
FOR THE INCREASE
AND DIFFVSION OF
KNOWLEDGE AMONG MEN
SMITHSONIAN
INSTITVTION
WASHINGTON

MUSEUM OF NATURAL HISTORY

Bagworm Moths of the Western Hemisphere

(Lepidoptera: Psychidae)

DONALD R. DAVIS

Associate Curator of Lepidoptera

SMITHSONIAN INSTITUTION

WASHINGTON, 1964

Publications of the United States National Museum

The scientific publications of the United States National Museum include two series, *Proceedings of the United States National Museum* and *United States National Museum Bulletin.*

In these series are published original articles and monographs dealing with the collections and work of the Museum and setting forth newly acquired facts in the fields of anthropology, biology, geology, history, and technology. Copies of each publication are distributed to libraries and scientific organizations and to specialists and others interested in the various subjects.

The *Proceedings*, begun in 1878, are intended for the publication, in separate form, of shorter papers. These are gathered in volumes, octavo in size, with the publication date of each paper recorded in the table of contents of the volume.

In the *Bulletin* series, the first of which was issued in 1875, appear longer, separate publications consisting of monographs (occasionally in several parts) and volumes in which are collected works on related subjects. *Bulletins* are either octavo or quarto in size, depending on the needs of the presentation. Since 1902, papers relating to the botanical collections of the Museum have been published in the *Bulletin* series under the heading *Contributions from the United States National Herbarium.*

This work forms number 244 of the *Bulletin* series.

Frank A. Taylor
Director, United States National Museum

U.S. GOVERNMENT PRINTING OFFICE
WASHINGTON : 1964

Contents

Bagworm Moths of the Western Hemisphere[1]

Introduction

This study is a preliminary revision of the tineoid family Psychidae of North and South America (including the West Indies). A treatment of such scope has been attempted only once (Gaede, 1936), and it was at best a very superficial study. Other published accounts consist mostly of original descriptions, taxonomic notes, and works treating restricted areas. As a result, the interpretations of previous authors have been erroneous in several instances; furthermore, a comprehensive key for the genera and species has never been attempted; thus, reliable identification of many of these insects has been virtually impossible.

The purpose of the present study is to re-evaluate the decisions of earlier workers; to complete and, where necessary, to correct their conclusions; and to investigate and utilize several taxonomic criteria in order to facilitate identification and a more comprehensive understanding of the insects presently included in this family.

The members of the family Psychidae present numerous problems that have greatly hindered a satisfactory treatment of the group. No single factor is unique for the family, and the close interrelation of many factors make their solution no easy task. The frequency with which many of these problems are met in the Psychidae demonstrates why this family has been considered one of the most perplexing groups, taxonomically, to be found in the Lepidoptera. Some of the more prevalent problems encountered are:

1. The extreme convergence in superficial appearance among a majority of the species; or, conversely, the extreme lack of obvious specific differentiation.

2. The sometimes extreme variation of diagnostic features in both adults and larval cases (e.g., wing venation in certain species).

3. The rarity in collections of a majority of the known species, with the consequent necessity of founding new species on the basis of one

[1] Modified from a doctoral dissertation submitted to Cornell University, 1962.

or a few specimens. (Undoubtedly this lack of adult specimens results in part from the exceedingly brief period of the year during which these forms may be collected.)

4. The disappearance or unavailability of the type specimens, a fact that is all too frequently linked with the inadequacy of the original description in providing diagnostic characters that can be relied upon.

5. The lack of biological data, a factor which can be of prime importance in a group that displays so much structural homogeneity. (This paucity in large part may be due to the extended life cycle of the larva, a factor which hinders breeding and rearing experiments.)

6. The lack of adequate collecting data, involving not only locality (especially for types) but also the association of larval cases with their corresponding adult, a fact of paramount importance in no. 7.

7. The erection of new species solely on the larval case or on the basis of a few general statements concerning the larva and/or pupa.

8. The polyphagous feeding habit of the larva. (This sometimes facilitates the rearing of these insects but of course makes it impossible to interpret precise relationships based on host preferences.)

9. The possibility of hybridization between certain species. (Sufficient evidence is at present lacking to support this supposition.)

Taxonomic keys and discussions of the larvae were omitted because immature stages of only a few species were available. A preliminary examination of setal maps, noting color markings and variations, etc., revealed only a few minor divergences among some of the species; thus, it is believed that larval systematics will not profoundly modify the present classification, which is based essentially on the adult male.

Future work should be concerned especially with the collecting of all stages of these insects. This work could best be done through rearings, a procedure that would provide not only an abundant series of specimens representing all stages but also would furnish material that definitely could be associated. Genetic information obtained from attempts to cross certain species and populations may be difficult to acquire but would be highly desirable.

All the specimens used in this study were borrowed from the collections of the United States National Museum, the British Museum, and the sources listed below. The abbreviations used to indicate where the material is deposited are:

AMNH—American Museum of Natural History, New York, N.Y.
ANS—Academy of Natural Sciences, Philadelphia, Pennsylvania.
BM—British Museum (Natural History), London, England.
CAS—California Academy of Sciences, San Francisco, California.
CM—Carnegie Museum, Pittsburgh, Pennsylvania.
CNC—Canadian National Collections, Ottawa, Ontario.
CPK—Collection of Charles P. Kimball, Sarasota, Florida.

CU—Cornell University, Ithaca, New York.
DEI—Deutsches Entomologisches Institut, Berlin, Germany.
DRD—Collection of the author, Washington, D.C.
INHS—Illinois State Natural History Survey, Urbana, Illinois.
MCZ—Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts.
MSU—Michigan State University, East Lansing, Michigan.
PM—Museum National d'Histoire Naturelle, Paris, France.
RNH—Rijksmuseum van Natuurlijke Historie, Leiden, Netherlands.
RWH—Collection of Ronald W. Hodges, Washington, D.C.
SNG—Senckenbergische Naturforschende Gesellschaft, Frankfurt, Germany.
UM—University of Missouri, Columbia, Missouri.
USNM—United States National Museum, Washington, D.C.
ZMHU—Zoologisches Museum der Humbolt-Universität, Berlin, Germany.
ZSBS—Zoologische Sammlung der Bayerischen Staates, München, Germany.

Gross measurements were made with a standard millimeter ruler. The wing expanse was measured from the extreme apex of one wing to that of the other side. In the larval cases, only those which were mature (i.e., which contained evidence of pupal material) were measured. The diameter in all instances refers to the greatest diameter observed along the length of the case.

Except in those cases where specific acknowledgment is given, all photographs were made by the author with an Exakta VX IIa 35 mm. camera. Drawings also were executed by the author, usually with the aid of a Kenivision Micro-Projector. Illustrations of some structures (e.g., the male and female genitalia of certain species) have been included to show the similarities in these organs that may exist between different species as well as the differences.

Definitions of nearly all the terms used in this study may be found in the glossary prepared by Torre-Bueno (1950). Terms relating to the male and female genitalia were in part derived from the discussions of Burrows (1923), Forbes (1923), and Klots (1956). Selected illustrations (figures 146–148, 310) have been labeled to show the precise application of many of the terms used in the discussions on wing venation and genitalia. The terminology used in discussing the distributions of the various species follows that of Smith (1935) and Lobeck (1948).

Many individuals and several institutions together have provided assistance in making this work possible. I wish primarily to express the gratitude I feel toward Dr. Frank Morton Jones (deceased, May 1962), whose very fine collection and extensive earlier work on the North American Psychidae provided a firm basis for the present revision. In addition to his valuable collection, Dr. Jones presented a fund of a thousand dollars to the Smithsonian Institution for future

research in this family; I am very grateful for having received this award. Considerable appreciation must be given to Dr. J. F. Gates Clarke, who first suggested this problem and helped promote and encourage my research, and to staff members of the United States National Museum for the many services they have extended me.

I wish to thank Dr. J. G. Franclemont, under whose guidance this work was performed, for his valuable advice concerning the manuscript and many perplexing problems, Dr. H. E. Moore, Jr., and Dr. J. A. Weidhaas, who also were very helpful in reading and criticizing the paper.

My sincerest appreciation is extended also to the following entomologists and the institutions or firms they represent for their cooperation in the loan of material: Dr. Harold J. Grant, Jr., Academy of Natural Sciences; Dr. Frederick H. Rindge, American Museum of Natural History; Mr. Alan Watson, British Museum (Natural History); Dr. C. Don MacNeil, California Academy of Sciences; Mr. George T. Okumura, California Department of Agriculture; Dr. Thomas N. Freeman, Canadian National Collection; Mr. Harry Clench, Carnegie Museum; Dr. Günter Petersen, Deutsches Entomologisches Institut; Dr. Frank W. Mead, Florida State Plant Board; Dr. Ronald W. Hodges; Mr. Charles P. Kimball; Mr. Paul Koehler; Dr. Richard B. Selander, Illinois State Natural History Survey; Michigan State University; Dr. W. T. M. Forbes, Museum of Comparative Zoology; Drs. Pierre Viette and Jean Bourgogne, Museum National d'Histoire Naturelle; Dr. A. Diakonoff, Rijksmuseum van Natuurlijke Historie; Dr. Heinz Schröder, Senckenbergische Naturforschende Gesellschaft; Mr. Clyde Stephens, United Fruit Company; Dr. Wilbur R. Enns, University of Missouri; Dr. W. Forster, Zoologische Sammlung der Bayerischen Staates; Dr. H. J. Hannemann, Zoologisches Museum der Humbolt-Universität.

Finally I would like to express my gratitude to my sister, Miss Carole Davis, for her services in typing the first draft of the manuscript.

Review of the Literature

The first published account of members of this family that definitely inhabit the Western Hemisphere was issued in 1827 by the Rev. Lansdown Guilding, who lived for several years on the island of St. Vincent in the Lesser Antilles. While residing there, he contributed a few short reports dealing with West Indian biology. In one, he described a new genus of psychid, *Oiketicus*, and two new species, *kirbyi* (q.v.) and *macleayi*, which he attributed to the West Indies.

Historically, the oldest name now considered referable to a species of Psychidae in this hemisphere is *Thyridopteryx ephemeraeformis*, which was described first by Haworth in 1803. At the time, the species was thought to be native to the British Isles; the first published suggestion that the species had an American origin was not proposed until 1841 by Edward Doubleday. The oldest name of a psychid now known to occur within the limits covered by this paper is that of *Fumaria casta* (Pallas), 1767.

The bulk of the literature for this region that has accumulated since these earliest references consists chiefly of descriptions of new species. To summarize this information and to note the workers who have contributed in varying degrees to the discovery of the American Psychidae, an alphabetical list of these authorities follows, showing the species (as originally proposed) for which they are responsible and the years that the names were first used. The number in parentheses after the author's name indicates the number of species that are considered synonyms in the present study (this does not include those species mentioned in the two appendices).

Barnes, William (0), *Thyridopteryx alcora*, 1905.

Barnes, W., and Benjamin, Foster (2), *Manatha jonesi*, 1922; *Eurukuttarus polingi*, 1924; *Oiketicus bonniwelli*, 1924.

Barnes, W., and McDunnough, James (0), *Manatha nigrita*, 1913; *Prochalia pygmaea*, 1913; *Apterona fragilis*, 1916.

Berg, Frederico (0), *Oiketicus geyeri*, 1877; *Oeceticus westwoodii*, 1882; *Oeceticus platensis*, 1883.

Butler, Arthur (0), *Hyaloscotes fumosa*, 1881; *Thanatopsyche canescens*, 1882.

Clemens, James (0), *Solenobia walshella*, 1862.

Davis, Don (0), *Lumacra haitiensis*, 1964; *L. hyalinacra*, 1964; *L. quadridentata*, 1964.

Dognin, Paul (0), *Animula limpia*, 1894.

Dyar, Harrison (1), *Platoeceticus aphaidropa*, 1914; *P. symmicta*, 1914; *Chalia zacualpania*, 1916; *Pachytelia pithopoera*, 1923; *Zamopsyche commentella*, 1923; *Pachytelia lepidopteris*, 1926.

Edwards, Henry (0), *Psyche conifcrella*, 1877; *P. fragmentella*, 1877; *Oiketicus davidsoni*, 1877; *Thyridopteryx meadi*, 1881.

Esper, Eugen (0), *Bombyx pulla*, 1785.

Felder, Rudolph (0), *Psychoglene basinigra*, 1874.

Freeman, Thomas (1), *Hyaloscotes sheppardi*, 1944.

Gaede, Max (0), *Oiketicus mexicanus*, 1936; *Thyridopteryx seitzi*, 1936.

Grossbeck, John (1), *Thyridopteryx pallidovenata*, 1917.

Grote, August (0), *Hymenopsyche thoracicum*, 1865; *Oiketicus abbotii*, 1880.

Grote, A., and Robinson, Coleman (0), *Psyche confederata*, 1868.

Guilding, Lansdown (0), *Oiketicus kirbyi*, 1827; *O. macleayi*, 1827.

Hampson, George (0), *Thantopsyche apicalis*, 1904.

Haworth, Adrian (0), *Sphinx ephemeraeformis*, 1803.

Herrich-Schäffer, Gottlieb (1), *Animula dichroa*, 1856; *Oeceticus fulgurator*, 1856.

Heylaerts, F. J. M. (0), *Chalia rileyi*, 1884; *Eumeta brasiliensis*, 1884; *Manatha edwardsi*, 1884; *Chalia künckelii*, 1901.

