterior end of the ductus bursae, from which the ductus seminalis arises.

ADULTS: Head with vertex having mixture of green, grayish green and brown scales; front dark brown medially, gray laterally and ventrally; palpi with mixture of pale gray and brown scales. Thorax above with grayish white collar, patagia and upper surface dark brown, tuft grayish brown; below ochraceous gray; legs pale brownish gray with variable amount of dark brown scaling. Abdomen above grayish brown, becoming grayer pos-

teriorly, tufts concolorous with abdomen; below grayer than above.

Upper Surface of Wings: Males: Forewings dark brown, with scattered black and reddish scales, maculation primarily greenish; t. a. line near base of wing, arising one-seventh length of costa, dull grayish green, broad, extending irregularly outward, with outward projection in cell Cu, meeting inner margin two-fifths its length; median area broad, with some pale scaling along costa, and with nebulous dark median line; t. p. line arising at middle of costa, broadly shaded outwardly by pale green, turning grayish green distally, extending at right angle to costa, with inward projections on radial vein and in cell, sharply angled outwardly, paralleling vein Cu₂ to near junction of veins M₃ and Cu₁, making right angle, extending in slightly sinuous course to meet inner margin two-thirds distance from base; subterminal area very wide anteriorly, brown with black striations, then grayish green with suffused reddish brown area, blackish brown posteriorly; s. t. line faintly greenish white, prominent at costa and above inner angle, absent in middle of wing; terminal area tending to have longitudinal black marks in some cells; fringe concolorous with wing. Hind wings dull grayish brown; without maculation except for faint trace of extradiscal line, apparently double in lower portion of wing.

Females: Similar to males but forewings with t. p. line arising about two-thirds length of costa, broadly S-shaped, with distal green markings narrower, and with more prominent median shade.

Under Surface of Wings: Forewings pale to dark brown, males darker than females, with broad pale area at t. p. line and with incomplete s. t. line. Hind wings grayish brown and brown, with discal spot and extradiscal line; subterminal and terminal areas tending to be paler than basal portion of wing, incompletely divided by s. t. line, and with dark longitudinal spot in or near cell M₃.

MALE GENITALIA: Uncus with ventral extension shorter than divergent dorsal extension; gnathos tapering to sharp elongate point; valves with each setae in each distal group straight except for curved end of each seta;

processes of anellus 0.3 mm. long; aedeagus 0.38 mm. long.

FEMALE GENITALIA: Sterigma with membranous lamellae; ductus bursae increasing in width anteriorly; ductus seminalis arising from end of large sac ventrally at posterior end of corpus bursae, with sac as long as ductus bursae; corpus bursae very long and slender, 8.5 mm. long, anterior end with concentric ridges around signum; signum 0.5 mm. long, elliptical. Apophyses posteriores 1.6 mm. long, apophyses anteriores 1.0 mm. in length.

TYPES: Holotype, male, Cosnipata, Paucartambo, Cuzco, Peru, November 15, 1951 (F. L. Woytkowski); allotype, female, same data but November 12, 1951; paratype, male, same data but November 28, 1951. The genitalia of the holotype are mounted on slide FHR 18935A, with the right antenna and legs on slide FHR 18935B; the genitalia of the allotype are on slide FHR 18904A, with the right antenna and legs on slide 18904B. All three type specimens are from the Sperry collection.

The holotype, allotype, and paratype are in the American Museum of Natural History.

DISTRIBUTION: Known only from the type locality in southern Peru.

REMARKS: Three specimens, two genitalic dissections, and two slide mounts of antennae and legs have been studied. The characters given in the Diagnosis will serve to separate this species from the other three known to me.

ETYMOLOGY: The specific name is from the Latin *earinus*, green or greenish, in reference to the part of the coloration on the forewings.

GENUS *ISCHNOPTERIS* HÜBNER

Figures 1, 66–68, 80–82, 90

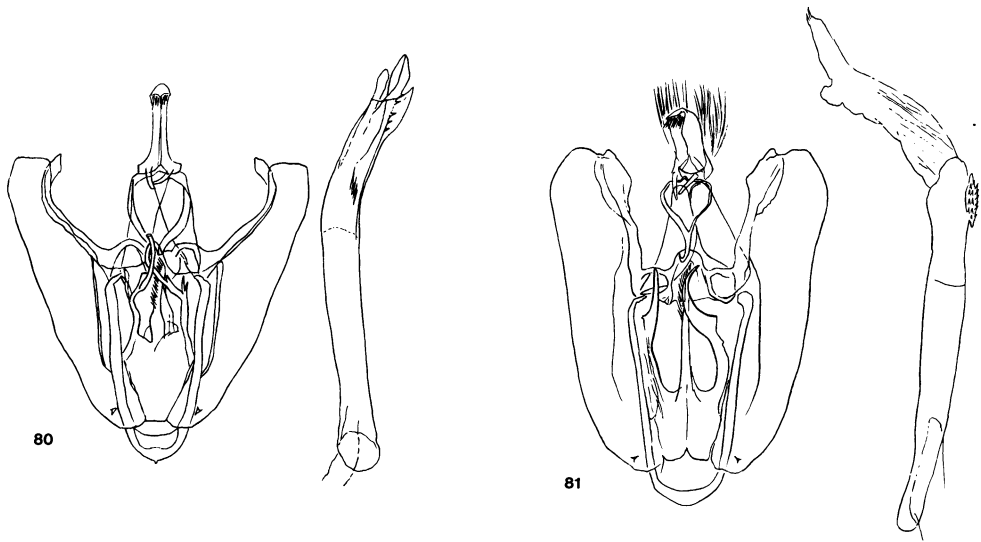
Ischnopteris Hübner, "1806" [1823], pl. [222].

Ischnopterix Hübner, "1816" [1825], p. 332. NEW SYNONYMY.

Ischnopertyx Agassiz, "1846" [1847], p. 196 (an unjustified emendation of *Ischnopterix* Hübner).

Amblyurodes Warren, 1900, p. 200. NEW SYNONYMY.

DIAGNOSIS: The moths of this genus have the upper surface of the forewings dull brown,



FIGS. 80, 81. Male genitalia. 80. *Ischnopteris chlorata* Hübner, Kamakusa, British Guiana, December 1922 (AMNH). 81. *Ischnopteris fabiana* (Stoll), Upper Kutari River, British Guiana, December 10–12, 1935 (G. A. Hudson; BM).

with indistinct maculation in the males, whereas the females may be the same or have a white median area, the hind wings being slightly paler than the forewings, those of the males having a setose basal swelling on the anal margin, and the antennae of both sexes simple. The male genitalia have a broad and deep complex uncus having two points at the apex, the gnathos is V-shaped, the apex of each valve is swollen, and the vesica has two groups of spines or sclerotized strips. The female genitalia have a narrow sclerotized lamella, the ductus bursae is between two and three times as long as it is wide, the corpus bursae has the slender posterior portion striate, the entire corpus is between 3.5 and 5.5 times as long as the apophyses posteriores, and the stellate signum is invaginated.

ADULTS: Head with eyes of both sexes large, of about same size; front prominently raised, extending one-quarter to two-fifths diameter of eye in front of eye, and having low ventral transverse ridge; palpi of both sexes with second segment 0.6 to 1.2 mm. long, third segment 0.4 to 0.7 mm., tightly scaled dorsally, with longer scales below, decumbent; antennae of both sexes simple, of from 66 to 92 segments. Thorax slender, patagia with mix-

ture of flattened scales and hairlike scales, with metathoracic tuft; legs elongate, fore legs with epiphysis of males arising three-fifths to two-thirds length of segment and being about two-fifths its length, of females arising at two-thirds length and being one-third its length; hind tibia of males with hair pencil. Abdomen slender, extending well beyond hind wings in males, reaching anal angle or slightly beyond in females, with prominent dorsal tufts; males with row of setae on ventral surface of third segment.

Forewings elongate, apex almost square, outer margin strongly curved posteriorly, shallowly concave between veins; with one accessory cell; vein Sc either separate or with cross vein to top of cell, R_1 from top of cell, R_2 either free or shortly stalked with R_{3+4} from end of cell, R_5 from either end or bottom of cell; mdc and ldc variable, being angled, curved, or biconvex. Hind wings elongate, outer margin angled, males with small to moderate swelling on basal one-half of anal margin bearing numerous elongate setae, males either similar to females in wing shape or with very short tail; Sc paralleling R for one-half length of cell; m and ldc curved or angled.

Upper surface of forewings dull brown, maculation of males usually indistinct, of females more clearly defined, with straight or weakly concave t. a. line and broadly out-curved t. p. line, with median area either concolorous with adjacent areas or white or pale brown, in latter case pale scaling often extending to outer margin; hind wings slightly paler than forewings, with or without faint extradiscal line and poorly defined subterminal band. Under surface of all wings pale brown to grayish brown, with median, t. p., and extradiscal lines usually present, and outer edge of wings slightly darkened.

Length of Forewings: Males, 18 to 23 mm.; females, 18 to 24 mm.

MALE GENITALIA: Uncus 0.7 to 1.7 mm. long, base 0.4 to 0.6 mm. wide, complex, posterior portion as wide or wider than base, subrectangular, with lateral, sclerotized, thickened strips extending into posterior hoodlike portion, latter rounded dorsally, inner hollow portion filled with from few to numerous short setae, apically with ventrally protruding double apical points, anterior one more bluntly pointed than posterior one, and with posterodorsal swelling, with or without elongate setae, extending from anterior to posterior portions; socius digitate, slender, membranous, with approximately 24 setae; gnathos with more heavily sclerotized portion V-shaped, slender, with long thin median extension, laterally and medially extending anteriorly as more lightly sclerotized curved plate to near transtilla; each valve with wide base, slender, reaching as far as base of uncus, costa sharply differentiated, extended basally as prominent curved transtilla, swollen distally at end of valve, and with single row of setae along inner margin, valvula with slender membranous area basally and with rounded membranous area adjacent to swollen portion of costa, swollen medially and distally, surface finely setose, sacculus with sclerotized, slender, ventrally projecting point near base, outer surface of valve with prominent cluster of setae, being longer than valve; processes of anellus with moderate to very long base, flattened, curving posteriorly, simple or bifurcate, tapering to slender point; anellus broad, anterior margin truncate or with slight median indentation, with either

median ridge or swelling, with long slender posteromedial pointed process basally symmetrical or asymmetrical, process straight or curved, unornamented or setose; cristae inconspicuous, 10 to 20 on each side; tegumen with moderate to long median fusion; saccus longer than tegumen, sides subparallel to tapering, anterior margin flatly rounded or bluntly pointed; aedeagus 2.7 to 4.6 mm. long, 0.3 to 0.4 mm. wide, slightly curved, posteriorly with denticulate strip, apex bluntly pointed, vesica with slender spinose sclerotized strip or with small group of short spines of different sizes.

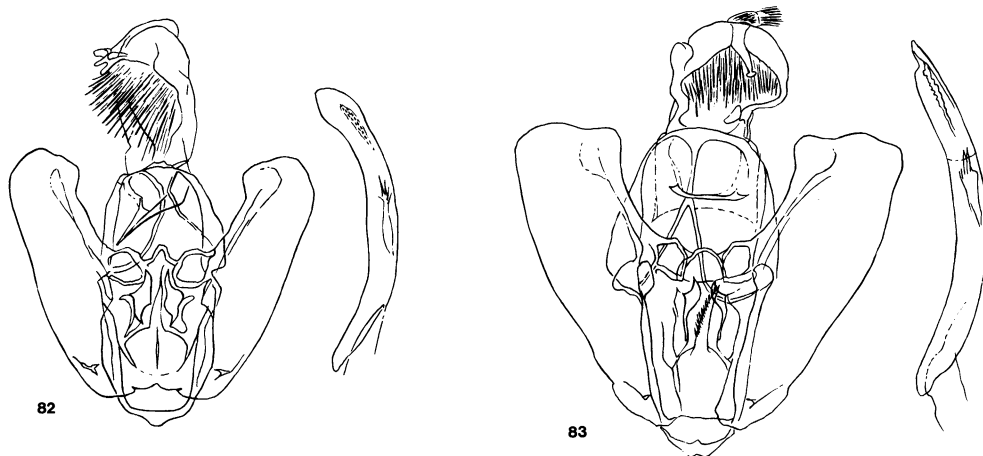
FEMALE GENITALIA: Sterigma with lamella antevaginalis a slender transverse, sclerotized strip, tapering distally and weakly narrowed medially, lamella postvaginalis a transversely striate median area; ostium bursae funnel-shaped, membranous, with rounded posterolateral areas weakly sclerotized; ductus bursae heavily sclerotized, slender, two to three times longer than wide; ductus seminalis arising either from sac at posterior end of corpus bursae or from slender continuation of corpus bursae, in length about equal to that of ductus bursae; corpus bursae long and slender, posterior portion partly sclerotized or membranous, variously curved, of varying lengths, with longitudinal striations, medially with or without swollen low circular ridge, elongate anterior portion of corpus membranous, slender, anterior end bluntly pointed, corpus bursae 3.5 to 5.5 times as long as apophyses posteriores; signum prominent, sclerotized, with rounded or shortly elliptical opening at surface of corpus bursae, variously invaginated, either close to surface or at steep angle, elliptical or triangular, outer margin rayed, flat surface dentate. Papillae anales short; apophyses with median attachment; apophyses posteriores 1.2 to 1.3 mm. long, apophyses anteriores 0.5 to 0.9 mm. in length.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPES SPECIES: *Ischnopteris chlorata* Hübner for *Ischnopteris*; by monotypy. *Phalaena fabiana* Stoll for *Ischnopteris*; by monotypy. *Ambluodes commixta* Warren for *Ambluodes*; by original designation.

DISTRIBUTION: Mexico, Central America, Guianas, Colombia, Ecuador, and Bolivia.



FIGS. 82, 83. Male genitalia. 82. *Ischnopteris commixta* (Warren), Chapare, Bolivia, August 16, 1949 (Peña; AMNH). 83. *Trichostichia bifinita* (Walker), Kartabo, British Guiana, July 17, 1922 (AMNH).

FLIGHT PERIOD: All months except February and April.

REMARKS: Ten species are placed in this genus.

Ever since the publication of *Ischnopteris* and *Ischnopterix* there has been confusion about the validity and proper usage of these names. Both are available and, as each has its own separate and distinct type species, each has to be considered as a separate genus. This is unfortunate, because of the similarity in spelling, however, there is no legal alternative to this fact.

The proper usage of these two generic names involves a study of their respective type species, which are listed above. Unfortunately, insofar as I know, the actual type specimens of *chlorata* Hübner and *fabiana* Stoll no longer exist. Therefore, identification of these two taxa have to be made from the appropriate color plates where the names were proposed. I have found a male (in AMNH) that is a fairly close match for *chlorata*; it is labeled "Kamakusa, British Guiana, Dec. 1922," and its genitalia are on slide FHR 18903. Both Prout and Fletcher have identified two males (in BM) as *fabiana*, and these have been lent to me. The genitalia of one lacks the posterior structures (FHR 19077A), but the second is entire (FHR 19079); the former is labeled "St. Jean de Maroni, French

Guiana," and the latter "Upper Kutari R[iver], British Guiana, 10–12.xii.1935, G.A. Hudson."

The genitalia of the above specimen of *chlorata* (see fig. 80) have a relatively slender and curved uncus, the two sides narrowly separated medially on the ventral side, with a relatively modest number of setae on the anterior surface of the elongate, ventrally projecting, attenuate apex; the gnathos is long and slender, terminating in a sharply pointed sclerotized curved point; the costa of each valve is curved distally and extends beyond the valve as a truncate projection; the processes of the anellus are bifurcate, with the medioposterior pair long, slender and curved; the anellus has a very long, slender median extension that is densely spinose on the left side; the aedeagus has, on the right side posteriorly, a sclerotized, slightly spoon-shaped process with a few teeth on the outer surface; the vesica has a small group of various sized spines.

The genitalia of the above specimens of *fabiana* (see fig. 81) have a shorter, broader, less curved uncus, the two sides narrowly separated medially on the ventral side, with a prominent, dense group of more elongate setae on the anterior surface of the elongate, ventrally projecting, attenuate apex; the gnathos is similar to that of *chlorata*; the costa

of each valve is enlarged distally and extends as far as the end of the valve as a broad truncate projection; the processes of the anellus are single, large, apically curving to a slender point; the anellus has a very long, slender median extension that has the distal one-half spinose on the left side, although not as densely so as in *chlorata*; the aedeagus has the posterior end on the right side sclerotized and with an elongate, rounded spinose process; the vesica has a long slender lightly sclerotized piece with the distal end having three or four spinelike teeth.

The genitalic differences between the two species are primarily in the size and shape of the uncus, the extent of the setae near its apex, the shape of the distal end of the costa, the processes of the anellus bifurcate or simple, the amount of spining on the median extension of the anellus, the configuration of the posterior end of the aedeagus, and the armature of the vesica. In the course of this study I have dissected and examined the male genitalia of five other species that I consider to be congeneric with these two taxa.

When the head and thorax, with their appendages, are studied (insofar as possible, as the antennae and most of the legs of the specimen of *chlorata* are missing), vein Sc in *chlorata* is farther away from the discal cell and has a definite cross vein to the cell, whereas in both specimens of *fabiana* Sc is immediately adjacent to the top of cell and lacks an apparent cross vein. As this is the only apparent structural difference between the two, I consider this to be a specific rather than a generic character. Therefore, based on both the male genitalia and the external structures, these two species are placed in the same genus, and *Ischnopteris* is placed as a synonym of *Ischnopteris*.

