A Review of the West Indian Moths of the Family Psychidae with Descriptions of New Taxa and Immature Stages

DONALD R. DAVIS

SMITHSONIAN CONTRIBUTIONS TO ZOOLOGY · NUMBER 188

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ABSTRACT

Davis, Donald R. A Review of the West Indian Moths of the Family Psychidae with Descriptions of New Taxa and Immature Stages. *Smithsonian Contributions to Zoology,* number 188, 66 pages, 206 figures, 1975.—The systematics, zoogeography, and biology are reviewed for the 10 genera and 16 known species of the West Indian (including Trinidad) bagworm moths of the family Psychidae. In addition, six unidentified and possibly distinct species are also treated. Three genera and five species are described as new. The larval and pupal stages of approximately half the known species are described for the first time. A taxonomic key, based on the adult male, is provided for those 10 genera and 14 species for which this stage is known. All stages are fully illustrated by line drawings and photographs.

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A Review of the West Indian Moths of the Family Psychidae with Descriptions of New Taxa and Immature Stages

Donald R. Davis

Introduction

Although it has not been many years since the American Psychidae were last revised (Davis, 1964), recent collecting over much of the West Indies has resulted in such an influx of new data that a review of the family for this region is required. Three new genera and five new species are described in this report, in addition to six unidentified species, which are left unnamed due to inadequate material. Furthermore, the immature stages of several previously recognized species have been discovered recently, thereby making it possible to present this information for the first time.

Much of the impetus for this review has been the result of the intensive survey of the Psychidae of Trinidad by Miss Rachel Cruttwell of the Commonwealth Institute for Biological Control. It was her need for the identification of the specimens collected during her research that prompted the description of two new species described herein. The results of her investigations on the Psychidae of Trinidad are now being published. I wish to express my gratitude to Miss Cruttwell for her diligent efforts to rear as many species as possible and, in doing so, to secure the larvae and pupae for most of the species encountered.

Donald R. Davis, Department of Entomology, National Museum of Natural History, Smithsonian Institution, Washington, D.C. 20560.

I also wish to acknowledge the following institutions and individuals for assisting in various ways to make my study possible: the Smithsonian Institution for supporting my field work on this group in Jamaica and the Dominican Republic with the aid of a Fluid Research Grant; Dr. Eugenio de Jesus Marcano of the Universidad Autonoma de Santo Domingo and his son Mr. José Marcano for assisting my field studies in the Dominican Republic; Dr. Thomas Farr of the Institute of Jamaica for his much needed assistance during my investigations in Jamaica; Dr. Wolfgang Dierl of the Zoologische Sammlung des Bayerischen Staates, Munich, for his remarks concerning certain Palaearctic genera; Mr. Charles Kimball for the collection of Puerto Rican Microlepidoptera, which formed part of the basis of this study and which was donated to the National Museum of Natural History, Smithsonian Institution; Mr. Clyde S. Stephens for critical field data and study material from Panama and the Dominican Republic; my wife, Mrs. Mignon Davis for her very helpful assistance on our recent West Indian field trip; Mr. Andre Pizzini (now deceased) and Mr. George Venable, staff artists for the Department of Entomology, Smithsonian Institution, for their assistance with the illustrations; Mr. Victor Kranz of the Smithsonian Photographic Laboratory who was responsible for most of the photographic work; and Mr. Walter Brown and Miss Mary Mann of the Smithsonian Scanning Electron

Microscope Laboratory for their much appreciated assistance with the photographs of various pupal structures. I am further grateful for the opportunity of serving as a participant with the Bredin-Archbold-Smithsonian Biological Survey of Dominica, for which this review is intended as another supplementary report. Finally, I wish to thank my colleagues in the institutions listed below for allowing me to examine the material under their charge or who assisted me in other ways.

AMNH	American Museum of Natural History, New York, New York
ANS	Academy of Natural Sciences, Philadelphia, Pennsylvania
BMNH	British Museum (Natural History), London, England
CIBC	Commonwealth Institute for Biological Control, Curepe, Trinidad
CM	Carnegie Museum, Pittsburgh, Pennsylvania
IPK	Institut für Pflanzenschutzforschung Kleinmachow [formerly Deutsches Entomologisches Institut], Berlin, DDR-East Germany
MNHN	Muséum National d'Histoire Naturelle, Paris, France
UPR	University of Puerto Rico, Agriculture Experiment Station, Rio Piedras, Puerto Rico
USNM	National Museum of Natural History [formerly in the United States National Museum], Smithsonian Institution, Washington, D.C.
ZMHU	Zoologisches Museum der Humbolt-Universität, Berlin, DDR-East Germany

Zoogeography

Although the large island of Trinidad is actually associated, in the biogeographic sense, with the northern coast of South America, it has been desirable to consider its fauna within the scope of this treatment. The principal reason for this being that the psychid fauna of Trinidad is now better known than for any other Neotropical area of comparable size and diversity. Consequently, the region encompassed by this report includes the Bahama Islands, and the Greater and Lesser Antilles, including Trinidad.

In contrast to other insect groups sampled (e.g., Selander and Bouseman, 1960; Mathews, 1966; and Duckworth, 1969), the psychid fauna of the West Indies appears relatively rich and contains some of the most unusual endemics of the entire American fauna. As summarized in Table 1, at least 16 species, representing 10 genera, are known from the West Indian archipelago. This number, although relatively small compared to some insect families, compares very favorably with the total number of only 22 species (and 12 genera) known for the much more well-collected area of North America, north of Mexico. Similarly, the entire middle American (including Mexico and Panama) psychid fauna is represented by only 6 genera and 21 species. The northern South American fauna (Colombia to and including French Guiana) shows the poorest representation of psychids for all the circum-Carribbean region with only 11 species grouped in 6 genera. Of greater significance than these numerical comparisons is the fact that 11 species and 4 genera of psychids are indigenous to the West Indies, although the range of one endemic species from Trinidad also probably extends into northern South America.

As may be surmised from the distributions summarized above, the Neotropical psychid fauna has been little sampled. The relative "abundance" of the Antillean psychids perhaps only emphasizes how little is known of the South American fauna. As this study points out, the greatest need for attention in this family involves the smaller, lichenivorous species, which have largely been overlooked in the Neotropics by past collectors. For example, all five new species proposed in this paper either are known to feed, or are believed to feed, exclusively on epiphytic lichens.

Because the West Indian Psychidae present somewhat of a paradox in this region compared to other animals studied, it becomes important to summarize the zoogeography of the ten West Indian genera.

The new genus *Pterogyne* is now represented by a single endemic species from the Dominican Republic, although evidence for a second, sympatric species exists. Possessing fully winged females, *Pterogyne insularis*, new species, is clearly the most primitive psychid known from the Western Hemisphere. *Pterogyne* is further interesting in that it stands remote from all New World genera, demonstrating its closest affinities with a group of southern Palearctic (particularly North African) genera.

Paucivena, new genus, is represented by at least two new species, one known only from the Dominican Republic and the other from Puerto Rico and Jamaica. Similar to *Pterogyne*, this genus is one of the more primitive American psychids, with its nearest affinities being with Palearctic genera.

The genus *Prochalia* presently stands as a monobasic genus with one species ranging through much of the southeastern United States. One unidentified and probably distinct species (species no. 10), however, has been collected in Cuba. Furthermore, *"Clania" licheniphilus* is probably a member of *Prochalia* and may actually represent the immature stages of species no. 10.

Metaxypsyche, new genus, likewise is monobasic with a single new species described herein from Trinidad. It is now the sole indigenous genus and species known from Trinidad, although eventually its range will probably be further extended across northern South America, following a distributional pattern characteristic of the other four psychids established in Trinidad.

Table 1. Geographic Distribution of the West Indian Psychidae

Species	Florida	Bahamas	Cuba	Jamaica	Hispaniola	Mona Island	Puerto Rico	St. John	Virgin Gorda	Antigua	Dominica	St. Lucia	St. Vincent	Tobago	Trinidad	South America	Mexico-Central America
Pterogyne insularis					X												
Paucivena reticulata				X			X										
Paucivena hispaniolae					X												
"Clania" licheniphilus			X														
Metaxypsyche trinidadensis															X		
Naevipenna aphaidropa															X	X	X
Naevipenna cruttwelli															X		X
Cryptothelea hoffmanni			X														
Cryptothelea macleayi													?				
Cryptothelea surinamensis															X	X	X
Cryptothelea watsoni					X	?	X	X	X								
Lumacra haitiensis					X												
Biopsyche apicalis		X															
Biopsyche thoracica			X														
Oiketicus kirbyi			X	X			X			X	X	X	?	X	X	X	X
Thyridopteryx ephemeraeformis	X	X			X		?										
Oiketicus species (4)			X	X													
Species (6)					X										X		
Oiketicus species (7)				X													
Species (8)															X		
Species (9)				X													
Prochalia species (10)			X														

The genus *Naevipenna* is comprised of two, perhaps sympatric, species which occur from Panama across northern South America to Trinidad. *Naevipenna aphaidropa* has also been collected in French Guiana and southeastern Brazil. Thus, the genus is of South American origin and demonstrates little relationship to the Antillean genera.

Of the eight recognized species of *Cryptothelea,* half occur in the West Indies, and three of these are believed to be endemic. Only Mexico, with four species, can demonstrate a comparable development with regard to this group. None of the Mexican-Central American species, however, are known to have reached the West Indies. The only nonindigenous species is *Cryptothelea surinamensis,* which occurs widely across northern South America. Although this genus has sometimes been considered a part of the Australian or eastern Palearctic fauna (von Dalla Torre and Strand, 1929; Dierl, 1968), I have yet to examine any Old World species congeneric with *Cryptothelea.* At least three of the four West Indian species show a rather close kinship, particularly in their possession of the broadest wing scales for the genus. The origin for this species group may have been South America as one of the species, *C. surinamensis,* presently exhibits such a distribution. The adult male of the fourth species, *C. hoffmanni,* new combination, is unknown, thus making it impossible at present to determine its relationships.

The genus *Lumacra* presently contains six Neotropical species with only one, an endemic species from Haiti, occurring in the West Indies. The genus is of South American origin, although the sole Antillean species may have arrived from Central America.

Biopsyche is another indigenous West Indian genus, represented by two species from the Bahama Islands and the Greater Antilles. Its closest affinities appear to be with the predominantly Nearctic genus *Thyridopteryx.*

The genus *Oiketicus* is largely a neotropical group with a very sparse representation of apparently congeneric species in both southern Africa and the Indo-Australian region. The only true member of the genus in the Far East may be *O. tertius* Templeton, which ranges from southern India to Australia and New Britain. Two species have been listed from southern Africa (Dierl, 1972), and at least one of these, *Oiketicus angulatus* Gaede, appears to be correctly placed. Only one species, *O. kirbyi,* has been positively identified from the West Indies, although at least one or possibly two other species may exist in Cuba and Jamaica. The spread of *O. kirbyi* through all the major islands of the Antilles apparently originated from South America where the species is extensively distributed, and possibly also from Middle America, where it likewise occurs. *Oiketicus abbotii* Grote of the southeastern United States is probably a derivative of *O. kirbyi,* with the separation of the two presently being maintained rather effectively by the water barrier between Florida and Cuba. Some later hybridization between these two insects has undoubtedly occurred, and evidence for this may be observed in the present Jamaican populations of *Oiketicus.* A rather interesting example of what may be circular overlap, involving the three species *O. abbotii, O. kirbyi,* and *O. townsendi* Townsend was summarized in my 1964 revision. Essentially no new information has been accumulated since then to add to that subject.

The genus *Thyridopteryx* has played a very minor role in the West Indian fauna with only one species, a straggler from the southeastern United States, being established. This is rather significant, however, as may be seen in Table 1, in that *T. ephemeraeformis* is the only Floridian psychid that has been able to colonize the West Indies, with the possible exception of *Oiketicus abbotii.* There is now some indication that *T. ephemeraeformis* may have spread as far east as Puerto Rico.

In summary then, our present knowledge of the West Indian Psychidae strongly emphasizes the oceanic nature of these islands, a conclusion that reinforces Darlington's (1957) earlier observations. The high rate of specific endemism for this group through the West Indian archipelago also seems to support a belief I previously expressed (Davis, 1964:24) that, although psychids possess remarkable capabilities to diffuse slowly into most habitats suitable for their existence, the gene exchange between widely dispersed populations is minimal.

Although the adult females of nearly all psychids are larviform and incapable of flight, many species have succeeded in establishing broad dis-

tributions. One of the reasons for this being that the eggs are deposited inside a very durable larval case which is also used for pupation. Immediately prior to pupation, the cases may be firmly attached to almost any firm support, including motor vehicles, shipping crates, or nursery stock. Consequently, the introduction into a new area of a single case containing hundreds to thousands of fertile eggs, may quickly produce a successful, breeding population. Furthermore, parthenogenesis is known to occur in a few of the more primitive Psychidae. From the foregoing discussion, it can be easily understood how the dispersal capabilities of most psychid species were greatly increased following the advent of man.

The primary origin for most of the West Indian Psychidae appears to have been the northern coast of South America. *Metaxypsyche, Cryptothelea, Naevipenna, Lumacra,* and *Oiketicus* were apparently derived from this source. *Thyridopteryx, Prochalia,* and possibly *Biopsyche* originated from the southeastern United States. At present there is little evidence to indicate a Mexican or Central American origin for any West Indian Psychidae, although it is possible that some *Oiketicus* or even *Lumacra* were derived from this area. *Pterogyne* and *Paucivena* probably represent Palearctic introductions; but there is no available evidence to suggest that their introductions were of recent (i.e., post-Colombian) occurrence. The western Palearctic Psychidae are relatively well collected and neither genus is known to exist there now. More significantly, the habitats favored by *Pterogyne* and *Paucivena* are decidedly more humid and tropical than those frequented by their Old World relations.

Although rafting on drifting vegetation must have had some effect on the distributional patterns of the Antillean bagworms, the strong South American character of this fauna, detectable even as far north as Hispaniola and Cuba, suggests a dispersion variously assisted by man. Thus, some genera may have inadvertently accompanied early man in his predominantly northward migration through the Antilles from South America. The main question remaining in this regard, however, is whether or not man appeared on the scene early enough to account for the high incidence of endemism witnessed through the West Indian archipelago.

Morphology

A résumé of the biology and morphology (i.e., morphological characters important to systematics) of the Psychidae was presented in my 1964 revision and need not be repeated here; however, certain supplementary morphological observations need to be discussed.

ADULT.—The adult males of the West Indian psychid genera have been found to demonstrate a rather interesting evolutionary series with regard to certain cephalic structures, particularly as witnessed in the progressive reduction of the labial palpi (Figures 18–37). The least specialized genus, *Pterogyne,* possesses a moderately long and slender, 2-segmented, labial palpus, as well as a rather distinct and unmodified labium. In *Paucivena,* a genus somewhat more specialized than *Pterogyne,* the palpi have lost one segment, but the remaining segment is still relatively large and articulates with the head capsule. In all the other, more advanced West Indian genera, the labial palpi become even more reduced, lose the basal articulation with the head, and usually become variously fused at the base. Thus, in *Thyridopteryx* one sees merely a bifurcate lobe, which in *Cryptothelea surinamensis* and *Biopsyche thoracica* becomes reduced even further to a single, small, median lobe. The maxillae are completely absent in all West Indian Psychidae except *Oiketicus* and *Thyridopteryx,* where they are represented by tiny, partially sclerotized vestiges. The small, completely membranous lobes lateral to the labial palpi in *Naevipenna* may also represent rudimentary maxillae.

Also referred to in this paper is the interocular index of the head, which is calculated as a ratio between the vertical diameter of the compound eye and the interocular distance measured at a point across the frons midway between the base of the antennal sockets and the anterior tentorial pits; or:

$$\text{Interocular index} = \frac{\text{vertical eye diameter}}{\text{interocular distance}}$$

Normally, a higher index indicates a greater development of the eye in relation to the entire head capsule. *Pterogyne insularis* (Figure 18), for example, exhibits the highest interocular index of all the West Indian Psychidae. As a means of summarizing the principal morphological features for

the adult males of this family, Table 2 has been provided for the West Indian genera.

PUPA.—One of the purposes of this study was to examine the immature stages of as many species as possible in an attempt to test how useful or reliable these stages might be in species diagnoses. The

Table 2. Diagnostic characters of West Indian psychid genera (males only)

Characters	Pterogyne	Paucivena	Prochalia	Metaxypsyche	Naevipenna	Cryptothelea	Lumacra	Biopsyche	Oiketicus	Thyridopteryx
Antennae: origin of rami	basal	basal	apical	submesal	mesal	mesal	apical	mesal	mesal	mesal
Antennae: no. of segments	28-30	14-21	18-19	17	21-26	13-33	24-34	33-30	32-46	30-36
Epiphysis	+	-	+	+	+	-	+	+	-	-
Mesothoracic tibia: no. of spurs	2	2	1	0	1	1	0	1	2(1)	2(1)
Metathoracic tibia: no. of spurs	4	2	0	0	1	1	0	1	2(1)	2(1)
Forewing: no. of veins	11	9	12 (11-9)	11	12 (11-10)	12 (11-10)	12	12	12 (11)	11 (14-9)
Accessory cell	+	+	-	-	-	-	-	-	-	-(+)
Intercalary cell	-	-	-	-	+,-	+,-	+,-	+(-)	+(-)	+
Forewing: union of CuP & 1A	-	-	+	+	+	+	+	+	+	+
Hindwing: no. of veins	7	7	8(7)	7	8(7-6)	8(7)	8(7)	8(7)	8(7-4)	7(8-5)
Hindwing: connection between Sc-R1 and Rs	-	-	-	+(-)	+,-	-	+	+	+	+
Interocular index	1.8	1.1	0.7	0.8	1.6	0.9-1.0	1.25	1.0	0.9	0.8
Labial palpi: no. of segments	2	1	1	1	1	1	1	1	1	1
Labial palpi: % fusion	0	0	25	85	50	100	0	100	20	45

+ present - absent ( ) intraspecific variation

results proved very enlightening and showed that the larval and especially pupal stages were very helpful in the systematics of this family. In fact, the immature stages for some (e.g., *Naevipenna*) were more diagnostic than the adults.

The pupae of Psychidae have never been studied adequately. The only significant work involving the New World Psychidae that even included the pupal stage in its treatment was that of Jones (1945) on the genus *Platoeceticus* (= *Cryptothelea*). In that report, Jones briefly characterized the pupae of *Cryptothelea, Prochalia,* and *Zamopsyche,* paying particular attention to the dorsal abdominal spines. Koehler (1939) unfortunately proposed several new species based principally on characteristics of the female pupae. In doing so, he overlooked the much more diagnostic features of the dorsal abdominal spines and concentrated instead on the pygidial area surrounding the cremaster. The relative development and form of the cremaster is sometimes diagnostic (Figures 112–118); but, the most critical systematic criteria of the pupae are in the relative development of the abdominal rows of spines (Tables 3 and 4).

Another area that may offer some significance in pupal systematics is the microsculpture of the abdominal, intersegmental membrane. This can best be examined in the region of the posterior row of abdominal spines with the aid of a scanning-electron microscope at magnifications of 100 or more. As may be seen in Figures 99–104, some differences can be noted in the integumental microsculpture of the species shown.

The frontal area of the male is usually developed to form a small protuberance, or cocoon-cutter (Figures 93–98). This structure apparently has limited taxonomic use, although its biological function is well known. It is used in conjunction with the abdominal spines to assist the male pupa in forcing its way partially out of the posterior end of the larval case immediately prior to adult emergence. Because the female pupa of all higher

Table 3. Tabulation of dorsal abdominal spines of male pupae

Species	Row	Abdominal Segments							
		I	II	III	IV	V	VI	VII	VIII
Pterogyne insularis	anterior	0	0	0	32-37	28-33	24-29	18-22	15-19
	posterior	0	0	15-18	22-26	17-20	0	0	0
Paucivenna hispaniolae	anterior	0	0	50-56	52-57	45-50	33-37	29-32	17-21
	posterior	0	0	0	0	16-19	9-13	7-10	0
"Clania" licheniphilus	anterior	0	0	0	6	13	17	15	10
	posterior	0	0	0	0	16	11	0	0
Metaxypsyche trinidadensis	anterior	0	0	0-10	10-15	13-17	17-23	15-21	4-8
	posterior	0	0	26-34	23-28	26-32	23-30	0	0
Naevipenna aphaidropa	anterior	0	0	12-16	11-16	11-14	14-17	8-11	7-10
	posterior	0	0	26-34	27-33	24-29	20-25	8-12	0
Naevipenna cruttwelli	anterior	0	0	10-13	15-20	14-18	12-15	9-12	5-8
	posterior	0	0	23-27	23-28	22-30	21-23	0	0
Cryptothelea surinamensis	anterior	0	0	0	0-3	3-5	14-18	13-19	13-16
	posterior	0	0	12-20	14-25	18-22	0	0	0
Oiketicus kirbyi	anterior	0	0	27-34	24-33	16-26	19-25	17-25	17-26
	posterior	0	36-44	36-41	32-37	34-39	0	0	0

psychids never emerges from the larval case, a cocoon-cutter is not developed in those forms.

LARVA—The systematic importance of larval morphology has been reviewed for the Palearctic psychids by Gerasimov (1937). This reference presents a good critique of those characters useful in delimiting the higher categories, as well as outlining the major evolutionary trends within the family. Gerasimov further summarizes this information in a larval key to the Palearctic genera.

The most obvious difference that may exist between the species of bagworms is the relative amount of integumental pigmentation (Figures 127–133). For example, this feature provides the easiest means of distinguishing the larvae of *Naevipenna aphaidropa* and *N. cruttwelli*. The maculation of the head capsule, however, must be used with discretion as this can be quite variable, particularly between instars of the same species.

In contrast to pigmentation, larval chaetotaxy has remained rather conservative. One of the more useful setal characters was observed in the relative position of the pore AFa to AF2 and P1. The ocelli likewise are consistent with six being the standard number for all of those studied. The exact arrangement of these, however, may sometimes be important for species separation. The arrangement of the abdominal crochets in a lateral penillipse appears to be a standard feature of the entire family and may be a major character distinguishing the Psychidae from its closest ally, Tineidae. Even a psychid genus as primitive as *Pterogyne*, for example, possesses crochets arranged in a typical lateral penillipse, a pattern nowhere to be found in the Tineidae.

Table 4. Tabulation of dorsal abdominal spines of female pupae

Species	Row	Abdominal Segments I	II	III	IV	V	VI	VII	VIII
Pterogyne insularis	anterior	0	0	0	39-43	42-46	35-39	28-32	21-24
	posterior	0	0	11-14	22-26	23-27	0	0	0
Paucivena hispaniolae	anterior	0	0	0	0	0	20-25	35-40	12-16
	posterior	0	0	0	0	21-26	20-24	0	0
"Clania" licheniphilus	anterior	0	0	24	44	42	26	22	4
	posterior	0	38	41	33	28	22	0	0
Metaxypsyche trinidadensis	anterior	0	0	0-6	0-6	3-6	8-10	8-12	1-3
	posterior	0	14-18	19-24	19-23	15-18	10-13	0	0
Naevipenna aphaidropa	anterior	0	0	23-28	22-28	20-28	18-21	15-17	2-5
	posterior	0	26-32	32-37	30-35	26-29	17-24	0	0
Naevipenna cruttwelli	anterior	0	0	0-5	12-21	12-16	13-21	9-17	0
	posterior	0	0	30-38	27-42	25-38	28-33	0	0
Cryptothelea surinamensis	anterior	0	0	0	0	0	7-9	8-11	0
	posterior	0	16-21	17-22	14-19	16-30	0	0	0
Cryptothelea hoffmanni	anterior	0	0	0	0	0	0	0	0
	posterior	0	0	0	0	11	64	63	0
Oiketicus kirbyi	anterior	0	0	10-25	33-50	46-52	38-49	15-21	0
	posterior	0	58-70	57-74	60-69	66-76	0	0	0

Key to the Genera and Species of West Indian Psychidae*

(Based on adult males)

1. Foretibia with epiphysis present 2
   Foretibia without an epiphysis 10
2. Metathoracic tibia with two pairs of large spurs (*Pterogyne*, new genus) ..... ***Pterogyne insularis***, new species
   Metathoracic tibia with less than two pairs of spurs 3
3. Metathoracic tibia without spurs 4
   Metathoracic tibia with at least one spur 6
4. Mesothoracic tibia with one spur (*Prochalia*) ..... ***Prochalia*** species No. 10
   Mesothoracic tibia without spurs 5
5. Forewing with 11 veins (Figure 58); small moths, wing expanse not exceeding 12 mm (*Metaxypsyche*, new genus) ..... ***Metaxypsyche trinidadensis***, new species
   Forewing with 12 veins; larger moths, wing expanse exceeding 20 mm (*Lumacra*) ..... ***Lumacra haitiensis***
6. Antennae with fewer than 30 segments (*Naevipenna*) 7
   Antennae with more than 30 segments 8
7. Wing expanse less than 14 mm; pterostigma absent in forewing ..... ***Naevipenna cruttwelli***, new species
   Wing expanse exceeding 16 mm; pterostigma present ..... ***Naevipenna aphaidropa***
8. Wings fully scaled (Figure 17); wing expanse exceeding 35 mm ..... ***Oiketicus kirbyi***
   Wings partially scaled (Figures 14–15); semitransparent; wing expanse less than 30 mm (*Biopsyche*) 9
9. Epiphysis 3/5 the length of foretibia and arising 2/5 the distance from base; vesture of head completely fuscous ..... ***Biopsyche apicalis***
   Epiphysis 4/5 the length of foretibia and arising 1/5 the distance from base; head vesture largely fuscous with area around antennal bases grayish white ..... ***Biopsyche thoracica***
10. Wing expanse less than 12 mm; antennal rami arising basad from flagellar segments (Figure 42) (*Paucivenna*, new genus) 11
    Wing expanse exceeding 14 mm; antennal rami arising from middle of flagellar segments 12
11. Apex of forewing strongly rounded (Figure 57); M2+M3 usually arising equidistant between M1 and CuA1 ..... ***Paucivena reticulata***, new species
    Apex of forewing subacute (Figure 54); M2+3 arising approximate to CuA1 ..... ***Paucivena hispaniolae***, new species
12. Wings nearly naked, transparent (Figure 16) (*Thyridopteryx*) ..... ***Thyridopteryx ephemeraeformis***
    Wings uniformly scaled, opaque (Figures 11–12) (*Cryptothelea*) 13
13. Eighth abdominal sternite of male with furcal arms longer than undivided base 14
    Eighth sternite with furcal arms slightly shorter than base ..... ***Cryptothelea surinamensis***
14. Antennae (Figure 48) with lateral rami long, sensory hairs, 2–2.5 times the diameter of rami ..... ***Cryptothelea watsoni***
    Antennae with rami shorter, sensory hairs 1.5 times diameter of rami ..... ***Cryptothelea macleayi***

* Exclusive of *"Clania" licheniphilus* and *Cryptothelea hoffmanni*, new combination, for which adult males are unknown.

Pterogyne, new genus

TYPE.—*Pterogyne insularis*, new species.

MALE.—Body moderately robust, of small size. Antennae (Figure 38) bipectinate; rami moderately long, arising from base of each segment and gradually decreasing in length to apex of flagellum; sensory setae sparsely scattered, 4–6 times diameter of supporting ramus in length. Compound eyes greatly enlarged, frons narrow; vertical diameter of eye 1.8 the interocular distance. Ocelli absent. Mandibles and maxillae absent. Labial palpi long, slender, 2-segmented with apical segment 3 times the length of basal segment. Forelegs (Figure 63) with a slender, elongate apiphysis, approximately

0.8 the length of tibia and extending slightly beyond apex of tibia; mesothoracic tibiae with a single pair of elongate apical spurs; metathoracic legs the longest and with two pairs of spurs, one pair situated apically and the other at the distal two-thirds of tibia.

Wings (Figure 53): Relatively narrow, elongate and fully scaled. Forewings 11-veined, with all veins normally arising separate from cell except R4 and 5 which are variably stalked; M2 and 3 rarely connate; accessory cell present, variable in size, sometimes extending over 0.5 the length of discal cell; intercalary cell absent; CuP weak, nearly straight and not continuous to tornus; 1A and 2A divided at base, then fused for remainder of length to wing margin. Hindwings 7-veined, all veins separate; Rs rarely forked at apex, usually simple; a short crossvein present between Rs and M1 at apex of cell; M2 and 3 completely fused; intercalary cell absent.

Genitalia: Tegumen broad, hood-shaped, with a shallow apical cleft. Vinculum well developed, broad, gradually tapering anteriorly to form a moderately long saccus. Apex of valvae deeply divided to form a rounded cucullus and a ventral sacculus; pulvilli large and well developed. Aedeagus short, cylindrical. Eighth sternite, broad, unmodified, without furcate apophyses.

FEMALE.—Similar to male except larger in size. Antennae (Figure 39) ciliate, basal half simple, distal half serrate. Forelegs (Figure 64) with epiphysis greatly reduced, approximately 0.2 the length of foretibia; meso- and metathoracic legs with paired tibial spurs similar to male.

Wings: Fully developed, similar to male in form and venation; frenulum multiple, typically consisting of 4-6 stiff setae. Seventh segment of abdomen encircled by a dense tuft of setae.

Genitalia: Ovipositor greatly lengthened, telescopic. Three pairs of apophyses present; posterior apophyses extending from caudal end well into seventh segment; anterior apophyses divided laterally near ostium with ventral branch extending across and bordering lamella antevaginalis and dorsal branch originating caudally in eighth segment; a third pair of accessory apophyses extending the length of terminal (9 and 10) segment. Bursa copulatix very short, contained entirely within caudal half of seventh segment; ductus seminalis greatly shortened.

DISCUSSION.—In 1961, Mr. Clyde Stephens of the United Fruit Company collected a series of rather insignificant appearing bagworms on roseapple along a mountain stream near Loma de Cabrera, Dominican Republic. A year later this material containing a few reared adults, was sent to me for identification. Although the adults had been largely destroyed by museum pests, it was obvious that the females were fully winged. Thus, it was immediately realized that this discovery was perhaps the most significant to have ever been made involving the New World Psychidae. Unfortunately, due to the extremely poor condition of the adult specimens, it was not advisable to describe the new

Table 5. Diagnostic features of the genus Pterogyne and allied genera

	Pterogyne	Penestoglossa	Dissoctenoides	Pseudofumea
Distribution	Dominican Republic	S. Europe N. Africa	N. Africa	Morocco
Female	fully winged	fully winged	fully winged	unknown
Labial palpi	2 segments	3 segments	3 segments	3 segments
Epiphysis	long in male short in female	long	absent	absent
R4 and 5	stalked	separate	separate	separate
Accessory cell	large	small	small	absent

genus and species. Not until May 1973 was it possible for the author, assisted by his wife, to collect additional examples of this genus. This material, representing most stages, now enables me to report on this interesting moth.

Pterogyne demonstrates no close affinities to any other American psychid; however, it does appear closely related to the southern Palearctic genera *Penestoglossa* and *Dissoctenoides*. *Pseudofumea* also may be closely allied, although the female in this genus is unknown. All three genera are restricted to the Mediterranean area, particularly the Atlas Mountains of North Africa. From a zoogeographical standpoint, it is interesting to speculate that *Pterogyne* originated from the same area.

Numerous morphological features distinguish *Pterogyne* from the above-mentioned genera. Kozhanchikov (1956) characterizes all three as possessing 3-segmented labial palpi, compared to two in *Pterogyne*. In addition, R4 and 5 are stalked in *Pterogyne* but separate in the Palearctic genera. Of the four, only *Penestoglossa* and *Pterogyne* possess epiphyses, which are greatly reduced in the female of the latter. These major features may best be summarized in Table 5.

The generic name is to be treated as feminine and is derived from the Greek term *pteron* (wing) and *gyne* (female).

Pterogyne insularis, new species

FIGURES 1–3, 18–20, 38–40, 53, 63–64, 67-69, 82, 87, 93, 105, 112, 119, 127, 134–140, 183–184

MALE (Figures 1, 2).—Body dark gray, uniformly covered with long hairlike scales, becoming whitish ventrally. Head with a whitish tuft of hairlike scales arising from dorsal part of frons beneath scape; scales immediately becoming dark fuscous and broader between eyes and ventrally. Antennae 28–30-segmented; dorsum of flagellum scaled, grayish, scape mostly white with a prominent tuft of hairlike scales arising from venter.

Forewings gray, variably marked with fuscous; pattern typically with a large subdiscal spot midway along hind margin (Figure 1) and with numerous, pale spots scattered over wing but concentrated near outer margin; sometimes with large subdiscal mark absent and with entire forewing heavily barred (Figure 2). Hindwings uniformly pale gray. Abdomen gray dorsally, more whitish beneath. Wing expanse 12–13.5 mm.