Jones, Frank (2), *Eurycttarus tracyi*, 1911; *Psyche cacocnemos*, 1922; *P. celibata*, 1922; *Oiketicus toumeyi*, 1922; *Thyridopteryx vernalis*, 1923; *Dendropsyche burrowsi*, 1926; *Oiketicus dendrokomos*, 1926; *Platoeceticus congregatus*, 1945; *P. watsoni*, 1945.

Koehler, Paul (4), *Chalia rebeli*, 1924; *Oiketicus elegans*, 1931; *Platoeceticus rugosus*, 1931; *P. tandilensis*, 1931; *Oiketicus horni*, 1938; *Chalia dispar*, 1939; *Chlania licheniphilus*, 1939; *Clania daguerrei*, 1939; *Cochliotheca fiebrigi*, 1939; *Platoeceticus chaquensis*, 1939; *P. hoffmanni*, 1939; *Oiketicus lizeri*, 1939; *O. oviformis*, 1939; *Zamopsyche haywardi*, 1939; *Clania borsanii*, 1953; *C. yamorkinei*, 1953; *Oiketicus ginocchionus*, 1953.

Lucas, Pierre (1), *Oiketicus poeyi*, 1856.

Moeschler, Heinrich (0), *Psyche surinamensis*, 1878.

Packard, Alpheus (2), *Oecticus coniferarum*, 1864; *Platoeceticus gloverii*, 1869; *Psyche carbonaria*, 1887.

Pallas, Peter (0), *Phalaena casta*, 1767.

Philippi, Rudolph (0), *Psyche chilensis*, 1860.

Schaus, William (6), *Oiketicus jonesi*, 1896; *Chalia tristis*, 1901; *C. vigasi*, 1901; *Oiketicus orizavae*, 1901; *Oiketicus specter*, 1905; *Platoeceticus marona*, 1905; *Thanatopsyche thoracica*, 1905; *Thyridopteryx microptera*, 1905; *Platoeceticus costaricensis*, 1911; *Chalia pizote*, 1927.

Siebold, Carl (0), *Psyche helix*, 1850.

Townsend, Charles (0), *Oiketicus townsendi*, 1894.

Vazquez G., Leonila (5), *Eurikuttarus hoffmanni*, 1941; *Oiketicus assimilis*, 1942; *O. fasciculatus*, 1942; *O. multidentatus*, 1942; *O. ochoterenai*, 1942; *O. sinaloanus*, 1942; *O. mortonjonesi*, 1949; *O. zihuatanejensis*, 1951.

Weyenbergh, Hendrik (1), *Oiketicus tabacillus*, 1884; *Psyche bergii*, 1884; *P. burmeisteri*, 1884; *P. cassiae*, 1884.

Zeller, Phillip (1), *Oiketicus gigantea*, 1871.

In the United States four workers have been prominent in the literature of this family. Dyar (1914–26) and Schaus (1896–1927) were concerned primarily with the Neotropical species, but Dyar wrote one paper (1923) that briefly treated several North American bagworms. Schaus described the greater number of species (10), but at least six of these represent synonyms. Barnes (1905–24), in collaboration with Benjamin and McDunnough, and especially Jones (1911–45) focused their attention on the Nearctic species. The latter author, through extensive collecting and in several short but informative papers, has contributed more toward the understanding of this difficult family than any other entomologist of the hemisphere.

In Mexico the efforts of Vazquez (1942–53) should be mentioned; her major work (a doctoral thesis) is entitled "Estudio Monografico de las Psychidae de Mexico." Relying in part on the early collections of Roberto Müller and Charles Hoffman as well as her own, Vazquez has described a total of eight new species from Mexico, of which five have been synonymized here. Twenty-one species are recognized by Vazquez as occurring in Mexico, but approximately nine of these names (including the five mentioned above) have been reduced to synonyms.

Comparatively little work has been accomplished in South America by entomologists of that area, and nearly all that has been done is the result of German nationals residing in Argentina. Two of the earliest workers were Berg (1877–83) and Weyenbergh (1884). Within recent years Koehler (1924–53) has presented several short papers on the systematics of Argentine psychids. He has described a total of 17 new species, but, unfortunately, many of these are not represented by adult males, and so they have been treated in the appendices of this paper.

Four other European entomologists need to be mentioned. Heylaerts (1881–1901), although not primarily interested in American insects, described four new species of bagworms which were sent to him from this hemisphere. The identities of three have been positively established; that of the fourth (*rileyi*) remains highly uncertain. Heylaert's major effort in this family culminated in his "Essai d'une Monographie des Psychides" (1881), but this was concerned mainly with the European species. The family Psychidae was cataloged for the world fauna by Dalla Torre and Strand (1929). This reference is most useful, but it has become somewhat outdated and it includes several genera (e.g., *Acrolophus*) which are no longer assigned to the Psychidae. The only previous comprehensive treatment of this family for the Western Hemisphere was that of Gaede (1936). In this work 17 genera and 68 species (including one genus and species since referred to the Cossidae) were considered in an extremely superficial manner.

Life History

The interesting life histories of the various members of this family demonstrate many phenomena that are unique or nearly so for the Lepidoptera. To supplement the present author's limited observations and conclusions acquired from the rearing of four species, the works of several entomologists have been summarized rather freely in the following discussion.

Distribution.—Present records indicate this family is widely distributed in the Americas, from as far north as Banff in Alberta, Canada (approximately 53° N. latitude), southward to the island of Navarino at the extreme tip of South America (55° S. latitude). In altitude these insects are known to range in the New World from near sea level to as high as 2200 meters in the Colombian Andes.

The flightless condition of the female psychid appears to be almost a contradiction of the very extended distribution that several species have attained; however, if one examines more closely their various means of dispersal, the phenomenon can be better understood. One important present day means of dispersal for bagworms is the acci-

dental shipment of infested plant stock by human agencies as attested by the relatively recent introductions of three old world species (*Apterona crenulella* f. *helix*, *Epichnopterix pulla*, and *Fumaria casta*) into widely diverse regions of the Western Hemisphere. In addition, *Solenobia walshella* possibly may have been introduced into this country from Europe during colonial times.

Certain biological adaptations of the Psychidae make such accidental transportation very possible: the ability of the larva to resist starvation for long periods of time, the polyphagous feeding habit (including, sometimes, the ability to subsist for brief periods on the dried leaves of its own case), the habit of firmly attaching the bag to almost any support for pupation, the high reproductive potential of a single female, and the occurrence of parthenogenesis in a few species. The last factor evidently has played a major role in the establishment of *Apterona crenulella* f. *helix* in this country. Theoretically, the successful introduction of a single egg is all that is necessary for a parthenogenetic insect such as *A. c.* form *helix* to become naturalized in certain favorable habitats.

Another means of dispersal of bagworms involves birds. An unusual observation by Jørgensen (1954) needs more investigation. He noted the viability of 30 or 40 larvae from eggs of *Acanthopsyche atra* L. that reportedly had passed through the digestive tract of a European robin (*Erithacus rubecula*). Mature females of this psychid were fed to these birds, and larval emergence from the fecal droppings were later observed. Small larval cases of other bagworms also have been reported attached to the legs of birds.

Wind dispersal of not only newly emerged larvae but also of various later stages may be an important factor over short distances. Young larvae, on emerging from the egg, often will spin silken threads and engage in an activity generally referred to as "ballooning," the common practice of many species of spiders. Strong breezes are capable of carrying these tiny larvae with their attached threads over short distances. Windstorms would be even more effective and could also aid in the dissemination of the more mature stages. Seitz (1912) has reported finding, on the treeless pampas of Uruguay, large branches of trees with living bagworms attached that obviously had been transported several miles by a violent storm (pampero).

Egg.—The eggs, which may number from 200 for some smaller species (Tutt, 1900) to as many as 6756 for the female of *Oiketicus kirbyi* (Stephens, 1962), almost invariably are deposited in the larval case, usually within the pupal shell that the female frequently abandons. The length of this stage varies considerably depending on the species; some (e.g., *Thyridopteryx ephemeraeformis*) pass the winter in this state. Stephens (1962) has reported that the egg stage

of *Oiketicus kirbyi* from Costa Rica is rather constant; hatching usually occurs within 29–33 days.

Larva.—The length of time required for this stage varies also with the species and sometimes considerably within a species. Several bagworms overwinter in this stage (usually as a last instar larva), but the shortest time spent by any species as a larva is approximately two to three months. The larval period of some of the larger tropical species is evidently very extended. *O. kirbyi* (in Costa Rica) has been observed by Stephens to require as long as 382 days for maturity, with considerable variation in the length of time. Considering such information, it is perhaps superfluous to mention that rarely is there more than one brood per year, but a second generation may be completed by some psychids inhabiting the warmer climates.

Very little is known about the number of larval instars, owing in part to the concealed nature of the moulting process (performed entirely within the case) and to the immediate eating of the cast skin by the larva. Jones and Parks (1928) briefly mention that there are "four or more molts." An actively feeding bagworm, when preparing to shed its cuticula, normally will attach its case and tightly close the anterior end as if preparing for pupation. Stephens, in recording the number of times this interruption occurred, concluded that *O. kirbyi* underwent approximately 12 to 20 molts during its larval history.

Apparently this family does not contain a single species which demonstrates host specificity. The polyphagous habit is well represented throughout the family, recorded hosts of many bagworms being numerous and widely varied. The more primitive members of the Psychidae, the so-called Micro-Psychina, are more prone to be scavengers, feeding on lichens and other low plant forms, and even resorting to an insectivorous diet at times. These tendencies also are carried over to the Macro-Psychina to some extent, but in this group the higher plant forms are preferred.

Even though the host range of most bagworms is frequently rather extensive, several species show a great reluctance to change food plants abruptly within the larval life. For many of these insects there seems to be a very definite preference for a single food plant, usually the host upon which the young larva first commenced to feed. Jones and Parks (1928) stated their belief that "food-plant choice by the young larvae rests on an inherited preference as well as on early proximity and reluctance to change. In this way impermanent food-plant races persisting for a number of years often result." This reluctance of a larva to feed successively on different plants probably varies with each species. The present writer, in rearing numerous larvae of *O. platensis*, observed that the insects feed indiscriminately on a wide variety of

plants (*Ostrya, Robinia, Ulmus, Vinca minor,* etc.) without any noticeable cessation in feeding from the changing of hosts.

The construction of a portable case by the larva is one of the most obvious features of the family. This unusual habit, however, is not restricted to the Psychidae, but it also occurs in the closely related family Tineidae as well as in such groups as the Coleophoridae and Lacosomidae. The basic construction of the case is of silk, which is spun from the labial glands of the larva. Various types and arrangements of ornaments usually are applied to this foundation. Both extremities of the case are open and are usually very flexible for a short distance from either end, thereby greatly facilitating the closing of the two apertures by the larva inside. The overall appearance of the case may vary considerably among different species of psychids, and it frequently may be diagnostic for a given species. In several instances, however, the architecture of the larval bag definitely is known to be of no specific importance. The Macro-Psychina frequently differ from the more primitive psychids in having the larval cases often covered with rather large fragments of plant material; on the other hand, the sacks of the Micro-Psychina are more tineid-like in construction: the exterior is nearly bare or it is covered often with minute fragments of lichens and/or soil particles.

Newly emerged bagworms very soon begin to construct somewhat conical cases that at first are carried upright. As the larva grows, the bag is enlarged correspondingly and, because of the increased weight, is carried in a pendant manner in which the insect clings to some support by means of its well-developed thoracic legs. The anal prolegs play an important role in retaining a firm grasp on the case. The anterior four pairs of abdominal prolegs, having lost a major part of their function, are reduced to mere vestiges.

Pupa.—All members of this family undergo pupation within the larval case. In preparing for pupation, the mature larva first firmly secures the upper end of the case to some support, thereby sealing the normal entrance. The larva of both sexes then reverses itself with the result that the head is directed toward the lower end of the case, and it pupates in this position. The male pupa of the Macro-Psychina is approximately half the size of the female, and it possesses the normal sheaths for the various body appendages; that of the female is very simple, with the leg and antennal sheaths being present only in the more primitive group. The length of time in this stage varies considerably within a species, between sexes, and among the species. In those that do not hibernate in this stage, the interval for the pupal instar may range from less than a week for some species to as long as 111 days for the male of *O. kirbyi* (Stephens, 1962).

Adult.—Immediately before the emergence of the adult, the male pupa gradually pushes itself partly out of the bag. Soon after leav-

ing the pupal shell, the male is ready for flight, and it may be observed clinging to the pupal remains or to the lower part of the case exercising its wings. The wing scales of several species are attached very loosely and often are easily lost at this time, leaving a portion of the wing membrane transparent. The flight time of the male may follow either a diurnal, crepuscular, or nocturnal habit, depending on the species. The response to light also varies accordingly; some species are somewhat phototropic while others almost never occur near lights.

For a majority of the members of the Macro-Psychina (those without functional legs), the initiation of the adult stage in the female does not involve an emergence from the larval case; in fact, seldom does this form leave the pupal shell until after copulation has occurred. In some of the more primitive members of this group (e.g., *Fumaria*) and in the Micro-Psychina, the females possess a normal complement of legs, and they are thus capable of leaving both the pupal shell and the larval case. After emerging, these forms usually may be observed clinging to the exterior of the case awaiting copulation with a male. In the genera *Diplodoma* and *Narycia*, which presently are considered by most authorities to be the most primitive members of the family, the female is fully winged and presumably goes through the same procedure in emerging as does the male.