When Warren proposed *Amblurodes*, based on the single included species *commixta*, he carefully detailed the hind wings, with the "inner marginal are largely developed, thickly fringed with hair, and produced into a curved lobe at anal angle, and with a fringed lobe at base." All the males that I have examined of *Ischnopteris* have, to varying degrees, the fringed lobe near the base of the anal margin; the curved lobe at the anal angle is more strongly developed in this species

than in most, but intermediate shapes do occur. When the antennae, legs, and venation of *commixta* are compared with other species in this genus, there are no differences that I would consider to be other than specific. The male genitalia (see fig. 82) have a much more strongly developed uncus, being apically thicker and noticeably hoodlike, the gnathos is smaller and has a straight median portion, the valves are shorter and broader but the costa is similar to that of *fabiana*, the processes of the anellus are simple and small, the posteromedian extension of the anellus is also small and only apically spinose, the curved aedeagus has an elongate dentate band, and the vesica is very similar to that of *fabiana*. *Commixta* possesses a number of apomorphic characters, both in the wings and genitalia, but I do not consider any of them to be of generic value; hence *Amblurodes* is placed as a synonym of *Ischnopteris*.

I have not studied any females of *chlorata*, *fabiana*, or *commixta*.

GENUS *TRICHOSTICHIA* WARREN

Figures 69, 83

Trichostichia Warren, 1895, p. 151.

DIAGNOSIS: Moths of this genus (with only the males being known) have large, broad wings, the upper surface of the forewings being olivaceous brown with obscure maculation, the hind wings blackish brown having a scale tuft medially on the anal margin and nearly all the veins having on both sides a thick row of transverse setae; the antennae are simple. The male genitalia have a broad and deep complex uncus with a pair of bundles of elongate setae arising posterodorsally and extending ventrally over the posterior end of the uncus, the gnathos is H-shaped and has two small, elongate, lateral, sclerotized processes, and the sclerotized costa terminates as an enlarged projection.

ADULTS: Head with large eyes in males; front broadly swollen, conical, extending one-half diameter of eye in front of eye, and with prominent ventral transverse ridge; palpi with second segment 1.2 mm. long, third segment 0.5 mm., tightly scaled, decumbent; antennae simple. Thorax slender, patagia with mixture of flattened and hairlike scales, with meta-

thoracic tuft; legs elongate, fore legs with epiphysis of males arising at two-thirds length of segment and being two-fifths its length; hind tibia swollen, with prominent hair pencil. Abdomen elongate, slender, extending beyond hind wings, with prominent dorsal tufts, and with tuft of scales ventrally on second segment, third segment with median row of setae and lateral paired tufts of scales, remaining segments long scaled, with scales curving dorsally, with lateral scale tufts on last segment, and genitalia surrounded by long pale scales.

Forewings broad, apex rounded, outer margin curved, weakly concave between veins; with one accessory cell; vein R_1 from top of cell, R_2 from upper angle at end of cell, R_{3+4} stalked, R_5 from bottom of cell; mdc and ldc biconvex. Hind wings broad, outer margin angulate; Sc paralleling R for one-third length of cell; m and ldc curved; anal margin with prominent scale tuft basally and medially; upper surface with veins long scaled on both sides, most prominently from vein M_1 posteriad, with thick row of raised, elongate, slender transverse scales.

Upper surface of forewings olivaceous brown with obscure maculation, traces of incomplete cross lines, and faint, white s. t. line; hind wings blackish brown. Under surface various shades of brown; forewings with indistinct t. a. and t. p. lines, with prominent, elongate, dark discal dash superimposed on t. p. line, and with paler outer margin; hind wings with dark extradiscal line in middle of wing, and with dark outer margin becoming paler at some vein endings.

Length of Forewings: Males, 22 to 23 mm.; females, unknown.

MALE GENITALIA: Uncus 1.2 mm. long, base 0.9 mm. wide, complex, posterior portion wider than base, rounded, ventral margins with slender sclerotized rim on each side, enlarged medially on both sides of single, apically swollen point, flangelike, bearing numerous slender setae, tapering strips laterally on each side from anterodorsal portion of uncus, posterior portion of uncus hoodlike, inner hollow portion filled with numerous short setae, mediodorsal area raised and bearing two adjacent, thick, bundles of elongate setae, latter curving around posterior end

of uncus to base of apical point; socius membranous, elongate, slender, bearing short setae; gnathos H-shaped, weakly sclerotized, lateral arms wide, flat, slightly tapering anteriorly, anterior margin extending to transtilla, with median incision, medially with raised transverse ridge, each end with more heavily sclerotized, ventrally projecting, pointed process; each valve with wide base, truncate distally, costa sharply differentiated, extending basally as prominent transtilla, distal portion projecting and extending to form part of truncate end of valve, valvula swollen distally, covered with numerous short slender setae, sacculus with prominent, slender, sharply pointed, sclerotized projection near base, outer surface of valve with prominent cluster or area of slender setae, being longer than valve; processes of anellus each arising from elongate, slender base, becoming narrowed distally and curving posteriorly; anellus with large anterior portion having partial median ridge, posteriorly tapering and forming slender median extension, about as long as lateral processes, distally becoming less heavily sclerotized, very finely denticulate, and having several thick setae on left side distally; cristae inconspicuous, with about 20 to 25 well-spaced setae on each side; tegumen broad anteriorly, with sclerotized edges separated on dorsal surface, being in approximation for two-fifths length of tegumen; saccus about equal in length to tegumen, sides very weakly tapered, anterior margin bluntly pointed; aedeagus 3.9 mm. long, 0.3 mm. wide, curved, ventral surface and posterior end sclerotized, latter with slender dentate area, vesica with three thick short spines and sclerotized area medially.

FEMALE GENITALIA: Unknown.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPE SPECIES: *Syrtodes bifinita* Walker; by original designation.

DISTRIBUTION: Guyana.

FLIGHT PERIOD: March, May, and July.

REMARKS: Only the type species is put into this genus.

Trichostichia can be separated from *Ischnopteris*, its most closely related genus, by the more swollen front, the more tightly scaled third segment of the palpus, the shorter par-

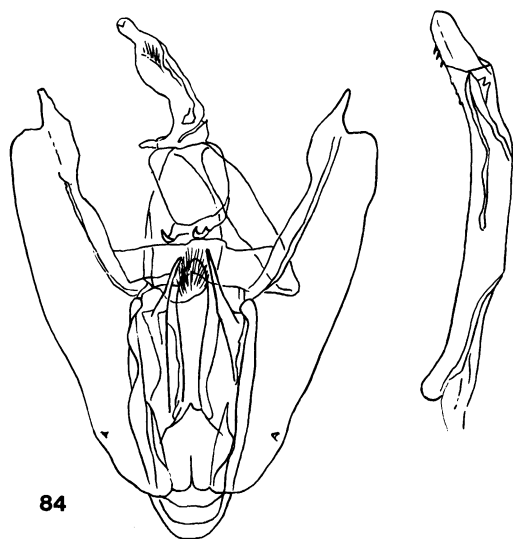


FIG. 84. Male genitalia of *Anischnopteris chryses* (Godman and Salvin), San Jeronimo, Mexico, October 7, 1970 (E. C. Welling; AMNH).

alleling of vein Sc and R in the hind wings, the much greater amount of specialized scaling covering the entire upper surface of the hind wings and on the abdomen, the larger and more complex uncus, being apically rounded and having two bundles of setae posteroventrally, and the bifurcate gnathos. *Trichostichia* gives the impression of being a highly evolved *Ischnopteris*, with *bifinita* showing resemblances to *commixta*; however, the number and amount of differences that are present are sufficient to keep the two in distinct genera.

ANISCHNOPTERIS, NEW GENUS

Figures 1, 70, 71, 84, 91

DIAGNOSIS: Moths of this genus are characterized by the upper surface of the forewings being unicolorous brown or olivaceous, sometimes with some white scaling or spots in the males, in the females having more clearly defined maculation, often with a pale median area, the hind wings are alike in both sexes and may be dark brown, grayish white with a dark border, or dark brown with the outer portion yellow-orange; the antennae of both sexes are simple. The male genitalia have a complex uncus with the terminal portion

attenuate and a single point, the gnathos is U- or H-shaped and has two elongate, lateral, sclerotized pointed processes, and the sclerotized costa terminates as a projection, either as a median arm or posterior projection. The female genitalia have a rather indistinctly defined ductus bursae, a very long and slender corpus bursae, being from four to eight times as long as the apophyses posteriores, and an invaginated, stellate signum.

ADULTS: Head with eyes large to moderate in males, of same size or slightly smaller in females; front prominently raised, extending two-fifths to one-half diameter of eye in front of eye, and having low ventral transverse ridge; palpi of both sexes with second segment 0.7 to 1.3 mm. long, third segment 0.4 to 0.7 mm., more or less tightly scaled dorsally, with longer scales below, decumbent; antennae of both sexes simple, of from 76 to 92 segments. Thorax slender, patagia with mixture of flattened and hairlike scales, with small metathoracic tuft; legs elongate, fore legs with epiphysis of males arising between three-fifths to two-thirds length of segment and being between two-fifths and one-half its length, of females arising at two-thirds length and being between one-third and two-fifths its length; hind tibia of males with hair pencil. Abdomen slender, extending well beyond hind wings in males, reaching anal angle or slightly beyond in females, with small dorsal tufts; males with row of setae on ventral surface of third segment.

Forewings elongate, apex almost square, outer margin curved or angled, shallowly concave between veins, some males with posterior margin expanded medially and bearing group of elongate scales; with one accessory cell; vein Sc to top of cell, R_1 from top of cell, R_2 stalked with R_{3+4} , R_5 from end or bottom of cell; mdc and ldc curved or biconvex. Hind wings elongate, broader than those of males, outer margin weakly angled, variably dentate between veins; males with small to moderate swelling on basal portion of anal margin bearing elongate setae, and some males with area of specialized, flattened scales at or near anal angle; Sc paralleling R for two-fifths to one-half length of cell; m and ldc curved to almost straight.

Upper surface of forewings with unicolorous brown or olivaceous in males, sometimes

with some white scaling or spots, in females with more clearly defined maculation, with straight or concave t. a. line and broadly out-curved t. p. line, with median area either concolorous with adjacent areas or varying from paler to white, with white scaling sometimes extending to outer margin; hind wings alike in both sexes, variable, dark brown, grayish white with dark border, or dark brown with outer portion yellow-orange. Under surface variable, species without orange above pale grayish brown, darkened distally, those with orange above mostly orange below, with apex of forewings broadly dark brown or black and with variable markings on hind wings.

Length of Forewings: Males, 18 to 23 mm.; females, 21 to 26 mm.

MALE GENITALIA: Uncus 1.1 to 1.2 mm. long, base 0.4 to 0.9 mm. wide, complex, prominent base wider than broad uncus, latter with or without anteromedian constriction, with longitudinal median membranous strip ventrally, expanding posteriorly, expanded area with lateral or posteromedian short setae, apex varying from having short point to elongate (0.3 mm.) digitate projection; socius membranous, digitate, slender, 0.4 to 1.5 mm. long, with from about 24 to 40 setae; gnathos U- or H-shaped, each anterolateral angle having heavily sclerotized, elongate, pointed process at least one-half length of gnathos; each valve with wide base, slightly tapering distally, costa sharply differentiated, extending basally as prominent transtilla, distal portion variable, either swollen and extending as straight projection beyond apex of valve or curved and forming projection at angle to valve, valvula more or less swollen distally, covered with short slender setae, sacculus with small sclerotized projecting point near base, outer surface of valve with prominent cluster or area of slender setae being longer than valve; processes of anellus prominent, either flattened and curving or rounded and straight, simple or bifurcate; anellus variable, quadrate, posterior margin rounded or as elongate median process, latter symmetrical, or asymmetrical, tapering or apically swollen and variably setose; cristae inconspicuous, 20 to 50 on each side; tegumen either with short to moderate median fusion or with sclerotized edges separated; saccus longer than tegumen, sides subparallel

or tapering, anterior margin flatly rounded; aedeagus 2.7 to 4.0 mm. long, 0.3 to 0.4 mm. wide, curved, ventral surface and posterior end sclerotized, latter either with variably dentate or spinose area or with recurved spineline process from apex, vesica with slender sclerotized strip of variable length.

FEMALE GENITALIA: Sterigma with lamella antevaginalis a slender, transverse, sclerotized strip, tapering distally, lamella postvaginalis variable, with transverse striations, weakly sclerotized or membranous, wide or narrow; ductus bursae short, either rectangular or with rounded dorsoposterior projection dorsad of small ostium bursae; ductus seminalis arising from small sac or projection near junction of ductus bursae and corpus bursae; corpus bursae very long, posterior one-half to two-thirds very slender, section adjacent to ductus bursae slightly swollen, weakly sclerotized, remainder membranous, partly or completely with longitudinal striations, anterior section of corpus swollen, symmetrical or footlike and angled to one side, with concentric ridges around signum, anterior end rounded or bluntly pointed, corpus bursae four to eight times as long as apophyses posteriores; signum prominent, sclerotized, with rounded or shortly elliptical opening at surface of corpus bursae, interior portion flattened, adjacent to surface of corpus or invaginated, semicircular to elliptical, outer margin with long rays or serrate, flat surface dentate. Papillae anales short, less than twice as long as wide; apophyses with median attachment; apophyses posteriores 1.2 to 1.8 mm. long, apophyses anteriores 0.2 to 0.8 mm. in length.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPE SPECIES: *Ischnopteryx* [sic] *chryses* Godman and Salvin.

DISTRIBUTION: Mexico, Central America, Guianas, Venezuela, Peru, Bolivia, Argentina, and Brazil.

FLIGHT PERIOD: Probably every month of the year, although I have not seen any specimens caught in November.

REMARKS: Thirteen species have been put into this genus.

The members of this genus are often placed in *Ischnopteris*, but may be distinguished from the latter by the genitalic structures. The pres-

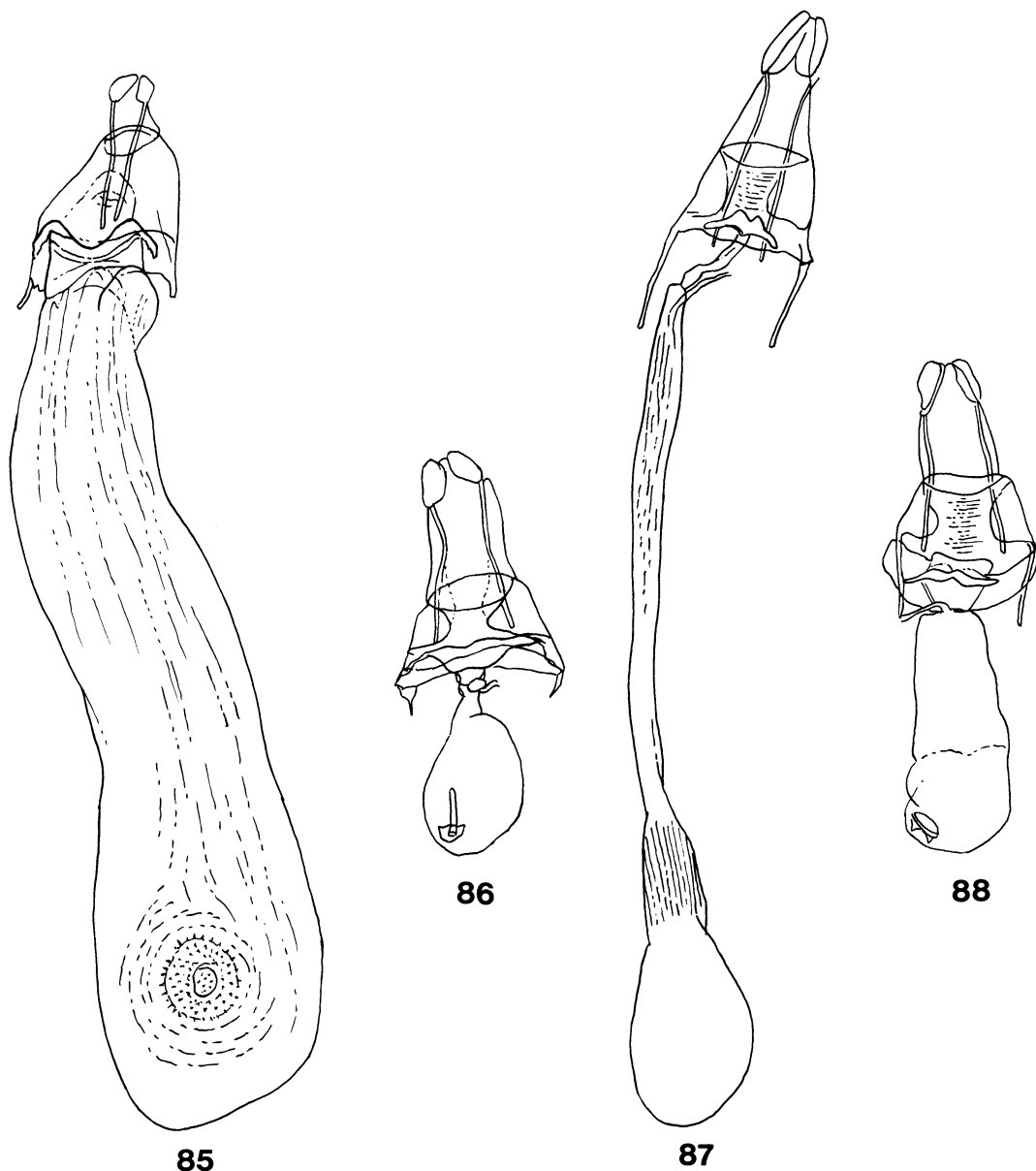


FIG. 85-88. Female genitalia. 85. *Charca triquetra*, new species, allotype, Chapare, Bolivia, August 28, 1949 (Peña; AMNH). 86. *Chrysomima semilutearia* (C. Felder and Rogenhofer), Colombia (AMNH). 87. *Nazca* sp., Caravani-Santa Ana, Bolivia, January 11, 1976 (L. E. Peña; AMNH). 88. *Cidariophanes ischnopterata* Warren, Nova Teutonia, Brazil, August 24, 1946 (AMNH).

ent genus has, in the males, a different configuration of the uncus, the gnathos is very different in that it has a heavily sclerotized, elongate, pointed process at least one-half the

length of the gnathos from each of the lateral angles of that structure, and by the very long and slender sclerotized strip in the vesica. In the females the corpus bursae is longer and

more slender, having the anterior end swollen, and the signum is located more anteriorly than in *Ischnopteris*.