Genitalia (Figures 67–68): Saccus relatively slender, slightly exceeding length of vinculum. Apex of valvae divided approximately 0.3 its length; cucullus relatively slender; sacculus with 5 or 6 short, stout spines at apex; pulvilli very large, over 0.5 the length of entire valva, densely covered with numerous short spines. Aedeagus slightly curved, without basal enlargement, 0.5 the length of entire genitalia.

FEMALE (Figure 3).—Head and thorax mostly white, similar in form to those of male. Antennae 26–28 segmented, grayish, with basal 10–11 segments simple and distal 16–18 segments with 1 or 2 small rami projecting distally from apex of each segment (Figure 40).

Forewings light gray with a large fuscous, subdiscal spot midway along hind margin and several smaller spots near outer margin. Hindwings uniformly whitish gray. Hair tuft encircling seventh segment of abdomen dark brown to fuscous. Wing expanse 18 mm.

Genitalia (Figure 82): Posterior apophyses greatly elongate, approximately 3 times the length of anterior pair; accessory apophyses of terminal segment about 0.3 the length of posterior pair. Lamella antevaginalis well developed, with a shallow, median notch in posterior margin. Total length of bursa copulatrix, including ductus bursae,

LARVAE (Figures 127, 134–140).—Length of largest larva 10 mm.

Head: Whitish, heavily marked with numerous, small and irregular, dark fuscous spots; adfrontal sclerite mostly whitish except for fuscous spot encircling AF1 and AF2; P1 much closer to AF1 than AF2; AFa more approximate to AF2 than AF1; frons mostly whitish except for small fuscous spots around Fa, F1, and C2. Six ocelli present; dorsal 5 ocelli situated together in an uneven, broken line; the sixth ocellus more remote, ventrad, and approximate to SO3.

Thorax: Prontum whitish with numerous scattered fuscous spots and practically no indication of longitudinal bands. Lateral setae situated close together far forward and remote from spiracle. SD1 located midway between XD1 and XD2. Meso- and metanotum whitish with a few prominent fuscous spots laterally and near dorsal mid-

line; L2 separate from pinnaculum bearing L1 and L3.

Abdomen: Integument typically whitish with pinnacula poorly defined and usually indistinct (one specimen examined with a broad, dark fuscous band extending length of body). SD2 minute, usually above and slightly anterior to spiracle on most segments. Subventral setae all arising from pinnaculum bearing crochets; VI separate. Abdominal prolegs with 20–24 crochets, anal prolegs with 15–17. Cephalic margin of anal plate irregular but not deeply clefted; tenth segment with only three pairs of setae on anal plate (L1 apparently absent).

LARVAL CASE (Figures 183, 184).—Variable in form; either elliptical (Figure 183), 12–16 mm in length and 4–6 mm in diameter; or more slender (Figure 184), 14–16 mm in length and 2.5–3 mm in diameter. Exterior of case pale whitish gray to dark brown, relatively smooth, densely covered with minute, granular fragments of plant material; material usually applied in concentric layers so as to impart a slight banded pattern to case exterior; wall of case relatively thick and firm.

MALE PUPA (Figures 93, 105, 112).—Length 6–6.5 mm, light to medium brown in color. Frontal ridge obsolete, broadly rounded (Figure 93). Antennal sheaths extending midway between apices of pro- and mesothoracic legs. Wing sheaths terminating at caudal margin of fourth abdominal segment. Abdominal segments I-III without anterior row of dorsal spines; anterior spines present on segments IV-VIII and arranged in a single row; a single row of slender posterior spines present only on III-V. Tabulation of spines are shown in Table 3.

Cremaster (Figure 112) vestigial, venter of tenth segment smoothly rounded except for anal furrow and a pair of small anal pads.

FEMALE PUPA (Figure 119).—Length 9–10 mm. Uniformly light chestnut brown. Frons similar to male, broadly rounded. Antennal sheaths extending midway between apices of meso- and metathoracic legs. Wing sheaths terminating near caudal margin of fourth abdominal segment. Segments IV-VIII with a single anterior row of stout, dark spines directed caudad; segments III-V with a single posterior row of slender spines directed anteriorly. Tabulation of dorsal spines is in Table 4.

Cremaster (Figure 119) vestigial; venter of tenth segment smooth, rounded except for anal furrow.

HOLOTYPE.—Dominican Republic: La Vega Province: Hotel Montana, 10 km NE of Jarabacoa, ca. 520 meters: ♂, 28 May 1973, coll. Don and Mignon Davis, holotype USNM 72084; in the National Museum of Natural History, Smithsonian Institution.

PARATYPES—Dominican Republic: La Estrellata Province: Loma de Cabrera, Balneario el Salto, 222 meters: 1 ♀ (emerged Aug. 1973), 8 cases, coll. 21–25 May 1973, Don and Mignon Davis, on bark of unidentified tree; 5 larvae, 41 cases (some with pupal remains), coll. 21–25 May 1973, Don and Mignon Davis, on bark of roseapple (*Eugenia* sp.); 29 cases (some with pupal remains), coll. 21–25 May 1973, Don and Mignon Davis, on bark of mango (*Mangifera indica* L.) (USNM). Between Loma de Cabrera and Dajabon: 3 ♂, 2 ♀, 15 cases, coll. May 1961, C. S. Stephens, on bark of roseapple (*Eugenia* sp.) (USNM). Constanza, Hotel Nueva Suiza, 1164 meters: 3 ♂ 29 May 1973, coll. Don and Mignon Davis (USNM). Same data as holotype: 6 ♂ (USNM).

Described from a total of 12 males, 3 females, 5 larvae and 93 larval cases, many containing pupal remains.

HOSTS.—Lichens on the bark of various trees, especially *Eugenia* sp. and *Mangifera indica* L.

DISTRIBUTION.—Known only from the mountains and foothills of the Cordillera Central of the Dominican Republic. The species appears most common along rivers and streams frequented by roseapple (*Eugenia* sp.).

DISCUSSION.—There is evidence to suspect that the above type-series actually comprises at least two species of *Pterogyne*. As may be seen in Figures 1 and 2, two more or less distinct adult phenotypes have been collected. The male genitalia of these two forms appear inseparable, although such similarity between species often occurs in this family. More significantly, the larvae and larval cases strongly indicate two species. One case form (type A) is broader and more elliptical (Figure 183), with the other (type B) being more slender (Figure 184). When these differences were first observed in the field, sexual dimorphism was suspected to be the cause. Fragmentary pupal remains of both sexes, however, were later obtained from each type of case. Furthermore, two distinctly different larvae were collected consistently from each case. Larvae from type A cases were much paler with an essentially unpigmented abdomen. Larvae

from type B cases were darker and possessed a broad, dark, middorsal band down the length of the abdomen (Figure 128). No significant differences in chaetotaxy have been noted between the two larvae.

Although a large number of living larvae were collected in 1973, only one badly rubbed female emerged (from type B case). Thus, all well-preserved adults were captured in flight, and none can be associated with the two larval types. For this reason nearly all material collected thus far has been designated as paratypes. The male holotype is believed to represent most closely those specimens reared by Stephens from type A cases. Consequently, I have relied entirely upon type A larvae for my description of this stage. Because of possible future implications, it should also be pointed out that the female genitalia has been figured from the adult reared from a type B case. A further clarification of the species problem in this genus will not be possible until more rearings are conducted with both larval forms.

The two forms of *Pterogyne insularis* are sympatric and apparently widely distributed through the Cordillera Central of the Dominican Republic. They have been collected from elevations of less than 200 meters north of Loma de Cabrera, to over 1100 meters at Constanza. As would be expected, these two extremes in habitats differ greatly. Whereas the area around Loma de Cabrera represents a more humid, tropical environment, that of Constanza (and Hotel Montaña) is considerably cooler and characterized by the dominance of *Pinus occidentalis* Swartz.

The larvae were found most commonly on the trunks and lower branches of roseapple and mango where they feed on the heavy growth of crustose and foliaceous lichens, which normally cover the bark of those trees. Roseapple is a dominant feature along mountain rivers and streams at lower elevations in the Dominican Republic, and both Stephens and I collected the species mostly on this tree. The adults are phototropic and are readily attracted to ultraviolet lights.

Paucivena, new genus

TYPE.—*Paucivena reticulata*, new species.

MALE.—Body slender, of small size. Antennae (Figures 42, 43) bipectinate; rami relatively short and stout, gradually decreasing in length to apex of flagellum and arising from base of each segment; sensory setae sparsely scattered, slightly longer than diameter of supporting ramus; rami asymmetrical with one member of a pair slightly longer than the other. Eyes large (Figure 20); vertical diameter approximately 1.1 the interocular distance. Ocelli absent. Maxillae and mandibles absent. Labial palpi reduced to a single elongate segment, approximately twice as long as broad. Forelegs (Figure 66) without an epiphysis, slightly shorter than middle pair; mesothoracic legs the longest, with a pair of apical spurs; metathoracic legs the shortest, with a single pair of apical spurs.

Wings thinly scaled, opaque. Forewings (Figures 54–57) broad, apex and termen moderately rounded; 9-veined with all veins arising separate from cell; Sc sometimes with an oblique crossvein to apex of cell; accessory cell present; intercalary cell absent within discal cell; Cu2 weakly present, not continuing to wing margin; only one anal vein (1A) visible. Hindwings 7-veined, all veins separate; crossvein between Sc and Rs absent; crossvein between Rs and M1 usually absent (although present in one Jamaican specimen), thus leaving upper half of discal cell typically open; M2 and M3 fused; intercalary cell absent.

Genitalia: Tegumen broad, hood-shaped, with a shallow apical cleft. Vinculum reduced to a narrow, weakly developed ventral ring; saccus short, somewhat triangular. Apex of valvae divided into a dorsal, rounded cucullus and ventral sacculus; pulvilli largely separated from base of valvae to form an imperfect anellar ring around aedeagus. Aedeagus short, cylindrical. Eighth sternite reduced, not modified, without furcate arms.

FEMALE.—Unknown.

DISCUSSION.—The only members of this genus presently known, *Paucivena reticulata* and *P. hispaniolae*, new species, are interesting in that they present a curious mixture of primitive and specialized features. For example, of our 18 indigenous American genera, only *Paucivena* and *Pterogyne* demonstrate well-developed, paired tibial spurs, unmodified eighth sternite in the male, and a simple, free Cu2 vein (frequently referred to as 1A). The tibial spurs in *Paucivena*, however, have begun to show some reduction as witnessed by the shortened spurs in *P. hispaniolae*. The presence of well-defined, articulated labial palpi,

although reduced to a single segment in *Paucivena,* should also be interpreted as primitive. In the vast majority of the Palearctic "micropsychidae" these features are similarly developed. Likewise, the abbreviated male genitalia, with its reduced vinculum and saccus, is strongly reminiscent of several primitive Old World genera currently grouped in the subfamily Taleporiinae. This group, and *Paucivena,* are also partially characterized by an unmodified and greatly reduced eighth abdominal sternite in the male, with a correspondingly enlarged eighth tergite (Figures 88–89). Although the adult female of *Paucivena* is yet to be collected, the female pupal case of *P. hispaniolae* has been studied. This indicates a larviform adult typical of the more advanced Psychinae. The adult males of *Paucivena* demonstrate their more specialized nature by their reduced venation and in the loss of the basal pair of spurs on the metathoracic tibiae.

Consequently, *Paucivena* presently stands quite alone among the American psychid fauna. It appears remotely related to the Palaearctic genus *Epichnopterix,* which likewise possesses a vermiform female and a free Cu2 in the forewing of the male. The latter, however, typically possesses 10 veins in the forewing, has retained both pairs of tibial spurs on the hindlegs, and demonstrates a more advanced (i.e., more extended) form of male genitalia. *Paucivena* also superficially resembles the Palaearctic genus *Whittleia* (especially the reticulated form of *P. reticulata*). *Whittleia,* however, is easily differentiated by the same characters as *Epichnopterix*. Another peculiarity of *Paucivena* is the typical absence of the radial-medial crossvein thereby leaving the upper half of the discal cell in the hindwing open.

The general reduction of wing veins in this genus has suggested its name, which has been derived from the Latin *paucus* (few) and *vena* (bloodvessel, vein). The generic name has been considered feminine in gender.

Paucivena reticulata, new species

FIGURES 7–8, 20–21, 42, 55–57, 66, 72–74, 88

MALE (Figures 7, 8).—Body light fuscous, sparsely clothed with long, hairlike scales, becoming more whitish gray ventrally. Antennae with 14 segments; lateral rami short (Figure 42). Tibial spurs elongate, approximately 0.5 the length of basal tarsal segments.

Forewings light grayish to dark fuscous, usually streaked with dark fuscous to form a faint reticulate pattern; scales mostly lanceolate with scattered hairlike scales. Hindwings paler in color, light gray, sparsely covered with lanceolate to hairlike scales. M2+3 usually arising equidistant between M1 and CuA1. Wing expanse 7–9 mm.

Genitalia (Figures 72, 73): Apical lobes of tegumen minutely serrated laterally. Length of saccus less than 0.5 the length of aedeagus. Valvae relatively slender; apex of sacculus serrulate; pulvilli sparsely setose, without spines. Aedeagus approximately 0.7 the length of valve; base of aedeagus slightly depressed and flared.

LARVA.—Unknown.

PUPA.—Unknown.

HOLOTYPE.—Puerto Rico: Central Vacacional, Monte del Estado, near Maricao, 650 meters: ♂, 1–9, Mar. 1971, coll. by C. P. Kimball, USNM 72080; in the National Museum of Natural History, Smithsonian Institution.

PARATYPES.—Jamaica: St. Ann Parish: near Runaway Bay Cave, 15 meters: 1 ♂, 2 May 1973, coll. Don and Mignon Davis (USNM). Puerto Rico: Centro Vacacional, Monte del Estado, near Maricao, 650 meters: 4 ♂, 1–9 Mar. 1971, coll. C. P. Kimball (USNM). Maricao: 1 ♂, July 1960, coll. J. Maldonado (USNM). El verde Field Station, Luquillo Experimental Forest, 435 meters: 6 ♂, 29 Dec. 1970–21 Jan. 1971, coll. C. P. Kimball (USNM); 1 ♂, 1–21 Jan. 1971, coll. C. P. Kimball (UPR); 1 ♂, 20 Mar. 1969 (USNM). El Yunque Biological Station, Luquillo Experimental Forest, Molindera Road, 2100 ft: 1 ♂, 2 Jan. 1963, coll. P. and P. Spangler (USNM). Described from a total of 16 males.

HOST.—Unknown.

DISTRIBUTION.—Presently known only from Puerto Rico at elevations above 400 meters and from Runaway Bay, Jamaica, at an elevation of 15 meters.

DISCUSSION.—On the basis of the collections to date, *Paucivena reticulata* appears to prefer wet, upland forests, although in Jamaica the species was collected in a dry, xerophytic forest near sea level. More than likely the larvae are lichenivorous and may be discovered eventually living on the trunks of various trees.

It is possible that the specimen collected at Runaway Bay, Jamaica, represents a different species. It differs from the Puerto Rican population in being a uniformly dark fuscous color (Figure 8) and was collected in a decidely different habitat. More significantly, it has retained the radial-medial crossvein in the hindwing with the result that the radial sector vein is abruptly depressed at the distal end of the cell. In addition, vein M2+3 is more approximate to CuA1 than to M1. Considering the variation of the forewing venation observed in this species and the absence of a study series from Jamaica, however, I prefer to await more material before passing further judgment concerning its status.

Paucivena hispaniolae, new species

FIGURES 6, 43, 54, 75–77, 89, 106, 113, 121–122, 129, 141–147, 187–188

MALE (Figure 6).—Body dark fuscous, uniformly covered with long hairlike scales, becoming whitish gray ventrally. Antennae with 21 segments; lateral rami short (Figure 43). Tibial spurs reduced, approximately 0.3 the length of basal tarsal segments.

Forewings uniformly dark fuscous; scales predominantly lanceolate to elliptical with rounded apices, or more rarely with minutely bi- to tridentate apices. Hindwings with scales more narrow and elongate; M3 arising much closer to M2 than to CuA1. Wing expanse 10 mm.

Genitalia (Figures 74, 75): Apical lobes of tegumen reduced, lateral margin smooth. Length of saccus less than 0.4 the length of aedeagus. Valvae relatively slender; apex of sacculus spinose, with 8–10 small spines; pulvilli sparsely setose. Aedeagus approximately 0.7 the length of valve; base of aedeagus slightly depressed and flared.

LARVA (Figures 129, 141–147).—Length, 10 mm.

Head: Whitish to light tan, heavily marked with numerous large and irregular patches of dark fuscous; adfrontal sclerite poorly defined, mostly whitish except for small fuscous spots surrounding AF2 and AF1; AF2 relatively remote from frontal suture and approximate to P1; frons with a pair of small fuscous spots bordering suture near dorsal end and a large ventral pair of spots encompassing F1, C1, and C2. Six ocelli present in a broken circle; dorsal five arranged in a continuous semicircle; the sixth more remote, ventral to 02 and approximate to 03.

Thorax: Pronotum whitish to light tan with numerous, irregular patches of dark fuscous; both dorsal and subdorsal bands incomplete and fragmented. SD1 arising closer to XD1 than to XD2. Mesonotum with only caudal half of dorsal and subdorsal longitudinal bands present; both mesonotum and metanotum with an extra seta (SD1a?) arising below SD1. L2 of mesothorax separate from pinnaculum bearing L1 and L3.

Abdomen: Integument mostly whitish except for pale fuscous middorsal band extending length of abdomen; pinnacula poorly defined, usually indistinct. D1 and D2 borne on separate pinnacula. Segment IX with D2 and SD1 on same pinnaculum; SD2 minute, usually above and slightly anterior to spiracle. SV1 and SV3 apparently separate from pinnaculum bearing SV2 and crochets. Abdominal prolegs III-VI with 19–20 crochets; anal prolegs with 15–16 crochets. Cephalic margin of anal plate irregular but not deeply clefted; tenth segment with only three pairs of setae on anal plate (L1 apparently absent).

LARVAL CASE (Figures 187, 188).—Dimensions: ♂, 11–13 mm in length, 3–3.5 mm in diameter; ♀, 13–16 mm in length, 3–4 mm in diameter. Exterior of case dark gray in color, densely covered with minute fragments of bark and lichens; typically smooth and fusiform in outline.

MALE PUPA (Figures 106, 113).—Length 5 mm; uniformly dark chestnut brown in color. Frontal ridge absent, frons smooth. Antennal sheaths extending midway between apices of pro- and mesothoracic legs. Wing sheaths usually extending midway along third abdominal segment. Abdominal segments I-II without transverse rows of dorsal spines; segments III-VIII with 1–5 scattered anterior rows of numerous small spines directed caudad; anterior spines of segment VIII arranged in an irregular, circular patch; a single posterior row of slender spines present on segments V-VIII. Tabulation of spines shown in Table 3.

Cremaster of tenth segment (Figure 113) reduced, consisting of a single pair of small hooks curved inward (medially).

FEMALE PUPA (Figures 121, 122).—Body light chestnut brown, intersegmental membranes slightly paler in color; length 10–11 mm. Pupal antennae,

eyes, maxillae, and legs vestigial; wings absent. Abdominal segments I-IV without transverse rows of dorsal spines; segments VI-VIII with an irregular series of 1–4 scattered, anterior rows of short, stout spines directed caudad; posterior row of slender spines present only on segments V and VI. Tabulation of spines as in Table 4.

Cremaster (Figure 122) of segment X relatively well developed, consisting of a pair of short acute spines widely set apart; immediately anterior to cremaster are a pair of raised and rounded anal papillae, widely separated by prominent, Y-shaped anal groove.

HOLOTYPE.—Dominican Republic: La Estrellata Province: Loma de Cabrera, 222 meters: ♂, reared from larva coll. 22 May 1973 by Don and Mignon Davis on trunk of unidentified tree, emerged 3 June 1973, holotype USNM 72088; in the National Museum of Natural History, Smithsonian Institution.

PARATYPES.—Same locality data as holotype: ♂, emerged 25 May 1973; 1 larva, coll. 22 May 1973, on microslide USNM 16679; 126 larval cases (a few with associated pupal remains), coll. 22 May 1973 (USNM). Described from 2 males, 1 larva, and 126 larval cases.

HOST.—Crustose lichens on the bark of an unidentified tree (referred to locally as "bolito").

PARASITE.—Ichneumonidae: *Chirotica* sp. (det. R. Carlson).

DISTRIBUTION.—Known only from the type-locality, which is located in the northern foothills of the Cordillera Central, Dominican Republic.

DISCUSSION.—A large number of larval cases of this species were collected by my wife and me from a single, unidentified tree within the town of Loma de Cabrera. Unfortunately, only two imperfect moths and three parasitic wasps emerged. It may be significant to note that cases of this species were not observed on the bark of nearby trees harboring other lichenivorous Lepidoptera (e.g., *Pterogyne insularis*, new species, and *Batrachedra* species. However, cases similar to *P. hispaniolae* were collected by Dr. J. Marcano on the trunks of *Mangifera indica* near Tamboril, Dominican Republic. This may indicate a specific preference for lichens attacked by these species within a rather limited geographical area.

Although the male genitalia of *Paucivena hispaniolae* and *P. reticulata*, new species, are very similar, the two may be easily separated by venational characters as well as overall size. The forewings of the two are most distinguished by their respective outline, with the apex of *P. hispaniolae* being less rounded. In the hindwings, *P. hispaniolae* is characteristic in having CuA1 arising approximate to M2+3, as is the case in the questionable specimen of *P. reticulata* from Jamaica. In the Puerto Rican specimens of the latter, CuA1 arises equidistant from CuA2 and M2+3. It should also be noted that the tibial spurs of P. hispaniolae are shorter than *P. reticulata*. Another difference between these two species may be observed in the relative length of their antennal segments. As may be seen in Figures 42 and 43, the flagellar segments of *P. reticulata* are relatively longer and more slender than *P. hispaniolae*.

Compared to the other Psychidae treated in this paper, *P. hispaniolae* exhibits several unusual or diagnostic features with regard to larval and pupal morphology. The larvae may be characterized by seta AF2 of the head arising approximate to P1 and rather remote from the frontal suture. The chaetotaxy of the tenth tergite (the anal plate) agrees with that of *Pterogyne insularis* in that L1 is apparently absent. All other larvae examined in this study possessed the typical four pairs of setae on this tergite. The most unusual larval character, however, is the presence of an extra subdorsal seta (SD1a?) on both the meso- and metanota. Such a seta is not known to occur in any other lepidopterous larva and may only be an anomaly in this species. Only one larva was preserved, and until more examples can be studied, the variability of SD1a remains unknown.

The pupae of both sexes are unusual in having the dorsal anterior spines arranged in usually 3–5 scattered rows (Figure 106), compared to the single row typically present in all other psychids examined. In addition, the cremaster is greatly reduced in both sexes, and the anterior dorsal spines are present only on segments VI-VIII in the female.

?*Prochalia* Barnes and McDunnough

"Clania" licheniphilus Koehler

FIGURE 186

Chlania [sic] *licheniphilus* Koehler, 1939:40.
"Clania" licheniphilus Koehler.—Davis, 1964:154.

Like *Cryptothelea hoffmanni* this species is known only from Havana, Cuba, and was inadequately described on the basis of only the female pupal shell and larval case (Figure 186). Because of the close resemblance in the larval cases of *"Clania" licheniphilus* and of other lichenivorous species treated in the present paper (particularly *Paucivena hispaniolae*, new species), it becomes imperative that a more careful diagnosis be made of the Cuban species.

Koehler's description of the female pupa concentrated on the pygidium and completely ignored the more diagnostic dorsal spines of the abdomen. A male pupa was included in the syntypic series, but it was not described by Koehler. Similarly, a larva was mentioned by him but with no other comment except that it was in too poor condition to describe. All of this material has been restudied, and the pupal characters are summarized below. The larva appears to be immature and closely agrees with that of *Prochalia pygmaea* in chaetotaxy. The larvae of the latter will be discussed in a future paper on the immature stages of the North American Psychidae.

MALE PUPA.—Length approximately 6.5 mm; color uniformly medium brown. (Appendages partially destroyed or missing.) A single row of anteror dorsal spines present on abdominal segments IV-VIII; segment IV with spines reduced and indistinct. A single posterior row of dorsal spines present on abdominal segments V and VI (posterior row may also be present on IV but unable to verify due to poor condition of specimen). Tabulation of spines summarized in Table 3.

Cremaster well developed, consisting of a pair of sharp, stout spines, arising from the crest of a broad, conical, base.

FEMALE PUPA.—Length approximately 8 mm; color uniformly light chestnut brown. Sheaths for antennae, eyes, maxillae, and legs vestigial, minute; wings absent. A single row of dorsal spines present on abdominal segments III-VIII. Segments II-VI with a single row of posterior dorsal spines. Tabulation of spines listed in Table 4.

Cremaster reduced, consisting of two, minute spines widely separated. Y-shaped anal groove prominent; area lateral to groove slightly rugose and only slightly raised, nearly flat.

DISCUSSION.—The immature stages of *"Clania" licheniphilus* most closely agree with those of *Prochalia pygmaea* and *Zamopsyche commentella*. The species demonstrates relatively little relationship to the new genus *Paucivena*, another lichenivorous genus that probably also occurs in Cuba. After the adult male of *"C." licheniphilus* has been reared, it will more than likely prove to be a member of either *Prochalia* or *Zamopsyche*, with little or no close affinities to *Clania*. Indeed, one can only wonder what reasons prompted Koehler to place his species in *Clania*, an Eastern Hemisphere genus that occurs nowhere in the New World.

The pupa of *"C." licheniphilus* differs from both *Prochalia pygmaea* and *Zamopsyche commentella* with regard to the number and distribution of the dorsal, abdominal spines; thus, it probably represents a valid species. It is possible that an unidentified species of *Prochalia* (species no. 10) from Cuba (p. 31), may in fact be the adult of *"C." licheniphilus*. A larval case very similar to *"C." licheniphilus* is also known from Trinidad (see species no. 8), but this in all likelihood is not conspecific with Koehler's species.

Although not stated originally by Koehler, the syntypic series of *"Clania" licheniphilus* has been found to consist of four larval cases, which contained one larva and the remains of one male pupa and two female pupae. The most complete pupa (a female) with its associated larval case has been designated as lectotype.

LECTOTYPE.—♀ pupa (with associated larval case) bearing the following seven labels: (1) "W.H. Hoffmann, Havana 192"; (2) "cotipus"; (3) "Pupa on slide 2928 ♀, D.R. Davis"; (4) "Lectotype, Clania licheniphilus Köh., by D. Davis 1974"; (5) "4. Masso/22"; (6) 4 "Se encuentra en cientos arboles"; (7) "Chlania licheniphila Khlr., det. Koehler." In the Institut für Pflanzenschutzforschung Kleinmachnow.

Metaxypsyche, new genus

TYPE.—*Metaxypsyche trinidadensis*, new species.

MALE.—Moths of small size, slender body. Antennae broadly bipectinate, gradually tapering to apex; lateral rami arising below middle near base of nearly all segments (Figure 41), arising medially on apical 2–3 segments. Compound eyes reduced in size, directed forward; vertical diameter of eye 0.8 the interocular distance. Ocelli absent.

Mandibles and maxillae absent. Labial palpi greatly reduced, unarticulated, almost completely fused to form a short but prominent, median lobe ventrally; apex of lobe with a shallow, median notch. Epiphysis present on foretibia (Figure 65), elongate; meso- and metathoracic legs without apical spurs.

Wings moderately broad, apices evenly rounded. Forewings (Figure 58) 11-veined, with all veins arising separate except R4 and 5, which are stalked; M1 originating above base of medial vein and more approximate to R4+5 than M2; intercalary cell absent, although medial spur vein present and nearly touching Cu. Hindwings 7-veined, with all veins arising separate except M2 and 3 which sometimes are connate; Rs not straight as in *Zamopsyche* but pinched inwards toward discal cell at junction of Rs-M crossvein; M1 absent; intercalary cell absent.

Genitalia: Elongate. Apex of tegumen entire. Constriction of vinculum to saccus gradual, not abrupt. Valvae broad, pulvilli obsolete; sacculus well set off from cucullus. Aedeagus elongate, slender, without basal enlargement. Eighth sternite with slender furcations longer than undivided base.

FEMALE.—Vermiform; eyes, antennae and maxillae vestigial; thoracic legs reduced to minute, unsegmented stubbs; wings absent.

Genitalia: Ovipositor reduced, largely membranous. Posterior apophyses well developed; anterior apophyses vestigial, indistinct. Bursa copulatrix reduced in size, spermatheca prominent. Ductus seminalis short, not exceeding length of spermathecal sac.

DISCUSSION.—A determination of the proper generic placement for *Metaxypsyche trinidadensis* has not been an easy decision, although the present action seems the most justified. *Metaxypsyche* bears greatest affinities to *Zamopsyche* and *Dendropsyche*, occupying a somewhat intermediate position between the two taxa; hence, the etymology of the generic name, *Metaxypsyche*, derived from the Greek *metaxy* (between) and *psyche* (spirit). The generic name has been considered feminine in gender.

M. trinidadensis agrees closely in leg structure and in the venation of the forewing with *Zamopsyche*. The hindwing venation differs, however, in that *Metaxypsyche* has lost M1 and has Rs strongly depressed at the Rs-M crossvein. In addition, the antennal rami of *Metaxypsyche* arise submedially from most of the flagellar segments (as in *Dendropsyche burrowsi* Jones) and not apically as in *Zamopsyche* and the closely allied genus *Prochalia*. The relatively slender, slightly notched labial palpi of *M. trinidadensis* is somewhat intermediate between the very short, truncate palpi of *Zamopsyche* and the much larger, prominently forked structure in *Dendropsyche venezuelae*. The male genitalia differ in having the valvae more narrow and the saccus more well defined in *Zamopsyche*. The aedeagus of the latter is also much shorter, extending usually no more than 0.5 the length of the entire genitalia. The female genitalia of *Zamopsyche* (and *Prochalia*) are also much different in possessing two distinct pairs of apophyses compared to only one pair in *Metaxypsyche*.

The venation of *Dendropsyche* is similar to that of *Metaxypsyche* in possessing an 11–7 pattern with the exception that R4 and 5 are separate in the former. The most consistent difference between the two taxa is the absence of an epiphyses in *Dendropsyche* and its presence in *Metaxypsyche*. The female of *D. burrowsi* is not known, thus making it impossible to compare the female genitalia of *M. trinidadensis* with the type-species of *Dendropsyche*. The female genitalia of a supposed congeneric species, *D. venezuelae*, however, has been described (Davis, in press), and it diverges greatly from that of *M. trinidadensis*. Most significantly, the ductus seminalis of the former is unusually long, resembling that found in *Oiketicus* and *Thyridopteryx*.

Metaxypsyche trinidadensis, new species

FIGURES 5, 24-25, 41, 58, 65, 70–71, 83, 90, 94, 99–100, 107, 114, 120, 130, 148–154, 185

MALE (Figure 5).—Body fuscous, clothed mostly with long hairlike scales; frons and venter of scape much paler, stramineous. Antennae fuscous, 17-segmented; sensory setae elongate, 4–5 times the diameter of supporting rami in length. Epiphysis (Figure 65) approximately 0.75 the length of foretibia, almost reaching to distal end of tibia.

Wings fuscous, uniformly covered with long, hairlike scales. Hindwings approximately same color as forewings. Wing expanse 9.5–11 mm.

Genitalia (Figures 70, 71): Tegumen elongate; apex entire, rounded. Vinculum gradually constricted to form relatively broad, elongate saccus. Valvae broad, costal margin revolute; apex of sacculus well separated from cucullus and covered with 6–8 minute, short, blunt spinules. Aedeagus elongate, between 0.85–0.9 the length of entire genitalia. Eighth sternite (Figure 90) relatively narrow; furcate arms approximately 1.5 the length of undivided base. Eighth tergite (Figure 90*a*) large, elongate.

FEMALE.—Length 5–6 mm. Dorsum of head and thorax slightly sclerotized, brownish; remainder of body whitish, membranous, and largely naked except for encirclement of light fuscous hairs on seventh segment.

Genitalia (Figure 83): Ovipositor reduced, largely membranous; posterior apophyses relatively well developed, cephalic ends inserted into a pair of well-defined, membranous pockets on dorsal wall of eighth segment; pockets situated slightly anterior to ostium. Anterior apophyses reduced to minute, indistinct, slightly pigmented stubbs situated at anterior margin of eighth segment; cephalic ends of anterior apophyses not free but entirely fused with integument. Bursa copulatrix reduced in size, volume less than one-third that of prominent spermatheca. Ductus seminalis very short, length approximately 0.5 that of spermathecal sac.

LARVA (Figures 130, 148–154).—Length of longest larva 9 mm.