More than likely adult males are attracted to receptive females by scent. The distance for this reception may be rather considerable, and in some instances it is believed to be as much as a mile or so. Observations by Hardenburg (1917) on *Acanthopsyche junodi* suggested that females had been visited by males which "could only have come from a couple of miles distant."

The actual mating procedure varies somewhat in this family, depending upon the location of the emergent female. In the lower forms, as stated previously, copulation with the male occurs outside the larval bag. In the higher psychids, mating has to occur within the case, and the entire abdomen of the male is highly specialized for this requirement. The typical procedure for such forms may be summarized as follows. After locating a case containing a receptive female, the excited male assumes a position at the lower end of the bag and begins to probe with its abdomen into the aperture of the case. Normally the only rupture in the female pupal case occurs at the anterior end, which projects downward, as did the male pupa. Thus, the abdomen of the male must first pass into this opening and extend the entire length of the female's body (fig. 145) before coming into contact with the female genitalia. This remarkable feat is accomplished primarily by the telescopic action of the male abdomen, which is capable of extending itself to three times its normal length.

693-052—64——2

The intersegmental membranes of this region are very developed and flexible, providing the necessary surface area for expansion. Relying chiefly upon pneumatic pressure from within its inflated body, the male extends its abdomen the necessary distance for eventual copulation. During actual union the moth becomes quiescent and remains suspended, head downward, for a brief period of usually less than ten minutes (Jones, 1927). After completion of the act, the abdomen is slowly withdrawn and the male flies away, often capable of mating again.

In a few old world genera (e.g., *Apterona*, *Luffia*, and *Solenobia*), parthenogenetic races are known to exist. A considerable amount of investigation of these insects has been made, primarily by Seiler (1917–49) and more recently by Narbel-Hofstetter (1946–55). It has been suggested, although by no means proven, that parthenogenesis also may occur occasionally in some species which are normally bisexual.

Egg laying commences immediately after mating. As stated previously, the eggs normally are deposited within the larval case and frequently within the pupal shell. In those species that normally mate outside the case (e.g., *Solenobia*), the females, after copulation, introduce the abdomen into the lower opening of the larval bag and deposit the eggs in an irregular mass, intermixed with wooly hair shed from the posterior segments of the female. Several authors have suggested that the eggs actually are not laid but mature within the parent's body, the young larvae eventually bursting through the body wall. Generalizations of this nature should be regarded with considerable skepticism until more careful observations can be performed. Following oviposition, the very shrunken female usually succeeds in forcing her way out of the case (if she has not already done so) and dropping to the ground eventually to perish.

Natural enemies.—Populations of bagworms in some areas of their distribution apparently can be seriously affected by the predation and parasitism of diverse organisms. Previous work in this phase of psychid biology has been quite insufficient, and no conclusions can yet be drawn concerning such phenomena as the frequency of host specificity among some of the parasites. One of the few papers devoted to this area of study has been that of Kochler (1939b). Recently published findings by Stephens have shown the existence of several new species of parasites attacking *Oiketicus kirbyi*.

Birds, lizards, and certain arachnids are known to prey upon members of the Psychidae. Birds have been noted eating both the larvae and adult females; however, the construction of the larval case sometimes offers adequate protection from such dangers. Occasionally bagworm cases are found pierced with holes that apparently

were made by birds (probably woodpeckers) in extracting the contents. Wolcott (1951) mentions an interesting example of predation by the lizards *Anolis pulchellus* and *Anolis cristatellus* in Puerto Rico. These animals reportedly swallow the larva inside its bag although the latter, presumably, is indigestible. The present writer has noticed that the egg-filled cases of *Oiketicus platensis* and *Thyridopteryx ephemeraeformis* are frequented at times by small spiders of the family Salticidae. As the young larvae emerged, several were eaten by the predators. Predaceous mites also have been reported among the egg masses: these arachnids probably attack the eggs primarily. Stephens further reports that ants ("probably *Solenopsis*") will occasionally feed on the larvae of *O. kirbyi*.

The Psychidae are parasitized by various other groups. The most common is the Ichneumonidae, which contain several species of larval parasites. Other families of Hymenoptera that are known to attack bagworms are the Bethylidae, Braconidae, and Chalcidae. Dipterous parasites are known from the families Sarcophagidae and Tachinidae. In addition to these insects, Stephens has found that a fungus, *Beauvaris bassiana* Balsamo, and a protozoan, *Nosema* species, are parasitic on the larvae of *O. kirbyi*.

In the collections of the United States National Museum there are a few larval cases of *Oiketicus toumeyi* that have been used for nest sites by a vespid wasp, identified by Dr. Karl Krombein as *Pachodynerus acuticarinatus* (Cameron). Mud nests consisting of approximately four to eight cells were constructed within the case, where the larvae of this intruder were reared. In one larval case was found the female pupal shell of a psychid; in another, the dried remains of a nearly matured larva. Since the bag of the latter was blocked at both ends by the nests of the wasp, it is possible that the death of the bagworm was caused indirectly by the presence of the visitor. The relationship of these two insects is evidently not that of host-parasite. It is also possible that the wasp makes use of the case after the original inhabitant has either died or pupated. *Pachodynerus acuticarinatus* previously has been reported (Rau, 1940) utilizing for nesting sites the old, vacated cells of another hymenopteran, *Sceliphron*.

Characters

The morphological characters that are employed in this family to delimit genera and species present many problems of character evaluation in defining taxonomic categories. Clench (1959), in working with a small group of South African psychids, has accurately emphasized this predicament. Several species or groups of species, although resembling each other very closely in most features and thus

demonstrating obvious relationships, sometimes may diverge extraordinarily in respect to other characters that in other families of Lepidoptera would be considered of generic or even suprageneric importance. This prominent divergence of several important characters throughout the Psychidae adds greatly to the difficulty of precisely defining the family. This divergence also emphasizes the present widely accepted principle of systematics that the evaluation of any character must be appraised for the particular group under consideration. Frequently this principle is applied to the family level, and often it may be extended to higher categories. Within the Psychidae, however, as observed in this study, the proper appraisal of supposed generic characters sometimes has to be decided for a given group of species. Certain characters may be relied upon to define several genera, but these same characters may vary within other comparable units, where they may be of no more than specific importance.

Criteria for generic limits were acquired in this study from the examination of such groups as *Oiketicus* and *Cryptothelea*. The information gained thereby was then employed in the recognition of supposed equivalent groups. It is obvious that more characters need to be investigated and correlated. In the African *Monda* group, Clench has discovered very significant generic characters in the thoracic anatomy as well as in the more traditional morphological areas of the body. Similar differences also may be present among some of the New World genera of Psychidae.

In the following paragraphs several characters are discussed under their various stages in an effort to summarize their applicability to the systematics of this family.

Male.—Systematic research in this family has been and still is predominantly dependent upon the adult male. The paucity of sufficient characters in the other stages and the extreme specialization in a majority of the females probably will always make this so.

Antennae: Several characters of value have been noted on this organ: the presence of lateral pectinations as they may occur along the entire length of the shaft; the relative length of the pectinations when present; the relative length and arrangement of the sensory hairs. One of the few characters that appears invariably to be of generic importance in the Psychidae is the origin of the pectinations from the segments of the shaft. The rami may originate basad (*Fumaria*), mesad (in most genera), or distally (as is the tendency for *Hyaloscotes*). In most species the rami usually arise more basad from those segments near the base of the antenna and gradually become more distad in the outer segments. Thus, as a standard in comparing this condition, observations near the middle of the antennae have been made in this study.

Palpi: For our New World psychids, these structures offer limited use in classification, owing to their extreme reduction in nearly all the species. Only in the more primitive genera (*Epichnopterix* or below) do they retain an observable size; they may be of generic value, if not of specific importance, in these groups.

Thorax: As previously mentioned, this region of the body may bear taxonomically important characters, usually as observed in the varying proportions and outlines of the lateral sclerites. This feature has not been fully evaluated in the present study. Dissections representing four genera (viz, *Astala*, *Cryptothelea*, *Oiketicus*, and *Thyridopteryx*) were examined. Relatively minor differences were noted between the subalar sclerites of the mesothorax, but some of this may be due in part to intraspecific variation. A thorough study of the thorax in this regard eventually should be performed.

Wings: Very little divergence exists in the wing color of most species of psychids. Few genera throughout the world demonstrate a distinct color pattern, and in the Western Hemisphere this characteristic is restricted primarily to *Oiketicus*. Normal variation in the color tone of certain members of this genus (e.g., *O. kirbyi*) has resulted in a rash of superfluous names.

Of more importance than the actual wing color is the shape of the wing scales and their distribution over the wing membrane. The shape of the scale varies according to its relative location on the wing. Those near the wing base usually tend to be the broadest and possess the greatest number of apical teeth (if any); a gradual narrowing of the scales is evident toward the outer margin. Consequently, it is both necessary and convenient to select a particular area of the wing to compare and discuss. In this study the discal cell of the forewing was chosen.

The wing venation is sometimes exceedingly variable in this family; however, it is believed by the present author that for many species this feature has been greatly overemphasized. Most of the variation that is observed usually involves the medial veins. Only occasionally is the radial system also affected. The exact cause of this inconsistency is not definitely known, but perhaps it is caused by unusual environmental influences on the larva and/or pupa. In some instances, the variation that is observed may result, in part at least, from the rearing of certain species. A study of the importance that rearing may exert, however, has not been pursued. Only certain species exhibit pronounced variation; others demonstrate a remarkably constant venation. A very consistent pattern can be observed in *Oiketicus kirbyi*. The wing veins of 65 specimens (130 wing pairs) of this species were examined, and only two minor variations from the norm

were noted. These involved merely the connate condition (versus typically stalked) of M_2 and $_3$ in the hindwing.

Legs: Several important characters are to be noted in the legs of these moths. The armature of the tibiae is one of the more obvious, which, unfortunately, has been neglected largely by a number of earlier workers. The presence or absence of the epiphysis or of the small tibial spurs occasionally provide absolute species characters (as in *O. platensis*), and frequently these are correlated with other characters in order to aid in defining genera. The condition of the epiphysis (or the spurs of the tibiae) should not itself be considered a firm basis for generic separation as some authors erroneously have believed in the past. Examination of the interspecific variation of this structure as it occurs in such genera as *Solenobia*, *Hyaloscotes*, and *Oiketicus* should make this evident.

Leg ratios, involving usually the relative lengths of the tibia and tarsal segments, often can be rather useful. Characters of this sort have been applied in the erection of the new subgenus *Paraoiketicus*.

Tarsal claws may be of considerable taxonomic importance (Clench, 1959). In the American forms, however, no divergences were noted from the smoothly curved and simple condition except for relatively minor interspecific differences with regard to size.

Abdomen: The main systematic importance of the abdomen lies in the structure of the abdominal sclerites, particularly the last (eighth) sternite. This is frequently of specific importance, but, like so many other characters, it varies, and so it should be used with the usual degree of taxonomic discretion. In the specific descriptions of this study, the eighth sternite has been discussed in connection with the male genitalia since these structures are closely associated in life and frequently in slide preparations.

Genitalia: The copulatory organs of the male offer only limited possibilities for specific and generic delimitation in this family, as contrasted to their great significance in many groups of Lepidoptera. In some genera (e.g., *Cryptothelea*) the genitalia can be relied upon in delimiting the genus, but for many psychids of both hemispheres species belonging even to different genera scarcely can be distinguished on the basis of this apparatus alone. This convergence of structure may be due in part to the very similar mating habits of the members of this family.

Female.—In the more primitive psychids, various specializations have not advanced as far as in the higher members of this family. In most of the lower forms the female has retained the antennae, functional legs, and a normally sclerotized body wall with the result that specific or at least generic boundaries can be determined. Furthermore, the ovipositor is reasonably elaborate and similar in

general form to the Tineidae. In the higher psychids, however, all body appendages have become vestigial and the body wall largely membranous. The external genitalia, in addition, vary from poorly developed to almost nonexistent. For these reasons it is doubtful that practical taxonomic characters, applicable on the specific level, ever will be discovered for many of the females. One feature of the female is apparently present in all known species, and thus it provides a good character for the family as a whole: the anal hair tuft; however, it is not entirely unique but is believed to occur in certain tineid moths (e.g., *Ecarfottia*).

Both the internal as well as the external genitalia were examined for as many species as available. Major differences were observed among widely separated genera, and minor ones were sometimes found among closely related groups (e.g., *Oiketicus* and *Thyridopteryx*); however, characters for differentiating species apparently are largely absent within a given genus. Small differences in the external genitalia of a few species of *Oiketicus*, after a sufficient series has been studied, may be determined to have reliable value; considerable variation, however, in the structure of this organ is known to exist as noted in approximately four dissections each of *O. kirbyi* and *O. platensis*. No sclerotization is known to occur within the internal organs, but a heavily chitinized and basiphilic structure, which has not been named, was characteristically present in the spermathecal duct of all the psychids examined. This elongate structure in part may serve in keeping the lumen of this tube open. The most divergent feature of the internal genitalia were the bifid accessory glands that, owing to their pronounced variability, are probably not of specific value within a particular genus.

Pupa.—Certain external structures (e.g., ridges, furrows, minute spines, and anal hooks) that evidently are of taxonomic importance are present on the male and female pupae. These have been discussed by Jones (1945) and heavily relied upon by Koehler (1939a). Unfortunately, the structures have not been investigated sufficiently for inclusion in the present study.

