

W. DONALD DUCKWORTH

*Bredin-Archbold-
Smithsonian Biological
Survey of Dominica:
West Indian Stenomidae
(Lepidoptera: Gelechioidea)*

SMITHSONIAN CONTRIBUTIONS TO
ZOOLOGY

NUMBER 4

W. Donald Duckworth *Bredin-Archbold-*
Smithsonian Biological
Survey of Dominica:
West Indian Stenomidae
(Lepidoptera:
Gelechioidea)

ISSUED

AUG 13 1969

SMITHSONIAN INSTITUTION PRESS
CITY OF WASHINGTON
1969

SERIAL PUBLICATIONS OF THE SMITHSONIAN INSTITUTION

The emphasis upon publications as a means of diffusing knowledge was expressed by the first Secretary of the Smithsonian Institution. In his formal plan for the Institution, Joseph Henry articulated a program that included the following statement: "It is proposed to publish a series of reports, giving an account of the new discoveries in science, and of the changes made from year to year in all branches of knowledge not strictly professional." This keynote of basic research has been adhered to over the years in the issuance of thousands of titles in serial publications under the Smithsonian imprint, commencing with *Smithsonian Contributions to Knowledge* in 1848 and continuing with the following active series:

Smithsonian Annals of Flight
Smithsonian Contributions to Anthropology
Smithsonian Contributions to Astrophysics
Smithsonian Contributions to Botany
Smithsonian Contributions to the Earth Sciences
Smithsonian Contributions to Paleobiology
Smithsonian Contributions to Zoology
Smithsonian Studies in History and Technology

In these series, the Institution publishes original articles and monographs dealing with the research and collections of its several museums and offices and of professional colleagues at other institutions of learning. These papers report newly acquired facts, synoptic interpretations of data, or original theory in specialized fields. Each publication is distributed by mailing lists to libraries, laboratories, institutes, and interested specialists throughout the world. Individual copies may be obtained from the Smithsonian Institution Press as long as stocks are available.

S. DILLON RIPLEY
Secretary
Smithsonian Institution

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

UNITED STATES GOVERNMENT PRINTING OFFICE
WASHINGTON : 1969

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C. 20402 - Price 35 cents (paper cover)

ABSTRACT

All the species of the microlepidopterous family Stenomidae known to occur in the West Indies are reviewed regarding their taxonomic history, zoogeography, identity, and morphology. Two new species are described, *Chlamydastis dominicae* and *Mothonica cubana*, one of which, *C. dominicae*, is the first representative of the genus *Chlamydastis* recorded from the West Indies. Keys to the species based on structures of the male and female genitalia and characters of the wing maculation are provided. Distribution maps, photographs of the adults, drawings of the male and female genitalia, and all known biological information are included.

The family Stenomidae, although a large and widespread group in Central and South America, is poorly represented in the West Indies. Presently the family is represented by nine species in five genera. Of these, two species are considered questionable either in occurrence or identity.

The principal impetus for this paper has come from the considerable amount of collecting conducted in recent years in connection with the Bredin-Archbold-Smithsonian Biological Survey of Dominica in the Lesser Antilles. In attempting to study properly the one species of stenomid collected during this survey, it seemed desirable to extend the coverage to the entire West Indian stenomid fauna to bring together the scattered records, descriptions, and other information and to provide a base for future studies.

In this paper the West Indies is defined as including the Greater Antilles, the Bahama Islands, and the Lesser Antilles as far south as Grenada. Trinidad and the other islands along the northern coast of South America are excluded because they are biogeographically continental and thus more logically treated as part of South America.

The author wishes to acknowledge with thanks the cooperation and aid of the following individuals and institutions who, through their support and encouragement, have materially aided the present study: Dr. F. Fernandez Yepez, Facultad de Agronomia, Universidad Central de Venezuela; Dr. M. G. Emsley, Academy of Natural Sciences of Philadelphia (formerly Assistant Director, The William Beebe Tropical Research Station, Trinidad); Mr. George E. Drewry,

W. Donald Duckworth, Department of Entomology, Smithsonian Institution, Washington, D.C. 20560.

Puerto Rico Nuclear Center; Dr. T. H. Farr, The Institute of Jamaica, for support and assistance in various field studies; Mr. Allan Watson, Mr. P. E. S. Whalley, British Museum (Natural History); Dr. Fritz Kasy, Naturhistorisches Museum, Vienna; Dr. J. G. Franclemont, Cornell University, for lending types and other specimens in their charge for study. Special thanks are extended to Dr. O. S. Flint, Dr. E. L. Todd, Dr. D. R. Davis, and Dr. J. F. G. Clarke for specimens and habitat information from their collecting activities on the island of Dominica and various other areas in the West Indies.

The author also wishes to thank Mrs. Elsie Froeschner for a portion of the genitalic drawings and Mr. Andre Pizzini for the distribution maps and a portion of the genitalic drawings. The photographic work was done by the Smithsonian Photographic Laboratory.

This study was aided in part by the National Science Foundation on Grant GB-1800.

Zoogeography

The stenomid fauna of the West Indies as herein defined consists of nine species in five genera. The identity of one, *Menesta cinereocervina* (Walsingham), is uncertain and thus should be disregarded for purposes of discussion here. The species are listed in Table 1, which also summarizes available distributional data. Although future collecting may increase the list of species or their ranges, it is apparent that the stenomid fauna of the islands is depauperate as compared with adjacent Central and South America. For contrast, Guatemala has 82 species representing at least 11 genera, Panama 171 species representing at least 16 genera, and French Guiana has more than 350

TABLE 1.—*Geographic distribution of the West Indian Stenomidae*

Species	Mexico-Central America							
	Cuba	Hispaniola	Puerto Rico	Dominica	St. Vincent	Grenada	Trinidad	South America
<i>Antaeotricha suffumigata</i>						X		
<i>Antaeotricha pseudochyta</i>						X		X
<i>Antaeotricha vacata</i>						X	X	
<i>Chlamydastis dominicae</i>				X				
<i>Mothonica ocella</i>	X	X	X?	X				
<i>Mothonica cubana</i>		X						
<i>Stenoma comma</i>	X	X						
<i>Stenoma byssina</i>						X?	X	X
<i>Menesta cinereocervina</i>					X			

species representing at least 18 genera. A similar impoverishment in the West Indies has been noted for other animal groups, such as terrestrial mammals and amphibians among the vertebrates (Darlington, 1957) and Meloidae (Selander and Bouseman, 1960) and Scarabaeinae (Matthews, 1966) among the insects.

As shown in Table 1, the stenomid fauna of the West Indies consists of two elements, the Greater Antillean species which appear to be derived from Central America, and the Lesser Antillean species derived from mainland South America. There is no overlap between these two elements at the specific or generic level. The apparent exception is in the genus *Stenoma* with *S. comma* occurring in Cuba and *S. byssina* a questionable record for Grenada. However, the genus *Stenoma* as presently constituted is not a natural assemblage of species and the two in question are not, in fact, congeneric. A more adequate generic classification for the family is currently under study and, when completed, should eliminate similar problems in the future.

One of the most critical handicaps in determining the distribution patterns of the West Indian stenomids is the lack of sufficient collecting data and information

concerning the life cycles and host-plant preferences. The latter is particularly important for without biological information it is virtually impossible to ascertain the role man may have played in the transportation of mainland species to the islands.

Although sufficient biological data are not currently available for definite conclusions, it seems most likely that the poorer island representation of stenomids is due to a scarcity of suitable habitats as well as the island's long physical isolation from the mainland. From personal experiences collecting stenomids throughout Central America and the northern portion of South America, the number of species attracted to lights increased as I moved from dry scrub to wet forest conditions. In the West Indies (especially the Lesser Antilles) the wet forest habitat occurs primarily at altitudes approximating 1,000 feet and above and to a lesser extent along rivers and streams in the Lowlands. It is also important to note that these humid forests do not reflect the stratification found in continental rain forest but, rather, are much more uniform ecologically. The larger islands of the Greater Antilles are more diversified, with Cuba beginning to approach a continental pattern.

Diakonoff (1954) has suggested that the family Stenomidae is of recent origin and that this is reflected in the rather specialized male genitalia and the large number of closely related species in some genera. If this premise is true, and current studies tend to support it, then the long isolation of the West Indies may have played a significant role in the poor representation of species currently known.

No attempt will be made to compare in detail the stenomid fauna of the various islands, because the small number of species involved requires a more exact knowledge of the fauna than is currently available. More specific remarks concerning the distribution of species can be found in the discussion following each species in the descriptive portion of this paper.

History

The first publication on Lepidoptera that included a species of West Indian Stenomidae as defined in this paper was that of Walsingham (1891). The species, *cinereocervina*, was described in the genus *Gelechia* and later (Walsingham, 1897) transferred to the stenomid genus *Menesta*.

Walsingham (1897) revised his earlier work and for the first time included the family Xyloryctidae (=Stenomidae) with eight species from the West Indies. Walsingham, however, included Trinidad in his concept of the West Indies and seven of the species were from that locality. Thus, only one species, *Antaeotricha suffumigata* Walsingham, described from Grenada is significant in the present study.

Following Walsingham's two papers there was a long period during which only a few isolated species descriptions of stenomids from the West Indies appeared. Busck (1911) described *Stenoma comma* in a paper on South American tineoid moths and noted one of the specimens in the type series was from Cuba. Meyrick (1925) described *Antaeotricha vacata* from Grenada in his Exotic Microlepidoptera series. Five years later Meyrick (1930) included Grenada in the distribution of *Stenoma byssina* (Zeller) in his account of the collection of Microlepidoptera made by Dr. H. Zerny in Brazil. This record remains unverified and is discussed in more detail in the remarks pertaining to this species in the present study.

Forbes (1930) described *Mothonica ocella* from Puerto Rico and included it in the family Xyloryctidae (=Stenomidae) in his study of the Heterocera of Puerto Rico.

Busck (1933) lists *Stenoma comma* and *Mothonica ocella* Forbes in his study of the Microlepidoptera of Cuba, and transferred the latter species from *Mothonica* to *Stenoma*. He also reported *Stenoma comma* Busck from Puerto Rico on the authority of Forbes. This distribution, although probable, has never been verified by actual specimens. Kisliuk and Cooley (1933) reported the larvae of *Mothonica ocella* Forbes and a *Stenoma* sp. infesting 20 percent of the fruit of *Melicocca bijuga* in Haiti. This report is questionable in that no adults were obtained and the

specimens of larvae have not been located. Also, the larva of *Mothonica ocella* Forbes has never been described and the accuracy of the identification remains extremely uncertain.