Head: Light tan heavily marked with fuscous; a large irregular patch usually extending from Va almost to P1; a smaller, more elongate band extending laterally and posteriorly from Pa; venter of head, bordered by ring of ocelli, dark fuscous; terminal ends of adfrontal sclerites and clypeal margin of frons bordered with dark fuscous. Six ocelli present; five arranged in a sinuate L-shaped line and the sixth situated more distant and ventrad. A1 approximate and anterior to third ocellus; both O2 and O3 located between fifth and sixth ocelli. P2 absent. AFa approximate to AF2. Mandibles with five acute teeth.

Thorax: Pronotum light tan, with two broad, longitudinal fuscous bands; the dorsal band being broader and more straight, the ventral band curving ventrally to spiracle. Mesonotum similar but with the two bands more irregular and anastomosing posteriorly. Mesothorax with L2 on a separate but contiguous pinnaculum from L1 and L3.

Abdomen: Pinnacula brownish, noticeably darker than whitish integument. D1 and D2 usually on small, separate pinnacula although the latter sometimes joined on first segment; on segment VIII, D1 and 2 borne on a single large pinnaculum, which is divided at dorsal midline from corresponding pinnaculum on opposite side. SD2 minute, situated anterior to spiracle and usually separated from large pinnaculum bearing SD1 except on segment VIII. Ninth segment with D2 and SD1 on same pinnaculum; L1, L2, and L3 all separate; SV2 absent from both segment I and II. Segments III–VI with subventral series all located on same pinnaculum bearing crochets and separate from VI. Prolegs III–VI with 20–22 crochets; anal prolegs with 18–20. Anal shield with cephalic margin not deeply excavated, relatively truncate.

LARVAL CASE (Figure 185).—Dimensions, ♂, 7–8 mm in length, 3–4 mm in diameter; ♀, 8–10 mm in length, 3.5–4.5 mm in diameter. Exterior of case heavily covered with relatively large fragments (up to 1.0 mm in diameter) of herbaceous stems applied irregularly but in a somewhat spiral direction around case; tips of longer stems may project outwards from case to a distance of 5 mm or more.

MALE PUPA (Figures 94, 99, 100, 107, 114).—Dark chestnut brown in color; length 5.0–5.5 mm. Frontal ridge reduced, with a single well-defined tooth. Antennal sheath reaching about midway between tips of pro- and mesothoracic legs. Wing sheaths extending to middle of third and often to base of fourth abdominal segment. Abdominal segments I–II without transverse rows of spines; segment III with anterior row often absent, or if present, then greatly reduced; posterior row always present but sometimes indistinct; segments IV–VI with an anterior transverse row of stout spines directed caudad and a posterior row of small, slender spines directed cephalad; posterior row absent on segments VII and VIII. Tabulation of spines as in Table 3.

Cremaster of Segment X consisting of a single pair of large stout hooks curved cephalad.

FEMALE PUPA (Figure 120).—Light chestnut to yellowish brown in color; length 5.5–6.0 mm. Sheaths for antennae, eyes, maxillae, and legs vestigial, indistinct; wings absent. Abdominal seg-

ments III–VIII with a transverse row of small, stout spines directed caudad near anterior margin of each segment, sometimes absent on segments III and IV and occasionally reduced to a single large spine on VIII; segments II–VI with a transverse row of minute, slender spines directed cephalad near posterior margin of each segment. Tabulation of spines shown in Table 4.

Cremaster of segment X reduced, consisting of a pair of widely separated spines directed cephalad. Anal groove prominent, Y-shaped with lateral arms widely divergent.

HOLOTYPE.—Trinidad: Curepe: ♂, reared Jan. 1972, coll. R. Cruttwell, Holotype USNM 72082; in the National Museum of Natural History, Smithsonian Institution.

PARATYPES.—Trinidad: Carapachima: 1 ♂, larva coll. Jan. 1973 by R. Cruttwell (USNM). Curepe: 1 ♂, 23 Mar. 1970; 1 ♂, emerged 15 Apr. 1970 (USNM); 1 ♂, reared June 1970, coll. R. Cruttwell (BM); 1 ♀, reared July 1970, coll. R. Cruttwell; 1 ♂, Oct. 1970, coll. R. Cruttwell; 1 ♂, reared Nov. 1970, coll. R. Cruttwell; 2 ♂, reared Feb. 1971, coll. R. Cruttwell; 1 ♂, reared July 1971, coll. R. Cruttwell; 1 ♂, reared Aug. 1971, coll. R. Cruttwell; 4 ♂, reared Nov. 1971, coll. R. Cruttwell; 6 ♂, 10 ♀, reared Dec. 1971, coll. R. Cruttwell (USNM), 1 ♂, reared Dec. 1971, coll. R. Cruttwell (BM); 13 ♂, 1 ♀, reared Jan. 1972, coll. R. Cruttwell; 4 ♂, reared Feb. 1972, coll. R. Cruttwell (USNM); 3 ♂, reared Feb. 1972, coll. R. Cruttwell (CIBC); 1 ♂, reared Mar. 1972, coll. R. Cruttwell; 1 ♂, Aug. 1972, coll. R. Cruttwell at light; 1 ♂, Sept. 1972, coll. R. Cruttwell at light; 2 ♂, Oct. 1972, coll. R. Cruttwell at light; 1 ♂, Dec. 1972, coll. R. Cruttwell (USNM). Lopinot: 2 ♂, emerged 20 Mar. 1970; 1 ♂, emerged 24 Mar. 1970 (USNM).

Described from a total of 49 males and 13 females, 5 larvae and 55 larval cases (usually with associated pupal exuviae).

HOSTS.—"Crustose and foliose lichens on the trunks of trees (e.g., *Citrus* sp., *Psidium* sp.) as well as on wooden posts, rotting stumps, orchid supports, etc." (Cruttwell, in press).

DISTRIBUTION—Presently, known only from Trinidad. The species is probably widespread over the island but has been collected mostly from elevations below 100 meters.

DISCUSSION.—Most of the diagnostic features of this species, particularly of the adult male, have already been reviewed under the generic discussion. The extreme specialization of the females in the Psychidae usually make specific diagnosis of this sex difficult, if not impossible; however, the paired dorsal pockets in the female genitalia of *M. trinidadensis* may be reliable characters for specific identification.

Naevipenna Davis

Naevipenna aphaidropa (Dyar)

FIGURES 9, 26–27, 44, 85, 95, 109, 115, 123, 131, 155–161, 189

Platoeceticus aphaidropa Dyar, 1914:253.
Naevipenna aphaidropa (Dyar).—Davis, 1964:49.

As in the case of *Cryptothelea surinamensis,* this species is known to occur through the Guiana Coastal Plain but had never been reported from Trinidad. The adult males are very close in general appearance to the new species, *N. cruttwelli,* but may be recognized by their larger size (wing spread 17–20 mm) and the presence of a relatively large pterostigma on the costal margin of the forewing. In addition to their similar appearance, the two species of *Naevipenna* apparently possess similar distributions and may be largely sympatric.

Although the adults of *N. aphaidropa* and *N. crutwelli* are superficially similar, their immature stages are strikingly dissimilar. These differences are discussed under *N. cruttwelli.* The larva, larval case, pupae, and adult female were previously unknown and are described below.

An examination of the structure of the head (Figures 26, 27) reveals the males of *N. aphaidropa* to possess relatively large eyes with an interocular index of 1.6. The maxillae are reduced to small membranous lobes. The labial palpi are nonarticulated and are fused basally to form a short Y-shaped ventral projection. In these respects the maxillae and labium of *Naevipenna* most resemble those of *Thyridopteryx.*

FEMALE.—Length 10–12 mm. Vermiform, without antennae, mouthparts, or wings; thoracic legs

present but greatly reduced and unsegmented. Head and thorax lightly sclerotized, brownish, sparsely setose; remainder of body whitish, membranous and largely naked except for ring of dense, fuscous hair around seventh segment.

Genitalia (Figure 85): Similar to *N. cruttwelli*, new species, except all proportions larger. Ovipositor reduced; both anterior and posterior apophyses relatively well developed and distinct; anterior apophyses with cephalic two-fifths free from integument, stouter than posterior pair; bursa copulatrix moderately large, approximately 0.7 the volume of spermatheca; vestibulum not enlarged, proportionately smaller than that of *N. cruttwelli;* a broad, bulbous enlargement of posterior end of spermathecal duct present as in *N. cruttwelli.*

LARVA (Figures 131, 155–161).—Length of longest larva 12 mm.

Head: Light tan, irregularly marked with fuscous; medial adfrontal sclerite entirely fuscous; frons with dark spots at or between AF2, F1, and Fa; markings on dorsal area of head variable and very irregular. A1 approximate to third ocellus. Six ocelli present; five arranged in an inverted L-shaped series, the sixth more distant and ventral. O2 situated midway between fifth and sixth ocelli; O3 immediately posterior to O2. P2 absent. AFa approximate to AF2. Mandibles with 4 or 5 acute teeth; first tooth reduced.

Thorax: Pronotum light tan with irregular fuscous markings; dorsal band mostly obsolete though partially evident toward posterior margin; subdorsal band only partial, extending from SD2 almost to spiracle. Dorsal band of meso- and metanota well defined; subdorsal band reduced, curving down toward SD1. L2 of mesothorax partially separated from pinnaculum bearing L1 and 3.

Abdomen: Integument very dark, almost black; pinnacula well defined, pale brown to whitish. D1 and 2 usually separate, though borne together on segment VIII on a large undivided dorsal plate, which also bears corresponding setae on opposite side. Segment IX with D2 and SD1 on same pinnacula. Lateral series all separate with pinnacula of L1 and 3 indistinct. SD2 minute, usually separate from SD1, and located anterior to spiracle. Subventral series all situated together on same pinnacula with crochets and separate from V1. SV2 absent from both segments I and II. Abdominal prolegs III–VI with 16–20 crochets; anal prolegs with 18–20. Cephalic margin of anal plate nearly entire.

LARVAL CASE (Figure 189).—Dimensions: ♂, 15–19 mm in length, 3–4 mm in diameter; ♀, 19–24 mm in length, 5–6 mm in diameter. Exterior of case dark, usually moderately covered with large (2–4 mm long) fragments of bark or leaves. Similar to *N. cruttwelli*, new species, but larger and not as slender, and usually with a shaggier, more irregular appearance due to heavier covering of plant fragments.

MALE PUPA (Figures 109, 115).—Uniformly dark chestnut brown in color; length 7.9 mm. Frontal ridge greatly reduced, with 1 or 2 minute, irregular serrations. Antennal sheaths extending midway between apices of pro- and mesothoracic legs. Wing sheaths usually extending to anterior margin of fourth abdominal segment. Abdominal segments I and II without transverse rows of spines; dorsum of segments III–VIII with an anterior row of stout spines directed caudad; dorsum of III–VII with a posterior row of slender spines curved cephalad. Tabulation of spines as in Table 3.

Cremaster (Figure 115) of segment X consisting of a single pair of large, stout hooks curved slightly cephalad, and situated on a prominently raised, tubercular portion of the anal area.

FEMALE PUPA (Figure 123).—Uniformly reddish brown in color; length 10–11.5 mm. Pupal antennae, eyes, maxillae, and legs vestigial; wings absent. First abdominal segment without a transverse row of dorsal spines; dorsum of segments III–VIII with an anterior row of stout spines directed caudad; dorsum of II–VI with a posterior row of slender spines curved cephalad. Tabulation of spines as in Table 4.

Cremaster (Figure 123) of segment X reduced, consisting of a pair of short but stout, closely set hooks; anal groove prominent, Y-shaped, nearly surrounding cremaster.

HOST.—"Lichens, on bark of various trees" (Cruttwell, in press).

WEST INDIAN DISTRIBUTION.—Trinidad: Curepe: 5 ♂, 1 ♀, reared Jan.; 1 ♂, reared Aug.; 1 ♂, 1 ♀, reared Nov.; 3 ♂, 3 ♀, reared Dec. (USNM).

Naevipenna cruttwelli, new species

FIGURES 10, 45, 59–61, 78–79, 84, 91, 96, 110, 116, 124, 132, 162–168, 190–191

MALE (Figure 10).—Body fuscous, clothed mostly with long, hairlike scales. Antennae fuscous, 21-segmented; rami arising medially from each segment midway along flagellum and more distad as segments progress toward apex of flagellum; sensory setae elongate, approximately 3 times the diameter of supporting rami in length; setae randomly scattered over ventral surface of rami. Epiphysis similar to that of *N. aphaidropa*, elongate, surpassing apex of tibia; meso- and metathoracic spurs noticeably shorter than *N. aphaidropa*, less than 0.2 the length of adjacent first tarsal segment.

Wings fuscous, uniformly scaled. Forewing with 12 veins (Figure 60); pterostigma absent; R3 and 4 stalked; R5 variable, typically stalked to R3+4, or separate; medial veins separate; scales of discal cell relatively broad, oblanceolate with apices subacute to nearly rounded. Hindwings with 7 veins; Sc and Rs never fused, but connected by a basal crossvein; M2 and 3 variable, typically separate, but sometimes stalked or connate. Wing expanse 12.5–13 mm.

Genitalia (Figures 78, 79): Similar to *N. aphaidropa*. Apex of tegumen entire. Valvae broad, margins revolute; pulvilli indistinct, vestigial, sparsely setose, vinculum abruptly tapering to elongate, slender saccus. Aedeagus simple, base not expanded. Eighth sternite (Figure 91) with a broad, heavy base; furcal arms widely separate, relatively short, approximately equalling the undivided base in length.

FEMALE.—Length 5–6 mm. Vermiform, without antennae, mouthparts or wings; thoracic legs absent. Dorsum of head and thorax lightly sclerotized, brownish, sparsely setose; remainder of body whitish, membranous, and largely naked except for dense encirclement of light fuscous hairs around seventh segment.

Genitalia (Figure 84): Similar to *N. aphaidropa* except smaller. Ovipositor reduced; both anterior and posterior apophyses relatively well developed and distinct; anterior apophyses with cephalic half free from integument, stouter than posterior apophyses; vestibulum large, proportionately larger than that of *N. aphaidropa*; posterior end of spermathecal duct near junction of vestibulum greatly enlarged.

LARVA (Figures 132, 162–168).—Length of largest larva 9 mm.

Head: Whitish to light tan, heavily marked with several large patches of dark fuscous, the largest, roughly elliptical spot encompassing V1 and V2 but not P1; dorsal half (above AF1) and ventral tip of adfrontal sclerite fuscous; ventral third of frons with a broad transverse band of fuscous interrupted at Fa; venter of head posterior from ocelli fuscous. Six ocelli present; first five arranged in an inverted L-shaped series, the sixth more distant and ventrad. O2 situated between fifth and sixth ocelli; O3 more posterior. A1 remote from third ocellus. P2 absent. AFa approximate to AF2. Mandibles usually with five acute teeth.

Thorax: Pronotum whitish to light tan with an irregular dorsal band extending longitudinally from D1; subdorsal band reduced, consisting of a partial sigmoid band curving posteriorly from XD1 and XD2; a third irregular band extending upwards through L3 and spiracle. Meso- and metanotum almost entirely covered by a single large rectangular spot. L2 of mesothorax separate from pinnaculum bearing L1 and L3.

Abdomen: Integument mostly whitish to light tan except for pale fuscous middorsal band extending the length of the abdomen; pinnacula usually pale brown although sometimes rather indistinct. D1 and D2 usually borne on separate pinnacula except on segment VIII where they are borne on a single large dorsal plate, which also bears corresponding setae from other side. Segment IX with D2 and SD1 on same pinnaculum; L1, L2, and L3 all separate. SD2 minute, separate from SD1 and anterior to spiracle. Subventral series all borne on same pinnacula as crochets and separate from V1; SV2 absent from both segments I and II. Abdominal prolegs III–VI with 19–21 crochets; anal prolegs with 19–20 crochets. Cephalic margin of anal plate slightly irregular, nearly entire.

LARVAL CASE (Figures 190, 191).—Dimensions: ♂, 12–15 mm in length, 2–2.5 mm in diameter; ♀, 12–16 mm in length, 2–3 mm in diameter. Exterior of case dark, usually smooth, densely covered with minute fragments of bark, leaves and lichens;

occasionally with a few larger leaf fragments loosely attached and oriented lengthwise.

MALE PUPA (Figures 96, 110, 116).—Length 6–6.5 mm. Uniformly dark chestnut brown in color. Frontal ridge greatly reduced, with one or two low serrations. Antennal sheaths reaching almost to tip of mesothoracic leg; wing sheaths extending to base of third abdominal segment. Abdominal segments I–II without transverse rows of spines; segments III–VI each with a dorsal anterior row of stout spines (though reduced in size on III) directed caudad and a posterior row of slender spines directed cephalad; segments VII and VIII with a single anterior row of stout spines. Tabulation of spines shown in Table 3.

Cremaster of tenth segment consisting of a single pair of large stout hooks curved cephalad.

FEMALE PUPA (Figure 124).—Reddish brown in color; length 7–8 mm. Pupal antennae, eyes, maxillae, and legs vestigial, reduced to minute, unsegmented pads; wings absent. Abdominal segments III–VI usually with a dorsal anterior row of stout spines (though reduced and occasionally absent on III) directed caudad and a posterior row of slender spines directed cephalad; segment VIII with a single anterior row of stout spines. Tabulation of spines shown in Table 4.

Cremaster of segment X relatively reduced, consisting of two small stout spines directed ventrad. Anal grooves prominent, Y- to T- shaped with posterior arms widely divergent.

HOLOTYPE.—Trinidad: Carapachaima: ♂ (with associated larval case and pupal exuvium), reared from larva coll. Nov. 1972 by R. Cruttwell, holotype USNM 72081; in the National Museum of Natural History, Smithsonian Institution.

PARATYPES.—Panama: Changuinola: 3 ♂, June 1965, coll. C. Stephens (USNM). Trinidad: Carapachaima: 1 ♂, reared from pupa coll. July 1972 by R. Cruttwell; 4 ♂, reared from larvae coll. Nov. 1972 by R. Cruttwell; ♂, emerged 22 Nov. 1972, coll. R. Cruttwell; 6 ♂, reared from larvae coll. Dec. 1972 by R. Cruttwell (USNM); 1 ♂, same data (BMNH); 2 ♂, reared Dec. 1972, coll. R. Cruttwell (USNM); 2 ♂, reared from larva coll. Jan. 1973 by R. Cruttwell (USNM); 2 ♂, same data (CIBC); Curepe: 1 ♂, 1 ♀, reared Feb. 1971, coll. R. Cruttwell; 1 ♀, reared 2 Oct. 1971, coll. R. Cruttwell, 1 ♀ reared Jan. 1972, coll. R. Cruttwell (USNM). Described from a total of 27 males, 3 females, 6 larvae, and over 100 larval cases (several with associated pupal exuviae).

HOSTS.—Foliose lichens on the bark of various trees (e.g., *Citrus* sp., *Persea gratissima* L., *Psidium* sp., *Erythrina* sp., *Roystonea regia* (H. B. K.) O. F. Cook) (Cruttwell, in press).

DISTRIBUTION.—Although presently known only from Panama and Trinidad, this species probably ranges widely over much of northern South America, extending perhaps into Brazil. In Trinidad, its distribution seems to be somewhat restricted because of the larva's apparent preference for foliose lichens as a food plant.

DISCUSSION.—Because of numerous similarities, particularly with regard to the genitalia, this species may be confused with *N. aphaidropa*. Adult males of the two species may be readily distinguished, however, by the smaller size of *N. cruttwelli* and the absence of the pterostigma. The venation, although somewhat variable in both species, may also be used in separating the two, especially with regard to the relative degree of association of Sc and Rs in the hindwing. In *N. cruttwelli,* the radial sector vein never fuses with Sc (as it does for a short distance in *N. aphaidropa)* but is only remotely connected by a distinct crossvein.

Due to the lack of representative material from a greater number of populations, it is not possible to comment to any extent on the variation of this species. The few adults examined from two widely disjunct populations (i.e., Panama and Trinidad) display relatively few discrepancies. The principal difference observed involved the degree of fusion of the radial veins in the forewing. The three adults from Trinidad all showed R5 stalked to R3 and 4; in the three from Panama, R5 was separate. The relative fusion of M2 and 3 of the hindwing appears to be a variable character within the Panamanian specimens, with M2 and 3 sometimes connate.

The wing structure of this species, particularly the venation of the Panamanian specimens, demonstrates the close affinities of this genus to *Cryptothelea*. It seems more accurate, however, to maintain a distinction between the two, with *Naevipenna* being characterized by the presence of an epiphysis and broader valvae in the male

The most conspicuous difference between this genitalia.

species and *N. aphaidropa* may be observed in the larvae. The abdominal integument of *N. cruttwelli* is mostly whitish with a brownish middorsal, longitudinal band; that of *N. aphaidropa* is uniformly dark fuscous to nearly black. Again as in the other stages the mature larvae of *N. aphaidropa* is significantly larger.

The pupae of this species, in addition to being considerably smaller, differs from *N. aphaidropa* in the dorsal chaetotaxy of the abdomen in both sexes. In the males, *N. cruttwelli* lacks the posterior row on the seventh segment, which is present in *N. aphaidropa*; similarly, the female pupae lack the posterior row on the second segment and the anterior row on the eighth segments, both of which are present in *N. aphaidropa*.

I have chosen to name this species after Miss Rachel Cruttwell, in recognition of the thorough biological investigation she has conducted on the Psychidae of Trinidad. Her diligent work has added substantially to our knowledge of the Neotropical psychid fauna.

Cryptothelea Duncan

Cryptothelea surinamensis (Moeschler)

FIGURES 11, 28–29, 47, 86, 97, 101–102, 108, 117, 125, 133, 169–175, 192

Psyche surinamensis Moeschler, 1878:669.
Cryptothelea surinamensis (Moeschler).—Davis, 1964:51.

Although originally described from Surinam and previously collected in Guyana and Venezuela, as well as a few other Latin American countries, *Cryptothelea surinamensis* had never been reported from Trinidad. As suspected, the species is rather common on the island and has been collected and reared by Miss Cruttwell. The larvae reportedly (Cruttwell, in press) restrict their feeding habits to lichens when young (until they are about 12 mm long) and then commence to feed on a wide variety of broadleaved plants listed below.

The adult female, larvae, and pupae were previously unknown and are described here for the first time. The thoracic legs of the adult female are greatly reduced, as they are in all higher Psychidae, but are interesting in being more developed than in any of the species with vermiform females I have examined to date. Occasionally a minute, budlike second segment is detectable. The female genitalia are rather similar to those of three species of *Cryptothela* described previously (Davis, 1964) but possess a slightly more lengthened ductus seminalis. The larval cases agree with those previously known for this species but represent larger individuals that measure up to 34 mm in length. The larvae may be recognized by the very dark, almost black color of the abdominal integument and by the mostly undarkened adfrontal sclerite. The male pupa is perhaps best characterized by the slender, spinelike cremaster, which is directed sharply forward. The absence of the anterior row of dorsal spines on all abdominal segments except the sixth and seventh should identify the female pupa.

FEMALE.—Length 11–14 mm. Vermiform, without antennae, mouthparts, or wings; thoracic legs reduced but with one usually well-defined, ovoid segment, and sometimes a minute trace of a second; tarsal claws absent. Dorsum of thorax and head lightly sclerotized, brownish, sparsely setose; remainder of body whitish, membranous, and largely naked except for dense tuft of dark brown hairs encircling seventh abdominal segment.

Genitalia (Figure 86): Ovipositor reduced, both anterior and posterior apophyses relatively well developed and distinct; posterior apophyses rodlike and mostly free; anterior apophyses more broad with only anterior one-third of shaft free from integumental membrane. Bursa copulatrix relatively large, its volume more than twice that of spermatheca. Ductus seminalis short, approximately equalling the spermatheca in length.

LARVA (Figures 133, 169–175)—Length of largest larva 14 mm.

Head: Light tan, heavily marked with dark fuscous; a large, often three branched, serrated band of fuscous extending laterally posterior to fifth ocellus; a broad subventral band extending longitudinally posterior to O3; dorsal end of adfrontal sclerite only slightly darkened around AF2; ventral end slightly darkened along lateral margin of adfrontal sclerite; lower margin of frontal sclerite with a deeply excavated fuscous band. Six ocelli present, five arranged in a curved line and the sixth situated more distant ventrally. O2 located midway between fifth and sixth ocelli; O3 poste-

rior to sixth ocellus. P2 absent. AFa approximate to AF2. Mandibles with four to five acute teeth; fourth tooth blunt.

Thorax: Pronotum light tan to whitish, heavily marked with numerous, irregular, fuscous spots; no distinct banding evident. Meso- and metonota less heavily spotted but with a definite dorsal band distinct and extending from SD1 and SD2. L2 on a separate but closely approximate pinnaculum to L1 and L3.

Abdomen: Integument darkly pigmented, nearly black, with pale brownish pinnacula distinctly outlined. D1 and 2 on separate pinnacula except on segment VIII where they are situated together on a large dorsal plate, which also bears corresponding setae on other side. Ninth segment with D2 and SD1 on same pinnacula. SD2 minute, sometimes situated at lower margin of pinnacula bearing SD1 and usually dorso-anterior to spiracle. Segment IX with L1, L2, and L3 all separate. SV2 absent from both segments I and II. Segments III–VI with subventral series all borne on same pinnacula as crochets and separate from VI. Abdominal prolegs with 16–17 crochets in a lateral penellipse; anal pair with 19–20 crochets in a nearly closed circle. Cephalic margin of anal shield very irregular but not deeply emarginate.

MALE PUPA (Figures 97, 101, 102, 108, 117).—Dark chestnut brown in color; length 10.5–11.5 mm. Frontal ridge reduced, with a single, well-defined tooth. Antennal sheaths extending almost to or surpassing caudal end of mesothoracic legs. Wing sheaths extending to middle of third abdominal segment. Abdominal segments I–IV without anterior transverse rows of dorsal spines, though sometimes with 1–3 rudimentary spines on IV; segments V–VIII always with anterior row of stout spines directed caudad; posterior row of slender dorsal spines absent on segments I, II, and VI–VIII, but present on III–V. Tabulation of spines as in Table 3.

Cremaster of segment X consisting of a pair of relatively slender spines sharply directed cephalad.

FEMALE PUPA (Figure 125).—Dark chestnut to dark reddish brown in color; intersegmental membranes of segments II–VI black; length 12–15 mm. Sheaths for antennae, maxillae, eyes, and legs vestigial; wings absent. Anterior row of stout, caudally oriented, dorsal spines present only on abdominal segments VI–VIII; posterior row of slender, dorsal spines present only on segments II–V. Tabulation of spines shown in Table 4.

Cremaster of tenth segment reduced, consisting of a pair of small, widely spaced spines. Anal groove very distinct, Y-shaped.

HOSTS.—"Lichens; Anacardiaceae: *Mangifera indica* L.; Fabaceae: *Cassia* sp.; Lauraceae: *Persea gratissima* Guertn.; Malvaceae: *Hibiscus* sp.; Rosaceae: *Rosa* sp.; Rubiaceae: *Ixora* sp.; Rutaceae: *Citrus* sp.; Sterculiaceae: *Theobroma cacao* L." (Cruttwell, in press); "?cordinia" (Davis, 1964).

WEST INDIAN DISTRIBUTION.—Trinidad: Curepe: ♀, Jan.; 1 ♂, 2 ♀, reared Feb.; 2 ♂, Apr. (at light), 1 ♂, reared June; 2 ♂, reared July; 1 ♂, reared Aug.; 1 ♂, reared Oct.; 2 ♂, Oct. (at light); 4 ♂, 3 ♀, reared Dec.; 3 ♂, Dec. (at light) (USNM).

Cryptothelea watsoni (Jones)

FIGURES 12, 48, 80–81, 92, 195

Psyche watsoni Jones, 1923:101.
Cryptothelea watsoni (Jones).—Davis, 1964:52

Previously this species was known only from its type-locality, Aux Cayes, Fort Ilet District, Haiti. Specimens, believed to be conspecific, are now known from St. John and Virgin Gorda in the Virgin Islands and Puerto Rico, respectively. The four males are slightly larger with somewhat more robust genitalia (Figure 81) than typical *C. watsoni*, but agree with the latter in antennal structure and form of wing scales. The wing expanse of the two males from St. John measure 22.5 mm and that from Virgin Gorda 27 mm.

The specimens from Virgin Gorda were found associated with two different plants. Larvae were actually observed by J. F. Gates Clarke feeding on *Schaefferia frutescens* and not on *Randia aculeata*. Because most of the larval cases were collected attached to the latter, however, this plant too is probably a natural host. Three larval cases examined from Puerto Rico resemble the stick cases from Prickly Pear Island; thus representing perhaps, the first record of *C. watsoni* from Puerto Rico. The cases were collected on *Casuarina equisetifolia* along with several questionably associated larvae. Since the cases all bear fragmentary pupal remains, the larvae cannot be from these cases. Until adults are reared from this population, precise identification will remain in doubt.

The immature stages of this species were described by Jones (1923). Likewise, the larval case has been described and illustrated (Jones, 1923; Davis, 1964), but because the form of the cases from Virgin Gorda differ superficially from that previously known, Figure 195 is presented herein.

HOSTS.—"Polygonaceae: *Coccoloba* sp. (sea grape)" (Jones, 1945). "Celastraceae: *Schaefferia frutescens* Jacq.; Rubiaceae: *Randia aculeata* Linn." (J. Gates Clarke, pers. comm.).

WEST INDIAN RECORDS.—Haiti: Aux Cayes, Fort Ilet District: ♂ (holotype), 10 Aug. (AMNM), ♂, 24 June; ♂, 7 Aug.; ♀, 8 larval cases (USNM). Puerto Rico: Mona Island: 3 larval cases, Aug. (UPR). San Juan, Isla Verde: ♂, 16 Mar., 2 larval cases, 6 Aug. (UPR) 1 larval case, same data (USNM). Virgin Islands: Prickly Pear Island, Virgin Gorda: ♂ emerged 10 Apr.; 6 larval cases, Apr. (USNM). St. John: 2 ♂, 7–11 July (USNM).

Cryptothelea macleayi (Guilding)

Oiketicus macleayi Guilding, 1827:375.
Cryptothelea macleayi (Guilding).—Davis, 1964:53.

The sole extant specimen upon which this species is believed based was referred to as the "holotype" in my 1964 revision. However, because no type-selection was ever made, a formal lectotype designation is necessary. The rather involved reasons for recognizing this specimen as a syntype are discussed in my revision, and in other references there referred to, and need not be repeated here. Suffice it to say that this specimen appears to be the only surviving specimen of this species (or of any psychid in the Guilding collection), and that it completely agrees with the very superficial original description. Unfortunately, no additional material agreeing with this specimen and species has been collected thus far from its type-locality, "India Occidentalis." As discussed in my earlier revision (1964:123), St. Vincent of the Lesser Antilles is suspected as being the origin of *C. macleayi*. Because this suspicion has never been verified, a query has been indicated in the appropriate place in Table 1.

LECTOTYPE.—♂ (present designation), bearing the following seven labels: (1) a small round, brown label: "7 $\frac{39}{113}$ 17"; (2) a white rectangular label: "det. W. H. T. Tams, *Cryptothelea macleayi* L. G., Type ♂, det. W. H. T. Tams"; (3) a green rectangular label: "*macleayi*, 26"; (4) a white rectangular label: "Psychid wing, legs, ant. and genitalia, slide nos. 39 and 40"; (5) a white rectangular label: "Slide 229, D. R. Davis"; (6) a white rectangular label: "♂ genitalia, Slide 280, D. R. Davis"; (7) a white, red-bordered label: "Lectotype; *Oiketicus macleayi* Guild., by D. Davis 1973."

Cryptothelea hoffmanni (Koehler), new combination

FIGURE 198

Platoeceticus hoffmanni Koehler, 1939:41.
"Platoeceticus" hoffmanni Koehler.—Davis, 1964:153.

This species was described from two larval cases and a single female pupal case collected in Havana, Cuba. No additional material has been collected subsequently. Because the larval cases are not diagnostic for this species (e.g., they could pertain to any one of several species of *Cryptothelea*), I have reexamined the fragmentary pupal remains in an attempt to discover any possible diagnostic feature for this insect. Koehler's pupal description included only a few general remarks on the pygidial structure and completely ignored the much more important characteristics of the dorsal abdominal spines. A more complete description of the pupa follows.

FEMALE PUPA.—Length approximately 10 mm; uniformly light chestnut brown in color. Sheaths for antennae, eyes, maxillae, and legs vestigial, indistinct; wings absent. Anterior row of dorsal abdominal spines absent from all segments. A single posterior row of dorsal spines present only on abdominal segments v–viii; spines very reduced and widely spaced on segment v. Tabulation of spines as summarized in Table 4.

