

A REVISION OF THE
NEOTROPICAL SPECIES
OF THE MOTH GENUS *GLENA*
(LEPIDOPTERA, GEOMETRIDAE)

FREDERICK H. RINDGE

BULLETIN
OF THE
AMERICAN MUSEUM OF NATURAL HISTORY
VOLUME 135 : ARTICLE 3 NEW YORK : 1967

A REVISION OF THE NEOTROPICAL SPECIES
OF THE MOTH GENUS *GLENA*
(LEPIDOPTERA, GEOMETRIDAE)

FREDERICK H. RINDGE

*Curator, Department of Entomology
The American Museum of Natural History*

BULLETIN
OF THE
AMERICAN MUSEUM OF NATURAL HISTORY
VOLUME 135 : ARTICLE 3 NEW YORK : 1967

BULLETIN OF THE AMERICAN MUSEUM OF NATURAL HISTORY

Volume 135, article 3, pages 107–172, figures 1–50

Issued February 27, 1967

Price: \$1.50 a copy

CONTENTS

| | |
|---|-----|
| INTRODUCTION | 111 |
| Materials and Methods | 111 |
| Acknowledgments | 112 |
| SYSTEMATIC DESCRIPTIONS | 113 |
| Genus <i>Glena</i> Hulst | 113 |
| Key to Species Based on Male Genitalia and Secondary Sexual Characters | 115 |
| <i>Glena effusa</i> , New Species | 116 |
| <i>Glena bipennaria</i> (Guenée), New Combination | 119 |
| <i>Glena bipennaria bipennaria</i> (Guenée) | 119 |
| <i>Glena bipennaria demissa</i> , New Subspecies | 120 |
| <i>Glena dentata</i> , New Species | 121 |
| <i>Glena grandillosa</i> (Dognin), New Combination | 121 |
| <i>Glena sucula</i> , New Species | 123 |
| <i>Glena vesana</i> , New Species | 124 |
| <i>Glena bisulca</i> , New Species | 124 |
| <i>Glena juga</i> , New Species | 125 |
| <i>Glena megale</i> , New Species | 127 |
| <i>Glena unipennaria</i> (Guenée), New Combination | 128 |
| <i>Glena unipennaria unipennaria</i> (Guenée) | 128 |
| <i>Glena unipennaria cosmeta</i> , New Subspecies | 129 |
| <i>Glena uncata</i> , New Species | 130 |
| <i>Glena demissaria</i> (Walker), New Combination | 131 |
| <i>Glena basalis</i> , New Species | 133 |
| <i>Glena hima</i> , New Species | 133 |
| <i>Glena lora</i> , New Species | 135 |
| <i>Glena agria</i> , New Species | 135 |
| <i>Glena trapezia</i> , New Species | 137 |
| <i>Glena sacca</i> , New Species | 138 |
| <i>Glena bulla</i> , New Species | 139 |
| <i>Glena gemina</i> , New Species | 139 |
| <i>Glena laticolla</i> , New Species | 140 |
| <i>Glena brachia</i> , New Species | 141 |
| <i>Glena cretacea</i> (Butler), New Combination | 143 |
| <i>Glena gamps</i> , New Species | 144 |
| <i>Glena labecula</i> , New Species | 144 |
| <i>Glena totana</i> , New Species | 145 |
| <i>Glena quadrata</i> , New Species | 146 |
| <i>Glena mopsaria</i> (Schaus), New Combination | 147 |
| <i>Glena turba</i> , New Species | 148 |
| <i>Glena tyrbe</i> , New Species | 148 |
| <i>Glena asacula</i> , New Species | 149 |
| LIST OF THE NEOTROPICAL SPECIES OF THE GENUS <i>Glena</i> , WITH THEIR KNOWN DISTRIBUTION | 150 |
| APPENDIX: SPECIMENS EXAMINED | 152 |
| BIBLIOGRAPHY | 171 |

INTRODUCTION

SEVERAL YEARS AGO I began working with the geometrid moths of the genus *Glena*, paying particular attention to the North American species. At that time preliminary work on the Central and South American species showed that much more time and labor were needed before the tropical taxa could be properly understood. The practical solution was to publish separate papers on the two faunas; the one on the nearctic fauna was published in 1965. The present paper is a revisional study of the neotropical species, in which I have attempted to answer some of the questions pertaining to their taxonomy, distribution, and phylogeny, and to propose a more satisfactory systematic arrangement of the taxa.

As now understood, *Glena* includes 31 species from the neotropical area. Two of these are polytypic, having two subspecies each; the remainder are monotypic. Six names are available for this group, all representing valid species; none has heretofore been published in *Glena*. Two of these names were proposed by Guenée in 1857, and one each was given by Walker (1868), Butler (1881), Dognin (1902), and Schaus (1913). In this revision 33 specific and subspecific names are recognized; 27 of them are proposed as new.

MATERIALS AND METHODS

MATERIALS STUDIED

This revision is based primarily on the specimens in the collections of the American Museum of Natural History, the British Museum (Natural History), and the United States National Museum of the Smithsonian Institution. Types of three of the six known species have been studied by the author. The genitalia of the remaining three, in the collection of the British Museum (Natural History), have been dissected by Mr. D. S. Fletcher; photographs of these preparations have been examined by the author.

The genitalic drawings were prepared from specimens taken from the above-mentioned collections. The following abbreviations have been used:

A.M.N.H., the American Museum of Natural History

B.M.N.H., British Museum (Natural History), London

U.S.N.M., United States National Museum, Smithsonian Institution, Washington, D. C.

All the specimens studied by the author during the preparation of this paper have had type or identification labels affixed. All too often such labeling has not been done in the past, so that there is always the question of whether or not certain specimens were examined by a reviser.

A total of 715 specimens were studied. A large number of genitalic dissections were prepared by the author, who also had at his disposal slides made by J. L. Sperry at the American Museum of Natural History, and by H. W. Capps and E. L. Todd of the United States National Museum. In all, 409 dissections were examined.

LOCALITY DATA

The locality data are briefly summarized under the heading of Distribution for every species. The complete information for the previously described species is contained in the Appendix, and that for the new species and subspecies in the list of type material for that taxon in the text.

Unfortunately many of the labels did not include adequate data and, in many cases, had very little information. The index to the Map of Hispanic America of the American Geographical Society (1945) served as the main source of information in the obtaining of additional facts. Whenever possible, the department, state, or province is given for the larger countries; if not indicated on the label, it is inserted in brackets in the text and Appendix. This task was lightened immeasurably for Ecuadorian localities by the paper of Brown (1941), and for Central America by the one of Selander and Vaurie (1962).

In some instances it was possible to correlate the distributional data of a species with the climatic zones of South America. The source of terms of these zones is the "Life pictorial atlas of the world" (Time, Inc., 1961).

PHYLOGENY

The nearctic taxa of *Glena* were divided into three species groups, based largely on the secondary sexual characters of the male, wing shape, pattern, and the nature of the armature of the aedeagus. As these criteria were also followed when the neotropical species were studied, the order in which they appear in this paper is the same. When I completed my studies of the North American moths, a few tentative conclusions were proposed regarding evolutionary changes within this portion of the genus, using the above characters.

Since the completion of the study of the North American *Glena*, a revision of the species of the genus *Anacamptodes* McDunnough has been finished (Rindge, 1966). The latter genus is closely allied to *Glena*, and some of the characters within it show definite and unmistakable evolutionary trends. These trends are the same as those found in the related and very large genus *Melanolophia* Hulst (Rindge, 1964), and are just the opposite of the ones given for the northern species of *Glena*. This fact, plus a knowledge of the tropical species of *Glena*, led to a reevaluation of these characters, and I now believe that my tentative conclusions were wrong. What I had considered as being primitive characters are, in fact, the more highly evolved ones. As a result, the species of groups II and III are actually the more primitive, whereas those of the much larger group I are the more advanced.

The following characters are the more highly evolved: moths of large size with whitish wings, the presence in the males of both the hair pencil on the hind tibia and the medioventral row of bristles on the third

abdominal segment, the presence of the large, single spine of the vesica of the aedeagus, a broad ductus bursae, and a flat signum.

When considered from a geographical point of view, the more primitive species of *Glena* are found in the United States and southern Canada. The species of group I are primarily neotropical in distribution, although three species are found in the southwestern United States and northwestern Mexico. Eight species are restricted to Mexico and Central America, and one extends from Mexico into Bolivia. In South America, 12 taxa are found along the Andes Mountains, usually at rather low elevations, and seven are from the Humid Subtropical Zone. The remaining several species are found in Trinidad (one), the Guianas (two), the Amazon Basin (one), and widespread throughout much of South America east of the Andes (one).

ACKNOWLEDGMENTS

The author wishes to acknowledge with thanks the cooperation and aid of the following colleagues who have allowed him to study the types and specimens in their charge: Dr. J. F. G. Clarke of the Smithsonian Institution; Mr. D. S. Fletcher of the British Museum (Natural History); Dr. E. L. Todd of the Insect Identification and Parasite Introduction Research Branch, United States Department of Agriculture; and Dr. P. E. L. Viette of the Museum National d'Histoire Naturelle, Paris, France.

The author wishes to thank Mr. Thomas Hayden of the Graphic Arts Department of the American Museum of Natural History for preparing the drawings of the genitalia.

SYSTEMATIC DESCRIPTIONS

GENUS *GLENA* HULST

Boarmia auct. nec Treitschke: DRUCE, 1892 (1891–1900), p. 72.

Glena HULST, 1896, p. 358. RINDGE, 1965, p. 269 (bibliography, synonymy, description).

Catoria auct. nec Moore: PROUT, 1929, p. 132.

As the genus was completely described for the revision of the nearctic species (Rindge, 1965), this information is not repeated here. However, the present study shows that my generic description must be slightly modified to include all the species now placed in *Glena*.

The males may or may not have a fovea at the base of the forewing. All the nearctic species have this character; in the neotropical region, 18 species possess the fovea, 11 do not, and the males of the remaining two taxa are unknown.

In my revision of the nearctic fauna, the species were divided into three groups based on, among other characters, the presence or absence of both the hair pencil on the hind tibia and the bristle comb on the venter of the third abdominal segment in the male. Continuing studies in this tribe of moths, both on *Anacamptodes* (Rindge, 1966) and the species included in this paper, show that these probably sex-linked characters are of more value on the specific level than as group characters. The males of 29 of the neotropical species are known; three of these lack both the tibial hair pencil and bristle comb, and it is probable that one of the two unknown males will not have either of the characters. These few taxa are so closely allied to the others in the genus that it does not seem reasonable to separate them into two groups, as was done for the nearctic species. This change should also apply to the northern species, so *arcana* Rindge should be transferred from group II to group I. The latter group includes all the neotropical species and three nearctic ones (*grisearia* Grote, *furfuraria* Hulst, and *arcana*). Group I is redefined as containing the larger species, all with the upper surface of the wings white or whitish gray, and having the very large spine in the aedeagus. Group II is now restricted to moths that are usually smaller in size than

those of the first group, and have broad, black, gray, or grayish brown wings, and lack the single, very large spine of the vesica. The definition of group III is unaffected. For the New World, the first group now contains a total of 34 species, the second but three taxa, and five species are included in group III.

A study of the male genitalia of the neotropical species necessitates but few changes in the generic description for these organs. The uncus ends in a single point in the majority of the species. Only four of the known species covered in this revision have two points on the uncus, as compared with all 11 of the nearctic taxa that have the latter condition. The valves are basically similar in the species of the two faunas, although more and varied modifications occur in the more numerous tropical taxa. Seven species have the apex of the costa sharply enlarged. There is considerable variation in the combined lengths of the sacculus and its process, ranging from 1.3 to 3.4 mm. In one of the shortest of these the process is vestigial, and its function is apparently assumed by what appears to be a lateral extension of the transtilla. Two species are unique in the genus in that they have a group of heavy spines at the base of the costa. All the neotropical species have an elongate spine in the vesica of the aedeagus; in the nearctic area, only three of the 11 taxa possess this character.

The female genitalia of the neotropical species show that there is a greater range of variability in these organs than in the ones from the nearctic region, as would be expected, because of the larger number of species involved. The variability manifests itself primarily in the sterigma, in the form and position of origin of the ductus seminalis, and in the form and location of the signum. The sterigma shows variation in its component parts, and there is also some variability in the intersegmental area between A_7 and A_8 . The ductus seminalis may arise ventrally, laterally on the left side, or dorsally, and it comes off the corpus bursae either as a large sac, a swollen tube, or as a slender tube. The signum is absent from one species; in the other taxa it may be found ventrally,

laterally on the left side, or dorsally. It is either rounded in shape, or else it is a more or less elongate, transverse ellipse, with the outer margin being either spinose or smooth.

The upper surface of the wings of all the neotropical species is of an even white or grayish white color, variably overlain with brown or gray scales. The cross lines are represented by black or very dark dots, and these may be either unconnected or connected. The hind wings are concolorous with the forewings, and they have the same type of maculation as is found on the primaries. The under surface of the wings may be white or gray, and in some species the wings are heavily suffused with dark brown or grayish black scales; in some of the taxa the forewings are darker in color than the hind wings. The under surface is usually without maculation except for a broad, dark terminal band of varying extent.

The early stages are completely unknown for all the species included in this paper.

The type species for *Glena* is *cognataria* Hübner; this moth is found in the eastern United States.

The range of the species covered in this revision is from southern Mexico, through Central America, and throughout most of South America, with the exception of Chile and southern Argentina.

The tropical species of *Glena* form a distinct and easily recognized group within the Cleorini (McDunnough, 1920) of the subfamily Ennominae. The adults can usually be distinguished by the more or less uniform color and pattern that are present in every species. Specific determinations are complicated by both geographical and seasonal variability. Many of the species are represented by inadequate material, so our knowledge of the variation is rather sketchy at the present time.

There is some sexual dimorphism in this genus, as the females tend to have more dark scaling on both surfaces of the wings than is found in the males. The pattern of the upper surface is usually less strongly indicated, whereas the terminal band of the lower surfaces is more strongly represented in the females.

Females are usually much fewer in number in the collections studied than are males. Un-

fortunately most of the species are known from so few examples that figures on sex ratios would be meaningless. Only 12 of the 31 species are represented by 10 or more specimens. Of this dozen, the sex ratio varies from one male to three females (*uncata*) to the other extreme of nine males to one female (*unipennaria cosmata*). The ratios of males to females vary: 1/1 (*agria*), 2.5/1 (*mopsaria*), 3/1 (*quadrata*), 4/1 (*juga*, *totana*, *demissaria*, and *unipennaria unipennaria*), 5/1 (*grandilosa* and *brachia*), 6/1 (*effusa*), and 7/1 (*bipennaria bipennaria*). Improved or modified collecting techniques are called for to find the females of some of the species.

References in the literature to species of this genus are usually completely unreliable, owing to the great similarity in size, color, and maculation of all the taxa. None of the earlier workers used the genitalia as an aid in classification. An example is "*Boarmia demissaria* Walker" as used by Druce [1892 (1891-1900), p. 75]. Fortunately his material was labeled, and most of it has been studied by the present author. The above category contained eight different species, none of them being *demissaria*. Seven are included in this paper, with six being described as new species. The last taxon is represented by the single female from Pinos Altos, Chihuahua (Buchan-Hepburn), which is referable to *furfuraria furfuraria* (Grote), and represents the first known Mexican record for this species. Unless the specific specimen has been personally examined, the literature records are not included in this paper.

In nearly every case a dissection of the genitalia is necessary for making specific determinations. These structures are large and easy to work with, so few difficulties are to be encountered when dissecting them. The aedeagus is large, so it is strongly recommended that the vesica be exerted during the dissection, a procedure that will show several characters that are otherwise difficult to see and that are of specific importance.

Because the color and pattern of the wings are so similar in all of the species, it is not feasible to make a key to the adults based on these characters. In addition, the females of one-third of the species are unknown, so a key based upon the genitalia of this sex is not very practical at this time. However, all the known

structures of this sex are described and figured. The male genitalia offer good characters for the recognition of the various species, and a key to these organs has been prepared.

The species described as *Boarmia nepia* Druce [1892 (1891–1900), p. 76] was suspected of belonging to *Glena* (McDunnough, 1920, p. 24; Rindge, 1965, p. 283). An examination of photographs of the genitalia of the female type of *nepia* proves it to be a member of the genus *Anavitrinella* McDunnough.

KEY TO SPECIES BASED ON MALE GENITALIA AND SECONDARY SEXUAL CHARACTERS¹

1. Venter of third abdominal segment with median row of bristles 2
 - Venter of third abdominal segment without median row of bristles 27
- 2(1). Uncus terminating in single point . . . 3
 - Uncus terminating in two widely separated points 25
- 3(2). Valves with dense patch of heavy spines at base of costa 4
 - Valves without basal patch of spines . . 5
- 4(3). Anellus with length twice as great as width *turba*
 - Anellus with length equal to width . *tyrbe*
- 5(3). Valves with elongate process of sacculus 6
 - Valves with rudimentary process of sacculus; middle of valve with lateral, apically spinose extension of transtilla *asacula*
- 6(5). Valves with costal arm attached at base only *brachia*
 - Costa an integral part of valve. 7
- 7(6). Uncus triangular; exerted vesica tubular and usually having sclerotized, shortly spinose dorsal strip 8
 - Uncus elongate; exerted vesica not tubular and without dorsal strip 13
- 8(7). Process of sacculus as long as, or longer than, costa 9
 - Process of sacculus shorter than costa 10
- 9(8). Process of sacculus of same length as costa *gampsia*
 - Process of sacculus longer than costa *cretacea*
- 10(9). Spines on terminal portion of process of sacculus situated laterally . *mopsaria*
 - Process of sacculus with terminal spines 11
- 11(10). Process of sacculus extending two-thirds

of length of costa; combined lengths of sacculus and process, 2.8 mm.

. *labecula*

Process of sacculus extending to middle of costa; combined lengths of sacculus and process, 1.5 to 1.9 mm. 12

- 12(11). Apical section of process of sacculus globular, with posteriorly directed spines in single or double row on posterior margin of process *totana*

Apical section of process of sacculus elongate, slender, and curved, with multiple rows of outwardly curved spines arising on posterior one-half of process *quadrata*

- 13(7). Spine of vesica with recurved base . . 14
 - Spine of vesica straight, without recurved base *trapezia*

- 14(13). Anellus very broad, with width almost equal to length 15
 - Anellus slender, with length at least twice as great as width 18

- 15(14). Exserted vesica with lateral, bifurcate caecum *sacca*
 - Exserted vesica without caecum 16

- 16(15). Process of sacculus with spines on distal one-half only 17
 - Process of sacculus with two widely separated spine patches, one basally and other terminally *grandilosa*

- 17(16). Process of sacculus with two spine patches *bisulca*
 - Process of sacculus with single, terminal spine patch *juga*

- 18(14). Recurved base of spine of vesica very short, being one-fifth to one-seventh of length of spine *effusa*
 - Recurved base longer, being from one-fourth to one-half of length of spine 19

- 19(18). Vesica with narrow, elongate, dentate patch on dorsal surface, and with larger dentate area ventrally *agria*
 - Vesica not as above 20

- 20(19). Recurved base of spine in vesica one-fourth to one-third of length of spine 21
 - Recurved base of spine one-third to one-half of length of spine 22

- 21(20). Process of sacculus with apex not swollen and with terminal two-fifths to one-half spinose, the spines either in one group or with median interruption *bipennaria*
 - Process of sacculus with apical one-third swollen and covered with spines *dentata*

- 22(20). Anellus strongly bilobed; uncus with ven-

¹ The males of *basalis* and *lora* are unknown.

- tral margin concave between extended ventrolateral margins *megale*
 Anellus not bilobed although with small median incision on posterior margin; uncus not as above 23
 23(22). Anellus with prominent constriction anteriorly and with raised lateral margins *unipennaria*
 Anellus without above characters 24
 24(23). Length of spine in aedeagus, 1.4 to 2.0 mm. *demissaria*
 Length of spine in aedeagus, 1.0 to 1.1 mm. *uncata*
 25(2). Length of sacculus and its process, 1.3 mm. *gemina*
 Length of sacculus and its process, at least 2.0 mm. 26
 26(25). Process of sacculus spinose for most of length *bulia*
 Process of sacculus with spines on outer one-third or one-fourth only *laticolla*
 27(1). Recurved base of spine in vesica very short, not exceeding 0.2 mm. 28
 Recurved base of spine one-third of length of spine, 0.5 to 0.6 mm. in length *hima*
 28(27). Terminal portion of process of sacculus slender, bearing spines in two groups; uncus 0.6 mm. in length; spine of aedeagus weakly curved *sucula*
 Terminal portion of process of sacculus capitate, bearing spines in one or two groups; uncus 0.7 mm. in length; spine of aedeagus with strong curve *vesana*

***Glena effusa*, new species**

Figures 1, 30

Boarmia demissaria auct.: DRUCE, 1892 (1891-1900), p. 75 (*partim*).

Boarmia unipennaria auct.: OBERTHÜR, 1913, p. 278 (*partim*), pl. CLXIX, fig. 1656.

This is the commonest and most widely ranging species of the genus, as it occurs from Mexico to Bolivia. It is one of the largest taxa, and the under side of the wings has a broad, dark terminal band. The genitalia should be used for identification.

MALE: Head with vertex white; front brownish gray, whitish gray across top and bottom; palpi blackish brown, with terminal segment becoming whitish gray or pale grayish brown. Thorax white above, with scattered light brown scales and with dark brown scaling at apex of collar and posteriorly on thorax; below dull grayish brown; legs

grayish white, with variable amount of pale brown scaling and with tarsus and tibia of forelegs of many specimens dark brown or brownish black, with narrow pale gray bands at ends of segments; tibia of hind leg with hair pencil. Abdomen white above, with variable amount of pale brown scaling and with paired dark brown or brownish black spots posteriorly on segments A₃ and A₄; below dull grayish brown.

UPPER SURFACE OF WINGS: Forewings with small fovea at base; ground color white, overlain with variable number of pale brown or grayish brown scales and strigations; cross lines appearing as brownish black spots on costa and on veins, with t. a., median, and t. p. lines represented; discal spot absent; t. p. line shaded distally by pale grayish brown in cells M₂, M₃, and above anal margin; s. t. line represented by large, dark brownish gray intravenular spots, with spots in cells R₄ and M₃ absent from some specimens; terminal line of prominent, blackish brown, intravenular spots; fringe concolorous with wing, with some pale brownish gray scaling. Hind wings concolorous with forewings and with same type of maculation, with intradiscal, extradiscal, and s. t. lines represented; discal spot brownish black, elongate; terminal line and fringe like those of forewings.

UNDER SURFACE OF WINGS: Pale gray, heavily and evenly overlain with dark grayish brown on forewings and with grayish brown on hind wings; discal dots absent from forewings, weakly represented on hind wings; without additional maculation except for broad blackish gray terminal band on all wings, with white apex on primary and with narrow white band at wing margin; terminal line represented by dull black or grayish black intravenular spots; fringe white.

LENGTH OF FOREWING: 18 to 25 mm.; holotype, 22 mm.

FEMALE: Similar to male, but tending to have upper surface of wings more irrorate with dark scales, and to have t. p. and extradiscal lines more completely represented on upper surface of wings.

LENGTH OF FOREWING: 19 to 26 mm.; allotype, 23 mm.

MALE GENITALIA: Uncus triangular, sides more or less straight, with apical portion slender and laterally compressed; gnathos with

median enlargement variable in shape, ranging from relatively broad, with apical region rounded, to slender and tapering, with apical region bluntly pointed; valves with costa sclerotized, apical one-fourth slightly swollen and with numerous anteromedially directed setae; valvula with poorly defined, lightly sclerotized strips extending length of valve; sacculus swollen, sclerotized, tapering in width distally, extending about one-half of length of valve, with process arising from distal portion; process long and slender, slightly longer than costa, projecting short distance beyond valvula, ribbon-like, without spines except for five or six at tip of process; length of sacculus and process varying from 2.7 to 3.4 mm.; cristae represented by large, elongate patch of numerous slender setae arising from area at base of sacculus; anellus constricted medially, with large, smoothly sclerotized base, very wide anteriorly, sharply tapering medially, enlarging posteriorly into large fanlike process, with prominent ridge on each side extending from posterior margin to median constriction; vesica with very long spine, basal end sharply bent and very short, with terminal portion broadly curved and having numerous small teeth on inside of curve; length of spine varying from 1.1 to 1.4 mm., of recurved base about 0.2 mm.; vesica with weakly sclerotized, oval area posteriad and away from base of spine on dorsal surface bearing short deciduous spines, and with large, narrow, lightly sclerotized areas bearing numerous short spicules on both ventral and dorsal surfaces of vesica under terminal portion of spine. Ventral surface of A_3 with median row of bristles.

FEMALE GENITALIA: Sterigma with large, smoothly sclerotized, elliptical or oval lamella postvaginalis, and with large, sclerotized lateral areas, their anteromedian margins extending over anterolateral portions of lamella postvaginalis; ductus bursae shorter than length of lamella postvaginalis; ductus seminalis arising from large, rounded sac laterally on left side of corpus bursae, originating between 1.1 and 1.4 mm. anterior of ductus bursae, with tubular portion coming off medially near corpus bursae; latter elongate, weakly swollen anteriorly, and with posterior one-third weakly sclerotized and striate, surface covered with very small

swellings or denticulations; signum with flat or weakly concave anterior margin, rounded posteriorly, outer margin with numerous pointed projections, anterolateral ones largest, those along anterior margin smallest and with flat median area recessed and bearing several small spinose processes. Posterior portion of ventral surface of A_7 thickly covered with minute, sclerotized, globular swellings, and having numerous short, longitudinal folds.

TYPES: Holotype, male, Avispas, Madre de Dios, Peru, September 20–30, 1962 (L. E. Peña); genitalia mounted on slide F.H.R. No. 12337. Allotype, female, Quincemil, Cuzco, Peru, September 1–6, 1962 (L. E. Peña); genitalia mounted on slide F.H.R. No. 12685. Paratypes: *Bolivia*: Chapare, [Beni], various dates in August and December, 1949 (L. E. Peña), June 6, 1948, June 5, 22 males and one female; Region Chapare, [Beni], July, 1951, one male; Yungas del Palmar, elevation 1000 meters, October 15, 1949, three females; San Ernesto, [La Paz], elevation 1000 meters, August–September, 1900 (Simons), three males, "*saison seche*," one male; Salampioni, elevation 800 meters, August, 1901, dry season (Simons), one male; R[io] Songo to R[io] Suapi, [La Paz], elevation 1100 meters, March–June, 1896 (Garlepp), one male; Songo (Garlepp), one male; Rio Songo, elevation 750 meters (Fassl), one male; Charaplaya, [Cochabamba], elevation 1300 meters, June, 1901 (Simons), one male; Buenavista, elevation 750 meters, August, 1906 to April, 1907 (Steinbach), one male; Yunga del Espiritu Santo, Cochabamba, 1888–1889 (P. Germain), five males; Yungas de la Paz, elevation 1000 meters, one male; no further data, one male. *Peru*: Quincemil, Cuzco, elevation 2400 feet, August, September 1–6, October 20–30, 1962 (L. E. Peña), nine males, one female; Avispas, Madre de Dios, September 10–30, 1962 (L. E. Peña), two males; Coosnipata, Paucartambo, Cuzco, November 11 to December 4, 1951 (F. L. Woytkowski), four males; Satipo, [Junin], June, 1948 (P. Paprzycki), one male; Chanchamayo, [Pasco], elevation 1000 meters, one male; Chaquimayo, [Puno], elevation 2500–3000 feet, September, 1910 (H. and C. Watkins), one male; Cajon, Cuzco, December, 1902 (Garlepp), one male; Huambo,

1889 (M. de Mathan), two males; Yahuar-mayo, [Puno], elevation 1200 feet, October–November, 1910, March, 1911 (Watkin brothers), three males; San Gaban, elevation 2500 feet, March–April, 1913, two males, two females; La Union, R[io] Huacamayo, Carabaya, [Puno], elevation 2000 feet, November, 1904, wet season (G. Ockenden), three males; Cushi, Huánuco, elevation 1820 meters, 1904 (W. Hoffmanns), one male; Pozuzu, Huánuco, elevation 800–1000 meters (W. Hoffmanns), two males. *Ecuador*: Dos Puentes, Kilometer 99, [Chimborazo], elevation 1700 feet, January, 1929 (W. J. Coxe), one male; Paramba, [Imbabura], November–December, 1898, January–August, 1899 (Flemming), two males; Canelos, Rio Bobonaza, [Napo–Pastaza] (M. G. Palmer), one male. *Colombia*: “Ob. Rio Negro,” [Norte de Santander], elevation 800 meters (Fassl), three males, one female; Muzo, [Santander], elevation 400–800 meters (Fassl), two males, two females; Popoyan, [Caqueta] (Lehmann), three males, 1896, one male; Minca, [Magdalena], elevation 2000 feet (H. H. Smith), one male, one female; Rio Agnatal, elevation 1600 meters, October, 1908 (Fassl), one male; no further data, four males. *Guyana* (former *British Guiana*): Rio Demerara, one male. *Venezuela*: San Esteban, June, 1909 (S. M. Klages), one male; Suapure, April 20, 1899, one male; Las Quiguas, Esteban Valley, one female. *Costa Rica*: San José, [San José] (H. Schmidt), one male. *Honduras*: La Cumbre, February 25–28, 1922 (J. Lienhart), three males. *Guatemala*: San Joaquin, Vera Paz (Champion), one male, identified as “*Boarmia demissaria* Walk., B. C. A. Lep. Het., Godman-Salvin Coll.”; Cayuga, May (Schaus and Barnes), one male; Volcan Santa Maria, [Quezaltenango], July (Schaus and Barnes), one male. *El Salvador*: Santa Tecla, June 30, 1954 (M. Salazar V.), two males. *British Honduras*: Columbia, December, 1932 (J. J. White), one male. *Mexico*: Santa Anita, Chiapas, July 13–14, 1930 (C. C. Hoffmann), two males; mountains near Soconusco, Chiapas, August, 1931 (C. Hoffmann), one male; Orizaba, [Veracruz], 1937 (C. C. Hoffmann), one male; Presidio, [Veracruz], July, 1951, one female; Cordoba, Veracruz, October 5, 1924 (C. C. Hoffmann), one female, (H. Rumeli), five males and four

females, with two males and two females identified as “*Boarmia demissaria* Walk., B. C. A. Lep. Het., Godman-Salvin Coll.”; Coatepec, [Veracruz], two males; Paso San Juan, Veracruz, one female; Tamazunchale, San Luis Potosi, May 20, 1952 (Cazier, Gertsch, Schrammel), one male.