ETYMOLOGY: The generic name is formed by combining the Greek prefix *an-*, meaning not, with *Ischnopteris*; its gender is feminine.

CANELO, NEW GENUS

Figures 1, 73, 92

DIAGNOSIS: Females of this genus (the males are unknown) are recognized by the upper surface of the forewings being brown or grayish brown, with white along the inner margin and distally. The female genitalia have a triangular ostium bursae, an extremely long corpus bursae, and a hollow, smoothly invaginated signum.

ADULTS: Head with eyes of female large; front strongly swollen, extending one-fourth to one-third diameter of eyes in front of eye, and having low ventral transverse ridge; palpi of females short, long scaled below, second segment 0.5 mm. long, third segment 0.2 mm., loosely scaled, erect; antennae simple, of 71 to 81 segments. Thorax slender, patagia with mixture of flattened and hairlike scales, without metathoracic tuft; legs elongate, fore legs with epiphysis of females arising between five-eighths and two-thirds its length and being between two-fifths and one-half its length. Abdomen moderate, extending shortly beyond anal angle, without tufts.

Forewings subtriangular, apex almost square, outer margin straight, becoming curved posteriorly, not indented between veins; without accessory cell; veins R_1 and R_2 free, R_{3+4} stalked, R_5 from end of cell; mdc and ldc weakly curved. Hind wings broad, outer margin curved; Sc paralleling R for one-half length of cell; m and ldc weakly angled.

Upper surface of forewings brown, grayish brown, or faintly olivaceous brown, females with obsolescent t. a. line, with inner margin white to or just beyond t. a. line, t. p. line more or less distinct, narrowly shaded distally with white, and with variable amount of white scaling in anterior portion of wing between t. p. and incomplete s. t. lines, and with narrow dull black distal line interrupted by veins; hind wings white, with broad, complete, grayish black border. Under surface of

forewings grayish white, with variable amount of gray scaling, and with broad brownish black border; hind wings slightly paler than forewings, veins darkened, and with broad dark outer margin.

Length of Forewings: Males, unknown; females, 19 to 22 mm.

MALE GENITALIA: Unknown.

FEMALE GENITALIA: Sterigma with lamella antevaginalis not differentiated, appearing as posterior end of ostium bursae and ductus bursae as lightly sclerotized transverse band, with posterior edge narrow, heavily sclerotized, lamella postvaginalis sclerotized, with lateral rounded areas and median, transversely striate area; ostium bursae and ductus bursae combined into large, triangular structure, membranous medially and anteriorly, about as long as width of posterior sclerotized margin; ductus seminalis arising from elongate, slender sac in area of junction of ductus bursae and corpus bursae; corpus bursae very long and slender, almost as long as abdomen, membranous posterior end slightly enlarged, posterior one-half of corpus with faint longitudinal striations, anterior portion only slightly widened, without striations, anterior end rounded, corpus bursae eight to nine times as long as apophyses posteriores; signum prominent, sclerotized, transverse, anterior and posterior margins parallel, ends rounded, 0.2 to 0.5 mm. wide, 0.1 to 0.2 mm. across, invaginated portion smoothly sclerotized, curved anteriorly, rounded or with central portion constricted. Papillae anales short; apophyses with median attachment; apophyses posteriores 1.1 to 1.2 mm. long, apophyses anteriores 0.5 to 0.7 mm. in length.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPE SPECIES: *Canelo constrictus*, new species.

DISTRIBUTION: Ecuador, Peru, and Bolivia.

FLIGHT PERIOD: February, March, September, and November.

REMARKS: Four species are placed in this genus.

Canelo can be recognized by the autopo-morphic type of signum, in which this structure is hollow and smoothly invaginated. The adult females of this genus are reminiscent of the males of *Cundinamarca*, as both genera have dark forewings and hind wings that

are white with a black border. The latter genus is placed in group 2, based on its genitalia; *Canelo* is put in group 3 on account of the type of pattern on the upper surface of the forewings, and by the very long and slender corpus bursae. The true relationships of the present genus will have to wait until the males are known.

ETYMOLOGY: The generic name is that of an Indian tribe of Ecuador; its gender is masculine.

***Canelo constrictus*, new species**

Figures 73, 92

DIAGNOSIS: As this species cannot be separated with certainty from the others in the genus by its size, color or pattern, the genitalia must be used. The female structures are characterized by the signum having an elongate elliptical opening in the wall of the corpus bursae, a median constriction, and a bulbous distal portion.

ADULTS: Head of female with vertex beige; front pale brownish gray; palpi pale brownish gray, distally darker gray. Thorax above with pale brownish gray collar, upper surface of thorax beige and brownish gray anteriorly, shading to pale beige and white posteriorly, patagia basally with mixture of beige, pale brownish gray, and dark brown scales, distally pure white; below faintly brownish white; legs concolorous with adjacent thorax, heavily scaled with brown and black, tibia with three bands of grayish white, two median and one distally, tarsi with ends of segments broadly grayish white. (Abdomen removed for dissection.)

Upper Surface of Wings: Forewings brown, with broad median area slightly darker than outer portion of wing; t. a. line indistinct, arising on costa about one-sixth length of costa, irregularly outwardly oblique, meeting inner margin one-third its length, formed of white scales in lower portion of wing, forming outer boundary of elongate white area in anal cell; median area beige to buff, thickly scaled with blackish brown scales, producing brownish color, being slightly paler medially; discal dot absent; t. p. line arising at middle of costa, broadly shaded distally with white, concave, swinging outward in center of wing, outwardly dentate on veins M_3 , Cu_1 , and Cu_2 ,

concave again to meet inner margin about two-thirds distance from base, lower portion with some white scaling distally; subterminal area very wide anteriorly, with some white scaling, median and lower portions with grayish brown scaling; s. t. line obsolescent, indicated by nebulous white area on costa, faint white spots on anterior portion of wing, absent posteriorly; terminal area concolorous with subterminal area but with very little white scaling anteriorly; terminal line dull black, interrupted by veins; fringe concolorous with wing, paler opposite vein endings. Hind wings white, without markings except for broad grayish black outer band; terminal line absent; fringe concolorous with wing.

Under Surface of Wings: Forewings gray, with nebulous white patch indicating discal spot, distally broadly grayish brown, apex of wing with some white and beige scaling; hind wings similar to upper surface, white more grayish, veins brown, distal portion more grayish.

Length of Forewing: Holotype, 22 mm.

MALE GENITALIA: Unknown.

FEMALE GENITALIA: Lamella postvaginalis with semicircular sclerotized, finely irregular ridges, and with transverse ridges; ostium bursae and ductus bursae with posterior margin heavily sclerotized, shallowly V-shaped medially; corpus bursae 9.0 mm. long; signum with elongate elliptical opening in wall of corpus bursae, constricted medially, and with distal portion swollen, apically tapering to blunt point. Apophyses posteriores 1.2 mm. long, apophyses anteriores 0.5 mm. in length.

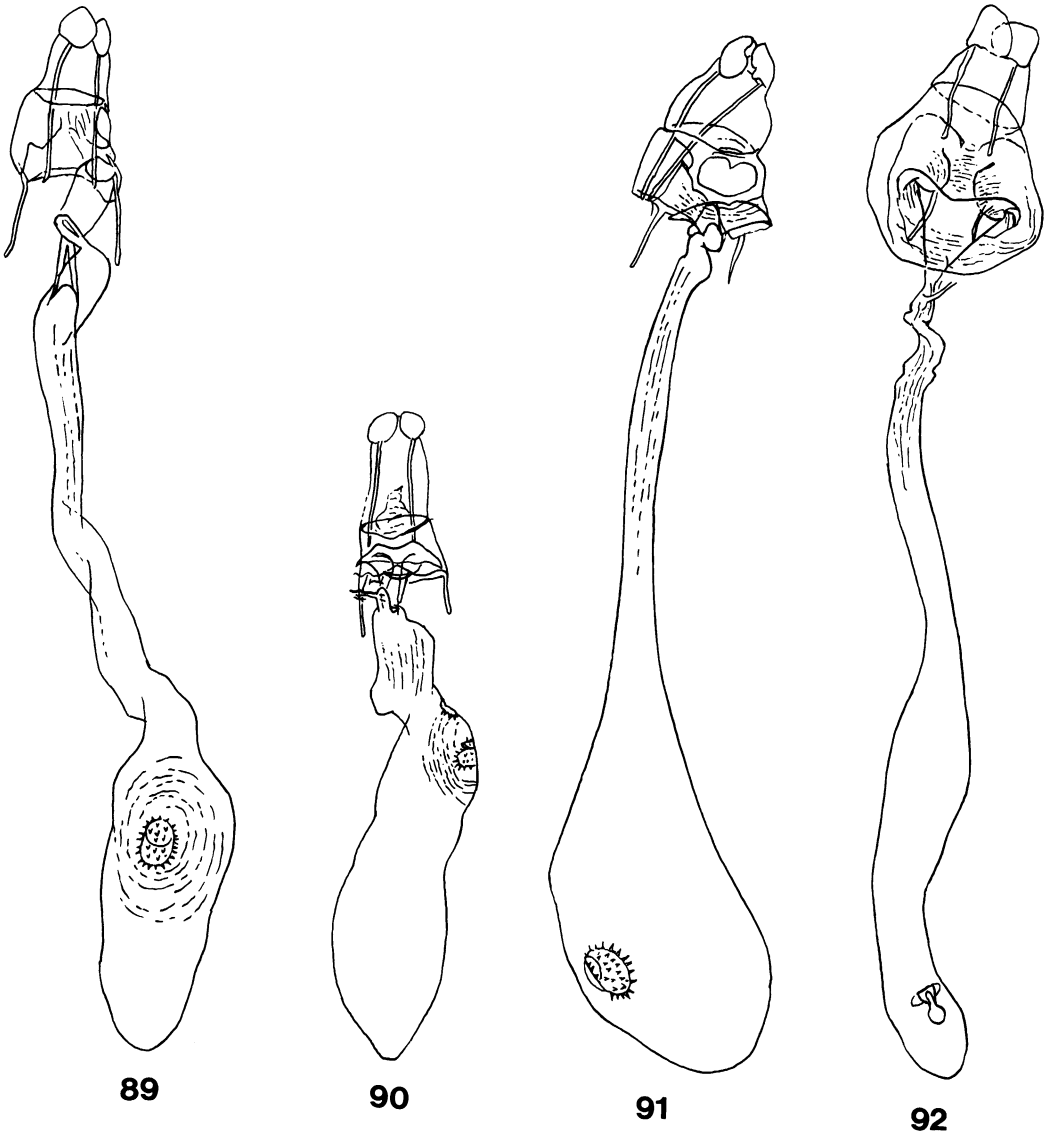
TYPE: Holotype, female, Yungas de Palmar, 2000 m., Bolivia, September 3, 1948. The genitalia of the holotype are mounted on slide FHR 18936A, and the antennae and set of legs on slide FHR 18936B. This specimen is from the collection of Grace H. and John L. Sperry.

The holotype is in the collection of the American Museum of Natural History.

DISTRIBUTION: Known only from the type locality.

REMARKS: One specimen, one genitalic slide, and one slide of appendages have been studied.

A second specimen from Bolivia is before me; its forewings above are a more blackish gray than is the holotype; the signum of this

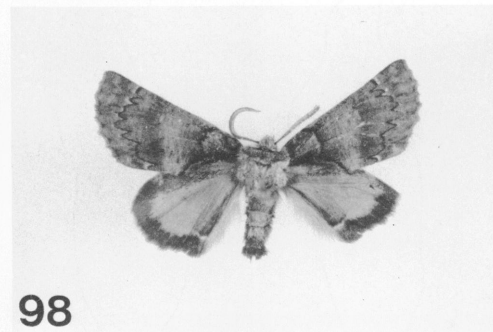
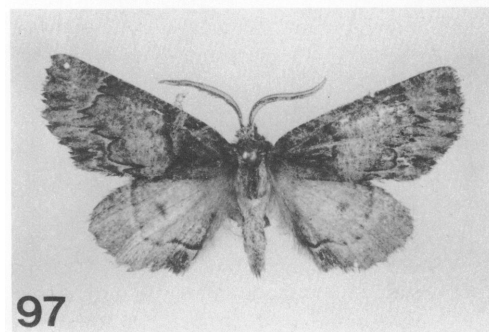
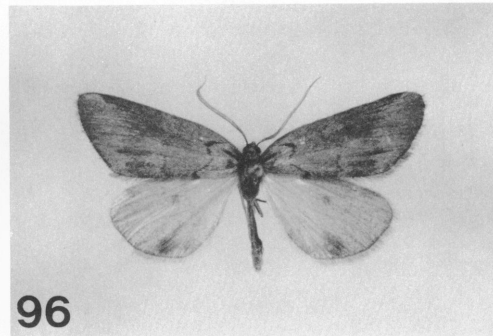
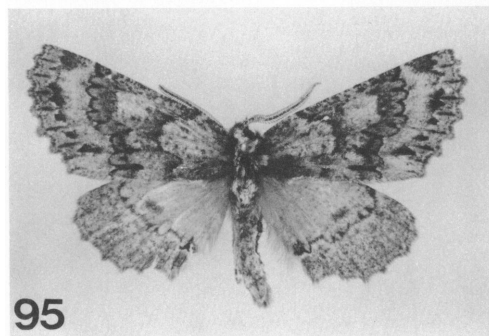
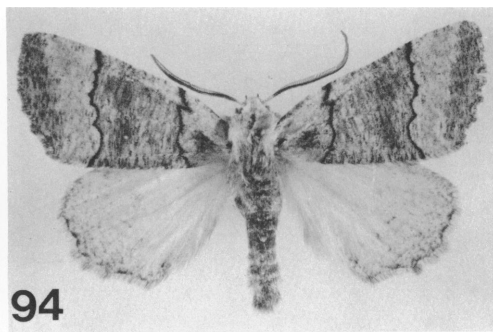
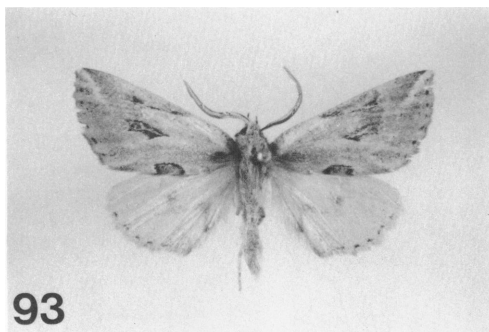


FIGS. 89-92. Female genitalia. 89. *Quillaca earina*, new species, allotype, Cosnipata, Peru, November 12, 1951 (F. L. Woytkowski; AMNH). 90. *Ischnopteris* sp., Acatenango, Guatemala, November 4, 1966 (E. C. Welling; AMNH). 91. *Anischnopteris* sp., Cuesta Totoral, Argentina, September 26, 1969 (L. E. Peña; AMNH). 92. *Canelo constrictus*, new species, holotype, Yungas de Palmar, Bolivia, September 3, 1948 (AMNH).

second specimen (slide FHR 18928A) is rounded on the surface and widened medially. I am assuming that it is another species. The signum of the Peruvian species (slide FHR 18924A) has a very broad opening and a short, tapering interior portion; the signum of the Ecuadorian species (slide FHR 19135A)

has a wide but nebulous opening and a parallel-sided interior portion that is rounded anteriorly. I am assuming that these various shapes are specific in nature; due to a lack of material I cannot ascertain the amount of individual variation.

ETYMOLOGY: The specific name is from the



FIGS. 93–98. Adult males. 93. *Praeantarctia* sp., Las Trancas, Chile, February 1978 (L. E. Peña; AMNH). 94. *Praeantarctia albida* Rindge, Victoria, Chile, December 26, 1976 (L. E. Peña; AMNH). 95. *Talca incurva* Rindge, Rio Blanco, Chile, January 20–25, 1974 (L. E. Peña; AMNH). 96. *Aconcagua fessa* (Rindge), paratype, Lago Gualletue, Chile, December 10, 1963 (L. E. Peña; AMNH). 97. *Dentinaia forsteri* Heimlich, Las Trancas, Chile, January 1974 (L. E. Peña; AMNH). 98. *Dentinaia latifascia* Rindge, paratype, Pucara, Argentina, November 5, 1958 (Schajovskoy; AMNH). All $\times 1.3$.