More attention has been given to the female pupa; considering the extreme reduction of the adult, adequate characters in this form would be very desirable. In this sex, various rugosities on the posterior abdominal segments (the pygidium, in particular) have been employed primarily for specific identification. A review of the works of Jones and Koehler shows that these minor characters, like those of the larval case, have limited application in the classification of the family as a whole. In some instances generic groupings possibly may be indicated by pupal characters, but this has not been confirmed. Presently it is believed that such characters are essentially of only specific importance, and thus they should be

considered supplementary to the accepted criteria for specific classification and not a comparable substitute. It is the present author's conviction that, because of the various complications involved, the erection of new species for this family should not be based primarily on the female stages. If a species is so uncommon that adult males cannot be obtained easily, it is far better to leave the insect unnamed until that stage can be collected and studied.

Larval case.—For some time, the familiar bags which the larvae construct have attracted considerable attention from various naturalists. This has been unfortunate as some workers have described new species solely from such artifacts. To a large extent this incorrect procedure has resulted from the comparative rarity of the adult male and from the misconception that the architecture of the case inevitably was diagnostic. It is now realized by most workers that the superficial appearance of the bags may vary considerably, depending upon the host to which a particular larva restricts itself. The basic construction, moreover, is not influenced by such variation, but it may be identical, or nearly so, for some related species. Thus, if used with discretion, the structure of the larval case on occasion may have specific value, but less frequently, generic.

Classification

Because a revision of the new world Psychidae necessarily involves a study of the most specialized members of the family, a study of this type can offer little toward an understanding of the classification and phylogeny of the group as a whole. Several old world genera, including some of the most primitive forms of the family, were examined during the preparation of this work. The results are as yet inconclusive and will be discussed more fully in subsequent papers. The writer's intention is eventually to revise the North American Tineidae and, through such a study and a more complete review of the old world annectant groups, to arrive perhaps at a more natural classification for the several families of Tineoidea.

The precise limits of this "family" have not as yet been ascertained. The examinations of several authors in the higher relationships of the bagworms have been so superficial that diverse opinions concerning the classification have arisen. The majority of these earlier concepts were reviewed adequately by Tutt (1900, pp. 117–127).

The Psychidae frequently are divided into two groups: the Micro-Psychina and the Macro-Psychina. Several characters, involving both morphology and behavior, serve to separate the two groups (Ford, 1945). Intermediate conditions for some of these characters exist, however, as both Tutt and Ford have pointed out; thus, the division is not sharply defined, but it does serve to emphasize certain

TABLE 1.—*Summary of some fundamental generic characters*

Genera	Antenna: origin of pectinations	Antenna: no. of segments	Epiphysis	Meso-thoracic tibia: no. of spurs	Meta-thoracic tibia: no. of spurs	Forewing: no. of veins	Hindwing: no. of veins	Inter-calary cell	Accessory cell	Hindwing: connection between Sc+R_1 and Rs	Female: functional legs
Solenobia		20–24[♀] 27–36[♂]	+	2	4	11	6	−	+	−	+
Fumaria	basal	12[♀] 18–20[♂]	+	2	4	11	7	−	−	−	+
Epichnopterix	basal	17–19	−	2	4	10	7	−(+)	−	−	−
Apterona		18–20	−	0	0	10	7	−	−	−	−
Prochalia	apical	18–19	+	1	0	12(11–9)	8(7)	−	−	−	−
Zamopsyche	apical	19–20	+	0	0	11(10)	8(7)	−	−	−(+)	−
Naevipenna	mesal	21–26	+	1	1	12	8	−	−	+	−
Cryptothelea	mesal	13–33	−	1	1	12(11–10)	8(7)	−,+	−	−	−
Dendropsyche	?	18	−	0	0	11	7	−	−	−(+)	−
Lumacra	apical	24–34	+	0	0	12	8(7)	+,−	−	+	−
Curtorama	basal	26–28	−	0	0	12	8	−	−	+	−
Astala	mesal	22–30	−	0	0	11(10)	7	−(+)	−	+	−
Hyaloscotes	mesal-apical	18–29	+,−	0	0	11	7	−	−	+	−
Basicladus	basal	23–34	−	0	0	11	7	−	−	+	−
Coloneura	mesal	17–18	−	0	0	10	7	−	−	+	−
Thanatopsyche	mesal	37–44	−	1	1	12	7(8)	+(−)	−	+	−
Animula	apical	?–40	−	1,0	1,0	10(9)	6(5?)		−	+	−
Biopsyche	mesal	33–40	+	1	1	12	8(7)	−	−	+	−
Oiketicus	mesal	32–46	+,−	2(1)	2(1)	12(11)	8(7–4)	+(−)	−	+	−
Thyridopteryx	mesal	30–36	−	2(1)	2(1)	11(14–9)	7(8–5)	+	−(+)	+	−

+ present − absent ( ) intraspecific variation

phylogenetic tendencies. Usually included within the Micro-Psychina are such genera as *Narycia, Diplodoma* (in which the females are fully winged), *Luffia, Taleporia, Solenobia,* and several others. The Macro-Psychina, which is the larger group, commences with such genera as *Fumaria* (=*Fumea*) and *Epichnopterix* and includes the more advanced psychids.

Some authors (e.g., Meyrick, Stainton) have radically separated these two divisions, placing the Micro-Psychina in the Tineidae and the Macro-Psychina in the Bombycoidea. Packard (1895), although dividing the Psychidae into two families (Talaeporidae and Psychidae), emphasized their close relationship and believed that these two groups represented a natural series evolving directly from the Tineidae. Hampson (1893), like Meyrick and others previous, placed the Micro-Psychina with the Tineidae but realized the former were closely related to the higher forms. The Psychidae, as thus recognized, were divided by Hampson into five subfamilies. A few of these (e.g., Chaliinae) were based on very artificial characters that have since proved unreliable.

Tutt (1900) believed that the bagworms represented one superfamily and he included several families that, under present day concepts, probably would be considered no more than tribes. Ford (1945), in one of the more recent discussions on this subject, likewise remarks that one superfamily is represented here; he adds that this group has "no close relation to other Lepidoptera from which they branched off in very early times."

The adult female has become specialized along different lines and at a correspondingly dissimilar rate than the male. This phenomenon accounts for the lack of correlation between certain fundamental characters of the male and female. If the characters of the female are emphasized in selecting the primary divisions of the family, then a classification different from that derived on the basis of the adult male results. Because the male is more conservative than the female in this family, at least equal if not greater emphasis should be placed on the male in deciding fundamental relationships.

Forbes (1923) reiterated the common belief that the psychids were linked closely to the lowest tineoids and divided the group into three subfamilies. Included in his most primitive subfamily (Lypusinae) are those bagworms possessing winged females and very distinct palpi. Forbes rather dubiously has referred one North American insect, *Kearfottia albafasciella* Fernald, to this group, largely on the basis of the anal hair tuft present on the female abdomen; indeed, this tuft is very similar to that of *Narycia. Kearfottia,* however, diverges from these primitive psychids in certain features (especially in the male and female genitalia) that show closer affinities to the Tineidae.

How many tineids also possess this anal tuft is not known presently, but more may be expected. The remaining two divisions recognized by Forbes have wingless females. The Talaeporiinae contains females that retain the normal body appendages and mate outside the larval case. In the Psychinae species exist in which all external appendages of the female are vestigial and copulation occurs within the case.

The two genera *Fumaria* and *Epichnopterix* are related closely as indicated by the males and the immature stages. The adult females, however, are very divergent. The female of *Fumaria* possesses a normal complement of legs and antennae that are lacking conspicuously in the vermiform female of *Epichnopterix*. Thus, following the classification of Forbes, *Fumaria* would be placed in the *Talaeporiinae*, and *Epichnopterix*, in the Psychinae. Other workers, apparently not realizing the condition of the female in *Epichnopterix*, also have erred in this manner.

Emphasis on the structure of the male and less familiarity with the female has resulted in a different partitioning of the family than that by Forbes. Kozhantshikov (1956), in one of the more recent and comprehensive works on the family, recognizes two subfamilies based largely on the anal veins in the forewings. He includes approximately the same assemblage of species within the family as previous authors and unites the Lypusinae and Talaeporiinae of Forbes into a single subfamily, Psycheoidinae. Kozhantshikov's second division, Psychinae, corresponds essentially to that of several earlier workers; however, he places *Epichnopterix* and *Fumaria* in the Psycheoidinae even though the female of the former is similar to that of the higher psychids. Duponchel and Herrich-Schäffer recognized a similar division approximately a hundred years earlier.

The purpose of this section largely has been to emphasize the difficulty involved in designating major divisions within the family Psychidae. At present no substitute scheme of classification can be offered. The situation is similar to the problem of subordinal delimitation in the order Lepidoptera, where, owing to various degrees of intermediacy, primary divisions are exceedingly difficult to define. In regard to the Psychidae, this problem extends to the family level. For the present the system that seems the best to follow is that which recognizes the two general groups within the family, Micro-Psychina and Macro-Psychina, with the recognition that various intermediates occur. These divisions have not been given definite taxonomic rank but can be used with convenience in discussing generalities.

The following family description includes the most primitive forms (Lypusinae) although the relationships of these are somewhat in doubt. Seitz (*in* Strand, 1912) suggested a polyphyletic origin for the Psychidae but did not elaborate on the subject. Possibly the

Lypusinae as recognized by Forbes represents an evolutionary line from the Tineidae entirely different from that of the higher psychids and one that is placed perhaps more correctly within the Tineidae. Present knowledge, however, appears to indicate an almost continuous series from the Macro-Psychina down through the more primitive psychids into the Tineidae. One rather conspicuous interruption occurs between such forms as *Solenobia* and *Epichnopterix,* but certain intermediate genera (e.g., *Luffia* and *Fumaria*) show evidence of intergradation. As previously mentioned, an adequate set of correlated characters as yet has not been proposed for defining the Psychidae. The inclusion of the entire group within the Tineidae does not seem logical at the present: such a heterogeneous group would not be equivalent to other lepidopterous families. Eventually, before the limits of the two families can be established, a comprehensive study will have to be made on the pertinent tineoid groups as they exist in the Palearctic region. The Acrolophidae, whose relative position has fluctuated between a subfamily status within the Tineidae (and sometimes Psychidae) to that of a separate family, also should be considered in such a study.

In an attempt to clarify or at least illustrate the basic generic relationships followed in this paper, a diagram is presented on page 25. Because the genera are not arranged alphabetically, an explanation of relationships should be attempted though the relative position of some groups is very questionable. This arrangement is based primarily on the male genitalia because these structures, more than any of those studied, seem to reflect the major evolutionary tendencies of the genera. Wing venation and leg structure, although frequently demonstrating conspicuous differences intergenerically, show little correlation and significance in the overall evolutionary trend. A comprehensive knowledge of the immature stages and other adult characters not thoroughly treated in this study (e.g., thoracic anatomy and the female genitalia) may change markedly the position of some genera as presented in this preliminary arrangement.

As indicated in the diagram, apparently there are three lines of specialization within the Psychidae indigenous to the Western Hemisphere. A general tendency prevails, with some exceptions, within each of these lines toward a reduction in wing venation and tibial armature.

One phyletic line is that terminating with the genus *Dendropsyche*. This group consists of rather slender-bodied, broad-winged moths with elongate male genitalia. The pulvillus at the base of the valve is obsolescent and the saccus well developed. The genera *Prochalia* and *Zamopsyche* are believed to represent the most primitive members

of this line primarily because of the *Solenobia*-like pattern of case construction and the lichenivorous feeding habit of the larvae.

The evolutionary series culminating with the genus *Coloneura* commences as somewhat robust insects and possesses genitalia with a prominent basal development (pulvillus) of the valves. The tegumen and vinculum, in contrast to the preceding group, tend to be relatively broad and the saccus in some species is reduced in length.

The genera *Thyridopteryx* and *Animula* climax a division which appears to be the most specialized of our new world psychids. Evolutionary tendencies in this group demonstrate such features as: loss of wing scales; gradual elongation of the forewings with a reduction in size of the secondaries; modification of the antennae with the outer segments becoming serrate; reduction in size and occasional loss of the tibial armature; elongation of the male genitalia with a gradual basal enlargement of the aedeagus; and other specializations. It should be mentioned that the general structure of the female genitalia suggests certain primitive features in this group, but this development may have been retained or evolved secondarily in conjunction with an increasing fecundity. Certainly this division, or at least certain elements of it, has become the most successful group of psychids in our hemisphere.

Conclusions

A total of 104 names have been referred correctly to the Psychidae in the Western Hemisphere. Of this number, 74 species and 2 subspecies have been considered in this revision possibly to be valid. In addition, 6 unnamed larval cases, which, in part at least, may eventually represent new species have been described. In the main body of this work, 55 species (including 3 which are new) and 2 subspecies are treated. These are grouped into 20 genera, 6 of which are described for the first time. In the two appendices 19 names are discussed; for this group the adult males either have not been discovered or have not been examined by the writer. Several of the names eventually may fall into synonymy, thus further reducing the number of valid species.

Readily observable morphological differences among comparable stages of many species of psychids usually are very slight. Lack of specific characters in the larvae is probably the result of great similarity in life history: all species are case bearers throughout the larval stage and tend to be general feeders.