The holotype and allotype are in the collection of the American Museum of Natural History; paratypes are in the collections of that institution, of the British Museum (Natural History), and of the United States National Museum.

DISTRIBUTION: From Mexico (the states of San Luis Potosi, Veracruz, and Chiapas) through Central America to Venezuela, Guyana, and Colombia (the departments of Norte de Santander, Santander, Caqueta, and Magdalena), Ecuador (the departments of Chimborazo, Imbabura, and Napo–Pastaza), Peru (the departments of Cuzco, Madre de Dios, Pasco, Puno, and Huánuco), and Bolivia (the departments of Beni, La Paz, and Cochabamba). In South America this species has been taken at elevations ranging from 1200 to 4300 feet.

The adults have been captured in the months of February, May, June, July, August, October, and December in Mexico and Central America, and in every month of the year except February and May in Ecuador, Peru, and Bolivia.

REMARKS: A total of 138 specimens (117 males and 21 females) and 65 genitalic dissections (53 males and 12 females) have been studied. The adults of *effusa* usually can be recognized by their large size, and by the dark coloration of the under surface of the wings, with the wide terminal band on all wings with the sharply contrasting white fringe.

Specimens from South America are rather uniform in size, with the exception of two males from Venezuela. Both of these are smaller and have the upper surface of the wings darker in coloration than those of most other examples. Specimens from Central America and Mexico tend to be slightly smaller than those from South America.

The male genitalia of this species can be recognized by the very long and slender process of the sacculus, which is unspined except for the very tip, and by the very short recurved base of the long spine of the aedeagus.

There is some variation in the male genitalia that seems to be associated with the geographical distribution of this species. Specimens from Ecuador, Peru, and Bolivia tend to have the spine of the vesica with a very short base, often appearing as if it were attached to a small sclerotized area, and to have a more sweeping curve to the posterior portion of the spine. Examples from Central America, Venezuela, and Colombia, on the other hand, tend to have the spine with a slightly longer base, without any trace of the sclerotized attachment, and to have less of a curve posteriorly. Southern specimens tend to have the gnathos shorter and more truncate, while many northern examples have a more elongate and pointed structure. Southern specimens also tend to have a longer sacculus and process than do those from Central America.

The females of *effusa* are unique in that the posterior portion of the venter of the seventh abdominal segment is thickly set with minute, globular swellings.

***Glena bipennaria* (Guenée), new combination**

Boarmia bipennaria GUENÉE, 1857, p. 257.

This species is usually slightly smaller than *effusa*, and the forewings are less elongate. Most specimens have a slightly more prominent pattern on the upper side of the wings and a narrower terminal band on the under surface of the hind wings. The genitalia should be used for identification.

This taxon occurs in two populations. The nominate one is found in southern South America, and the second is known from French Guiana.

***Glena bipennaria bipennaria* (Guenée)**

Figures 2, 31

Boarmia bipennaria GUENÉE, 1857, p. 257.
BOISDUVAL AND GUENÉE, 1858, pl. 13, fig. 5.
WALKER, 1860, p. 356. OBERTHÜR, 1913, p. 278.
VIETTE, 1950, p. 203.

The nominate subspecies occurs in southern South America, and it is larger and more heavily marked than the following population.

MALE: Similar to that of *effusa*, differing mainly as follows: thorax and abdomen tending to be more heavily marked with

brownish black scales; forewings less elongate; upper surface of wings with maculation darker and more strongly defined in most specimens, with t. p. line more complete and having stronger, dark gray, distal shading; under surface with narrower terminal band, especially on secondaries, and with wings tending to be less heavily suffused with dark gray scaling; hind tibia with hair pencil.

LENGTH OF FOREWING: 18 to 24 mm.

FEMALE: Similar to male but tending to have upper surface of wings more irrorate with dark scales and to have less clearly defined maculation.

LENGTH OF FOREWING: 21 to 23 mm.

MALE GENITALIA: Similar to those of *effusa*, differing mainly as follows: gnathos with more elongate median enlargement, slender and tapering in most specimens; valves with costa having outer one-third slightly enlarged; process of sacculus long and slender, slightly shorter than costa, extending short distance beyond valvula, distal two-fifths to one-half spinose along inner side, spines directed posteriorly and tending to be curved around process, either in one row or with median interruption; length of sacculus and process varying from 2.5 to 2.9 mm.; anellus with larger indentation posteriorly on midline, and appearing cleft anteriorly to median constriction; spine of vesica with longer recurved base, sharply pointed, and having terminal portion with more sinuous curve, posteriorly with small teeth distributed around spine; length of spine varying from 1.1 to 1.3 mm., of recurved base from 0.3 to 0.4 mm.; vesica with weakly sclerotized oval area away from base of spine bearing short deciduous spines, with smoothly sclerotized area extending from recurved base of spine, and with large, more or less triangular area, decreasing in width laterally, on dorsal surface, bearing very many short teeth, these increasing in size anterolaterally; ventral surface of vesica with weakly sclerotized area, its surface covered with extremely fine denticulation. Ventral surface of A_2 with median row of bristles.

FEMALE GENITALIA: Sterigma with large, sclerotized, elliptical or oval lamella postvaginalis with more or less rough surface, and with large, sclerotized lateral areas, their anteromedian margins extending over an-

terolateral portions of lamella postvaginalis; intersegmental area between A_7 and A_8 recessed and convoluted ventrally; ductus bursae about one-half of length of lamella postvaginalis; ductus seminalis arising from large, rounded sac ventrolaterally on left side of corpus bursae, originating between 0.6 and 0.7 mm. anterior of ductus bursae, with tubular portion coming off medially near corpus bursae; latter elongate, weakly swollen anteriorly, and with posterior one-third to one-fourth weakly sclerotized and striate, surface covered with very small swellings or denticulations; signum with flat or weakly concave anterior margin, rounded posteriorly, outer margin with numerous pointed projections, those along anterior margin smallest, and with flat median area recessed and bearing several small spinose processes. Posterior portion of ventral surface of A_7 not modified.

TYPE: Guenée described *bipennaria* from one male and one female. The type male is in the Museum National d'Histoire Naturelle, Paris; the female apparently has been lost. The genitalia of the type are mounted on slide F.H.R. No. 13521.

TYPE LOCALITY: Brazil.

DISTRIBUTION: Southern Brazil (the states of Santa Catarina, Paraná, São Paulo, Guanabara, and Mato Grosso), Paraguay, the eastern portions of Bolivia (the departments of Beni and Santa Cruz), Peru (the departments of Madre de Dios, Cuzco, Pasco, and Puno), and Ecuador (the province of Loja). (See Appendix for locality data of specimens examined.) This species occurs in the Humid Subtropical Zone of South America.

The adults are probably on the wing during every month of the year, although no material dated June has been examined.

REMARKS: A total of 65 specimens (57 males, including the type, and eight females) and 40 genitalic dissections (33 males and seven females) have been studied. This species is very similar to *effusa*, but it has shorter, less elongate forewings, and most specimens have a narrower terminal band on the secondaries below.

The male genitalia of this species can be separated from those of *effusa* by the more extensive area of spining along the inner margin of the process of the sacculus, by the very

long median invagination of the anellus, by the fact that the spine of the aedeagus has a longer and more sharply pointed recurved base, and by the different ornamentation of the vesica.

There is some variation in the spining on the process of the sacculus; this is apparently correlated with the geographical distribution of the specimens. Most specimens from Brazil tend to have both a slightly longer area of spining and to have it uninterrupted medially; examples from Paraguay, Bolivia, and Peru tend to have a shorter area of spines that is usually interrupted to some degree in or near the middle.

The female genitalia of *bipennaria* are quite similar to those of *effusa*. These structures in the present species can be recognized by the convoluted intersegmental membrane between A_7 and A_8 ventrally, and by the more posterior location of the ductus seminalis.

Glena bipennaria demissa, new subspecies

This species is smaller than nominate *bipennaria*, and the wings are less strongly marked on the upper surface than are those of specimens of the nominate form. The present taxon is found in French Guiana.

MALE: Similar to that of nominate *bipennaria* but smaller, and with the upper surface of the wings more suffused with pale grayish brown, and having less prominent maculation; under surface of all wings heavily suffused with dark scales.

LENGTH OF FOREWING: 18 mm. (holotype).

FEMALE: Unknown.

MALE GENITALIA: Similar to those of Brazilian examples but tending to have slightly shorter area of uninterrupted spining on process of sacculus.

FEMALE GENITALIA: Unknown.

TYPE: Holotype, male, French Guiana, ex collection C. Bar, and in the collection of the British Museum (Natural History). The genitalia are on slide Geometridae No. 4805.

DISTRIBUTION: This subspecies is known only from French Guiana.

REMARKS: One specimen and one genitalic dissection have been studied. This population is more likely to be confused with *demissaria* (Walker), which flies in the same area, than with nominate *bipennaria*. The genitalia should be used for identification, as the two

species are easily distinguished by means of these structures.

***Glena dentata*, new species**

Figure 3

This species is similar to nominate *bipennaria* in size and color, but the maculation of the upper surface of the wings is less strongly represented. The genitalia should be used for identification. This taxon occurs in Ecuador and Colombia.

MALE: Similar to that of *bipennaria*, differing mainly as follows: upper surface of wings more finely irrorate with light brown scales, and with cross lines more weakly indicated; under surface more heavily suffused with dark scales, with wider terminal band, with larger white area at apex of forewing, with small grayish white terminal spot in cell M_3 of forewings, and with wider white terminal area on hind wings; hind tibia with hair pencil.

LENGTH OF FOREWING: 22 (holotype) to 24 mm.

FEMALE: Unknown.

MALE GENITALIA: Similar to those of *bipennaria*, differing mainly as follows: uncus with terminal portion tending to be more strongly compressed laterally and thicker; gnathos longer; valves with costa only weakly enlarged apically; process of sacculus long and slender, extending to edge of valvula, apical one-third swollen and covered with numerous, more or less appressed spines; length of sacculus and process varying from 2.4 to 2.8 mm.; anellus with small anterior constriction, gradually increasing in width posteriorly as delimited by lateral ridges, but with actual sides of anellus more membranous, convoluted, swollen, and with posterior margin rounded and with median incision; spine of vesica S-shaped, with base more sharply curved than apical region, latter with small teeth on inside of curve; length of spine varying from 1.3 to 1.4 mm., of recurved base 0.45 mm.; vesica with weakly sclerotized area near recurved base of spine bearing short deciduous spines, and with elongate, tear-shaped area on dorsal surface bearing numerous teeth, these markedly increasing in size distally; ventral surface of vesica covered with extremely fine denticula-

tion. Ventral surface of A_3 with median row of bristles.

FEMALE GENITALIA: Unknown.

TYPES: Holotype, male, Balzapamba, Bolivar, Ecuador, March–April, 1894 (M. de Mathan); genitalia mounted on slide Geometridae No. 4820; in the collection of the British Museum (Natural History). Paratype, one male, Mesopotamia, Antioquia, Colombia, elevation 5000 feet; in the collection of the American Museum of Natural History.

DISTRIBUTION: The western side of the Andes Mountains in Ecuador (the department of Bolivar) and Colombia (the department of Antioquia). The specimens were captured at elevations of about 2100 to 5000 feet. The time of flight is unknown.

REMARKS: Two specimens (both males) and two genitalic dissections have been studied.

The male genitalia of this taxon are like those of *bipennaria*, but there are diagnostic differences in the shape and spining of the process of the sacculus, of the anellus, and of the armature of the vesica.

There are some differences between the two dissections of the male genitalia. The holotype from Ecuador appears to have a longer and more bluntly pointed gnathos, the process of the sacculus is shorter, and there are differences in the anellus, when compared with the Colombian specimen. The anellus of the latter appears flatter and narrower than does that of the former, and it does not have the lateral ridges that are so prominent in the Ecuadorian example. Perhaps these variations are individual, or perhaps they represent geographical changes within this species; more material is needed to settle this question.

***Glena grandillosa* (Dognin), new combination**

Figures 4, 32

Cymatophora ? *grandillosa* DOGNIN, 1902, p. 349.

Catoria unipennaria auct.: DYAR, 1913, p. 649.

The adults of this species are similar to those of *bipennaria*, but they tend to be smaller, to have slightly darker wings, and to have a more reduced terminal band on the under surface of the wings. The genitalia should be used for identification. This taxon

occurs in Argentina, Bolivia, Peru, and Ecuador.

MALE: Similar to that of *bipennaria*, differing mainly as follows: head, thorax, and abdomen tending to have more brown scales; front with wider white band across bottom; upper surface of wings with more grayish brown and brown scales, and with cross lines more weakly indicated; under surface less heavily suffused with dark scales, especially on hind wings, and with terminal band less strongly represented, on secondaries greatly reduced on or absent from some specimens; hind tibia with hair pencil.

LENGTH OF FOREWING: 18 to 23 mm.

FEMALE: Similar to male but tending to have upper surface of wings more irrorate with dark scales and to have less clearly defined maculation; under surface with terminal band tending to be reduced farther, extending only to middle of wing in some specimens.

LENGTH OF FOREWING: 16 to 22 mm.

MALE GENITALIA: Similar to those of *effusa*, differing mainly as follows: uncus with sides tending to be slightly more concave, and with laterally compressed apex more elongate; gnathos with median enlargement longer, more pointed, and more heavily sclerotized; valves with terminal three-eighths of costa swollen; process of sacculus long and slender, extending to just beyond edge of valve; length of sacculus and process varying from 2.5 to 3.1 mm.; process enlarged on inner side near base, this swelling covered with numerous heavy spines, medially slender and naked, and with apex weakly capitate and covered with slender spines; anellus large, flat, more or less rectangular in outline but with weak anterior constriction, with lateral and posterior margins more or less crenulate, and having several small ridges extending basally; spine of vesica thick and of moderate length, with elongate, sharply angled base about one-half as long as spine, and with terminal portion broadly curved anteriorly and without minute teeth; length of spine varying from 1.0 to 1.2 mm., of recurved base from 0.4 to 0.6 mm.; vesica with weakly sclerotized area away from base of spine bearing numerous, short, deciduous spines, with dorsal surface having subtriangular, sclerotized, dentate area; ventral surface with weakly sclerotized area, its surface covered

with extremely fine denticulation. Ventral surface of A_8 with median row of bristles.

FEMALE GENITALIA: Sterigma with large, elliptical or oval lamella postvaginalis, smoothly sclerotized except for posterior portion, and with large, sclerotized lateral areas, their anteromedian margins extending over anterolateral portions of lamella postvaginalis, and having pleural areas outwardly swollen; intersegmental area between A_7 and A_8 recessed and weakly convoluted ventrally; ductus bursae slightly less than one-half of length of lamella postvaginalis; ductus seminalis arising from large, rounded sac ventrolaterally on left side of corpus bursae, originating between 0.7 and 0.9 mm. anterior of ductus bursae, with tubular portion coming off medially near corpus bursae; latter elongate, weakly swollen anteriorly, and with posterior one-third to one-fourth weakly sclerotized and striate, surface covered with very small swellings or denticulations; signum situated ventrally, relatively small, varying in shape from an elongate ellipse to being widest anteriorly and having flat or weakly concave anterior margin, rounded posteriorly, outer margin with numerous pointed projections, those along anterior margin tending to be widest in some specimens, and with flat median area recessed and bearing several small spinose processes. Posterior portion of ventral surface of A_7 not modified.

TYPES: Dognin described *grandilosa* from two females. One of these bears his type label, and has the genitalia mounted on slide E.L.T. No. 1370. This specimen is hereby designated the lectotype; it is U.S.N.M. No. 32986.

TYPE LOCALITY: Tucuman, Tucuman, Argentina.

DISTRIBUTION: Argentina (the provinces of Jujuy and Tucuman), Bolivia (the departments of Beni, Cochabamba, and La Paz), Peru (the departments of Cuzco, Pasco, Puno, and Huancabamba), and Ecuador (the province of Loja). (See Appendix for locality data of specimens examined.) This species is found along the eastern slopes of the Andes Mountains at elevations of from about 3000 to 6600 feet.

Adults have been examined that have been captured in every month except July and November.

REMARKS: A total of 125 specimens (105 males and 20 females, including the lectotype) and 44 genitalic dissections (35 males and nine females) have been studied. Specimens from Argentina, in the southernmost part of the range of *grandillosa*, tend to be smaller and darker than examples from other countries.

The male genitalia of this species are similar to those of the preceding species in the nature of the long process of the sacculus; this process, in the present taxon, has two widely separated areas of spining, a condition that is diagnostic. Additional points of recognition are to be found in the broader anellus, and in the much longer base of the spine in the vesica.

The female genitalia of *grandillosa* can be separated from those of the preceding species by the swollen pleural areas laterad of the sterigma. This taxon also has both a smaller lamella postvaginalis and signum than are to be found in *bipennaria*, as well as a less strongly crenulate intersegmental area between A_7 and A_8 .

The genitalia of the lectotype do not agree exactly with those of the other specimens placed under this name. The genitalia of the type lack the swollen pleural areas laterad of the sterigma and appear to have a smaller lamella postvaginalis and larger lateral areas of the sterigma. Among the dissections of seven Argentinian females (two from Tucuman), none was seen that exactly matched Todd's dissection. Possibly two species are represented, but, if so, it is not obvious from a study of the moths themselves. As far as we know now, only one species of *Glena* is to be found in northwestern Argentina.

Glena sucula, new species

Figure 5

This species resembles *dentata* but can be distinguished from it by the lack of both the tibial hair pencil and the row of bristles on the under side of the third abdominal segment of the male. The male genitalia also have good diagnostic characters. This taxon occurs in Colombia.

MALE: Similar to that of *dentata*, but differing mainly as follows: hind tibia without hair pencil; upper surface of wings with variable amount of dark brown and brownish

gray scaling, varying from being quite heavy (holotype) to almost absent; most specimens with large brown or brownish gray patch in cell M_3 distad of t. p. line, and with s. t. line more heavily represented below costa and in cells M_1 and M_2 ; under surface with forewings heavily and evenly suffused with dark brown scales, and with secondaries more lightly suffused with dark brown; discal spots and broad, brownish black terminal band present on all wings.

LENGTH OF FOREWING: 21 to 27 mm.; holotype, 27 mm.

FEMALE: Unknown.

MALE GENITALIA: Uncus elongate, sides concave, apex curving ventrally and terminating in single spine; gnathos well sclerotized, narrowing ventrally and with large, terminally rounded median projection; costa of valve extending short distance beyond valvula; sacculus elongate, with process slightly shorter than costa, not swollen apically, and with apical region bearing two groups of spines, one at about three-fourths of length of process, the other terminal; length of sacculus and process varying from 2.1 to 2.3 mm.; anellus large, length about one and one-half times greater than width, with slight basal constriction, posterolateral areas with longitudinal ridges, with posterior margin rounded and having median incision; spine of vesica sinuous or with apical portion curved, bearing small teeth along median concave surface, and with very short recurved base; length of spine varying from 0.8 to 1.2 mm., of recurved base 0.1 to 0.2 mm.; vesica with elongate, lightly sclerotized patch extending parallel with spine on both sides of base of spine, bearing numerous short, deciduous spines; dorsal surface of vesica with large, subtriangular, coarsely denticulate area, and ventral surface with finely denticulate area. Ventral surface of A_3 without row of bristles.

FEMALE GENITALIA: Unknown.

TYPES: Holotype, male, Paso del Quiridui, Cent[ral] Cord[illera], Colombia, elevation 3500 meters (Fassl); genitalia mounted on slide Geometridae No. 5806. Paratypes, all from Colombia: Manizales (A. M. Patino), one male; San Antonio, [Valle del Cauca], elevation 5800 feet, November, 1907 (M. G. Palmer), one male, and elevation 2000 meters, February, 1909 (Fassl), one male;

Cañon del Tolima, [Tolima], elevation 2700 meters, December, 1909 (A. H. Fassl), one male; Pacho, [Cundinamarca] (Chapman), one male; no further data, one male.

The holotype is in the collection of the British Museum (Natural History); paratypes are in the collections of that institution and of the United States National Museum.

DISTRIBUTION: Colombia (the departments of Valle del Cauca, Tolima, and Cundinamarca). This is apparently a species that is to be found in the mountains, as the elevations range from 5800 to about 11,500 feet.

The adults have been captured in November, December, and February.

REMARKS: A total of seven specimens (all males) and seven genitalic dissections have been studied. This species is one of the largest in the genus, and it has one of the darkest under surfaces of the wings of any taxon. In addition it is one of the few species that does not have a hair pencil on the hind tibia of the male.

This and the following species are unique in having the very short recurved base of the spine of the vesica. The present taxon can be recognized by the fact that the longer and non-capitate process of the sacculus bears its spines in two groups, and by the more slender anellus. The two groups of spines on the process of the sacculus are very similar to those in *granillosa*; these two species can be separated by the nature of the spine of the vesica, and by the absence of the row of bristles from the ventral surface of A_3 in the present species.

***Glena vesana*, new species**

Figure 6

This species closely resembles *sucula*; the males of both species lack both the tibial hair pencil and the row of bristles on the under surface of the third abdominal segment. The male genitalia have good differences by which to separate the two taxa. The present species occurs in Peru and Bolivia.

MALE: Similar to that of *sucula*, but differing mainly as follows: under surface of wings with less dark brown scaling, particularly on hind wings; hind wings with discal dot tending to be smaller, and with terminal band obsolescent.

LENGTH OF FOREWING: 21 to 22 mm.; holotype, 22 mm.

FEMALE: Unknown.

MALE GENITALIA: Similar to those of *sucula*, but differing mainly as follows: uncus slightly longer; valvula with more heavily sclerotized and irregularly shaped area longitudinally; sacculus with process shorter, apically swollen and bearing either one group of spines ventrally and medially, or two narrowly separated groups of spines; length of sacculus and process, 2.0 to 2.1 mm.; anellus large, slightly longer than wide, posterolateral areas rugose, posterior margin rounded and with wide median incision; spine of vesica with broad curve, bearing small teeth in apical region, and with short recurved base; length of spine, 1.2 mm., of recurved base 0.1 to 0.2 mm. Ventral surface of A_3 without row of bristles.

FEMALE GENITALIA: Unknown.

TYPES: Holotype, male, Incachaca, Cochabamba, Bolivia (J. Steinbach); genitalia mounted on slide F.H.R. No. 13546. Paratypes: Same data as holotype, one male; Tinguri, Carabaya, [Puno], Peru, one male. All three specimens are in the collection of the United States National Museum.

DISTRIBUTION: Bolivia (the department of Cochabamba) and southern Peru (the department of Puno).

REMARKS: A total of three specimens (all males) and two genitalic dissections have been studied. This species is closely related to *sucula* but can be recognized by the paler under surface of the hind wings, by the distribution, and by the genitalia.

The male genitalia of *vesana* are quite similar to those of the preceding taxon, and can be recognized by the shorter capitate process of the sacculus, and by the broader anellus.

***Glena bisulca*, new species**

Figure 7

This large-sized species is very similar to *dentata*; both taxa occur in Ecuador and Colombia. The genitalia should be used for identification.

MALE: Similar to that of *dentata*, differing mainly as follows: upper surface of wings variably overlain with dark scales, tending to be paler in color than that of *dentata*; macula-

tion tending to be slightly more heavily represented; under surface of forewings tending to have more sinuate inner border of terminal band, represented by narrow, pale, more or less indistinct line; hind wings with incomplete terminal band and less dark scaling medially; hind tibia with hair pencil.

LENGTH OF FOREWING: 22 (holotype) to 26 mm.

FEMALE: Unknown.

MALE GENITALIA: Similar to those of *grandillosa*, differing mainly as follows: uncus with apical area more laterally compressed and curved ventrally; valves with apex of costa only slightly swollen; process of sacculus elongate but not reaching edge of valve; length of sacculus and process varying from 2.5 to 2.7 mm.; process without basal swelling but with slight enlargement at about two-thirds of length covered with elongate spines on inner side, and with apex bearing spines; anellus with length equal to width, with moderate anterior constriction, posterior margin concave and in form of two cuplike ovals, posterolateral angles with weak, posteriorly extending ridges; spine of vesica with elongate base, and with terminal portion curved dorsally and bearing minute teeth; length of spine 1.2 to 1.3 mm., of sharply recurved base 0.7 to 0.9 mm.; vesica with weakly sclerotized area posteriad of base of spine bearing numerous short, deciduous spines, and with dorsal surface having large, sclerotized, dentate area; ventral surface with weakly sclerotized area, its surface covered with extremely fine denticulation. Ventral surface of A_3 with median row of bristles.

FEMALE GENITALIA: Unknown.

TYPES: Holotype, male, Hacienda La Mascota, Rio Topo, [Napo-Pastaza], Ecuador, elevation 4500 feet, April 13, 1931 (W. J. Coxe); genitalia mounted on slide F.H.R. No. 13446. Paratypes, all from Colombia: San Cajetano, elevation 8000 feet, September, 1902, one male; Manizales, [Caldas] (A. M. Patino), one male; Vergara, [Cundinamarca], October 15 (Apollinaire), one male; Rio Vitaco, elevation 2000 meters, November, 1908 (Fassl), one male. The holotype is in the collection of the American Museum of Natural History; the first two paratypes are in the collection of the British Museum

(Natural History) and the last two are in the United States National Museum.

DISTRIBUTION: Ecuador (the province of Napo-Pastaza) and Colombia (the departments of Caldas and Cundinamarca). The species apparently flies at higher altitudes than does *dentata*, as the present taxon is known to occur from 4500 to 8000 feet.

The adults have been taken in April, September, and November.

REMARKS: A total of five specimens (all males) and five genitalic dissections have been studied. This species is similar to *dentata* in its distribution and variation. Both species apparently tend to be slightly smaller and to have less strongly defined maculation in Ecuador than in Colombia, factors that may prove to be of subspecific value when sufficient material comes to hand.

This species, like *grandillosa*, has two patches of spines on the process of the sacculus. In the latter species these groups of spines are separated by a distance of at least 0.5 mm.; in the present species this is reduced to about 0.2 mm. There are also differences between the two taxa in the shape of the anellus and in both the spine and ornamentation of the vesica.

Glena juga, new species

Figures 8, 33

The males usually have the under surface of the forewings dark and that of the hind wings white and immaculate, whereas the females have a more or less complete terminal band on the secondaries. The genitalia should be used for identification. This species occurs from Colombia south to Bolivia and Paraguay.

MALE: Similar to that of *bipennaria*, differing mainly as follows: smaller in size; maculation less strongly indicated on upper surface; under surface with forewings heavily suffused with dark brownish gray scales, and with broad, dark terminal band; under surface of hind wings varying from immaculate white to having partial representation of terminal band anteriorly; hind tibia with hair pencil.

LENGTH OF FOREWING: 18 to 27 mm.; holotype, 19 mm.

FEMALE: Similar to male but tending to have upper surface of wings more heavily irrorate with dark scales and to have less

clearly defined maculation, and to have more strongly represented terminal band below, with more dark scaling on hind wings.

LENGTH OF FOREWING: 20 to 25 mm.; allotype, 22 mm.

MALE GENITALIA: Similar to those of *grandillosa*, differing mainly as follows: valves with apex of costa only slightly swollen; process of sacculus elongate but not reaching edge of valve; length of sacculus and process varying from 2.1 to 2.4 mm.; process with terminal one-third swollen and with numerous heavy spines; anellus without constriction, increasing in width posteriorly, lateral margins and posterolateral areas with several small ridges, and with posterior margin convex and having median indentation; spine of vesica relatively short and with very long recurved base, terminal portion of spine somewhat variable in curvature, some specimens with single curve, others with weak double curve; length of spine varying from 0.9 to 1.2 mm., of sharply recurved base, 0.5 to 0.8 mm.; vesica with weakly sclerotized area posteriad of base of spine bearing numerous short, deciduous spines, and with dorsal surface having large, sclerotized, dentate area; ventral surface with weakly sclerotized area, its surface with extremely fine denticulation. Ventral surface of A_3 with median row of bristles.

FEMALE GENITALIA: Sterigma with large, elongate, smoothly sclerotized lamella postvaginalis, with width slightly more than one-half of length, narrowing posteriorly, with posterior end angled dorsally; lateral areas of sterigma large, heavily sclerotized, with pleural area produced as strongly raised ridge; intersegmental area between A_7 and A_8 sclerotized laterally, and weakly recessed and convoluted ventrally; ductus bursae about one-fifth of length of lamella postvaginalis; ductus seminalis arising from large sac laterally or ventrolaterally on left side of corpus bursae, originating between 0.9 and 1.0 mm. anterior of ductus bursae, with tubular portion coming off medially near corpus bursae; latter elongate, weakly swollen anteriorly, and with posterior one-third to two-fifths weakly sclerotized and striate, surface covered with very many small swellings or denticulations; signum situated ventrally, with flat or weakly concave ante-

rior margin, rounded posteriorly, outer margin with numerous pointed projections, and with flat median area recessed and bearing several small spinose processes. Posterior portion of ventral surface of A_7 not modified.

TYPES: Holotype, male, Carl[os] Pfannl, Paraguay, July 6, 1951 (Schade); genitalia mounted on slide F.H.R. No. 13480. Allotype, female, Coosnipata, Paucartambo, Cuzco, Peru, November 29, 1951 (F. L. Woytkowski); genitalia mounted on slide F.H.R. No. 13377. Paratypes: *Paraguay*: Carlos Pfannl, August 6, 1951 (Schade), three males; Paso Yobay, September, 1951 (Schade), two males. *Bolivia*: Rio Songo, elevation 750 meters (Fassl), one female. *Peru*: Coosnipata, Paucartambo, Cuzco, November 16, 19, 29, 1951 (F. L. Woytkowski), three females; Oconeque, Carabaya, [Puno], elevation 6000–7000 feet, July, November, 1904, February, 1905 (G. Ockenden), five males and one female; "Ob. Madre de Dios, Sud Peru," elevation 500–1200 meters (Fassl), one female; Limbani, Carabaya, [Puno], elevation 9500 feet, dry season, May, 1904 (G. Ockenden), one male. *Ecuador*: Environs of Loja, [Loja], 1888–1893, 24 males, one female; Loja, [Loja], one male. *Colombia*: Villavicencio, [Meta] (Apollinaire), one female.