Wolcott (1936, 1948) listed *M. ocella* Forbes, *Shistonoea fulvidella* Walsingham (Gelechiidae) and "*Stenoma*" species for Puerto Rico in the family Xyloryctidae (=Stenomidae).

Bruner, Scaramuzza, and Otero (1945) reported a species of stenomid, *Catarata* sp. determined by A. Busck, feeding in the larval stage in the older seeds of *Copernicia glabrescens* in Cuba. The material upon which this report was based was located in the United States National Museum (USNM) collection and found to be a new species of *Mothonica* and is described in this paper.

Family STENOMIDAE

Genus *Antaeotricha* Zeller

Antaeotricha Zeller, 1854, p. 390.

This is the largest genus in the family Stenomidae, numbering in excess of four hundred species in the Western Hemisphere. Information to date indicates only slight penetration of this genus into the West Indies. The three West Indian species are from Grenada and only one, *A. suffumigata*, has not been recorded from adjacent continental areas. It is very likely that ultimately this species will also be found in the Guianas and/or Trinidad.

Unfortunately, information concerning the life histories of tropical species of *Antaeotricha* is scarce and completely unknown for the three species included here. Obviously, such information would provide important clues concerning the present distribution patterns.

Key to the Species of West Indian *Antaeotricha*

BASED ON MACULATION

1. Groundcolor of forewing white. 2
Groundcolor of forewing grayish-ochreous *Antaeotricha vacata* Meyrick
2. Forewing very lightly shaded with brown on dorsum from tornus to base; if present, spot at end of cell faint brown *Antaeotricha suffumigata* Walsingham
- Forewing heavily shaded with brown in complex pattern; spot at end of cell large, oblique-longitudinal in shape, fuscous. *Antaeotricha pseudochyta* Meyrick

Key to the Species of West Indian *Antaeotricha*—Continued

BASED ON GENITALIA

1. Male 2
Female 4
2. Gnathos dorsoventrally flattened apically; lateral lobes of anellus well developed; aedeagus without long, ventral lip at apex 3
Gnathos with median dorsal keel at apex; lateral lobes of anellus reduced; aedeagus with apex extended ventrally forming lip which equals remainder of aedeagus in length
. *Antaeotricha suffumigata* Walsingham
3. Aedeagus with cornuti consisting of short, heavy subtriangular shaped spines in a random pattern *Antaeotricha pseudochyta* Meyrick
Aedeagus with cornuti consisting of two parallel patches of small heavy spines
. *Antaeotricha vacata* Meyrick
4. Ductus bursae membranous; signum a heavily sclerotized, dentate plate slightly constricted at middle *Antaeotricha suffumigata* Walsingham
Ductus bursae with sclerotized corrugations; signum a dentate, V-shaped plate
. *Antaeotricha pseudochyta* Meyrick

Antaeotricha suffumigata Walsingham

FIGURES 1, 2, 14, 21, 30

Antaeotricha suffumigata Walsingham, 1897, p. 98.

Alar expanse 16–20 mm.

Antenna white, lightly shaded with brown. Head, labial palpus, legs white, lightly shaded with brown. Thorax, abdomen white. Forewing white, very slightly shaded with brown on dorsum from tornus to base; in some specimens a faint brown spot at end of cell; cilia white. Hind wing white overcast with brown, cilia white.

MALE GENITALIA (slide WDD 3736).—Gnathos enlarged at apex with a median dorsal keel. Anellus small, V-shaped; two small lateral setiferous lobes. Aedeagus short, broad; apex extended ventrally forming lip which equals remainder of aedeagus in length; cornuti consisting of a small tight cluster of heavy spines.

FEMALE GENITALIA (slide WDD 3737).—Ostium broad; ostium bursae a large, sclerotized pouch; ductus bursae membranous; corpus bursae membranous, signum a large dentate plate; inception of ductus seminalis at junction of ostium bursae and ductus bursae.

TYPE.—Lectotype, present designation; female bearing following labels: "(1) Mount Gay Est. (leeward side), Grenada, W. I., H. H. Smith, 1–5.X. (2)

Walsingham Collection, 1910–427. 65344. (3) *Antaeotricha suffumigata* Wlsm., 'Para-type' ¼." In the British Museum (Natural History).

TYPE-LOCALITY.—Mount Gay Estate, Grenada.

DISTRIBUTION.—Grenada: Mount Gay Estate, 300 feet, leeward side (October); Balthazar, 250 feet, windward side (March, April).

In addition to the type series of six specimens in the British Museum (Natural History), I have examined 13 specimens of this species in the USNM collection collected by William Schaus. The illustration of the male genitalia in this paper is derived from one of these latter specimens since the only male in the type series is without abdomen.

Antaeotricha pseudochyta Meyrick

FIGURES 3, 4, 15, 22, 30

Antaeotricha pseudochyta Meyrick, 1915, p. 393.

Alar expanse 13–19 mm.

Antenna whitish suffused with gray basally, gray beyond. Head white; second segment of labial palpus gray basally, white beyond, apical segment white. Thorax white in males, suffused with gray in females: fore and midlegs white heavily suffused with gray, hind legs white. Forewing white; a dark brown blotch on costa from base to one-fourth from which two

oblique irregular partially obsolete brown lines extend across wing; dorsal area much suffused and blotched with gray, more so in female than male; a strong oblique-longitudinal fuscous spot on upper angle of cell and a small fuscous dot below its apical extremity; an irregular curved oblique narrow interrupted fuscous transverse band beyond spot extending from costa to dorsum, more pronounced in female than male; fuscous suffusion on apex, in female forming a broader band around apical part of costa and termen, leaving dentate white marginal line with fuscous interspaces; cilia white, with three brown shades, in male nearly obsolete except around apex. Hind wing white in male, gray in female; cilia white with two gray lines, obsolete in males except at apex.

MALE GENITALIA (slide WDD 3741).—Gnathos long, narrow; apex without dorsal development. Anellus shield-like in shape with two long, narrow, lateral lobes bearing small setae at the extreme apex; aedeagus simple, basal one-fourth angled approximately 45°; cornuti present, consisting of short heavy subtriangular shaped spines.

FEMALE GENITALIA (slide WDD 3774).—Ostium narrow; ostium bursae sclerotized; ductus bursae broad, with sclerotized corrugations; corpus bursae membranous, signum a V-shaped dentate plate; inception of ductus seminalis just beyond junction of ostium bursae and ductus bursae.

TYPE.—In the British Museum (Natural History).

TYPE-LOCALITY.—Bartica, British Guiana.

DISTRIBUTION.—British Guiana: Bartica (December, January, February). Grenada: St. George's (November).

Clarke (1955) designated the lectotype for this species and presented photographs of the genitalia and left wings. The type series consisted of 22 specimens of both sexes all from Bartica, British Guiana. The single specimen from Grenada is in the USNM collection.

Antaeotricha vacata Meyrick

FIGURES 5, 23, 30

Antaeotricha vacata Meyrick, 1925, p. 170.

Alar expanse 20–22 mm.

Antenna whitish at base, brown beyond. Head whitish; labial palpus ochreous white, second segment dark gray except apical fifth. Thorax grayish ochreous. Forewing grayish ochreous, with barely perceptible

darker line from lower angle of cell to dorsum; cilia ochreous. Hind wing gray, costa strongly dilated on anterior half; cilia whitish with faint gray subbasal line.

MALE GENITALIA (slide WDD 3009).—Gnathos enlarged at apex forming a flattened scooplike structure. Anellus a U-shaped sclerite with two lateral, dorsally recurved lobes. Aedeagus large, slightly flaring apically, with ventral edge slightly produced into a lip and ringed with dentate spines; cornuti consisting of two subparallel rows of small spines.

FEMALE GENITALIA.—Unknown.

TYPE.—In the British Museum (Natural History).

TYPE-LOCALITY.—St. George's, Grenada.

DISTRIBUTION.—Grenada: St. George's. Trinidad: No locality.

The species is known only from the male type in the British Museum (Natural History) illustrated by Clarke (1955, p. 136, pl. 68: figs. 2–2*b*) and one male in the USNM collection from Trinidad collected by Wm. Schaus.

Genus *Chlamydastis* Meyrick

Chlamydastis Meyrick, 1916, p. 481.

This genus consists of over 60 species widely distributed in Central and South America. Many of the species are large and bear a close superficial similarity to noctuids of the subfamilies Sarrothripinae, Acronyctinae, and Acontiinae.

The new species described herein is the first of this genus recorded from the West Indies.

Chlamydastis dominicae, new species

FIGURES 17, 24, 30

Alar expanse 23–25 mm.

Antenna brown flecked with white. Head white suffused with brown; labial palpus mottled brown and white, second segment with basal half exteriorly brown, first segment brown. Thorax white overlaid with brownish orange; legs white patched with brown. Forewing white variously mottled with brown, black, and brownish orange; two outwardly oblique transverse indistinct black lines from costa before middle but failing to reach dorsum; an irregular outwardly oblique blotch of brownish orange from costa at middle extending to area just above tornus; two parallel

indistinct subterminal orange lines from apical third, terminating in two black dashes at tornus; terminal line consisting of black dots from well before apex to tornus; cilia gray, lighter basally. Hind wing heavily overcast with gray; cilia whitish, with basal gray line.

MALE GENITALIA.—Unknown.

FEMALE GENITALIA (slide WDD 3613).—Ovipositor lobes large, sclerotized; two parallel inner lobes covered with minute papillae. Lamella postvaginalis densely clothed with small setae on posterior half, lamella antevaginalis small, bandlike. Ostium small, ostium bursae sclerotized; ductus bursae membranous except enlarged sclerotized area at midpoint; corpus bursae membranous, signum small slightly dentate plate constricted in middle, inception of ductus seminalis from posterior portion of sclerotized pouch.

TYPE.—In the United States National Museum, No. 69951.

TYPE-LOCALITY.—4 mi E of Pont Casse, Dominica, Lesser Antilles.

DISTRIBUTION.—Known only from the type-locality and immediate vicinity.

Described from the female holotype: Dominica: .4 mi E of Pont Casse, V-6-1964, O. S. Flint, Jr.; one female paratype: same data as holotype; one female paratype: Dominica: 2.2 mi E of Pont Casse, V-II-64, O. S. Flint, Jr.; two female paratypes: Dominica: Pont Casse, 2 mi NW, V-18-1965, V-21-1965, D. R. Davis.