Cremaster reduced, consisting of a small pair of widely separated stout spines; spines directed ventrad. Y-shaped anal groove prominent; entire ventral area of segment x relatively smooth except for a pair of low and widely separated tubercules on either side of anal groove and a smaller, more adjacent pair near anterior end of groove.

DISCUSSION.—The most unique diagnostic feature in the female pupa of this species is the absence of the anterior rows of dorsal spines. A faint indication of these spines may be present on the eighth abdominal segment in the form of scattered series of 20–25 minute, black-tipped spinules, barely visible under ×100 magnification. The reduction of the transverse dorsal spines is another indication, along with the superficial resemblance in larval cases, of *Cryptothelea hoffmanni*'s relationship to the other members of *Cryptothelea*. The other female pupae examined in this genus, however, normally possess anterior spines on at least two or three abdominal segments (VI–VIII). Jones (1945:118) noted up to four rows of anterior spines in the female pupae of the four species of *Cryptothelea* he studied, with the first row sometimes situated as far forward as segment III.

Because a type-selection was never made, the female pupa, with its associated larval case, has been designated lectotype (Figure 198).

LECTOTYPE.—♀ pupa (with associated larval case) bearing the following nine labels: (1) "W. H. Hoffman, Havana 192"; (2) "Dtsch. Entomol. Institut Berlin"; (3) "cotipus"; (4) "pupa ♀ slide 2931, D. R. Davis"; (5) "Lectotype, *Platoeceticus hoffmanni* Köh., by D. Davis 1974"; (6) "Photo, D. R. Davis"; (7) "5 En aquadades de lagra cas en los montes"; (8) "5 in der Berge an Filsen anze heptet"; (9) "*Platoeceticus hoffmanni* Khlr., det Koehler." In the Insitut für Pflanzenschutzforschung Kleinmachow.

Lumacra Davis

Lumacra haitiensis Davis

FIGURES 13, 46

Lumacra haitiensis Davis, 1964:67.

This species is still represented only by the holotype (Figure 13), which was collected 19–28 Feb. 1922, at Port-au-Prince, Haiti, at an elevation of about 91.5m (300 ft). Nothing is known of its biology or immature stages. Of the six described species of *Lumacra* it is the only one reported from the West Indies.

Biopsyche Dyar

Biospsyche apicalis (Hampson)

FIGURES 14, 49

Thanatopsyche apicalis Hampson, 1904:180.
Biopsyche apicalis (Hampson).—Davis, 1964:100.

Biopsyche apicalis is known from only two islands in the Bahaman chain, Abaco and Bimini. Although the species approaches closely to Florida, it has never been collected in the United States. Nothing is known concerning its biology or immature stages.

Hampson described the species from three male "types" without officially designating a holotype. Two of the syntypes are currently deposited in the British Museum (Natural History) and the third is in the National Museum of Natural History, Smithsonian Institution. The better specimen of the two syntypes in the British Museum has been selected as lectotype and is illustrated in Figure 14.

LECTOTYPE.—♂, bearing the following four labels: (1) "Type"; (2) "Bahamas. Abaco, J. L. Bonhote 1902–278"; (3) "Lectotype ♂, *Thanatopsyche apicalis* Hmpn., by D. Davis 1974"; (4) "*Thanatopsyche apicalis*, type ♂ Hmpsn."

WEST INDIAN DISTRIBUTION.—Bahamas: Specific locality unknown: 1 ♂, paralectotype, J. L. Bonhote, 1903–224 (BMNH); 1 ♂, paralectotype, J. L. Bonhote, 1903–224 (USNM). Abaco: 1 ♂, lectotype, 1902–278 (BMNH). Bimini: 1 ♂, (CM).

Biopsyche thoracica (Grote)

FIGURES 15, 32, 33, 50, 199

Hymenopsyche thoracicum Grote, 1865:249.
Biopsyche thoracica (Grote).—Davis, 1964:99.

This species is known only from Cuba, where the larva supposedly feeds on *Casuarina equisetifolia* and undoubtedly other plants. The structure of the larval case appears to be characteristic in that numerous, short twigs are applied in a somewhat spiral arrangement from the anterior end caudally (Figure 199). The larvae and pupae are unknown.

Biopsyche thoracica was originally described from two specimens without a type-selection, although a holotype was erroneously reported in my

1964 revision (p. 99). A recent attempt to re-examine both specimens, formerly deposited in the Academy of Natural Sciences at Philadelphia, has proved futile because the specimens cannot now be located. Consequently, the proper selection of a lectotype for this species will have to await the hopeful reappearance of the syntypic material.

HOST.—"Casuarinaceae: *Casuarina equisetifolia* Blanco" (Davis, 1964:99).

DISTRIBUTION.—Cuba: Specific locality unknown: 2 ♂ (syntypes), (ANS); 2 ♂, 2 cases (USNM). Havana: 1 ♂, 15–18 July; 1 ♂, 22 cases (DEI); 1 ♂, 12 Apr. (USNM). Vista Alegra: 2 cases, 19 Sep. (USNM).

Oiketicus Guilding

Oiketicus kirbyi Guilding

FIGURES 17, 34, 35, 51, 98, 103, 104, 111, 118, 126, 176–182, 201–203

Oiketicus kirbyi Guilding, 1827:374.—Davis, 1964:120.

As I had reported previously (Davis, 1964:124) only 14 males of this common, widespread, Neotropical species were known from the entire West Indies. Unfortunately, the situation has not improved greatly. Examples, however, have been collected from Dominica as a result of the Bredin-Archbold-Smithsonian Biological Survey of that island, and a good series of all stages has been recently collected in Trinidad by Miss Cruttwell. The specimens from Dominica and Trinidad represent the very dark phase of this species, and thus closely resemble Guilding's original illustration of the lost type. A neotype designation should be proposed whenever good material is acquired from the supposed type-locality of St. Vincent.

In a paper currently in press, Cruttwell reports on this insect several biological observations that had not been noted previously. She observed that the egg viability in the Trinidad population of *O. kirbyi* usually approached 100 percent, and from one egg mass 9802 larvae actually emerged. Basing her calculations on average body weights, Cruttwell estimated that approximately 13,000 eggs were laid by the largest female, a number considerably higher than the 6756 counted by Stephen (1962) in Costa Rica. Although this is an extremely high production, it is not the highest reported for Lepidoptera, as believed by Cruttwell. An Australian hepialid moth, *Abantiades magnificus* (Lucas), reputedly lays more than 18,000 eggs (Common, 1970:791).

Cruttwell also observed that the stage in which the outer covering of silk is applied to the larval case is quite variable, thus explaining, perhaps, the superficial variation often observed in these cases. Usually, when the case attains 30–40 mm in length, the larva begins to cover the exterior with a thin layer of silk, which sometimes, is not added until the case is 70 mm long, but is usually completed before pupation. If the external silk layer is completed relatively early, then it may become partially destroyed or even rubbed off prior to pupation.

The adult male head of *Oiketicus kirbyi* is interesting in possessing a greatly reduced but relatively elongate, one segmented labial palpus (Figure 35). The palpi appear to be nonarticulated and slightly fused at their base. Lateral to the labium are the minute remnants of the maxillae. The tiny, 1-segmented buds probably represent the maxillary palpi. The mandibles are completely absent. The eyes are relatively small, their diameter being approximately 0.9 the interocular distance.

Because the larvae and pupae of this species have never been accurately described, a rather detailed diagnoses of those stages has been provided.

LARVA (Figures 176–182).—Length of largest larva 45 mm.

Head: Light tan, heavily marked with dark fuscous. Adfrontal sclerite with ventral half fuscous and a large spot at AF2; a large triangular spot at both ventral angles of frons, with a paler connecting band along clypeal margin; lateral area of head with a variable and irregular set of 3–5 striae; first four ocelli surrounded by dark fuscous; median adfrontal suture bordered by highly irregular margins. Six ocelli present; five arranged in an L-shaped series; the sixth situated more distant and ventrad. A1 remote and dorsad of third ocellus. Both O2 and O3 posterior to fifth and sixth ocelli; P2 absent; AFa approximate to AF2. Mandibles with 4–5 blunt teeth; fifth tooth often acute.

Thorax: Pronotum light tan with numerous, irregular patches of dark fuscous; largest patch extending from SD2 to spiracle; dorsal patch not bandlike, interrupted at middle; meso- and meta-

thorax with dorsal and subdorsal bands more distinct. L2 of mesothorax separated from pinnaculum bearing L1 and 3.

Abdomen: Integument fuscous, distinctly darker than brownish pinnacula. D1 and D2 on small, separated pinnacula on segments I–VIII; SD2 minute, usually separate from pinnacula bearing SD1 and anterior to spiracle. Ninth segment with D1, D2, and SD1 usually together on same pinnaculum; L1 and L2 on same pinnacula; SV2 absent from segment I but present with seta VI on segment II. Segments III–VI with subventral series all located on same pinnacula bearing crochets and separate from VI. Prolegs III–VI with 23–26 crochets; anal prolegs with 22–25 crochets. Anal shield with cephalic margin slightly irregular but not deeply clefted.

MALE PUPA (Figures 98, 103, 104, 111, 118).—Very dark reddish brown, nearly black; abdominal intersegmental membranes distinctly lighter in color, chestnut brown; length 22–25 mm. Frontal ridge moderately raised, with a single well-defined tooth (Figure 98). Antennal sheaths extending usually to or slightly beyond prothoracic legs. Wing sheaths extending usually to middle of third abdominal segment. Abdominal segments I and II without anterior transverse row of stout spines; III–VIII with anterior row, but spines reduced and indistinct on segments III–V; abdominal segments I, VI–VIII without posterior transverse row of slender spines, although present on II–V. Tabulation of spines shown in Table 3.

Cremaster (Figure 118) of segment X consisting of a single pair of large, stout, slightly curved spines; a prominent pair of tubercules immediately posterior to anal scar, and an even larger pair (anal pads) anterior.

FEMALE PUPA (Figure 126).—Dark reddish brown; intersegmental membrane approximately same color; length 33–36 mm. Sheaths for antennae, maxillae, eyes, and legs vestigial; wings absent. Abdominal segments I, II, and VII without anterior transverse row of stout spines; anterior row present on III–VII but greatly reduced on segment III; transverse posterior row of slender spines present on segments II–V only; spines of segment II unusually large and stout; posterior spines of III and IV reduced in size; those of V elongate but slender. Tabulation of abdominal spines listed in Table 4.

Cremaster (Figure 126) reduced, without paired spines; a pair of large, irregular pads situated on either side of anal groove; surface of pads very coarse and rough.

HOSTS.—New records not previously mentioned in the literature are: "Araceae: *Philodendron* sp." (from specimen label). "Fabaceae: *Bauhinia* sp., *Mimosa pudica* L.; Meliaceae: *Swietenia macrophylla* King; Myrtaceae: *Psidium guajava* L.; Rosaceae: *Rosa* sp.; Rubiaceae: *Coffea* sp.; Rutaceae: *Citrus* sp.; Sterculiaceae: *Theobroma cacao* L.; Verbenaceae: *Tectona grandis* L." (R. Cruttwell, in press). "Rutaceae: *Citrus sinensis* Osbeck" (from specimen label).

WEST INDIAN DISTRIBUTION.—Antigua: Specific locality unknown: 11 cases (USNM). Boggy Peak, 183–366m (600–1200 ft): 3 larvae, 33 larval cases, 2 Apr. (USNM).

Cuba: Specific locality unknown: 2 ♂ (ANS); 1 ♂ (MNHN); 1 ♂ (ZMHU).

Dominica: 0.5 mi N of Pont Cassé, 610m (2000 ft): 4 larval cases, 13 June (USNM). South Chiltern, 1 ♂ with larval case, emerged 19 Feb. (USNM).

Jamaica: Kingston: 1 ♂, 27 Aug. (USNM). Montego Bay: 1 ♂, 24 Dec. (BMNH). Mt. Mansfield House, Gordontown: 1 ♂, 12 July (CM). Runaway: 1 ♂, 24 Feb. (BMNH). Sandy Gully, St. Catherine: 1 ♂, 27 Mar. (AMNH).

Puerto Rico: Specific locality unknown: 2 cases (ZMHU). Corozal Agricultural Experiment Station: 2 cases, Jan. (UPR). Mayaguez: 1 ♂, 14 May (USNM). Trujillo Alto: 1 case, 24 July (UPR).

St. Lucia: Specific locality unknown: 1 ♂ (BMNH).

Tobago: Specific locality unknown: 2 ♂ (BMNH).

Trinidad: Specific locality unknown: 1 ♂ (USNM). Curepe: 2 ♂, 4 and 28 Mar. (reared); 5 ♂, 1 ♀, June (reared); 3 ♂, 2 ♀, July (reared); 3 ♂, Aug. (reared); 1 ♂, Oct. (reared); 2 ♂, Nov. (at light trap); 1 ♂, Nov. (reared); 3 ♂, Dec. (reared), (USNM).

Thyridopteryx Stephens

Thyridopteryx ephemeraeformis (Haworth)

FIGURES 16, 36, 37, 52, 200

Sphinx ephemeraeformis Haworth, 1803:72.
Thyridopteryx ephemeraeformis (Haworth).—Davis, 1964:134.

The predominantly eastern North American bagworm, *Thyridopteryx ephemeraeformis,* has been reported from the West Indies (Davis, 1964), but this evidence is still based primarily upon only three male specimens from the Bahamas and Haiti. The adult illustrated in Figure 16, represents the largest form typical of southern Florida and the West Indies. As would be expected, the head of the adult male of *Thyridopteryx* (Figures 36, 37) demonstrates greatest affinities to that of *Oiketicus*. The maxillae, however, are even more reduced, and the labial palpi are shorter in length with the basal portion more strongly fused.

Seventeen larval cases, a few containing poorly preserved larvae, have been examined from Puerto Rico that may represent this species. The largest of these cases (30 mm long) are somewhat small for mature larvae of *T. ephemeraeformis,* but they do resemble cases of this species reared from *Thuja occidentalis* in the United States. The resemblance, however, may be due simply to the fact that the Puerto Rican larvae were collected from a related host, *Thuja orientalis*. Hopefully, adults will eventually be reared from this population.

HOSTS.—Over 125 species of plants have been reported as hosts (Davis, 1964) with members of the Cupressaceae being particularly favored.

WEST INDIAN DISTRIBUTION.—Bahamas: Specific locality unknown: 1 ♂ (BM). Nassau, 1 ♂, 3 Jan. (BM). Haiti: Port-au-Prince: 1 ♂ (ZMNU). Puerto Rico: Guaynabo, Parkville: 12 larval cases (determination questionable), 18 Nov. (UPR); 5 larval cases (determination questionable), 18 Nov. (USNM).

Unidentified Species

On the following pages I have followed the procedure in my 1964 revision for several species that cannot be named at this time because of insufficient or otherwise inadequate material. Indeed, no new specific names should be proposed for these insects until the adult males have been reared and properly described. The reason for this being, that within this troublesome family it is the adult male that is the ultimate basis for both specific and generic delimitation. The purpose in mentioning these oddities is to attract the attention of future students and collectors. The numerical sequence used is a continuation of that followed previously (Davis, 1964:156–158).

Species No. 4: *Oiketicus* species

FIGURES 204, 205

This species is typified by larval cases usually 60–70 mm long that are without an external sheath of silk but are covered by closely appressed, interwoven fragments of leaves (Figures 204, 205), or, in some individuals, with more loosely attached, divergent leaves. The adults are still unknown. The larval cases most resemble those of *O. toumeyi* Jones but may represent a rather unusual variation of *O. abbotii* Grote. Several cases have been reported from Cuba (Davis, 1964:156), and one specimen of perhaps the same species has been collected in Jamaica.

HOST.—"An Mandelbaun" (from specimen label).

WEST INDIAN DISTRIBUTION.—Cuba: Havana: 11 cases (IPK); 1 case (USNM). Jamaica: St. Ann Parish: Clarement, 534 m (1750 ft): 1 case, Mar. (USNM).

Species No. 6

FIGURE 196

Larval cases of this insect were previously reported (Davis, 1964) from Haiti and were characterized as having the exterior of the bag usually covered with long, slender stems of grasses, or other plants, applied longitudinally. Frequently these plant fragments extend the entire length of the case (12–14 mm) or even beyond. As I mentioned in my earlier report, these cases most closely resemble those constructed by larvae of *Epichnopteryx* and *Psyche* (=*Fumea* and *Fumaria* auct.). The adult stage is still unknown although similar bags (Figure 196) have been collected in Trinidad by Miss Cruttwell. Her material may represent a different species, but they do fall within the same size range (11–12 mm). In her report (in press) on the bagworms of Trinidad, Miss Cruttwell states that the species was rarely encountered. All larval cases from Trinidad were collected on low growing herbs, and one was found on *Eupatorium odoratum* L.

HOST.—Asteraceae, "*Eupatorium odoratum* L." (Cruttwell, in press).

WEST INDIAN DISTRIBUTION.—Haiti: Aux Cayes: 4 larval cases, 15–18 Mar. (AMNH). Petionville, 457–915m (1500–3000 ft): 4 larval cases, 26–28 Jan. (AMNH). Trinidad: Curepe: 2 larval cases, Dec. (USNM).

Species No. 7: *Oiketicus* species

FIGURE 206

Five larval cases have been collected in Jamaica that do not resemble that of any species of *Oiketicus* known to occur in the Antilles. The larger examples bear a strong resemblance to cases of *O. geyeri*, a widespread South American species, which has never been collected in the West Indies. It is possible that these bags are simply a variant of *Oiketicus* species no. 4. Two of the cases contained fragmentary pupal remains.

LARVAL CASE (Figure 206).—Length 40–65 mm in length; greatest diameter 7–12 mm. Exterior of case typically smooth, naked, and covered with grayish white silk; sometimes with short (5–10 mm long) plant stems arranged longitudinally along length of case.

HOST.—Unknown.

WEST INDIAN DISTRIBUTION.—Jamaica: Specific locality unknown: 3 larval cases (USNM). Falmouth: 1 larval case (USNM), Rose Hill, Runaway Bay, St. Ann Parish, 274 m (900 ft): 1 larval case, 29 Apr. (USNM).

Species No. 8

FIGURE 197

Only one larval case of this unidentified species is known. It was collected in December in Curepe, Trinidad, by Miss Cruttwell. The host is not known, although judging from the construction of the larval case, the species is probably lichenivorous. The structure of the bag most resembles that of "*Clania*" *licheniphilus* or *Dendropsyche burrowsi* and may be briefly characterized as follows:

LARVAL CASE (Figure 197).—Dimensions: length, 9 mm; diameter, 2 mm. Fusiform in outline; exterior of case gray with irregular bands and patches of white; walls relatively smooth, covered with minute particles of plant material overlying a thin silken base.

Species No. 9

FIGURES 193, 194

Several moderately large larval cases have been collected in Jamaica for which no adult or immature specimens have been preserved. Most of the bags are simply labeled "Jamaica," although a more precise locality is provided for some; the latter were collected at Claremont, St. Ann Parish, in March at an elevation of 534 m (1750 ft). Pupal and larval remains are present inside some of the cases, but these are too fragmentary for description. It is possible that the bags were produced by a rather large species of *Cryptothelea*, possibly *C. watsoni*. The 30 larval cases are deposited in the collection of the National Museum of Natural History, Smithsonian Institution, and may be characterized as follows:

LARVAL CASE (Figures 193, 194).—Dimensions: length, 20–29 mm; diameter, 6–8 mm. Fusiform in shape; exterior of case dark, heavily covered with small particles of plant material and usually with a few medium (6–8 mm long) to large (10–15 mm long) sections of cut stems; stems normally applied lengthwise to case but occasionally may project out at nearly right angles. Walls of case thin and flexible.

Species No. 10: *Prochalia* species

FIGURES 4, 62

This species is represented by a single adult male (Figure 4) collected 13 August 1931 at Santiago de las Vegas, Cuba. Unfortunately, the missing abdomen makes it impossible to identify the species, although it is known to belong to the genus *Prochalia*. It agrees with that genus in all major features of the antennae, legs and wing venation (Figure 62). The radial venation of the forewings differs slightly from that figured for *Prochalia pygmaea* Jones (Davis, 1964), but these set of veins are particularly variable in this genus. As mentioned earlier, it is possible that this speci-

men may be the adult of *"Clania" licheniphilus*. The unique specimen is deposited in the National Museum of Natural History, Smithsonian Institution.

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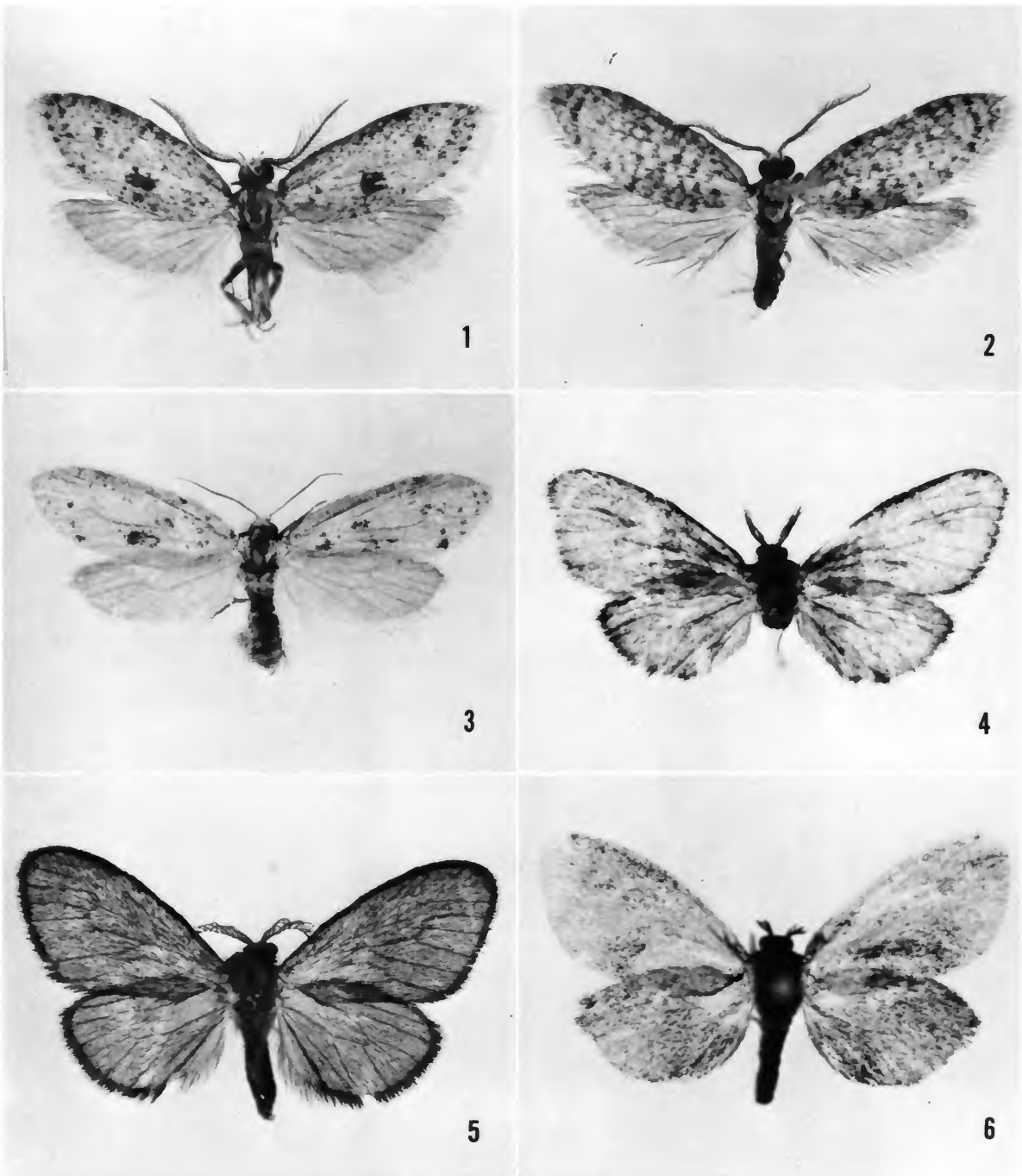
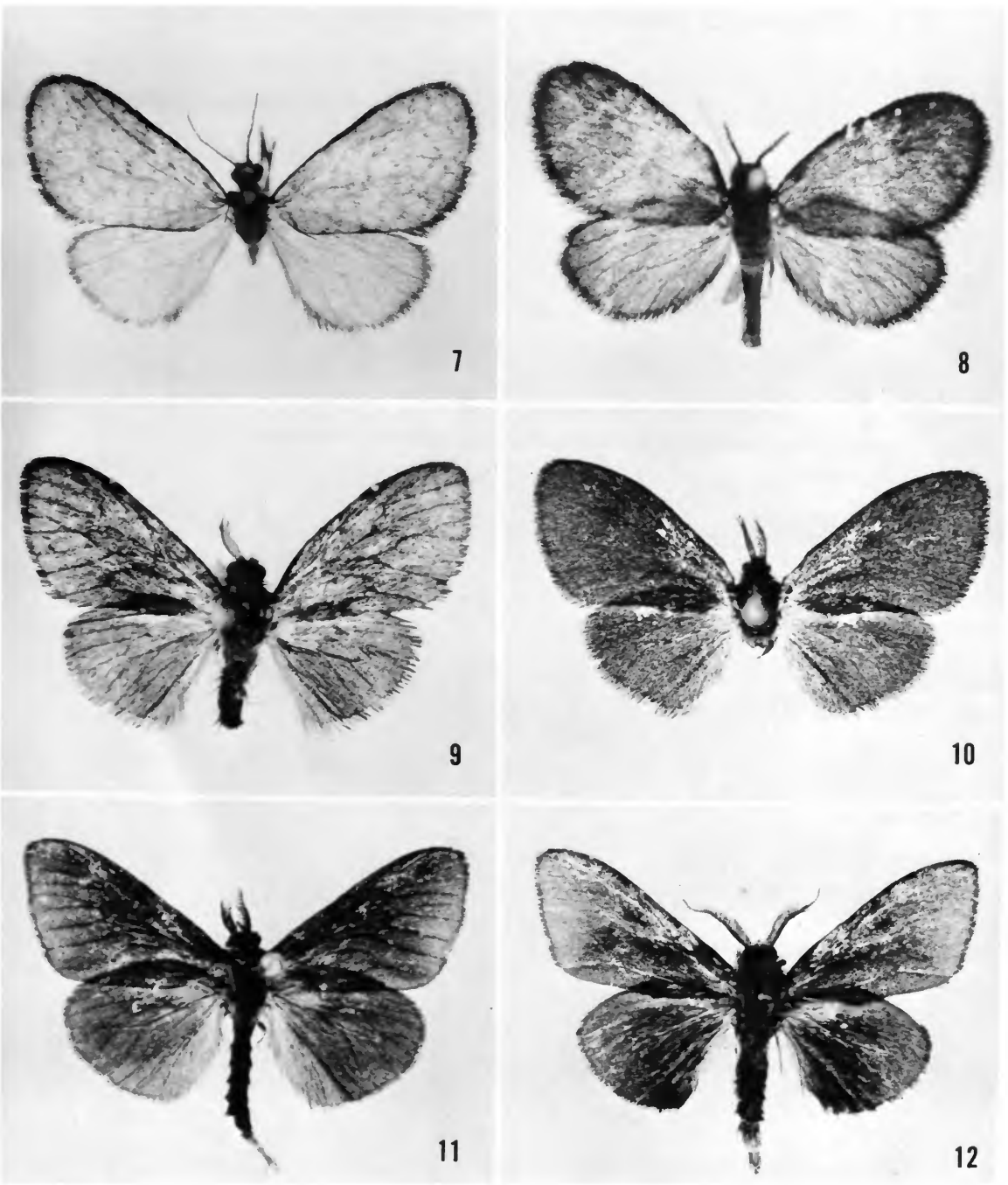
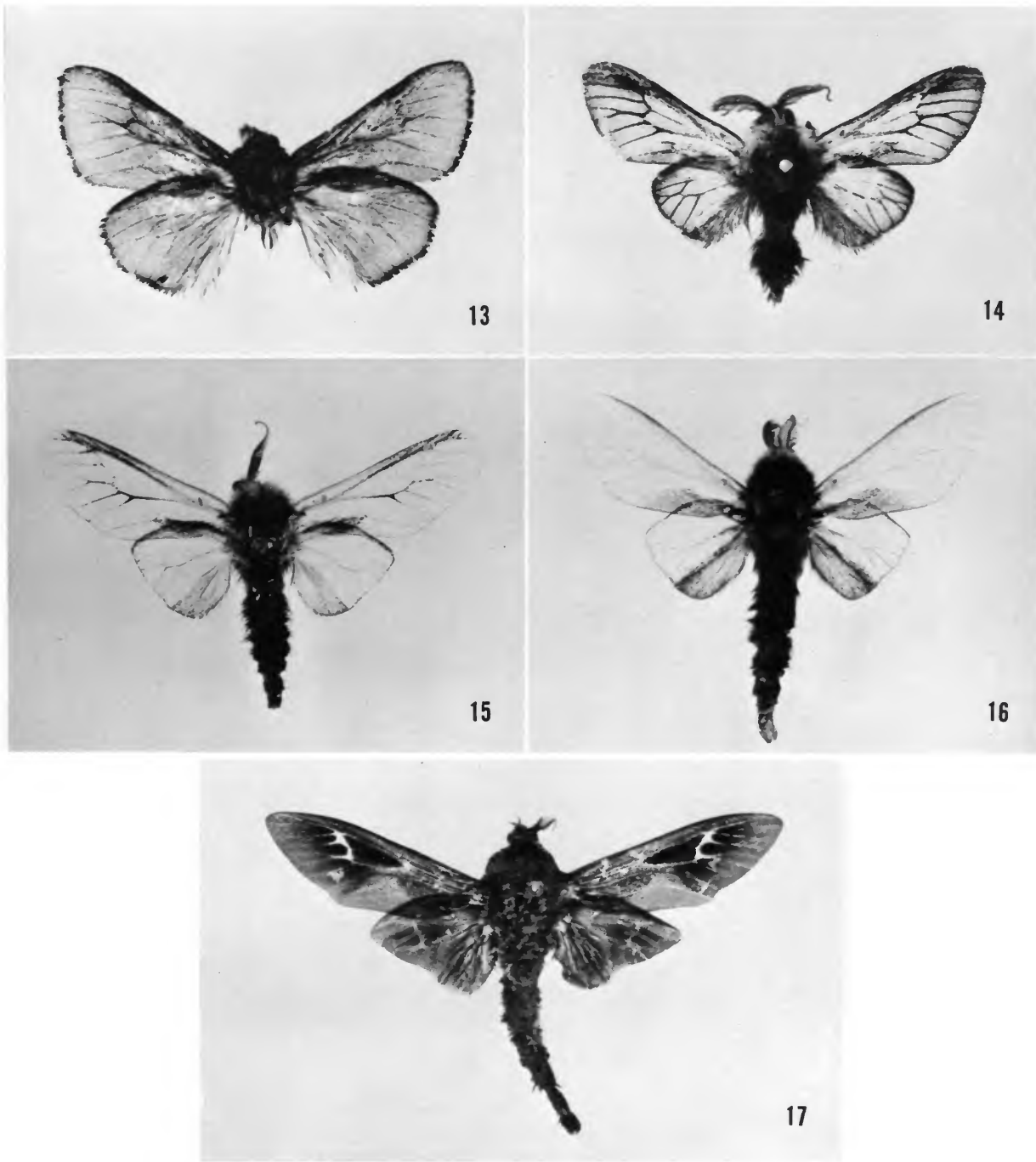


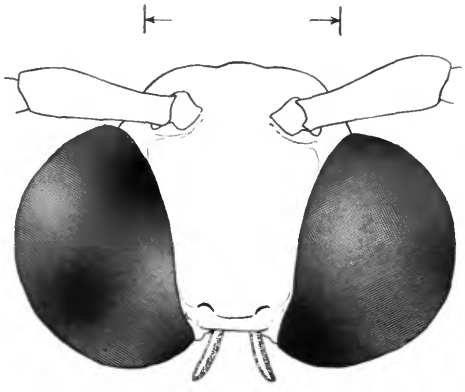
FIGURES 1–6.—Adults: 1, *Pterogyne insularis,* new species, ♂ holotype, 10 km NE Jarabacoa, Dominican Republic, wing expanse 14 mm; 2, *Pterogyne insularis,* new species, ♂ paratype, 10 km NE Jarabacoa, Dominican Republic, wing expanse 13 mm; 3, *Pterogyne insularis,* new species, ♀ paratype, Loma de Cabrera, Dominican Republic, wing expanse 18.5 mm; 4, *Prochalia* species no. 10, ♂, Santiago de las Vegas, Cuba, wing expanse 13.5 mm; 5, *Metaxypsyche trinidadensis,* new species, ♂ holotype, Curepe, Trinidad, wing expanse 11.5 mm; 6, *Paucivena hispaniolae,* new species, ♂ holotype, Loma de Cabrera, Dominican Republic, wing expanse 10 mm.