The holotype and allotype are in the collection of the American Museum of Natural History; paratypes are in the collections of that institution, of the British Museum (Natural History), and of the United States National Museum.

DISTRIBUTION: Paraguay, Bolivia, Peru (the departments of Cuzco and Puno), Ecuador (the province of Loja), and Colombia (the department of Meta). Apparently this species occurs to the east of the Andes Mountains at elevations of from about 2500 to 9000 feet.

The adults have been captured in February, May, July, August, September, and November.

REMARKS: A total of 46 specimens (37 males and nine females) and 33 genitalic dissections (26 males and seven females) have been studied. Examples from Paraguay tend to be slightly smaller and paler in coloration than specimens from farther north. Males from Paraguay have an immaculate white under surface to the hind wings, whereas

Ecuadorian specimens have a partial terminal band on those wings.

This species has the apex of the process of the sacculus swollen and spinose, something like that of *bipennaria*. The present species can be separated from the latter by the broader anellus and by the much longer base of the spine in the vesica.

The female genitalia of *juga* can be recognized by the very long, tapering lamella postvaginalis with the modified posterior end, and by the prominent ridge on each side of the heavily sclerotized lateral areas of the sterigma.

***Glena megale*, new species**

Figure 34

This is a large species with elongate forewings and with the upper surface of the wings more or less heavily dusted with dark scales. The genitalia should be used for identification. This species occurs from Venezuela to Peru.

MALE: Similar to that of *effusa*, differing mainly as follows: front tending to have wider white band across bottom; upper surface of wings more heavily suffused with pale brownish gray scales, and with maculation tending to be more strongly represented; under surface with more prominent white apical spot on forewings, with terminal band tending to fade out before reaching anal angle of hind wings, and with discal dots tending to be more prominent; hind tibia with hair pencil.

LENGTH OF FOREWING: 22 to 24 mm.; holotype, 22 mm.

FEMALE: Similar to male, but with upper surface of wings heavily and evenly suffused with grayish brown scaling, and with maculation more weakly defined; under surface more heavily suffused with brown scales.

LENGTH OF FOREWING: 24 mm. (allotype).

MALE GENITALIA: Similar to those of *juga*, differing mainly as follows: uncus more strongly developed, ventral surface tending to be concave, with ventrolateral margins slightly extended; gnathos very attenuate, curving posteriorly, with long and slender median projection; process of sacculus extending beyond edge of valve, very long and slender, scarcely swollen apically, with terminal two-fifths having numerous heavy

spines; length of sacculus and process varying from 2.9 to 3.1 mm.; anellus about one and one-half times longer than broad, with wide anterior end, sharply constricted posteriorly thereof, then broadly swollen into two large, flat lobes with minutely denticulate surface, each lobe rounded posteriorly, and with large median indentation; spine of vesica sinuously curved, terminal portion with small teeth, and with elongate, sharply recurved base; length of spine varying from 1.4 to 1.5 mm., of recurved base from 0.7 to 0.8 mm.; vesica with weakly sclerotized area posteriorly of base of spine bearing numerous short, deciduous spines, and with more heavily sclerotized area extending to apex of base of spine, latter area tending to have cross striations at right angle to spine; dorsal surface of vesica with large, sclerotized, dentate area, with teeth becoming larger anteriorly of apex of spine; ventral surface with weakly sclerotized area, its surface with extremely fine denticulation. Ventral surface of A_3 with median row of bristles.

FEMALE GENITALIA: Sterigma with large, very weakly sclerotized, oval or elliptical lamella postvaginalis, becoming enlarged and more heavily sclerotized posteriorly, and with large, sclerotized lateral areas, their irregularly shaped anteromedian margins extending up to anterolateral portions of lamella postvaginalis; intersegmental membrane between A_7 and A_8 recessed and weakly convoluted ventrally; ductus bursae very short, scarcely differentiated from lamella postvaginalis; ductus seminalis arising from large sac on dorsal or dorsolateral surface, originating about 2.0 mm. anteriorly of ductus bursae, with tubular portion coming off posterolaterally; corpus bursae elongate, weakly swollen anteriorly, and with posterior two-fifths sclerotized, surface covered with very small swellings or denticulations, and with median area of corpus bursae having numerous striations; signum on left side of corpus bursae, anterior margin flat, rounded posteriorly, outer margin with numerous pointed projections, and with flat median area recessed and bearing several small spinose processes. Posterior portion of ventral surface of A_7 not modified.

TYPES: Holotype, male, Pedregosa, Merida, Venezuela, elevation 3000 meters, October,

1897 (Briceno). Allotype, female, same data, June 8, 1898; genitalia mounted on slide Geometridae No. 4801. Paratypes: *Venezuela*: Merida, November, 1898 (Briceno), one male. *Colombia*: "Nouv. Grenada," Honda, 1899 (M. de Mathan), one male. *Ecuador*: Environs of Loja, [Loja], 1887, one male. *Peru*: Santo Domingo, [Carabaya, Puno], elevation 6000 feet (G. Ockenden), one male; Chanchamayo, [Pasco], 1898 (O. Schuncke), one male; no further data, one male.

The holotype and allotype are in the collection of the British Museum (Natural History); paratypes are in the collections of that institution and of the United States National Museum.

DISTRIBUTION: Venezuela (the state of Merida), Colombia, Ecuador (the province of Loja), and Peru (the departments of Puno and Pasco). This species may be found at higher elevations; the two specimens with altitude data indicate that they were taken at 6000 and 9840 feet.

The adults were captured in June, October, and November.

REMARKS: Eight specimens (seven males and one female) and seven genitalic dissections (six males and one female) have been studied. The genitalia of the holotype protrude from the end of the abdomen, with valves spread, and they have been studied without dissection.

The adults are quite uniform in size, maculation, and color. The relatively dark color of the upper surface of the wings might be due to the age of the specimens, as all the material was apparently taken between 1887 and 1899.

The male genitalia of this species are easily recognized by their large size, by the very elongate gnathos, by the very long process of the sacculus, and by the unique shape of the anellus.

The female genitalia of *megale* can be identified by the very weakly sclerotized lamella postvaginalis and its more heavily sclerotized posterior portion, by the almost dorsal origin of the ductus seminalis from the large sac, and by the fact that the posterior part of the corpus bursae is sclerotized but not striated.

Glena unipennaria (Guenée), new combination

Boarmia unipennaria GUENÉE, 1857, p. 257.

This rather pale species of moderate size

occurs in Panama and in much of South America. The genitalia should be used for determination.

This species is divided into two populations. In one, the under side of the hind wings of the male is usually without maculation; it occurs in Brazil and Paraguay. The second population occurs from Panama to Bolivia, and the under side of the hind wings of the male has a dark terminal band.

Glena unipennaria unipennaria (Guenée)

Figures 10, 35

Boarmia unipennaria GUENÉE, 1857, p. 257. WALKER, 1860, p. 356. OBERTHÜR, 1913, p. 278 (*partim*), pl. CLXIX, fig. 1655 (lectotype).

Catoria sp. (? *Boarmia bipennaria*): COSTA LIMA, "1949" [1950], p. 129, figs. 97 (adult), 98 (male genitalia).

This is the paler population, in which the under side of the secondaries of the male is usually immaculate.

MALE: Similar to that of *bipennaria*, differing mainly as follows: smaller; upper surface of wings paler and with weaker maculation; under surface of wings considerably paler and with terminal band tending to be absent, particularly from hind wings; hind tibia with hair pencil.

LENGTH OF FOREWING: 18 to 22 mm.

FEMALE: Similar to male, but with heavier brown and brownish gray scaling above and with more weakly defined pattern; under surface more heavily suffused with dark scales and with terminal band more strongly represented.

LENGTH OF FOREWING: 16 to 24 mm.

MALE GENITALIA: Similar to those of *juga*, differing mainly as follows: gnathos tending to be less attenuate medially; process of sacculus shorter, with terminal spinose swelling; length of sacculus and process varying from 1.8 to 2.3 mm.; anellus elongate and slender, its length approximately 2.5 times as great as width, anterior portion broad, with prominent median constriction, lateral margins thickened, expanding in width posteriorly but with posterior one-fourth narrowed, without thickened margins, posteriorly rounded and with small median indentation, latter apparently continued anteriorly to near middle of anellus; spine of vesica more or less S-shaped, with elongate, sharply recurved

base, and with small teeth on anterior surface of spine near apex; length of spine varying from 1.2 to 1.5 mm., of recurved base from 0.5 to 0.8 mm.; vesica with weakly sclerotized area posteriad and away from base of spine bearing numerous short, deciduous spines, and with dorsal surface having large, subtriangular, dentate area; ventral surface with weakly sclerotized area, its surface with extremely fine denticulation. Ventral surface of A_3 with median row of bristles.

FEMALE GENITALIA: Sterigma with large, sclerotized, oval lamella postvaginalis, and with large, sclerotized lateral areas, their anteromedian margins extending to anterolateral portions of lamella postvaginalis; intersegmental area between A_7 and A_8 recessed and convoluted ventrally; ductus bursae very short; ductus seminalis arising from very large, rounded sac ventrally on corpus bursae, originating between 0.8 and 1.0 mm. anterior of ductus bursae, with tubular portion coming off sac posteroventrally; corpus bursae elongate, scarcely swollen anteriorly, and with posterior one-third to two-fifths of dorsal surface weakly sclerotized and striate, surface covered with very small swellings or denticulations; signum on ventral surface of corpus bursae, with flat or weakly concave anterior margin, rounded posteriorly, outer margin with numerous pointed projections, and with flat median area recessed and bearing several small spinose processes. Posterior portion of ventral surface of A_7 not modified.

TYPES: Guenée described *unipennaria* from a series of one male and three female specimens. Oberthür (1913) selected one of the females as the "specimina typica," because what was presumably the original male was incomplete and in a very poor state of preservation. This female becomes the lectotype; it was figured by Oberthür, and it is in the collection of the British Museum (Natural History).

TYPE LOCALITY: Brazil.

DISTRIBUTION: Southern Brazil (the states of Santa Catarina, Parana, São Paulo, Guanabara, Rio de Janeiro, Minas Gerais, and Mato Grosso) and Paraguay. (See Appendix for locality data of specimens examined.) This subspecies occurs from about sea level up to about 3100 feet.

The adults apparently fly throughout the year, as specimens have been examined that

were caught in every month except February.

REMARKS: A total of 65 specimens (51 males and 14 females) and 38 genitalic dissections (28 males and 10 females) have been studied. This population can usually be distinguished, at least in the males, by the almost immaculate under surface of the hind wings.

This species can be distinguished from *juga* in the male genitalia by the shorter process of the sacculus and by the much narrower anellus.

The female genitalia of *unipennaria* can be recognized by the very large ventral sac on the corpus bursae, with the ductus seminalis arising posteroventrally therefrom, and by the fact that the sclerotized area of the corpus bursae is primarily on the dorsal surface.

***Glena unipennaria cosmeta*, new subspecies**

Boarmia demissaria auct.: DRUCE, 1892 (1891-1900), p. 75 (*partim*).

This population differs from the nominate one by the presence of a dark terminal band on the under side of the hind wings in the males. It occurs from Panama and the Guianas to Bolivia. The genitalia should be used for determination.

MALE: Similar to that of nominate *unipennaria*, but differing mainly as follows: upper surface of wings tending to have slightly less dark scaling, and with maculation slightly less strongly indicated; under surface with dark, wide terminal band on all wings.

LENGTH OF FOREWING: 18 to 23 mm.; holotype, 19 mm.

FEMALE: Similar to male but with more obscure maculation and with upper surface of wings more heavily suffused with dark scales; under surface with heavier terminal band and more suffused with dark scales.

LENGTH OF FOREWING: 21 to 25 mm.

MALE GENITALIA: Similar to those of nominate subspecies.

FEMALE GENITALIA: Similar to those of nominate subspecies.

TYPES: Holotype, male, Fort Kobbe, Canal Zone, Panama, September 30, 1956 (W. E. Lundy); genitalia mounted on slide F.H.R. No. 13492. Paratypes: *Panama*: Same data as holotype, one male; Tolé, [Chiriquí] (Champion), one male, identified as "*Boarmia*

demissaria Walk., B. C. A. Lep. Het., Godman-Salvin Coll." *French Guiana*: Cayenne, one male. *Guyana* (former *British Guiana*): Christianburg, one male. *Venezuela*: Aroa, [Yaracuy], two males. *Colombia*: "Ob. Rio Negro," [Norte de Santander], elevation 800 meters (Fassl), two males; Minca, [Magdalena], elevation 2000 feet (H. H. Smith), one male; Florida, R[io] Putamayo, [Amazonas], March, 1932 (G. Klug), one male; no further data, one male. *Ecuador*: Zamora, Santiago-Zamora, March 27-30, 1965 (L. E. Peña), one male; Sarayacu, [Napo-Pastaza] (C. Buckley), two males; environs of Loja, [Loja], 1889, one female. *Bolivia*: Chapare, [Beni], elevation 400 meters, November 2, 1948, May, 1951, two males; R[io] Songo to R[io] Suapi, [La Paz], elevation 1100 meters, March-June, 1896 (Garlepp), one male; Prov[ince] del Sara, Santa Cruz, elevation 450 meters, January (J. Steinbach), one female.

The holotype is in the collection of the American Museum of Natural History; paratypes are in the collections of that institution, of the British Museum (Natural History), and of the United States National Museum.

DISTRIBUTION: Panama (the province of Chiriqui; the Canal Zone), Guyana, French Guiana, Venezuela (the state of Yaracuy), Colombia (the departments of Norte de Santander, Magdalena, and Amazonas), Ecuador (the provinces of Santiago-Zamora, Napo-Pastaza, and Loja), and Bolivia (the departments of Beni, La Paz, and Santa Cruz). The moths have been taken from near sea level up to about 3600 feet.

The adults have been captured in January, March, May, June, September, and November.

REMARKS: A total of 20 specimens (18 males and two females) and 16 genitalic dissections (14 males and two females) have been studied. Specimens of this population are easily separated from examples of the nominate taxon by the more heavily marked under surface of the wings. Some individuals from Bolivia tend to be more lightly marked than more northern examples. Greater difficulty will be found in separating members of this population from specimens of *demissaria*; the genitalia should be studied.

***Glena uncata*, new species**

Figures 11, 36

Boarmia demissaria auct.: DRUCE, 1892 (1891-1900), p. 75 (*partim*).

This rather pale species of moderate size occurs from Mexico to Costa Rica. The genitalia should be used for determination.

MALE: Similar to that of *unipennaria cosmeta*, differing mainly as follows: upper surface of wings with only sparse dusting of brownish gray scales; t. p. and extradiscal lines outwardly dentate on veins; under surface pale, with brownish black terminal band on all wings, decreasing in width and intensity posteriorly on hind wings; hind tibia with hair pencil.

LENGTH OF FOREWING: 18 to 20 mm.; holotype, 20 mm.

FEMALE: Similar to male, but tending to be more heavily dusted with dark scales on both upper and under surfaces of wings; terminal band on hind wings varying from being like that of male (allotype) to being broad and complete.

LENGTH OF FOREWING: 20 to 23 mm.; allotype, 20 mm.

MALE GENITALIA: Similar to those of *unipennaria*, differing mainly as follows: uncus smaller, with flatter sides; process of sacculus extending almost to edge of valve, very long and slender, scarcely swollen apically, with terminal one-fourth having numerous short spines; length of sacculus and process varying from 1.7 to 2.0 mm.; anellus long and slender, broadly concave medially, swollen distally, with posterior end rounded and with median indentation; spine of vesica curved, terminal portion with a few small teeth, and with elongate, sharply recurved base, terminating in anteriorly directed point; length of spine 1.0 to 1.1 mm., of recurved base, 0.45 mm.; vesica with weakly sclerotized area posteriad of base of spine bearing numerous short, deciduous spines, and with dorsolateral surface having large, weakly sclerotized, dentate area; ventral surface membranous. Ventral surface of A_2 with median row of bristles.

FEMALE GENITALIA: Sterigma with relatively short, posteriorly rounded, smoothly sclerotized lamella postvaginalis, with width

greater than length; lateral areas of sterigma weakly sclerotized, narrow, not attaining sterigma ventrally; intersegmental area between A_7 and A_8 recessed and convoluted laterally; ductus bursae less than one-half of length of lamella postvaginalis; ductus seminalis arising as large tube ventrolaterally from swollen area on corpus bursae, originating between 0.4 and 0.6 mm. anterior of corpus bursae; corpus bursae elongate, weakly swollen anteriorly, and with posterior one-fourth weakly sclerotized and striate, surface covered with very small swellings or denticulations; signum situated laterally or dorsally on corpus bursae, elliptical, outer margin with numerous pointed projections of approximately equal length, and with flat median area recessed and bearing small spinose processes. Posterior portion of ventral surface of A_7 not modified.

TYPES: Holotype, male, Juan Vinas, [Cartago], Costa Rica, January (Schaus and Barnes); genitalia mounted on slide F.H.R. No. 13599. Allotype, same data but collected in June, and with genitalia mounted on slide F.H.R. No. 13610. Paratypes: *Costa Rica*: Same data as types, February and June, two females; Guapiles, [Limon], November (Schaus and Barnes), one female; no further data (P. Biolley), one male. *Guatemala*: Cayuga, May (Schaus and Barnes), one male. *Mexico*: Cordoba, [Veracruz], April 28, 1908, May 16, 1908 (F. Knab), two females; Jalapa, [Veracruz] (Hoegel), one female, identified as "*Boarmia demissaria* Walk., B. C. A. Lep. Het., Godman-Salvin Coll."

The holotype and allotype are in the collection of the United States National Museum; paratypes are in the collections of that institution and of the British Museum (Natural History).

DISTRIBUTION: Costa Rica (the provinces of Cartago and Limon), Guatemala, and Mexico (the state of Veracruz).

The moths have been collected in January, February, April, May, June, and November.

REMARKS: A total of 10 specimens (three males and seven females) and nine genitalic dissections (three males and six females) have been studied. This species can usually

be separated from *unipennaria cosmata* by the fact that the terminal band on the under side of the wings is less heavily represented, by its more northern distribution, and by its genitalia.

The male genitalia are very much like those of *unipennaria*, but can be distinguished by the different shape of the anellus, by the different ornamentation of the vesica, and by the shorter spine in the aedeagus.

The female genitalia of *uncata* can be separated from those of any of the preceding species by the fact that the ductus seminalis arises as a thick tube, rather than as a large sac.

***Glena demissaria* (Walker), new combination**
Figures 12, 37

Boarmia demissaria WALKER, 1860, p. 357.

Catoria unipennaria auct.: OBERTHÜR, 1913, p. 278 (*partim*), pl. CLXIX, fig. 1657. DYAR, 1914, p. 243.

This species is similar to *unipennaria cosmata*, but the cross lines are less dentate, and there is usually more dark scaling on the under surface of the wings. The genitalia should be used for identification. This species occurs in much of South America.

MALE: Similar to that of *unipennaria cosmata*, differing mainly as follows: upper surface of wings with cross lines tending to be represented by spots on veins; under surface with broad terminal band on all wings, and with wings more or less heavily suffused with dark brownish gray scales; hind tibia with hair pencil.

LENGTH OF FOREWING: 17 to 22 mm.

FEMALE: Similar to male, but both surfaces of wings more heavily suffused with dark scales, and with cross lines on upper surface more weakly represented.

LENGTH OF FOREWING: 18 to 22 mm.

MALE GENITALIA: Similar to those of *unipennaria*, differing mainly as follows: uncus with terminal area not laterally compressed; gnathos with median process tending to be slightly shorter and less attenuate; process of sacculus shorter and with terminal spinose swelling; length of sacculus and process varying from 1.4 to 1.9 mm.; anellus elongate and slender, its length approximately three times

as great as width, sides varying from being subparallel anteriorly to having constriction about one-third of distance from base, and with prominent, rounded, rugose lobe on each margin at two-thirds of distance from base; posterior margin of anellus bilobed, with prominent median indentation extending anteriorly as membranous strip to basal constriction; spine of vesica very long, relatively straight, terminal portion with weak bend only and apex slightly hooked, and with area of slender teeth near apex; base of spine sharply recurved, its end pointed; length of spine varying from 1.4 to 2.0 mm., of recurved base from 0.6 to 1.0 mm.; vesica with weakly sclerotized area posteriad of base of spine bearing numerous short, deciduous spines, and with dorsal, posterior and ventral surfaces having extensive, sclerotized, dentate area, the teeth thereof becoming larger along margin of vesica. Ventral surface of A_3 with median row of bristles.

FEMALE GENITALIA: Sterigma with large, sclerotized, rounded lamella postvaginalis, with width slightly greater than length, and with large lateral areas partially sclerotized, their irregularly shaped median margins extending to lateral margins of lamella postvaginalis; intersegmental area between A_7 and A_8 weakly recessed and convoluted ventrally; ductus bursae very short; ductus seminalis arising in form of large tube dorsally or dorsolaterally on corpus bursae, originating between 1.1 and 1.5 mm. anterior of ductus bursae; corpus bursae elongate, weakly swollen anteriorly, and with posterior one-third to two-fifths weakly sclerotized and striate, surface covered with very small swellings or denticulations; signum on ventral surface of corpus bursae, elliptical, outer margin with numerous pointed projections, those along anterior margin tending to be longer than posterior ones, and with flat median area recessed and bearing many small spinose processes. Posterior portion of ventral surface of A_7 not modified.

TYPE: Walker described *demissaria* from a single male specimen; it is in the collection of the British Museum (Natural History).

TYPE LOCALITY: Pará, Brazil.

DISTRIBUTION: Brazil (the states of Pará, Amazonas, Mato Grosso, Minas Gerais, and Santa Catarina), Uruguay, Paraguay, eastern

Bolivia, eastern Peru (the departments of Junin, Madre de Dios, and Puno), Colombia (the department of Santander), Venezuela (the states of Bolivar and Yaracuy), Guyana, French Guiana, and Trinidad. This widely ranging species is usually found at low elevations, although one locality in Peru is given as 6000 feet.

The adults have been captured in every month of the year.

REMARKS: A total of 94 specimens (76 males and 18 females) and 55 genitalic dissections (39 males and 16 females) have been studied. *Glena demissaria* is the most common and most widespread of the smaller taxa in South America. It is a rather nondescript species that is difficult to characterize, although most specimens have the wide terminal band on the under side of the wings, and the same surface is usually suffused with dark scaling, particularly on the forewings. The genitalia should be used for identification.

The male genitalia of this species are similar to those of *unipennaria* but can be recognized by the shorter process of the sacculus, by the different configuration of the anellus, and by the longer and straighter spine in the vesica.

There is some variation in the size of the parts of the male genitalia of *demissaria*. Specimens from the southern Andes Mountains tend to have both a longer sacculus and process in the valve, and a longer spine in the aedeagus, than do examples from northern or eastern South America.

The female genitalia of this species can be separated from those of all the preceding taxa, except *uncata*, by the entirely tubular ductus seminalis. Additional diagnostic features include the short and broad lamella postvaginalis and the spinose margins of the signum; the latter will separate the genitalia of this species from those that follow. From those of *uncata*, the genitalia of *demissaria* can be recognized by the dorsal origin of the ductus seminalis.

Several years after the appearance of the description of *demissaria*, Walker (1868, pp. 184, 197) redescribed this species. The second description was based on a male from Bogotá, Colombia; this specimen has not been ex-

aminated, so it is not known whether or not it is conspecific with true *demissaria*.

***Glena basalis*, new species**

Figure 38

This species is similar to *demissaria*, but both surfaces of the wings are darker, and the t. p. and extradiscal lines are situated nearer the base of the wings. The genitalia should be used for identification. This species is known only from Costa Rica.

MALE: Unknown.

FEMALE: Similar to that of *demissaria* but with more white scales on front, and with third segment of palpi white; upper surface of wings more heavily dusted with grayish brown scales, and with maculation tending to be slightly less well defined; t. p. and extradiscal lines more dentate and situated more basally on the wings; discal spot of hind wings touching extradiscal line; under surface brownish gray, with very wide but rather poorly defined terminal band, with prominent white apical spot on each forewing, and with prominent discal dots on all wings.

LENGTH OF FOREWING: 19 mm. (holotype).

MALE GENITALIA: Unknown.

FEMALE GENITALIA: Sterigma with large, elongate lamella postvaginalis, smoothly sclerotized except for rugulose posterior one-third, and with large, sclerotized lateral areas, their median margins not extending over lamella postvaginalis, and with posterior portion having vertical ridge just anterior of outwardly swollen posterior margin; intersegmental area between A_7 and A_8 recessed but not convoluted; ductus bursae very short; ductus seminalis arising ventrally as large, swollen tube, extending posteriorly as far as ductus bursae, sharply narrowed at posterior margin and ductus continued anteriorly and then laterally, originating about 0.75 mm. anterior of ductus bursae; corpus bursae relatively short and broad, weakly swollen anteriorly, and with posterior one-fourth weakly sclerotized and striate, surface covered with very small swellings or denticulations; signum a transverse ellipse, anterior margin enlarged and smoothly rounded, and with flat median area recessed and projecting anteriorly at angle into ventral wall of corpus bursae, surface minutely ridged.

TYPE: Holotype, female, Tuis, [Cartago],

Costa Rica, elevation 5800 feet, August 31, 1908; genitalia mounted on slide F.H.R. No. 13614. This specimen is in the collection of the United States National Museum.

DISTRIBUTION: This species is known only from the province of Cartago in central Costa Rica.

REMARKS: This taxon is represented by the unique type only. The dark coloration of both surfaces of the wings, the relatively basal position of the cross lines, and the distinctive female genitalia will serve to distinguish this species.

***Glena hima*, new species**

Figures 13, 39

Boarmia—?: DRUCE, 1892 (1891–1900), p. 74.

Boarmia demissaria auct.: DRUCE, 1892 (1891–1900), p. 75 (*partim*).

This species is similar to *demissaria*, but the under surface of the wings is paler, and both the tibial hair pencil and the bristle comb on the third abdominal segment are lacking. The genitalia of both sexes are distinctive. The present taxon occurs in Costa Rica and Panama.

MALE: Similar to that of *demissaria*, but differing mainly as follows: hind tibia without hair pencil; upper surface of wings tending to have slightly more brownish scaling, and to have more prominent brown band outside t. p. and extradiscal lines; under surface much paler, forewings lightly suffused with pale brownish gray scales, and with pale brown terminal band weakly represented on forewings only.

LENGTH OF FOREWING: 18 to 24 (holotype) mm.

FEMALE: Similar to male, but with upper surface of wings more heavily suffused with brown scales, and with maculation less strongly represented; under surface of wings varying from lightly suffused with brown scales and with prominent terminal band on all wings (Panamanian specimens) to more heavily suffused with brown scales and with much less prominent terminal band (Costa Rican specimens).

LENGTH OF FOREWING: 17 to 24 mm.; allotype, 17 mm.

MALE GENITALIA: Uncus triangular, apex curving ventrally and terminating in two weak points; gnathos with moderate median

enlargement, apically wedge-shaped; costa of valves concave, and with outer one-half covered with spines; sacculus elongate, continued posteriorly by long process extending to just beyond edge of valvula, with process gradually increasing in width distally and bearing numerous short spines along inner margin of outer one-half and continuing around apex of process; length of sacculus and process varying from 1.9 to 2.6 mm.; anellus elongate, slightly increasing in width posteriorly, with raised lateral margins, and with posterior margin strongly bilobed; spine of vesica sinuate, bearing small teeth distally and with large, strongly recurved base; length of spine varying from 1.5 to 1.8 mm., of recurved base from 0.5 to 0.6 mm.; vesica with elongate, weakly sclerotized area along base of spine bearing numerous short, deciduous spines; vesica with two lateral, elongate, longitudinal, denticulate strips on dorsal surface, and with undifferentiated ventral surface. Ventral surface of A_3 without median row of bristles.

FEMALE GENITALIA: Sterigma with lamella postvaginalis long and narrow, its length three times greater than width, smoothly sclerotized, with ends rounded and with large, subtriangular, smoothly sclerotized lateral areas, slightly shorter than lamella postvaginalis; intersegmental area between A_7 and A_8 deeply recessed; ductus bursae short, tapering; ductus seminalis arising ventrally as large, rounded sac 0.6 mm. anterior of ductus bursae, with posterior portion curving to right and producing narrow tube; corpus bursae weakly swollen anteriorly, with small swelling on dorsal surface opposite origin of ductus seminalis, and with posterior portion weakly sclerotized and longitudinally striate, surface covered with very fine swellings or denticulations; signum situated ventrally, large, transverse, elliptical, with broad outer margin of more or less equal width, outer edge minutely serrate, and with median section flat.

TYPES: Holotype, male, V[olcan] de Chiriqui, [Chiriqui, Panama], below 4000 feet (Champion); genitalia mounted on slide Geometridae No. 5812. Allotype, female, David, [Chiriqui], Panama (Champion); genitalia mounted on slide Geometridae No. 5811. Both specimens are labeled "*Boarmia*

demissaria Walk. B. C. A. Lep. Het. Godman-Salvin Coll." Paratypes: *Panama*: Chiriqui, one female. *Costa Rica*: Orosi, [Cartago], elevation 1200 meters (Fassl), one male; R[io] Sucio, [San José] (H. Rogers), and identified as "*Boarmia* sp. (?)", No. 10, Druce, B. C. A. Lep. Het. Godman-Salvin Coll., one female; San José, [San José], November, 1906, one female.

The holotype and allotype are in the collection of the British Museum (Natural History); paratypes are in the collections of that institution and of the United States National Museum.