Latin *constrictus*, contracted or drawn together, in reference to the shape of the signum.

GROUP 4

The members of the included genera have all their species occurring in Chile and/or southern Argentina; in Argentina, both the

eastern side of the Andes and southern portion are inhabited. A number of species of *Mallomus* are known to occur in Chile and Argentina; for a discussion of placement of this genus, see the introductory remarks for group 2.

The adults can be recognized by having most of the following characters: Adults with a fully developed functional tongue; the third

segment of the palpi is one-half or less the length of the middle segment; the female palpi are as large as, or longer than, those of the males; the male antennae are either pectinate or simple; the front is often raised or swollen; and the row of setae ventrally on the third segment of the male abdomen is absent, although the hair pencil on the male's hind tibia may be present or absent. In the male genitalia the uncus is usually simple, and variable in length; the gnathos is usually V-shaped; and the processes of the anellus are either strongly developed or greatly reduced. In the female genitalia the ductus bursae is often short; the narrowed posterior portion of the corpus bursae has striations and the anterior part is swollen; and the signum is usually present and of varying shapes.

All the males, with one exception, belonging to this assemblage have their male genitalia with a simple uncus. *Catocalopsis* is the one with the complex structure and its uncus is trifid and very large. This organ differs markedly from those found in group 3; I do not believe that this particular type of complex uncus is homologous with those of the preceding section. The males of *Malleco* have some setae on the dorsal surface of each uncus; these setae are very slender, usually more so than in the more plesiomorphic genera of group 3. It is probable that this condition in *Malleco* is homologous to that in the preceding group.

GENUS *PRAEANTARCTIA* HEIMLICH

Figures 1, 93, 94, 105, 115

Praeantarctia Heimlich, 1956, p. 310. Rindge, 1971, pp. 374–379, figs. 95–101.

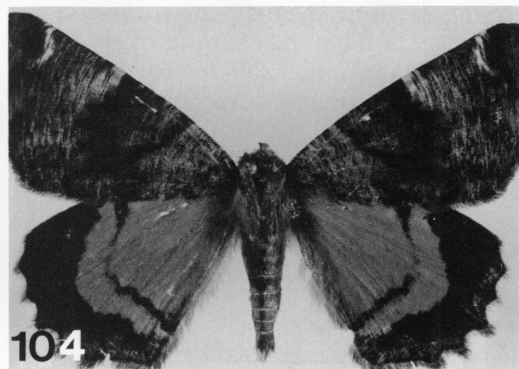
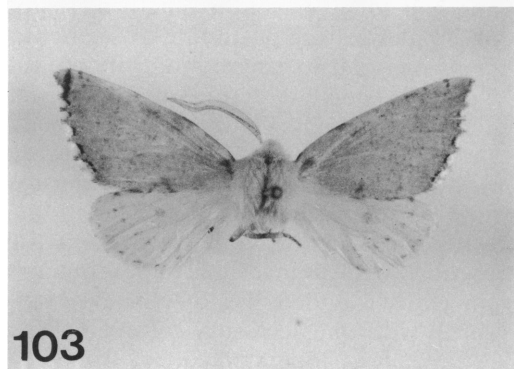
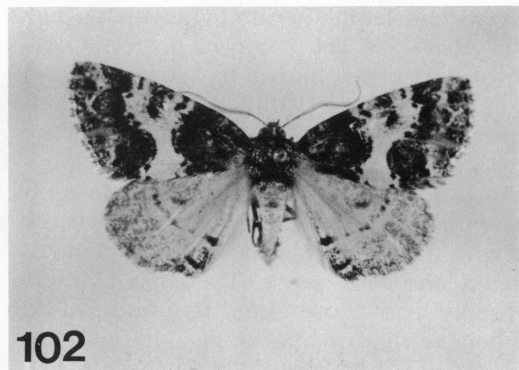
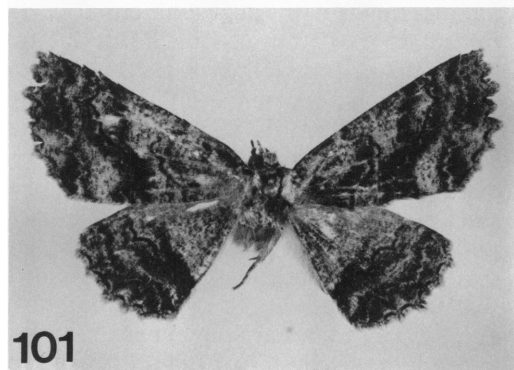
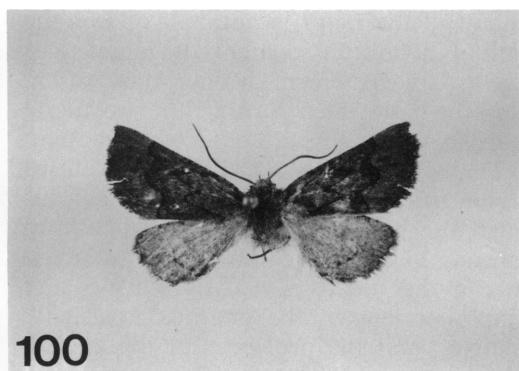
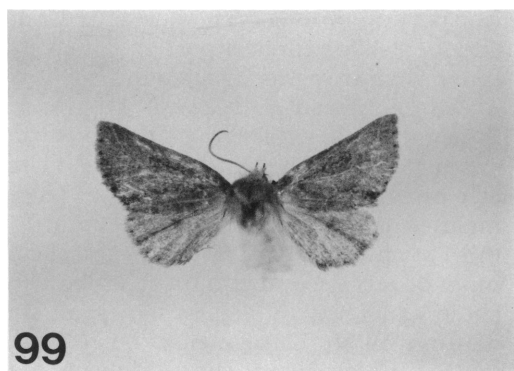
DIAGNOSIS: The moths of this genus are characterized by having the upper surface of the forewings various shades of brown or grayish white, usually with two cross lines, the hind wings paler than the forewings, the females either of the same wing expanse or larger than the males, and the male antennae bipectinate. The male genitalia have an uncus that is 1.4 to 1.6 mm. long, the processes of the anellus are shorter than the uncus, and the vesica has a longitudinal row of thick spines. The female genitalia have a slender sclerotized lamella antevaginalis, the poste-

rior portion of the corpus bursae is striated, and the swollen anterior portion of that structure has an invaginated signum.

ADULTS: Head with eyes of both sexes moderately large; front gently to strongly swollen, raised one-third to one-half diameter of eye above front rim of eye; palpi of males with second segment 0.9 mm. long, third segment 0.7 to 0.8 mm., tightly scaled, more or less decumbent, those of females of about equal size or slightly larger; antennae of from 54 to 72 segments, bipectinate in male, simple or very shortly bipectinate in female, males with longest antennal pectinations 0.45 to 0.50 mm. long, 2.0 to 2.5 times longer than basal segments, pectinations arising basally on segments, either extending to apex or with terminal three or four segments simple, pectinations thick, slightly enlarged distally, and having double row of slender to thick setae below. Thorax moderate, patagia with either mixture of long slender flattened scales and hairlike scales or with only hairlike scales, with metathoracic tuft; fore tibia with epiphysis of males arising between two-fifths and one-half length of tibia and being from one-half to seven-tenths length of segment, of females arising at middle of segment and being one-half its length; hind tibia of males with hair pencil. Abdomen moderately slender in males to heavier in females, extending shortly behind hind wings, with dorsal tufts, without ventral row of setae on ventral surface of third segment of males.

Forewing either attenuate with pointed apex or broad with almost square apex, outer margin gently rounded, weakly concave between veins; with one accessory cell; veins R_1 and R_2 free, R_{3+4} long stalked, R_5 from end of cell; mdc and ldc curved. Hind wings broad, outer margin rounded, weakly concave between veins; Sc paralleling R for one-half length of cell; m and ldc strongly curved.

Upper surface of forewings with two types of maculation, first having various shades of brown and gray, very variable pattern or none at all, with or without cross lines and median area, males and females usually with different maculation, second grayish white with slender, almost parallel, t. a. and t. p. lines, very consistent, sexes similar in color and pattern; hind wings of both types white or grayish



FIGS. 99–104. Adult males. 99. *Omaguacua truncata* (Rindge), holotype, Cerro Malo, Argentina, December 21, 1957 (S. Schajovskoy; AMNH). 100. *Poya unica* (Rindge), Las Trancas, Chile, January–February 1971 (L. E. Peña; AMNH). 101. *Malleco versicolor* Rindge, paratype, Estero de Leiva, Chile, January 8–12, 1953 (L. E. Peña; AMNH). 102. *Huapianus obater*, new species, paratype, Puerto Blest, Argentina, November 12, 1978 (Mis. Cient. Danesa; AMNH). 103. *Arauco schajovskoyi* (Rindge), paratype, Tromen, Argentina, November 28, 1967 (Schajovskoy; AMNH). 104. *Catocalopsis medinae* (Bartlett-Calvert), Refugio Las Cabras, Chile, March 23, 1968 (L. E. Peña; AMNH). All $\times 1.4$.

white, with faint extradiscal line. Under surface grayish white or pale grayish brown, with more or less distinct curved t. p. and extradiscal lines.

Length of Forewings: Males, 18 to 22 mm.; females, 18 to 26 mm.

MALE GENITALIA: Uncus 1.4 to 1.6 mm. long, base 0.6 to 0.9 mm. wide, long, slender,

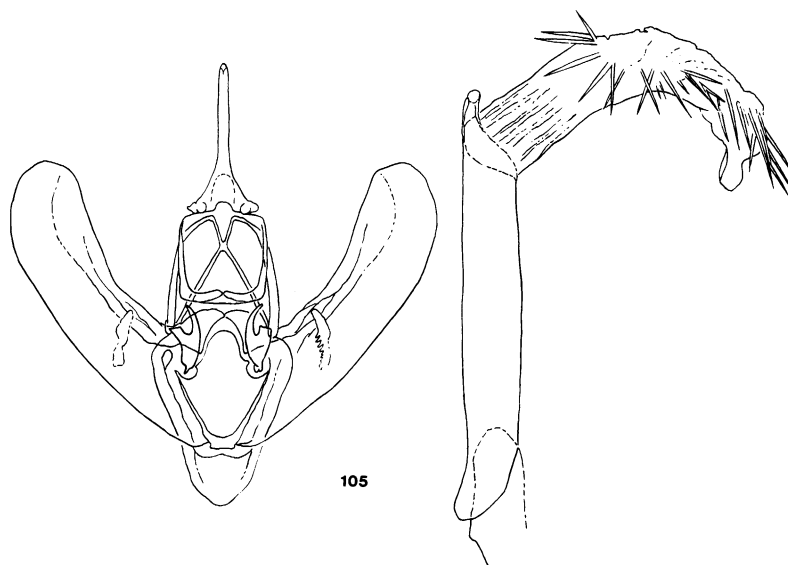


FIG. 105. Male genitalia of *Praeantarctia albida* Rindge, paratype, Tregualemu, Chile, January 26, 1967 (L. E. Peña; AMNH).

with parallel sides, apex with single blunt point; socius projecting, either short and broad or slender and more elongate, with about 10 to 25 setae; gnathos variable, either a square U-shape with a weakly developed median lip or V-shaped with apex curving ventrally; valves simple, costa sclerotized, valvula with or without prominent transverse ridge near base, with ridge raised near costa, angled distally and fusing with costa, valvula with median and distal portions with numerous slender setae, sacculus lightly sclerotized, weakly swollen; processes of anellus heavily sclerotized, laterally flattened, distal portion curved posteriorly and ending in sharp point; anellus big, broad with large posteromedian swelling; tegumen elongate, with very short median fusion; saccus large, sides slightly tapering, anterior margin rounded or bluntly wedge-shaped; aedeagus elongate, 3.5 to 4.6 mm. in length, 0.50 to 0.65 mm. wide, straight or slightly curved, posteriorly sclerotized, bluntly pointed; vesica, when exerted, extending at 60° to 90° angle to aedeagus, basal portion with longitudinal striations, with small to moderate ventral sac medially, distal portion of vesica

tending to be recurved, and with sac and distal portion having single row of from 15 to 24 elongate setae.

FEMALE GENITALIA: Sterigma with lamella antevaginalis a slender, transverse, sclerotized strip tapering distally, lamella postvaginalis a membranous or lightly sclerotized, transversely striate, longitudinal strip; ostium bursae membranous, posteriorly broadly triangular, anteriorly tubelike; ductus bursae short, ventrally and laterally sclerotized, lateral margins symmetrical or with left side larger than right, with length about equal to width; ductus seminalis from large ventral sac at middle or posterior end of sclerotized area of corpus bursae near ductus bursae; corpus bursae with posterior one-fourth to one-half sclerotized, deeply striate, inner surface sparsely or thickly spiculate, anterior portion of corpus membranous, enlarged, smoothly membranous, anterior end rounded, corpus bursae 2.3 to 3.4 times as long as apophyses posteriores; signum sclerotized, 0.5 mm. wide, round or elliptical on surface of corpus, shallowly invaginated anteriorly, narrowly V-shaped in profile, margins and surfaces serrate. Papillae anales short; apophyses with

anteromedian attachment; apophyses posteriores 1.8 to 2.5 mm. long, apophyses anteriores 0.5 to 1.6 mm. in length.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPE SPECIES: *Praeantarctia indecisa* Heimlich; by original designation.

DISTRIBUTION: Central Chile and adjacent Argentina.

FLIGHT PERIOD: December, January, and February.

REMARKS: Three species are included in this genus (see Rindge, 1971).

Praeantarctia has relatively few apomorphic states, as listed in the tables, and most of these are shared with other genera. A number of characters that can be used to recognize this group are given in the Diagnosis and the Keys; others include female antennae that may be simple, serrate, or shortly pectinate, the shortest gnathos found in group 4 (about one-third the length of the uncus), the large anellus (about 1.2 mm. in length), the long aedeagus with a single row of from 15 to 24 setae, and the elongate apophyses.

This genus was originally described in the Notodontidae.

GENUS *TALCA* RINDGE

Figures 1, 95, 106, 116

Talca Rindge, 1971, pp. 316–320, figs. 3, 4, 10, 11.

DIAGNOSIS: The included species are recognized by the upper surface of the forewings being gray or brown, with three slender, curved or irregular cross lines, the median area being slightly darkened, the hind wings slightly paler and having a discal dash and extradiscal line, the sexes of equal size, the males with bipectinate antennae, and both sexes with metathoracic tufts only. In the male genitalia the uncus is triangular, the processes of the anellus are thick and completely covered with spines, and the spinose vesica, when exerted, extends at a right angle to the aedeagus and has a median posterior lobe. The female genitalia have the posterior portion of the large corpus bursae sclerotized and with longitudinal striations, the junction between the preceding portion and the membranous

anterior part is oblique, and the signum is a large invagination.

ADULTS: Head with moderate-sized eyes, those of females slightly smaller than those of males; front flat, scarcely raised above front rim of eyes, and covered with raised scales; palpi of males with second segment 0.6 to 0.8 mm. long, third segment 0.7 mm., tightly scaled, decumbent, those of females of about equal size; antennae of 58 to 72 segments, bipectinate in males, simple in females; males with longest antennal pectinations 0.4 to 0.6 mm. long, arising basally on segments, and extending to end of antenna, each pectination thick, bearing several dentate projections, apex broad and curved distally, and bearing numerous short setae. Thorax moderate, patagia with mixture of flattened and hairlike scales, with prominent metathoracic tuft; fore tibia of males with elongate epiphysis, arising at two-fifths length of segment and being three-fourths its length, of females arising at three-fifths length of segment and being two-fifths its length; hind tibia of males with hair pencil. Abdomen moderately stout, extending slightly beyond wings, without dorsal tufts, and without ventral row of setae on third segment of males.

Forewings broad, apex bluntly pointed, outer margin curved and concave between veins; with or without one accessory cell; veins R_1 and R_2 free, R_{3+4} stalked, R_5 from R_{3+4} or cell; mdc and ldc biconvex. Hind wings broad, outer margin rounded, concave between veins; Sc paralleling R for three-fifths length of cell; m and ldc curved.

Upper surface of forewings various shades of gray, grayish brown, and brown, cross lines slender, t. a. line broadly curved, median area slightly darker than adjacent areas of wings, t. p. line inwardly dentate on veins, s. t. line complete; hind wings slightly paler than forewings, with elongate discal dash and complete extradiscal line; females similar to males. Under surface of wings gray, forewings slightly darker than hind wings, having discal dash and t. p. line, hind wings with maculation similar to that of upper surface but more clearly represented.

Length of Forewings: Males, 20 to 21 mm.; females, 18 to 22 mm.

MALE GENITALIA: Uncus 0.8 mm. long, base

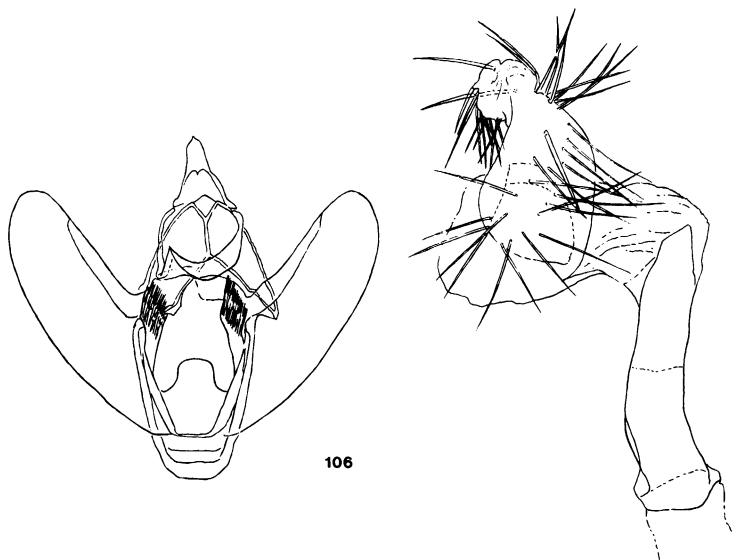


FIG. 106. Male genitalia of *Talca incurva* Rindge, paratype, Icalma, Chile, January 2, 1968 (L. E. Peña; AMNH).