FIGURES 7–12.—Adults: 7, *Paucivena reticulata,* new species, ♂ holotype, near Maricao, Puerto Rico, wing expanse 9 mm; 8, *Paucivena reticulata,* new species, ♂ paratype, near Runaway Bay Cave, Jamaica, wing expanse 8 mm; 9, *Naevipenna aphaidropa* (Dyar), ♂, Curepe, Trinidad, wing expanse 16 mm; 10, *Naevipenna cruttwelli,* new species ♂ holotype, Carapachaima, Trinidad, wing expanse 14 mm; 11, *Cryptothelea surinamensis* (Moeschler), ♂, Curepe, Trinidad, wing expanse 24 mm; 12, *Cryptothelea watsoni* (Jones), ♂, St. John, Virgin Islands, wing expanse 23 mm.



FIGURES 13–17.—Adults: 13, *Lumacra haitiensis* Davis, ♂ holotype, Port-au-Prince, Haiti, wing expanse 22 mm; 14, *Biopsyche apicalis* (Hampson), lectotype ♂, Abaco, Bahamas, wing expanse 21 mm; 15, *Biopsyche thoracica* (Grote), ♂, Havana, Cuba, wing expanse 24 mm; 16, *Thyridopteryx ephemeraeformis* (Haworth), ♂, Florida City, Florida, wing expanse 30 mm; 17, *Oiketicus kirbyi* Guilding, ♂, Curepe, Trinidad, wing expanse 40 mm.



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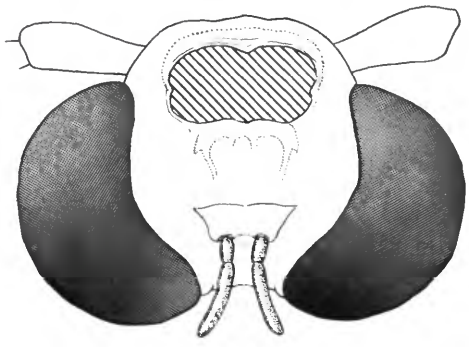

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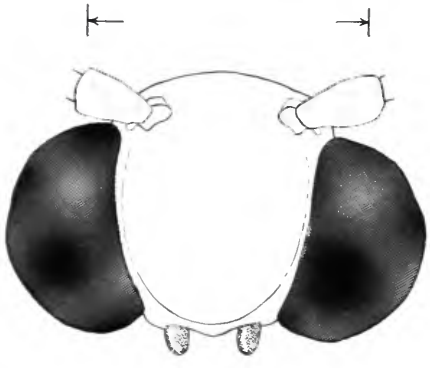

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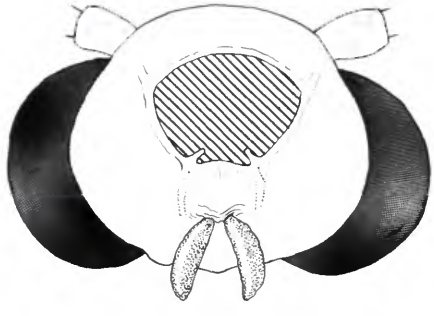

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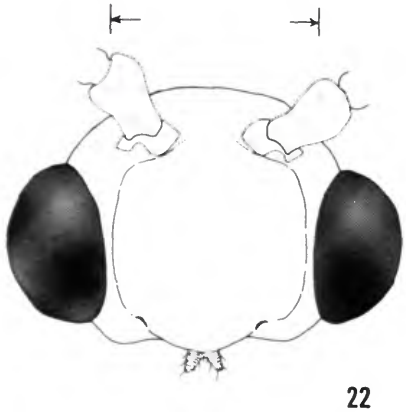

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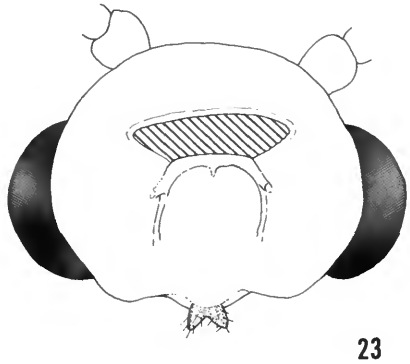

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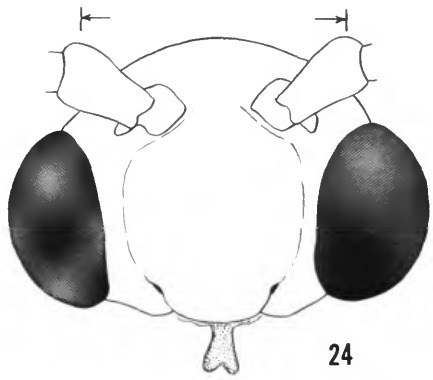
FIGURES 18–23.—Heads of adult males: 18, *Pterogyne insularis,* new species, anterior view; 19, *Pterogyne insularis,* new species, posterior view; 20, *Paucivena reticulata,* new species, anterior view; 21, *Paucivena reticulata,* new species, posterior view; 22, *Prochalia pygmaea* Barnes and McDunnough, anterior view; 23, *Prochalia pygmaea* Barnes and McDunnough, posterior view. (Scale = 0.5 mm)



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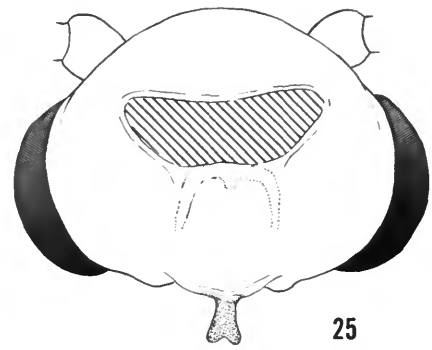

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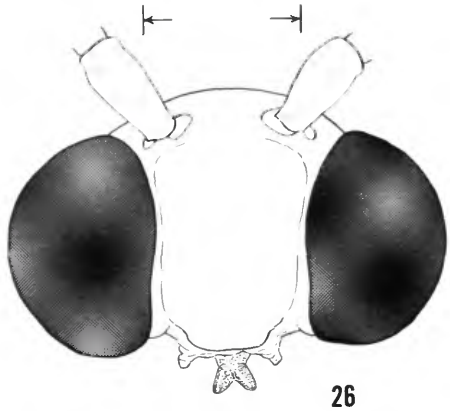

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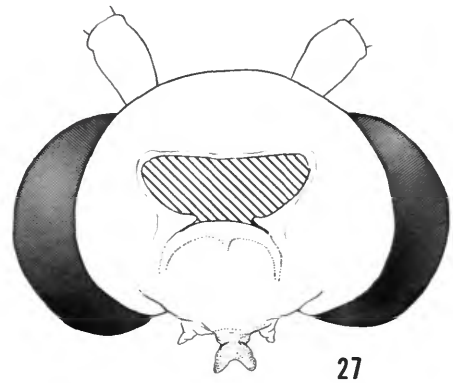

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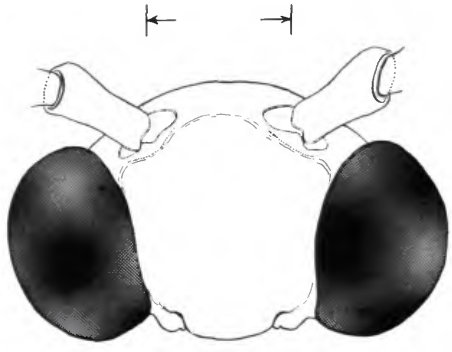

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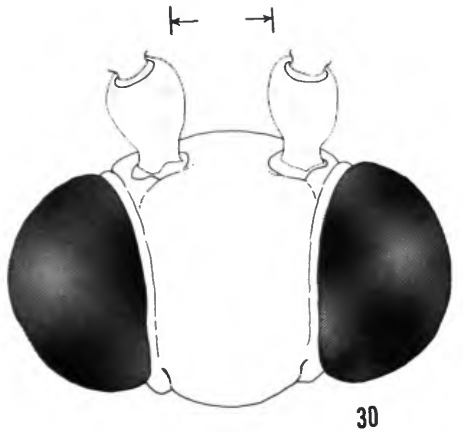
FIGURES 24–29.—Heads of adult males: 24, *Metaxypsyche trinidadensis,* new species, anterior view; 25, *Metaxypsyche trinidadensis,* new species, posterior view; 26, *Naevipenna aphaidropa* (Dyar), anterior view; 27, *Naevipenna aphaidropa* (Dyar), posterior view; 28, *Cryptothelea surinamensis* (Moeschler), anterior view; 29, *Cryptothelea surinamensis* (Moeschler), posterior view. (Scale=0.5 mm)



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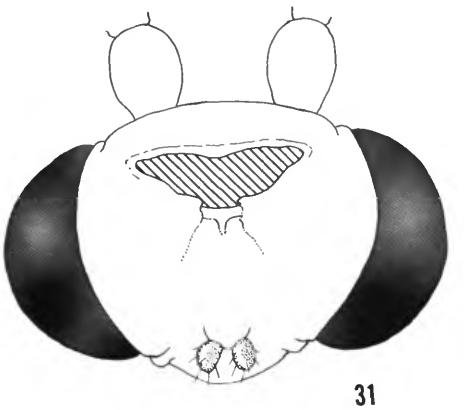

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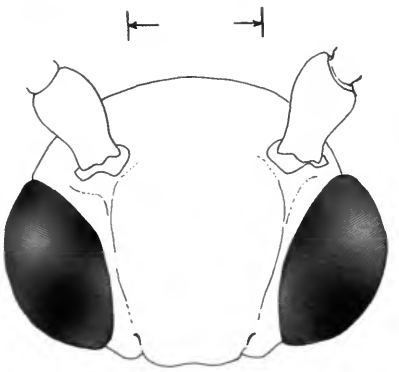

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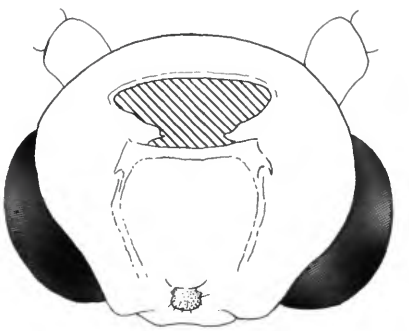

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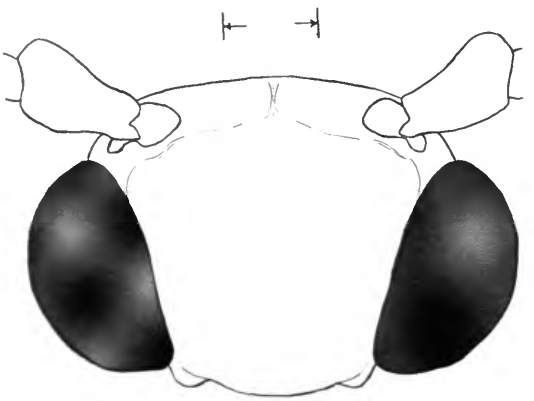

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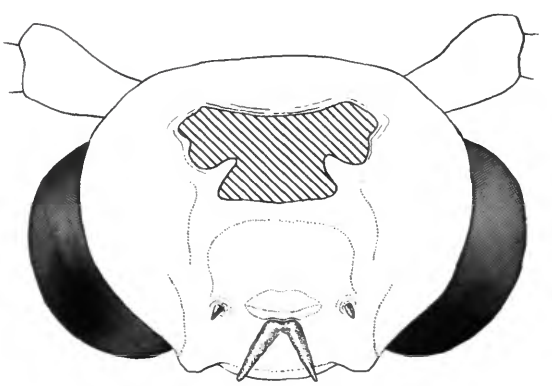

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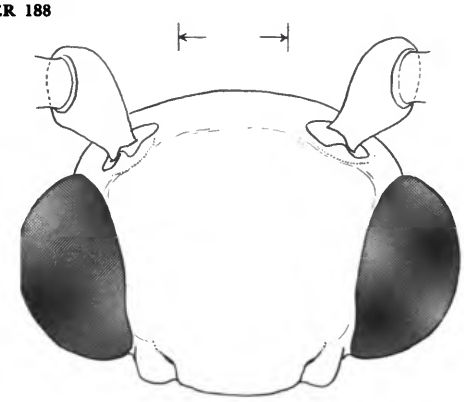
FIGURES 30–35.—Heads of adult males: 30, *Lumacra brasiliensis* (Heylaerts), anterior view; 31, *Lumacra brasiliensis* (Heylaerts), posterior view; 32, *Biopsyche thoracica* (Grote), anterior view; 33, *Biopsyche thoracica* (Grote), posterior view; 34, *Oiketicus kirbyi* Guilding, anterior view; 35, *Oiketicus kirbyi* Guilding, posterior view. (Scale=0.5 mm)



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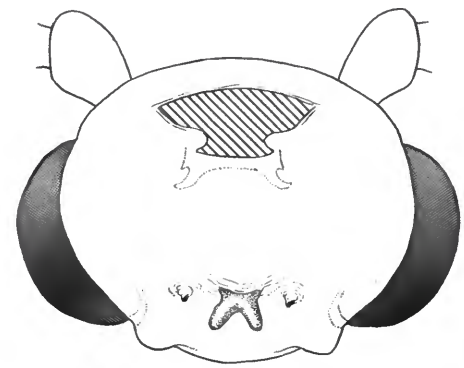

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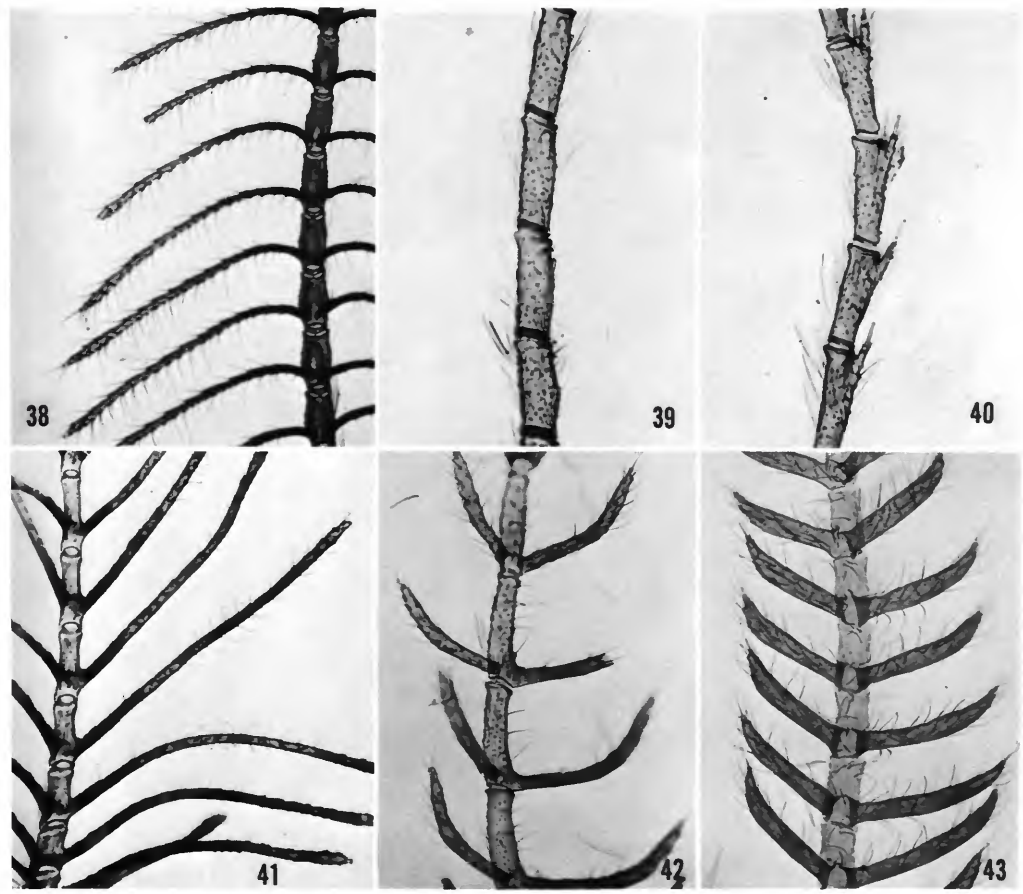
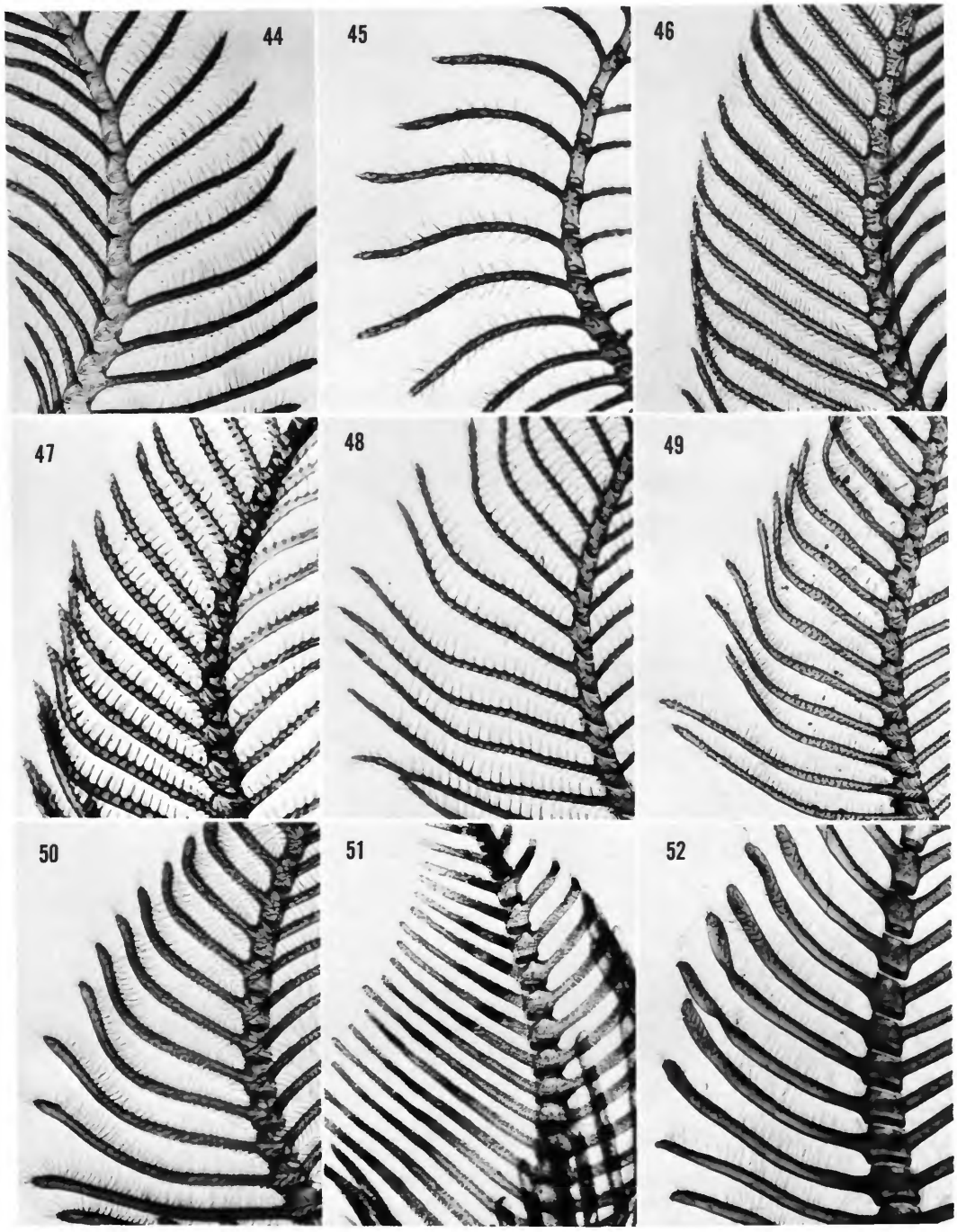
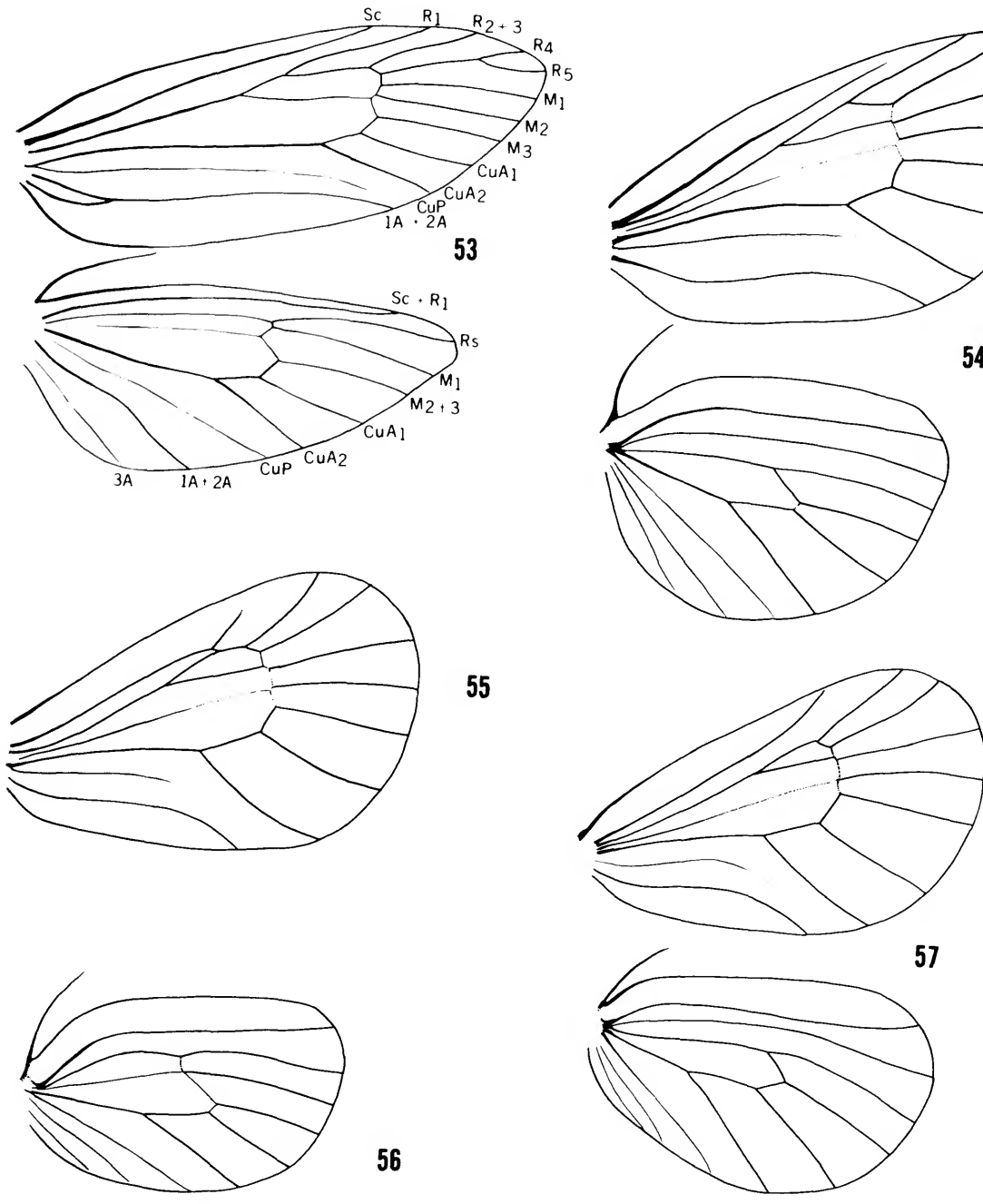


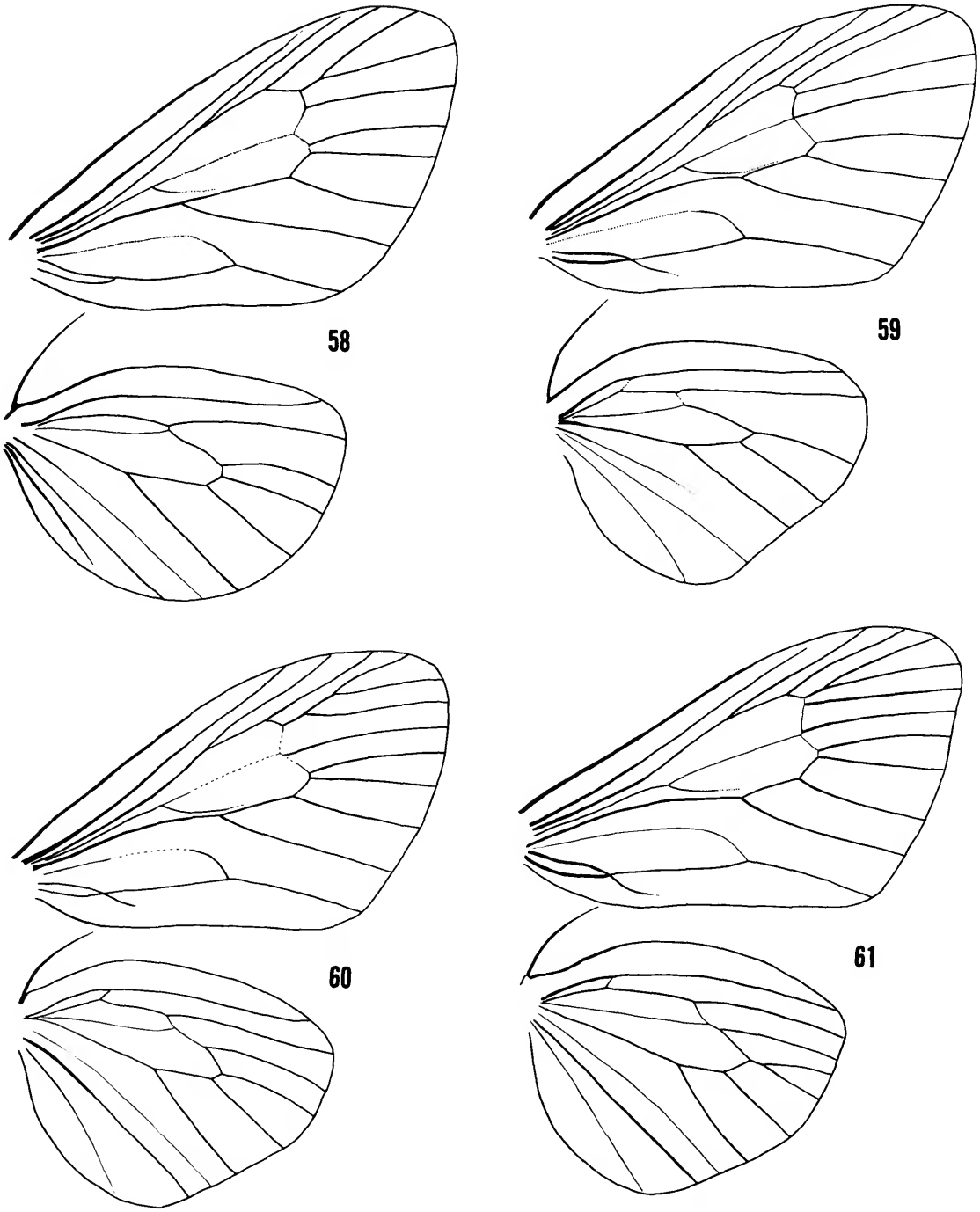
FIGURES 36–43.—Antennae and heads of adult males: 36, *Thyridopteryx ephemeraeformis* (Haworth), anterior view of male head (scale=0.5 mm); 37, *Thyridopteryx ephemeraeformis* (Haworth), posterior view of male head; 38, *Pterogyne insularis,* new species, male antenna; 39, *Pterogyne insularis,* new species, basal segments (nos. 5–8) of female antenna; 40, *Pterogyne insularis,* new species, apical segments (nos. 14–17) of female antenna; 41, *Metaxypsyche trinidadensis,* new species, male antenna; 42, *Paucivena reticulata,* new species, male antenna; 43, *Paucivena hispaniolae,* new species, male antenna.



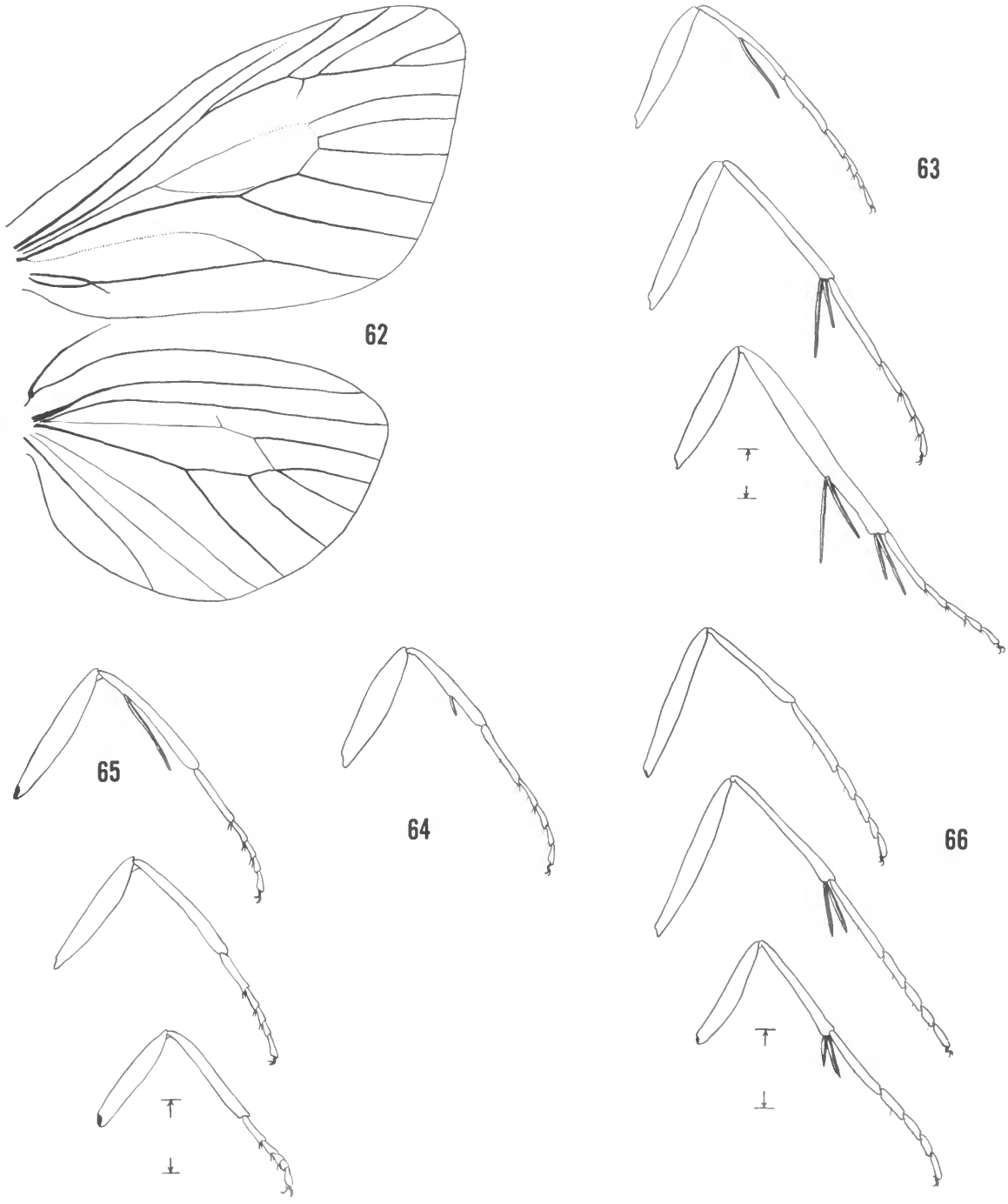
FIGURES 44–52.—Male antennae: 44, *Naevipenna aphaidropa* (Dyar); 45, *Naevipenna cruttwelli*, new species; 46, *Lumacra haitiensis* Davis; 47, *Cryptothelea surinamensis* (Moeschler); 48, *Cryptothelea watsoni* (Jones); 49, *Biopsyche apicalis* (Hampson); 50, *Biopsyche thoracica* (Grote); 51, *Oiketicus kirbyi* Guilding; 52, *Thyridopteryx ephemeraeformis* (Haworth).