DISTRIBUTION: Panama (the province of Chiriqui) and Costa Rica (the provinces of Cartago and San José).

The only known date of capture is in November.

REMARKS: A total of six specimens (two males and four females) and six genitalic dissections have been studied. More material is needed before questions pertaining to the variability of this species can be answered. There is considerable variation in size among the few specimens that are in the type series, and there is a marked difference in maculation on the under surface of the wings between the Panamanian and Costa Rican females. Unfortunately five of the specimens do not have their dates of capture, so it is not possible to tell whether or not seasonal variation is present in this species.

The male genitalia of this species can be recognized by the nature of the process of the sacculus, by the elongate recurved base of the spine of the vesica, and by the ornamentation of the vesica.

There are certain differences between the two male dissections of this species. Part of these may be due to the way they are mounted but cannot account for all the variation. The genitalia of the Panamanian specimen are larger, and the extent of spining along the process of the sacculus is greater. The anellus of this specimen appears to be less rugose than that of the example from Costa Rica.

The female genitalia are very distinctive in having the very long and slender lamella postvaginalis. There does not appear to be very much difference between the dissections of the specimens from the two countries,

although the Panamanian examples tend to have a slightly stronger dorsal protuberance on the posterior portion of the corpus bursae.

***Glena lora*, new species**

Figure 40

This species is similar to *hima*, but the t. p. and extradiscal cross lines are slightly nearer the base of the wing in the present taxon. Good differences are present in the female genitalia by which to separate the two species. This one is known from Nicaragua.

MALE: Unknown.

FEMALE: Similar to that of *hima*, but differing mainly as follows: upper surface of wings more evenly suffused with brownish gray scales and with cross lines tending to be more clearly represented; t. p. and extradiscal cross lines slightly nearer base of wing; terminal area grayish brown, quite wide, with complete, crenulate s. t. line; under surface pale grayish brown, with forewings darker than hind wings; terminal band dark brown, completely represented on all wings; discal dots present on all wings.

LENGTH OF FOREWING: 18 mm. (holotype).

MALE GENITALIA: Unknown.

FEMALE GENITALIA: Sterigma with lamella postvaginalis long and narrow, more heavily sclerotized medially, increasing in width anteriorly to become three to four times as wide as elongate posterior strip, and with large, subtriangular, smoothly sclerotized lateral areas, shorter than lamella postvaginalis; intersegmental area between A_7 and A_8 deeply recessed; ductus bursae very short, extending more or less vertically from swollen end of lamella postvaginalis; ductus seminalis arising ventrally as slender tube about 0.3 mm. anterior of ductus bursae; corpus bursae swollen anteriorly, posterior portion not sclerotized, and with longitudinal striations extending to anterior swelling; signum situated dorsally, large, transverse, narrowly elliptical in outline, with narrow, stellate outer margin, and with flat median area having several dentate ridges.

TYPE: Camoapa, w[estern] Nicaragua, elevation 2000 feet, wet season, 1906 (G. M. Palmer); genitalia mounted on slide Geometridae No. 5829. This specimen is in the collection of the British Museum (Natural History).

DISTRIBUTION: Nicaragua.

REMARKS: One specimen (a female) and one genitalic dissection have been studied. The color of the under surface of the type specimen is somewhat intermediate between the Panamanian and Costa Rican examples of *hima*, while the pattern is more like the specimens from the former country. We do not begin to have enough material of either of these species to understand their variability.

The female genitalia of *lora* are similar to those of *hima*. These structures in the present species can be recognized by the different shape of the lamella postvaginalis, by the difference in the basal portion of the ductus seminalis, and by the different shape and position of the signum.

***Glena agria*, new species**

Figures 14, 41

Boarmia demissaria auct.: DRUCE, 1892 (1891-1900), p. 75 (*partim*).

This species resembles nominate *unipennaria*, but the upper surface of the wings tends to be slightly darker in color. The genitalia should be used for identification. The present taxon occurs from Mexico to Panama.

MALE: Similar to that of *unipennaria*, differing mainly as follows: upper surface of wings tending to be slightly grayer; t. p. and extradiscal cross lines situated slightly more basad on wings, with latter line tending to be more angled in middle of hind wing; under surface varying in color from white to dull gray, forewings darker than hind wings, and with terminal band incomplete in most specimens but completely represented in a few examples; hind tibia with hair pencil.

LENGTH OF FOREWING: 16 to 22 mm.; holotype, 16 mm.

FEMALE: Similar to male but tending to be more heavily suffused with dark scales above and below; maculation of upper surface tending to be less clearly represented, and with terminal band more prominent on under surface.

LENGTH OF FOREWING: 18 to 22 mm.; allotype, 21 mm.

MALE GENITALIA: Similar to those of *unipennaria*, differing mainly as follows: approximately one-third or one-fourth shorter

in length; valves with costa concave, slightly widened medially and not enlarged posteriorly; process of sacculus with terminal spinose swelling; length of sacculus and process varying from 1.6 to 1.8 mm.; anellus elongate and slender, with length about twice as long as width, broadly concave anteriorly, enlarged posteriorly with convoluted lateral areas, and with posterior margins rounded and having prominent median indentation; spine of vesica very long, somewhat curved and having small hook at apex, and with area of slender teeth near end; base of spine broadly recurved, its end bluntly pointed; length of spine about 1.5 mm., of recurved base 0.6 to 0.7 mm.; vesica with elongate, slender, weakly sclerotized area along base of spine bearing numerous short, deciduous spines, and with elongate, slender, spinose strip dorsally and longer and wider denticulate band ventrally. Ventral surface of A_8 with median row of bristles.

FEMALE GENITALIA: Sterigma with large, sclerotized, elliptical or oval lamella postvaginalis, length one and one-half times greater than width, and with large, sclerotized lateral areas, each of their anteromedian margins extending over one-third of anterolateral portions of lamella postvaginalis, and with posterolateral margins of lateral areas sharply curved outward; intersegmental area between A_7 and A_8 recessed and convoluted ventrally; ductus bursae with length about one-third of that of lamella postvaginalis; ductus seminalis arising laterally as large tube on left side of corpus bursae, originating between 0.7 and 0.8 mm. anterior of ductus bursae; corpus bursae elongate, weakly swollen anteriorly, and with posterior one-fourth weakly sclerotized and striate, surface covered with very small swellings or denticulations; signum in form of long, narrow, transverse ellipse, posterior margin weakly concave, outer margin anteriorly and laterally extended and weakly spinose, and with flat median area recessed and projecting anteriorly at angle into ventral wall of corpus bursae, surface flat or weakly ridged. Posterior portion of ventral surface of A_7 not modified.

TYPES: Holotype, male, Vista Hermosa, Municipio Comaltepec, Oaxaca, Mexico, elevation 4650 feet, October 1, 1962 (E. C. Wel-

ling); genitalia mounted on slide F.H.R. No. 13456. Allotype, female, same data; genitalia mounted on slide F.H.R. No. 13644. Both types are from the author's collection. **Paratypes:** *Mexico:* Same data as holotype, various dates between September 22 and October 16, 1962, three males and nine females; Mo Cuou, Cerro Pelon, Municipio Yolox, Oaxaca, elevation 7050 feet, September 17, 1962 (E. C. Welling), one female; Coatepec, [Veracruz], one male; Orizaba, [Veracruz], October (F. Knab), one female, March, 1896 (W. Schaus), two males and one female; Jalapa, [Veracruz], one female, July, 1897 (Schaus), one male, (M. Trujillo), one male and one female, (Hoegel), identified as "*Boarmia demissaria* Walk., B. C. A. Lep. Het., Godman-Salvin Coll.," one female; no further data, one male. *Guatemala:* Quirigua, [Izabal], May (Schaus and Barnes), one male; Volcan Santa Maria, [Quezaltenango], October (Schaus and Barnes), one female. *Costa Rica:* Puntarenas, Monteverde, elevation 1400 meters, 4600 feet, various dates in January, February, March, and October, 1960–1962 (C. W. Palmer), four males and one female; Sixola River, [Limon], March (Schaus and Barnes), one male. *Panama:* Chiriqui, two males and one female; Volcan del Chiriqui, below 4000 feet (Champion), one female, 3000–4000 feet (Champion), identified as "*Boarmia demissaria* Walk., B. C. A. Lep. Het., Godman-Salvin Coll.," one male.

The holotype and the allotype are in the collection of the American Museum of Natural History; paratypes are in the collections of that institution, of the British Museum (Natural History), and of the United States National Museum.

DISTRIBUTION: Mexico (the states of Veracruz and Oaxaca), Guatemala (the provinces of Izabal and Quezaltenango), Costa Rica (the provinces of Monteverde and Limon), and Panama (the province of Chiriqui). This is apparently a montane species, as it occurs at elevations of from about 4000 to 7050 feet.

The adults have been captured in January, February, March, May, July, September, and October.

REMARKS: A total of 39 specimens (19 males and 20 females) and 20 genitalic dissections (10 males and 10 females) have been

studied. There is more variation of the under surface of the wings in this species than in the preceding taxa. This applies not only to the color of the wings but to the extent of the terminal band. As is the usual case with the species in this genus, the genitalia should be studied.

The male genitalia of this species are shorter than those of both *unipennaria* and *demissaria*, but the width of the spread valves is about as great. Additional diagnostic characters are to be found in the form of the anellus, in the shape of the spine, and in the armature of the vesica.

The female genitalia of *agria* are like those of *demissaria* in that the ductus seminalis arises as a tube instead of from a large sac. The genitalia of the present taxon can be separated from those of the preceding species by the lateral origin of this tube, and by the different shape of the signum.

***Glena trapezia*, new species**

Figures 15, 42

This small species is found in southern Brazil; it can be separated from all the preceding taxa by the absence of the fovea at the base of the forewing of the male. The genitalia should be used for identification.

MALE: Similar to that of *demissaria*, differing mainly as follows: base of forewing without fovea; upper surface of wings tending to have more dark scaling in subterminal and terminal areas, with distinct s. t. line for most of length of forewing; extradiscal line on secondaries evenly rounded; under surface of all wings white, with forewings more or less shaded with brownish gray; terminal band dark brown, broad on forewings, greatly reduced and extending only to middle of secondaries; hind tibia with hair pencil.

LENGTH OF FOREWING: 18 (holotype) to 19 mm.

FEMALE: Similar to male, but with both surfaces of wings more heavily suffused with grayish brown scales; beneath with terminal band complete on hind wings but becoming less intense posteriorly.

LENGTH OF FOREWING: 20 mm. (allotype).

MALE GENITALIA: Uncus triangular, sides weakly concave, apex sharply pointed and not strongly curved ventrally; gnathos relatively small, with median enlargement

rounded; costa of valves with outer two-thirds slightly swollen and bearing slender spines; sacculus sclerotized, extending slightly more than one-half of length of valve, distal one-third with slender, sclerotized basal extension of process along outer edge of valve; process of sacculus slender, curving into middle of valve, not attaining posterior margin of valvula, and bearing row of heavy, outwardly directed spines, consisting of six or seven basal ones in single line and six to eight smaller terminal spines in double row; length of sacculus and process 1.9 mm.; anellus with wide anterior margin, constricted posteriorly, then widening distally, posterolateral margins extended ventrally and being finely spiculate, and with posterior margin becoming membranous, apparently bilobed and with prominent median incision; spine of vesica without recurved base, gently curved medially, and tapering to long, slender point; length of spine 1.0 to 1.1 mm.; vesica extending at right angle to aedeagus when exerted, with sclerotized area near base of spine bearing numerous short, deciduous spines; posterior surface of vesica with elongate, slender, sclerotized, denticulate strip. Ventral surface of A_8 with median row of bristles.

FEMALE GENITALIA: Sterigma roughly trapezoidal in outline, with elongate lamella postvaginalis, lightly sclerotized anteromedially, increasing in width posteriorly, with two elongate, raised, padlike processes; lateral areas of sterigma lightly and smoothly sclerotized, their median margins extending out ventrally over lateral margins of lamella postvaginalis, and with rear margin becoming more heavily sclerotized and projecting posteriorly in triangular fashion; intersegmental area between A_7 and A_8 recessed and slightly convoluted; ductus bursae short; ductus seminalis arising on left side of corpus bursae as slightly swollen tube 0.6 mm. anterior of ductus bursae; corpus bursae with anterior portion swollen, posterior one-fifth lightly sclerotized and striate, surface covered with minute denticulations extending farther down left side than on right; signum ventrolateral, elongate, transverse, anterior margin weakly concave, outer margin weakly denticulate, and with flat median area recessed and projecting an-

teriorly at angle into wall of corpus bursae, its surface with minute teeth. Posterior portion of ventral surface of A_7 not modified.

TYPES: Holotype, male, Faz[enda] dos Campos, Passa Quatro, Minas [Gerais], Brazil, November 24, 1916 (J. F. Zikan); genitalia mounted on slide F.H.R. No. 13540. Allotype, female, Alto Serra, São Paulo, Brazil, December 10 (Pohl); genitalia mounted on slide F.H.R. No. 13423. Paratype, Petropolis, [Rio de Janeiro, Brazil], one male.

The holotype and allotype are in the collection of the United States National Museum; the paratype is in the collection of the British Museum (Natural History).

DISTRIBUTION: Southern Brazil (the states of Minas Gerais, São Paulo, and Rio de Janeiro).

The moths have been captured in November and December.

REMARKS: Three specimens (two males and one female) and three genitalic dissections have been studied. In addition to the lack of the fovea at the base of the forewing in the male, the adults can be recognized by the presence of the broad terminal band on the under side of the forewings. On the hind wings, the males are without almost any trace of the terminal band, but the females have a wide band, decreasing in intensity posteriorly.

The male genitalia of this species are very distinctive in that the spine of the vesica does not have a recurved base, and the spining of the process of the sacculus is directed outward instead of inward and posteriorly.

The female genitalia are unique in the genus in the trapezoidal outline of the sterigma.

***Glena sacca*, new species**

Figure 16

This species, known from Peru, can be separated from *trapezia* by the absence of the heavy black terminal band from the under side of the forewing. The male genitalia are distinctive.

MALE: Similar to that of *trapezia*, differing mainly as follows: larger; front with narrower white band across bottom; palpi longer; forewing without noticeable fovea but specialized scaling present on under side at base of wing,

and with apex more produced; upper surface of wings pale brownish gray, with very large costal spots at origin of cross lines; t. p. and extradiscal lines situated nearer base of wing; terminal intravenular dots small; under side with nebulous dark brown terminal band in upper one-half of forewings only, with wide area of ground color distad thereto, and with partial t. p. line present in upper portion of wing; discal dots present on all wings; hind tibia with hair pencil.

LENGTH OF FOREWING: 20.5 mm. (holotype).

FEMALE: Unknown.

MALE GENITALIA: Similar to those of *trapezia*, but differing mainly as follows: larger, with combined lengths of uncus, tegumen, and saccus almost one-half again as long; uncus with apex angled ventrally; valves with costa neither swollen nor spinose, and extending well posteriorly of valvula; sacculus simple, with process not so strongly angled basally, thicker, tubular, and bearing band of small spines on posteromedian end of process; length of sacculus and process 1.8 mm.; anellus with posterior end large, rounded, and with lateral areas weakly crenulate; spine parallel with aedeagus when vesica exerted, evenly curved dorsally, and with very short recurved base; length of spine 1.15 mm., of recurved base 0.25 mm.; vesica with weakly sclerotized area by base of spine, presumably bearing numerous short, deciduous spines; vesica with posterior end on dorsal surface finely granulose, and with large, apically bifurcate, exsertile caecum on left side just posteriorly of aedeagus. Ventral surface of A_3 with median row of bristles.

FEMALE GENITALIA: Unknown.

TYPE: Holotype, male, Chanchamayo, [Pasco, Peru], elevation 2100–7500 feet; genitalia mounted on slide Geometridae No. 5775. This specimen is in the collection of the British Museum (Natural History).

DISTRIBUTION: Peru (the department of Pasco).

REMARKS: One specimen and one genitalic dissection have been studied. The upper surface of the unique type is somewhat worn, so all the details of the maculation cannot be made out. It is also possible that the specimen may be somewhat discolored.

The male genitalia of this species are very

distinctive in the type of spine and vesica of the aedeagus. The process of the sacculus is also characteristic.

***Glena bulla*, new species**

Figure 17

This is a relatively small species with narrow, complete, dentate t. p. and extradiscal lines, with a strong fovea at the base of the forewing of the male, and with the terminal band represented at the apex of the forewing only. The female is unknown. The taxon occurs in Paraguay, Argentina, and Bolivia. The genitalia have good specific characters.

MALE: Similar to that of *trapezia*, but differing mainly as follows: base of forewing with small, strongly raised fovea; upper surface of wings whitish gray, with very few dark scales; t. p. and extradiscal lines complete, narrow, outwardly dentate on veins; terminal area concolorous with, or only slightly darker than, remainder of wing, with s. t. line tending to appear more prominent as result. Under surface of wings white; forewings with broad blackish brown terminal band extending to vein M_3 only, some specimens with faint, narrow trace of band continued down primaries and onto hind wings; costa with three spots marking inception of cross lines of upper surface. Hind tibia with hair pencil.

LENGTH OF FOREWING: 16 to 18 mm.; holotype, 16 mm.

FEMALE: Unknown.

MALE GENITALIA: Uncus triangular, with apical region extending posteriorly, apex with parallel sides and terminally bifurcate; gnathos relatively small, well sclerotized, median enlargement not prominent; valves elongate, with distal two-thirds to three-fourths of costa weakly swollen and bearing numerous setae; sacculus rather short and wide; process of sacculus extending inward, then angled to subparallel costa, latter part elongate, slender, and bearing numerous short, heavy setae; length of sacculus and process varying from 2.0 to 2.2 mm.; anellus long and slender, appearing pedicelate from wide base, expanding in width posteriorly by means of several convoluted ridges, and with membranous posterior margin rounded; spine of vesica weakly sinuous, inner surface of apical region having numerous fine teeth, and

with apex hooked; spine with elongate, recurved base, tending to become slightly membranous and flattened apically; length of spine varying from 2.0 to 2.1 mm., of recurved base from 0.8 to 0.9 mm.; vesica with elongate, narrow, sclerotized strip along base of spine bearing numerous, short, deciduous spines, and with lightly sclerotized, dentate area continued from sclerotized strip, parallel with spine, with denticulations extending posteriorly and decreasing in size; ventral surface without denticulate area. Ventral surface of A_3 with median row of bristles.

FEMALE GENITALIA: Unknown.

TYPES: Holotype, male, Puerto Casado, [Boquerón], Paraguay, July 4, 1950; genitalia mounted on slide F.H.R. No. 9800. Paratypes: [uerto] Casado, Independencia, Paraguay, November 21, 1949, one male; Vincente Lopez, Buenos Aires, Argentina, August 5, 1951, one male; Yunga del Espiritu Santo, Cochabamba, Bolivia, 1888–1889 (P. Germain), one male.

The holotype is in the collection of the American Museum of Natural History; the paratypes are in the collections of that institution and of the British Museum (Natural History).

DISTRIBUTION: Argentina (the province of Buenos Aires), Paraguay (the department of Boquerón), and Bolivia (the department of Cochabamba). This apparently is a southern species that is found at low elevations in the Humid Subtropical Zone.

The adults have been taken in July, August, and November.

REMARKS: A total of four specimens (all males) and four genitalic dissections have been studied. The fovea at the base of the forewing is of a different shape than the foveae of any of the preceding species. In *bulla* this modification of the wing is relatively short but quite high; in the other species the structure is more elongate, lower, and less prominent.

***Glena gemina*, new species**

Figures 18, 43

Boarmia demissaria auct.: DRUCE, 1892 (1891–1900), p. 75 (*partim*).

The adults of this species appear to be very similar to those of *agria*, but the genitalia indicate a close relationship to *bulla*. This

species is known from Central America, and the genitalic structures should be used for identifying it.

MALE: Similar to that of *agria*, differing mainly as follows: upper surface of wings with slightly heavier dusting of brownish gray scales, particularly in outer portion of wings; under surface with forewings pale brownish gray, with darker, broad terminal band separated from more basal portion of wing by nebulous pale gray stripe, and with hind wings similar to forewings but paler; hind tibia with hair pencil.

LENGTH OF FOREWING: 20 mm. (holotype).

FEMALE: Similar to male, but with both surfaces of wings more heavily covered with grayish brown scales, and with under surface having both more prominent terminal band and white apical patch on forewings.

LENGTH OF FOREWING: 23 mm. (allotype).

MALE GENITALIA: Similar to those of *bulla*, but differing mainly as follows: uncus with apical region wider and with posterior margin truncate; gnathos with median enlargement slightly longer and more slender; valves with costa neither enlarged nor spinose; sacculus with much shorter process; length of sacculus and process 1.3 mm.; anellus almost twice as long as wide, flat except for lateral ridges posteriorly, with constriction near base, and with posterior margin bluntly wedge-shaped and having median incision; spine of aedeagus elongate, bisinuate, and with apex curved; base of spine sharply recurved, elongate; length of spine 1.8 mm., of recurved base 0.65 mm.; vesica with slender sclerotized area along base of spine bearing numerous short, deciduous spines; vesica with two slender, longitudinal, denticulate strips, one each on right and left sides, both near aedeagus. Ventral surface of A_3 with median row of bristles.

FEMALE GENITALIA: Sterigma with large, elongate, ovate lamella postvaginalis, and with large lateral areas, more or less subtriangular in outline, their anteromedian margins extending out ventrally over anterolateral margins of lamella postvaginalis; intersegmental area between A_7 and A_8 recessed, truncate anteriorly; ductus bursae short, narrower than width of lamella postvaginalis; ductus seminalis arising on left side of corpus bursae as slightly swollen tube al-

most 1.0 mm. anterior of ductus bursae; corpus bursae with anterior end rotated about one-half turn to left, posterior one-eighth lightly sclerotized and striate, surface covered with minute denticulations, and with striations extending almost entire length of corpus bursae; signum situated dorsally or dorsolaterally, elongate, transverse, outer margin stellate, and with flat median area recessed and having minute teeth. Posterior portion of ventral surface of A_7 not modified.

TYPES: Holotype, male, Cerro Zunil, [Quezaltenango], Guatemala, elevation 4000–5000 feet (Champion), identified as "*Boarmia demissaria* Walk., B. C. A. Lep. Het., Godman-Salvin Coll."; genitalia mounted on slide Geometridae No. 5826. Allotype, female, Orosi, [Cartago], Costa Rica, elevation 1200 meters (Fassl); genitalia mounted on slide Geometridae No. 5824. Both specimens are in the collection of the British Museum (Natural History).

DISTRIBUTION: This species is known only from the mountains of Guatemala and Costa Rica.

REMARKS: Two specimens and two genitalic dissections have been studied. The only safe way to distinguish *gemina* from *agria* is by studying the genitalia.

The male genitalia of this taxon show a close relationship to those of *bulla*, but are to be distinguished by the much shorter process of the sacculus and by the different configuration of the anellus.

Glena laticolla, new species

Figures 19, 44

Boarmia demissaria auct.: DRUCE, 1892 (1891–1900), p. 75 (*partim*).

This small species with variable maculation is found in Mexico and Nicaragua. The genitalia should be used for identification.

MALE: Similar to that of *gemina*, differing mainly as follows: upper surface of wings more (holotype) or less (paratype) suffused with grayish brown scales; maculation tending to be less clearly defined, with large grayish brown patch on forewings in cells M_2 and M_3 , and with rather nebulous markings in outer portion of wing; under surface varying from being dull gray, with faint, broad terminal band (holotype), to whitish gray, with distinct terminal band (paratype), both

specimens with hind wings paler than forewings; hind tibia with hair pencil.

LENGTH OF FOREWING: 18 (paratype) to 19 (holotype) mm.

FEMALE: Similar to male, but upper surface more heavily suffused with grayish brown scales; under surface gray, with distinct, complete terminal band on all wings.

LENGTH OF FOREWING: 23 mm. (allotype).

MALE GENITALIA: Similar to those of *gemina*, but differing mainly as follows: sacculus with process straight, very long, and slender, bearing spines on outer one-fourth or one-third; length of sacculus and process varying from 2.0 to 2.1 mm.; spine of vesica less curved and without curved apex; length of spine 1.45 mm., of recurved base 0.45 mm. Ventral surface of A_8 with median row of bristles.

FEMALE GENITALIA: Similar to those of *gemina*, but differing mainly as follows: sterigma less heavily sclerotized and with smaller lateral areas; intersegmental area between A_7 and A_8 not truncate anteriorly and more convoluted; ductus bursae very broad, at least as wide as lamella postvaginalis; ductus seminalis arising about 0.8 mm. anterior of ductus bursae; corpus bursae shorter, with narrowed area, owing to rotation of anterior portion, situated more posteriorly.

TYPES: Holotype, male, Puerto Elegio, Municipio Comaltepec, Oaxaca, Mexico, elevation 2296 feet, September 26, 1961 (E. C. Welling), and from the author's collection; genitalia mounted on slide F.H.R. No. 10554. Allotype, female, Cordova, Veracruz, [Mexico] (Rumeli), and identified as "*Boarmia demissaria* Walk., B. C. A. Lep. Het., Godman-Salvin Coll."; genitalia mounted on slide Geometridae No. 5834. Paratype, Eden, [Zelaya], Nicaragua, May 13, 1922 (Wharton Huber), one male.

The holotype and paratype are in the collection of the American Museum of Natural History; the allotype is in the collection of the British Museum (Natural History).

DISTRIBUTION: Southern Mexico (the states of Veracruz and Oaxaca) and Nicaragua.

The adults have been captured in the months of May and September.

REMARKS: A total of three specimens and three genitalic dissections have been studied.

The single male from Mexico tends to have a suffused appearance on both surfaces of the wings, whereas the male from Nicaragua is lighter in color and has the maculation on both surfaces of the wings much more contrasting.

The genitalia of this species are very similar to those of *gemina*. The male can be recognized by the much longer and thinner process of the sacculus, and the female can be known by the much wider ductus bursae.

Glena brachia, new species

Figures 20, 45

This small to moderate-sized species has the outer portion of the upper surface of the wings darkened, strongly dentate t. p. and extradiscal lines, and lacks the fovea at the base of the forewing in the male. It occurs from southern Brazil to Peru. The genitalia should be used for identification.

MALE: Similar to that of *bulla*, differing mainly as follows: forewing without fovea at base; upper surface suffused with grayish brown in terminal area; t. p. and extradiscal lines strongly dentate; s. t. line whitish gray, outwardly scalloped, more or less complete; under surface whitish gray, with faint pearly luster, with blackish brown terminal band complete on forewings, varying from being absent to being partially represented on hind wings; hind tibia with hair pencil.

LENGTH OF FOREWING: 17 to 20 mm.; holotype, 20 mm.

FEMALE: Similar to male but more heavily dusted with dark scales on both surfaces of wings; terminal band below tending to be more heavily represented.

LENGTH OF FOREWING: 18 to 21 (allotype) mm.

MALE GENITALIA: Uncus heavily sclerotized, triangular, with apex wedge-shaped and terminating in single point; gnathos heavily sclerotized, lateral areas straplike, with elongate, slender, median projection; valves with costa in form of slender, S-shaped, free arm, attached at base only; valvula with rounded posterior margin extending to, or slightly beyond, tip of costa; sacculus short, continued distally as very long, slender process extending as far as tip of costa; apex of process in form of slender, diagonal enlargement, about four times

longer than width of process, and bearing numerous spines along posterior margin; length of sacculus and process varying from 2.4 to 3.0 mm.; anellus elongate, with length twice that of width, with small, smoothly sclerotized anterior portion with median indentation and constriction, posteriorly in form of two elongate, slender lobes, separated by less than own width by more membranous area; cristae prominent, situated at base of valve near anterior margin of anellus; base of valve, on outer surface, with strong patch of very long, hairlike scales; vesica with well-developed, S-shaped spine, with hooked apex and with several stout teeth nearby, and with strongly recurved base; length of spine varying from 1.3 to 1.5 mm., of recurved base from 0.7 to 0.8 mm.; vesica with elongate, slender, lightly sclerotized strip along base of spine bearing numerous small, deciduous spines; exserted vesica with finely denticulate area dorsally and on right side, terminating in heavily sclerotized strip; left side with much smaller sclerotized and denticulate area, in some specimens appearing as several teeth only; ventral surface striate. Ventral surface of A_8 with median row of bristles.

FEMALE GENITALIA: Sterigma with heavily sclerotized, short, rhomboidal lamella postvaginalis, with posterior end curved dorsally, and with very large, sclerotized, lateral areas situated posteriad of lamella postvaginalis and having irregularly curved margins; intersegmental area between A_7 and A_8 shallowly recessed, weakly crenulate and membranous ventrally, becoming sclerotized laterally; ductus bursae very short; ductus seminalis arising from dorsal surface of corpus bursae as swollen tube, originating about 0.6 mm. anterior of ductus bursae; corpus bursae relatively short and broad, with posterior one-fourth to one-third weakly sclerotized, surface covered with very small swellings or denticulations, and having several small ridges; signum on dorsal surface of corpus bursae, long and slender, transverse, outer margin smooth and tending to be slightly wider on anterior side, and with flat median area recessed and projecting anteriorly at angle into wall of corpus bursae.

TYPES: Holotype, male, Nuevo Teutonia, [Santa Catarina], Brazil, October 28, 1948

(F. Plaumann), and from the Sperry collection; genitalia mounted on slide J.L.S. No. 1710. Allotype, female, Sapucay, [Paraguari], Paraguay, July 6, 1902 (W. Foster); genitalia mounted on slide Geometridae No. 4838. Paratypes: *Brazil*: Same data as holotype, March, 1953, one male. *Paraguay*: Same data as allotype (Collins), one male, October 27, 1903, one male. *Bolivia*: Prov[ince] del Sara, Santa Cruz, elevation 450 meters, October (J. Steinbach), one male; Mapiri R[iver], east Bolivia, one female; latitude $17^{\circ} 46' 55''$ S., longitude $63^{\circ} 5' 34''$ W. [about 6 miles southwest of Santa Cruz, Santa Cruz], one male. *Peru*: Satipo, [Junin], December, 1941, August, 1948, October (P. Paprzycki), three males; Chanchamayo, [Pasco] (Schuncke), one male; Huambo, "IV Trin.," 1889 (M. de Mathan), one male.