0.7 mm. wide, triangular, posterodorsal surface lightly setose, apex curved ventrally, bluntly pointed; socius membranous, pad-like, with about 16 to 24 setae; gnathos with lateral arms broad, medially curved ventrally or slightly posteroventrally, narrowed, terminating in sharp sclerotized point, with entire structure as large as uncus; valves simple, broad, apically rounded, costa sclerotized, valvula with numerous slender setae medially and distally, sacculus lightly sclerotized, weakly swollen basally; processes of anellus large, longer than uncus, straight, tapering to pointed apex, ventral and lateral surfaces thickly setose; anellus broad anteriorly, with weak median indentation, posteriorly with wide, more heavily sclerotized projection, apically bluntly rounded, having small median membranous indentation; tegumen elongate, with long median fusion; saccus large, weakly tapering anteriorly, anterior margin bluntly rounded; aedeagus 2.5 to 2.7 mm. long, 0.6 to 0.7 mm. wide, dorsoventrally curved, apex lightly sclerotized, bluntly pointed; vesica, when exerted, very large and complex, extending at about right angle to aedeagus, with large posteriorly directed sac arising from distal part of first portion of ves-

ica, posterior sac with about 45 to 50 elongate setae extending entire length of sac.

FEMALE GENITALIA: Sterigma with lamella antevaginalis a slender, transverse sclerotized strip tapering distally, lamella postvaginalis broadly and smoothly sclerotized anteriorly, forming dorsal surface of triangular ostium bursae, posteriorly with a series of transverse sclerotized ridges; ductus bursae sclerotized, short, about one-half as long as wide; ductus seminalis arising from large sac or projection ventrally near posterior end of corpus bursae; corpus bursae large, thick, asymmetrical, posterior end extending slightly distad of junction with ductus bursae, either ventrally or laterally, posterior portion variably sclerotized, with longitudinal striations or prominent ridges, anteriorly with diagonal margin, curved or projecting on right side, anterior portion of corpus enlarged, membranous, with concentric ridges around signum, anterior end rounded, corpus bursae 2.6 to 4.1 times as long as apophyses posteriores; signum large, prominent, elliptical or ovate on surface of corpus, invaginated, 0.8 to 1.2 mm. long, flattened, outer margin and surface dentate. Papillae anales short; apophyses with anterior or anteromedian attachment;

apophyses posteriores 1.8 to 2.6 mm. long, apophyses anteriores 0.45 to 0.70 mm. in length.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPE SPECIES: *Talca incurva* Rindge; by original designation.

DISTRIBUTION: Central Chile.

FLIGHT PERIOD: November through February.

REMARKS: Two species have been described in this genus (Rindge, 1971).

Talca, as is the case with *Praeantarctia*, has relatively few apomorphic states, as listed in the tables, and most of these are shared with other genera. One of these characters, present in *Talca* but absent in *Praeantarctia*, is the absence of abdominal tufts. Additional characters that separate these two genera are the presence of a flat front in *Talca*, the longer epiphysis on the fore legs of the males, females with simple antennae, upper surface of the hind wings with the discal dot and extradiscal line distinct, a much shorter uncus (0.8 mm. in *Talca*, 1.4 to 1.6 mm. in *Praeantarctia*), the gnathos equal in its length to the uncus, spinose processes of the anellus that are about 1.2 mm. long (0.7 to 0.9 mm. in *Praeantarctia*), a smaller anellus, a shorter aedeagus with many more, longer spines, a lobed exerted vesica, and the differently shaped signum.

ACONCAGUA, NEW GENUS

Figures 1, 96, 107, 117

Ceratonyx, in part: Rindge, 1975, pp. 1-6, 17-22, figs. 7-9, 16, 29, 34-36 (group II, in part).

DIAGNOSIS: The adults of this genus have elongate wings, the upper surface of the forewings are dull brown and gray with the pattern weakly developed, the hind wings white or grayish white, the antennae of the males are either pectinate or dentate and the females (insofar as they are known) are weakly serrate, and the hind tibia of the males lack a hair pencil. The male genitalia have elongate slender valves with the costa terminating in a more or less prominent swelling, and very long slender processes of the anellus. The female genitalia (two of the three included species are unknown) have a large

sterigma, the ductus bursae is oblique, and the membranous striated corpus bursae has a very small signum.

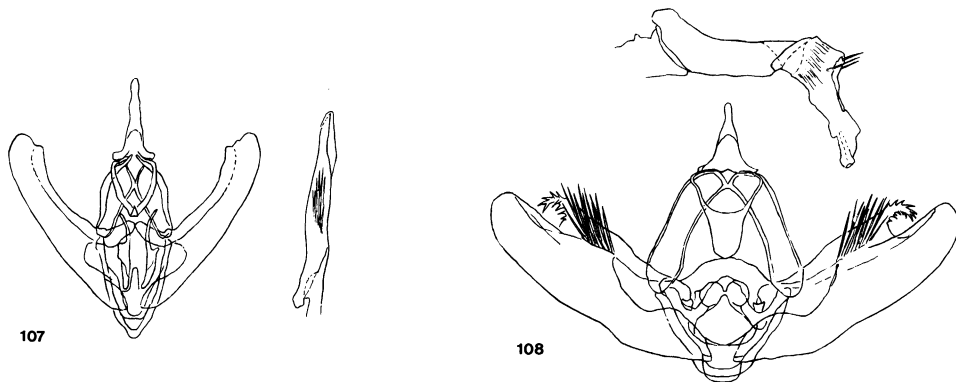
ADULTS: Head with eyes of both sexes large, of equal size; front raised, extending two-fifths to one-half diameter of eye in front of eyes and having small ventral ridge; palpi of both sexes with second segment 0.4 to 0.7 mm. long, third segment 0.2 to 0.3 mm., loosely scaled, decumbent; antennae of from 57 to 66 segments, bipectinate or dentate in males, weakly serrate in females; males with longest antennal pectinations 0.6 to 0.7 mm. long, from 3.4 to 4.0 times as long as basal segments, pectinations arising basally on segments, with terminal two to four segments simple, each pectination having double row of slender setae below. Thorax slender, patagia with mixture of flattened and hairlike scales, with metathoracic tuft; fore tibia with epiphysis of males arising between three-fifths and two-thirds length of segment and being two-fifths to one-half length of that structure; hind tibia of males without hair pencil. Abdomen slender in males, extending beyond hind wings, thicker in females, attaining or extending just beyond hind wings, with dorsal tufts; males without ventral row of setae on third segment.

Forewings elongate, apex rounded, outer margin oblique, smooth; with or without one accessory cell; vein R_1 free, R_2 either free, stalked with R_{3+4} or with R_{3+5} ; mdc and ldc shallowly biconvex. Hind wings elongate, outer margin smooth; Sc paralleling R for three-fifths length of cell; m and ldc curved.

Upper surface of forewings dull brown and gray, females tending to have more reddish brown scaling than males, maculation reduced or absent, with median area slightly smaller in males than in females; hind wings white or grayish white, with maculation obsolescent or absent. Under surface of forewings dark gray, of hind wings white or pale grayish white, all wings with discal spots, maculation reduced or absent.

Length of Forewings: Males, 12.5 to 18.0 mm.; females, 16 to 19 mm.

MALE GENITALIA: Uncus 0.9 to 1.1 mm. long, base 0.30 to 0.45 mm. wide, slender, sides parallel, apically with ventral surface either flattened or concave, terminating in



FIGS. 107, 108. Male genitalia. 107. *Aconcagua fessa* (Rindge), paratype, Lago Gualletue, Chile, December 10–12, 1963 (L. E. Peña; AMNH). 108. *Dentinaia forsteri* Heimlich, Icalma, Chile, January 2, 1968 (L. E. Peña; AMNH).

point or short transverse ridge; socius either swollen and padlike or projecting, not prominent, with from four to about 10 setae; gnathos V-shaped, median portion either bluntly pointed or extended as elongate, heavily sclerotized recurved point; valves with sclerotized costa having slightly protruding point apically or with apical region slightly swollen, valvula with membranous base, distally with numerous slender setae, sacculus lightly sclerotized, slightly swollen; processes of anellus prominent, curving posteriorly, with either broad triangular base or with very small base and elongate slender processes; anellus recessed dorsally, with lateral vertical walls and posteriorly with prominent median extension; tegumen with median fusion varying from short to moderate in length; saccus longer than tegumen, sides tapering, anteriorly bluntly pointed; aedeagus 1.6 to 2.5 mm. long, 0.20 to 0.25 mm. wide, posterior end lightly sclerotized, with ventral surface either finely denticulate or smooth; vesica, when exerted, extending at about 100° to 120° angle to aedeagus, basal portion longitudinally striate, and with from approximately 10 to 25 long thin setae.

FEMALE GENITALIA: Sterigma with lamella antevaginalis represented by sclerotized posterior margin of ostium bursae, lamella postvaginalis a membranous median strip with transverse striations; ostium bursae large, triangular, posterior margin with shallow median curvature, dorsolateral margins very

finely rugose; ductus bursae asymmetrical, set at angle, anterior margin truncate, posterior margin with curved extension on right side; ductus seminalis arising from elongate sac at end of small ventral projection of corpus bursae near ductus bursae; corpus bursae membranous except for area adjacent to ductus bursae, posterior portion not noticeably narrower than anterior section, entire structure with shallow longitudinal striations, anterior end bluntly pointed, corpus bursae twice as long as apophyses posteriores; signum small, less than 0.1 mm. long, quadrate, flat. Papillae anales short; apophyses with median attachment; apophyses posteriores 1.2 to 1.6 mm. long, apophyses anteriores 0.5 mm. in length.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPE SPECIES: *Ceratomyx fessa* Rindge.

DISTRIBUTION: Central Chile.

FLIGHT PERIOD: October through January.

REMARKS: This genus includes *Ceratomyx fessa* Rindge, *C. crebra* Rindge, and *C. aculeata* Rindge (all 1975). These three names all form new combinations with the generic name.

When I first revised *Ceratomyx* (1975) I included these three species as part of its Group II. Upon analysis of the characters of all the species formerly included in that genus for this paper, it became apparent that I had a polyphyletic group. It became necessary to place the three species from Chile in their

own genus in order to have a presumably monophyletic group.

Aconcagua can be recognized by the characters given in the Diagnosis and in the Keys. It is one of the few genera in the Nacophorini in which both pectinate and non-pectinate antennae occur in the males; the others are *Azuayia* and *Salpis*, both members of group 2. In the present genus, one of the three included species has shortly dentate antennae, and is known from only the holotype male.

ETYMOLOGY: The generic name is that of a province in Chile; its gender is feminine.

GENUS *DENTINALIA* HEIMLICH

Figures 1, 97, 98, 108, 118

Dentinalia Heimlich, 1960, p. 268. Rindge, 1971, pp. 312–314, figs. 1, 5, 8; 1973b (in part), pp. 3–11, figs. 1, 2, 7, 8.

DIAGNOSIS: The included species are characterized by the upper surface of the forewings being grayish brown or dark brown, with an angulate t. a. line and a dentate t. p. line, the hind wings being either slightly paler than the forewings or orange with a complete black border, the sexes of equal wing expanse, the male antennae bipectinate with the pectinations extending to the apex, the male hind tibia without a hair pencil, and with tufts being present on the metathorax but absent on the abdomen. The male genitalia are recognized by the large, curved, terminally dentate costal swelling and by the greatly reduced processes of the anellus. In the female genitalia the ductus bursae is shorter than wide, the posterior end of the corpus bursae has sclerotized striations, and the signum is a rounded indentation.

ADULTS: Head with eyes of both sexes moderate in size, those of females as large as males; front flat, raised above front rim of eyes, covered with large group of scales; palpi of males with second segment 0.7 to 1.0 mm. long, third segment 0.4 to 0.5 mm. long, tightly scaled, decumbent, those of females slightly longer; antennae of 60 to 69 segments, bipectinate in males, simple in females; males with longest antennal pectinations about 0.7 mm. long, four to five times as long as basal segments, pectinations arising basally on segments, extending to apex of

shaft, each pectination slightly swollen apically and weakly curved distally, and having double row of slender setae below. Thorax moderately stout, patagia with apically broadly flattened scales overlying hairlike scales, with metathoracic tuft; fore tibia with epiphysis of males very long, arising between one-third and two-fifths length of segment and being from seven-tenths to three-fourths length of that structure; hind tibia of males without hair pencil. Abdomen moderately stout, extending to or beyond hind wings, without dorsal tufts, and without ventral row of setae on third segment of males.

Forewings broad, apex pointed, outer margin rounded, dentate between veins; without accessory cell; veins R_1 and R_2 both free, R_{3+4} stalked, R_5 from R_{3+4} ; mdc and ldc either angled or straight. Hind wings broad, outer margin rounded, weakly concave before anal angle, dentate between veins; Sc paralleling R for one-half length of cell; m and ldc angled.

Upper surface of forewings various shades of brown or grayish brown in both sexes, with median area only weakly differentiated, if at all, from adjacent areas; forewings with curved and angulate t. a. line, t. p. line moderately to strongly dentate, and with small pale discal spot usually present; hind wings either slightly paler than forewings, having dark discal spot and complete extradiscal line, or orange with complete black outer border. Under surface either more or less grayish brown, with t. p. and extradiscal lines and dark discal spots, or forewings orange with dull black borders, and hind wings partially orange, also with dull black borders.

Length of Forewings: Males, 19 to 20 mm., females, 18 to 21 mm.

MALE GENITALIA: Uncus 0.7 to 1.1 mm. long, base 0.4 to 0.6 mm. wide, triangular, elongate, tapering to slender point, entire structure tending to be curved ventrally; socius a weakly defined swelling on antero-median margins of ventral surface of uncus, having between five and 12 setae; gnathos heavily sclerotized, situated adjacent to uncus and about same size, V-shaped, distal portion solid with finely denticulate surface, apex bluntly pointed, slightly thickened ventrally; valves with sclerotized costa extending to end of valve with large median costal arm,

either broadly swollen and with recurved dentate apex or as slender arm with dentate apex, having large prominent patch of elongate setae medially at base of costal arm, valvula with large membranous area basally, sharply delimited distally by curved ridge extending to setal patch, and having distal surface thinly set with slender setae, sacculus sclerotized, swollen; processes of anellus reduced to rather weakly sclerotized, poorly defined areas posterolateral of anellus; anellus with posterior portion tapering to small single or double point, and with slender median membranous strip; tegumen elongate, slender, with short median fusion; saccus broad posteriorly; tapering anteriorly; aedeagus 1.3 to 1.9 mm. long, 0.4 mm. wide, apex sclerotized laterally, pointed; vesica, when exerted, extending at between slight angle and up to 60° angle to aedeagus, surface somewhat irregular, and armed with either two or three larger setae or one large and many smaller, more slender setae.

FEMALE GENITALIA: Sterigma with scarcely differentiated lamella antevaginalis, appearing as shallowly bilobed posterior margin of ductus bursae, lamella postvaginalis and ventral portion of segment eight heavily sclerotized, broadly indented medially for ostium bursae and ductus bursae, and with slender, raised, transverse lamelliform ridge extending width of segment, more heavily sclerotized medially; ductus bursae lightly sclerotized, lateral margins heavily sclerotized, short, slightly wider than long; ductus seminalis from elongate sac ventrolaterally on right side of corpus bursae near ductus bursae; corpus bursae asymmetrical, posterior portion bulbous, lightly sclerotized distally, becoming more slender medially, with longitudinal striations, anterior three-fourths of corpus gently rounded, elliptical, membranous, with finely ribbed surface, corpus bursae 1.6 times as long as apophyses posteriores; signum large, with round opening in wall of corpus, invaginated and extending anteriorly, 0.2 mm. long, shortly elliptical, flattened, rim and surface dentate. Papillae anales short, with rugose surface bearing many setae; apophyses with anteromedian attachment; apophyses posteriores 1.9 mm. long, apophyses anteriores 0.3 mm. in length.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPE SPECIES: *Dentinalia forsteri* Heimlich; by original designation.

DISTRIBUTION: Central Chile and adjacent Argentina.

FLIGHT PERIOD: October through March.

REMARKS: I am restricting this genus to include *D. forsteri* Heimlich, *diversa* Rindge, and *latifascia* Rindge (see Rindge, 1971, 1973b).

Dentinalia is the only genus in group 4 that has the large curved, terminally dentate costal swelling on each valve.