This is the only species of stenomid discovered during the intensive collecting conducted in connection with the Bredin-Archbold-Smithsonian Biological Survey of Dominica. Since two of the collectors were microlepidopterists and several others were experienced collectors of Microlepidoptera, it seems reasonable to assume that the possibility of many more species occurring on the island is remote. However, the type-locality of this species (Pont Casse) is reported by the collectors to be wet montane forest at approximately 2,000 feet elevation and representing a relatively undisturbed element of the natural vegetation. Pont Casse was one of the few points that had ready access to this habitat by road and thus the only point at which this type of plant association was sampled intensively for Microlepidoptera. Thus, further collecting might produce additional species of stenomids and certainly should provide male specimens of the species described here.

The information concerning the habitat may also bear on the distribution pattern presented by this spe-

cies. The presence of a species of *Chlamydistis* so far up the chain of islands that comprise the Lesser Antilles and the lack of records of this or any other species in the genus from the other islands presents an interesting problem in distribution. Since the nearest point to Dominica where species of *Chlamydistis* are encountered is Trinidad, which of course is continental in the makeup of its fauna, the question immediately arises, why a species occurs on Dominica and not in between. Two possibilities seem likely at this point. Either (1) the species was at one time more widespread but was restricted by the disappearance of its host plant as the environment was changed by the onslaught of man and his activities, or (2) the species is still present on the other islands and the lack of records is due to inadequate sampling of the wet montane forest that still exists on these islands. I am inclined to favor the latter possibility, since far too little collecting has been done on the other islands to date.

Genus *Mothonica* Walsingham

Mothonica Walsingham, 1912, p. 153.

The name *Mothonica* is currently applied to a group of species that have been assigned to the genus on the basis of their obvious relationship to each other and a superficial resemblance to the type-species, *M. peripta* Walsingham. Since the type-species was described from a single specimen without an abdomen, it is impossible to determine accurately the availability of the generic name for the species that have been assigned to it due to the inability to examine the genitalia. Forbes (1930) established the precedent for other workers by describing a new species, *ocellea*, which he assigned to *Mothonica* apparently on the basis of its resemblance to Walsingham's figure of the type-species. Busck (1933) transferred *ocellea* to the heterogeneous *Stenomima* because it did not agree structurally with Walsingham's generic description, which lays stress on the stalked veins 8 and 9 in the forewing and the approximate veins 6 and 7 in the hind wing. Subsequent workers (Clarke, 1955; Duckworth, 1964) have continued to place species related to *ocellea* in the genus *Mothonica* although *ocellea* has never been formally returned to the genus. In this paper *ocellea* Forbes is returned to *Mothonica* and an additional new species described. Future studies may indicate a different generic affiliation; however, it seems more appropriate to maintain the present assignment for the time being.

Key to the Species of West Indian *Mothonica*

BASED ON MACULATION

1. Forewing with costa brown from midpoint to just before apex; dorsum without triangular-shaped brown patches *Mothonica ocella* Forbes
Forewing without brown shading, with a large brown triangular patch at midpoint; dorsum with two triangular brown patches, one at anal angle and one at midpoint *Mothonica cubana*, new species

BASED ON GENITALIA

1. Male 2
Female 3
2. Harpe with heavy spine on ventral margin of sacculus; anellar lobes narrow, extending dorsally to uncus, each with a small laterally directed spine before apex *Mothonica ocella* Forbes
Harpe with bifurcate lobe on ventral margin of sacculus; anellar lobes bladelike, apically acute, without lateral spines, each with a small, setiferous secondary lobe on ventral edge near base *Mothonica cubana*, new species
3. Lamella postvaginalis a narrow, lightly sclerotized band; ostium bursae much longer than wide, without scobinations on inner wall *Mothonica ocella* Forbes
Lamella postvaginalis membranous except two sclerotized bars extending from outermost anterior edge to midpoint posteriorly; ostium bursae wider than long, with scobinations on inner wall *Mothonica cubana*, new species

Mothonica ocella Forbes, new combination

FIGURES 10, 11, 18, 25, 29

Mothonica ocella Forbes, 1930, p. 131.

MALE GENITALIA (slide WDD 3738).—Uncus reduced, dorsoventrally flattened. Gnathos two lateral plates extending from tegumen towards midline. Anellus consisting of two outer bands articulating with the bases of harpes, two inner bands embracing aedeagus laterally; at junction of inner and outer bands arise two large narrow lateral lobes extending dorsally to uncus, each with a small laterally directed spine before apex. Aedeagus long, with large tooth at apex; cornuti absent. Harpe short, broad; sacculus well developed, ventral margin produced, with heavy spine at apex.

FEMALE GENITALIA (slide WDD 3739).—Lamella postvaginalis a narrow, lightly sclerotized band, lamella antevaginalis largely membranous except flap-like area over ostium. Ostium one-half the width of genital plate. Ostium bursae sclerotized, approximately twice as long as wide, somewhat sinuate. Ductus bursae membranous, patch of minute scobinations near midlength. Corpus bursae membranous, signa two narrow, dentate plates. Inception of ductus seminalis at junction of ostium bursae and ductus bursae.

TYPE.—In the United States National Museum.

TYPE-LOCALITY.—Cayuga, Guatemala.

DISTRIBUTION.—Cuba: Sierra Maestra, 1000 feet (April); Central Baragua, Prov. Camaguey (no date);

San Blas, Trinidad Mts. (May); Santiago de las Vegas, Habana (July); Mts. of Pinar del Rio (no date). Puerto Rico: El Verde, Luquillo Exp. Forest (March); Naguabo (March).

FOOD PLANT.—*Talisia svensoni* (Sapindaceae). Larvae in fruit.

This species also occurs in Central America where it distributionally overlaps to an undetermined extent with Meyrick's species *fluminata*. Although the two species are virtually indistinguishable on maculation, the male genitalia provide several characters for separation. The anellar lobes are shorter and bladelike in *fluminata* and the vesica of the aedeagus is armed with a short heavy cornutus. The anellar lobes in *occella* are long and rodlike and the vesica is without cornutus.

One of the principal factors contributing to the confusion over the identity of these two species in the past has been the illustrations of the genitalia provided by Forbes in his original description of *occella*. I have studied Forbes' type series in the USNM and discovered that the paratypes from Central America are mixed. Unfortunately, the paratypic specimen he chose to illustrate the male genitalia of *occella* is, in fact, a specimen of *fluminata* Meyrick! In addition, he provides two views of the aedeagus, one lateral and one ventral, the ventral view is the aedeagus of the specimen of *fluminata* Meyrick; however, the lateral view is depicted with a drawing of the aedeagus of the true

ocellea. Thus, it is not surprising that the distinctiveness of these two species has been in doubt.

There is an unverified record in the literature (Kisliuk and Cooley, 1933) of this species occurring in Haiti where the larvae were reported feeding in the fruit of *Melicocca bijuga*. Since the genera *Talasia* and *Melicocca* are closely related in the Sapindaceae the record is quite feasible and the locality is in keeping with the known distribution of the species. However, the specimens have not been located and the authority for the identification was not given and thus the record must be considered questionable for the time being.

The possibility that *M. ocella* was introduced into the Greater Antilles through the agency of man in connection with the transport of host plants is worthy of consideration. *Melicocca bijuga* is a native plant of South America that is cultivated extensively throughout Central America and the West Indies for its fruit, known by various common names such as "Spanish Lime," "Mamon," and "Genips." The unverified record of *M. ocella* from Haiti associated the species with the fruit of *Melicocca bijuga* and imposes the possibility that the species is associated with this plant throughout the Greater Antilles. Further support for this speculation is the rearing of *M. ocella* from a closely related genus, *Talasia*, in Panama. Further discussion of this problem must await additional rearing and host-plant data.

Mothonica cubana, new species

FIGURES 8, 9, 19, 26, 29

Alar expanse 14–19 mm.

Antenna white suffused with brown basally, brown beyond. Head brown suffused with white; labial palpus white sprinkled with brown scales. Thorax white sprinkled with brown scales dorsally; legs white; forelegs heavily shaded with brown exteriorly, mid and hind legs suffused with brown, heavier on tarsi. Forewing white sprinkled with brown scales, 6 and 7 stalked; an indistinct brown triangular area on costa at basal one-third; a larger, more distinct brown triangular area on costa at one-half; an outwardly curving transverse line from costal two-thirds to dorsum before tornus composed of series of fuscous dashes; a series of terminal fuscous dots from costal two-thirds to tornus; a fuscous spot at end of cell; a fuscous patch on dorsum below spot; a triangular fuscous patch on dorsum at anal angle; cilia brown apically; lighter basally with a fuscous basal line. Hind wing white

overcast with brown towards apex; cilia whitish, with fuscous basal line from apex, disappearing in vicinity of vein 2.

MALE GENITALIA (slide AB, Nov. 8, 1934, holotype).—Uncus short, rodlike, apically setiferous. Gnathos as in *M. ocella* Forbes. Anellus reduced; with two large bladlike, apically acute lateral lobes, each with a small setiferous secondary lobe on ventral edge arising near base. Aedeagus short, broad, achieving greatest width at midpoint; cornuti a large cluster of heavy spines. Harpe very similar to *M. kimballi* Duckworth but saccular lobe narrower, saccular margin deeply excavated approximate to base of lobe.

FEMALE GENITALIA (slide AB, Nov. 8, 1934, paratype).—Lamella postvaginalis membranous except two sclerotized bars extending from outermost anterior edge to midpoint posteriorly. Lamella antevaginalis membranous except for two lightly sclerotized areas laterad of ostium. Ostium large, flaring. Ostium bursae sclerotized, width greater than length, inner wall lined with numerous scobinations. Ductus bursae membranous, without distinct transition into corpus bursae. Corpus bursae membranous, signa two narrow dentate plates with faint sclerotized bridge between them. Inception of ductus seminalis at junction of ostium bursae and ductus bursae.

TYPE.—In the U.S. National Museum, No. 69952.

TYPE-LOCALITY.—Candelaria, Pinar del Rio, Cuba.

DISTRIBUTION.—Known only from the type-locality.

FOOD PLANT.—*Copernicia glabrescens* (Palmae). Larvae boring in the seeds.

Described from the male holotype: E. E. A. Cuba, Ent. No. 10360, Candelaria, P. del Rio, Oct. 2/34, A. R. Oleto; boring seeds of *Copernicia*; two female paratypes with same data as above except Oct. 3/34.