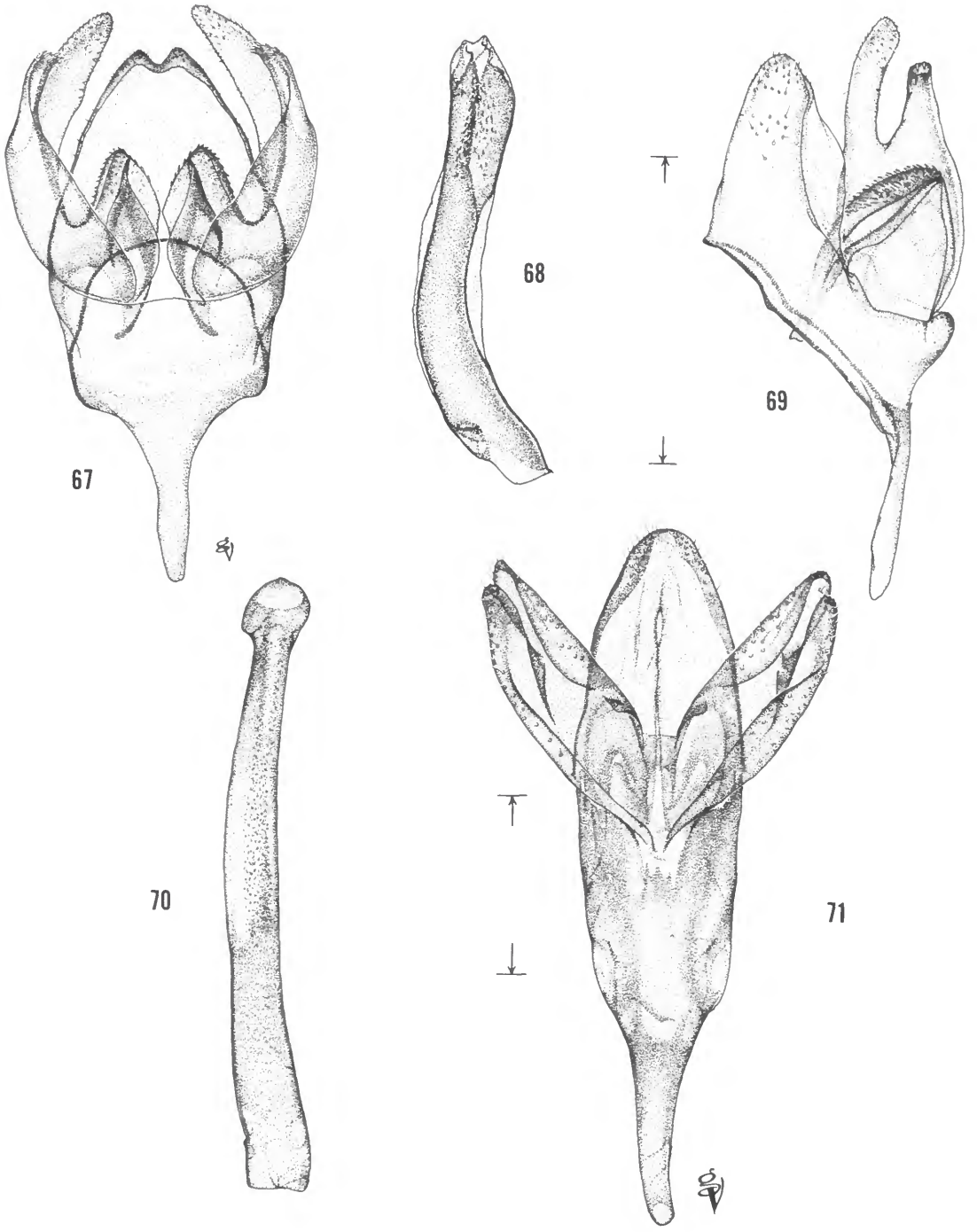
FIGURES 53–57.—Wing venation: 53, *Pterogyne insularis*, new species; 54, *Paucivena hispaniolae*, new species; 55, *Paucivena reticulata*, new species, forewing, Luquillo Forest, Puerto Rico; 56, *Paucivena reticulata*, new species, hindwing, near Runaway Bay Cave, Jamaica; 57, *Paucivena reticulata*, new species, near Maricao, Puerto Rico.



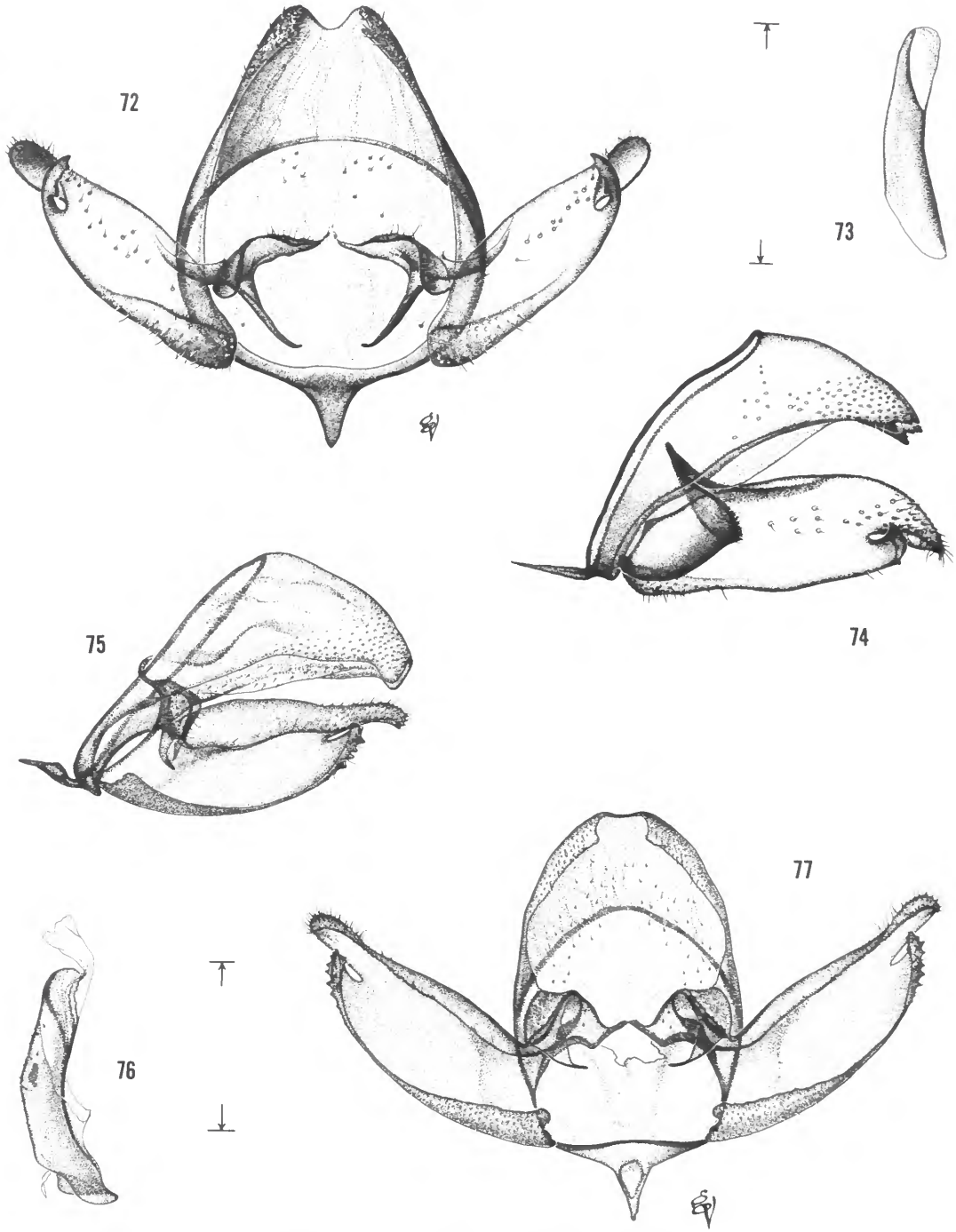
FIGURES 58–61.—Wing venation: 58, *Metaxypsyche trinidadensis,* new species; 59, *Naevipenna cruttwelli,* new species, Carapachaima, Trinidad; 60, *Naevipenna cruttwelli,* new species, Carapachaima, Trinidad; 61, *Naevipenna cruttwelli,* new species, Chanquinola, Panama.



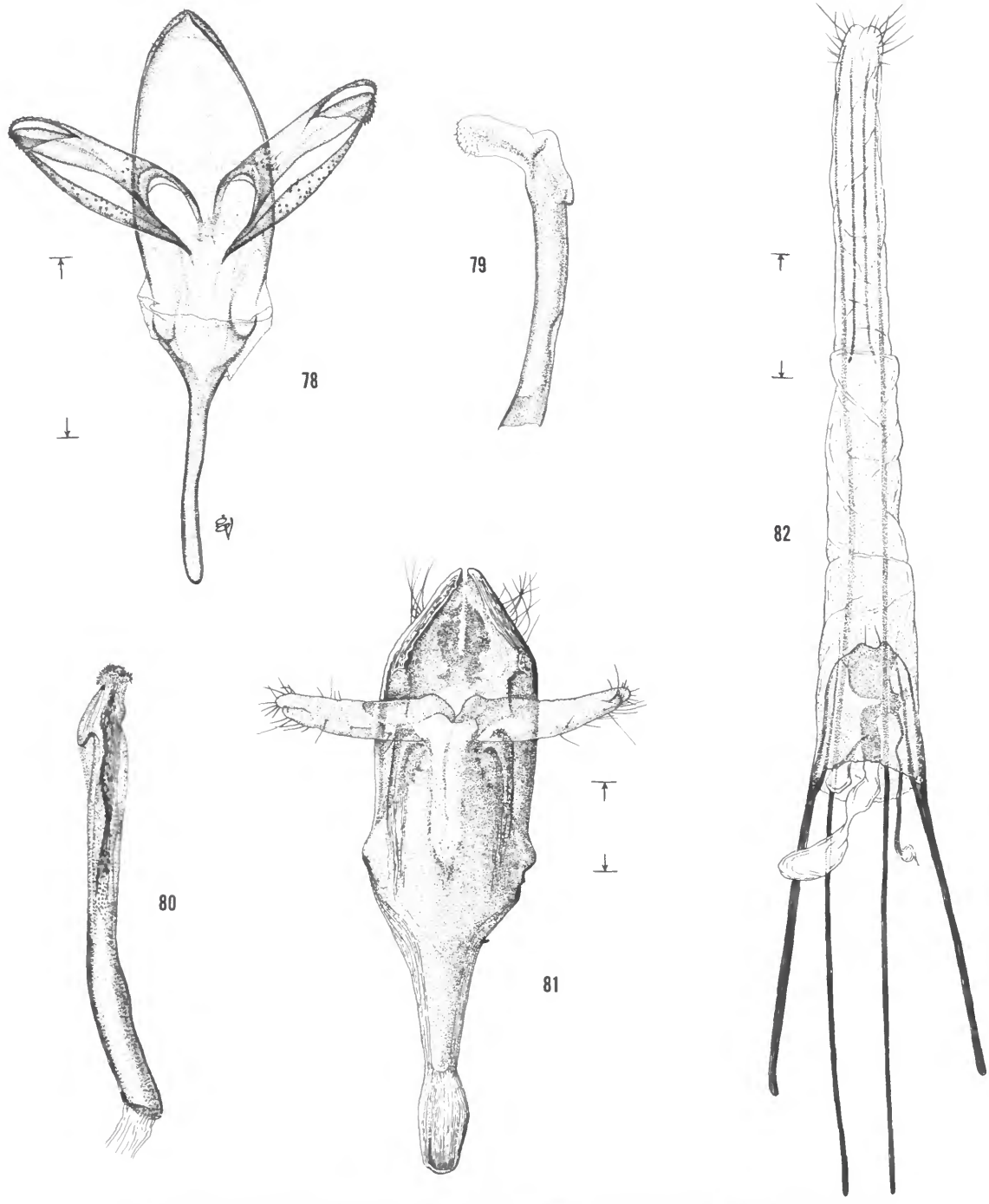
FIGURES 62-66.—Wing venation and leg structure: 62, *Prochalia* species no. 10.; 63, *Pterogyne insularis*, new species, male; 64, *Pterogyne insularis*, new species, foreleg of female; 65, *Metaxypsyche trinidadensis*, new species; 66, *Paucivena reticulata*, new species.



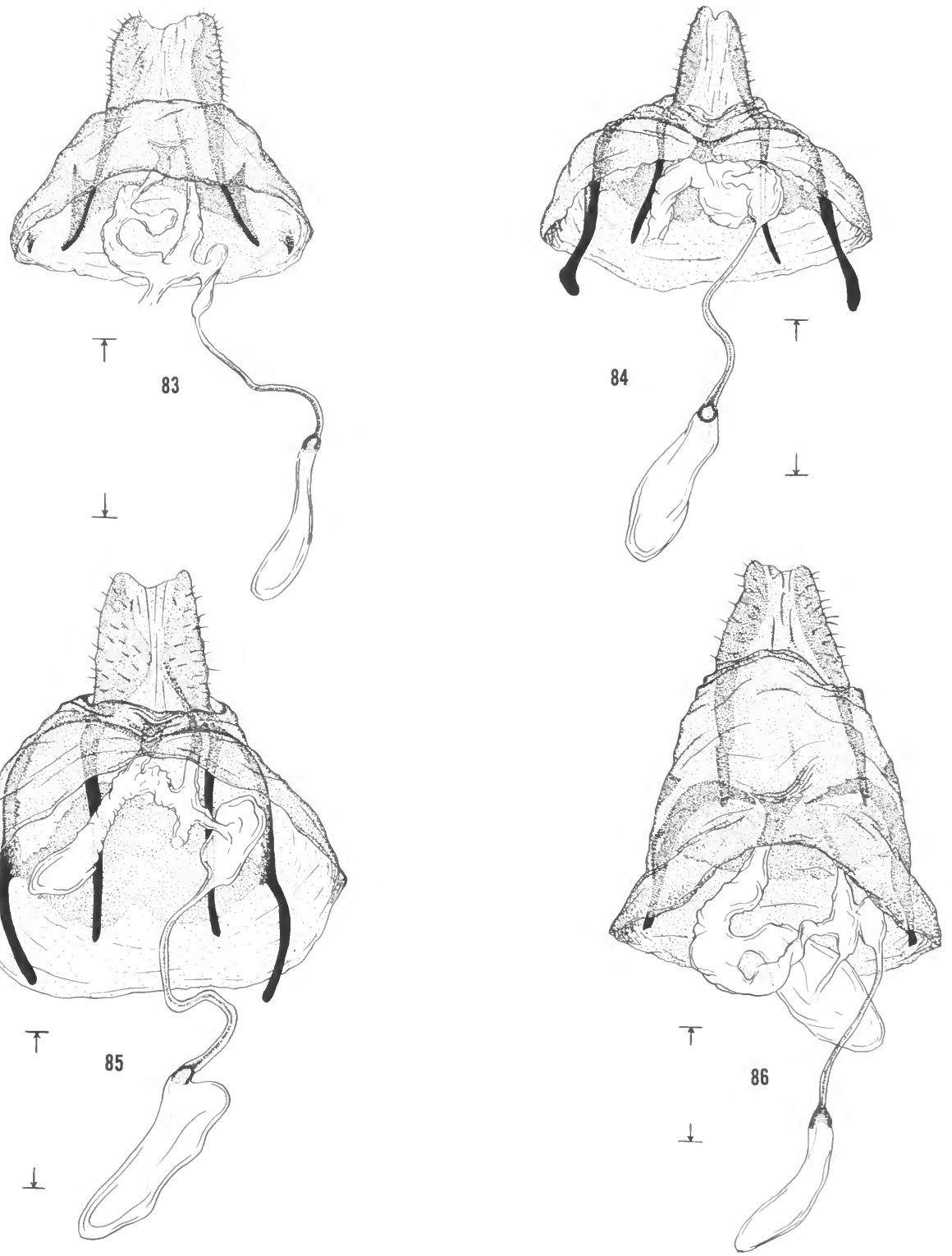
FIGURES 67–71.—Male genitalia: 67, *Pterogyne insularis*, new species, ventral view; 68, *Pterogyne insularis*, new species, lateral view of aedeagus; 69, *Pterogyne insularis*, new species, lateral view; 70, *Metaxypsyche trinidadensis*, new species, lateral view of aedeagus; 71, *Metaxypsyche trinidadensis*, new species, ventral view. (Scale=0.25 mm)



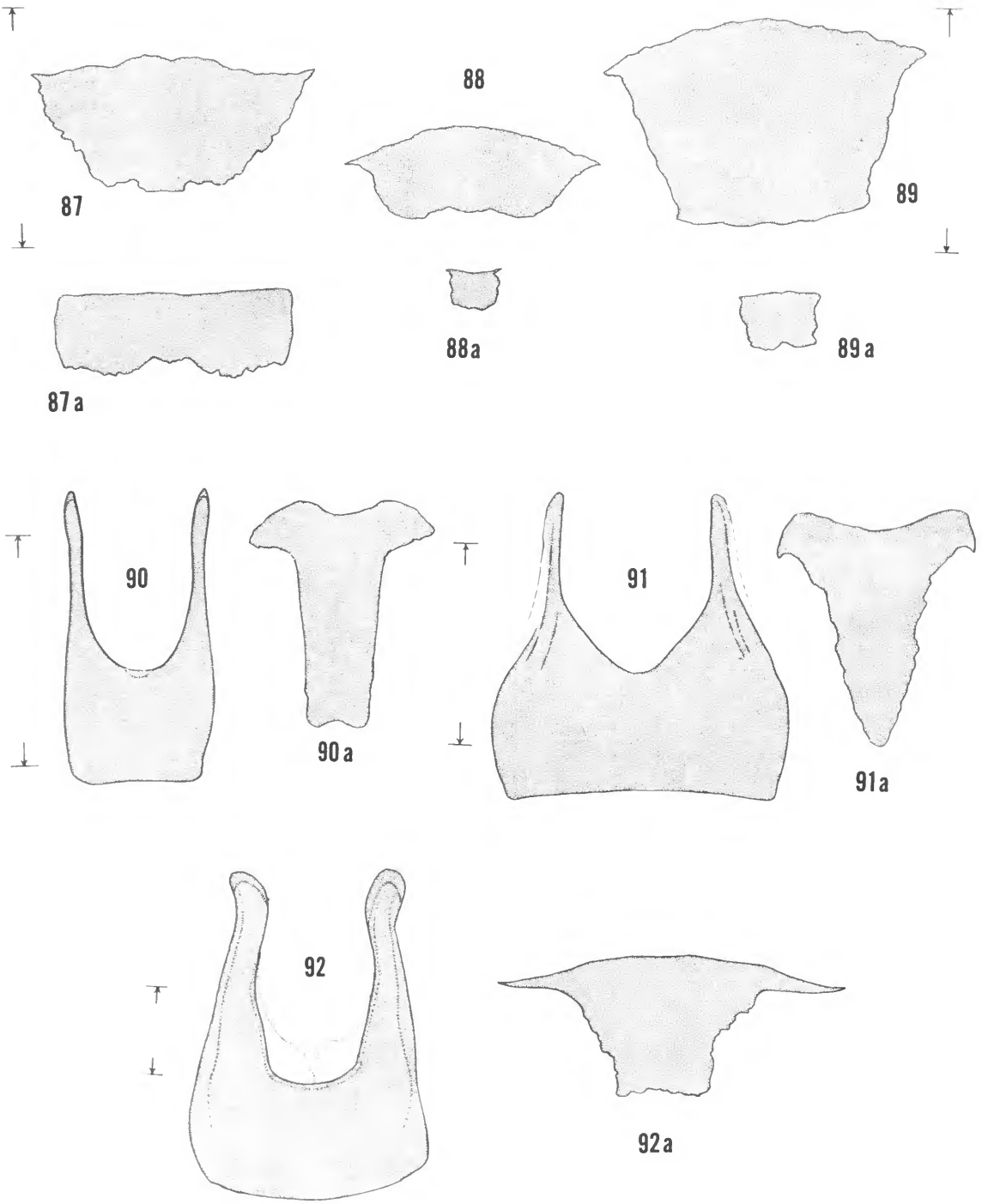
FIGURES 72–77.—Male genitalia: 72, *Paucivenna reticulata,* new species, ventral view; 73, *Paucivena reticulata,* new species, lateral view of aedeagus; 74, *Paucivena reticulata,* new species, lateral view; 75, *Paucivena hispaniolae,* new species, lateral view; 76, *Paucivena hispaniolae,* new species, lateral view of aedeagus; 77, *Paucivena hispaniolae,* new species, ventral view. (Scale= 0.25 mm)



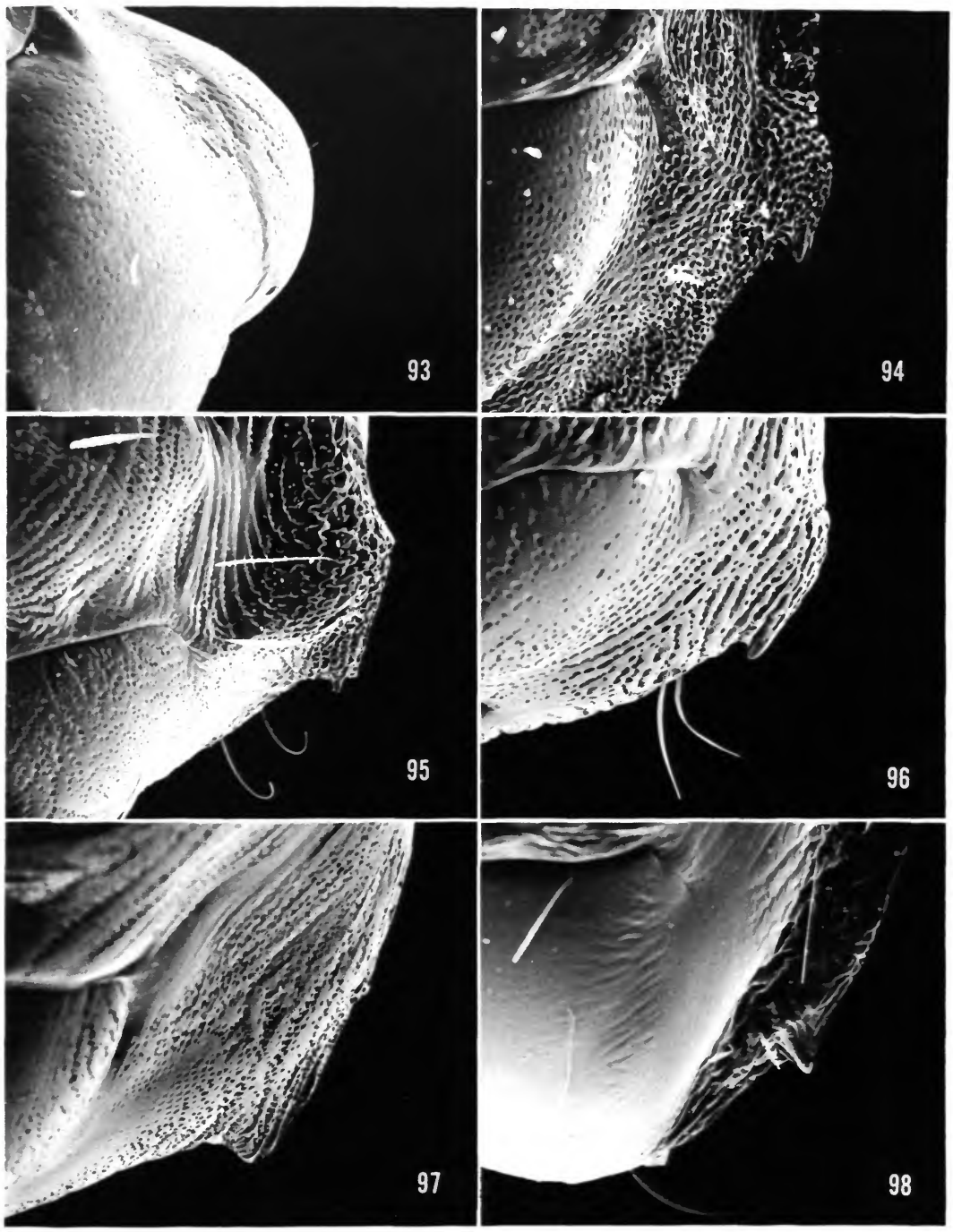
FIGURES 78–82.—Male and female genitalia: 78, *Naevipenna cruttwelli,* new species, ventral view of male genitalia; 79, *Naevipenna cruttwelli,* new species, lateral view of aedeagus; 80, *Cryptothelea watsoni* (Jones), lateral view of aedeagus; 81, *Cryptothelea watsoni* (Jones), ventral view of male genitalia; 82, *Pterogyne insularis,* new species, ventral view of female genitalia. (Scale= 0.5 mm)



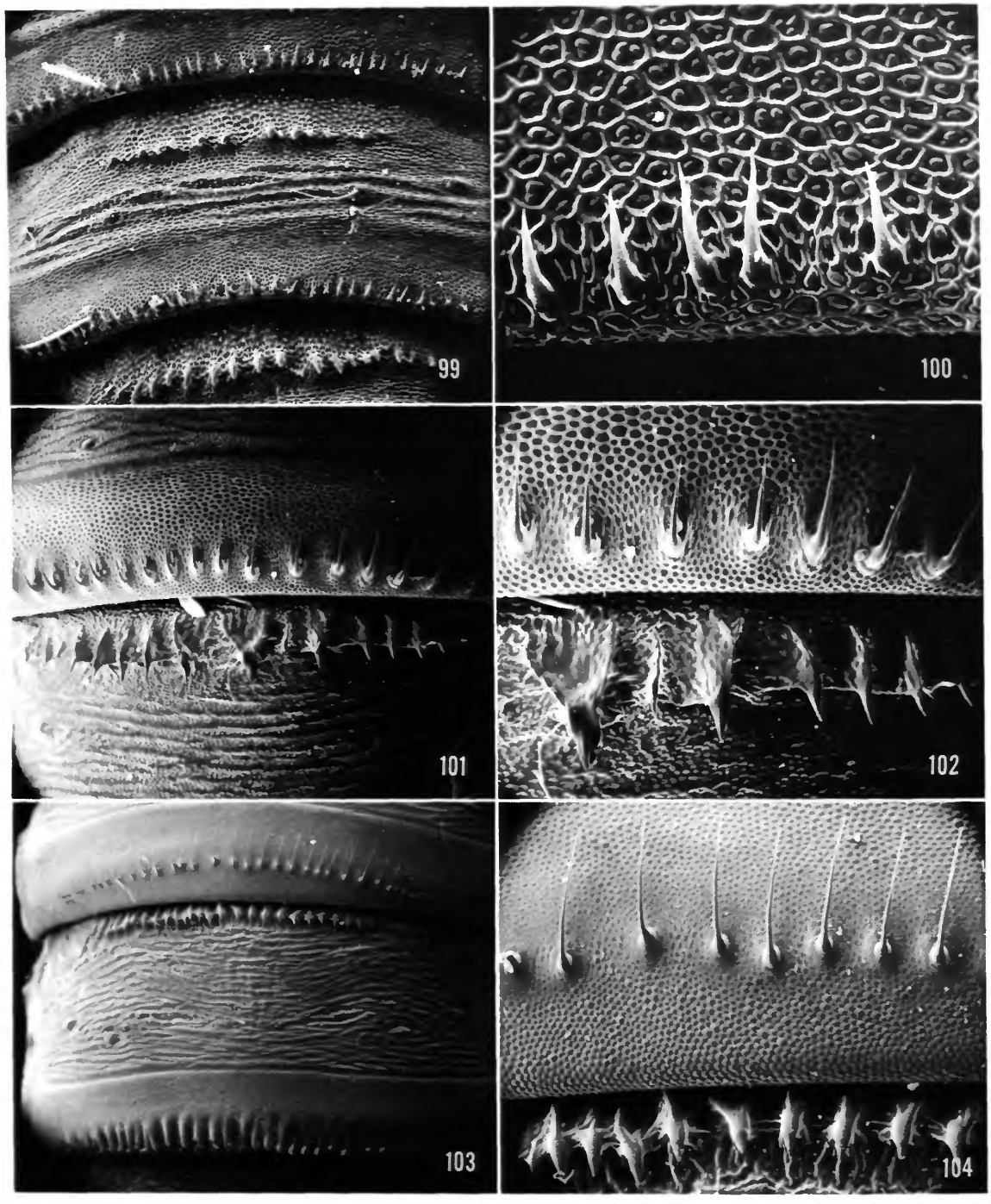
FIGURES 83–86.—Female genitalia, ventral view: 83, *Metaxypsyche trinidadensis*, new species; 84, *Naevipenna cruttwelli*, new species; 85, *Naevipenna aphaidropa* (Dyar); 86, *Cryptothelea surinamensis* (Moeschler). (Scale = 0.5 mm)



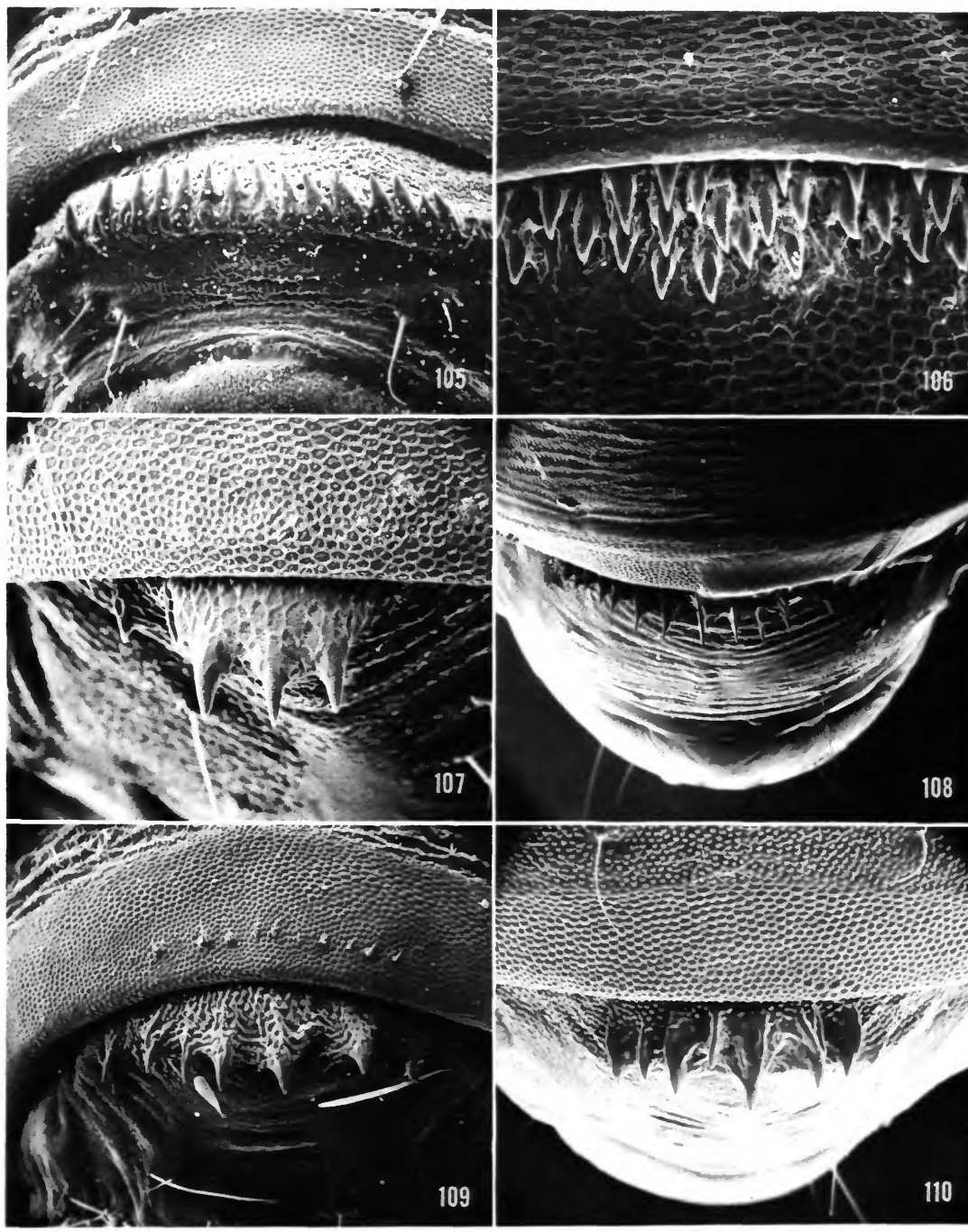
FIGURES 87–92.—Male, sclerites of eighth abdominal segment: 87, *Pterogyne insularis*, new species, tergite; 87a, sternite; 88, *Paucivena reticulata*, new species, tergite; 88a, sternite; 89, *Paucivena hispaniolae*, new species, tergite; 89a, sternite; 90, *Metaxypsyche trinidadensis*, new species, sternite; 90a, tergite; 91, *Naevipenna cruttwelli*, new species, sternite; 91a, tergite; 92, *Cryptothelea watsoni* (Jones), sternite; 92a, tergite. (Scales=0.5 mm; Figures 88 and 89 drawn to same scale).