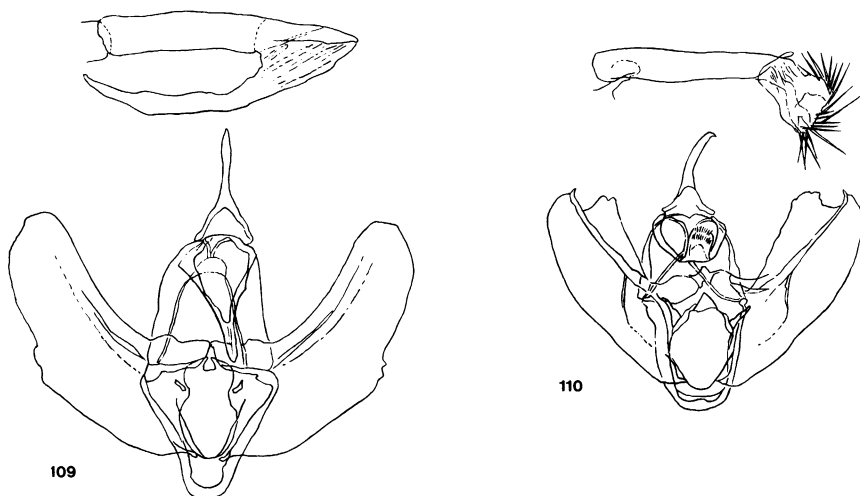
In my 1971 paper only the type species of the genus was included. Later (1973b) I described five new species and transferred a sixth from *Salpis*, placing them all in *Dentinalia*. This necessitated a new generic description to encompass the additional species; a discussion was given at that time about the diversity of the included taxa. My current analysis shows that I formed a polyphyletic group when I enlarged the genus, and that three new genera are needed to have presumably monophyletic groups. The apomorphic characters that distinguish these genera are given in the tables, and in the Remarks for the different groups.

ARAUCO, NEW GENUS

Figures 1, 103, 109, 119

Dentinalia, Rindge, 1973b (in part), pp. 3–5, 13, 14, figs. 4, 10, 14.

DIAGNOSIS: Moths of this genus are characterized by their pointed and elongate forewings, the upper surface of which is yellowish ochre with the maculation greatly reduced or absent, the white hind wings, both sexes of equal wing length, the patagia with hairlike scales only, the males with bipectinate antennae, the male hind tibia without a hair pencil, and with tufts being absent on both the metathorax and abdomen. In the male genitalia the gnathos is very long and slender, the outer margin of the valve has a short point medially, the processes of the anellus are greatly reduced, and the vesica is without spines. The female genitalia have a short, tapered ductus bursae and an elongate corpus bursae with a large, flat, elliptical signum.



FIGS. 109, 110. Male genitalia. 109. *Arauco schajovskoyi* (Rindge), paratype, Tromen, Argentina, November 28, 1967 (Schajovskoy; AMNH). 110. *Omaguacua truncata* (Rindge), holotype, Cerro Malo, Argentina, December 21, 1957 (S. Schajovskoy; AMNH).

ADULTS: Head with eyes of both sexes large, those of females smaller than males; front flat, raised above front rim of eyes, covered with large group of scales; palpi elongate, of males with second segment 1.4 mm. long, third segment 1.0 mm. long, tightly scaled, decumbent, those of females about same size or slightly smaller; antennae of 68 to 70 segments, bipectinate in males, simple in females; males with longest antennal pectinations 0.7 mm. long, arising basally on segments, and extending to end of antennae, each pectination slightly enlarged distally and having double row of slender setae below. Thorax relatively stout, patagia with hairlike scales only, without metathoracic tuft; fore tibia with epiphysis of males arising at two-fifths length of segment and being one and one-fourth its length, of females arising at one-half length of segment and three-fifths its length; hind tibia of males without hair pencil. Abdomen relatively stout, without dorsal tufts, and without ventral row of setae on third segment of male.

Forewings elongate, apex produced, outer margin oblique and dentate between veins; without accessory cell; vein R_1 free, R_{2+3} stalked, R_3 and R_4 separate, R_5 from R_4 ; mdc and ldc biconvex. Hind wings elongate,

somewhat triangular in outline, outer margin weakly rounded, scarcely dentate between veins; Sc paralleling R for one-half length of cell; m and ldc angled.

Upper surface of forewings almost unicolorous yellowish ochre with maculation greatly reduced or absent; females colored as in males; hind wings white, with grayish discal dot and extradiscal line more or less complete. Under surface of forewings paler than above, with t. p. line present, of hind wings with more yellow scaling and with maculation similar but stronger than above.

Length of Forewings: Males, 20 mm.; females, 17 to 20 mm.

MALE GENITALIA: Uncus 1.0 to 1.2 mm. long, base 0.6 mm. wide, basal portion triangular, terminal one-half slender, slightly tapering, apex with small recurved point; socius long and slender, low, with about 10 to 12 very long setae; gnathos V-shaped, longer than uncus, apically attenuate and very slender, apex bluntly pointed; valves with broad, lightly sclerotized costa, valvula with slender setae becoming less numerous distally, sacculus swollen, with small tooth just distad of middle on outer edge of valve; processes of anellus small, sclerotized, curving posterodorsally to meet manica anterior of transtilla;

anellus very large, almost as long as uncus, ellipsoid, with mediolateral constriction and bifurcate posterior end; tegumen elongate, slender, with short median fusion; saccus shorter than tegumen, slightly wider than latter posteriorly, constricted medially, weakly bulbous anteriorly; aedeagus 2.7 to 2.9 mm. long, 0.5 mm. wide, straight, posterior end lightly sclerotized, apex tapering to blunt point; vesica unarmed, when exerted sharply recurved anteriorly, paralleling aedeagus, basal portion with faint longitudinal striations, terminally evenly tapering.

FEMALE GENITALIA: Sterigma with lamella antevaginalis a slender, transverse, weakly sclerotized strip, lamella postvaginalis membranous, with transversely striate median area; ductus bursae sclerotized, lateral areas prominent, tapering, longer than wide, anterior end about one-half width of posterior portion; ductus seminalis from elongate sac ventrolaterally on right side of corpus bursae near ductus bursae; corpus bursae elongate, membranous, posterior one-third narrowed, with shallow longitudinal striations, anterior two-thirds of corpus gently rounded, elliptical, with concentric ridges around signum, anterior end rounded, corpus bursae 2.5 times as long as apophyses posteriores; signum large, 0.3 to 0.5 mm. long, round or elliptical on surface of corpus, with short anterior rim, margin partly or entirely dentate, median area variably ridged. Papillae anales short; apophyses with anteromedian attachment; apophyses posteriores 1.9 mm. long, apophyses anteriores 0.5 mm. in length.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPE SPECIES: *Dentinalia schajovskoyi* Rindge.

DISTRIBUTION: Central Chile and adjacent Argentina.

FLIGHT PERIOD: October, November, and December.

REMARKS: Only *D. schajovskoyi* is placed in this genus. This forms a new combination with the generic name.

Arauco is the only genus with species formerly included in *Dentinalia* that has veins R_3 and R_4 separate, the sacculus with a tooth-like projection, and the vesica without spines. Additional characters are listed in the tables, Keys, and the Diagnosis for this genus.

ETYMOLOGY: The generic name is that of a province in Chile; its gender is masculine.

OMAGUACUA, NEW GENUS

Figures 1, 99, 110, 120

Dentinalia, Rindge, 1973b (in part), pp. 3, 4, 11-13, figs. 3, 9, 13.

DIAGNOSIS: Moths of this genus are recognized by the upper surface of the forewings being an almost unicolorous brown with very faint maculation, the hind wings slightly paler, the sexes of equal wing length, the patagia with hairlike scales only, the antennae of both sexes being simple, the male hind tibia without a hair pencil, and with tufts being absent on both the metathorax and abdomen. The male genitalia are characterized by the costa being extremely broad but not reaching the spined apex of the valve, and by the reduced, slender, posterolaterally extending processes from the anellus. The female genitalia have a large ostium bursae, the ductus bursae is shorter than wide, the corpus bursae is globose and has a small signum in the dorsal wall.

ADULTS: Head with eyes of both sexes moderate in size, those of females as large as males; front flat, raised above front rim of eyes, covered with large group of scales; palpi of males with second segment 0.9 mm. long, third segment 0.8 mm. long, tightly scaled, decumbent, those of females slightly longer; antennae of approximately 60 segments, simple in both sexes. Thorax moderately stout, patagia with hairlike scales only, without metathoracic tuft; hind tibia of males without hair pencil. Abdomen moderately stout, without dorsal tufts, and without ventral row of setae on third segment of males.

Forewings triangular, with attenuate and pointed apex, outer margin rounded and weakly dentate between veins; with one accessory cell; vein R_1 free, R_2 from end of cell, stalked for short distance with R_{3+4} , R_5 from bottom of cell; mdc and ldc angled. Hind wings broad, outer margin rounded, weakly dentate between some veins; Sc paralleling R for slightly more than one-half length of cell; m and ldc angled.

Upper surface of forewings almost unicolorous brown with very faint maculation; female slightly darker than male; hind wings

grayer, slightly paler than forewings, with indistinct dark discal spot. Under surface similar to upper, paler, with more prominent discal spot on hind wings.

Length of Forewings: Males, 15 mm.; females, 16 mm. (incorrectly given as 14 and 15 mm., respectively, in the original description of *truncata*).

MALE GENITALIA: Uncus 0.9 mm. long, base 0.6 mm. wide, slender, laterally flattened, curving ventrally and ending in single point; socius padlike, not prominent; gnathos V-shaped, with broad, truncate, recurved, spinulose apex; valves with large, lightly sclerotized, triangular costa, apex irregularly rounded, maximum width equal to width of valve opposite it, abruptly narrowed from widest point, with narrow costa continuing to sharp point at end of valve, valvula with membranous base, outer portion with numerous elongate slender setae, sacculus lightly sclerotized; processes of anellus reduced to small, straight arms directed posterolaterally from distal portion of anellus; anellus very large, slightly longer than uncus, elliptical, posteriorly slightly tapered and more heavily sclerotized; tegumen elongate, with narrow median fusion; saccus longer than tegumen, broad, evenly rounded anteriorly; aedeagus 2.2 mm. long, 0.35 mm. wide, posteriorly lightly sclerotized, tapering to blunt point; vesica, when exerted, extending at about 45° angle to aedeagus, basal portion longitudinally striate, and with about 40 or 45 setae, varying from very thin and relatively short to thick and long.

FEMALE GENITALIA: Sterigma with single sclerotized lamella on each side of ostium bursae, large, concave, tapering laterally; ostium bursae large, sclerotized, rounded, posterior and lateral margins slender, heavily sclerotized; ductus bursae asymmetrical, short, right lateral portion straighter and longer than left side; ductus seminalis arising from sac posteriorly on right side of corpus bursae; corpus bursae globular, membranous, posterior end finely reticulate, with ductus bursae having dorsal attachment, corpus bursae three times as long as apophyses posteriores; signum small, inconspicuous, in dorsal wall of corpus, with short anterior invagination. Papillae anales moderately long,

slender, about twice as long as high; apophyses with anterior attachment; apophyses posteriores 1.3 mm. long, apophyses anteriores 0.3 mm. in length.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPE SPECIES: *Dentinalia truncata* Rindge.

DISTRIBUTION: Known only from the mountains of Neuquén Province, Argentina.

FLIGHT PERIOD: December and February.

REMARKS: Only *D. truncata* is placed in this genus. This forms a new combination with the generic name.

Omaguacua is another genus that has a species that was formerly placed in *Dentinalia*. The present genus shares with *Poya* simple male antennae, but differs from the latter in having a spinulose apex to the gnathos, and by having a signum. *Omaguacua* and *Arauco* both lack metathoracic tufts; the present genus has a discal cell in the forewing, veins R_3 and R_4 are stalked, the sacculus does not have the toothlike projection, and the vesica has spines, and all of these characters separate it from *Arauco*.

ETYMOLOGY: The generic name is that of an Indian tribe of Argentina; its gender is feminine.

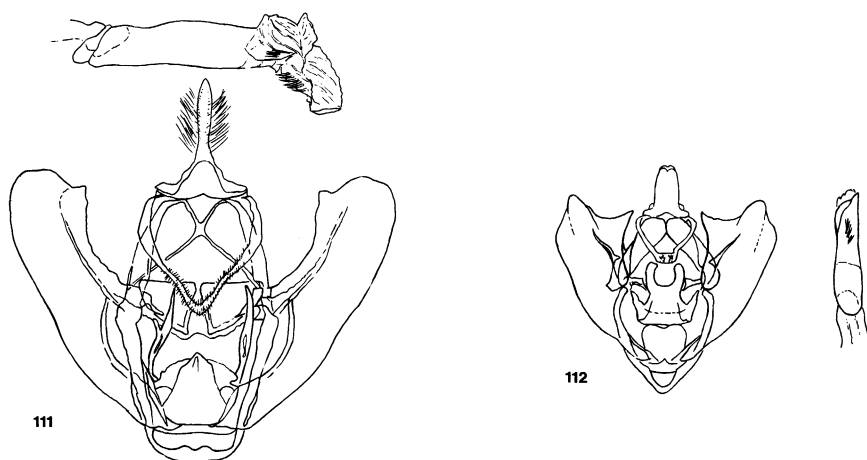
GENUS *MALLECO* RINDGE

Figures 1, 101, 111, 121

Malleco Rindge, 1971, pp. 314–316, figs. 2, 6, 9. *Brillosa* Heimlich, 1973, p. 179, pl. 6, figs. 1, 2, 1 text fig. Fletcher, 1979, p. 30 (placed as synonym of *Malleco*).

DIAGNOSIS: Moths of this genus are recognized by the unicolorous grayish brown or brown upper surface of all wings, with slender irregular cross lines, the females being slightly larger than the males, the antennae of both sexes simple, and with both metathoracic and abdominal tufts. In the male genitalia the uncus has numerous long setae dorsally, the anterior half of the gnathos has projections, and the distal end of the costa forms an angular projection. The female genitalia have a very short ductus bursae, the corpus bursae is five times longer than the apophyses posteriores and lacks a signum.

ADULTS: Head with eyes of both sexes large, of equal size; front flat, barely raised above



FIGS. 111, 112. Male genitalia. 111. *Malleco versicolor* Rindge, holotype, Caramavida, Chile, January 30–31, 1967 (L. E. Peña; AMNH). 112. *Huapianus obater*, new species, paratype, Puerto Blest, Argentina, November 14, 1978 (Mis. Cient. Danesa; AMNH).

front rim of eyes, and covered with crest of scales; palpi elongate, males with second segment 1.2 mm. long, third segment 1.0 mm., tightly scaled, decumbent, of females about same size; antennae of about 66 to 68 segments, simple in both sexes. Thorax slender, patagia with flattened scales overlying hair-like scales, with paired metathoracic tuft; foretibia with epiphysis of males arising at three-fifths length of segment and being two-fifths length thereof; hind tibia of males with hair pencil. Abdomen moderately stout, extending just beyond end of wings, with dorsal tufts, and without ventral row of setae on third segment of males.

Forewings broad, apex pointed, outer margin well rounded, concave between veins; with one accessory cell; veins R_1 and R_2 both free, R_{3+4} stalked from end of cell, R_5 from cell; mdc and ldc biconvex. Hind wings broad, outer margin strongly dentate; Sc paralleling R from one-half to two-thirds length of cell; m and ldc curved.

Upper surface of all wings unicolorous grayish brown or brown, forewings with dark, slender, irregular t. a. and t. p. lines, median area slightly suffused with pale gray scaling; hind wings with slender, complete extradiscal line; sexes alike in color and maculation. Under surface of forewings gray, with faint t. p.

line, of hind wings pale gray, with discal spot and prominent extradiscal line.

Length of Forewings: Males, 21 to 22 mm.; females, 23 to 24 mm.

MALE GENITALIA: Uncus 1.2 to 1.3 mm. long, base 0.9 to 1.0 mm. wide, curved ventrally, dorsal surface with numerous elongate setae, sides of uncus parallel, terminally tapering to sharp point; socius shortly digitate, having 30 to 36 long setae; gnathos large, as long as uncus, with posterior portion rounded, with broad lateral arms, medially arms narrowing and densely covered with short thick spinose processes, united medially in broad V-configuration; valves with costa broadly sclerotized, swollen distally, not attaining rounded apex of valve, valvula with semicircular membranous base set off by low sclerotized ridge, distal portion with numerous setae, sacculus lightly sclerotized, swollen; processes of anellus arising from wide base, sharply narrowed and curved distally, terminating in sharp point; anellus with broad recessed anterior portion having vertical lateral walls, and with large triangular median extension; cristae prominent, one group on lateral walls, another from sides of triangular extension of anellus; tegumen with short median fusion; saccus longer and wider posteriorly than tegumen, sides tapered, anterior

margin truncate or bluntly pointed; aedeagus 2.3 to 2.5 mm. long, 0.35 to 0.45 mm. wide, posteriorly lightly sclerotized and pointed; vesica, when exerted, extending at about 30° angle to aedeagus, basal portion longitudinally striate, with small transverse swelling on dorsal surface opposite apex of aedeagus, tapering apically, and having row of six to eight short thick spines medially.

FEMALE GENITALIA: Sterigma with sclerotized lamella antevaginalis very long, slender, lamella postvaginalis sclerotized, broad, slightly concave medially, posteromedially with several irregular transverse striations; ductus bursae short, curved, longer than wide; ductus seminalis arising from large sac, about as long as ductus bursae, at posteroventral end of corpus bursae; corpus bursae elongate, posterior one-half with shallow longitudinal striations, anterior portion of corpus slightly swollen, ovate, corpus bursae 5.2 times as long as apophyses posteriores; signum absent. Papillae anales with finely rugose surface and elongate setae, anterior margin broad, smoothly sclerotized; apophyses with antero-medial attachment; apophyses posteriores 1.4 mm. long, apophyses anteriores 0.3 mm. in length.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPE SPECIES: *Malleco versicolor* Rindge; by original designation.