This species is very close to *M. kimballi* Duckworth described from Florida. The genitalia, however, provide several distinguishing characteristics. In the male genitalia of *M. cubana* the lateral lobes of the anellus are bladlike and apically acute, the aedeagus is broadest at the midpoint and the cornuti consist of a large cluster of medium spines; whereas in *M. kimballi* the lateral lobes are not apically acute, the aedeagus is rather uniform in width throughout and the cornuti consist of two clusters of small spines. In the female genitalia *M. cubana* has a flaring ostium and ostium bursae lined with scobinations; while in *M. kimballi* the ostium has a large median slot and the ostium bursae is without scobinations.

This species appears endemic to Cuba; however, additional collecting may alter this presumption. It is interesting to note the close relationship between this species and *M. kimballi* that occurs in Southern Florida. Biological studies on the North American Stenomidae being conducted by Dr. D. H. Habeck, University of Florida, may provide information concerning *M. kimballi* that will aid in further clarification of the relationship between the two species and allow a more detailed assessment of the position of *M. cubana* in the West Indian fauna.

Genus *Stenoma* Zeller

Stenoma Zeller, 1839, p. 195.

This genus is an unnatural accumulation of unrelated species that have been assigned by previous workers who were primarily describing species and not establishing generic limitations. The West Indian species included here is maintained in this genus for convenience, since it will be part of a new genus to be described in a generic revision of the family now in preparation.

Stenoma comma Busck

FIGURES 6, 7, 16, 27, 29

Stenoma comma Busck, 1911, p. 218.

Stenoma melanocrypta Meyrick, 1915, p. 455.

MALE GENITALIA (slide WDD 3278).—Entire genitalia dorsoventrally flattened. Tegumen extending anteriorly approximately one-half the length of the lateral arms of the vinculum. Uncus short, broad at base. Gnathos a simple band, directed posteriorly, arching ventrad of uncus. Anellus collar-like, with four lateral lobes, ventral pair large, inwardly recurved at apex, dorsal pair blade-like. Aedeagus large; cornuti two: one long and one short.

FEMALE GENITALIA (slide WDD 3279).—Lamella antevaginalis forming a flap over ostium, with a median notch. Ostium opening near middle of eighth abdominal sternite. Ostium bursae sclerotized. Ductus bursae long, membranous. Corpus bursae membranous, signa consisting of two sclerotized diamond-shaped patches with dentate median ridges. Inception of ductus seminalis nearer corpus bursae.

TYPE.—In the United States National Museum.

TYPE-LOCALITY.—Cayenne, French Guiana.

DISTRIBUTION.—Cuba. Also known from Mexico,

El Salvador, Costa Rica, Panama, Venezuela and the Guianas.

Busck (1933) reports this species from Puerto Rico on the authority of Forbes, however, I have not found any published record of this nor any specimens verifying such a distribution.

The males of this species are easily recognized by the black, comma-like scaling near the base on the hind wing.

Stenoma comma is the most widely distributed of the West Indian stenomids occurring in the Greater Antilles, Central America, and South America. Without host-plant information it is impossible to say with certainty what this widespread distribution is attributable to, however, there are some indirect data that may bear on the subject. In collecting stenomids throughout Central and South America I have noticed that *S. comma* is frequently the most common species encountered in dry environments. Also, there are several records in the literature (Wolcott, 1936, 1948) indicating a species of "Stenoma" occurring on *Inga vera* seeds in Puerto Rico. Similar records from Mexico were discovered in the larval collections of the USNM, however, these are unassociated with adult specimens and cannot be determined with certainty beyond family. In my opinion, *S. comma* will most likely prove to be the species in question feeding on *Inga* sp. The occurrence in dry environments is characteristic of *Inga* and the widespread distribution of *Inga vera* would correspond well with that of *S. comma*.

Species of Uncertain Status in the West Indian Fauna

The two species that follow are impossible to include formally in the West Indian Stenomidae at this time. In the first species, *S. byssina* (Zeller), there is one unverified record in the literature of its occurrence in Grenada. The second species, *M. cinereocervina* (Walsingham), is known only from one badly damaged specimen from St. Vincent.

Stenoma byssina (Zeller)

FIGURES 12, 13, 20, 28

Cryptolechia byssina Zeller, 1855, p. 165.

Cryptolechia tetragonella Walker, 1864, p. 723.

Cryptolechia isabella Felder, 1875, pl. 139: fig. 24.

Alar expanse 20–30 mm.

Antenna whitish. Head whitish tinged with pale green: labial palpus whitish, second segment heavily

shaded gray exteriorly except apex. Thorax pale green dorsally; legs whitish, fore and midlegs heavily shaded with gray. Forewing pale green, in old specimens deteriorates to pale yellow; a faint gray dot at end of cell; two triangular fuscous spots on costa, one at midpoint, one at apical three-fourths; from latter extends outwardly curved transverse line of gray spots to dorsum before tornus; dorsum edged with gray; a gray spot in fold surrounded irregular gray suffusion present in some specimens; cilia pale green. Hind wing pale yellow, more or less heavily overcast with gray in anal area; cilia whitish at anal angle progressing to green at apex, a darker subbasal line usually present.

MALE GENITALIA (slide WDD 3166).—Uncus a small rectangular sclerite. Gnathos two free arms, apex of each with outwardly curved small tooth. Anellus small, bandlike, with four lateral lobes; ventral pair shorter than dorsal pair, setiferous, fleshy, approximately uniform in width from base to apex; dorsal pair sclerotized, bladlike, broad at base tapering to single sclerotized spine at apex, closely appressed to aedeagus. Aedeagus simple, cornuti an irregular spinulate area on vesica.

FEMALE GENITALIA (slide 3820).—Eighth tergite deeply excavated on posterior margin. Lamella postvaginalis with a median notch extending two-thirds across plate from posterior margin, extent somewhat variable; lamella antevaginalis with posterior margin projected and medially notched. Ostium broad; ostium bursae sclerotized walls clothed with minute setae, narrowing toward ductus then flaring at junction with ductus; ductus bursae membranous; corpus bursae membranous, signum dumbbell-shaped dentate plate; inception of ductus seminalis at junction of ostium bursae and ductus bursae.

TYPE.—In the Zoologisches Museum der Humboldt Universitat zu Berlin.

TYPE-LOCALITIES.—Para, Brazil (*byssina*); Ega, Brazil (*tetragonella*); Amazonas (*isabella*).

HOST PLANT.—*Melicocca bijuga* (Sapindaceae). Larvae on foliage.

DISTRIBUTION.—Grenada(?). Known also from Venezuela, the Guianas, Trinidad, Brazil, and Paraguay.

Meyrick (1930) records this species from Grenada, however, specimens bearing these data have not been located. Specimens from Trinidad and French Guiana have been used for the descriptions and figures provided in this paper. It is not unlikely that *S. byssina*

occurs in the West Indies since it is present on Trinidad and adjacent areas of continental South America, however, until specimens authenticating the occurrence are obtained it must remain questionable.

I have before me a long series of specimens labeled as this species ranging from northern Mexico to Paraguay. During the course of this study a large number of genitalia preparations were made and it appears that more than one species has been lumped under the name *byssina*. It is not my intent to pursue the details of this situation at this time except as it relates to the West Indian fauna. From the information gathered thus far, the species described in this paper is *byssina* Zeller and the Walker and Felder synonyms are correctly associated with it. The species is widespread in South America and apparently does not extend into Central America. The Central American specimens placed in *byssina* appear to represent one or more closely related new species.

The host-plant information provided is from a series of *S. byssina* reared from leaf-tying larvae feeding on the foliage of a species of Sapindaceae, *Melicocca bijuga*, in Venezuela. From this same series one specimen of a parasitic fly was reared and has been identified as *Nemorilla* sp., of the family Tachnidae, by Dr. C. W. Sabrosky of the United States Department of Agriculture.

Menesta cinereocervina (Walsingham)

FIGURE 30

Gelechia cinereocervina Walsingham, 1891, p. 519.

The following original description is provided since the specimen from which it was derived, located in the British Museum (Natural History) and the only one known, is without abdomen and the wings on the left side. In the original description two specimens are mentioned; however, the second specimen has yet to be located.

Antennae pale greyish fawn.

Palpi with projecting scales above towards the apex of the second joint, apical joint about equal in length to the second, slender and slightly recurved; pale greyish fawn, darkened externally on the second joint.

Head pale greyish fawn; face paler.

Thorax pale greyish fawn.

Fore wings with 12 veins; 7 and 8 from a point, running to the costa; dull greyish fawn, with a small fuscous spot on the middle, followed by another at the end of the cell, slightly preceded by one below it on the fold; an elongate narrow

fuscous shade along the costal margin beyond the middle and four fuscous dots around the apex—two on the costal and two on the apical margin; cilia dull greyish fawn.

Hind wings with 8 veins: 3 and 4 from a point; 6 and 7 from a point; cell closed; trapezoidal, with a very oblique and scarcely indented apical margin; grey with grey cilia.

Abdomen and legs grey.

Expl. al. 8 millim.

Hab. West Indies—St. Vincent (windward side, 2 specimens, *Smith*).

Type, ♂.

Walsingham (1897) amended the above description as follows:

The neuration of the fore wings of this species as recorded (*l.c.* 519) is erroneous. I find on re-examination of the two original specimens that they have only eleven veins, not *twelve*, and therefore wish to amend my original description as follows:

Fore wings with 11 veins (7 and 8 coincident), 7+8 approximated to 9, running to the costa.

With this correction *Gelechia cinereocervina* differs from *Menesta tortriciformella*, Clem., in having 6 and 7 of the hind wings connate instead of stalked, and in not having biciliate antennae; but for the moment I am unwilling to separate them generically.

There is a good possibility that this species is not a stenomid; however, the type is in very poor condition and unless additional material is obtained it may prove impossible ever to apply correctly the name or properly place the species. The other species included in the genus *Menesta* are North American in distribution, and thus there is possible cause to doubt the generic placement of *cinereocervina* even if the family assignment proves accurate.