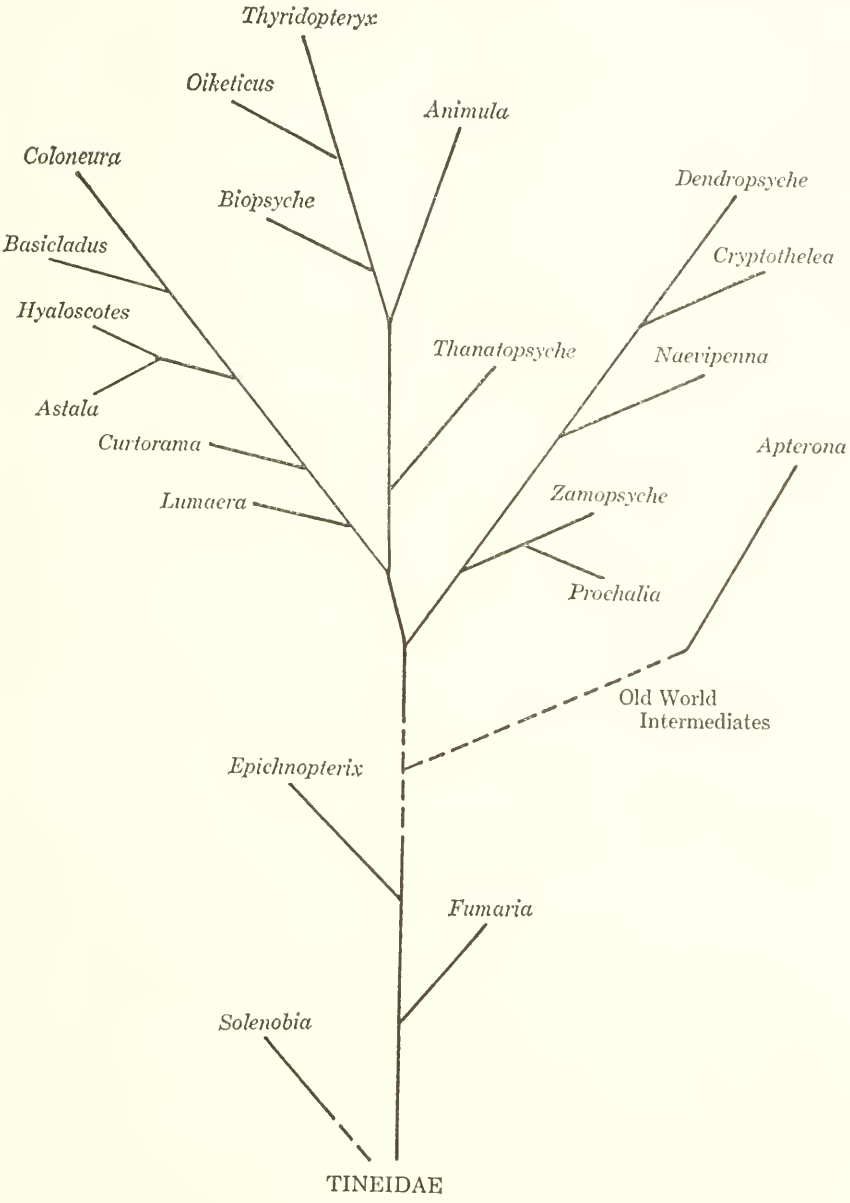
Speciation, with the formation of genetic barriers, likewise has occurred in the adult male with little to no morphological differentiation. The males of most species are unicolorous or possess nearly transparent wings. Obviously there has been rather limited selective

pressure toward a more cryptic color pattern that would better enable the moths to remain hidden from predators during the day. Evidently little advantage lies in this feature for most members of the family, probably because of the very brief life span (approximately 3 days) of the males. Thus, in the Psychidae, one finds an exiguous development of wing pattern observed in several other families of moths (e.g., Noctuidae) that possess longer adult stages and are, therefore, in greater need of such protection. It might be concluded that the function of wing scales (to provide a color pattern) has been largely lost in the Psychidae, with the result that in many species the scales have become reduced in area, loosely attached, and easily discarded.

Although its relative importance is not known, the determination of mating pairs in the majority of psychids can not involve superficial features such as recognition characters because the female imago is unable to make a selection in mating and may accept any male that attempts copulation. The larval cases, on the other hand, sometimes display a much greater difference among species, and possibly do initiate a recognition stimulus, along with an olfactory response, in the male. The olfactory stimulation, however, is believed to be of far greater importance in mate attraction, as evidenced by the fact that the males of all known species of Macro-Psychina usually possess broadly bipectinate antennae. Such an antenna provides a greater surface area and, thus, a greater number of olfactory receptors, assuming, of course, that these receptors are evenly distributed over the antenna.

The similarity of male genitalia probably is due to the very specialized mating behavior. This procedure makes exacting demands upon these structures, and natural selection largely has prevented extravagant variation from the selected type. In most families of Lepidoptera apparently there is not so great a necessity for such rigidity and compactness of the genitalia, and the result is that more diverse forms have developed within a given group.

The members of this family are capable of achieving a wide distribution by means of various adaptations. These methods of dispersal enable a species eventually to occupy most of the habitats favorable to its existence, but the methods probably do not provide an efficient means of gene exchange among widely separated populations. It is conceivable that certain widespread species (e.g., *Oiketicus kirbyi*) are composed of a number of reproductively isolated sibling species. However, this should not be assumed until so proven, or else an even greater number of superfluous names could result, originating from a failure to recognize what actually may be the normal variation in a given species.



GENERIC RELATIONSHIPS OF NEW WORLD PSYCHIDAE

Checklist

1. Solenobia Duponchel
   1. walshella Clemens
2. Fumaria Haworth
   Fumea Haworth
   2. casta (Pallas)
3. Epichnopterix Hübner
   3. pulla (Esper)
      fiebrigi (Koehler)
4. Apterona Millière
   4. crenulella form helix Siebold
5. Prochalia Barnes and McDunnough
   5. pygmaea Barnes and McDunnough
6. Zamopsyche Dyar
   6. commentella Dyar
7. Naevipenna Davis
   7. aphaidropa (Dyar)
8. Cryptothelea Duncan
   Platoeceticus Packard
   8. surinamensis (Moeschler)
   9. watsoni (Jones)
   10. macleayi (Guilding)
   11. nigrita (Barnes and McDunnough)
   12. congregata (Jones)
   13. symmicta (Dyar)
   14. gloverii (Packard)
      jonesi (Barnes and Benjamin)
      pizote (Schaus)
9. Dendropsyche Jones
   15. burrowsi Jones
10. Lumacra Davis
   16. brasiliensis (Heylaerts)
      marona (Schaus)
      costaricensis (Schaus)
   17. künckelii (Heylaerts)
   18. haitiensis Davis
   19. quadridentata Davis
   20. hyalinacra Davis
11. Curtorama Davis
   21. cassiae (Weyenbergh)
      rebeli (Koehler)
      rugosa (Koehler)
12. Astala Davis
   22. confederata (Grote and Robinson)
      lepidopteris (Dyar)
   23. hoffmanni Vazquez
   24. polingi (Barnes and Benjamin)
   25. edwardsi (Heylaerts)
      carbonaria (Packard)
   26. tristis (Schaus)
   27. zacualpania (Dyar)
   28. vigasi (Schaus)

13. Hyaloscotes Butler
    29. fumosa Butler
    30. pithopoera (Dyar)
        sheppardi Freeman
14. Basicladus Davis
    31. tracyi (Jones)
        cacocnemos (Jones)
    32. celibatus (Jones)
15. Coloneura Davis
    33. fragilis (Barnes and McDunnough)
16. Thanatopsyche Butler
    34. chilensis (Philippi)
    35. canescens Butler
17. Animula Herrich-Schäffer
    Animula, subgenus sensu stricto
    36. limpia Dognin
    37. microptera (Schaus)
    38. dichroa Herrich-Schäffer
    Artipenna Davis, subgenus
    39. seitzi (Gaede)
18. Biopsyche Dyar
    40. thoracica (Grote)
    41. apicalis (Hampson)
19. Oiketicus Guilding
    Paraoiketicus Davis, subgenus
    42. bergii (Weyenbergh)
        oviformis Koehler
    43. borsanii Koehler
    44. geyeri Berg
        tabacillus Weyenbergh
        jonesi Schaus
        thoracicus Schaus
    45. zihuatanejensis Vazquez
    Oiketicus, subgenus sensu stricto
    46. toumeyi Jones
        mortonjonesi Vazquez
    47. assimilis Vazquez
    48. specter Schaus
    49. townsendi Townsend
        bonniwelli Barnes and Benjamin
            t. dendrokomos Jones
            t. mexicanus Gaede
                multidentatus Vazquez
    50. abbotii Grote
    51. kirbyi Guilding
        fulgurator Herrich-Schäffer
        poeyi Lucas
        gigantea (Zeller)
        orizavae Schaus
        sinaloanus Vazquez
        ochoternai Vazquez
        fasciculatus Vazquez
    52. platensis Berg

693-052—64——3

20. Thyridopteryx Stephens
    Hymenopsyche Grote
        53. meadi Hy. Edwards
        54. alcora Barnes
        55. ephemeraeformis (Haworth)
            coniferarum (Packard)
            pallidovenata Grossbeck
            vernalis Jones

Adult males known but not examined

1. Psychoglene basinigra Felder
2. "Zamopsyche" haywardi Koehler
3. Oiketicus lizeri Koehler
4. "Chalia" rileyi Heylaerts
5. Oiketicus westwoodii Berg

Adult males unknown

1. "Psyche" burmeisteri Weyenbergh
2. "Platoeceticus" chaquensis Koehler
3. Hyaloscotes coniferella (Hy. Edwards)
4. "Chalia" daguerrei Koehler
5. "Oiketicus" davidsoni Hy. Edwards
6. "Chalia" dispar Koehler
7. Oiketicus elegans Koehler
8. Hyaloscotes fragmentella (Hy. Edwards)
9. Oiketicus ginocchionus Koehler
10. "Platoeceticus" hoffmanni Koehler
11. Oiketicus horni Koehler
12. "Clania" licheniphilus Koehler
13. "Platoeceticus" tandilensis Koehler
14. "Clania" yamorkinei Koehler

Family Psychidae

Male.—Head with divergent, hairy vesture. Mouthparts usually vestigial; tongue absent or represented at most by minute projections that do not extend beyond head vesture; labial palpi 3-segmented in most primitive forms, but usually reduced to minute, hairy tubercules. Antennae less than half length of forewing, either bipectinate or simple; scape without pecten. Ocelli absent except in few primitive genera. Armature of legs consisting of tibial spurs, which vary from none to two on middle tibia and from none to four on hindtibia, tending to become minute and spinelike in higher genera.

Wings typically thinly scaled, becoming translucent or transparent in many genera. Primaries with accessory cells present or absent; R_5 extending to outer margin below apex; base of medius almost always preserved within cell of both wings, often divided to form intercalary cell; 1A at least partially present, either curving to fuse with 2A, or parallel to 2A; 2A and 3A separate at base, then joining

either for short distance or for entire length. Secondaries usually with $Sc+R_1$ and Rs parallel to wing apex, occasionally with basal crossvein and/or with outer one near apex of discal cell; 1A frequently disappearing, 2A and 3A present.

Male genitalia.—Uncus absent. Tegumen usually hood-shaped, often cleft at apex. Valves typically short and broad; pulvillus at base of valve becoming prominent in higher forms; apex of sacculus usually distinctly set off from rest of valve. Saccus poorly developed in primitive psychids, but tending toward great elongation in more advanced genera.

Female.—Similar to males in most generalized forms with gradual reduction of all external structures (fig. 144) in higher groups. Antennae, if present, usually simple. Abdomen with dense tuft of long hair concentrated on seventh segment.

Female genitalia.—Ovipositor in lower forms greatly extended, with usually three pairs of elongate apodemes; extremely reduced in more specialized genera, with apodemes sometimes lost. Internal genitalia relatively simple in lower groups with bursa copulatrix reduced in size; ductus seminalis short, usually not exceeding bursa in length. In higher forms, internal genitalia become more modified, probably in accordance with increased egg capacity; bursa may greatly exceed size of spermatheca, and seminal duct may become very lengthened and convoluted (as in *Oiketicus*).

Key to Genera Based on Characters of Adult Male

One species, *Apterona crenulella* form *helix*, that has been introduced recently into the United States at present is not known in this country from the adult male. Thus, parthenogenetic female specimens collected within the geographical scope of this treatment cannot be determined on the basis of the key presented below. Since it was not possible to devise comprehensive keys for the females or immature stages, suffice it to say here that the coiled larval case of this species (fig. 69) is unique among our New World psychids; the known cases of the other included species are straight and elongate. In case a male specimen should be found within our area, this form has been included in the following key.