The holotype is in the collection of the American Museum of Natural History, and the allotype is in that of the British Museum (Natural History); paratypes are in the collections of those two institutions and of the United States National Museum.

DISTRIBUTION: Southern Brazil (the state of Santa Catarina), Paraguay (the department of Paraguari), Bolivia (the department of Santa Cruz), and Peru (the departments of Junin and Pasco).

The adults have been taken in March, July, August, October, and December.

REMARKS: A total of 13 specimens (11 males and two females) and 13 genitalic dissections have been studied. Specimens from Brazil and Paraguay tend to have less of a terminal band on the under surface of the wings in males than do those from Bolivia and Peru. In addition to this variability, there seem to be some seasonal differences within this taxon, as far as can be determined from the limited amount of dated material. Specimens from Peru, dated May, have a much heavier terminal band than do the examples dated October and December, as do two Brazilian specimens dated March and October. Much more material of this species is needed before the entire picture of variability can be satisfactorily explained.

This species can be recognized by the unique, free costal arm of the costa in the male genitalia. The form of the uncus is dif-

ferent from that of all the preceding species, although it is to be found in the succeeding taxa.

The female genitalia of *brachia* are distinctive in that the sterigma is heavily sclerotized, with the lamella postvaginalis anterior of the irregularly shaped lateral areas.

***Glena cretacea* (Butler), new combination**

Figure 21

Tephrosia ? cretacea BUTLER, 1881, p. 327.

This species is similar to *brachia*, but the upper surface of the wings tends to be slightly more brownish. The genitalia should be used for determination. This taxon occurs in Brazil and Peru.

MALE: Similar to that of *brachia*, differing mainly as follows: upper surface of wings slightly more suffused with brownish scaling; cross lines tending to be more strongly represented; under surface of wings with terminal band present on forewings, varying from prominent to absent on hind wings; hind tibia with hair pencil.

LENGTH OF FOREWING: 18 mm.

FEMALE: Not examined (known only from unique type).

MALE GENITALIA: Uncus heavily sclerotized, triangular, with apex slightly attenuate and curved ventrally; gnathos heavily sclerotized, with large median projection terminally rounded; valves with slender costa enlarged distally into hirsute, triangular protuberance jutting inward toward center of valve, not attaining end of valvula, and with inner margin of costa irregular in outline and bearing small spines; sacculus short but with very long and slender process extending beyond end of costa, outer one-half of process slightly wider than basal portion, and with apex somewhat enlarged and bearing curved band of spines extending from surface of valvula to ventral surface of process; length of sacculus and process varying from 2.9 to 3.0 mm.; anellus long and slender, with length about twice as great as width, strongly constricted above base, enlarging posteriorly, with median incision separating wedge-shaped posterior segments, lateral areas with

several ridges and with two ridges running length of anellus; base of valve on outer surface with strong hair pencil; spine of vesica slightly sinuous, with slightly curved apex having thornlike projections apically, and with sharply recurved base; length of spine 2.2 to 2.3 mm., of recurved base 0.85 mm.; vesica with sclerotized strip near base of spine presumably bearing numerous short, deciduous spines; exerted vesica with slender, denticulate strip extending to sclerotized, projecting tip of aedeagus, in length about one-half of that of spine, and with shorter, denticulate area on vesica under outer portion of spine. Ventral surface of A_3 with median row of bristles.

FEMALE GENITALIA: Not examined. A photograph of the genitalia of the type indicates that these structures are similar to those of *totana*, *quadrata*, and *mopsaria*. In the present species the sterigma is narrower than the ductus bursae, and ends posteriorly in two widely divergent points.

TYPE: Butler described *cretacea* from a single female; this specimen is in the collection of the British Museum (Natural History).

TYPE LOCALITY: "Prainha, Amazons," Brazil.

DISTRIBUTION: The Amazon basin, in both Brazil and Peru (the department of Madre de Dios). (See Appendix for locality data of specimens examined.)

The adults have been captured in the months of September and November (the type specimen).

REMARKS: Two specimens (both males) and two genitalic dissections have been studied. The under surface of the wings of these two males show the same type of variation that is found in *brachia*. The Peruvian specimen, caught in September, has but a very faint terminal band on the hind wings, whereas the undated Brazilian example has a heavy terminal band on the secondaries.

The male genitalia of this species are basically similar to those of *brachia*. The present taxon can be distinguished by the differences in the valves, particularly in the costa and process of the sacculus, and by the nature of the anellus.

Glena gampsia, new species

Figure 22

This species is very similar to *brachia*; it occurs in Venezuela. The genitalia should be used for identification.

MALE: Similar to that of *brachia*, differing mainly as follows: upper surface of wings with outer portion slightly darker and with s. t. line complete; t. p. line tending to be more S-shaped; under surface with terminal band broadly represented on forewings and on anterior portion of hind wings; hind tibia with hair pencil.

LENGTH OF FOREWING: 17 mm. (holotype).

FEMALE: Unknown.

MALE GENITALIA: Similar to those of *cretacea*, differing mainly as follows: smaller by approximately one-fifth; uncus tapering to single point; gnathos with elongate, slender, median enlargement; valves with costa having inner margin without spines and with apex rounded and with small median cleft; sacculus with very long and slender process extending as far as end of costa, with apical region curving medially, becoming swollen and bearing thick group of short spines on posterior surface; length of sacculus and process 2.1 mm.; anellus shorter and broader, with posterior margin more or less truncate; spine of vesica slender, straight, with apex tapering and finely hooked at end and with sharply recurved base; length of spine 1.0 mm., of recurved base 0.3 mm.; vesica with sclerotized strip near base of spine bearing numerous short, deciduous spines; exerted vesica with small swelling near middle of spine, having apical portion sclerotized, and with elongate, slender dentate strip on opposite side of vesica. Ventral surface of A_3 with median row of bristles.

FEMALE GENITALIA: Unknown.

TYPE: Holotype, male, San Esteban, Venezuela, June, 1909 (S. M. Klages); genitalia mounted on slide Geometridae No. 5840. The type is in the collection of the British Museum (Natural History).

DISTRIBUTION: Venezuela.

REMARKS: One specimen and one genitalic dissection have been studied. Although the type of this species is about the same size as the adults of *brachia*, the genitalia of the male are considerably smaller. In color and

maculation these two species are very similar, but good differences are present in both the distribution and in the male genitalia to separate them. The male structures of the present taxon can be recognized by the more pointed uncus, the longer and more slender gnathos, and by the fact that the process of the sacculus does not extend beyond the apex of the costa.

Glena labecula, new species

Figure 23

This species is very similar to *brachia* and *cretacea*; it occurs in Bolivia. The genitalia should be used for identification.

MALE: Similar to that of *brachia*, differing mainly as follows; upper surface of wings slightly more suffused with brownish scaling; cross lines tending to be more strongly represented; nebulous brownish gray spot present in cell M_2 distad of t. p. line; under surface without pearly luster, with dull brownish black terminal band on all wings; hind tibia with hair pencil.

LENGTH OF FOREWING: 18 mm. (holotype).

FEMALE: Unknown.

MALE GENITALIA: Similar to those of *cretacea*, but differing mainly as follows: uncus shorter, more triangular; gnathos with much more slender median enlargement; costa of valves somewhat S-shaped, extending slightly beyond valvula, with apex somewhat attenuate and with slender, finger-like projection arising from inner margin, length of projection equal to width of costa; sacculus with process shorter than costa, apex swollen and bearing spines posteriorly; length of sacculus and process 2.8 mm.; anellus slender, length two and one-half times width, posterolateral areas with several longitudinal ridges and with posterior margin deeply bilobed; spine of vesica shallowly S-shaped, with several teeth posteriorly and sharply recurved base; length of spine 1.5 mm., of recurved base 0.5 mm.; vesica with sclerotized strip near base of spine presumably bearing numerous short, deciduous spines; vesica with elongate, broad, denticulate strip, almost as long as spine. Ventral surface of A_3 with median row of bristles.

FEMALE GENITALIA: Unknown.

TYPE: Holotype, male, Chapare, [Beni], Bolivia, April, 1951; genitalia mounted on

slide F.H.R. No. 9860. This specimen is from the Sperry collection and is in the American Museum of Natural History.

DISTRIBUTION: Bolivia (the department of Beni).

REMARKS: One specimen and one genitalic dissection have been studied. The only safe way to separate this species from the preceding one is by a study of the genitalia.

The male genitalia of *labecula* are like those of *brachia* but can be distinguished by the fact that the costa of the valves extends beyond the process of the sacculus.

***Glena totana*, new species**

Figures 24, 46

Boarmia bipennaria auct.: KAYE AND LAMONT, 1927, p. 99 (*partim*).

This species is very similar to the preceding taxa; it occurs in Trinidad. The genitalia should be used for identification.

MALE: Similar to that of *brachia*, differing mainly as follows: upper surface of wings slightly more suffused with gray scales; s. t. line tending to be slightly more strongly represented, emphasized by dark gray or grayish black scales along inner margin of line; under surface without pearly luster and tending to be more strongly suffused with dark scales, particularly on forewings; dark terminal band present on all wings; hind tibia with hair pencil.

LENGTH OF FOREWING: 16 to 18 mm.; holotype, 16 mm.

FEMALE: Similar to male, but with more light brown scaling on upper surface of wings and with brown band distad of t. p. line; under surface dark brownish gray, with wider and darker terminal band on all wings.

LENGTH OF FOREWING: 17 to 19 mm.; allotype, 17 mm.

MALE GENITALIA: Similar to those of *labecula*, but differing mainly as follows: costa straight, with slender, finger-like projection arising from near middle of distal margin and with length of projection slightly shorter than width of costa; sacculus with shorter capitate process bearing fewer and longer spines; length of sacculus and process 1.5 to 1.6 mm.; spine of vesica with weakly curved apex, several thornlike teeth posteriorly, and sharply recurved base; length of spine 1.4 mm., of recurved base 0.45 mm.;

vesica with additional small, denticulate patch near end of aedeagus under spine. Ventral surface of A_8 with median row of bristles.

FEMALE GENITALIA: Sterigma with lamella postvaginalis bilobate, in width two-thirds as wide as posterior portion of corpus bursae, and with large, sclerotized, winglike, lateral areas united medially, twice as wide as posterior portion of corpus bursae and becoming narrowed medially; intersegmental area between A_7 and A_8 weakly sclerotized and deeply recessed ventrally; ductus bursae not differentiated; ductus seminalis arising dorsally from corpus bursae as slender tube 1.1 mm. anterior of anterior margin of intersegmental area; corpus bursae gradually increasing in width anteriorly, with posterior two-fifths sclerotized, surface covered with very small swellings or denticulations; signum on dorsal surface near anterior end of corpus bursae, outer margin smooth and wider on anterior side, and with flat median area recessed and projecting anteriorly at angle into wall of corpus bursae.

TYPES: Holotype, male, Arima Valley, Trinidad, elevation 800–1200 feet, February 10–22, 1964 (J. G. Rozen and P. Wygodzinsky); genitalia mounted on slide F.H.R. No. 12544. Allotype, female, Palmiste, Trinidad, March 7, 1917 (Sir N. Lamont); genitalia mounted on slide Geometridae No. 5825. Paratypes, all from Trinidad: Same data as holotype, eight males, February 20, 24, 1966 (J. G. Rozen), two males; no further data, two females.

The holotype and the male paratypes are in the collection of the American Museum of Natural History; the allotype is in the collection of the British Museum (Natural History), and the female paratypes are in the United States National Museum.

DISTRIBUTION: Trinidad. The adults have been taken in February and March.

REMARKS: A total of 14 specimens (11 males and three females) and five genitalic dissections (three males and two females) have been studied. Kaye and Lamont (1927, p. 99) reported two specimens of "*bipennaria*" from Trinidad. One of these is the allotype of *totana*. The second specimen (Guaico, April 18, 1915) has not been examined, so it is not known whether it belongs to this species or

to *demissaria*, which also occurs on Trinidad.

The male genitalia of this species are to be separated from those of *labecula* by the much shorter sacculus and process. In the present taxon they are slightly less than one-half of the length of these structures in the previous species.

The female genitalia of *totana* are quite distinct from any of the previously described structures in that the sterigma has the lateral areas united medially and much wider than the lamella postvaginalis.

***Glena quadrata*, new species**

Figures 25, 47

This species closely resembles *totana*, but it is browner; it is known from French Guiana. The genitalia should be used for identification.

MALE: Similar to that of *brachia*, differing mainly as follows: upper surface of wings more suffused with brown scales; cross lines more strongly represented, with s. t. line emphasized by dark gray or grayish black scales along inner margin of line; under surface without pearly luster and more strongly suffused with dark scales; dark terminal band present on all wings; hind tibia with hair pencil.

LENGTH OF FOREWING: 16 to 18 mm.; holotype, 17 mm.

FEMALE: Similar to male, but with heavier suffusion of brown and brownish gray scales on both upper and under surfaces of wings; maculation less clearly represented above and with heavier terminal band below.

LENGTH OF FOREWING: 18 to 19 mm.; allotype, 19 mm.

MALE GENITALIA: Similar to those of *totana*, differing mainly as follows: process of sacculus slightly longer, apical process elongate, bearing numerous outwardly curving spines on dorsal surface; length of sacculus and process 1.8 to 1.9 mm.; spine of vesica with curved tip, with several thornlike teeth posteriorly, and with sharply recurved base, apical region of which becomes flattened and curves posteriorly; length of spine 1.2 to 1.3 mm., of recurved base, 0.5 mm.; vesica with dorsal, denticulate strip tending to be shorter and broader. Ventral surface of A_3 with median row of bristles.

FEMALE GENITALIA: Sterigma with lamella postvaginalis more or less square in outline, almost as wide as posterior portion of corpus bursae, increasing in width anteriorly to ductus bursae, with posterior margin weakly concave, and with large, sclerotized, winglike lateral areas, united medially by small, more membranous area, and with posterior margin outwardly oblique; intersegmental area between A_7 and A_8 deeply recessed ventrally; ductus bursae not differentiated, perhaps represented by anterior enlargement of lamella postvaginalis; ductus seminalis arising dorsally from corpus bursae as slender tube 1.0 mm. anterior of anterior margin of intersegmental area; corpus bursae gradually increasing in width anteriorly, with posterior two-fifths sclerotized, surface covered with very small swellings or denticulations; signum on dorsal surface near anterior end of corpus bursae, outer margin smooth and wider on anterior side, and with flat median area recessed and projecting anteriorly at angle into wall of corpus bursae.

TYPES: Holotype, male, allotype, female, plus nine male and two female paratypes, all from Cayenne, F[rench] Guiana. The genitalia of the holotype are on slide F.H.R. No. 13561, of the allotype, F.H.R. No. 13584. All the type specimens are in the collection of the United States National Museum.

DISTRIBUTION: French Guiana.

REMARKS: A total of 13 specimens (10 males and three females) and four genitalic dissections (two males and two females) have been studied. This species closely resembles the several preceding taxa. The upper surface of the wings has more brown scaling than do the others. Other differences are to be found in its distribution, and in the genitalia.

The genitalia are of the same type as is found in the preceding taxa. In *quadrata* the process of the sacculus is shorter than that of *cretacea* and slightly longer than that of *totana*. The configuration of the apical section of the sacculus process, and the position and length of the spines thereupon, are also distinctive.

The female genitalia of this species can be recognized by the square lamella postvaginalis.

***Glena mopsaria* (Schaus), new combination**

Figures 26, 48

Boarmia plenaria auct.: DRUCE, 1892 (1891-1900), p. 75 (*partim*).*Alcis mopsaria* SCHAUS, 1913, p. 347.

This species is very similar to the preceding ones, but it tends to have less of a terminal band on the under side of the wings of the male. It occurs from Costa Rica to Colombia and Venezuela. The genitalia should be used for identification.

MALE: Similar to that of *brachia*, differing mainly as follows: upper surface of wings slightly more irrorate with brown scales, and tending to have t. p. and extradiscal lines more dentate and more heavily represented; under surface with dark terminal band on forewings, varying from being absent from, to being partially represented on, hind wings; hind tibia with hair pencil.

LENGTH OF FOREWING: 16 to 19 mm.

FEMALE: Similar to male, but with both upper and under surfaces of wings tending to be more heavily dusted with dark scaling; cross lines on upper surface less clearly represented and with terminal band on under surface broader.

LENGTH OF FOREWING: 17 to 20 mm.

MALE GENITALIA: Similar to those of *labecula*, but differing mainly as follows: gnathos with median enlargement shorter, broader, and with truncate posterior margin; costa straight, with very short projection arising from outer angle; sacculus with shorter, wider capitate process bearing spines along outer margin; length of sacculus and process varying from 1.4 to 1.5 mm.; anellus more slender; spine of vesica weakly sinuous, with hooked apex and a few projecting teeth medially, and with sharply recurved base; length of spine varying from 1.3 to 1.5 mm., of recurved base from 0.35 to 0.45 mm.; vesica without small denticulate patch under spine. Ventral surface of A_3 with median row of bristles.

FEMALE GENITALIA: Sterigma with lamella postvaginalis slightly narrower than ductus bursae, posterior margin weakly convex laterally and concave medially, and with large, winglike lateral areas not quite twice as wide as ductus bursae, narrowing medially and

with narrow slit on midline; intersegmental area between A_7 and A_8 deeply recessed ventrally; ductus bursae very short, poorly defined; ductus seminalis arising dorsally from corpus bursae as slender tube between 1.0 and 1.5 mm. anterior of ductus bursae; corpus bursae relatively thick, with posterior one-fourth to one-third sclerotized, surface covered with very small swellings or denticulations; signum on dorsal surface near anterior end of corpus bursae, outer margin varying from smooth to finely denticulate, wider on anterior side, and with flat median area recessed and projecting anteriorly at angle into wall of corpus bursae.

TYPE: Schaus described *mopsaria* from a single male specimen; it is U.S.N.M. No. 17974. The genitalia are mounted on slide F.H.R. No. 13531.

TYPE LOCALITY: Juan Vinas, Avangarez, Costa Rica.

DISTRIBUTION: Costa Rica, Panama, Colombia, and Venezuela. (See Appendix for locality data of specimens examined.)

The adults have been captured in March, April, June, and October.

REMARKS: A total of 17 specimens (12 males and five females) and 13 genitalic dissections (eight males and five females) have been studied.

The male genitalia of this species are similar to those of the three preceding species. The present taxon can be distinguished, in these structures, by the shorter and thicker process of the sacculus and by the much shorter projection from the end of the costa.

The female genitalia are also similar to those of the preceding species. These organs of *mopsaria* can be separated from those of *totana* by the wider lamella postvaginalis which projects farther posteriorly than does that structure in the former taxon.

Five females have been available for dissection. The one from Costa Rica has an irregular posterior margin to the lateral areas of the sterigma, and the lamella postvaginalis has the two swellings near the midline. Both Colombian examples have a heavily sclerotized and smooth posterior margin to the lateral areas, and the swellings of the lamella postvaginalis are situated farther from the midline. The two Panamanian specimens are

somewhat intermediate between the above. The remainder of the genitalia are very similar in all the specimens.

***Glena turba*, new species**

Figures 27, 49

This species is very similar to the preceding ones, so the genitalia should be used for identification. It occurs in southern Brazil.

MALE: Similar to that of *brachia*, differing mainly as follows: upper surface of wings more heavily suffused with grayish brown scales, and tending to have t. p. and extradiscal lines represented by heavier venular dots; under surface more suffused with dark brownish scales, and with broad terminal band present on forewings and on anterior portion of hind wings; hind tibia with hair pencil.

LENGTH OF FOREWING: 17 mm. (holotype).

FEMALE: Similar to male, but with both upper and lower surfaces of wings tending to be more heavily dusted with dark scaling; cross lines on upper surface less clearly represented, and with terminal band on under surface broader.

LENGTH OF FOREWING: 17 mm. (allotype).

MALE GENITALIA: Uncus with relatively narrow base, elongate, slightly tapering, apex broad and bluntly rounded, terminating in single point; gnathos with small, rounded, median projection; valves with outer three-fourths of costa straight, with parallel sides and extending beyond valvula; valvula broad, posterior margin truncate, with weakly sclerotized trough with irregular margins extending from base of valve toward capitate enlargement of sacculus process, and with dense group of heavy, ventrally projecting spines at base near costa; sacculus elongate, with short, capitate, spinose process; length of sacculus and process 1.6 mm.; anellus elongate, with wide base and sharply constricted median area, increasing in width posteriorly, lateral surfaces rugose, posterior margin with well-defined median incision; spine of vesica weakly S-shaped, with strongly recurved base; length of spine 0.8 mm., of recurved base 0.3 mm.; vesica with large, elongate, lightly sclerotized area near base of spine bearing numerous small, deciduous spines; vesica with narrow, longitudinal, denticulate strip ventrally and with

very weakly sclerotized area on dorsal surface near end of aedeagus. Ventral surface of A_3 with median row of bristles.

FEMALE GENITALIA: Sterigma with lamella postvaginalis elongate, weakly sclerotized, and with large, more heavily sclerotized lateral areas, their median margins extending partially over lateral margins of lamella postvaginalis; intersegmental area between A_7 and A_8 recessed, produced anteriorly as two rounded points, concave between; ductus bursae small; ductus seminalis arising on left side of corpus bursae as slender tube, starting about 0.4 mm. anterior of intersegmental area; corpus bursae widening posteriorly from narrow ductus bursae, and with posterior end lightly sclerotized, surface covered with minute denticulations; signum elongate, transverse, lateral margins strongly stellate, anterior and posterior margins weakly stellate. Posterior portion of ventral surface of A_7 not modified.

TYPES: Holotype, male, Rio Laeiss, Blumenau, Santa Catarina, [Brazil], October, 1934 (F. H. Hoffman); genitalia mounted on slide Geometridae No. 5736. Allotype, female, Santa Catarina, Brazil; genitalia mounted on slide Geometridae No. 5735. Both specimens are in the collection of the British Museum (Natural History).

DISTRIBUTION: Southern Brazil (the state of Santa Catarina).

REMARKS: Two specimens (one male and one female) and two genitalic dissections have been studied. The male genitalia of this species are very different from any of these structures in the preceding species. This taxon, and the following taxa, can be recognized by the prominent patch of spines at the base of the costa. *Glena turba* is characterized both by the elongate process of the sacculus and by the elongate anellus.

The corpus bursae of the allotype is not fully inflated, as the specimen was not mated. Additional details concerning this portion of the genitalia will have to be supplied when more material comes to hand.

***Glena tyrbe*, new species**

Figure 28

As far as can be determined from the worn condition of the unique type, *tyrbe* can be distinguished by the well-developed fovea at

the base of the forewing of the male and by the large discal spots on the upper surface of all wings. The male genitalia are very distinctive. This taxon occurs in Peru.

MALE: Similar to that of *turba*, differing mainly as follows: base of forewing with strongly developed fovea; upper surface of wings more heavily dusted with pale brown and brownish black scales; maculation mostly lacking because of rubbed condition of specimen, with large, dark discal spots having centers of whitish gray on all wings; s. t. line represented by larger spots; under surface with broad terminal band represented on primaries and becoming obsolescent posteriorly on secondaries; large discal spot on each forewing, absent from hind wing; hind tibia with hair pencil.

LENGTH OF FOREWING: 17 mm. (holotype).

FEMALE: Unknown.

MALE GENITALIA: Similar to those of *turba*, differing mainly as follows: uncus very long, with posterior portion extending ventrally at nearly right angle from anterior portion and ending in slender point; valves with costa more curved, weakly enlarged apically, and with larger group of spines at base; sacculus and process wider and shorter, apex capitate, with numerous spines arising from dorsal and posterior surfaces; length of sacculus and process 1.5 mm.; anellus short, widely expanding from narrow base, posterior margin apparently deeply concave; spine of vesica with apical portion angled, weakly enlarged, bearing small spines along inner margin, and having strongly recurved base; length of spine 0.9 mm., of recurved base 0.45 mm.; vesica with elongate, slender, sclerotized strip near recurved base of spine, with elongate, slender, dentate strip near apex of spine, and with ventral surface slightly swollen and very finely setose. Ventral surface of A_3 with median row of bristles.

FEMALE GENITALIA: Unknown.

TYPE: Holotype, male, Satipo, [Junin], Peru (P. Paprzycki), from the John L. Sperry collection; genitalia mounted on slide F.H.R. No. 13693. This specimen is in the collection of the American Museum of Natural History.

DISTRIBUTION: Peru (the department of Junin).

REMARKS: One specimen and one genitalic dissection have been studied. Unfortunately

the type is badly rubbed, so that most of the scales on the forewings are missing. As far as can be determined from what scaling is left, *tyrbe* has large discal spots on all wings above. This is reminiscent of species of *Iridopsis* Warren, but the genitalia do not agree with those of that genus.

The male genitalia are similar to those of *turba*, but can be recognized by the differently shaped uncus, by the different ornamentation of the valves, and by the much shorter anellus.

***Glena asaccula*, new species**

Figures 29, 50

This is a species with pale wings, having the cross lines represented by large dots; the male does not have a fovea at the base of the forewing. The genitalia are very distinctive in both sexes. This taxon occurs in southern Brazil.

MALE: Similar to that of *brachia*, but differing mainly as follows: upper surface of wings whitish gray, with very few dark scales basad of t. p. line; cross lines represented by much larger, unconnected spots; t. p. and extradiscal lines shaded distally by brown; s. t. line complete on all wings; under surface whitish gray, forewings with very faint brown suffusion; discal spots present on all wings beneath; terminal band dark brownish black, complete on forewing, partially represented on hind wings; hind tibia with hair pencil.

LENGTH OF FOREWING: 20 mm. (holotype).

FEMALE: Similar to male, but with both surfaces of wings much more heavily suffused with dark scaling; upper surface with cross lines much less strongly represented; under surface with broader and more complete terminal band.

LENGTH OF FOREWING: 22 mm. (allotype).

MALE GENITALIA: Uncus short, triangular, with apex projecting ventrally into single point; gnathos with elongate median projection; valves with weakly biconcave costa extending beyond valvula, apex bent at right angle and projecting as long, pointed process; sacculus short, with weakly developed process extending only to middle of outer margin of valvula; length of sacculus and process 1.35 mm.; transtilla membranous, but apparently projecting laterally as strongly sclerotized arm into middle of valve, terminating

in four or five elongate, ventrally projecting spines; anellus smoothly sclerotized, one and one-half times longer than wide, with weak basal constriction, raised lateral margins, and with posterior margin rounded; spine of vesica weakly S-shaped, and with strongly recurved base; length of spine 1.4 mm., of recurved base 0.4 mm.; vesica with elongate, weakly sclerotized area near base of spine bearing numerous short, deciduous setae; vesica with dorsal surface bearing two widely separated, spinose patches near end of aedeagus, and with elongate, slender denticulate area on ventral surface. Ventral surface of A_3 with median row of bristles.

FEMALE GENITALIA: Sterigma with very large, subtriangular, sclerotized lamella post-vaginalis and with membranous lateral areas; intersegmental area between A_7 and A_8 weakly sclerotized and recessed ventrally; ductus bursae very short; ductus seminalis arising as slender tube ventrolaterally on left side of corpus bursae about 0.4 mm. anterior of ductus bursae; corpus bursae elongate, with posterior one-eighth sclerotized and striate, surface covered with very small

swellings or denticulations; signum absent.

TYPES: Holotype, male, Rio Laeiss, Blumenau, Santa Catarina, [Brazil], December, 1933 (F. H. Hoffman); genitalia mounted on slide Geometridae No. 5728. Allotype, female, Jaragua do Sul, Santa Catarina, [Brazil], September, 1932 (F. H. Hoffman); genitalia mounted on slide Geometridae no. 5726. Both type specimens are in the collection of the British Museum (Natural History).

DISTRIBUTION: Southern Brazil (the state of Santa Catarina).

REMARKS: A total of two specimens (one male and one female) and two genitalic dissections have been studied.

The genitalia of *asaccula* are distinctive and somewhat atypical of *Glena*. The males do not have an elongate process of the sacculus, and it would appear that this structure has been replaced by the lateral extension of the transtilla. The female genitalia are unique, insofar as these structures are now known, in having neither a signum nor the sclerotized lateral areas of the sterigma.

LIST OF THE NEOTROPICAL SPECIES OF THE GENUS *GLENA*, WITH THEIR KNOWN DISTRIBUTION

- | | |
|------------------------------------|--|
| 1. <i>effusa</i> , new species | Southern Mexico to Bolivia |
| 2. <i>bipennaria</i> (Guenée) | |
| a. <i>bipennaria</i> (Guenée) | Southern Brazil, Paraguay, Bolivia, Peru, and Ecuador |
| b. <i>demissa</i> , new subspecies | French Guiana |
| 3. <i>dentata</i> , new species | Ecuador and Colombia |
| 4. <i>grandillosa</i> (Dognin) | Argentina, Bolivia, Peru, and Ecuador |
| 5. <i>sucula</i> , new species | Colombia |
| 6. <i>vesana</i> , new species | Bolivia and Peru |
| 7. <i>bisulca</i> , new species | Ecuador and Colombia |
| 8. <i>juga</i> , new species | Paraguay, Bolivia, Peru, Ecuador, and Colombia |
| 9. <i>megale</i> , new species | Venezuela, Colombia, Ecuador, and Peru |
| 10. <i>unipennaria</i> (Guenée) | |
| a. <i>unipennaria</i> (Guenée) | Southern Brazil and Paraguay |
| b. <i>cosmeta</i> , new subspecies | Panama and the Guianas to Bolivia |
| 11. <i>uncata</i> , new species | Southern Mexico to Costa Rica |
| 12. <i>demissaria</i> (Walker) | Brazil, Uruguay, Paraguay, Bolivia to Colombia, Venezuela, the Guianas, and Trinidad |
| 13. <i>basalis</i> , new species | Costa Rica |
| 14. <i>hima</i> , new species | Costa Rica and Panama |
| 15. <i>lora</i> , new species | Nicaragua |
| 16. <i>agria</i> , new species | Southern Mexico to Panama |
| 17. <i>trapezia</i> , new species | Southern Brazil |
| 18. <i>sacca</i> , new species | Peru |
| 19. <i>bullia</i> , new species | Argentina, Paraguay, and Bolivia |
| 20. <i>gemina</i> , new species | Guatemala and Costa Rica |

- | | |
|------------------------------------|--|
| 21. <i>laticolla</i> , new species | Southern Mexico and Nicaragua |
| 22. <i>brachia</i> , new species | Southern Brazil, Paraguay, Bolivia, and Peru |
| 23. <i>cretacea</i> (Butler) | Brazil and Peru |
| 24. <i>gampsia</i> , new species | Venezuela |
| 25. <i>labecula</i> , new species | Bolivia |
| 26. <i>totana</i> , new species | Trinidad |
| 27. <i>quadrata</i> , new species | French Guiana |
| 28. <i>mopsaria</i> (Schaus) | Costa Rica, Panama, Colombia, and Venezuela |
| 29. <i>turba</i> , new species | Southern Brazil |
| 30. <i>tyrbe</i> , new species | Peru |
| 31. <i>asaccula</i> , new species | Southern Brazil |

APPENDIX: SPECIMENS EXAMINED

ALTHOUGH THE RANGE is summarized under the heading of Distribution for each taxon, the complete data are given below for all specimens examined of previously described species. Whenever possible, the department, province, or state is given for the larger countries; if this was not indicated on the label it has been inserted in brackets. The spelling of certain names has been altered from that indicated on the labels, unless given in quotation marks, to conform with the approved present-day spelling.