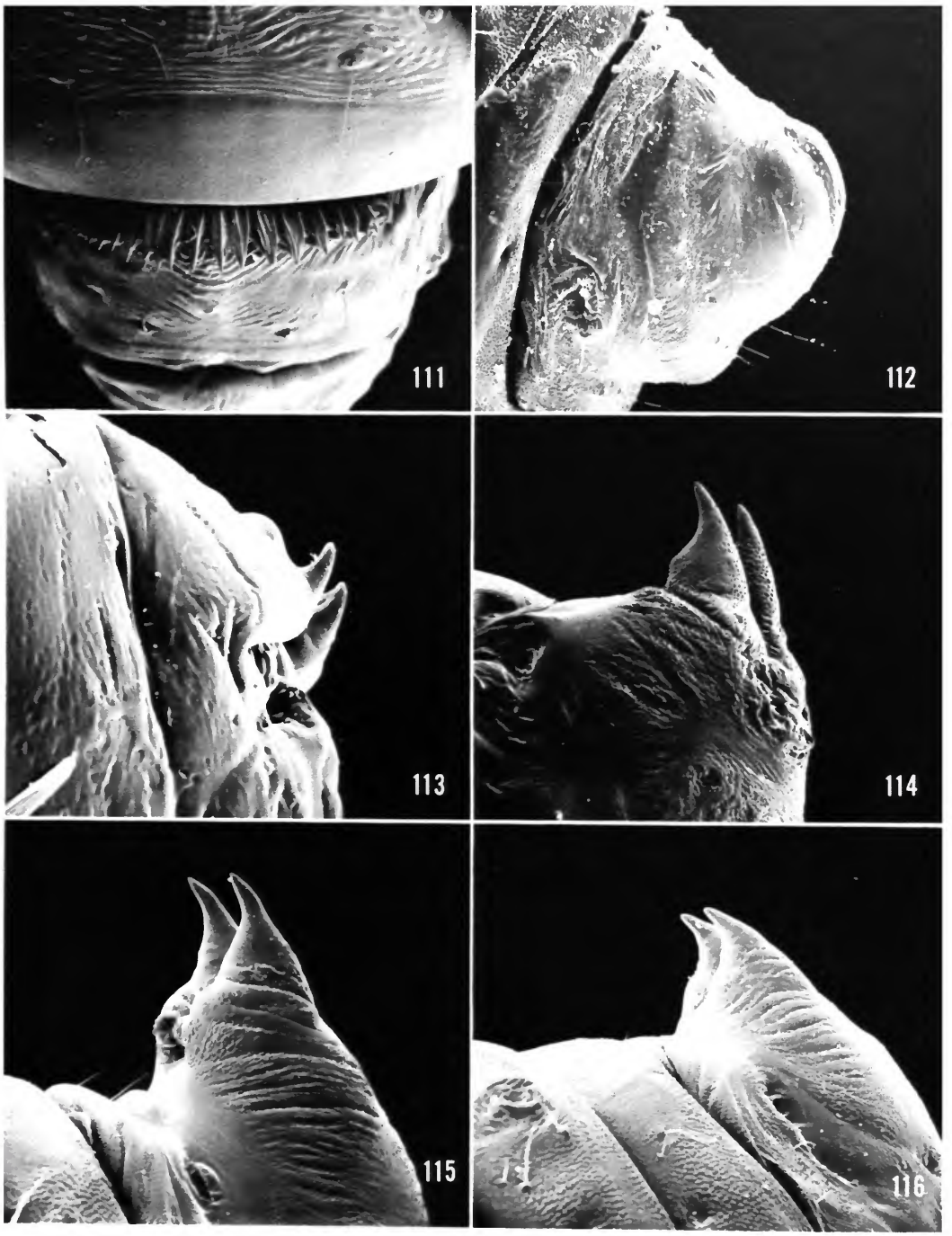
FIGURES 93–98.—Lateral view of frons (and frontal ridge) of male pupae: 93, *Pterogyne insularis*, new species × 190; 94, *Metaxypsyche trinidadensis*, new species × 300; 95, *Naevipenna aphaidropa* (Dyar), × 130; 96, *Naevipenna cruttwelli*, new species, × 200; 97, *Cryptothelea surinamensis* (Moeschler), × 200; 98, *Oiketicus kirbyi Guilding*, × 70. (Photographs reduced to 77 percent.)



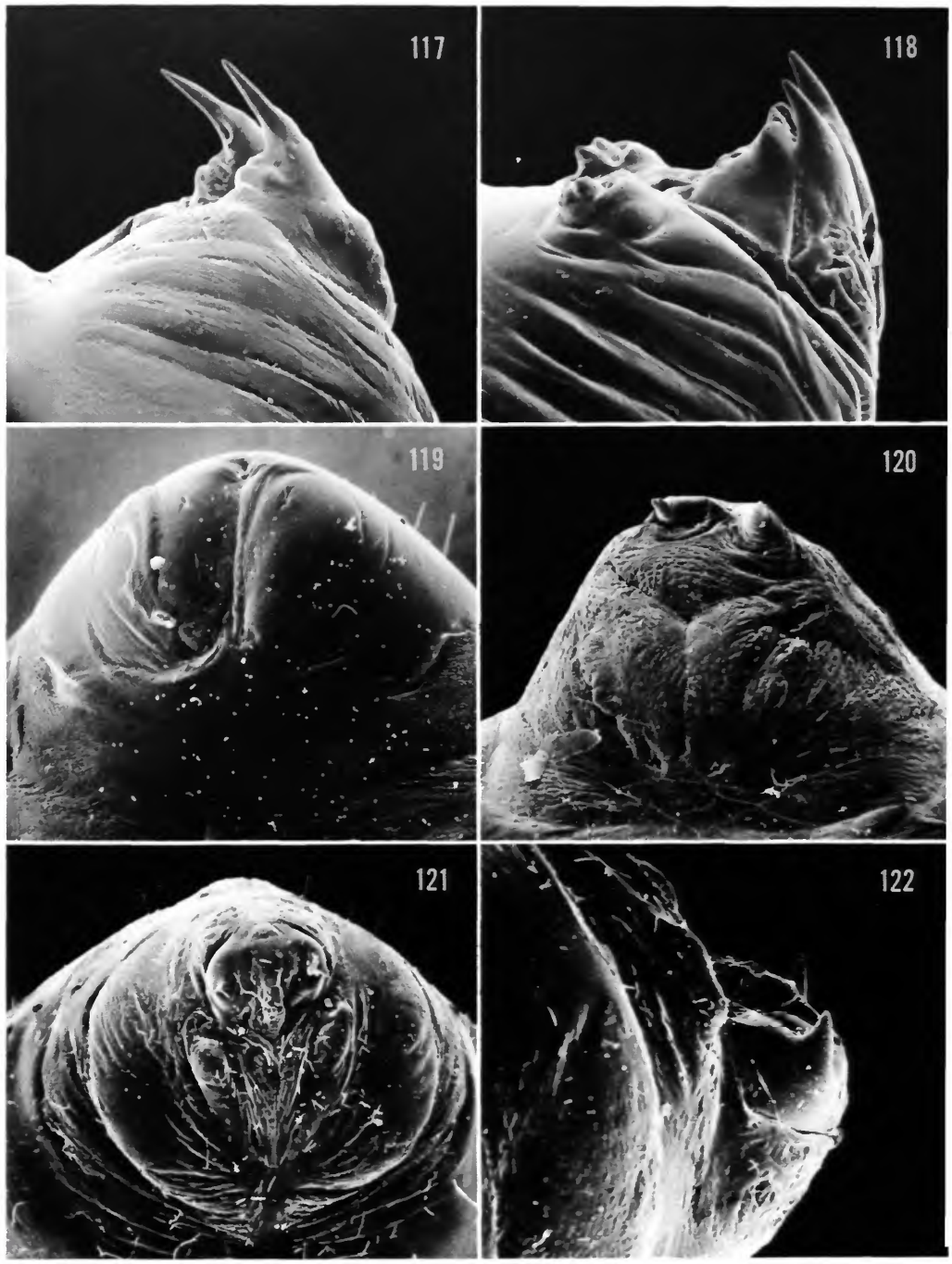
FIGURES 99–104.—Dorsal abdominal chaetotaxy of male pupae: 99, *Metaxypsyche trinidadensis*, new species, segments v–viii, × 130; 100, detail of Figure 99 showing posterior row of spines of fifth segment, × 825; 101, *Cryptothelea surinamensis* (Moeschler), segments v–vi, × 80; 102, detail of Figure 101 showing posterior spines of fifth segment and anterior spines of sixth segment, × 165; 103, *Oiketicus kirbyi* Guilding, segments v–viii, × 34; 104, detail of Figure 103 showing posterior spines of fifth segment and anterior spines of sixth segment, × 90. (Photographs reduced to 74 percent.)



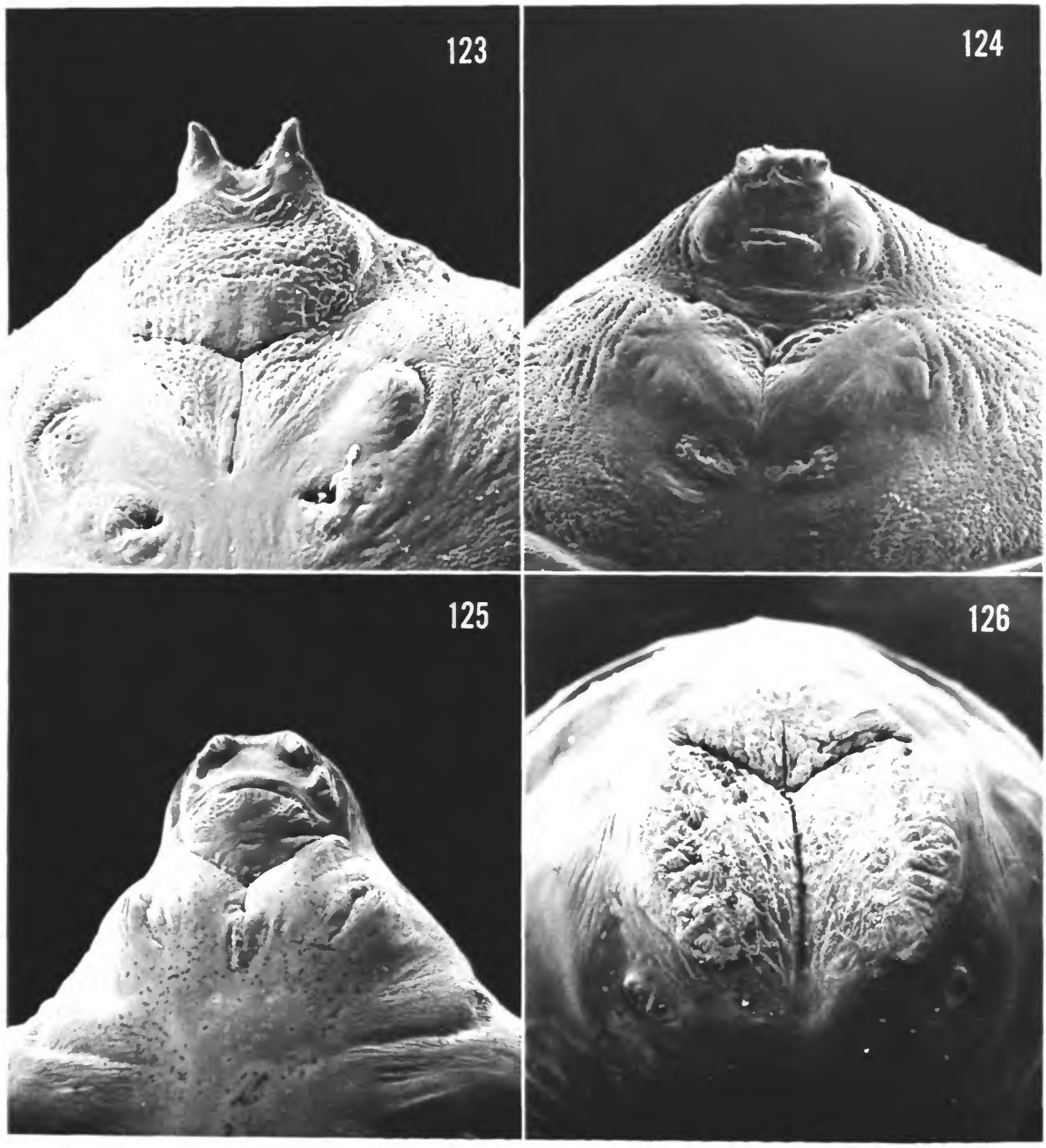
FIGURES 105–110.—Male pupae, anterior row (terminal) of dorsal spines of eighth abdominal segment: 105, *Pterogyne insularis*, new species, × 135; 106, *Paucivena hispaniolae*, new species, × 400; 107, *Metaxypsyche trinidadensis*, new species, × 330; 108, *Cryptothelea surinamensis* (Moeschler), × 85; 109, *Naevipenna aphaidropa* (Dyar), × 98; 110, *Naevipenna cruttwelli*, new species, × 150. (Photographs reduced to 74 percent.)



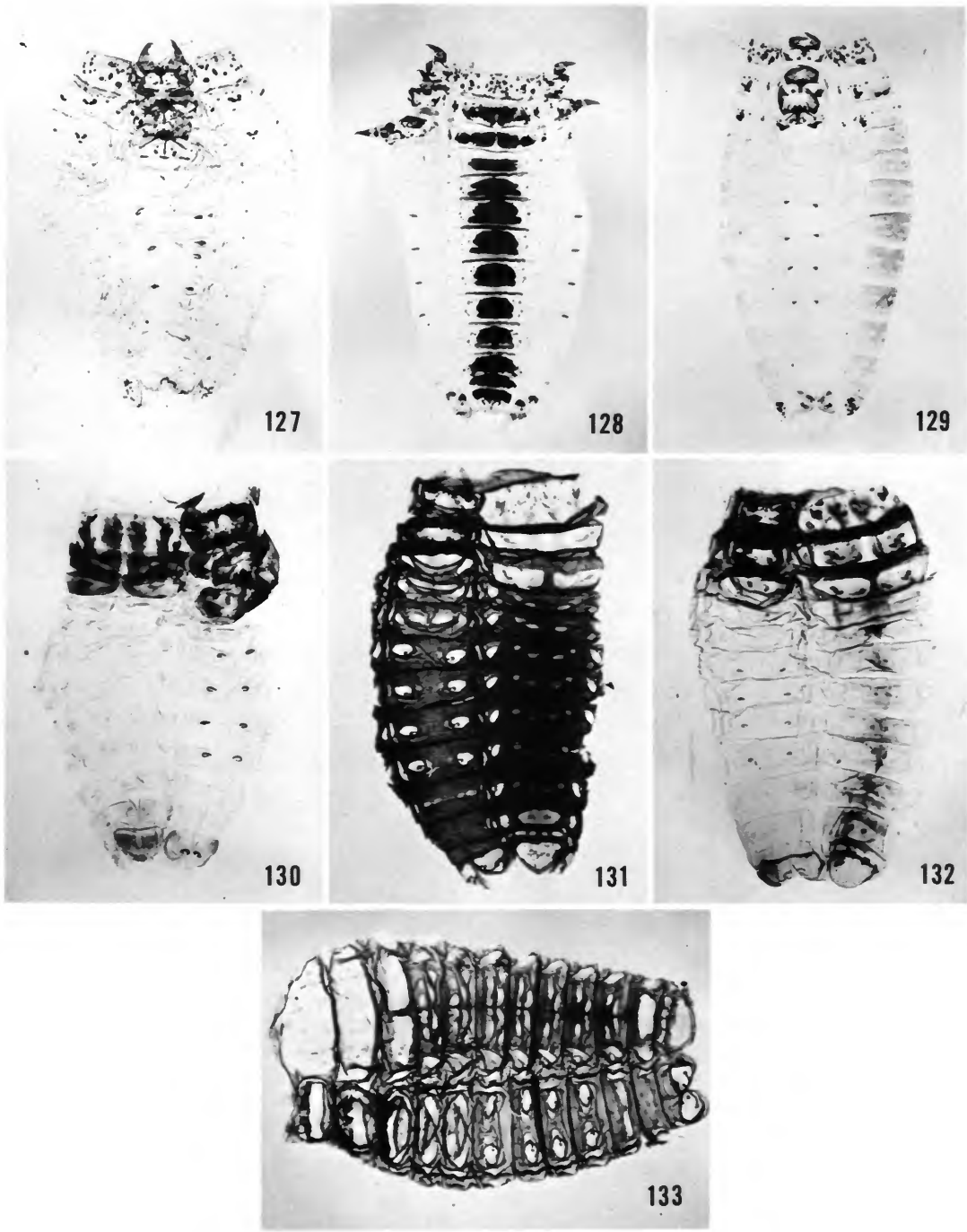
FIGURES 111–116.—Male pupae: 111, *Oiketicus kirbyi* Guilding, anterior row (terminal) of dorsal spines of eighth abdominal segment, × 32; 112, *Pterogyne insularis,* new species, cremaster area of tenth segment, × 80; 113, *Paucivena hispaniolae,* new species, cremaster hooks of tenth segment, × 350; 114, *Metaxypsyche trinidadensis,* new species, cremaster hooks of tenth segment, × 170; 115, *Naevipenna aphaidropa* (Dyar), cremaster hooks of tenth segment, × 115; 116, *Naevipenna cruttwelli,* new species, cremaster hooks of tenth segment, × 125. (Photographs



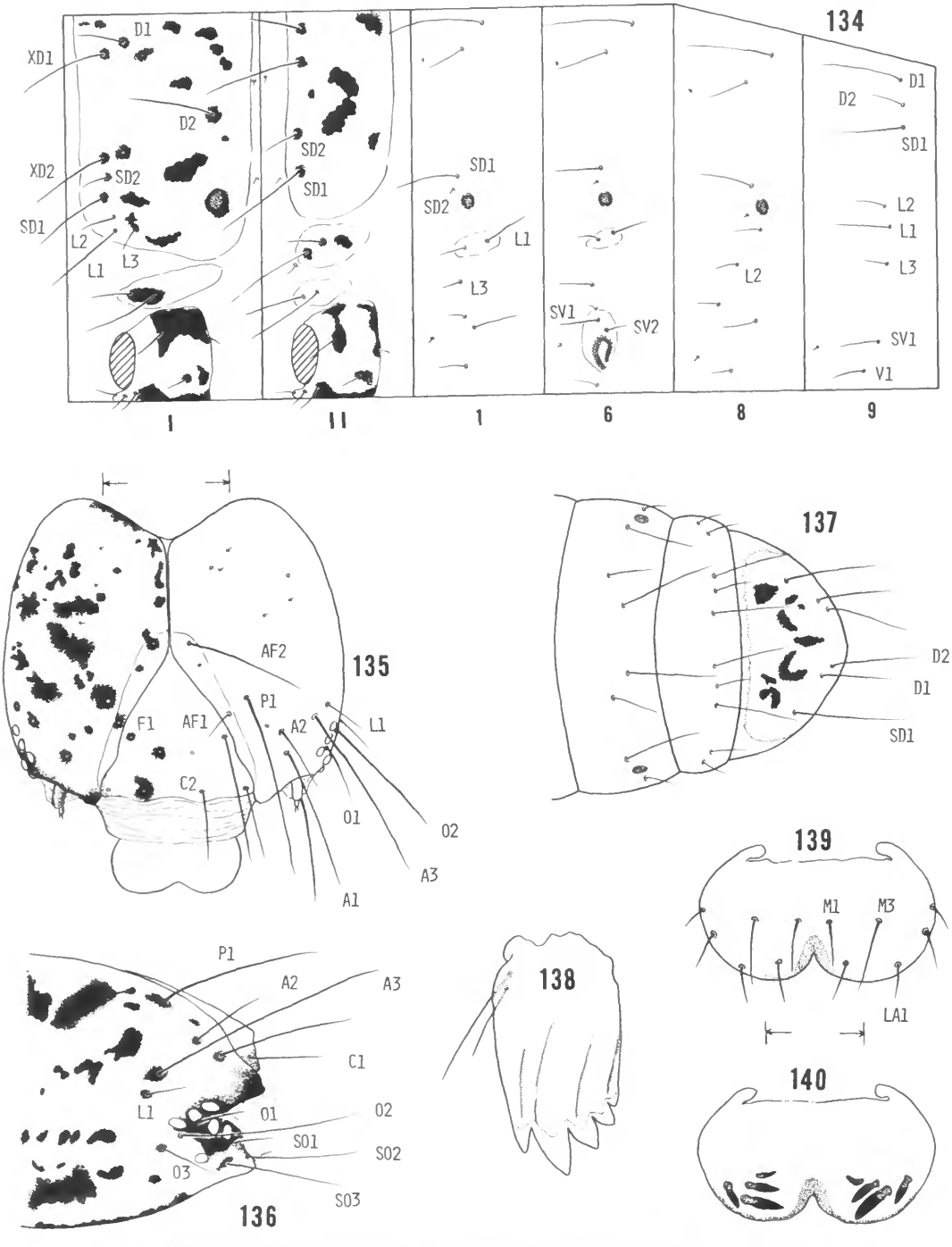
FIGURES 117–122.—Cremaster area of tenth abdominal segment of male and female pupae: 117, *Cryptothelea surinamensis* (Moeschler), lateral view of cremaster hooks of male, × 45; 118, *Oiketicus kirbyi* Guilding, lateral view of cremaster hooks of male, × 75; 119, *Pterogyne insularis,* new species, ventral view of cremaster area of female, × 105; 120, *Metaxypsyche trinidadensis,* new species, ventral view of cremaster area of female, × 170; 121, *Paucivena hispaniolae,* new species, ventral view of cremaster area of female, × 95; 122, *Paucivena hispaniolae,* new species, lateral view of cremaster hooks of female, × 200. (Photographs reduced to 80 percent.)



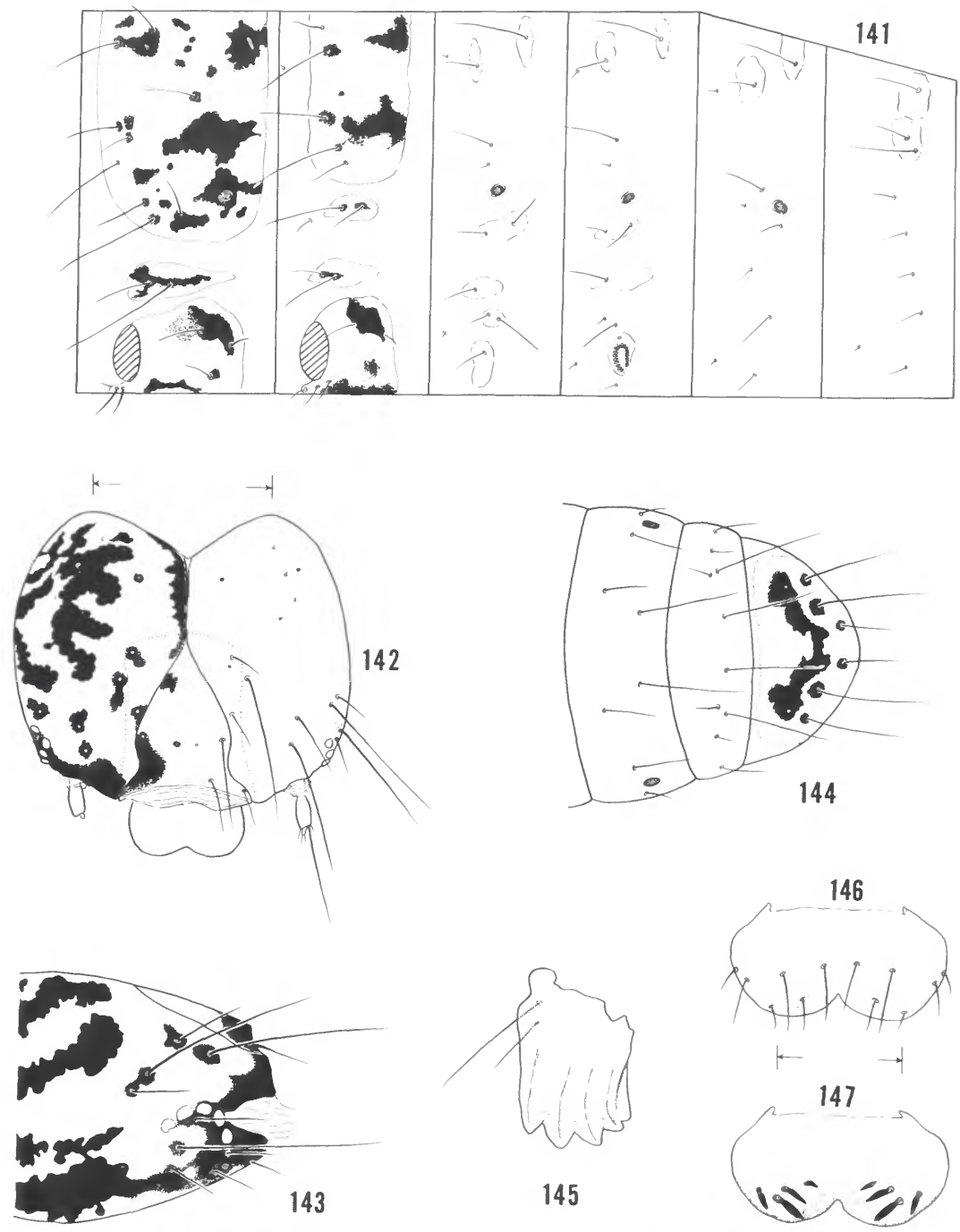
FIGURES 123–126.—Ventral view of cremaster area (tenth abdominal segment) of female pupae: 123, *Naevipenna aphaidropa* (Dyar), × 100; 124, *Naevipenna cruttwelli*, new species, × 125; 125, *Cryptothelea surinamensis* (Moeschler), × 50; 126, *Oiketicus kirbyi* Guilding, × 24.



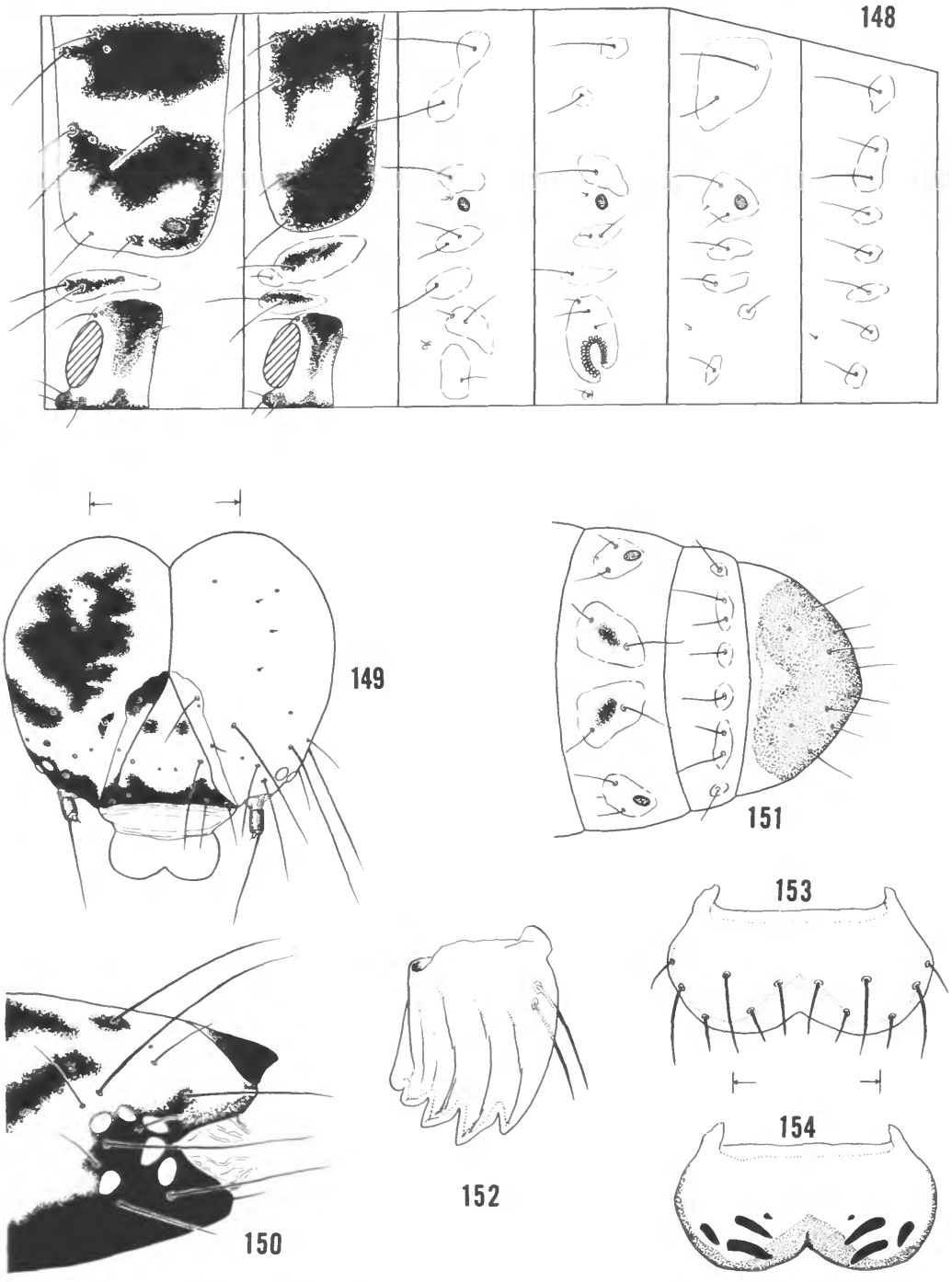
FIGURES 127–133.—Larvae (last instar?), integumental pigmentation: 127, *Pterogyne insularis,* new species; 128, *Pterogyne* species (type B); 129, *Paucivena hispaniolae,* new species; 130, *Metaxypsyche trinidadensis,* new species; 131, *Naevipenna aphaidropa* (Dyar); 132, *Naevipenna cruttwelli,* new species; 133, *Cryptothelea surinamensis* (Moeschler).



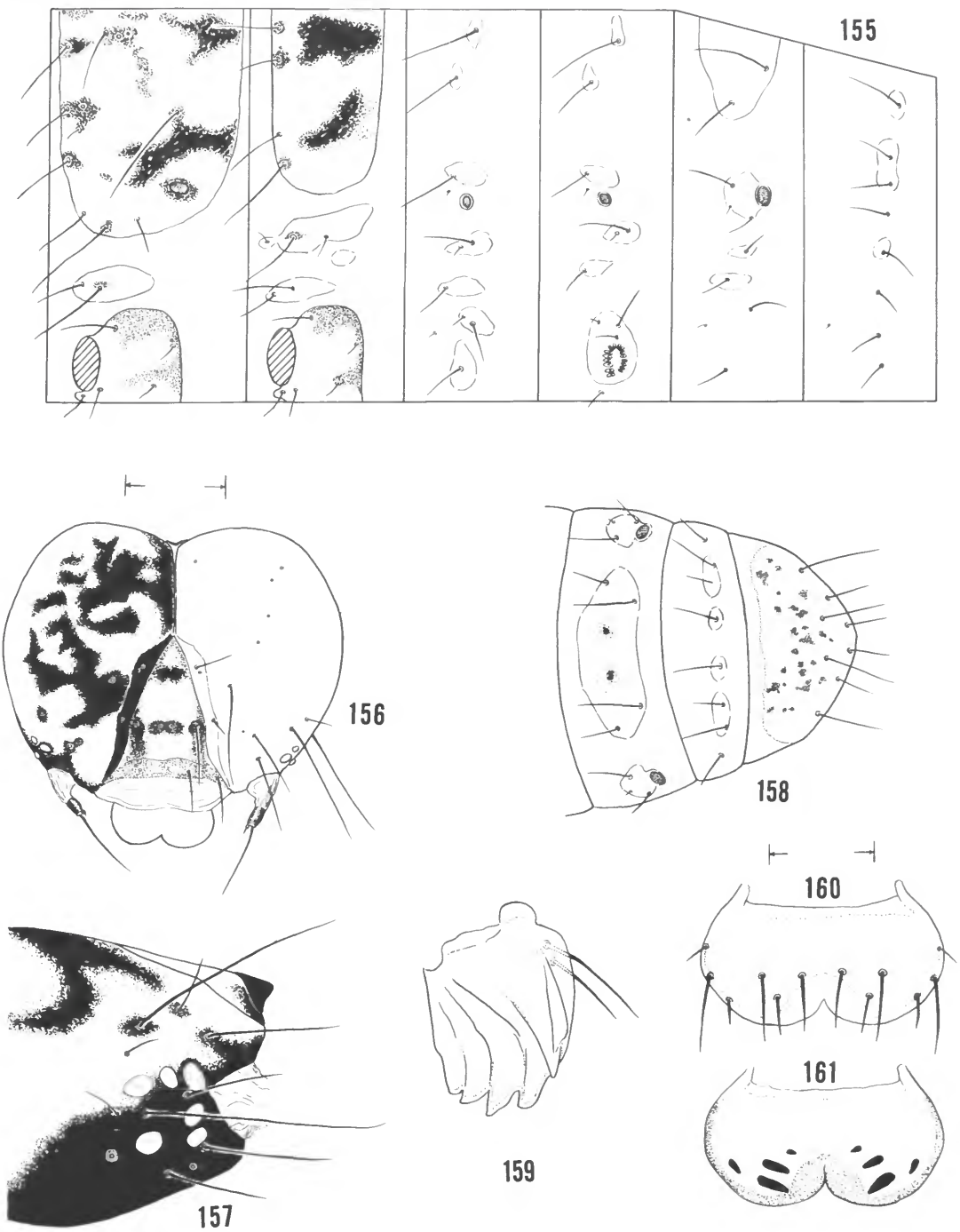
FIGURES 134–140.—*Pterogyne insularis*, new species, larval chaetotaxy: 134, lateral view of prothorax, mesothorax, and abdominal segments 1, 6, 8, and 9; 135, dorsal view of head (scale= 0.5 mm); 136, ocellar region of right side of head; 137, dorsal view of abdominal segments 8–10; 138, ventral view of left mandible; 139, dorsal view of labrum; 140, ventral view of labrum. (Figures 138–104 enlarged to same scale=0.2 mm.)