Literature Cited

- Bruner, S. C., L. C. Scaramuzza, and A. R. Otero
1945. Catalogo de los insectos que atacan a las plantas economicas de Cuba. *Boletín de la Estación Experimental Agronómico de Santiago*, 63:1-246.
- Busck, A.
1911. Descriptions of Tineoid Moths (Microlepidoptera) from South America. *Proceedings of the United States National Museum*, 40(1815):205-230.
1933. Microlepidoptera of Cuba. *Entomologica Americana*, 13(4):151-202.
- Clarke, J. F. Gates
1955. *Catalogue of the Type Specimens of Microlepidoptera in the British Museum (Natural History) Described by Edward Meyrick*. Volume 2. London, England: British Museum.
- Darlington, Philip J., Jr.
1957. *Zoogeography: The Geographical Distribution of Animals*. xi+675 pages. New York.
- Diakonoff, A.
1954. *Microlepidoptera of New Guinea*. Part IV. 191 pages. Amsterdam.
- Duckworth, W. Donald
1964. North American Stenomidae. *Proceedings of the United States National Museum*, 116(3495):23-72.
- Felder, C.
1875. *Reise der Novara*. Atlas. Wien, Austria: Aus der Kaiserlich-Königlichen Hof- und Staatsdruckerei.
- Forbes, W. T. M.
1930. Insects of Porto Rico and the Virgin Islands: Heterocera. *New York Academy of Sciences Survey*, 12:4-171.
- Kisliuk, Max, Jr., and C. E. Cooley
1933. Fruit-Fly Survey in the West Indies, Brazil, Uruguay, Chili, and Peru. *Bureau of Entomology and Plant Quarantine, Service and Regulatory Announcements no. 116*, July-September 1933, pages 197-243.
- Matthews, Eric G.
1966. A Taxonomic and Zoogeographic Survey of the Scarabaeinae of the Antilles (Coleoptera: Scarabaeidae). *Memoirs of the American Entomological Society*, 21:1-134.
- Meyrick, E.
1915. *Exotic Microlepidoptera*, 1:393, 455. Marlborough, England: Published by the author.
1916. *Exotic Microlepidoptera*, 1:481. Marlborough, England: Published by the author.
1925. *Exotic Microlepidoptera*, 3:170. Marlborough, England: Published by the author.
1930. Ergebnisse einer zoologischen Sammelreise nach Brasilien, insbesondere in das Amazonasgebiet, ausgeführt von Dr. H. Zerny. *Annalen des Naturhistorischen Museums in Wien*, 44:223-268.
- Selander, Richard B., and John K. Bouseman
1960. Meloid Beetles (Coleoptera) of the West Indies. *Proceedings of the United States National Museum*, 111(3428):197-226.
- Walker, F.
1864. *List of the Specimens of Lepidopterous Insects in the Collection of the British Museum*. Volume XXIX. London, England: British Museum.
- Walsingham, Lord (Thomas De Grey)
1891. On the Microlepidoptera of the West Indies. *Proceedings of the Zoological Society of London*, 1891:492-549.
1897. Revision of the West-Indian Micro-Lepidoptera, with Descriptions of New Species. *Proceedings of the Zoological Society of London*, 1897:54-183.
1912. Lepidoptera-Heterocera. In Godman and Salvin, *Biologia Centrali-Americana*, 42(4):1-482.
- Wolcott, George N.
1936. *Insectae Borinquenses*, a Revised Annotated Check-List of the Insects of Puerto Rico. *The Journal of Agriculture of the University of Puerto Rico*, 20(1):1-600.

Walcott, George N.—Continued

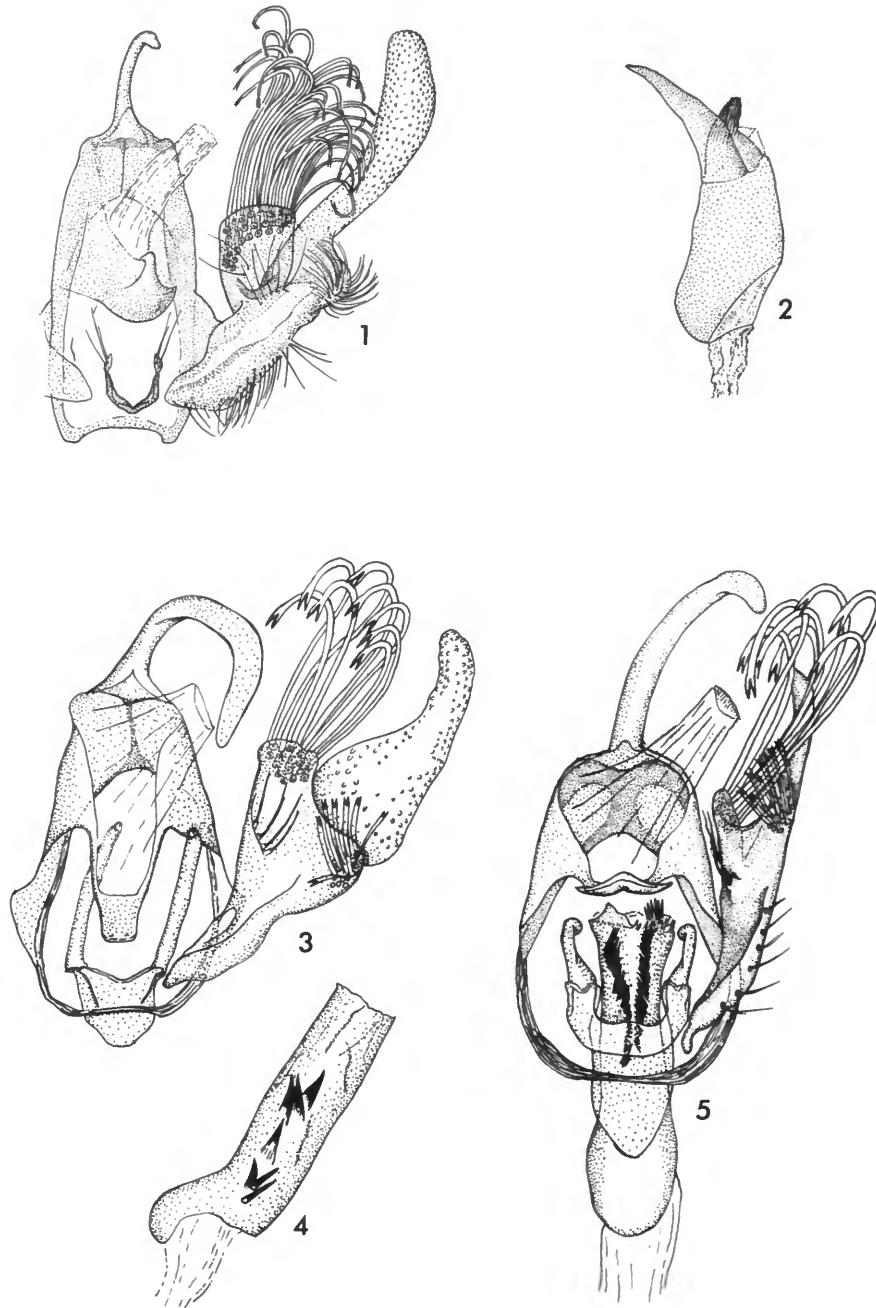
1948. Insects of Puerto Rico. *The Journal of Agriculture of the University of Puerto Rico*, 32(3):417-975.

Zeller, P. C.

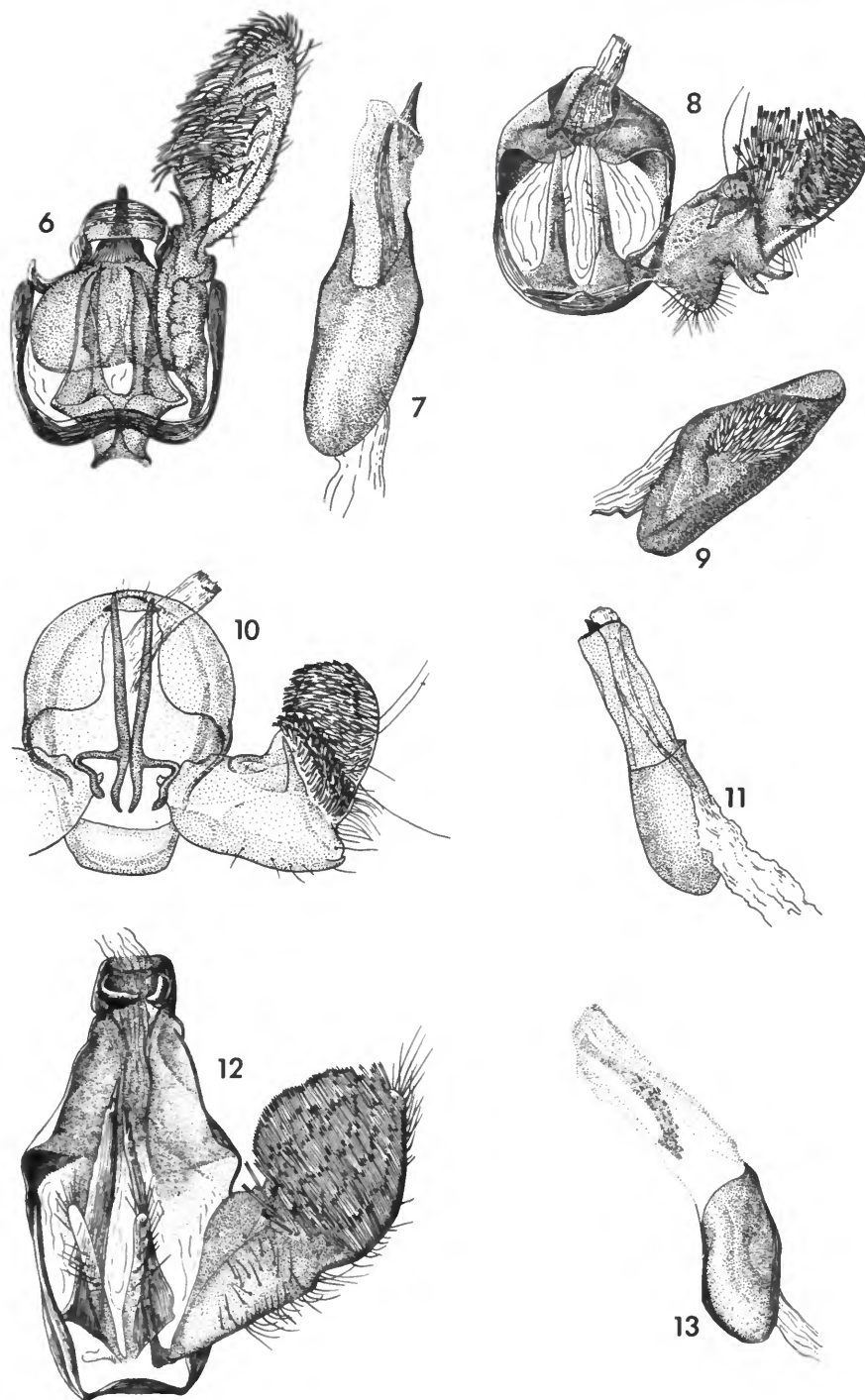
1839. Versuch einer naturgemassen Eintheilung der Schaben: Tinea. *Isis von Oken*, 3:167-220.