The arrangement of the species is the same as that in the text.

GENUS *GLENA* HULST

Glena bipennaria bipennaria (Guenée)

BRAZIL: Nuevo Teutonia, [Santa Catarina], various dates in Jan., Mar., Apr., May, July, Aug., Sept., and Nov., 1943–1953 (F. Plaumann), 10 ♂, 3 ♀; Santa Catarina, Aug., 1882, 1 ♂; Jaraguá do Sul, Santa Catarina, Jan. 30 (Hoffmann), 1 ♂; Castro, Paraná, 950 meters (E. D. Jones), 3 ♂; Iguassu, Paraná, Oct. 15, 1921, 1 ♂; Rio [de] Janeiro, [Guanabara], 1 ♂, 1 ♀; Burity, 30 miles northeast of Cuyabá, Mato Grosso, 2250 ft., Sept. 22–30, Oct. 1–15, 1927 (C. L. Collenette), 1 ♂, 1 ♀; Santa Cruz, Brésil méridionale, 1 ♂; São Paulo, [São Paulo], Apr., 1 ♀; no further data, type ♂.

PARAGUAY: Caa-genzú, Nov. 20, Dec. 6, 1950, 2 ♂; Carlos Pfannl, Aug. 6, 1951 (Schade), 1 ♂; Independencia, [Caazapa], various dates in Oct., Nov., and Dec., 1950, 6 ♂; Villarrica, Feb., 1924 (P. Jorgensen), 1 ♂; Sapucay, [Paraguari], Nov. 17, 1908 (W. Forster), 1 ♂; no further data, 1 ♂.

BOLIVIA: Chapare, and Region Chapare, [Beni], 400 meters, Nov. 26, Dec. 18, 1948, Apr. and July, 1951, 4 ♂; Rio Suruta, Santa Cruz, 400 meters, Aug. (J. Steinbach), 2 ♂; Santiago del Estero, 1905–1906 (J. Steinbach), 1 ♂; Buena-vista, July–Oct., 1906 (J. Steinbach), 1 ♂.

PERU: Avispas, Madre de Dios, Sept. 10–30, 1962 (L. E. Peña), 6 ♂; Quincemil, Cuzco, 2400 ft., Aug., 1962 (L. E. Peña), 1 ♂; Chanchamayo, [Pasco], 1000 meters, 1898, Oct. and Nov., 1906 (O. Schuncke), 6 ♂; La Merced, Chanchamayo, [Pasco] (C. O. Schuncke), 3 ♂; Tinguri, Carabaya, [Puno], 3400 ft., wet season, Jan., 1905 (G. Ockenden), 1 ♂; Chanchamayo, [Pasco], 1 ♀.

ECUADOR: "Environs de Loja," [Loja], 1890, 1891, 2 ♂.

Glena grandillosa (Dognin)

ARGENTINA: Jujuy, Jujuy, Jan., May, June, 1948, Jan., Feb., Mar., May, Dec., 1950 (J. Foerster), 15 ♂, 6 ♀; La Almona, Jujuy, Feb. 16, 1949, 1 ♂; Prov. Jujuy, Mar., Apr., May, 1948, Mar., Apr., 1949, Jan., Feb., Mar., Dec., 1950, 16 ♂, 4 ♀; Tucuman, [Tucuman], 1 ♀, (R. Schreiter), 4 ♂, 2 ♀, Apr., 1903 (L. Monetti), 1 ♀, (F. Gerard), 1 ♀ lectotype; Siambon, Tucuman, 1600 meters, Jan., 1931 (R. Schreiter), 1 ♀; no additional data (W. Rait-Smith), 1 ♂.

BOLIVIA: Chapare, [Beni], Aug. 23, 1949 (Peña), 1 ♂; Rio Songo, Prov. Yungas, Feb.–May, 1896, 1 ♂, 750 meters (Fassl), 1 ♂; R[i]o Tanampaya, 1894 (Garlepp), 1 ♂; Chulumani, [La Paz], 2000 meters, Dec., 1900 (Simons), 1 ♂; La Paz, 1000 meters (E. Garlepp), 2 ♂; Charaplaya, [Cochabamba], 1300 meters, June, 1901 (Simons), 1 ♂; Yunga del Espiritu Santo, Cochabamba, 1888–1889 (P. Germain), 5 ♂; Suapi (Garlepp), 1 ♂.

PERU: Coosnipata, Paucartambo, Cuzco, Nov. 14 to Dec. 7, 1951 (F. L. Woytkowski), 24 ♂; Callanga, Paucartambo, Cuzco, Feb. 14–17, 1953 (F. L. Woytkowski), 5 ♂; Marcapata, eastern Peru, 4500 ft., 1 ♂; Chanchamayo, [Pasco], 1 ♂; Tinguri, Carabaya, [Puno], 2 ♂, 3400 ft., dry season, Aug., 1904 (G. Ockenden), 2 ♂; R[i]o Inambari, La Oroya, [Puno], 3100 ft., dry season, Sept., 1904, wet season, Oct., 1904 (G. Ockenden), 3 ♂; La Oroya, Carabaya, [Puno], 3000 ft., Mar., 1905 (G. Ockenden), 1 ♂; Oxapampa, [Pasco], 6400 ft., 2 ♂; El Porvenir, 900 meters, Oct., 1909, 1 ♂; Cerro de Pasco, Huancabamba, 6000–10,000 ft. (E. Boettger), 5 ♂; Huancabamba, 6000–10,000 ft., 1 ♂; Santo Domingo, Carabaya, [Puno], 4 ♂; Pampaconas R[iver], Aug., 1911 (Yale Peruvian Expedition), 1 ♂.

ECUADOR: Loja, [Loja], Sept., 1896, 1 ♀.

Glena unipennaria unipennaria (Guenée)

BRAZIL: Nuevo Teutonia, [Santa Catarina], various dates in Jan., May, July, Aug., 1948–1953 (F. Plaumann), 6 ♂; Nova Bremen, Santa Catarina, 250 meters, Apr., 1933, Aug., 1937 (F. Hoffmann), 2 ♂; Santa Catarina, 1 ♂; Jaraguá do Sul, Santa Catarina, Dec., 1927 (F. Hoffmann), 1 ♀; Iguassu, Parana, Nov. 20, 1921, 1 ♂; Alta Parana, June, 1927 (F. Wucherpfennig), 1 ♂; Castro, Paraná, 950 meters (E. D. Jones), 2 ♂, 1 ♀; Aracatuba, São Paulo, 150 meters, Apr. 1, 1913 (E. D. Jones), 1 ♂; Alta da Serra, Santos, [São Paulo], 2600 ft., Mar. 5, 1910 (E. D. Jones), 1 ♂; Rio [de] Janeiro, Guanabara, 2 ♂, (Derg.), 1 ♀, 1883, (P. Germain), 1 ♂; Prov[in]ce Rio de Ja-

neiro, 1 ♀, (Zikan), 1 ♂; "Lagune de Sacuaresma," Prov[ince] Rio de Janeiro, Aug.-Sept., 1884 (P. Germain), 1 ♀; Petropolis, [Rio de Janeiro], 1 ♂; N[ovo] Friburgo, [Rio de Janeiro], 1 ♀; Uberaba, Minas Gerais, 1 ♂, 1 ♀; Prov[ince] Mato Grosso, 1886 (P. Germain), 3 ♂; Porto Alegre, 1 ♂; Victoria, 1 ♂; "Casa Br., Bras. m., G," 1 ♂.

PARAGUAY: Independencia, [Caazapa], various dates in Sept., Oct., Nov., Dec., 1950-1951, 5 ♂; Paso Yobay, Sept., Nov., 1951 (Schade), 2 ♂, 1 ♀; Carlos Pfannl, Sept. 30, Nov. 25, 1951 (Schade), 2 ♂, 1 ♀; no further data, Nov. 9, 1951, 1 ♂; Palino cué, also spelled Patino cué (Monforts), 1 ♂, 2 ♀, Feb., 2 ♂, 2 ♀; Sapucay, various dates in July, Sept., Oct., Dec., 1902-1903 (W. Forster), 4 ♂; Sapucay, near Villa Rica (Forster), 1 ♂; Villarica, Oct., Dec., 1922-1924 (F. Schade), 3 ♂, 1 ♀; Yhu, Sept.-Dec., 1896 (Andeer), 1 ♂; central Paraguay, 1885-1886 (P. Germain), 2 ♂.

Glena demissaria (Walker)

BRAZIL: Nuevo Teutonia, [Santa Catarina], Mar., 1953 (F. Plaumann), 1 ♂; Uberaba, Minas Gerais, 4 ♂, 1 ♀; Prov. Mato Grosso, 1886 (P. Germain), 2 ♂; Pará (A. M. Moss), 2 ♂, 2 ♀; São Paulo de Olivença, Amazonas, Nov.-Dec. (Fassl), 3 ♂; Taperinha, Amazonas, 1 ♂; Tonantins, Amazonas, July-Sept., 1880 (de Mathan), 1 ♂; Codajas, upper Amazon [River, Amazonas], Apr., 1907 (S. M. Klages), 1 ♂; Santarem, Pará, Jan., 1878 (de Mathan), 1 ♂; Fura, Amazonas (H. Fassl), 1 ♂; Rio Madeira, 380 meters up river (A. M. Moss), 1 ♂; Calama, Rio Madeira, below Rio Machados, [Amazonas], Aug.-Oct., 1907 (W. Hoffmanns), 1 ♂; Humayta, Rio Madeira, [Amazonas], July-Sept., 1906 (W. Hoffmanns), 1 ♂; lower Amazon [River] (A. M. Moss), 1 ♀; Amazons (Leech), 1 ♂; "Amaz." (Bates; Felder collection), 1 ♂.

URUGUAY: Santa Cruz, Sept., 1 ♂.

PARAGUAY: Villarica, 1924 (F. Jorgensen), 3 ♂; Trinidad, 1 ♀; "Paraguay central," 1885 (P. Germain; illustrated by Oberthür, 1913, pl. CLXIX, fig. 1657), 1 ♂.

BOLIVIA: Rio Grande, Prov. Cordillera, Dec., 1903 (J. Steinbach), 1 ♂; San Ernesto, [La Paz], 1000 meters, Aug.-Sept., 1900 (Simons), 4 ♂; Buenavista, east Bolivia, 750 meters, Aug., 1906, to Apr., 1907 (Steinbach), 1 ♂; Chimate, 760 meters, Sept., 1900 (Simons), 2 ♂; Nutio de

Chavez, Esperanza, east Bolivia, 2 ♂; Prov. del Sara, Santa Cruz, 450 meters, May, Oct. (J. Steinbach), 1 ♂, 1 ♀; Santa Cruz de la Sierra to San Jose de Chiquitos, end of July, 1904 (Steinbach), 1 ♀.

PERU: Satipo, [Junin], July, Aug., 1948 (P. Paprzycki), 2 ♂; Avispas, Madre de Dios, Sept. 20-30, 1962 (L. E. Peña), 1 ♂; Clevelandia, Nov. 28, 1937, 1 ♀; Rio Ucayali (Stuart), 1 ♂; Santo Domingo, [Carabaya, Puno], 6000 ft., May, 1902, Nov., 1904 (G. Ockenden), 2 ♂; Tarapoto, May-Aug., 1886 (de Mathan), 1 ♂.

COLOMBIA: Muzo, [Santander], 400-800 meters (Fassl), 4 ♂.

VENEZUELA: Suapure, [Bolívar], Apr. 20, 1899 (Klages), 1 ♀; Aroa, [Yaracuy], 1 ♀.

GUYANA (FORMER BRITISH GUIANA): Rockstone, Essequibo, 1 ♂; Essequibo River (Whibley), 1 ♀; confluence of Oronoque and New River, July 20 to Sept. 20, 1937 (C. A. Hudson), 1 ♀; Potoro, Jan., Feb., 1908 (S. M. Klages), 2 ♂; Tumatumari, Rio Potoro, 1 ♂; no further data, 1 ♀.

FRENCH GUIANA: St. Jean de Maroni, 14 ♂ 3 ♀; no further data (C. Bar), 3 ♂, 3 ♀.

TRINIDAD: Arima Valley, 800-1200 ft., Feb. 10-22, 1964 (Rozen and Wygodzinsky), 3 ♂, Feb. 24, 1966 (J. G. Rozen), 1 ♂; no further data, 1 ♂.

Glena cretacea (Butler)

BRAZIL: Ponta Nova, Rio Xingu, Amazonas, 1 ♂.

PERU: Avispas, Madre de Dios, Sept. 20-30, 1962 (L. E. Peña), 1 ♂.

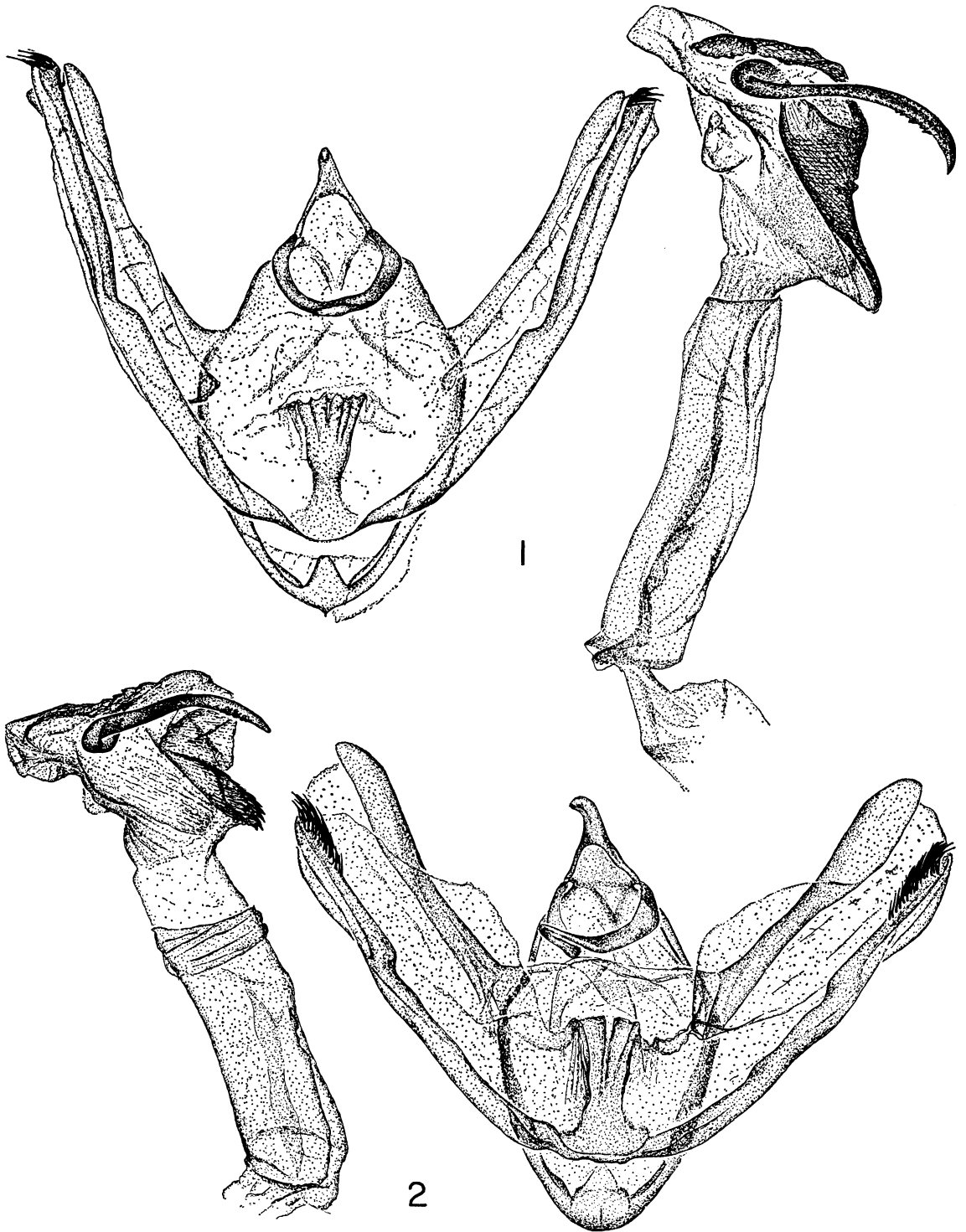
Glena mopsaria (Schaus)

COSTA RICA: Juan Vinas, Avangarez, type ♂; San José, without date and Apr. 16, 1923 (H. Schmidt), 6 ♂ and 1 ♀; San Carlos, June, 1899 (Underwood), 1 ♂.

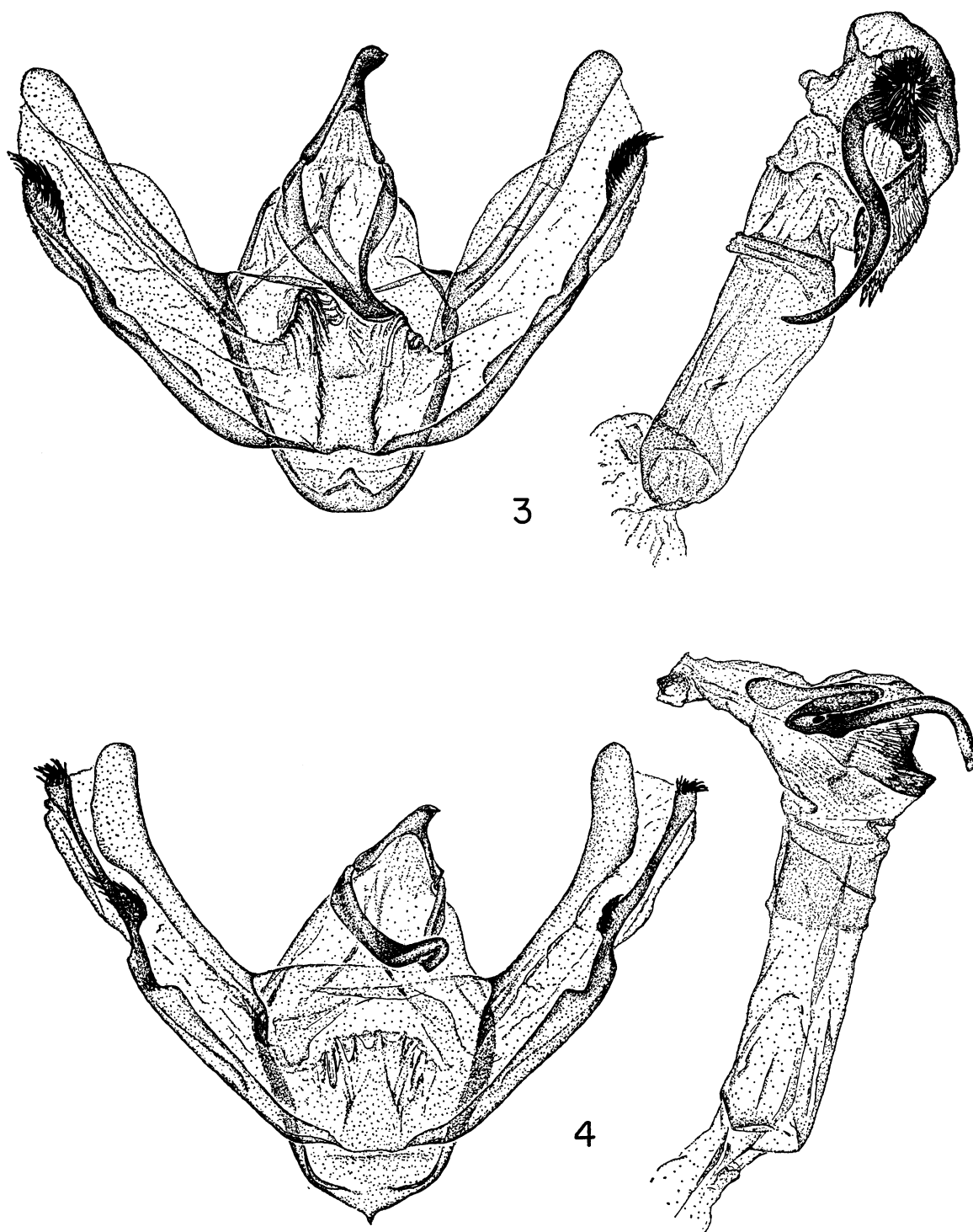
PANAMA: V[olcan] de Chiriqui, 2000-3000 ft. (Champion), identified as "*Boarmia plenaria* Walk., B. C. A. Lep. Het., Godman-Salvin Coll.," 1 ♂; Chiriqui, 1 ♀; Lino, 800 meters (Fassl), 1 ♂; Corazal, Canal Zone, Mar. 24, 1911 (Aug. Busck), 1 ♀.

COLOMBIA: Makasaka, Santa Marta (V. de Andreis), 1 ♀; Don Ano, Magdalena, 4000 ft., June (H. H. Smith), 1 ♀.

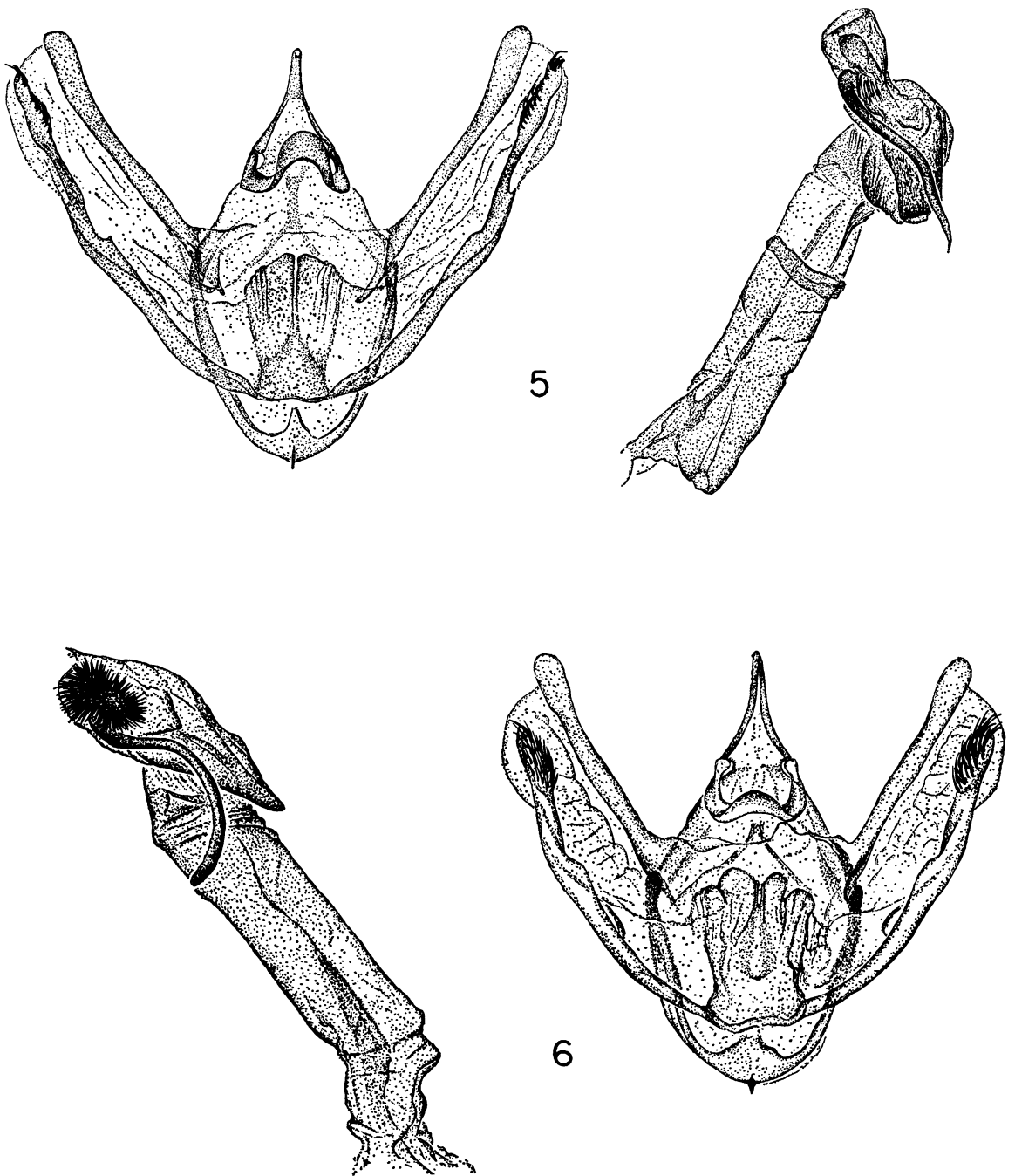
VENEZUELA: Merida, 1 ♂, Oct., 1898, 1 ♂.



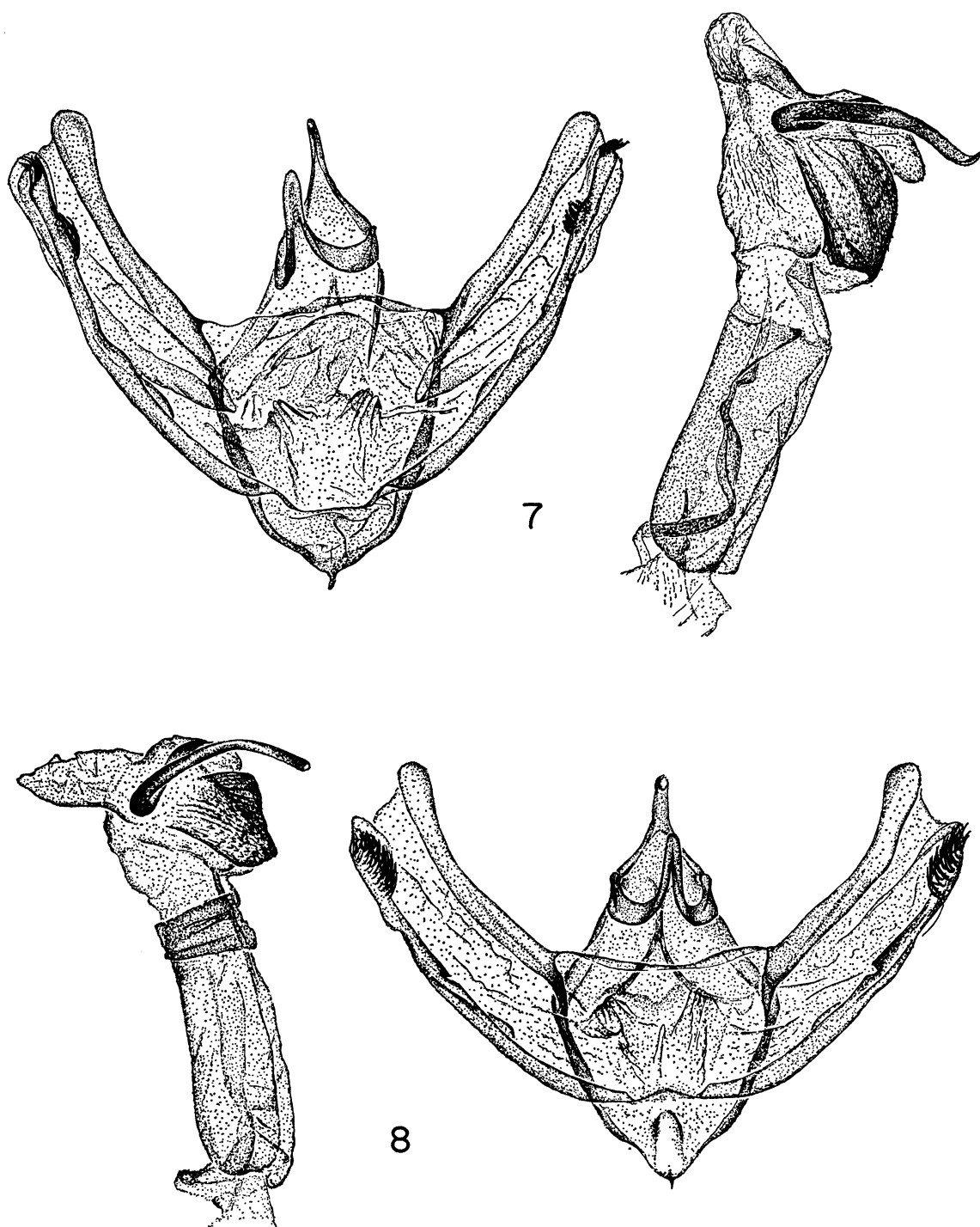
FIGS. 1, 2. Male genitalia. 1. *Glana effusa*, new species, paratype, Popoyan, [Colombia] (Lehmann; B.M.N.H.). 2. *G. bipennaria bipennaria* (Guenée), Sapucay, Paraguay, November 17, 1903 (W. Forster; B.M.N.H.).