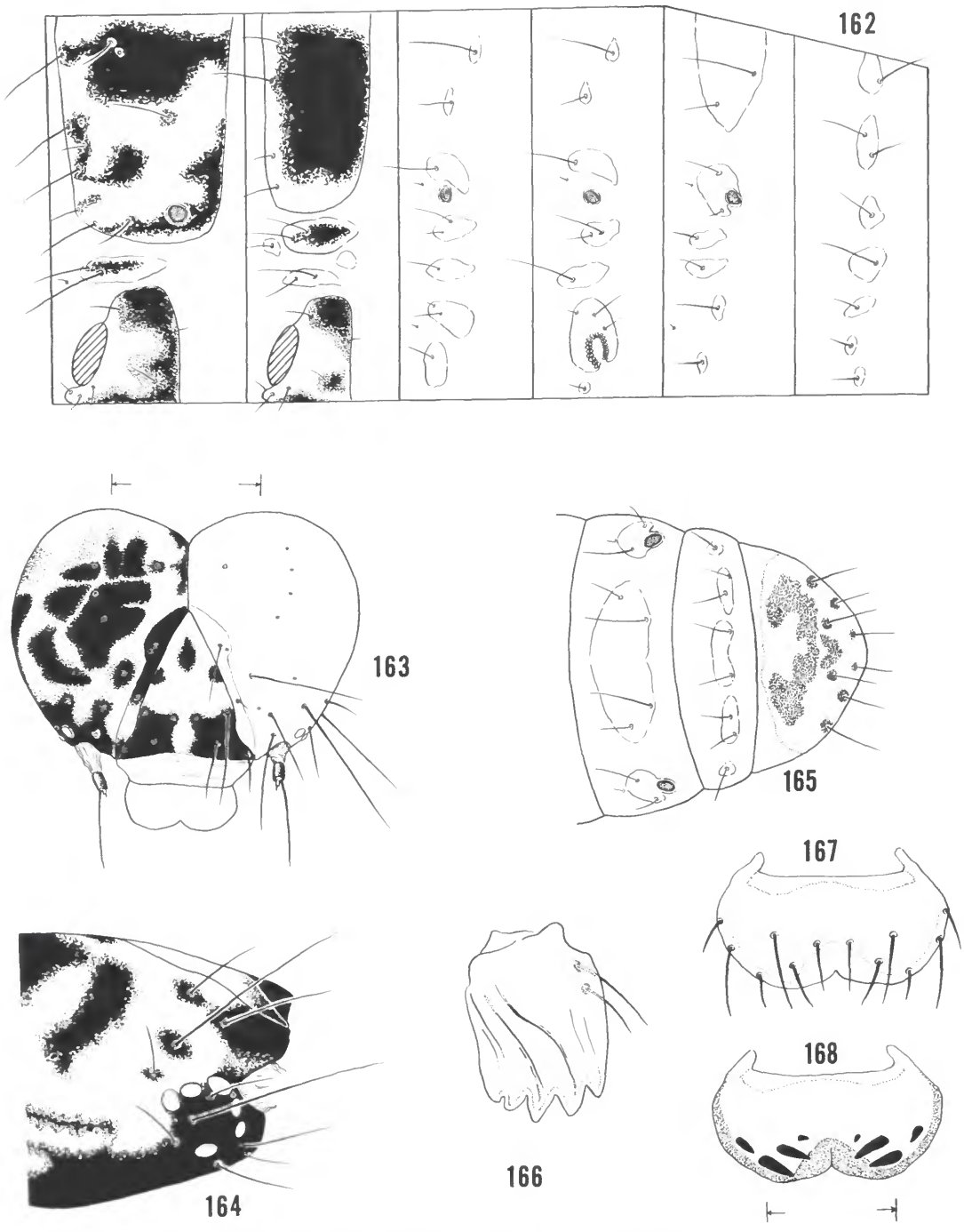
FIGURES 141–147.—*Paucivena hispaniolae,* new species, larval chaetotaxy: 141, lateral view of prothorax, mesothorax, and abdominal segments 1, 6, 8, and 9; 142, dorsal view of head (scale = 0.5 mm); 143, ocellar region of right side of head; 144, dorsal view of abdominal segments 8–10; 145, ventral view of left mandible; 146, dorsal view of labrum; 147, ventral view of labrum. (Figures 145–147 enlarged to same scale = 0.2 mm.)



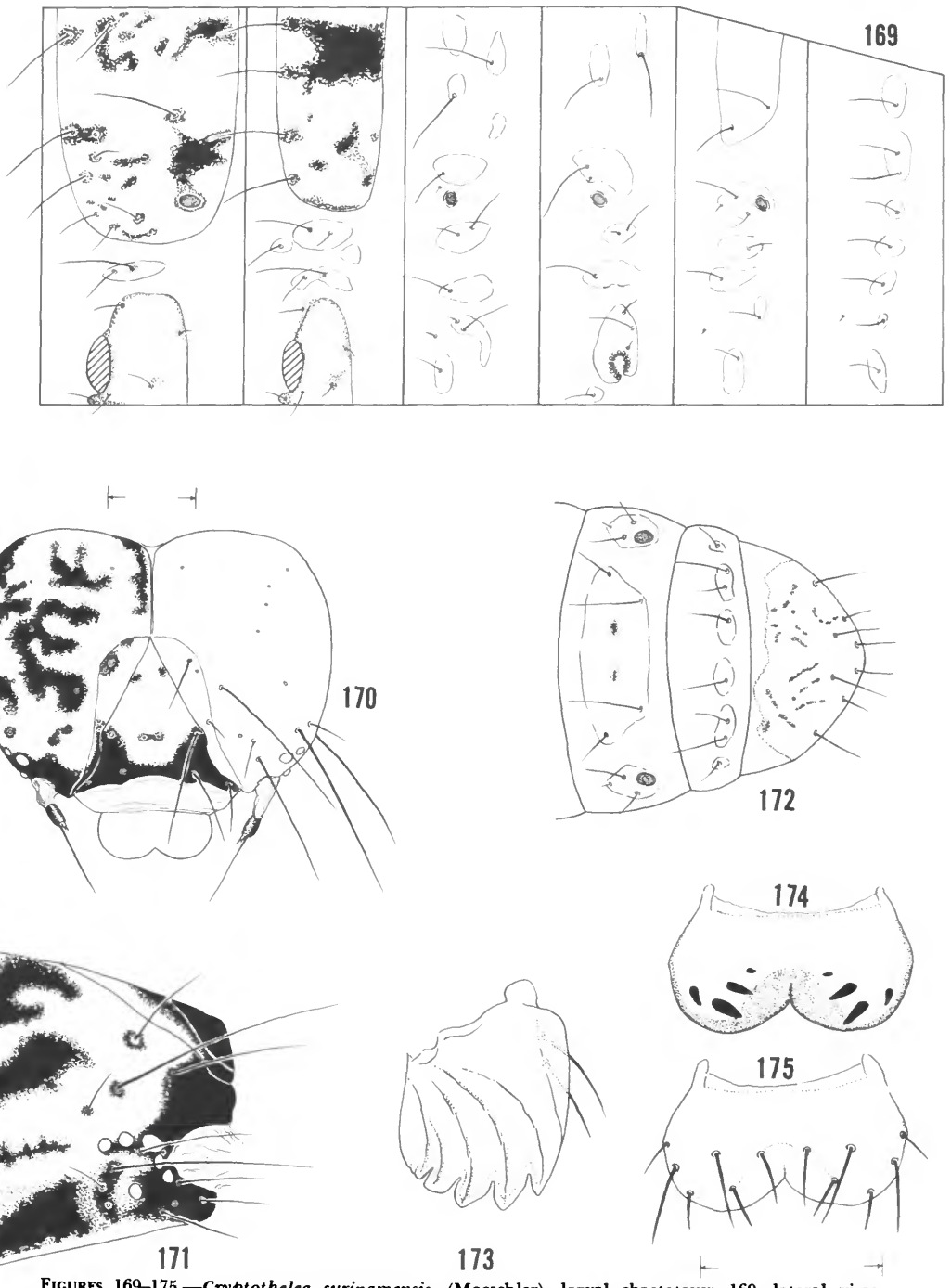
FIGURES 148–154.—*Metaxypsyche trinidadensis*, new species, larval chaetotaxy: 148, lateral view of prothorax, mesothorax, and abdominal segments 1, 6, 8, and 9; 149, dorsal view of head (scale = 0.5 mm); 150, ocellar region of right side of head; 151, dorsal view of abdominal segments 8–10; 152, ventral view of right mandible; 153, dorsal view of labrum; 154, ventral view of labrum. (Figures 152–154 enlarged to same scale = 0.2 mm.)



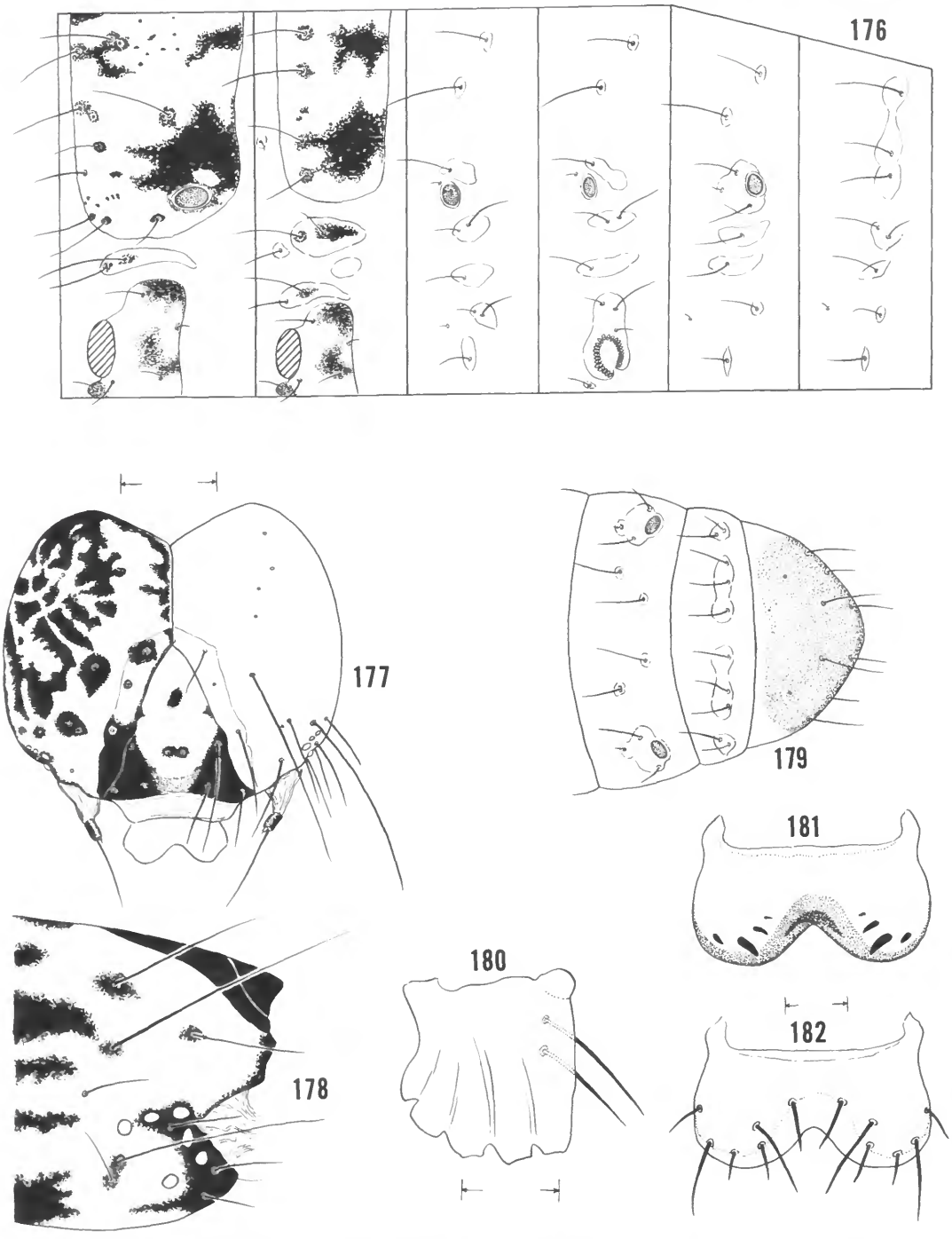
FIGURES 155–161.—*Naevipenna aphaidropa* (Dyar), larval chaetotaxy: 155, lateral view of prothorax, mesothorax, and abdominal segments 1, 6, 8, and 9; 156, dorsal view of head (scale = 0.5 mm); 157, ocellar region of right side of head; 158, dorsal view of abdominal segments 8–10; 159, ventral view of right mandible; 160, dorsal view of labrum; 161, ventral view of labrum. (Figures 159–161 enlarged to same scale = 0.2 mm.)



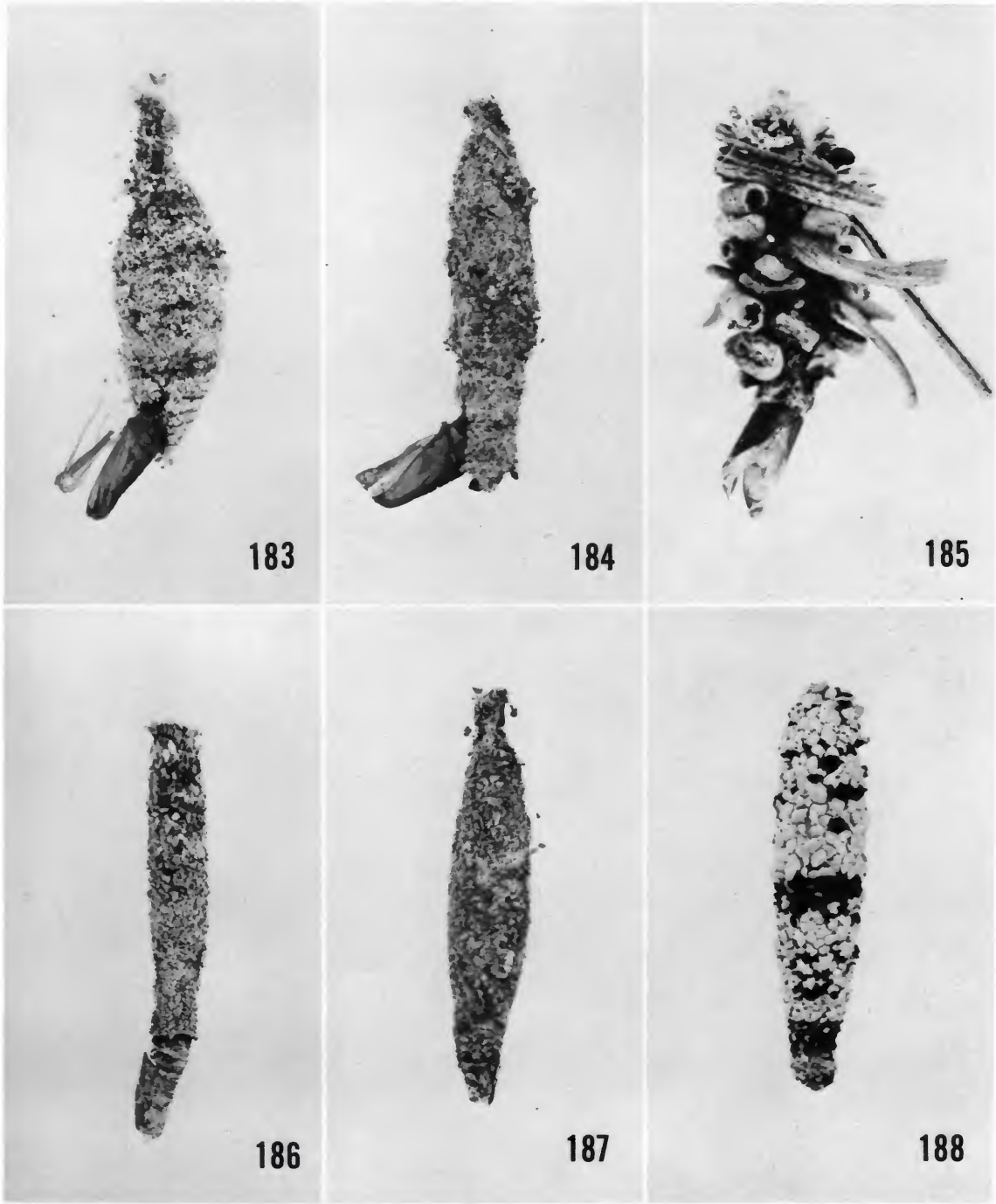
FIGURES 162–168.—*Naevipenna cruttwelli*, new species, larval chaetotaxy: 162, lateral view of prothorax, mesothorax, and abdominal segments 1, 6, 8, and 9; 163, dorsal view of head (scale= 0.5 mm); 164, ocellar region of right side of head; 165, dorsal view of abdominal segments 8–10; 166, ventral view of right mandible; 167, dorsal view of labrum; 168, ventral view of labrum. (Figures 166–168 enlarged to same scale=0.2 mm.)



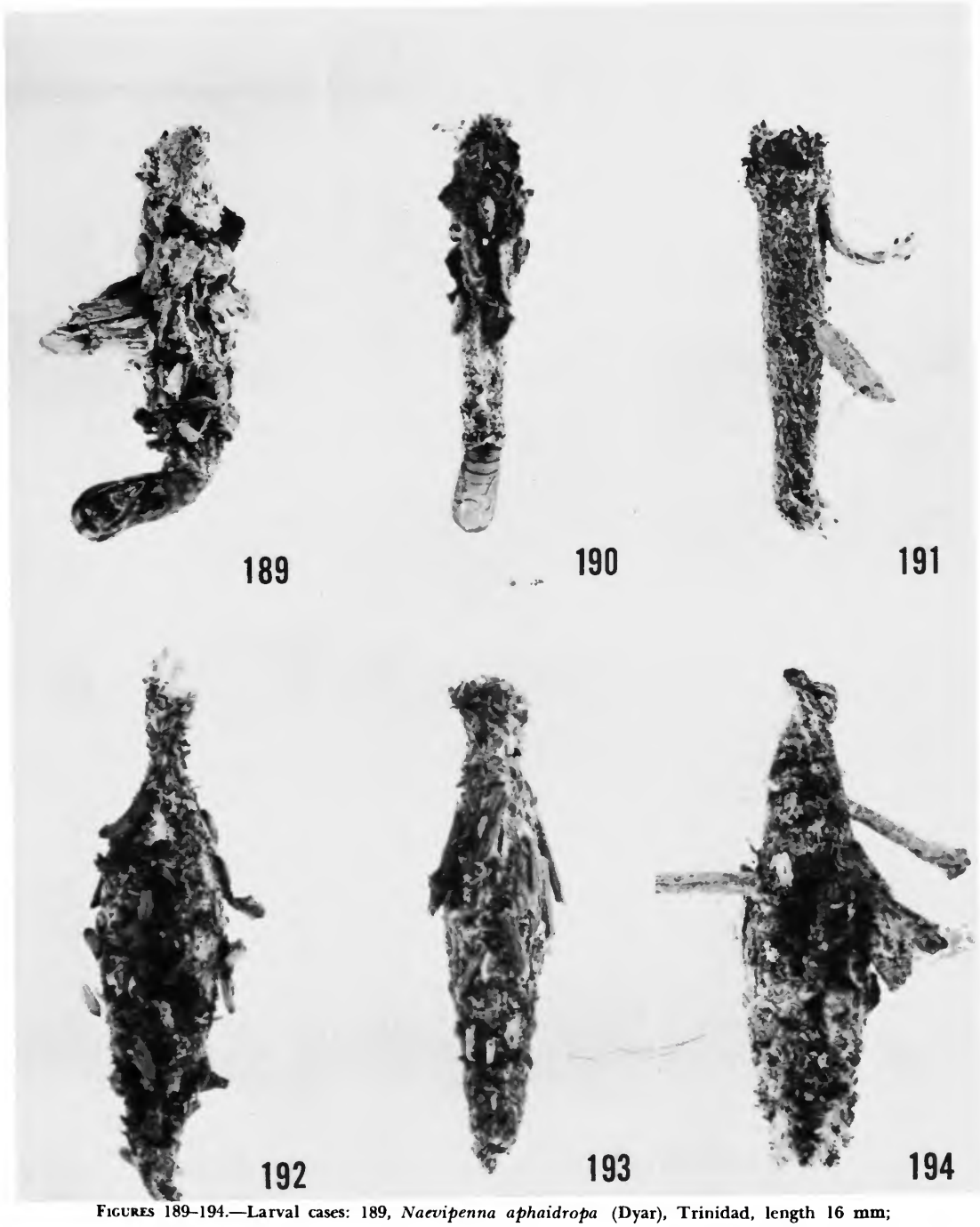
FIGURES 169–175.—*Cryptothelea surinamensis* (Moeschler), larval chaetotaxy: 169, lateral view of prothorax, mesothorax, and abdominal segments, 1, 6, 8, and 9; 170, dorsal view of head (scale=0.5 mm); 171, ocellar region of right side of head; 172, dorsal view of abdominal segments 8–10; 173, ventral view of right mandible; 174, ventral view of labrum; 175, dorsal view of labrum. (Figures 173–175 enlarged to same scale=0.5 mm.)



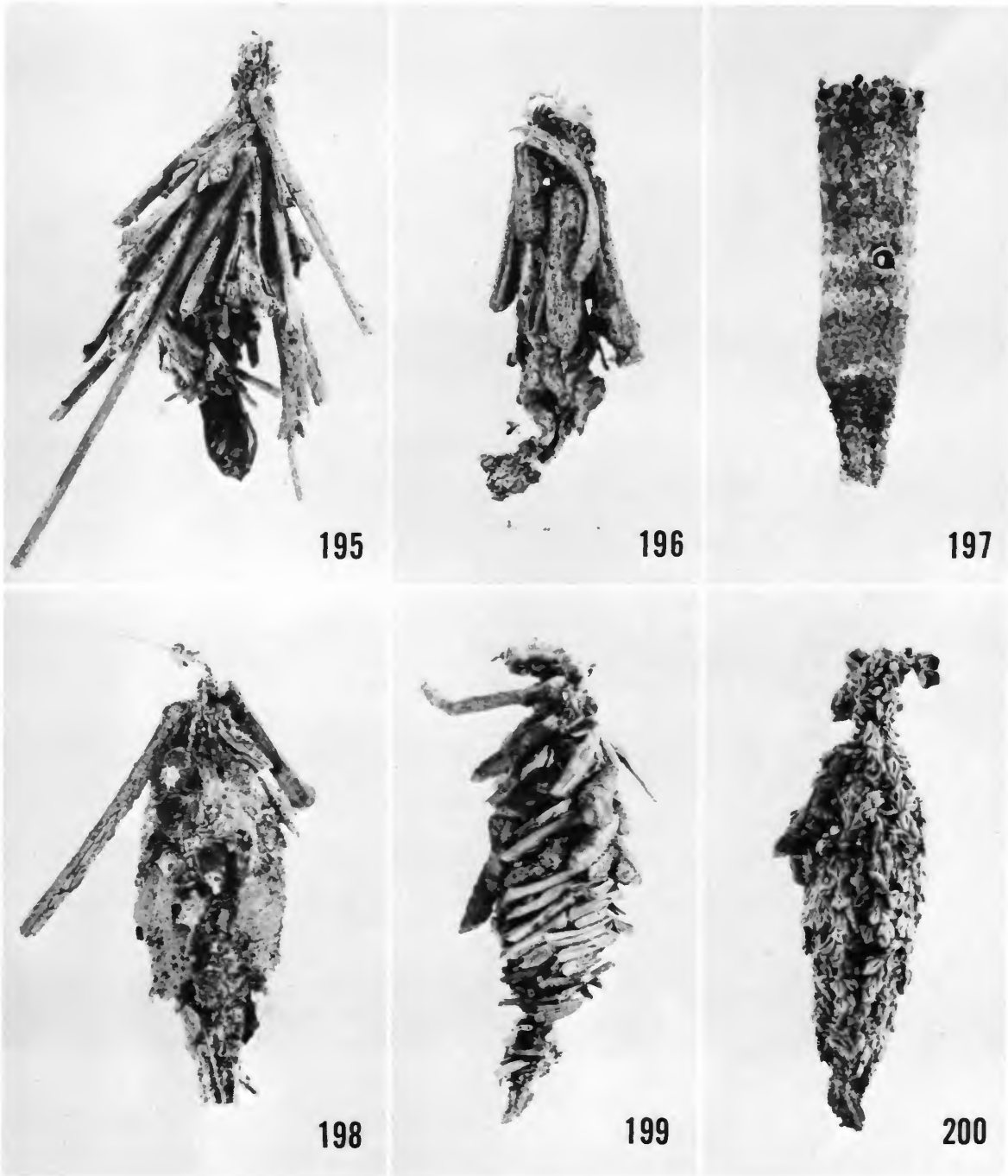
FIGURES 176–182.—*Oiketicus kirbyi* Guilding, larval chaetotaxy: 176, lateral view of prothorax, mesothorax, and abdominal segments 1, 6, 8, and 9; 177, dorsal view of head (scale=2.0 mm); 178, ocellar region of right side of head; 179, dorsal view of abdominal segments 8–10; 180, ventral view of right mandible (scale=1.0 mm); 181, ventral view of labrum; 182, dorsal view of labrum. (Figures 181 and 182 enlarged to same scale=0.5 mm.))



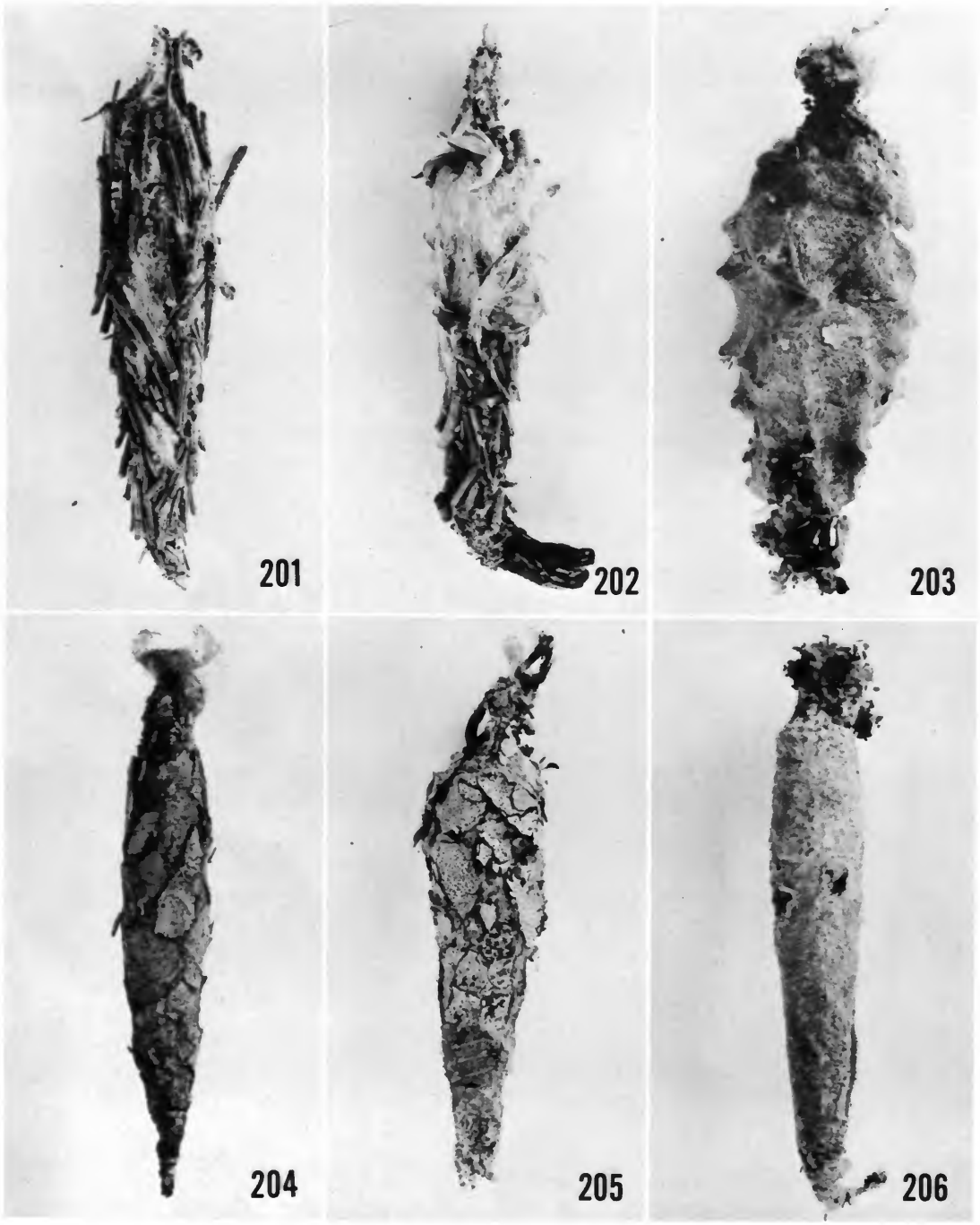
FIGURES 183–188.—Larval cases: 183, *Pterogyne insularis,* new species, Dominican Republic, type A case, length 20 mm; 184. *Pterogyne ?insularis,* new species, Dominican Republic, type B case, length 17 mm; 185, *Metaxypsyche trinidadensis,* new species, Trinidad, length 9 mm; 186, *"Clania" licheniphilus* Koehler, Cuba, length 18 mm; 187, *Paucivena hispaniolae,* new species, Dominican Republic, length 15 mm; 188, *Paucivena ?hispaniolae,* new species, Dominican Republic, length 12.5 mm.



FIGURES 189–194.—Larval cases: 189, *Naevipenna aphaidropa* (Dyar), Trinidad, length 16 mm; 190, *Naevipenna cruttwelli*, new species, Trinidad, length 13 mm; 191, *Naevipenna cruttwelli*, new species, Panama, length 17 mm; 192, *Cryptothelea surinamensis* (Moeschler), Trinidad, length 35 mm; 193, *Cryptothelea* species no. 9, Jamaica, length 28 mm; 194, *Cryptothelea* species no. 9, Jamaica, length 24 mm.



FIGURES 195–200.—Larval cases: 195, *Cryptothelea watsoni* (Jones), Virgin Gorda, length 29 mm; 196, unidentified species no. 6, Trinidad, length 12 mm; 197, unidentified species no. 8, Trinidad, length 10 mm; 198, *Cryptothelea hoffmanni* (Koehler), new combination, Cuba, lectotype, length 16 mm; 199, *Biopsyche thoracica* (Grote), Cuba, length 29 mm; 200, ?*Thyridopteryx ephemeraeformis* (Haworth), Puerto Rico, length 30 mm.



FIGURES 201–206.—Larval cases: 201, *Oiketicus kirbyi* Guilding, Dominica, length 80 mm; 202, *Oiketicus kirbyi* Guilding, Dominica, length 80 mm; 203, *Oiketicus kirbyi* Guilding, Venezuela, length 87 mm; 204, *Oiketicus* species no. 4, Cuba, length 72 mm; 205, *Oiketicus* species no. 4, Jamaica, length 58 mm; 206, *Oiketicus* species no. 7, Jamaica, length 65 mm.

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