1854. Die Depressarien und einige ihnen nahe stochen Gattungen. *Linnaea Entomologica*, 9:167-220.

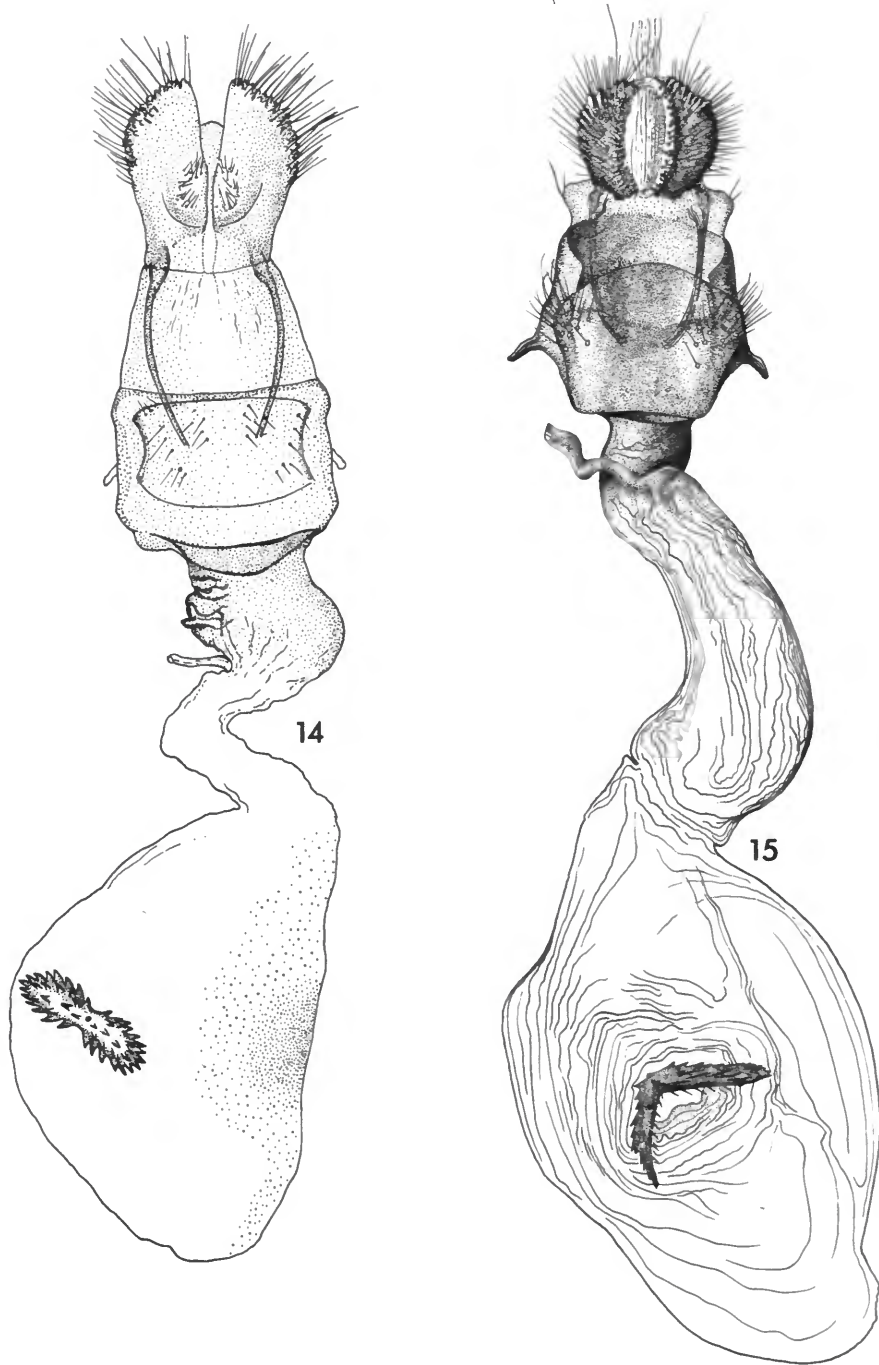
1855. Nachtrag zu den im 9. Bande der *Linnaea Ent.* beschriebenen arten des genus *Cryptolechia*. *Linnaea Entomologica*, 10:145-168.



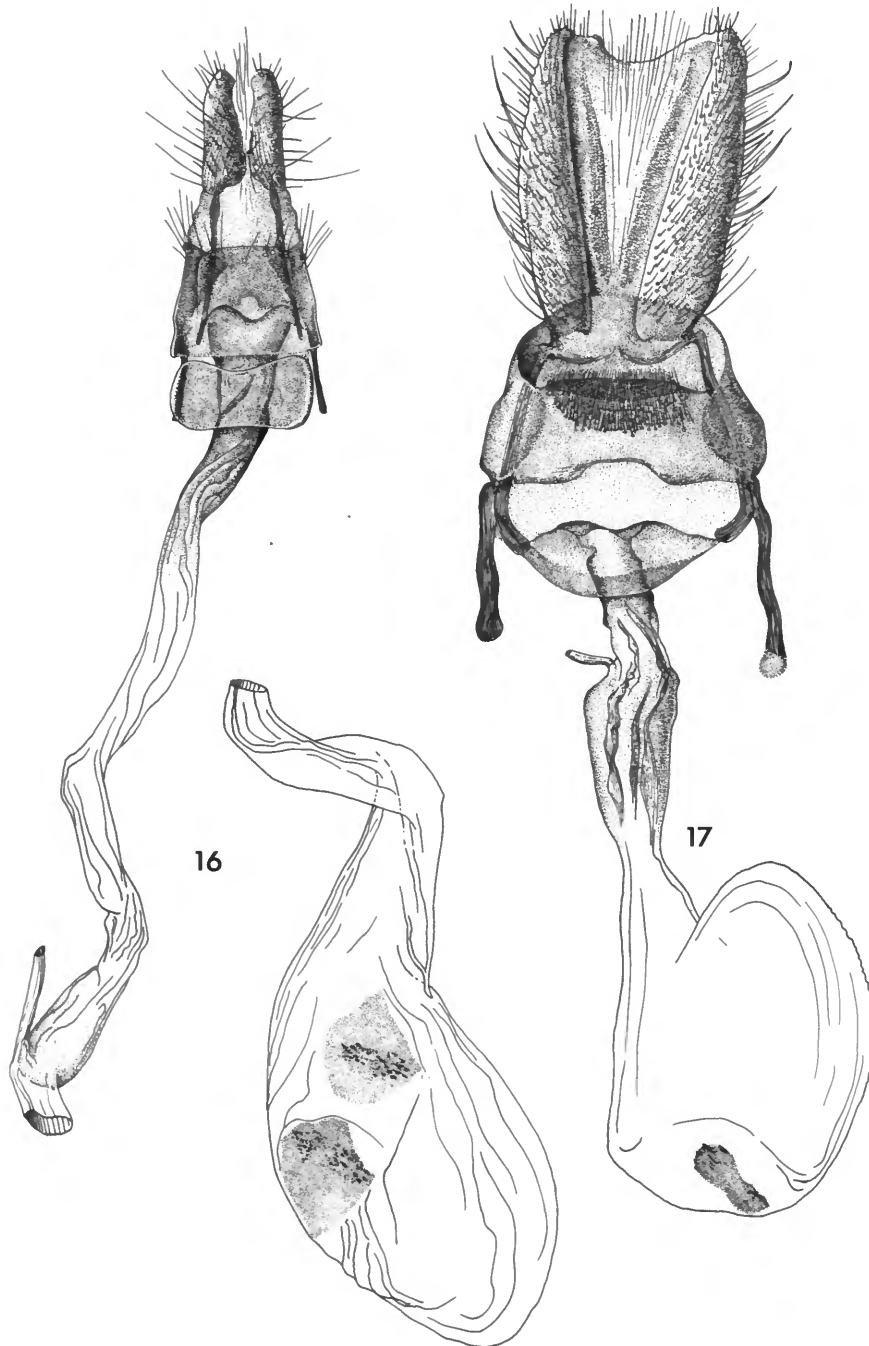
FIGURES 1-5.—Ventral view of male genitalia: 1, *Antaeotricha suffumigata* (Walsingham) (aedeagus removed); 2, *A. suffumigata* Meyrick, lateral view of aedeagus; 3, *A. pseudochyta* Meyrick (aedeagus removed); 4, *A. pseudochyta*, lateral view of aedeagus; 5, *A. vacata* (aedeagus in situ).