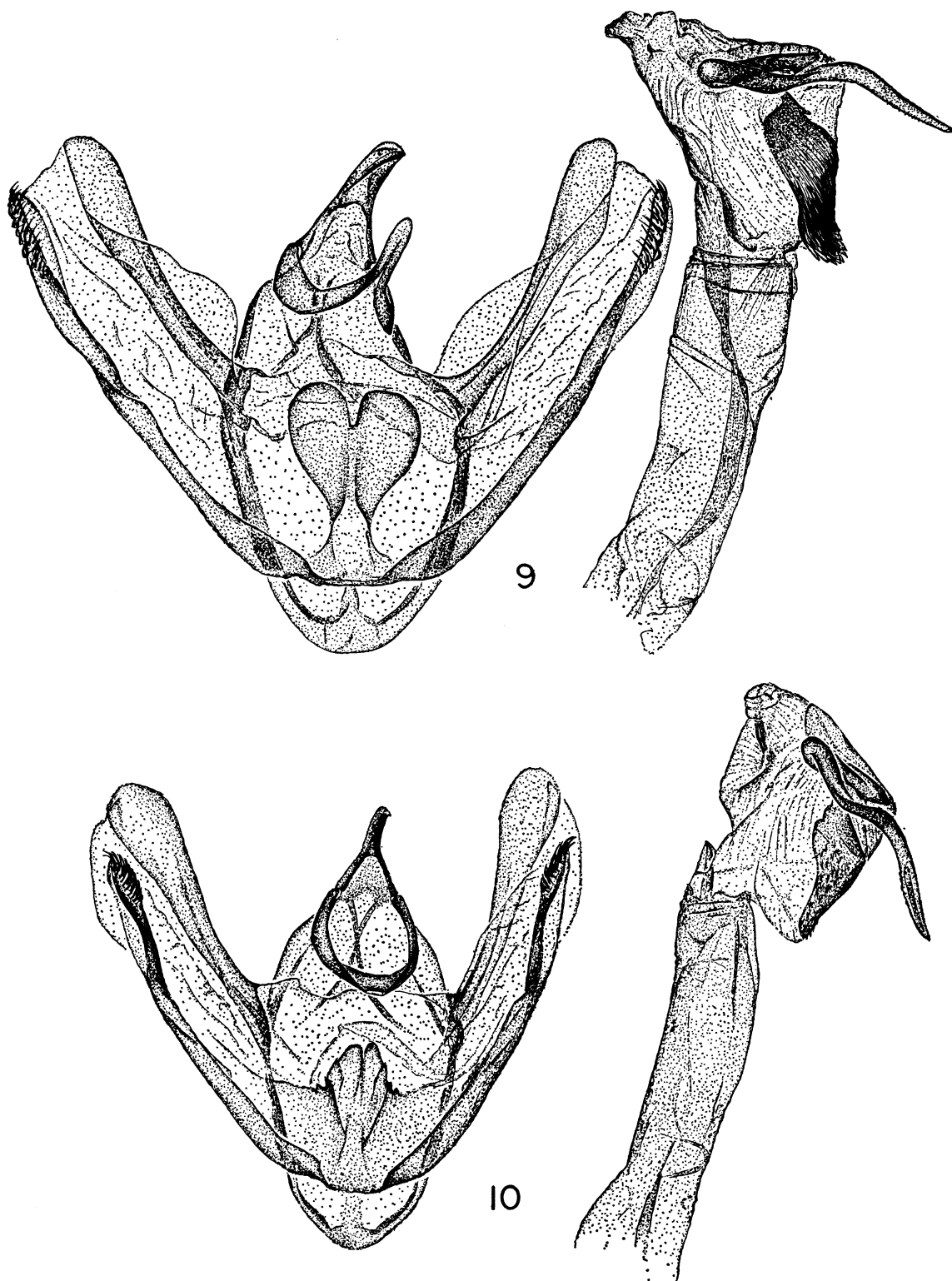
FIGS. 3, 4. Male genitalia. 3. *Glena dentata*, new species, holotype, Balzapamba, Bolivar, [Ecuador], March-April, 1894 (de Mathan; B.M.N.H.). 4. *G. grandillosa* (Dognin), Callanga, Cuzco, Peru, February 16, 1953 (F. L. Woytkowski; A.M.N.H.).



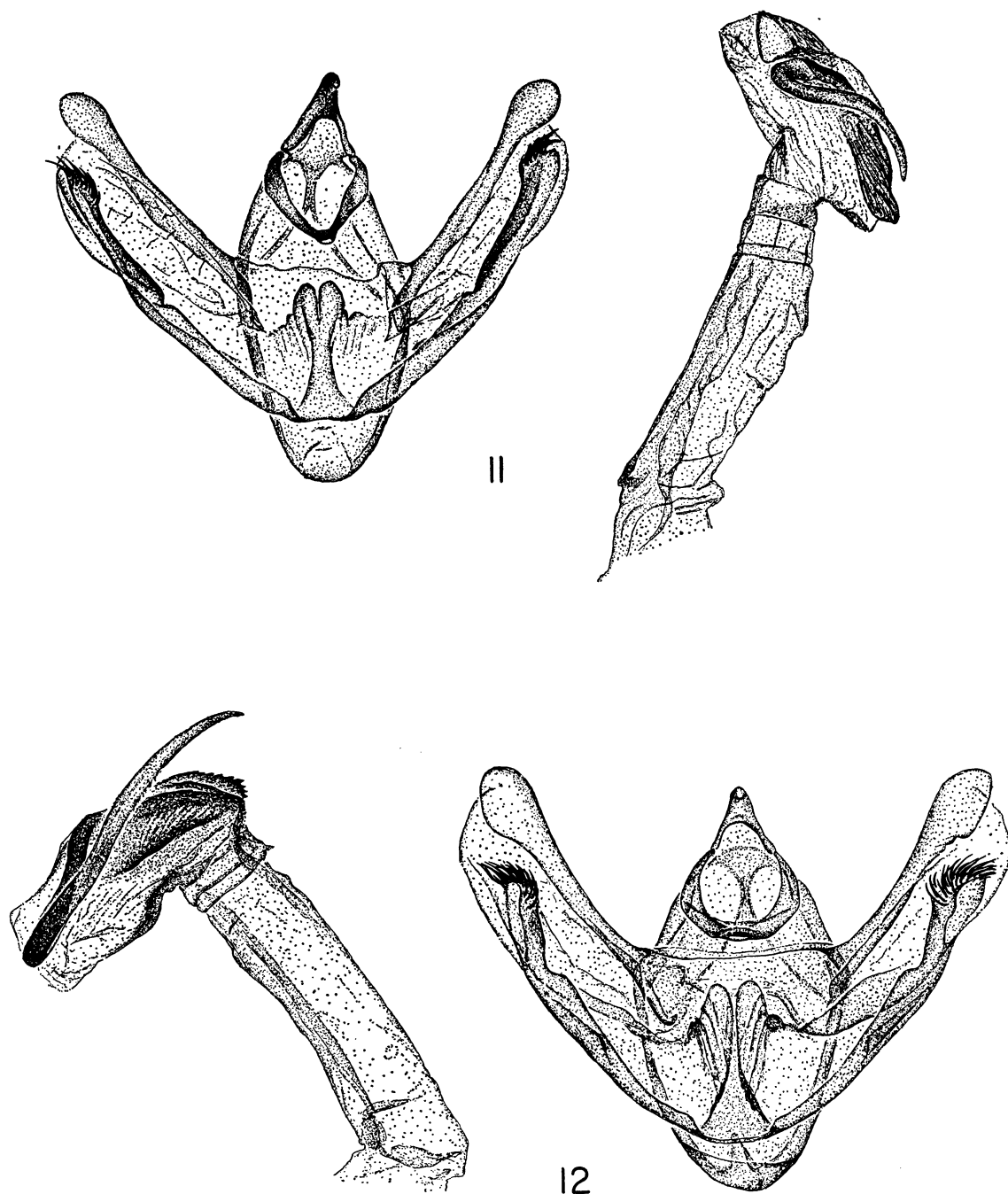
FIGS. 5, 6. Male genitalia. 5. *Glana sucula*, new species, paratype, Colombia (B.M.N.H.). 6. *G. vesana*, new species, holotype, Incachaca, Cochabamba, Bolivia (J. Steinbach; U.S.N.M.).



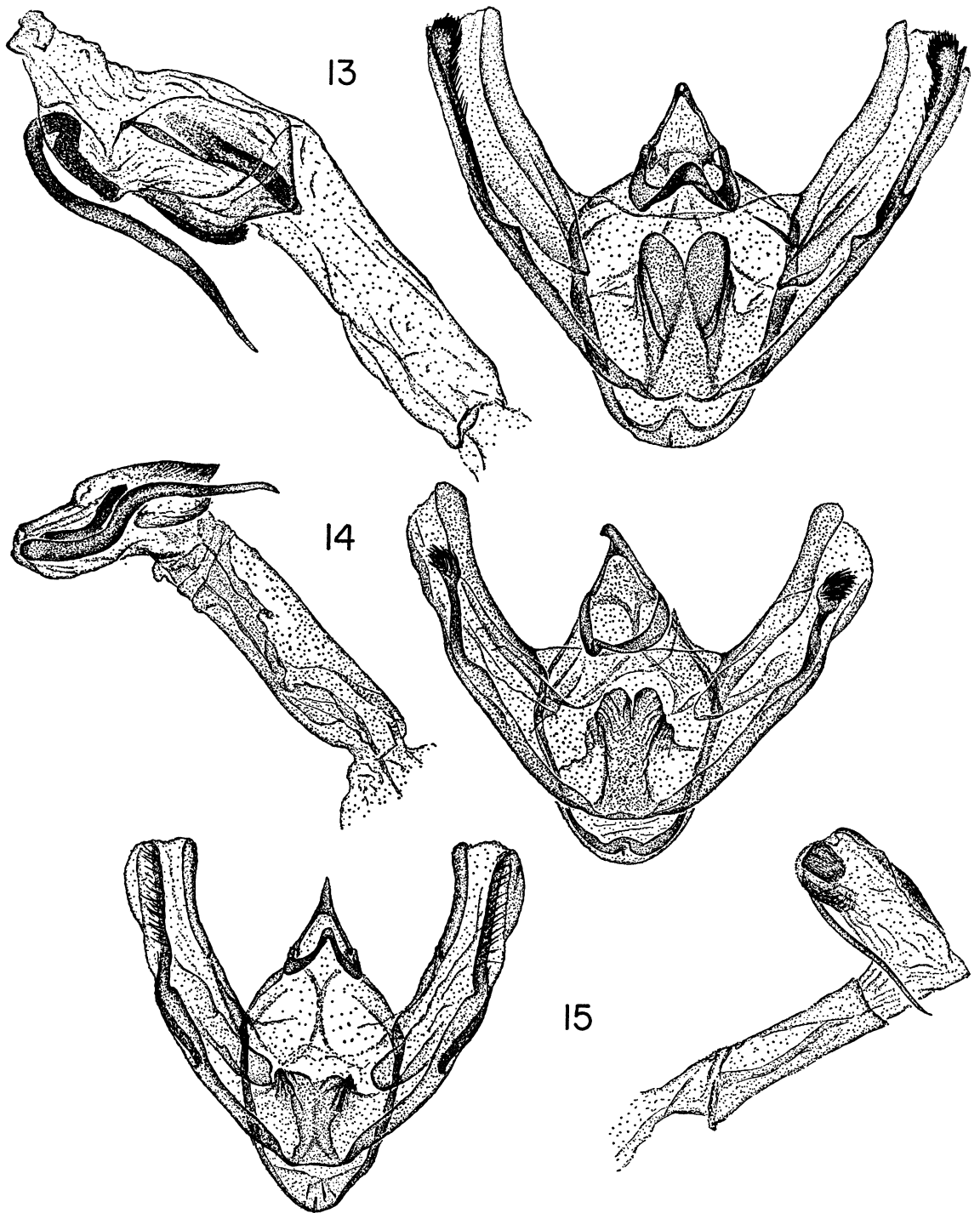
FIGS. 7, 8. Male genitalia. 7. *Glenn bisulca*, new species, holotype, Hacienda La Mascota, Rio Topo, Ecuador, April 13, 1931 (W. J. Coxey; A.M.N.H.). 8. *G. juga*, new species, paratype, environs of Loja, Ecuador, 1888 (U.S.N.M.).



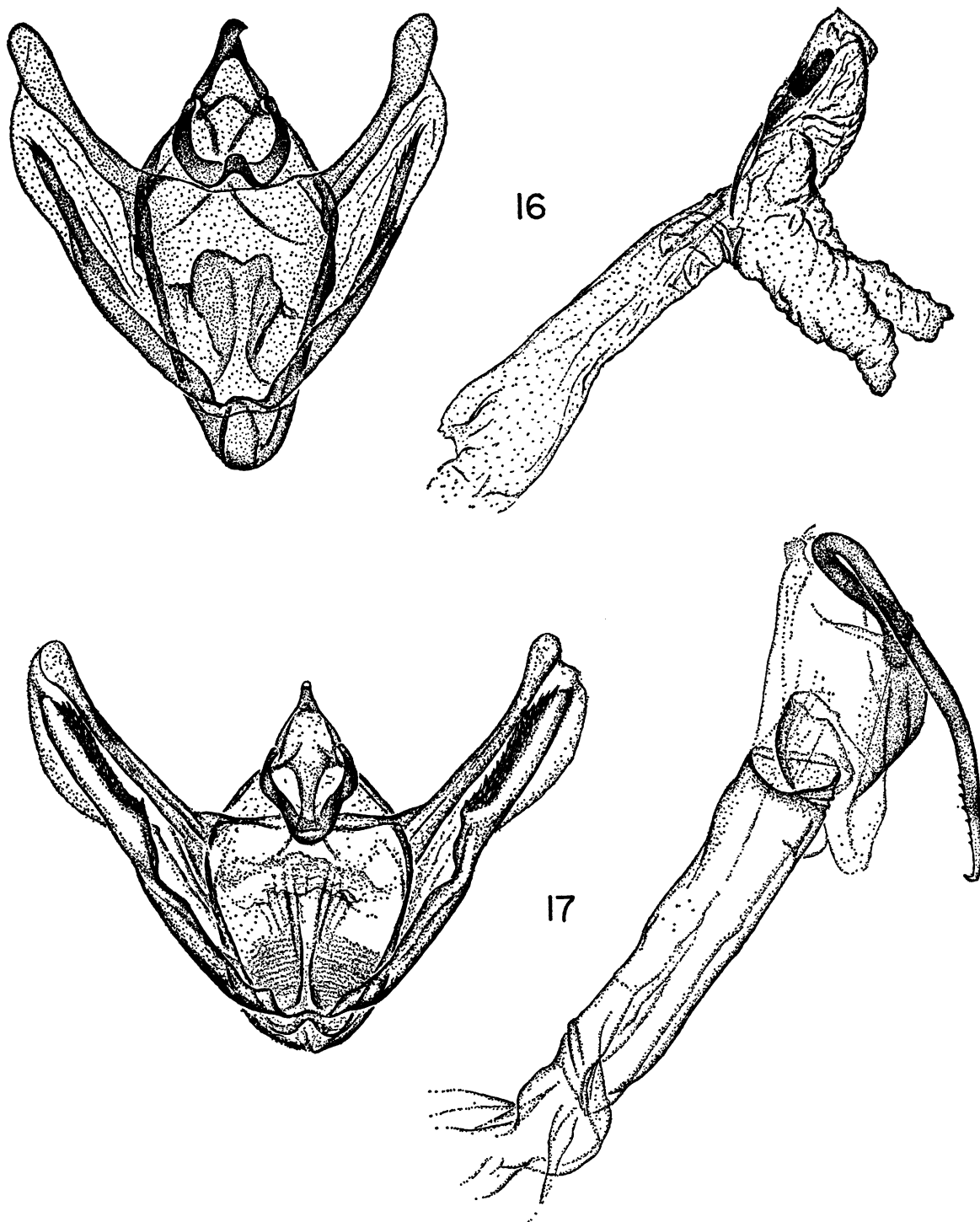
FIGS. 9, 10. Male genitalia. 9. *Glana megale*, new species, paratype, Santo Domingo, Peru (G. Ockenden; B.M.N.H.). 10. *G. unipennaria unipennaria* (Guenée), Independencia, Paraguay, September 22, 1951 (A.M.N.H.).



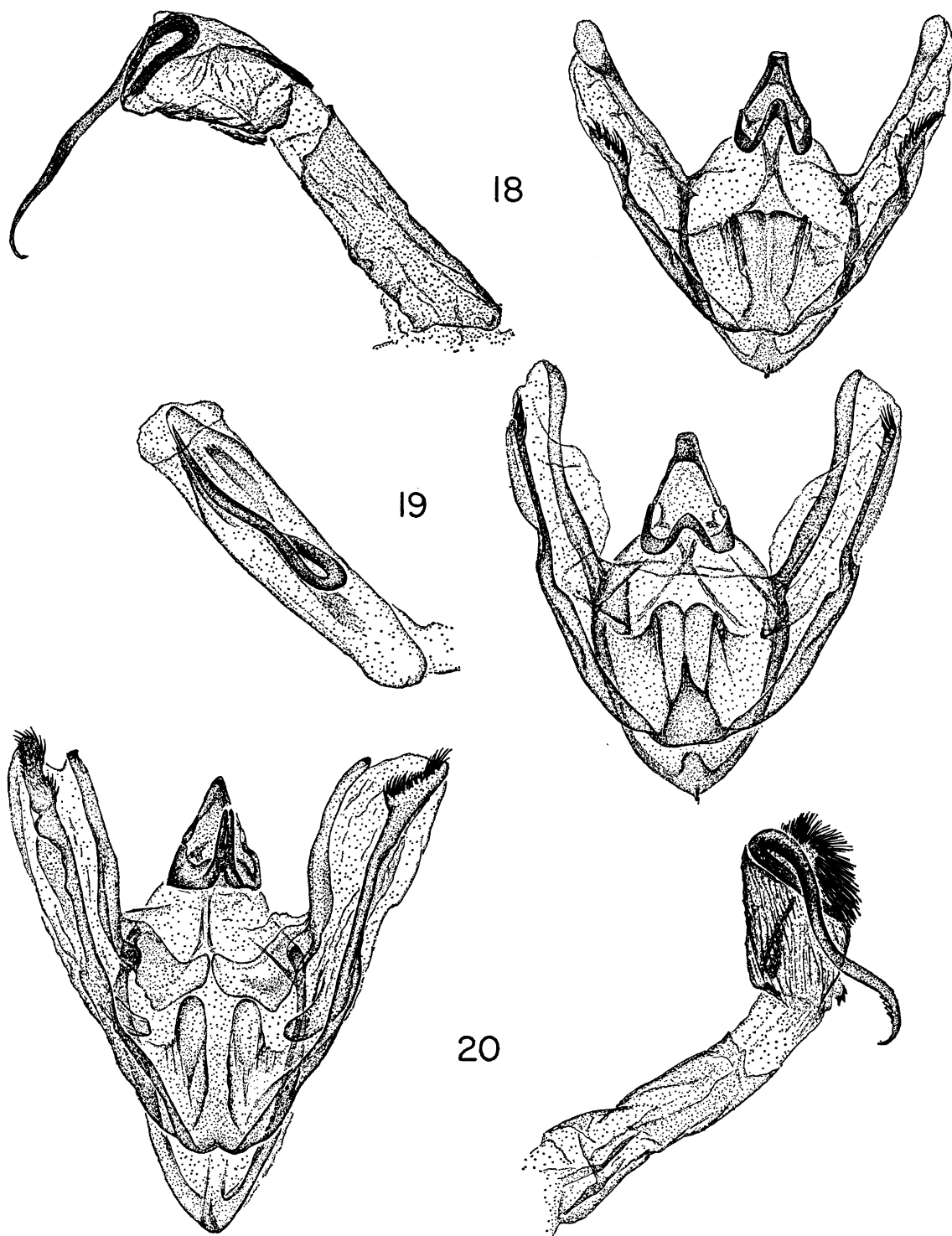
FIGS. 11, 12. Male genitalia. 11. *Glena uncata*, new species, holotype, Juan Vinas, Costa Rica, January (Schaus and Barnes; U.S.N.M.). 12. *G. demissaria* (Walker), Chimate, Bolivia, September, 1900 (Simons; B.M.N.H.).



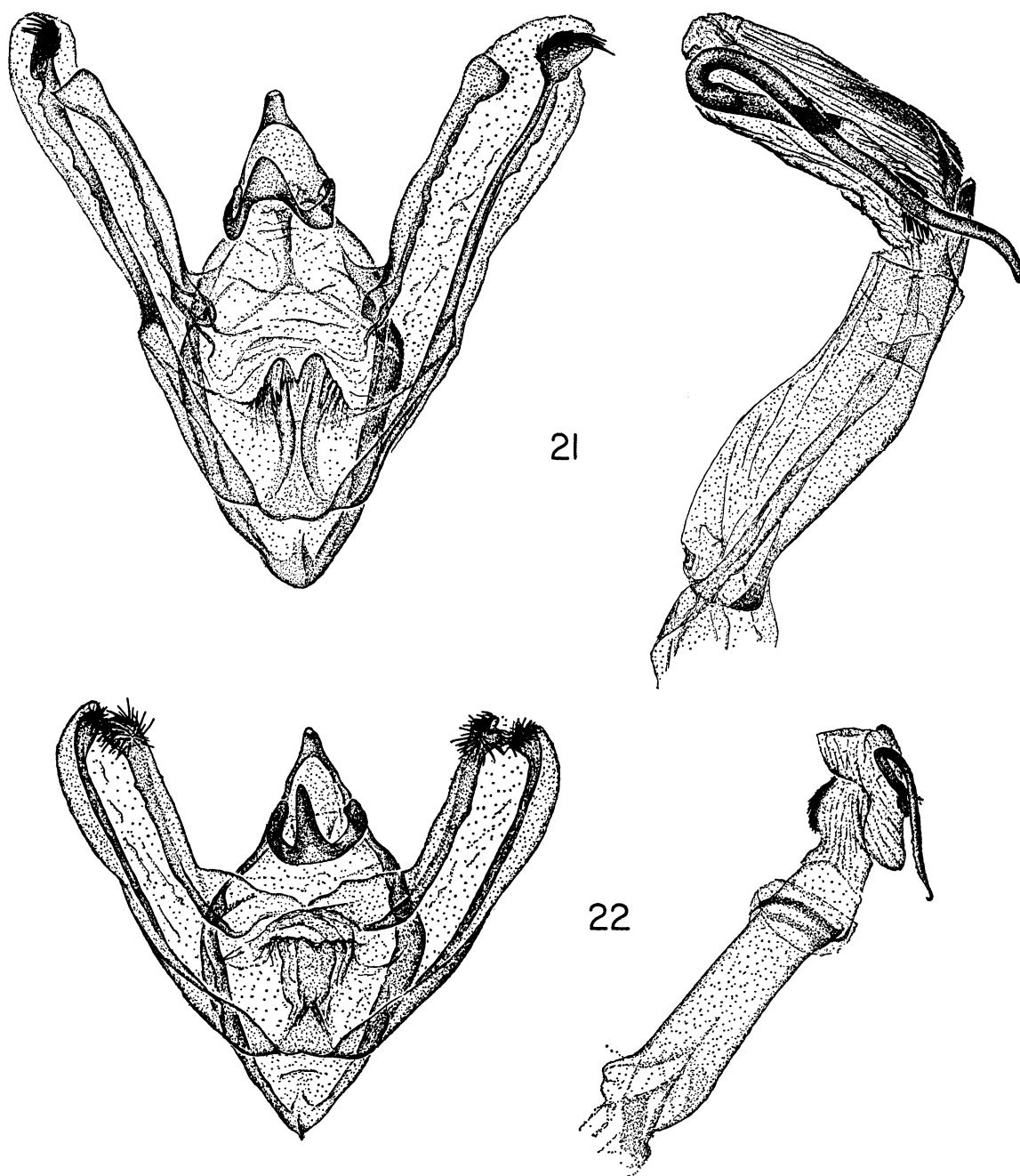
FIGS. 13-15. Male genitalia. 13. *Glana hima*, new species, holotype, V[olcan] de Chiriqui, [Panama] (Champion; B.M.N.H.). 14. *G. agria*, new species, paratype, Orizaba, [Mexico], March, 1896 (W. Schaus; B.M.N.H.). 15. *G. trapezia*, new species, holotype, Faz[enda] dos Campos, Passa Quatro, Minas [Gerais], Brazil, November 24, 1916 (J. F. Zikan; U.S.N.M.).



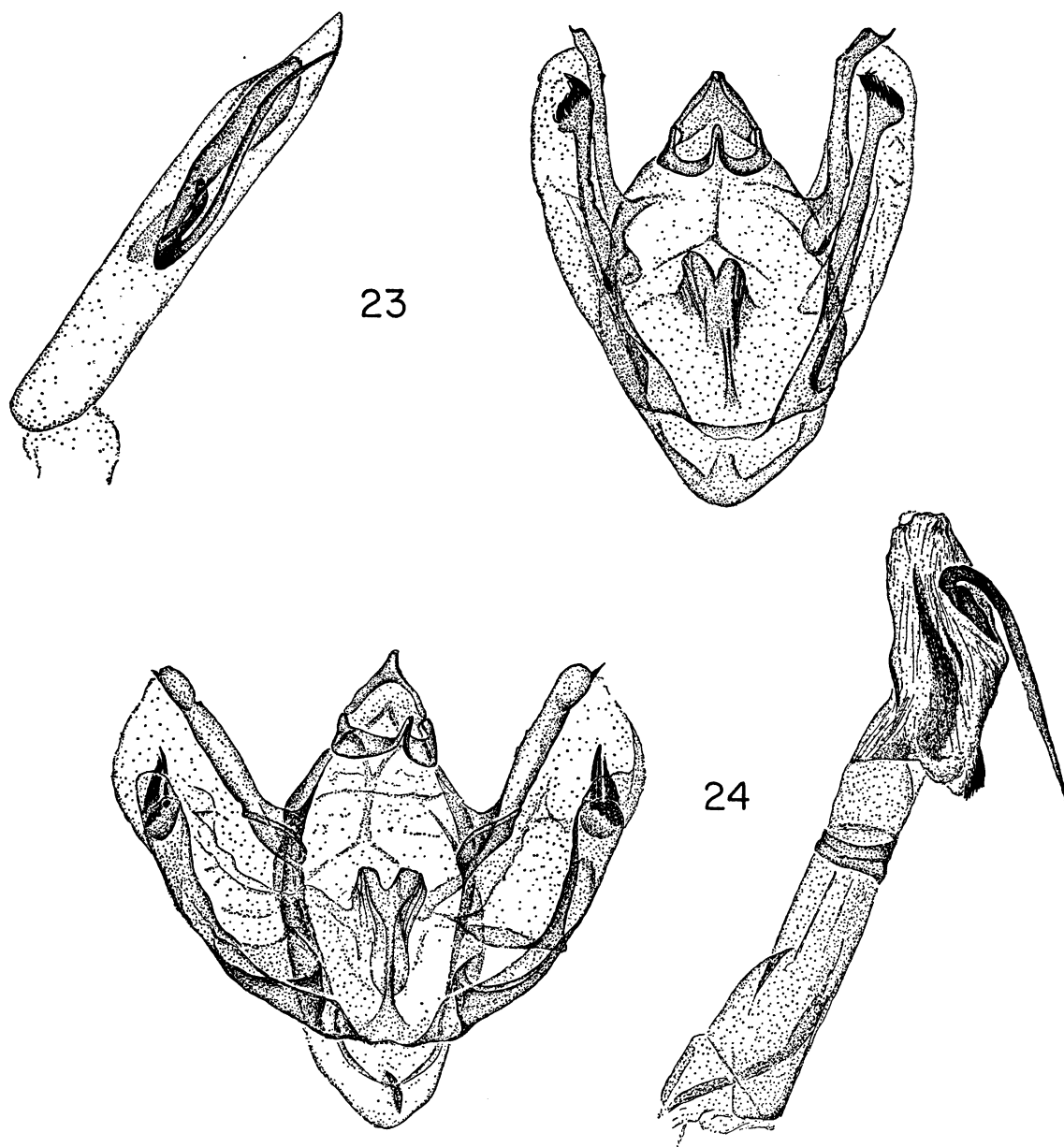
FIGS. 16, 17. Male genitalia. 16. *Glana sacca*, new species, holotype, Chanchamayo, [Peru] (B.M.N.H.). 17. *G. bulla*, new species, paratype, Independencia, Paraguay, November 21, 1949 (P. Casada; A.M.-N.H.).