DISTRIBUTION: Central Chile.

FLIGHT PERIOD: December, January, and February.

REMARKS: Only one species has been placed in this genus (Rindge, 1971). In 1973 Heimlich described *Brillosa epulauquena* as a new genus and new species. Fletcher (1979) has placed *Brillosa* as a synonym of *Malleco* and *epulauquena* Heimlich as a synonym of *versicolor* Rindge.

Malleco has the anterior portion of the gnathos thickly spinose; this is an autapomorphic character for the tribe. While Heimlich apparently did not dissect the genitalia of the holotype of *epulauquena*, he did examine the venation. His text figure shows the forewing without an accessory cell; in the several specimens of *versicolor* in which I studied the venation, one such cell was present. This difference does not surprise me, as the venation

is normally variable within a species; it is quite possible to have an accessory cell in one forewing but be without it in the opposite wing, or to have one specimen in a series that lacks the cell.

HUAPIANUS, NEW GENUS

Figures 1, 102, 112, 122

DIAGNOSIS: Moths of this genus have the upper surface of the forewings black with some paler scaling and with a very prominent white median band, the hind wings are grayish white with a grayish black discal spot and extradiscal line, the antennae of the males are pectinate and of the females very shortly pectinate, the male hind tibia are without a hair pencil, and tufts are present on the metathorax but absent on the abdomen. The male genitalia are recognized by the short broad uncus, the large triangular extension from the costa of each valve, and by the thick Y-shaped processes of the anellus. In the female genitalia the ductus bursae is heavily sclerotized and longer than wide, and the signum is absent.

ADULTS: Head with eyes of both sexes moderate in size, those of females as large as males; front flat, not raised above front rim of eyes; palpi of males with second segment 0.8 mm. long, third segment 0.6 mm. long, tightly scaled, decumbent, those of females of same size; antennae of from 55 to 62 segments, bipectinate in both sexes, females very short; males with longest antennal pectinations about 0.5 mm. long, about three times as long as their basal segments, pectinations arising basally on segments, with terminal four or five segments simple, each pectination slightly swollen apically and weakly curved distally, and having double row of slender setae below; females with longest pectinations barely extending beyond their basal segment. Thorax moderately stout, patagia with apically flattened scales mixed with hairlike scales, with metathoracic tuft; fore tibia with epiphysis of males arising at middle of segment and being one-half length of that structure, of females arising at two-thirds length of segment and being two-fifths length of tibia; hind tibia of males without hair pencil. Abdomen moderately stout, extending as

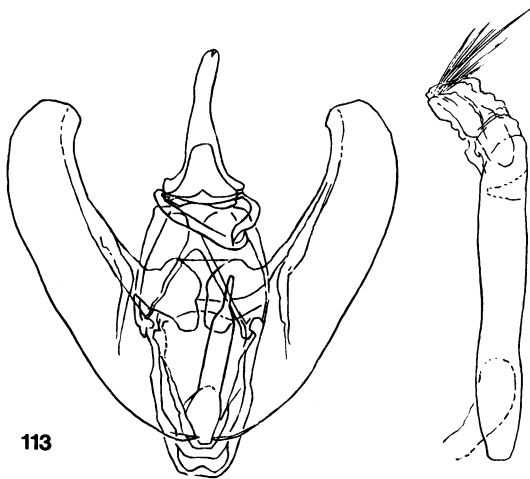
far as anal angle of hind wings, without dorsal tufts, and without ventral row of setae on third segment of males.

Forewings broad, apex bluntly pointed, outer margin rounded, very weakly concave between veins; without accessory cell; veins R_1 and R_2 both free, R_{3+4} stalked, R_5 from R_{3+4} ; mdc and ldc curved. Hind wings broad, outer margin rounded, very weakly concave between veins; Sc paralleling R for one-half length of cell; m and ldc angled.

Upper surface of wings black with some paler scaling in both sexes, with very prominent median white band containing discal spot, with distal portion of wing slightly paler than basal section; forewings with white median area delimited by cross lines, latter with some yellow scaling, and with s. t. line white, slender, interrupted medially by brown scaling on veins; hind wings grayish, with dull grayish black discal spot and extradiscal line. Under surface of forewings dull dark gray, with faint yellowish cast, with maculation of upper surface repeated but without white median area; hind wings similar to upper surface.

Length of Forewings: Males, 18 to 21 mm.; females, 21 mm.

MALE GENITALIA: Uncus 0.5 mm. long, base 0.6 mm. wide, appearing as inverted "T," sides parallel, apex curved ventrally, terminating in single broad point; socius membranous, weakly defined, with approximately 12 setae; gnathos V-shaped, as long as uncus, with apex slightly attenuate, bluntly pointed, posteroventral surface finely spiculate; valves with each costa sclerotized, extending to end of valve, posterior edge sharply triangular, with apex of triangle extending as far as base of uncus, valvula with curved, lightly sclerotized strip extending as far as base of valve to costa, terminating at peak of more heavily sclerotized ridge, latter gradually decreasing in height distally, sharply so basally; posterior end of valve rounded, lightly sclerotized as extension of costa, rounded, having group of inwardly pointing thick setae; sacculus lightly sclerotized basally, extending distally and rather abruptly narrowed before apex of valve; processes of anellus heavily sclerotized, their bases broadly fused, posterodistally extended as curved, tapering process on each side, pos-



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FIG. 113. Male genitalia of *Poya unica* (Rindge), Las Trancas, Chile, January 11, 1971 (L. E. Peña; AMNH).

teroventrally extending as two thick, widely separated, weakly curved arms; anellus ovoid, with median longitudinal depression increasing in width posteriorly; cristae absent; tegumen wider than long, with elongate median fusion; saccus subtriangular; aedeagus 1.3 to 1.4 mm. long, 0.2 mm. wide, apex sclerotized, pointed; vesica armed with from five to seven short slender setae.

FEMALE GENITALIA: Sterigma with tapering sclerotized area on each side of posterior end of ductus bursae, and with rounded, minutely spiculate sclerotized area posteriad of ductus; ductus bursae heavily sclerotized, longer than wide, sides parallel, posterior margin weakly concave, anteriorly narrowly membranous; ductus seminalis arising on right side at junction of ductus bursae and corpus bursae; corpus bursae with slender posterior end, narrowly sclerotized distally, with longitudinal striations, anterior portion globose, membranous, much wider than posterior end, corpus bursae slightly shorter than apophyses posteriores; signum absent. Papillae anales with finely globular surface; apophyses with anterior attachment; apophyses posteriores bent medially, 2.8 mm. long, apophyses anteriores 1.1 mm. in length.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPE SPECIES: *Huapianus obater*, new species.

DISTRIBUTION: Argentina and adjacent Chile.

FLIGHT PERIOD: November.

REMARKS: This genus contains only the type species.

The shape of the processes of the anellus is unique in this tribe; with their fused bases, they are reminiscent of the shape of the uncus of a number of North American species of *Hydriomena* (Larentiinae). A second autopomorphic character is the short broad uncus, with the base being wider than the length of the structure.

The moths look basically similar to *Mal-leco versicolor* Rindge, but are distinguished by the white band of the forewings, the male genitalic characters given above, and by the female genitalia of the present genus having the sclerotized ductus bursae and the much shorter and differently shaped corpus bursae.

ETYMOLOGY: The generic name is formed from the Indian Huapí, plus the Latin suffix *-anus*; its gender is masculine.

***Huapianus obater*, new species**

Figures 102, 112, 122

DIAGNOSIS: See generic Diagnosis.

ADULTS: Head with vertex and front having mixture of brownish gray and brown scales, front tending to have dark brown scaling laterally; palpi with mixture of brownish gray, brown and blackish brown scales, apex of third segment grayish white. Thorax above with collar dark grayish brown, becoming blackish brown distally, upper surface of thorax covered by large, broad patagia, being a mixture of white, gray, brown and reddish brown scales, metathoracic tuft small, partially white; below pale brownish gray; legs grayish brown to blackish brown, having white bands on tibia and tarsus. Abdomen above grayish white, with some grayish brown scaling on second segment; below similar but with brown scaling.

Upper Surface of Wings: Forewings black, with grayish brown scaling, median area pure white; t. a. line arising on costa at one-third its length, black, bordered basally by white, becoming yellow in cell and above inner mar-

gin, biconvex; white median area containing black discal dash, and with variable amount of grayish black scaling; t. p. line arising on costa three-fifths its length, black and yellow, outwardly curved in cell, concave in lower portion of wing; subterminal area concolorous with basal area; s. t. line white, partially represented, convex opposite cell, interrupted by brown-scaled veins extending to outer margin; terminal area slightly paler than subterminal area; terminal line indistinct; fringe concolorous with wing, interrupted by brown scaling opposite veins. Hind wings dull white with variable number of gray scales, latter becoming more numerous distally; discal spot dull grayish black; extradiscal line dull grayish black, complete or represented by venular spots; veins faintly brown in outer portion of wing; terminal line absent; fringe concolorous with wings.

Under Surface of Wings: Forewings dull dark gray, with variable amount of brown or yellowish brown scaling, especially on ends of veins; maculation of upper surface repeated, but without white median area; hind wings similar to their upper surface but with more dark scaling.

Length of Forewings: Holotype, 19 mm.; allotype, 21 mm.; paratypes, 18 to 21 mm.

MALE GENITALIA: See generic description.

FEMALE GENITALIA: See generic description.

TYPES: Holotype, male, Puerto Blest, 770 m., Lago Nahuel Huapí, Río Negro, Argentina, November 12, 1978 (Misión Científica Danesa); allotype, female, same data but November 14, 1978. Paratypes: 42 males, one female, same data as holotype, with dates of November 7, 9, 12, 14, and 24, 1978.

The holotype and allotype are in the Zoological Museum, University of Copenhagen, Denmark; paratypes are in that collection and in the American Museum of Natural History.

DISTRIBUTION: Río Negro, Argentina and Anticura, 350 m., Parque Nacional Puyehue, Osorno, Chile (Nielsen, in letter). The Chilean locality is only a hundred air kilometers from the type locality. The types were collected at the Misión Científica Danesa station 8; see Madsen, Nielsen and Ødum (1980) for information about the locality.

FLIGHT PERIOD: November.

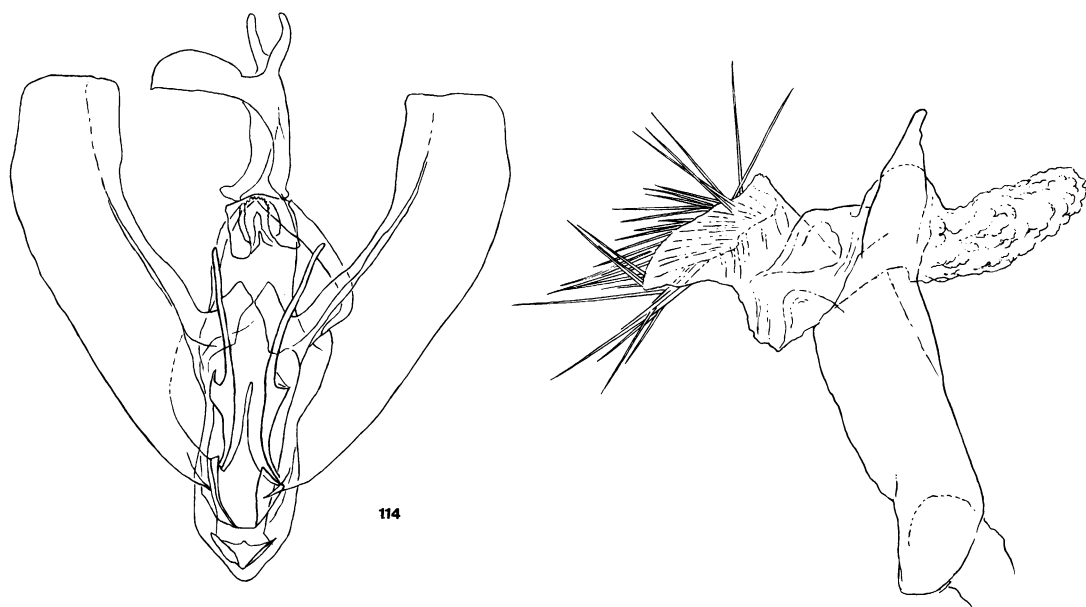


FIG. 114. Male genitalia of *Catocalopsis medinae* (Bartlett-Calvert), Pucara, Argentina, February 25, 1953 (S. Schajovskoy; AMNH).

REMARKS: Four specimens (three males, one female), three genitalic slides (two males, one female), and one male and one female slide mounts of antennae and legs have been studied.

Variation within this species is moderate, and is mainly expressed in the amount of greenish suffusion in the white median area.

ETYMOLOGY: The specific name is from the Latin *obater*, blackish, in reference to color of the forewings above.

POYA, NEW GENUS

Figures 1, 100, 113, 123

Dentalia, Rindge, 1973b (in part), pp. 3–5, 15–18, figs. 5, 6, 11, 12, 15.

DIAGNOSIS: The included species are distinguished by their relatively small size (length of forewings 14 to 17 mm.), by the upper surface of the forewings being dark brown and having two slender angulate or rounded cross lines, the hind wings being paler with an extradiscal line, the sexes of equal size, the patagia with hairlike scales only, the antennae simple in both sexes, the male hind tibia with

a hair pencil, and with scale tufts being present on the metathorax but absent on the abdomen. The male genitalia are characterized by the very long, slender, and sclerotized gnathos, the greatly reduced lateral processes of the anellus, and by the anellus being long and narrow and having a slender rounded apical extension. In the female genitalia there is a large sclerotized ostium bursae, a tapering ductus bursae, and an elongate curved corpus bursae without a signum.

ADULTS: Head with eyes of both sexes moderate in size, those of females smaller than males; front flat, slightly raised above front rim of eyes, and covered with large group of scales; palpi of males with second segment 0.8 to 1.3 mm. long, third segment 0.8 to 0.9 mm. long, tightly scaled, decumbent, those of females equal in size or slightly larger; antennae of about 63 to 65 segments, simple in both sexes. Thorax moderately stout, patagia with hairlike scales only, with metathoracic tuft; fore tibia with epiphysis of both sexes arising at middle of segment and being one-half length of tibia; hind tibia of males with hair pencil. Abdomen moderately stout, ex-

tending beyond hind wings, without dorsal tufts, and without ventral row of setae on third segment of males.

Forewings broad, apex pointed, outer margin convex, weakly dentate between veins; with one accessory cell; vein R_1 free, R_2 and R_{3+4} from end of cell, R_5 from bottom of cell; mdc and ldc biconvex. Hind wings broad, outer margin rounded, concave between veins; Sc paralleling R for one-half to three-fifths length of cell; m and ldc angled.

Upper surface of forewings various shades of brown in both sexes, median area tending to be darker than adjacent areas, with dentate t. a. line and curved or angulate t. p. line; hind wings paler than forewings, having faint discal spot and extradiscal line. Under surface grayish brown, with partial maculation and larger discal dot on each hind wing.

Length of Forewings: Males, 14 to 16 mm.; females, 15 to 17 mm.

MALE GENITALIA: Uncus 0.9 to 1.2 mm. long, base 0.4 to 0.7 mm. wide, curved ventrally, without dorsal setae, elongate, sides very slightly tapering, apex with single sharp point; socius a small inconspicuous structure with about six setae; gnathos approximately same length as uncus, attenuate, with elongate median section terminating in small recurved or swollen apex; valves with slender sclerotized costa, straight except for gently swollen apical portion, valvula with narrow membranous basal area set off by low sclerotized ridge, distally with numerous short, thin setae, sacculus lightly sclerotized and swollen; processes of anellus reduced to rather poorly defined lightly sclerotized strips on either side of manica; anellus in form of long (0.9 to 1.3 mm.) slender projection, apical one-fourth narrowed, slightly curved distally and terminating in point; tegumen with thickened margins slightly separated medially by slender sclerotized strip; saccus at least as long as tegumen, lateral margins slightly tapered, anterior end truncate; aedeagus 1.9 to 2.6 mm. long, 0.3 to 0.4 mm. wide, apically lightly sclerotized and with bluntly pointed apex; vesica, when exerted, apparently extending at about 30° angle to aedeagus, basally with very short area of longitudinal striations, having small dorsal swelling opposite end of aedeagus, remainder of vesica

with circular striations, and with from about 12 to 18 long slender setae, varying in length from 0.5 to 0.7 mm.