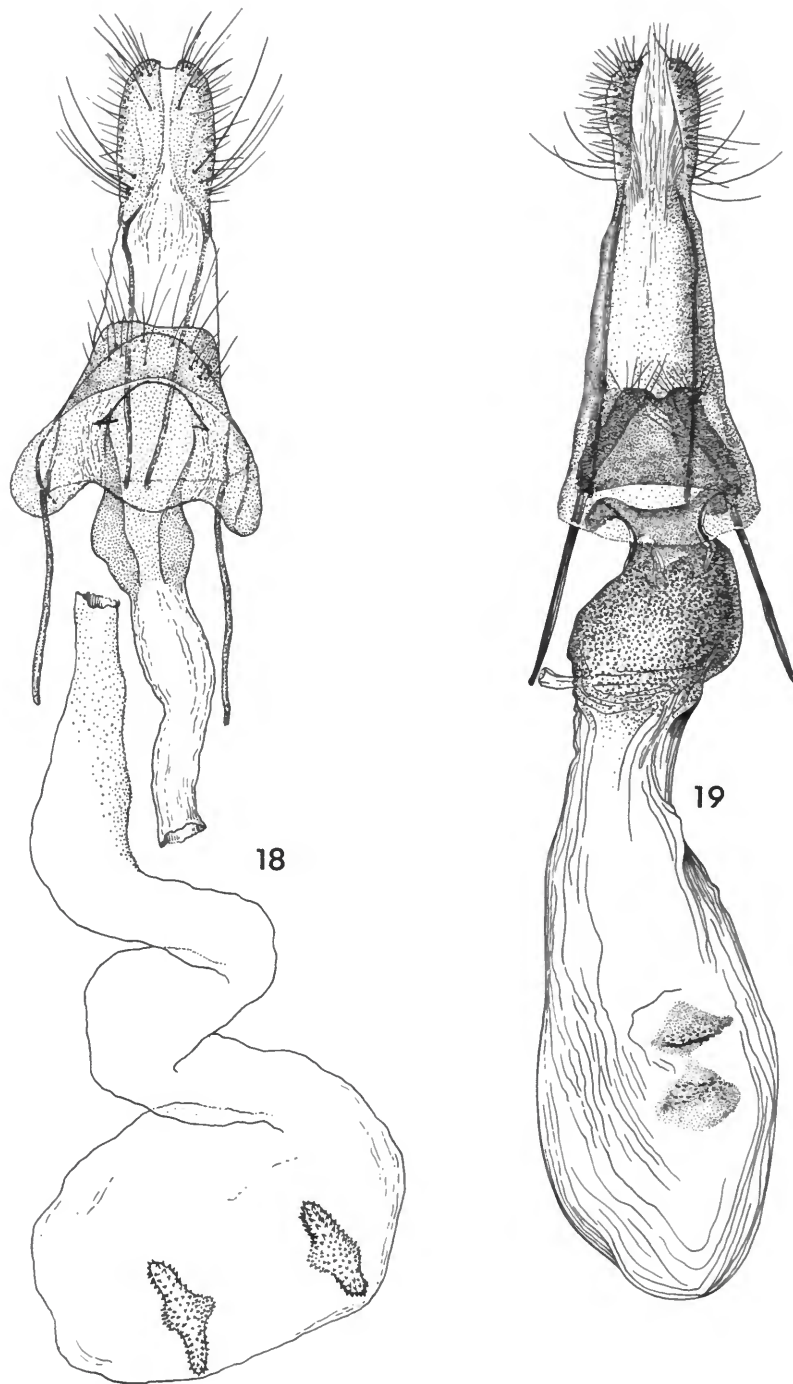
FIGURES 6-13.—Ventral view of male genitalia (aedeagus removed): 66, *Stenoma comma* Busck; 8, *Mothonica cubana*, new species; 10, *M. ocella* Forbes; 12, *S. byssina* (Zeller). Aedeagus: 7, *S. comma* Busck; 9, *M. cubana*, new species; 11, *M. ocella* Forbes; 13, *S. byssina* (Zeller).



FIGURES 14-15.—Ventral view of female genitalia: 14, *Antaeotricha suffumigata* (Walsingham); 15, *A. pseudochyta* Meyrick.



FIGURES 16-17.—Ventral view of female genitalia: 16, *Stenoma comma* Busck; 17, *Chlamydastis dominicae*, new species.



FIGURES 18-19.—Ventral view of female genitalia: 18, *Mothonica ocella* Forbes; 19, *M. cubana*, new species.

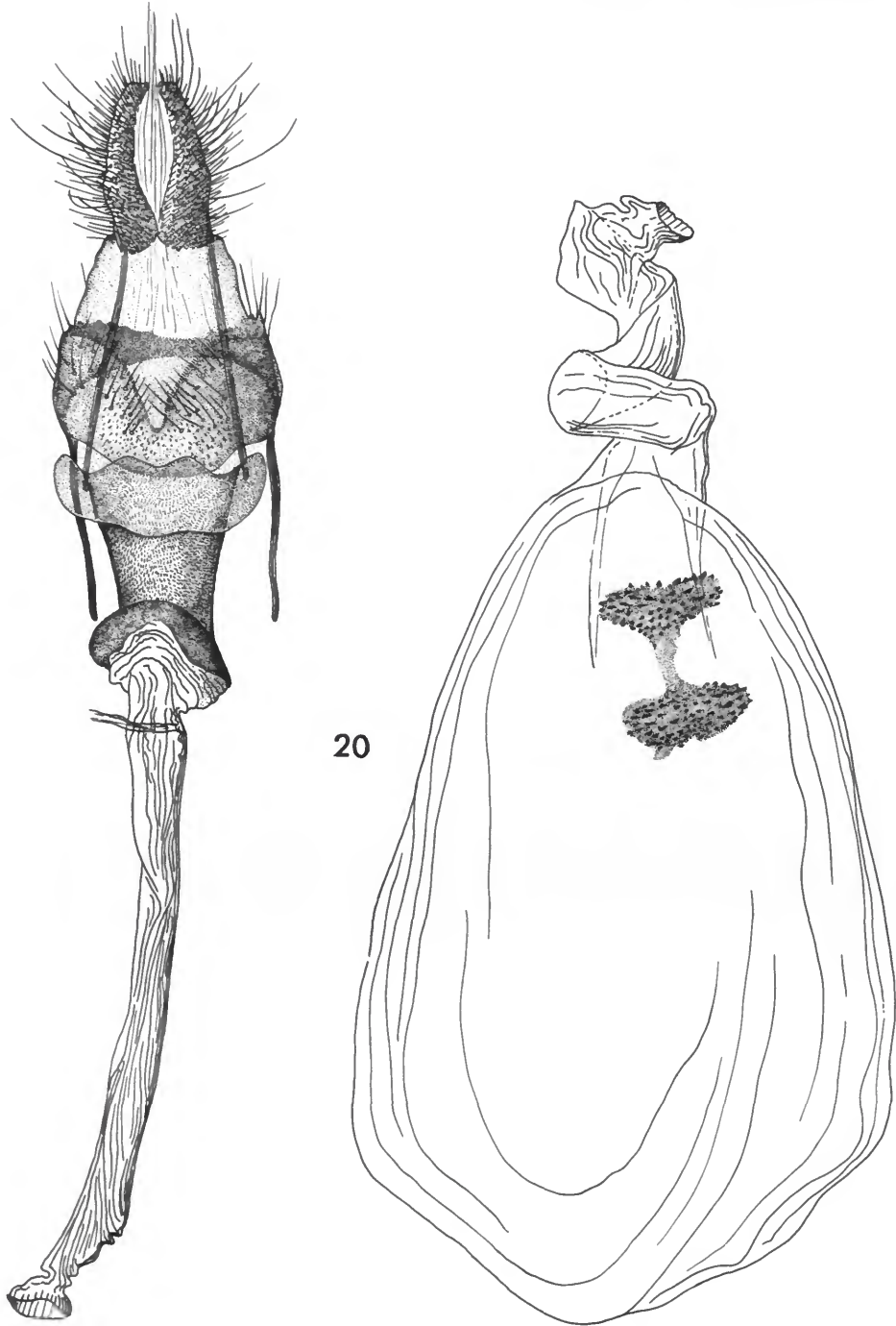
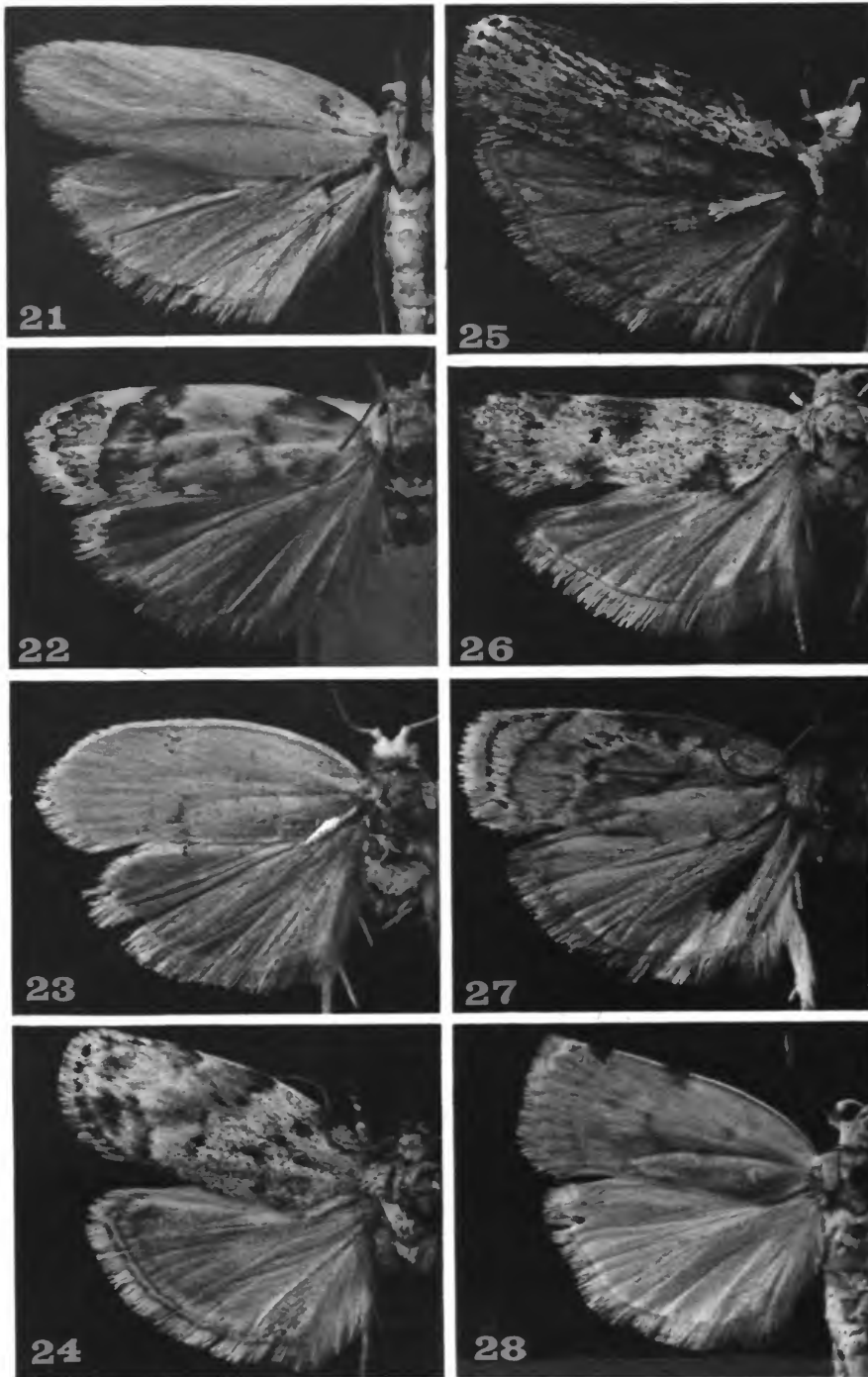


FIGURE 20.—Ventral view of female genitalia: *Stenoma byssina* (Zeller).