1a. Foretibia with epiphysis present.
  2a. Hindtibia with four prominent spurs.
    3a. Antennae broadly bipectinate; hindwing with 7 veins; epiphysis basad and as long as foretibia or nearly so . . . . . **2. Fumaria casta**
    3b. Antennae simple and ciliate; hindwing with 6 veins; epiphysis subapical and approximately one-third length of foretibia.
      1. Solenobia walshella

2b. Hindtibia with two minute spurs or less.
4a. Mesothoracic tibia with one or two small apical spurs.
5a. Costal margin of forewing with sclerotized stigma (fig. 155).
7. Naevipenna
5b. Costal margin of forewing without stigma.
6a. Antennae with less than 25 segments; hindtibia without spurs.
5. Prochalia pygmaea
6b. Antennae with more than 26 segments; hindtibia with one or two minute spurs.
7a. Hindwing with a basal crossvein present (fig. 167); wings usually fully scaled, but in few species nearly transparent.
19. Oiketicus
7b. Hindwing without basal crossvein; wings transparent.
18. Biopsyche
4b. Mesothoracic tibia without spurs.
8a. Forewing with 11, sometimes 10, veins; discal scales hairlike.
9a. Wing expanse 25 mm. or more; antennae with more than 25 segments; hindwing with basal crossvein distinctly present.
29. Hyaloscotes fumosa
9b. Wing expanse less than 20 mm.; antennae with less than 25 segments; hindwing with basal crossvein absent or sometimes indistinctly indicated . . . . . **6. Zamopsyche commentella**
8b. Forewing with 12 veins; discal scales oblanceolate . . . **10. Lumacra**
1b. Foretibia without an epiphysis.
10a. Hindtibia with four prominent spurs; 10 veins present in forewing.
3. Epichnopterix pulla
10b. Hindtibia with two minute spurs or less; 10 or more veins in forewing.
11a. Mesothoracic tibia with small apical spur.
12a. Both wings fully scaled; hindwings normally with 8, rarely 7, veins.
13a. Wing expanse 26 mm. or less; forewing unicolorous.
8. Cryptothelea
13b. Wing expanse exceeding 30 mm.; forewing not unicolorous, with dark discal spot . . . . . **52. Oiketicus platensis**
12b. Wings transparent or nearly so; hindwings normally with 6 or 7, rarely 8 veins.
14a. Antennal pectinations abruptly decreasing in length before apex (fig. 385), antennae becoming strongly biserrate on outer fourth; meso- and metathoracic tibiae with either one or two minute apical spurs . . . . . **20. Thyridopteryx**
14b. Antennal pectinations gradually decreasing in length to tip of antennae; meso- and metathoracic tibia with one apical spur.
15a. Forewing with 12 veins . . . . . **16. Thanatopsyche**
15b. Forewing with 10 or fewer veins . . . . . **17. Animula**
11b. Mesothoracic tibia without spurs.
16a. Forewing with 10 veins.
17a. Antennae serrate . . . . . **4. Apterona crenulella**
17b. Antennae bipectinate.
18a. Forewings devoid of scales, transparent; hindwings with outer margin greatly extended (fig. 37) . . . **39. Animula seitzi**
18b. Forewings thinly scaled; hindwings normal, evenly rounded (fig. 31) . . . . . **33. Coloneura fragilis**

16b. Forewing with 11 or more veins.

19a. Forewing with 12 veins; hindwing 8-veined.

21. Curtorama cassiae

19b. Forewing with 11 veins; hindwing 7-veined.

20a. Hindwing with Sc+R_1 and Rs parallel, without distinct basal crossvein, although sometimes with vestige of one; posterior margin of eighth abdominal sternite evenly rounded (fig. 202).

15. Dendropsyche burrowsi

20b. Hindwing with Sc+R_1 and Rs either converging at point above cell, or connected by prominent crossvein; posterior margin of eighth sternite more or less truncate (figs. 209–218).

21a. Antennal pectinations arising basad (fig. 377); apex of forewing evenly rounded (fig. 162) . . . . . **14. Basicladus**

21b. Antennal pectinations arising mesad or beyond (figs. 375, 376); apex of forewing not evenly rounded, somewhat acute (figs. 160, 161).

22a. Forewing with scales of discal cell either broadly oblanceolate, or, if hairlike, with apices almost invariably bidentate (fig. 341); vinculum of male genitalia longer than broad . . . . . **12. Astala**

22b. Scales of discal cell very slender and hairlike (fig. 351) with acute apices; vinculum broader than long.

30. Hyaloscotes pithopoera

1. *Solenobia* Duponchel

Solenobia Duponchel, Hist. Nat. Lep France, Suppl., vol. 4, pp. 201, 428–430, 1842; Cat. Method. Lep. Eur., p. 358, 1844–46.—Zeller, Linn. Ent., vol. 7, pp. 332, 343, 1852.—Herrich-Schäffer, Syst. Bearb. Schmett. Eur., vol. 5, pp. 26, 40, 1853; p. 88, 1855.—Stainton, List Brit. Animals Brit. Mus., vol. 16, p. 5, 1854; Insecta Britannica, vol. 3, p. 19, 1854.—Frey, Tineen und Pterophoren Schweiz, p. 13, 1856.—Stainton, Man. Brit. Butterfl. Moths, vol. 2, p. 285, 1859.—Hofmann, Berl. Ent. Zeitschr., vol. 4, pp. 35–40, 1860.—Wocke, Stett. Ent. Zeit., vol. 23, p. 68, 1862.—Heinemann, Schmett. Deutschl. und Schweiz, vol. 2, no. 2, p. 21, 1870; Anal. Tab. Best. Schmett., vol. 2, pt. 2, p. 1, 1877.—Wocke *in* Staudinger, Cat. Lep. Eur. Faun., p. 266, 1871.—Nolcken, Arbeit. Nat. Ver. Riga, new ed. 4, vol. 24, p. 467, 1871.—Millière, Cat. Lep. Alpes-Maritimes, p. 295, 1875.—Sand, Cat. Lep. Berry et Auvergne, p. 154, 1879.—Frey, Lep. Schweiz, p. 335, 1880.—Snellen, Vlinders Nederl., vol. 2, pp. 416, 444–445, 1882.—Barrett, Ent. Mo. Mag., vol. 31, p. 163, 1895.—Chapman, Ent. Mo. Mag., vol. 32, p. 79, 1895.—Barrett, Ent. Mo. Mag., vol. 33, p. 125, 1897.—Durrant, Ent. Mo. Mag., vol. 33, p. 220, 1897.—Reutti, Verh. Naturw. Ver. Karlsruhe, vol. 12, p. 305, 1898.—Tutt, Nat. Hist. Brit. Lep., vol. 2, pp. 155–162 (etc.), 1900.—Dyar, U. S. Nat. Mus. Bull. 52, p. 353, 1902 [1903].—Rebel *in* Spuler, Schmett. Eur., vol. 2, p. 187, 1910.—Forbes, Cornell Univ. Agric. Exp. Sta. Mem. 68, p. 143, 1923.—Meyrick, Rev. Handb. Brit. Lep., p. 835, 1928.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 27, 1929.—Fletcher, Mem. Dep. Agric. India, vol. 11, p. 205, 1929.—McDunnough, Check List Lep. Canada and USA, pt. 2, p. 103, 1939.—Kozhantshikov, Fauna SSSR, vol. 3, pt. 2, pp. 131, 132, 249, 1956.—Sauter,

Ann. Soc. Suisse Zool. Mus. Hist. Nat. Genève, vol. 63, fasc. 3, no. 27, pp. 451–555, 1956.—Forster and Wohlfahrt, Schmett. Mitteleur., vol. 3, p. 193, 1960.

Type of genus.—(*Psyche*) *clathrella* Fischer V. Röslerstamm, 1834. Designated by Tutt, 1900.

Male.—Head with rough bristly hairs; palpi reduced, consisting of two short segments barely extending from beneath head. Antennae simple, ciliated. Foretibia very short, without epiphysis in majority of species; present in few species. Middle tibia slightly longer than that of forelegs, with pair of apical spurs. Hindtibia greatly lengthened, with paired median and apical spurs.

Wings (fig. 149) relatively long and slender; fully scaled. Forewing with 11 veins; all veins normally separate with exception of R_3 and R_4, which are completely fused; accessory cell usually present; base of media always preserved, rarely divided within discal cell (of both wings) forming intercalary cell; base of 1A present, parallel to 2A+3A, but gradually disappearing farther out; 2A and 3A uniting near base, continuing as fused vein to margin. Secondaries usually with 6 veins (in one European species only 5 veins present, owing to complete fusion of M_2 and M_3); $Sc+R_1$ and Rs more or less parallel throughout length with no crossvein present; M_2 and M_3 either separate or variously stalked.

Male genitalia.—Tegumen broad, hood-shaped, with shallow notch at apex. Vinculum somewhat broadened ventrally; saccus undeveloped. Valves broadened basally with prominent spinelike process midway along lower margin, sloping abruptly to much narrower distal half. Anellus undeveloped. Aedeagus curved, with base forked, sending short process caudad, diverging slightly from aedeagus. Eighth sternite (fig. 188) simple, without furcal arms; much smaller than eighth tergite (fig. 188a).

Female.—Palpi very reduced, 1-segmented. Antennae varying in length and segmentation depending on species; either long with 12–26 segments, or short with 3–9 segments. Legs short but all segments present. Foretibia unarmed; armature of meso- and metathoracic tibia variable, with either 1–2 apical spurs or spurs absent. Tarsi 3–5 segmented.

Forewings represented only by minute flaplike vestiges. Hindwings smaller, almost completely absent.

Female genitalia.—(Fig. 296.) Eighth and ninth abdominal segments long and very protrusible, with three pairs of apophyses; first pair weakly developed, short, entirely within last abdominal segment; second pair longest, originating in last segment, extending usually far forward into abdomen; third pair long, originating in eighth segment often at level of ostium. Curved, transverse bar

situated immediately anterior to ostium, frequently fused with bases of third apophyses. Seventh segment with caudal hair tufts located laterally and ventrally. Spermatheca and accessory glands small, both arising from vestibulum. Ductus seminalis of medium length, slightly shorter than bursa copulatrix.

1. *Solenobia walshella* Clemens

FIGURES 1, 64, 149, 169, 188, 188a, 243, 296, 319, 361; MAP 2

Solenobia walshella Clemens, Proc. Ent. Soc. Phil., vol. 1, pp. 132–133, 1862.—Packard, Guide Study Insects, p. 346, 1869.—Chambers, Can. Ent., vol. 5, pp. 74–75, 1873; vol. 8, p. 19, 1876.—Tutt, Brit. Lep., vol. 2, p. 199, 1900.—Dyar, U.S. Nat. Mus. Bull. 52, no. 4072, 1902 [1903].—Forbes, Cornell Univ. Agric. Exp. Sta. Mem. 68, p. 144, fig. 103, 1923.—Forbes *in* Leonard, Cornell Univ. Agric. Exp. Sta. Mem. 101, p. 539, 1928.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 35, 1929.—McDunnough, Check List Lep. Canada and USA, part 2, no. 9539, 1939.—Williams, Journ. Morph., vol. 75, pp. 251–260, figs. 1–2, 1944.—Tietz, Lep. Penn., p. 157, 195?.—Sauter, Ann. Soc. Suisse Zool. Mus. Hist. Nat. Genève, vol. 63, fasc. 3, no. 27, p. 541, 1956.

MALE.—(Fig. 1.) Scales of face light brown, those of vertex usually with whitish tips. Apical segment of palpi 2.5x length of basal one. Antennae (fig. 361) 27–36 segments, brownish fuscous, spotted slightly with white. Foretibia (fig. 169) with subapical spur approximately ⅓ length of tibia.

Forewings white to greyish white, mottled with almost equal amount of brownish fuscous; scales (fig. 319) of cell broadly oblanceolate with usually 3–4 apical dentations; 11 veins present, with accessory cell; intercalary cell absent in both wings. Hindwings light grey, 6-veined; M_2 and M_3 either stalked or connate. Wing expanse 12–14 mm.

MALE GENITALIA.—(Fig. 243.) As described for genus.

FEMALE.—Length 6–7 mm. Antennae long with 20–24 segments. Middle tibia with either one or two apical spurs. Hind tibia with apical pair. Tarsi 5-segmented.

FEMALE GENITALIA.—(Fig. 296.) Bases of third pair of apophyses connected by curved transverse bar. Accessory glands bifid with two small symmetrical lobes; spermatheca and accessory glands much smaller in volume than vestibulum.

CASE.—(Fig. 64.) 7–10 mm. long; greatest diameter 1.5–2 mm.; fusiform in outline, of somewhat leathery consistency. Silk greyish color, covered frequently with tiny sand grains; fragments of lichens, larval excrement, various small animal remains also may be attached.

TYPE.—In the Academy of Natural Sciences, Philadelphia.

TYPE LOCALITY.—Not definitely stated, but the collector, Benjamin D. Walsh, was a resident of Rock Island, Illinois (Clemens, 1862).

RECORDED HOSTS.—"Lichens" (Chambers, 1873).

Distribution.—(Map 2.) A common species in the eastern part of its range, *S. walshella* extends as far west as the Till Plains of Illinois, south to the Northern Embayed Section of Virginia, and north to the St. Lawrence Valley Section of southeastern Canada.

Discussion.—As mentioned earlier (see p. 8), the insect presently recognized as *Solenobia walshella* is possibly a European introduction into North America. The specific name of our common *Solenobia*, therefore, eventually may fall into synonymy. Sauter (1956) stated the possibility that *S. walshella* and the bisexual form of the widespread European species *S. triquetrella* Hübner were identical. An examination of the foretibia, however, is sufficient to separate the males of these two species: in *S. walshella* the foretibia of the male possesses an epiphysis that is lacking in *S. triquetrella*.

A few authorities have supposed for several years that more than one species, or more than one race of the same species, of *Solenobia* are present in North America. Sauter (1956) mentioned a parthenogenetic race of "*S. walshella*" from Montreal, Canada, that, according to him, differed in no morphological way from *S. triquetrella*.

The taxonomy of *S. walshella* probably is much more complicated than is presented here. Considerable more study, emphasizing genetics as well as life history, will have to be made in order properly to evaluate this complex.