FEMALE GENITALIA: Sterigma with lamella antevaginalis being the sclerotized ventral surface of large ostium bursae, with minutely spiculate surface, bluntly pointed anteriorly, lateral margins oblique, posteriorly curved, with shallow median bend, lamella postvaginalis sclerotized, triangular; ductus bursae as long as ostium bursae, outer portion membranous, variably ribbed, swollen, slightly longer than wide, narrowed anteriorly, inner portion smoothly sclerotized, tapered anteriorly; ductus seminalis from sac at posterior end of corpus bursae to right of ductus bursae; corpus bursae asymmetrical, membranous or with small ventral sclerotized area ventrally near ductus bursae, posterior one-half curved dorsoventrally, with longitudinal striations, anterior portion of corpus swollen, ovate, posterior end bluntly pointed, corpus bursae 2.0 to 2.5 times as long as apophyses posteriores; signum absent. Papillae anales moderately long, with triangular setose area anteromedially; apophyses with anteromedian attachment; apophyses posteriores 1.7 to 2.2 mm. long, apophyses anteriores 0.3 to 0.4 mm. in length.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

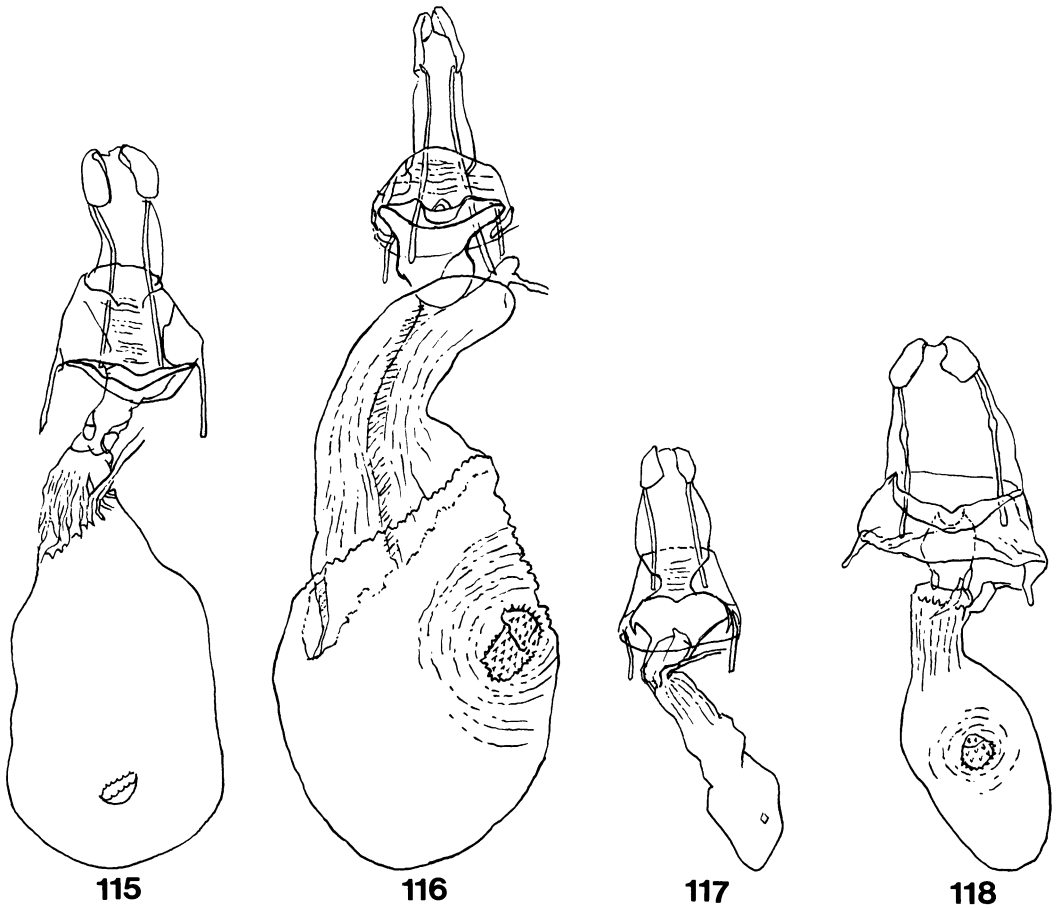
TYPE SPECIES: *Salpis unica* Rindge.

DISTRIBUTION: Central Chile and adjacent Argentina.

FLIGHT PERIOD: From mid-September into January.

REMARKS: Two species are included in this new genus, *S. unica* Rindge and *Dentinalia variata* Rindge (see Rindge, 1971, 1973b); both specific names form new combinations with this generic name. In my 1973b paper I transferred *unica* into *Dentinalia*, as males had become available since the original description; at that time I remarked about the distinctness of these species in the Nacophorini.

Poya is another genus erected to contain certain species formerly placed in *Dentinalia*. Of these four genera, *Poya* is unique in having the very long, slender, sclerotized gnathos, the very long and slender anellus, and by the absence of the signum.



FIGS. 115–118. Female genitalia. 115. *Praeantarcia indecisa* Heimlich, Las Trancas, Chile, February 7–12, 1966 (L. E. Peña; AMNH). 116. *Talca incurva* Rindge, paratype, Río Blanco, Chile, February, 1964 (L. E. Peña; AMNH). 117. *Aconcagua fessa* (Rindge), allotype, Guardia Vieja, Chile, December 3, 1958 (L. E. Peña; AMNH). 118. *Dentinalia forsteri* Heimlich, Icalma, Chile, January 2, 1968 (L. E. Peña; AMNH).

ETYMOLOGY: The generic name is that of an Indian tribe of Argentina; its gender is feminine.

GENUS *CATOCALOPSIS* RINDGE

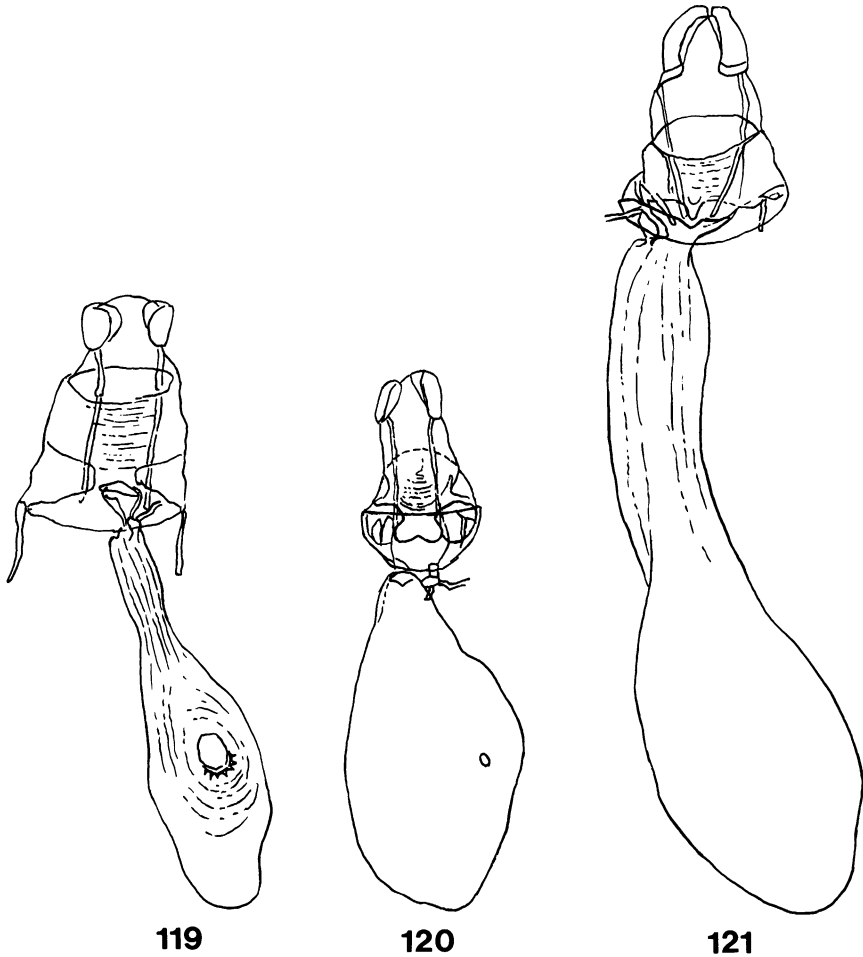
Figures 1, 104, 114, 124

Catocalopsis Rindge, 1971, pp. 386–388, figs. 107, 113, 114.

DIAGNOSIS: Moths of this genus are characterized by their large size, the grayish brown upper surface of the forewings and by the bright red or orange-red hindwings having a

complete black border, and the antennae being simple in both sexes. The male genitalia are distinguished by the trifid uncus and by the very long and slender processes of the anellus. The female genitalia have the ductus bursae almost twice as long as it is wide, and the very large corpus bursae is sclerotized posteriorly on the left side, and has a long invaginated signum.

ADULTS: Head with eyes large, elliptical, those of females as large as of males; front slightly swollen, raised above front rim of eyes, covered with hairlike scales, these more



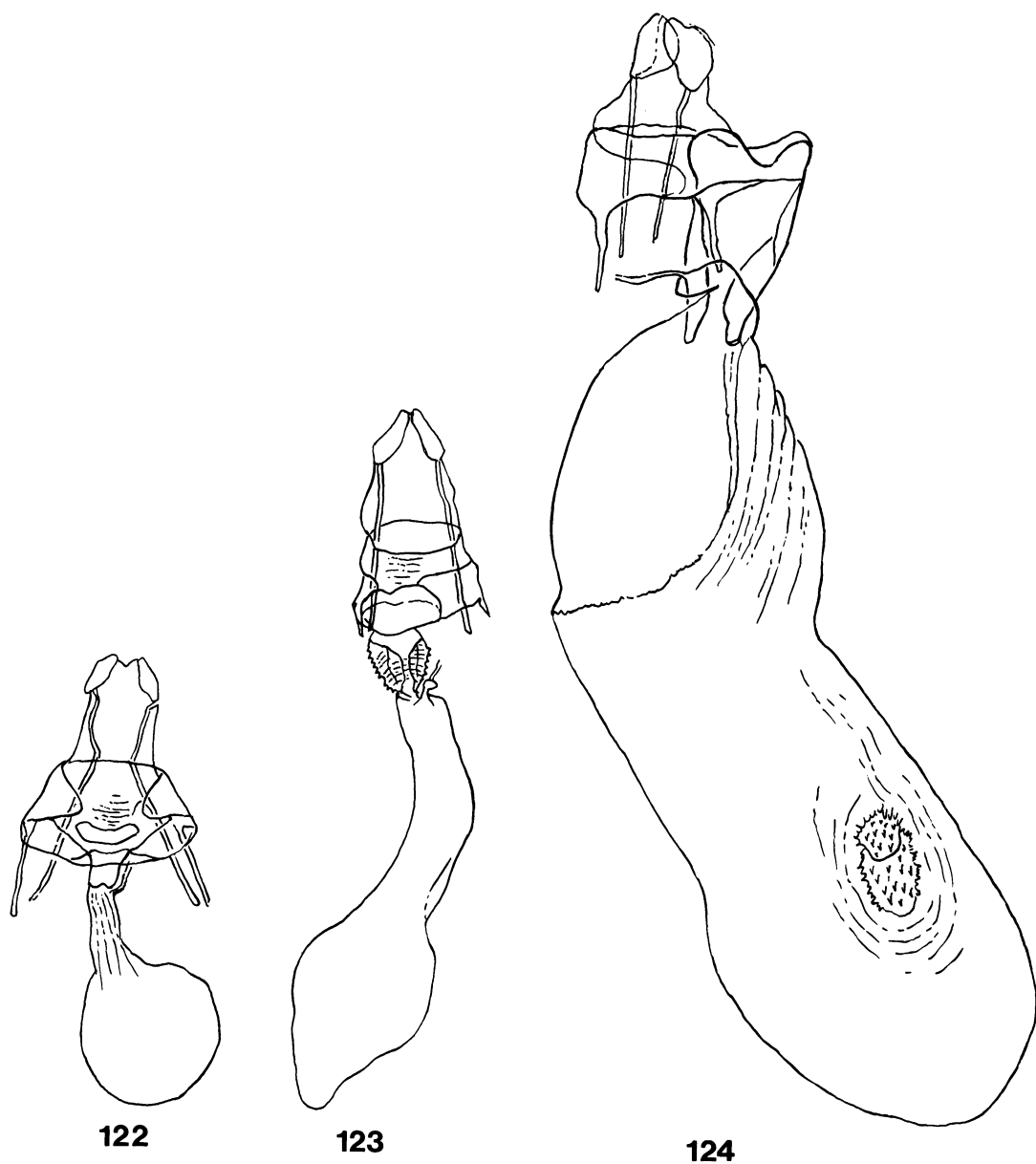
FIGS. 119–121. Female genitalia. 119. *Arauco schajovskoyi* (Rindge), allotype, Pucara, Argentina, December 30, 1960 (S. Schajovskoy; AMNH). 120. *Omaguacua truncata* (Rindge), allotype, Pucara, Argentina, February 3, 1968 (S. Schajovskoy; AMNH). 121. *Malleco versicolor* Rindge, Las Trancas, Chile, March 7–12, 1966 (L. E. Peña; AMNH).

elongate laterally than medially; palpi of males elongate, with both second and third segments 1.0 mm. long, last segment tightly scaled, decumbent, those of females slightly shorter; antennae of from 63 to 74 segments, simple in both sexes. Thorax moderately stout, patagia with a few flattened scales mixed in with more numerous hairlike scales, with prominent bifurcate metathoracic tuft; fore tibia of both sexes with epiphysis arising medially, that of males being one-half length of segment, of females two-fifths length; hind tibia of males with hair pencil. Abdomen

moderately stout, reaching anal angle of hind wings in males, shorter in females, with prominent dorsal tufts, and without ventral row of setae on third segment of males.

Forewings triangular, apex weakly attenuate, outer margin slightly curved and weakly concave between veins; without accessory cell; veins R_1 and R_2 free, R_{3+4} stalked, R_5 from R_{3+4} ; mdc and ldc almost straight. Hind wings broad, outer margin strongly dentate in lower portion of wing; Sc paralleling R for one-third length of cell; m and ldc curved.

Upper surface of forewings variably gray-



FIGS. 122–124. Female genitalia. 122. *Huapianus obater*, new species, paratype, Puerto Blest, Argentina, November 12, 1978 (Mis. Cient. Danesa; AMNH). 123. *Poya unica* (Rindge), holotype, Icalma, Chile, January 2, 1968 (L. E. Peña; AMNH). 124. *Catocalopsis medinae* (Bartlett-Calvert), El Bolcon, Argentina, March 1, 1961 (A. Kovacs; AMNH).

ish brown or brown, maculation variable, with or without cross lines, when present t. a. line outwardly oblique, dentate in lower portion of wing, median area slightly darkened, when present t. p. line outwardly oblique and

sharply dentate, s. t. line represented by white dash from costa; hind wings bright red or orange-red, with trace of extradiscal line, and with broad complete black border; sexes alike in color and maculation. Under surface of

forewings dull black with elongate reddish triangular area basally, with yellow or orange-yellow, slightly curved outer band, and with white costal patch near apex; hind wings similar to upper surface except outer marginal area bisected by irregular white band.

Length of Forewings: Males, 25 to 29 mm.; females, 28 to 30 mm.

MALE GENITALIA: Uncus complex, very large, with long, prominent, ventral beaklike projection arising medially, 1.2 mm. long, laterally flattened, covered with elongate slender setae, terminating in single point, with posterior portion of uncus broadly bifurcate, each slender process 0.6 to 0.7 mm. long, finely setose, apically rounded; socius digitate, about 0.5 mm. long, with between 40 and 50 long slender setae; gnathos V-shaped, with broad lateral arms, united medially to form broad, flat, rounded process, its edges shortly spinulate; valves elongate, costa sclerotized, slightly S-shaped, apical portion angulate, almost reaching apex of valve, valvula with slender basal membranous area, median and apical regions thickly covered with numerous setae of varying lengths, sacculus lightly sclerotized; processes of anellus arising from triangular bases, slender, elongate, curving posteriorly, terminating in fine point; anellus with anterior portion recessed, with vertical lateral walls, posteriorly extended, with slender median process 0.5 mm. long; cristae elongate, arising from vertical lateral walls of anellus; tegumen elongate, with short median fusion; saccus longer than tegumen, with tapering sides, anteriorly bluntly pointed; aedeagus 5.3 mm. long, 1.2 mm. wide, posteriorly sclerotized, digitate; vesica, when exerted, extending on both sides of aedeagus anteriorly of its apex, left side a wrinkled blind sac, right side longer and larger, bearing about 50 elongate, sclerotized setae up to 1.5 mm. long.

FEMALE GENITALIA: Sterigma with lamella antevaginalis sclerotized, posteriorly bilobed, forming ventral surface of large ostium bursae, lamellae postvaginalis membranous; ductus bursae elongate, lateral margins sclerotized, longer than wide, anteriorly narrower than posterior end; ductus seminalis arising from sac at end of small, apical, curved projection of corpus bursae ventrad of ductus bursae, extending to left side, corpus bursae large, thick, of about equal diameter for entire length, sclerotized posteriorly on left side, inner surface minutely dentate, dorsal portion with longitudinal striations, remainder of corpus membranous, with longitudinal striations deeper and more numerous posteriorly, some circular ridges around signum, anterior end rounded, corpus bursae 4.6 times as long as apophyses posteriores; signum large, sclerotized, with ventrally projecting, semicircular opening from surface of corpus, area on surface around opening rugose, signum invaginated, 1.2 mm. long, flat, margin and surface dentate. Papillae anales short; apophyses with anterior attachment; apophyses posteriores 2.1 mm. long, apophyses anteriores 1.0 mm. in length.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPE SPECIES: *Epimecis? medinae* Bartlett-Calvert; by original designation.

DISTRIBUTION: Central Chile and adjacent Argentina.

FLIGHT PERIOD: January, February, March, and April.

REMARKS: One species is included in this genus (Rindge, 1971).

Catocalopsis has the autopomorphic character for the tribe of a trifid uncus. Members of this genus are easily recognized by their large size and by the bright red or orange-red hind wings having a complete black border.

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