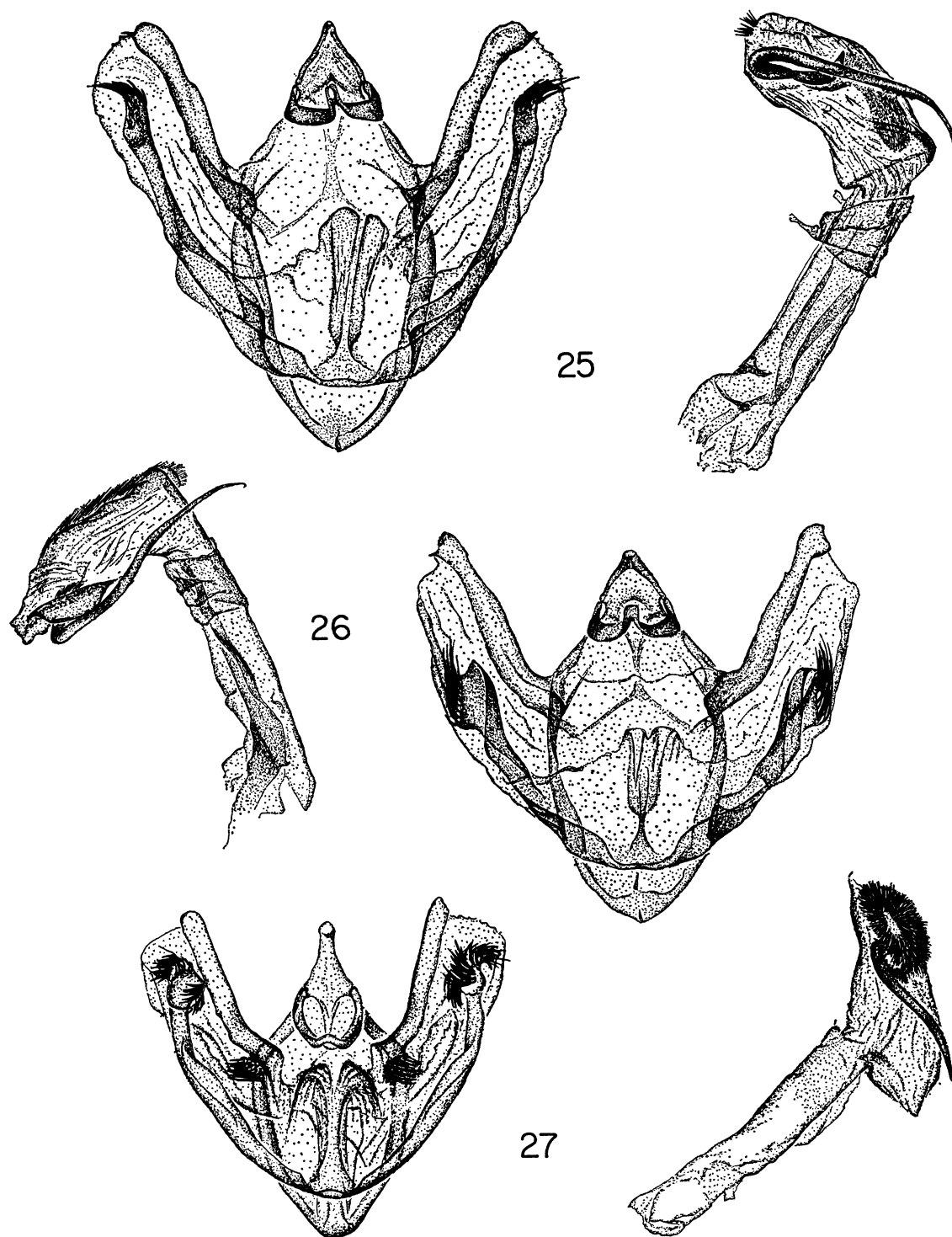
FIGS. 18-20. Male genitalia. 18. *Glana gemina*, new species, holotype, Cerro Zunil, [Guatemala] (Champion; B.M.N.H.). 19. *G. laticolla*, new species, holotype, Puerto Elegio, Oaxaca, Mexico, September 26, 1961 (E. C. Welling; A.M.N.H.). 20. *G. brachia*, new species, paratype, Chanchamayo, Peru (Schuncke; B.M.N.H.).



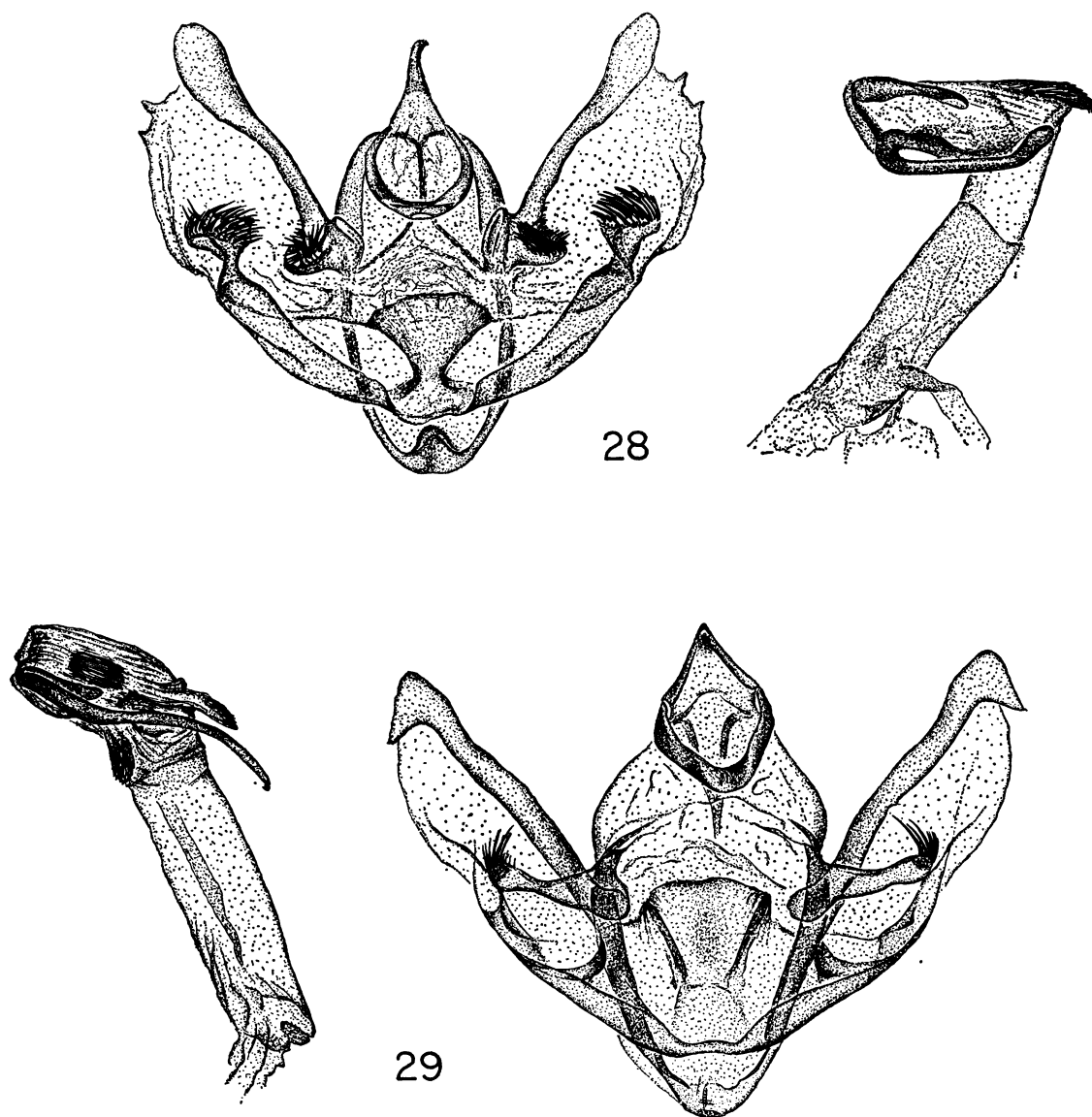
FIGS. 21, 22. Male genitalia. 21. *Glena cretacea* (Butler), Avispas, Madre de Dios, Peru, September 20–30, 1962 (L. E. Peña; A.M.N.H.). 22. *G. gamps*, new species, holotype, San Esteban, Venezuela, June, 1909 (S. M. Klages; B.M.N.H.).



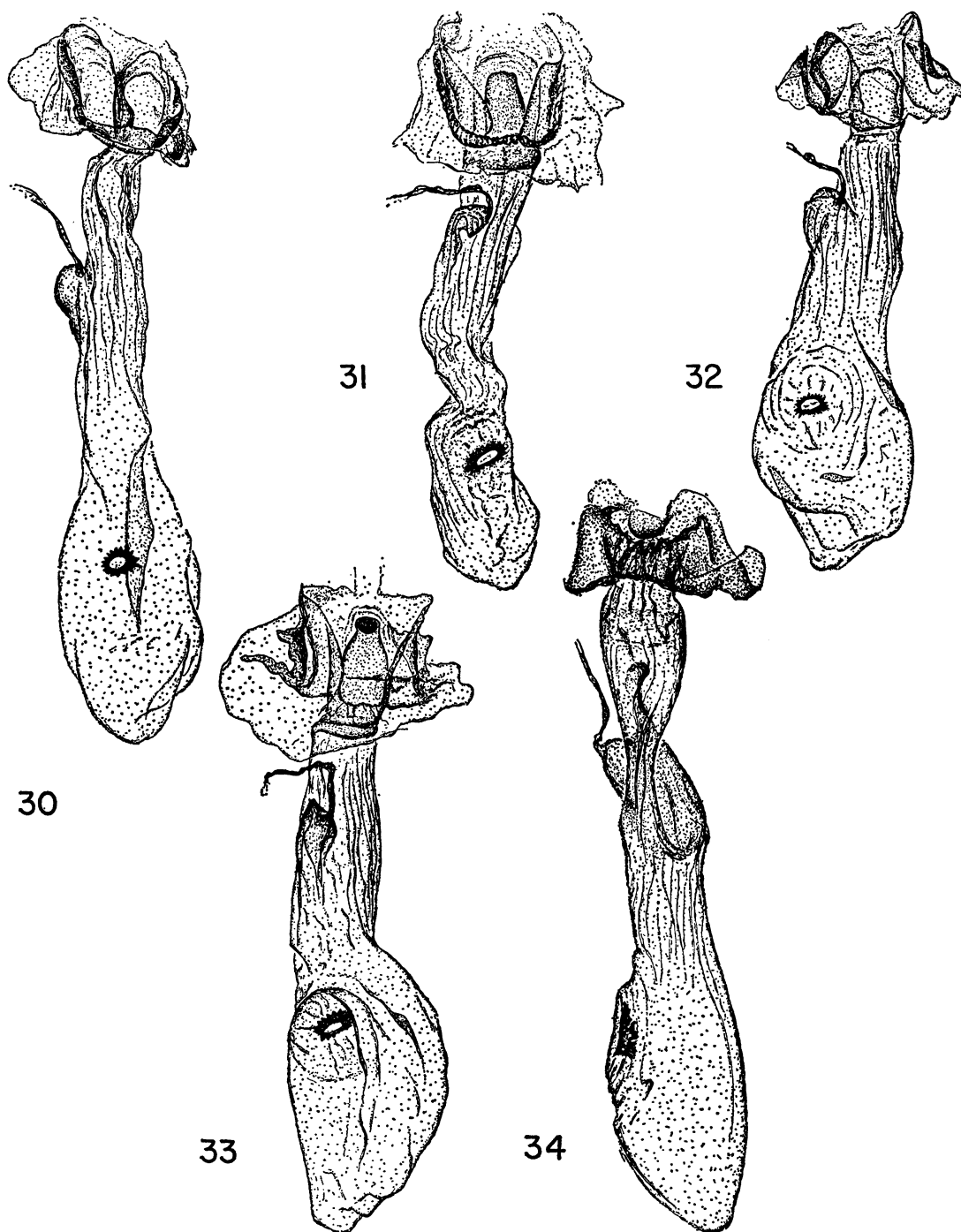
FIGS. 23, 24. Male genitalia. 23. *Glana labecula*, new species, holotype, Chapare, Bolivia, April, 1951 (A.M.N.H.). 24. *G. totana*, new species, paratype, Arima Valley, Trinidad, February 10-22, 1964 (Rozen and Wygodzinsky; A.M.N.H.).



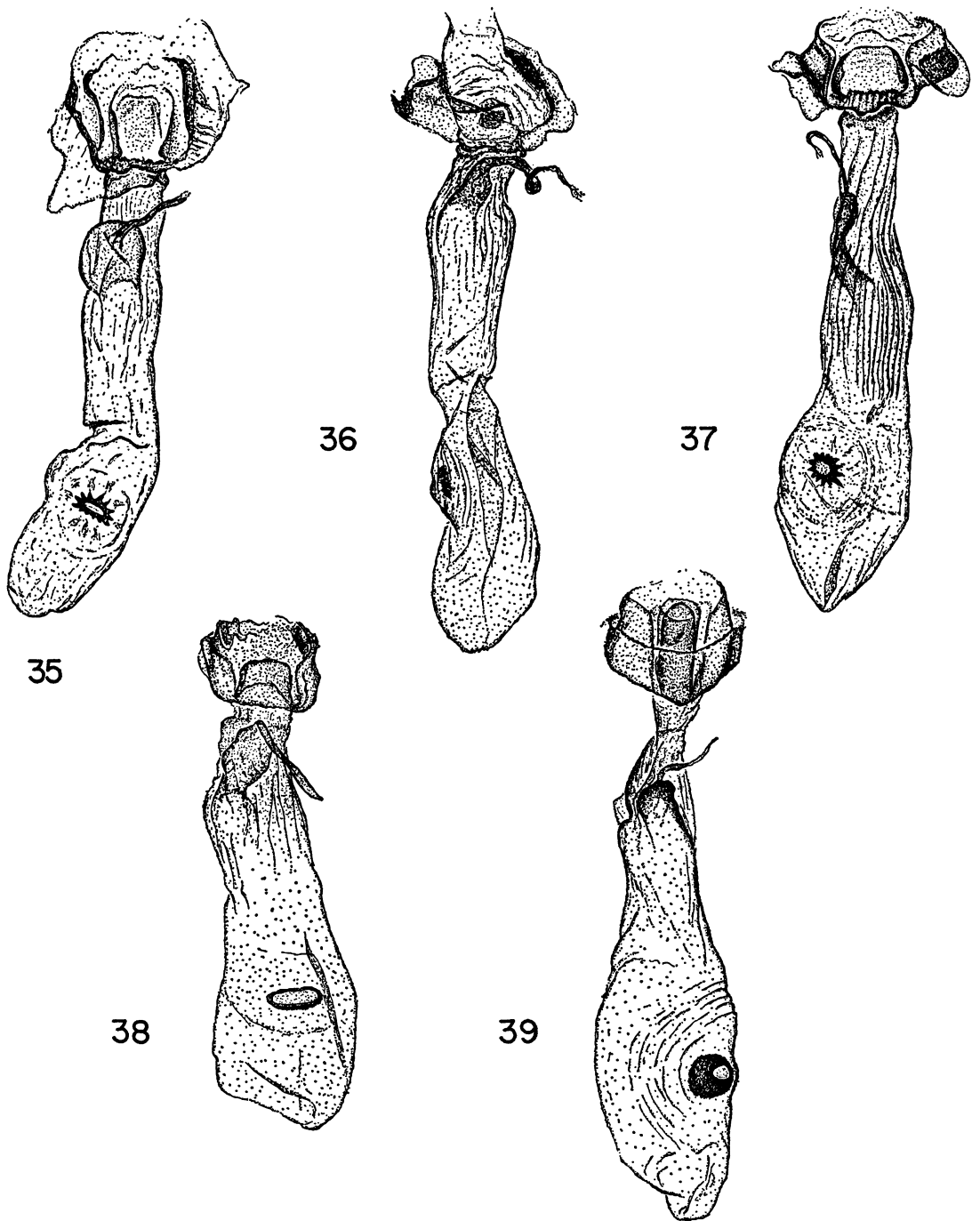
FIGS. 25-27. Male genitalia. 25. *Glana quadrata*, new species, holotype, Cayenne, French Guiana (U.S.N.M.). 26. *G. mopsaria* (Schaus), San José, Costa Rica (H. Schmidt; B.M.N.H.). 27. *G. turba*, new species, holotype, Rio Laeiss, Blumenau, Santa Catarina, [Brazil], October, 1934 (F. H. Hoffman; B.M.N.H.).



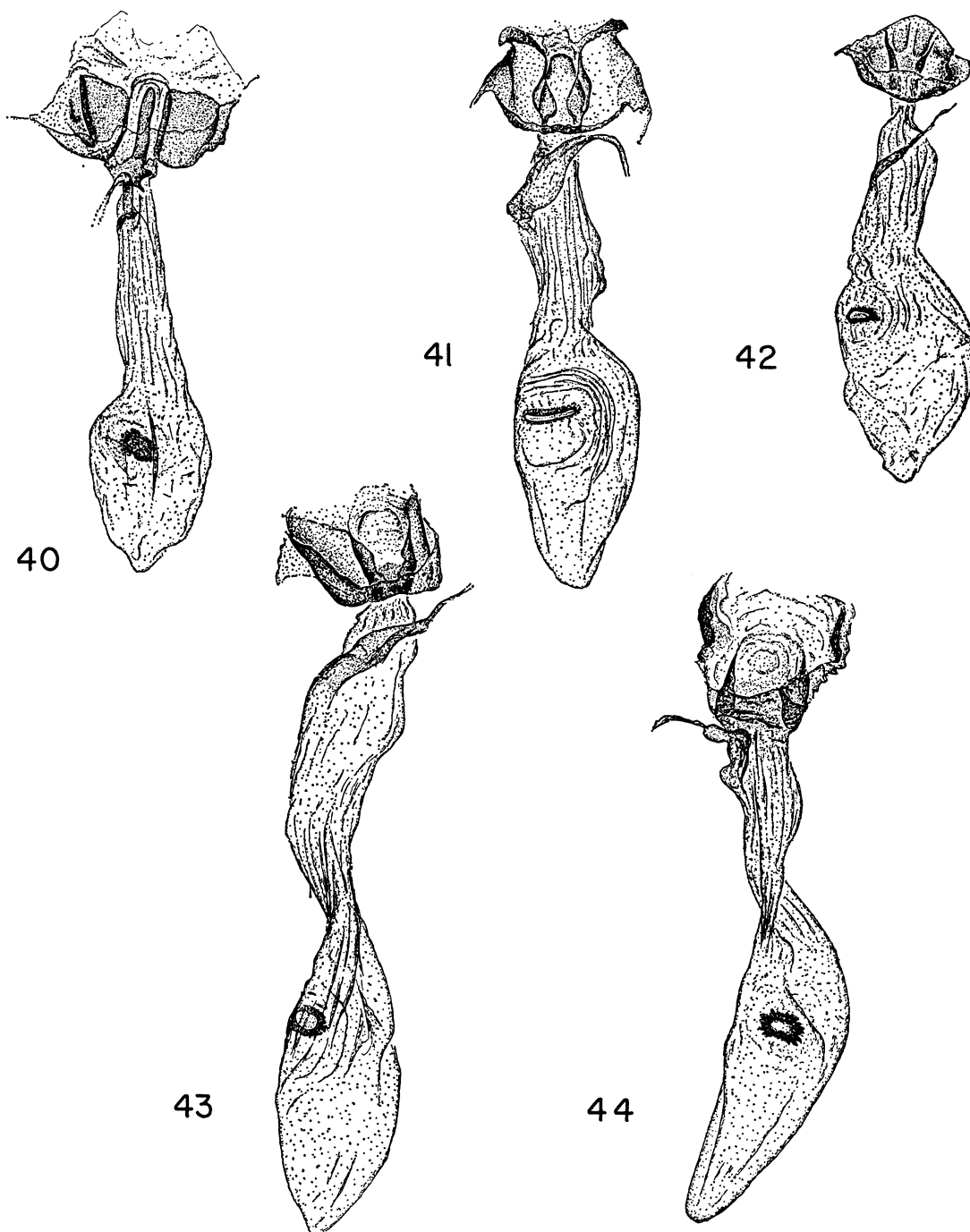
FIGS. 28, 29. Male genitalia. 28. *Glana tyrbe*, new species, holotype, Satipo, Peru (P. Paprzycki; A.M.N.H.). 29. *G. asaccula*, new species, holotype, Rio Laeiss, Blumenau, Santa Catarina, [Brazil], December, 1933 (F. H. Hoffman; B.M.N.H.).



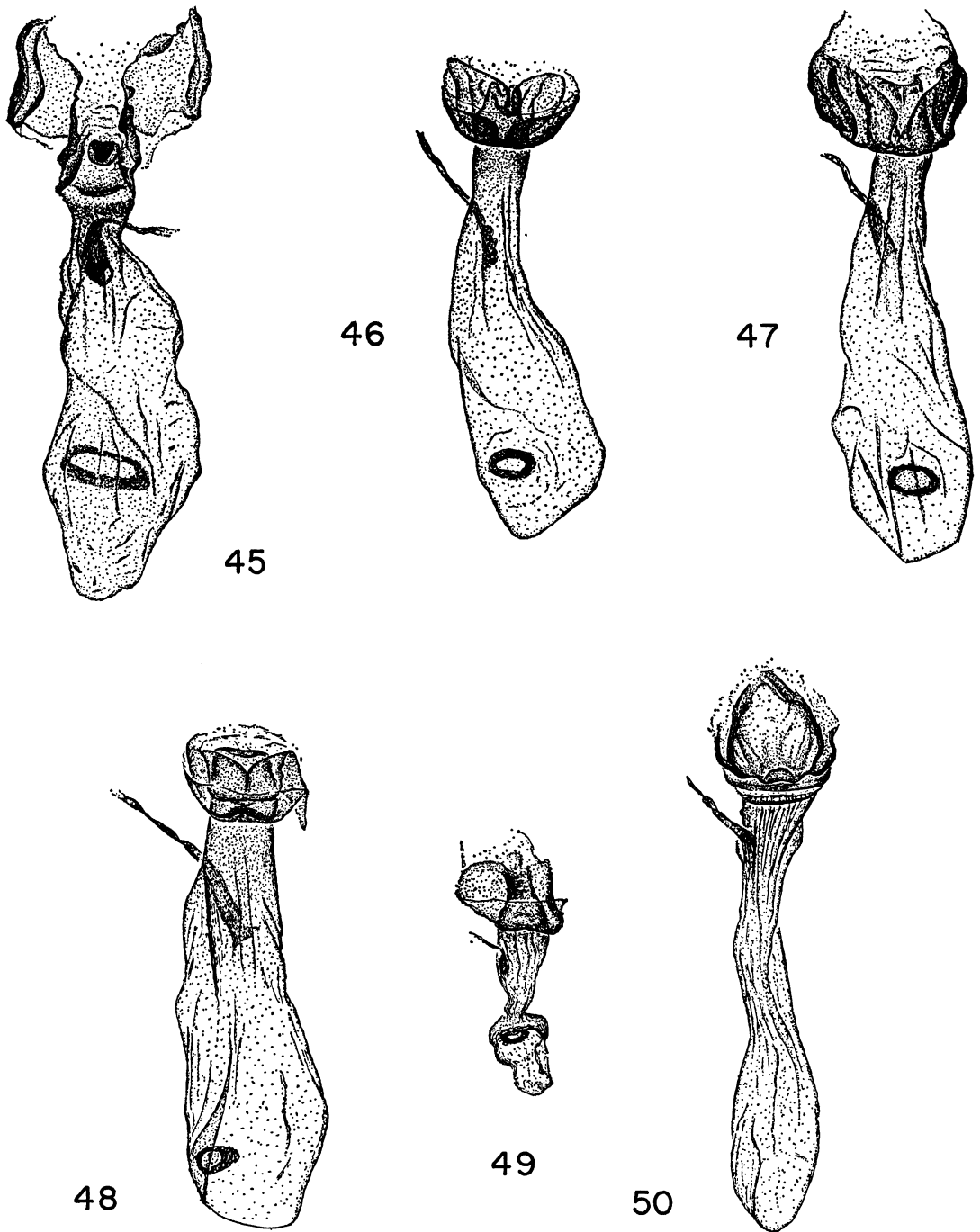
FIGS. 30-34. Female genitalia. 30. *Glana effusa*, new species, paratype, Presidio, Mexico, July, 1951 (A.M.N.H.). 31. *G. bipennaria bipennaria* (Guenée), Nuevo Teutonia, Brazil, September 2, 1943 (F. Plaumann; A.M.N.H.). 32. *G. grandillosa* (Dognin), Tucuman, Argentina (R. Schneider; B.M.N.H.). 33. *G. juga*, new species, paratype, Coosnipata, Paucartambo, Cuzco, Peru, November 29, 1951 (F. L. Woytkowski; A.M.N.H.). 34. *G. megale*, new species, allotype, Pedregosa, Merida, Venezuela, June 8, 1898 (Briceno; B.M.N.H.).



FIGS. 35-39. Female genitalia. 35. *Glenea unipennaria unipennaria* (Guenée), Patino cué, Paraguay (Monforts; B.M.N.H.). 36. *G. uncata*, new species, allotype, Juan Vinas, Costa Rica, June (Schaus and Barnes; U.S.N.M.). 37. *G. demissaria* (Walker), Para, [Brazil] (A. M. Moss; B.M.N.H.). 38. *G. basalis*, new species, holotype, Tuis, Costa Rica, August 31, 1908 (U.S.N.M.). 39. *G. hima*, new species, paratype, Chiriqui, Panama (U.S.N.M.).



FIGS. 40-44. Female genitalia. 40. *Glenn lora*, new species, holotype, Camoapa, Nicaragua, 1906 (G. M. Palmer; B.M.N.H.). 41. *G. agria*, new species, allotype, Vista Hermosa, Oaxaca, Mexico, October 1, 1962 (E. C. Welling; A.M.N.H.). 42. *G. trapezia*, new species, allotype, Alto Serra, São Paulo, [Brazil], December 10 (Pohl; U.S.N.M.). 43. *G. gemina*, new species, allotype, Orosi, Costa Rica (Fassl; B.M.N.H.). 44. *G. laticolla*, new species, allotype, Cordova, Veracruz, [Mexico] (Rumeli; B.M.N.H.).



FIGS. 45-50. Female genitalia. 45. *Glana brachia*, new species, paratype, Sapucay, Paraguay, July 6, 1902 (W. Foster; B.M.N.H.). 46. *G. totana*, new species, allotype, Palmiste, Trinidad, March 7, 1917 (N. Lamont; B.M.N.H.). 47. *G. quadrata*, new species, allotype, Cayenne, French Guiana (U.S.N.M.). 48. *G. mopsaria* (Schaus), Makasaka, Santa Marta, [Colombia] (V. de Andreis; B.M.-N.H.). 49. *G. turba*, new species, allotype, Santa Catarina, Brazil (B.M.N.H.). 50. *G. asaccula*, new species, allotype, Jaragua do Sul, Santa Catarina, [Brazil], September, 1932 (F. Hoffman; B.M.-N.H.).

BIBLIOGRAPHY

- AMERICAN GEOGRAPHICAL SOCIETY
1945. Map of Hispanic America, 1:1,000,000. Washington, Government Printing Office.
- BOISDUVAL [J. B. A. D. DE], AND [A.] GUENÉE
1858. Histoire naturelle des insectes. Species général des lépidoptères. Uranides, phalénites, siculides. Paris, atlas, pp. 1-6, 1-4, pls. 1, 1-22, 1.
- BROWN, F. MARTIN
1941. A gazetteer of entomological stations in Ecuador. Ann. Ent. Soc. Amer., vol. 34, pp. 809-851, 10 figs.
- BUTLER, ARTHUR GARDINER
1881. On the Lepidoptera of the Amazons, collected by Dr. James W. H. Trail during the years 1873 to 1875. Trans. Ent. Soc. London, pp. 315-349.
- COSTA LIMA, A. DA
"1949" [1950]. Insetos do Brasil. Lepidópteros, 2ª parte. Esc. Nac. Agronomia, vol. 6, 420 pp., 331 figs.
- DOGNIN, PAUL
1902. Hétérocères nouveaux de l'Amerique du sud. Ann. Soc. Ent. Belgique, vol. 46, pp. 335-350.
- DRUCE, HERBERT
1891-1900. Biologia Centrali-Americana. Insecta. Lepidoptera-Heterocera. London, vol. 2, pp. 1-622.
- DYAR, HARRISON G.
1913. Results of the Yale Peruvian expedition of 1911. Lepidoptera. Proc. U. S. Natl. Mus., vol. 45, pp. 627-649.
1914. Report on the Lepidoptera of the Smithsonian biological survey of the Panama Canal Zone. *Ibid.*, vol. 47, pp. 139-350.
- GUENÉE, A.
1857. Histoire naturelle des insectes. Species général des lépidoptères. Paris, vol. 9, lvi+514 pp.
- HULST, GEO. D.
1896. A classification of the Geometrina of North America, with descriptions of new genera and species. Trans. Amer. Ent. Soc., vol. 23, pp. 245-386, pls. 10, 11.
- KAYE, WILLIAM JAMES, AND NORMAN LAMONT
1927. A catalogue of the Trinidad Lepidoptera Heterocera (moths). Mem. Dept. Agr., Trinidad and Tobago, no. 3, pp. 1-144.
- MCDUNNOUGH, J.
1920. Studies in North American Cleorini (Geometridae). Dominion of Canada, Dept. Agr., Ent. Branch, Tech. Bull., no. 18, pp. 1-64, pls. 1-11.
- OBERTHÜR, CHARLES
1913. Études de lépidoptérologie comparée. Rennes, fasc. 7, 677 pp., pls. 1-111, CLXI-CXC VII.
- PROUT, LOUIS B.
1929. On the geometrid genus *Catoria* Moore. Novitates Zool., vol. 35, pp. 132-142.
- RINDGE, FREDERICK H.
1964. A revision of the genera *Melanolophia*, *Pherotesia*, and *Melanotesia* (Lepidoptera, Geometridae). Bull. Amer. Mus. Nat. Hist., vol. 126, pp. 241-434, figs. 1-163.
1965. A revision of the nearctic species of the genus *Glena* (Lepidoptera, Geometridae). *Ibid.*, vol. 129, pp. 265-306, figs. 1-28.
1966. A revision of the moth genus *Anacampitodes* (Lepidoptera, Geometridae). *Ibid.*, vol. 132, pp. 175-244, figs. 1-53, pls. 22-25.
- SCHAUS, W.
1913. New species of Heterocera from Costa Rica. XXI. Ann. Mag. Nat. Hist., ser. 8, vol. 11, pp. 342-357.
- SELANDER, RICHARD B., AND PATRICIA VAURIE
1962. A gazetteer to accompany the "Insecta" volumes of the "Biologia Centrali-Americana." Amer. Mus. Novitates, no. 2099, pp. 1-70, figs. 1-8.
- TIME, INC.
1961. Life pictorial atlas of the world. New York, Time, Inc.
- VIETTE, P.
1950. Sur quelques espèces de géométrides décrites par Guenée (1857). Bull. Mens. Soc. Linnéenne, Lyon, yr. 19, pp. 201-206.
- WALKER, FRANCIS
1860. List of the specimens of lepidopterous insects in the collection of the British Museum. Geometrites. London, pt. 21, pp. 277-498.
1868. Characters of some undescribed heterocerous Lepidoptera. Jour. Linnean Soc., London, Zool., vol. 9, pp. 181-199.