Material examined.—140 ♂♂, 18 ♀♀, 39 cases:

CANADA: Quebec: Old Chelsea, ♂ with case, May 5, CNC; 2 ♂♂ with cases, May 5–24; ♀, May 8, CM. Ontario: Ottawa East, ♂ with case, April 6, CNC.

UNITED STATES: Delaware: Rehoboth, 4 cases, USNM. Watertown, 12 ♂♂, March 6–April 25, USNM. Wilmington, 2 ♂♂, March 2–5, USNM; 6 cases, USNM. District of Columbia: Washington, ♂, April; 2 ♂♂ with cases, March 24; ♂, April 20, USNM. Illinois: Decatur, 14 ♂♂, March 16–April 23, USNM. Putnam Co., ♂, April 30, USNM. Maine: Augusta, 4 ♀♀ with cases, May 1; 3 ♀♀ with cases, April 15, USNM. Bar Harbor, 2 ♀♀ with cases, May 19, USNM. Maryland: Wheaton, ♂, April 8, USNM. Massachusetts: Beverly, 3 cases, USNM. Fitchburg, ♀ with case, May 1, USNM. Jamaica Pond, ♂ with case, May 12, USNM. Melrose Highlands, ♂, May 11, USNM. New Jersey: Elizabeth, 5 ♂♂, Sept. 4–21; ♀, Sept. 14, CM. Essex Co., ♂, May 8, USNM. Princeton, 2 ♂♂, Aug., CM. Watchung Mts., 7 ♂♂ with 4 cases, March 30–April 13, USNM. New York: Aurora, ♂, June 4, CU. Ithaca, 2 ♂♂, May 5–20, CU. Lockport, ♂ with case, April 17, CU. McLean, ♂, May 21, CU. Mecklenburg, ♀ with case, May, DRD. Scarsdale, 6 ♂♂, April 21–May 3, USNM. Ohio: Cincinnati, 4 ♂♂, April 2–24, ANS. Pennsylvania: Ambridge, ♂, May 22, CM. Finleyville, 2 ♂♂, May 1–7, CM. Longwood, ♂, April 1, USNM; 2 cases, USNM. New Brighton, ♂, May 5, USNM. Oak Station, 21 ♂♂, April 19–May 5; 5 ♀♀, April 19–May 10, CM; 10 ♂♂, April 19, USNM; 5 ♂♂, April 25–May 3, AMNH. Pittsburgh, 8 ♂♂, April 22–May 6, CM; 3 ♂♂, April 12–22, AMNH; 5 ♂♂, April 29–May 11, USNM. Roxboro, 6 ♂♂, April 25–May 5, ANS. Sharpsburg, 5 ♂♂, April 15–May 22, CM. Virginia: Peninsular, case, USNM.

2. *Fumaria* Haworth

Fumaria Haworth, Lep. Brit., p. 473, 1812 [1811].—Tutt, Nat. Hist. Brit. Lep., vol. 2, p. 317, 1900.—Fletcher, Mem. Dep. Agric. India, vol. 11, p. 97, 1929.—McDunnough, Check List Lep. Canada and USA, pt. 2, p. 103, 1939.—Kozhantshikov, Fauna SSSR, vol. 3, no. 2, p. 189, 1956.

Fumea Haworth, Trans. Ent. Soc. London, p. 340, 1812.—Stephens, Illustr. Brit. Ent., vol. 2, pp. 81–83, 1829.—Siebold, Stett. Ent. Zeit., vol. 12, p. 345, 1851.—Healy, Ent. Weekly Intell., vol. 8, p. 59, 1860.—Staudinger and Wocke, Cat. Lep. Eur. Faun., p. 64, n. 99, 1871.—Heylaerts, Ann. Soc. Ent. Belg., vol. 25, pp. 68, 72, 1881.—Höfner, Wiener Ent. Zeit., vol. 2, pp. 245–246, 1883.—Kirby, Cat. Lep. Heter., p. 523, 1892.—Barrett, Ent. Monthly Mag., vol. 30, pp. 265–269, 1894.—Tutt, Nat. Hist. Brit. Lep., vol. 2, pp. 316–320, 1900.—Staudinger and Rebel, Cat. Lep. Palaearct. Faun., p. 399, n. 745, 1901.—Rebel *in* Spuler, Schmett. Eur., vol. 2, p. 183, 1910.—Lampert, Grosschmett. und Raupen Mitteleur., p. 295, 1907.—Rebel, Fr. Berg's Schmett.-Buch, ed. 9, p. 461, n. 414, 1910.—Strand *in* Seitz, Macrolep. World, vol. 2, p. 367, 1912.—Dalla Torre, Ent. Jahrb., vol. 38, p. 144, 1929.—Fletcher, Mem. Dep. Agric. India, vol. 11, p. 97, 1929.—Meyrick, Rev. Handb. Brit. Lep., p. 478, 1928.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 58, 1929.—Hering *in* Brohmer, Tierw. Mitteleur., vol. 1, p. 302, 1932.—Gaede *in* Seitz, Macrolep. World, vol. 14, p. 487, 1929; vol. 6, p. 1186, 1936.—Bourgogne and Paclt, Časopis, Acta Soc. Ent. Česk., vol. 45, pp. 47–48, 1948.—Kozhantshikov, Fauna SSSR, vol. 3, no. 2, pp. 130, 132, 189, 1956.—Forster and Wohlfahrt, Schmett. Mitteleur., vol. 3, p. 185, 1960.

Epichnopterix Herrich-Schäffer, Syst. Bearb. Schmett. Eur., vol. 5, p. 62, n. 2, 1855 (not Hübner).—Staudinger and Wocke, Cat. Lep. Eur., p. 27, n. 30, 1861.

Type of genus.—*Phalaena casta* Pallas, 1767. Designated by Fletcher, 1929.

Male.—Small, usually unicolored moths of various shades of fuscous. Palpi 1-segmented, elongate, slender, length approximately 4–5x that of diameter. Antennae bipectinate, pectinations arising from base of each segment. Epiphysis (fig. 170) well developed, variable length. Mid- and hindlegs each possessing pair of very prominent tibial spurs, one member of pair usually longer than other.

Wings (fig. 150) evenly scaled, 11- and 7-veined with base of medius undivided in cell of both wings. Primaries usually with 1A only partially developed, frequently not reaching margin; 2A and 3A united near base, continuing as fused vein to margin. Hindwing with crossvein between Sc+R_1 and Rs absent.

Male genitalia.—Short, ovoid in general appearance. Valves with pulvilli lacking; apex of sacculus with small spines. Anellus well developed, bilobed, enclosing aedeagus, which is strongly curved, without basal dilation. Vinculum triangular, largely membranous. Saccus undeveloped.

Eighth sternite (fig. 189) very simple, short, broadly transverse, furcations absent; smaller in area than eighth tergite.

Female.—Apterous with well-developed legs possessing 5-segmented tarsi and apical pair of claws. Hindtibia with single short, blunt spur. Other legs lacking armature. Antennae many-segmented, simple. Abdominal plates darkly pigmented; body essentially naked except for thin scattering of pale hairs and dense, posterior ring of silky hairs.

Female genitalia.—(Fig. 297.) Mostly membranous except for three pairs long, slender apodemes, shortest and longest pair originating in last abdominal segment; third pair, medium length, originating in penultimate segment.

Discussion.—As pointed out by Tutt (1900), Dalla Torre (1929), Bourgogne and Paclt (1948), and others, Haworth in 1812 proposed the substitutive name *Fumea* for his genus *Fumaria* (1811), which he thought was preoccupied by a genus of plants. Under present circumstances, however, this is considered to be an incorrect procedure as the names in botany and zoology are independent of one another. Thus, by priority the genus *Fumaria* should be considered the valid name, and it is so treated in this paper.

2. *Fumaria casta* (Pallas)

Figures 3, 65, 150, 170, 189, 244, 297, 320, 362, 363; Map 1

Phalaena casta Pallas, Nov. Act. Acad. Natur. Curios, vol. 3, p. 435, "t. 7, f. 1, bis 5," 1767.

Fumea casta (Pallas) Meyrick, Rev. Handb. Brit. Lep., p. 478, 1928.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 58, 1929.—Fletcher, Mem. Dep. Agric. India, vol. 11, p. 97, 1929 (synonym of *F. nitida* Haworth).—Hering *in* Brohmer, Tierw. Mitteleur., vol. 1, p. 302, 1932.—Jones and Farquhar, Psyche, vol. 41, no. 1, p. 30, pl. 3, figs. 1–10, 1934.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1186, 1936.—Ford, Proc. S. London Ent. Nat. Hist. Soc. 1945–46, p. 106, 1946.—Forster and Wohlfahrt, Schmett. Mitteleur., vol. 3, p. 186, 1960.

Fumaria casta (Pallas) Fletcher, Mem. Dep. Agric. India, vol. 11, p. 97, 1929 (synonym of *F. nitida* Haworth).—McDunnough, Check List Lep. Canada and USA, pt. 2, no. 9538, 1939.

Note: For references to the European literature dealing with the synonymy of this species prior to 1929, see Dalla Torre and Strand (1929).

Male.—(Fig. 3.) Body, wings fuscous. Antennae (fig. 362) with 18–20 segments. Apex of forewing rounded, that of hindwing more acute. Scales (fig. 320) of cell in forewing broad with dentate apices of usually 5–6 teeth; scales of secondaries in general more slender. All veins of primaries separate except R_3 and R_4, which are connate; veins of hindwing all separate. Wing expanse 11–13 mm.

Male genitalia.—(Fig. 244.) As described for genus.

Female.—Approximately 6–8 mm. long. Antennae usually 12–13 segments. Female genitalia (fig. 297) as described for genus.

CASE.—(Fig. 65.) Approximately 9–13 mm. long. Silk of whitish grey, heavily covered by small pieces of plant fragments, usually by segments of grass stems, arranged longitudinally, often surpassing length of case, projecting in irregular fashion posteriorly.

TYPE.—Lost.

TYPE LOCALITY.—Europe.

RECORDED HOSTS.—"Consists chiefly of grasses, mosses, lichens, and other low plants, although the insect may occasionally exhibit carnivorous tendencies as evidenced by its feeding on scale insects, and, in the laboratory when very hungry, on the living larvae and females of its own species" (Farquhar, 1934).

DISTRIBUTION.—(Map 1.) In North America *Fumaria casta* occurs primarily through the Appalachian Highlands from southeastern Canada to eastern Pennsylvania. In the Old World it is reportedly widely distributed from North Africa to Finland and from Asia Minor west to Great Britain. (For a more thorough discussion of the distribution, see Tutt, 1900.)

DISCUSSION.—This insect reportedly was discovered first in this country in 1931 near Jamaica Pond, Boston, Massachusetts. The population, which has since spread to several adjacent states, undoubtedly originated as an introduction from Europe. The identity of this moth in the New World was made first by F. M. Jones, and its biology in our area was investigated by Farquhar (1934).

MATERIAL EXAMINED.—70 ♂♂, 16 ♀♀, 41 cases:

CANADA: Overbrook, ♂, June 10; 3 ♀♀, June 15, CM.

UNITED STATES: CONNECTICUT: New Haven, 2 ♂♂, June 12–16, CU. West Haven, 3 ♂♂, June, USNM; 2 ♂♂, 3 cases, CU. MASSACHUSETTS: Boston, 45 ♂♂, May 10–July 1; 9 ♀♀, May–June; 23 cases, USNM. Roslindale, ♂, June 28, USNM. NEW YORK: Locust Valley, Long Island, 6 ♂♂, June 13; 2 ♀♀, June 13, CU. Monroe County, 4 ♂♂ with cases, June 18–July 5, CPK; 2 ♂♂ with cases, June 14–18; 2 ♀♀ with cases, June 14–24, CU; 2 ♂♂, July 3–9; 5 cases, USNM. Scarsdale, 2 ♂♂ with cases, June 6, USNM. PENNSYLVANIA: Germantown, Morris Arboretum, 2 cases, USNM.

3. *Epichnopterix* Hübner

Epichnopterix Hübner, Verz. bek. Schmett., p. 399, 1816 [1826].—Tutt, Nat. Hist. Brit. Lep., vol. 2, p. 347, 1900.—Staudinger and Rebel, Cat. Lep. Eur. Faun., pt. 1, p. 398, 1901.—Lampert, Grosschmett. Raupen Mitteleur., p. 295, 1907.—Dalla Torre, Entom. Jahrb., vol. 36, p. 130, 1927.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 85, 1929.—Kozhantshikov, Fauna SSSR, vol. 3, no. 2, p. 263, 1956.

Fumea Herrich-Schäffer, Syst. Bearb. Schmett. Eur., vol. 5, p. 61, n. 1, 1855 (not Haworth).—Staudinger and Wocke, Cat. Lep. Eur., p. 28, n. 21, 1861.

Epichnopteryx [sic] Heylaerts, Tijdschr. Ent., vol. 18, p. xcvi, 1875; Ann. Soc. Ent. Belg., vol. 25, p. 72, 1881.—Kirby, Cat. Lep. Heter., p. 520, 1892.—Barrett, Ent. Mo. Mag., vol. 30, p. 249, 1894.—Rebel *in* Spuler, Schmett. Eur., vol. 2, p. 181, 1910.—Rebel *in* Berge, Fr. Berge's Schmett.-Buch, ed. 9,

p. 458, 459, n. 412, 1910.—Strand *in* Seitz, Macrolep. World, vol. 2, p. 365, 1913.—Meyrick, Rev. Handb. Brit. Lep., p. 477, 1928.—Hering *in* Brohmer, Tierw. Mitteleur., vol. 1, p. 301, 1932.—Forster and Wohlfahrt, Schmett. Mitteleur., vol. 3, p. 176, 1960.