FIGURES 21-28.—Left wings: 21, *Antaeotricha suffumigata* (Walsingham); 22, *A. pseudochyta* Meyrick; 23, *A. vacata* Meyrick; 24, *Chlamydastis dominicae*, new species; 25, *Mothonica ocella* Forbes; 26, *M. cubana*, new species, 27, *Stenoma comma* Busck; 28, *S. byssina* (Zeller).

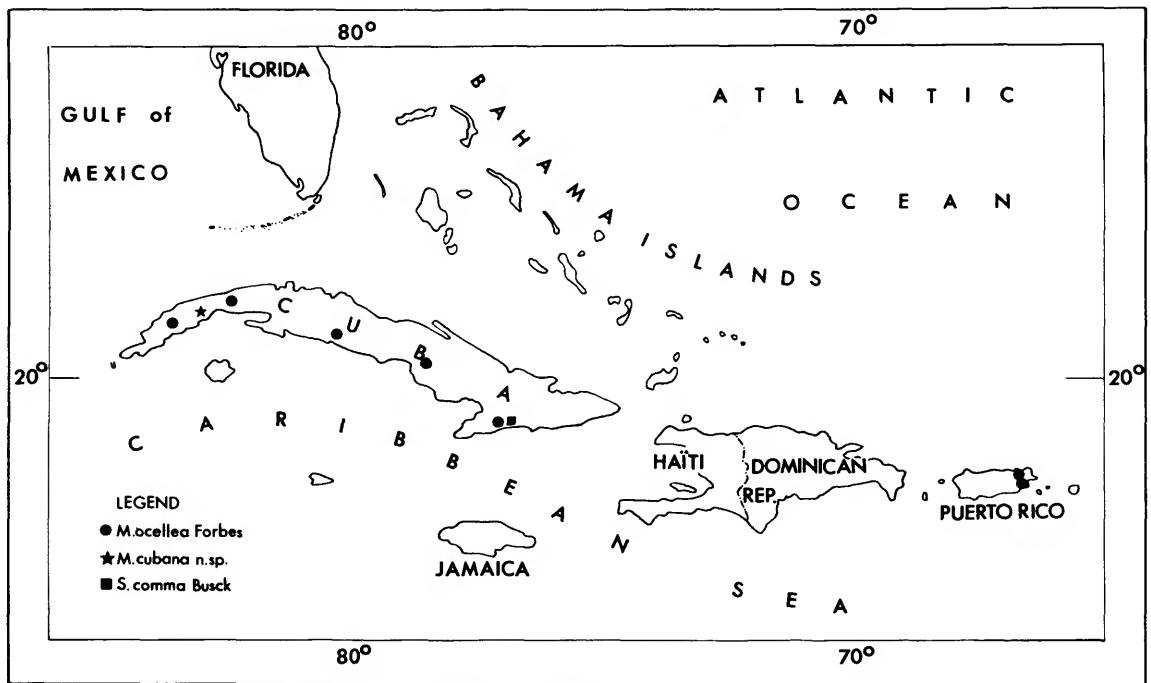


FIGURE 29.—Distribution of species.

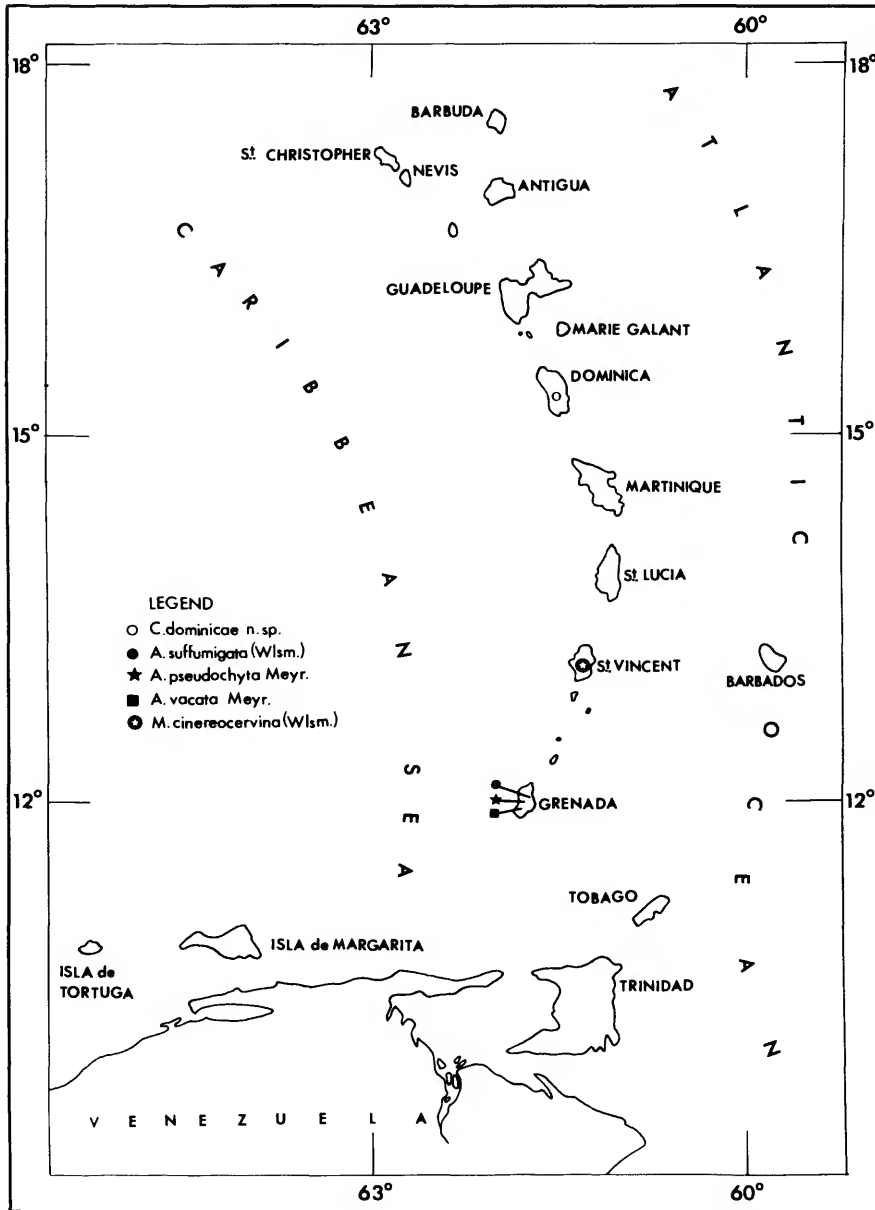


FIGURE 30.—Distribution of species.

Publication in *Smithsonian Contributions to Zoology*

Manuscripts for serial publications are accepted by the Smithsonian Institution Press, subject to substantive review, only through departments of the various Smithsonian museums. Non-Smithsonian authors should address inquiries to the appropriate department. If submission is invited, the following format requirements of the Press will govern the preparation of copy. (An instruction sheet for the preparation of illustrations is available from the Press on request.)

Copy must be typewritten, double-spaced, on one side of standard white bond paper, with 1½" top and left margins, submitted in ribbon copy with a carbon or duplicate and accompanied by the original artwork. Duplicate copies of all material, including illustrations, should be retained by the author. There may be several paragraphs to a page, but each page should begin with a new paragraph. Number consecutively all pages, including title page, abstract, text, literature cited, legends, and tables. The minimum length is 30 pages of typescript and illustrations.

The *title* should be complete and clear for easy indexing by abstracting services. Taxonomic titles will carry a final line indicating the higher categories to which the taxon is referable: "(Hymenoptera: Sphecidae)." Include an *abstract* as an introductory part of the text. Identify the *author* on the first page of text with an unnumbered footnote that includes his professional mailing address. A *table of contents* is optional. An *index*, if required, may be supplied by the author when he returns page proof.

Two *headings* are used: (1) text heads (boldface in print) for major sections and chapters and (2) paragraph sideheads (caps and small caps in print) for subdivisions. Further headings may be worked out with the editor.

In *taxonomic keys*, number only the first item of each couplet; if there is only one couplet, omit the number. For easy reference, number also the taxa and their corresponding headings throughout the text; do not incorporate page references in the key.

In *synonymy*, use the short form (taxon, author, date, page) with a full reference at the end of the paper under "Literature Cited." Begin each taxon at the left margin with subsequent lines indented about three spaces. Within a taxon, use a period-dash (.—) to separate each reference. Enclose with square brackets any annotation in or at the end of the taxon. For *references within the text*, use the author-date system: "(Jones, 1910)" or "Jones (1910)." If the reference is expanded, abbreviate the data: "Jones (1910, p. 122, pl. 20: fig. 1)."

Simple *tabulations* in the text (e.g., columns of data) may carry headings or not, but they should not contain rules. Formal *tables* must be submitted as pages separate from the text, and each table, no matter how large, should be pasted up as a single sheet of copy.

Illustrations (line drawings, maps, photographs, shaded drawings) can be intermixed throughout the printed text. They will be termed *Figures* and should be numbered consecutively; however, if a group of figures is treated as a single figure, the individual components should be indicated by lowercase italic letters on the illustration, in the legend, and in text references: "Figure 9b." If illustrations (usually tone photographs) are printed separately from the text as full pages on a different stock of paper, they will be termed *Plates*, and individual components should be lettered (Plate 9b) but may be numbered (Plate 9: figure 2). Never combine the numbering system of text illustrations with that of plate illustrations. Submit all legends on pages separate from the text and not attached to the artwork.

In the *bibliography* (usually called "Literature Cited"), spell out book, journal, and article titles, using initial caps with all words except minor terms such as "and, of, the." (For capitalization of titles in foreign languages, follow the national practice of each language.) Underscore (for italics) book and journal titles. Use the colon-parentheses system for volume, number, and page citations: "10(2):5-9." Spell out such words as "figures" and "plates" (or "pages" when used alone).

For *free copies* of his own paper, a Smithsonian author should indicate his requirements on "Form 36" (submitted to the Press with the manuscript). A non-Smithsonian author will receive 50 free copies; order forms for quantities above this amount with instructions for payment will be supplied when page proof is forwarded.