TYPE OF GENUS.—*Bombyx pulla* Esper, 1785. Designated by Kirby, 1892.

MALE.—Moths of small size with slender bodies. Palpi of one segment, subglobose, length approximately 1.5x that of diameter. Antennae broadly bipectinate, pectinations gradually decreasing in length toward apex, arising from base of each elongate segment. Prothoracic legs shortest in length; epiphysis absent. Mesothoracic tibiae with prominent pair of apical spurs. Metathoracic legs the most well developed, two pairs of tibial spurs; one pair situated apically, other located ¼ distance from apex of tibia.

Wings (fig. 151) with all veins arising separately from cell; both wings with base of medius undivided within cell. Primaries with 10 veins; R_3 and $_4$ united entire length; M_1 and 1A absent; 2A and 3A completely fused, sometimes slightly separated at extreme base. Secondaries with 7 veins; without crossvein between $Sc+R_1$ and Rs; M_1 absent as in forewings.

MALE GENITALIA.—Short, stout. Valves with pulvilli absent; apex of sacculus spined. Vinculum triangular, gradually tapering to form short, indistinct saccus. Anellus well developed, bilobed, inclosing aedeagus, which is straight, simple. Eighth sternite simple, broadly transverse, slightly smaller in area than eighth tergite.

FEMALE.—"Vermiform; naked; head small, ventral, mouth organs modified, not functional; legs appear as minute warts; antennae as warts; eye spots dark; wings obsolete; thoracic segments with whitish corneous dorsal shields, the head carrying pupal head parts; skin transparent (some of the internal organs visible); reddish yellow in tint with faint anterior transverse dorsal abdominal plates" (Tutt, 1900).

3. *Epichnopterix pulla* (Esper)

FIGURES 2, 66, 151, 171, 190, 245, 245a, 321, 364

Bombyx pulla Esper, Schmett., vol. 3, p. 232, table 44, fig. 8, 1785.

Epichnopterix pulla (Esper) Dalla Torre and Strand, Cat. Lep., pars 34, p. 87, 1929 (synonym of *E. plumella* Schiffermüller).—Kozhantshikov, Fauna SSSR, vol. 3, no. 2, p. 268, 1956.

Epichnopteryx [sic] *pulla* (Esper) Meyrick, Rev. Handb. Brit. Lep., p. 377, 1928.—Hering *in* Brohmer, Tierw. Mitteleur., vol. 1, p. 301, 1932.—Forster and Wohlfahrt, Schmett. Mitteleur., vol. 3, p. 177, pl. 24, fig. 32; pl. 26, figs. 7–9, 32, 1960.

Cochliotheca fiebrigi Koehler, Arb. Morph. Tax. Ent., vol. 6, p. 38, 1939 (new synonymy).

NOTE: For references to the European literature dealing with the synonymy of this species prior to 1929, see Dalla Torre and Strand (1929).

MALE.—(Fig. 2.) Vesture of wings and body dark fuscous. Antennae (fig. 364) with 17–19 segments; sensory hairs approximately 2.5–3x diameter of pectinations in length. First tarsal segment equal length in all legs (fig. 171). Tibial spurs nearly as long as or equalling length of first tarsal segment. Hindfemur slightly swollen, outer ⅔ distinctly lighter color than rest of leg. Wings evenly, thinly, uniformly covered with very narrow hairlike scales (fig. 321). Wing expanse 11.5–15 mm.

MALE GENITALIA.—(Fig. 245.) Apex of tegumen rounded, with prominent cleft. Aedeagus with base slightly expanded. Eighth sternite (fig. 190) with anterior and posterior margins curved inward.

CASE.—(Fig. 66.) Length 13–15 mm.; diameter 3–4 mm. Roughly cylindrical, approximately same diameter throughout; covered with longitudinally arranged pieces of grass that usually extend entire length of case.

TYPES.—Lost (*B. pulla* Esper); in Deutsches Entomologisches Institut (*C. fiebrigi* Koehler, lectotype).

TYPE LOCALITIES.—Europe (*B. pulla*); Paraguay (*C. fiebrigi*).

RECORDED HOSTS.—"Poaceae; grasses" (Strand *in* Seitz, 1913).

DISTRIBUTION.—In the Western Hemisphere this species is known only from the Argentine Mesopotamia of Paraguay. In the Old World *E. pulla* reportedly is found from Asia Minor west through Roumania and Italy to Great Britain. (For a more thorough review of the Old World distribution, see Tutt, 1900.)

DISCUSSION.—In 1939 Koehler described two male specimens of a small moth collected in Paraguay by Karl Fiebrig. Koehler selected these two specimens (one of which has been designated as a lectotype by the present writer) as cotypes of a new species that he named in honor of Dr. Fiebrig, who was at one time the Director of the Botanical Gardens of Asunción, Paraguay. The statement of dedication by Koehler suggests two possibilities: first, the two cotypes were collected by Fiebrig in or near Asunción; second, they were probably collected on or near the grounds of the Botanical Garden itself. If the latter possibility is an actuality, the probability follows that *Cochliotheca fiebrigi* represents an alien insect that had been introduced into the locality on imported plant material. This appears to be a correct conclusion since Koehler's species has been found to be identical with the Old World species *Epichnopterix pulla*.

MATERIAL EXAMINED.—8 ♂♂, 3 cases:

No specific locality: ♂ with case, CU; 4 ♂♂, 2 cases, USNM.

FRANCE: Canigou, ♂, USNM.

PARAGUAY: Asuncion(?), 2 ♂♂, cotypes, *C. fiebrigi* Koehler, May 21, 1937, DEI.

4. *Apterona* Millière

Apterona Millière, Ann. Soc. Linn. Lyon, vol. 4, no. 2, p. 192, 1857.—Heylaerts, Ann. Soc. Ent. Belg., vol. 25, pp. 67, 71, 1881.—Speyer, Stettiner Ent. Zeit., vol. 47, p. 349, 1886.—Heylaerts, Tijdschr. Ent., vol. 30, pp. 5, 6, pl. 10, figs. 4–9, 1887a.—Kirby, Cat. Lep. Heter., vol. 1, p. 518, 1892.—Tutt, Nat. Hist. Brit. Lep., vol. 2, pp. 110, 112, 113, 116, 267, 369, 372, 422, 423, 1900.—Staudinger and Rebel, Cat. Lep. Palaearct. Faun., p. 397, n. 740, 1901.—Rebel *in* Spuler, Schmett. Eur., vol. 2, p. 180, 1910.—Rebel, Fr. Berge's Schmett.-Buch, ed. 9, p. 453, 458, n. 410, 1910.—Strand *in* Seitz, Macrolep. World, vol. 2, p. 363, 1912.—Dalla Torre, Ent. Jahrb., vol. 36, p. 130, 1927.—Wehrli, Ent. Zeitschr., Frankfurt, vol. 41, p. 329, 1927.—Strand, Ent. Zeitschr., Frankfurt, vol. 41, pp. 332, 333, 1927.—Hering *in* Brohmer, Tierw. Mitteleur., vol. 6, no. 3, pp. 48, 49, 50, 1928.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 101, 1929.—Gaede *in* Seitz, Macrolep. World, vol. 14, p. 486, 1929.—Kozhantshikov, Fauna SSSR, vol. 3, no. 2, pp. 314, 317, 320, 448, 1956.

Cochliotheca Rambur, Cat. Syst. Lep. Andalousie, vol. 2, p. 301, 1866 (type= *Cochliotheca helicinella* Rambur, 1866; not *C. helicinella* Herrich-Schäffer, 1845).—Kirby, Cat. Lep. Heter., vol. 1, p. 518, 1892 (synonym of *Apterona*).—Püngeler, Iris, vol. 5, p. 137, 1893.—Strand, Ent. Zeit., vol. 41, pp. 332–333, 1927.—Wehrli, Ent. Zeit., vol. 41, pp. 329–332, 381–383, 1927.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 101, 1929 (synonym of *Apterona*).—Kozhantshikov, Fauna SSSR, vol. 3, no. 2, p. 448, 1956 (synonym of *Apterona*).—Forster and Wohlfahrt, Schmett. Mitteleur., vol. 3, p. 169, 1960.

Type of genus.—*Psyche crenulella* Bruand, 1853. Designated by Kirby, 1892.

Male.—Small, delicate moths with slender bodies. Antennae bipectinate or serrate. Epiphysis absent; tibiae without spurs, or hindtibiae with short apical spurs. Wings (fig. 152) broadly rounded; evenly clothed with hairlike scales. Primaries with 10 veins, secondaries with 7.

Female.—Head inconspicuous, bent beneath thorax; antennae and wings absent; eyes represented by unfaceted dark spots, legs reduced to unsegmented stubs. Abdomen whitish grey; dorsum of thorax and head brownish. Body curved ventrad, nearly naked, very sparsely covered with small white hairs and characteristic lateral anal hair tufts.

4. *Apterona crenulella* form *helix* (Siebold)

Figure 69; Map 1

Psyche helix Siebold, Jahresb. Schles. Gesellsch. vaterl. Kultur, p. 87, 1850.

Apterona helix (Siebold) Dalla Torre and Strand, Lep. Cat., pars 34, p. 103 (synonym [form?] of *A. crenulella*).—Nägeli, Mitteil. Schweiz. Ent. Gesellsch., vol. 15, pp. 56–61, 1931.—Narbel-Hofstetter, Rev. Suisse Zool., vol. 53, pp. 625–681, 1946; vol. 61, p. 417, 1954.—Kozhantshikov, Fauna SSSR, vol. 3, no. 1, pp. 451, 454, 455, 456, 1956.

Apterona crenulella form *helix* (Siebold) Hering *in* Brohmer, Tierw. Mitteleur., vol. 1 (suppl.), p. 301, 1932.—Forster and Wohlfahrt, Schmett. Mitteleur., vol. 3, p. 170, 1960.

Apterona crenulella Bruand.—Robinson, Calif. Dep. Agric. Bull., vol. 42, no. 1, pp. 1–9, figs. 1–3, 1953 "(*-helix*)."

NOTE: For European references dealing with the synonymy of this species prior to 1929, see Dalla Torre and Strand (1929).

FEMALE.—As described for genus, 5–6 mm. long.

CASE.—(Fig. 69.) Diameter 3–5 mm.; 4–5 mm. in depth. Case characteristic shape, resembling helical snail shell with 2½ to 3½ coils; firmly constructed of white silk overlaid with fine-grained particles of earth. Three apertures normally present: small apical opening; large basal opening from which larva protrudes to creep and feed; large slitlike lateral opening in uppermost whorl through which shrivelled female reputedly emerges after oviposition.

TYPE.—Lost.

TYPE LOCALITY.—Southern Germany.

RECORDED HOSTS.—"Polypodiaceae: common brake fern [*Pteridium aquilinum* (L.) Kuhn]; Iridacaeae: *Gladiolus* sp.; Poaceae: ripgut [*Bromus rigidus* Roth.], rough stock blue [?], wild oat [*Avena fatua* L.], meadow foxtail [*Alopecurus pratensis* L.]; Asteraceae: California mugwort [*Artemisia vulgaris* var. *heterophylla* Jepson], *Chrysanthemum* sp., *Gaillardia* sp., giant marigold [*Tagetes erecta* L. ?], *Zinnia* sp.; Brassicaceae: black mustard [*Brassica nigra* (L.) Koch], broccoli [*Brassica oleracea* var. *botrytis* L.], cabbage [*Brassica oleracea* var. *capitata* L.], turnip [*Brassica rapa* L.], wild radish [*Raphanus raphanistrum* L.]; Fabaceae: alfalfa [*Medicago sativa* L.], Ladino clover [*Trifolium* sp. ?], lupine [*Lupinus* sp.], sweet pea [*Lathyrus odoratus* L.], trefoil [*Trifolium* sp.], vetch [*Vicia* sp.], wild clover [*Trifolium* sp.]; Lamiaceae: horehound [*Marrubium vulgare* L.]; Malvaceae: hollyhock [*Althaea* sp.], *Sidalcea* sp.; Plantaginaceae: plantain [*Plantago* sp. ?]; Plumbaginaceae: statics [*Statice* sp. ?]; Polygonaceae: sour dock [*Rumex* sp.]; Rosaceae: apple [*Pyrus malus* L.], rose [*Rosa* sp.]; Solanaceae: tomato [*Lycopersicon esculentum* Mill.]; Violaceae: *Viola* sp." (Robinson, 1954). "Pinaceae: *Pinus ponderosa* Dougl.; Cucurbitaceae: winter squash [*Cucurbita maxima* Duchesne]; Fabaceae: beans [*Phaseolus* sp. ?], *Cytisus scoparius* Link, sweet clover [*Melilotus* sp.]; Fagaceae: oak [*Quercus* sp.]; Polygonaceae: rhubarb [*Rheum rhaponticum* L.]; Ranunculaceae: peony [*Paeonia* sp.]; Rhamnaceae: *Ceanothus cuneatus* (Hook.) Nutt.; Rosaceae: almond [*Prunus amygdalus* Batsch], pear [*Pyrus communis* L.], raspberry [*Rubus* sp.]" (George Okumura, in correspondence).

DISTRIBUTION.—(Map 1.) According to Strand (1912), in the Eastern Hemisphere this form is "distributed in Central and Southern

Europe and Western Asia as far as Persia and the Issyk-kul and extends northward to Livonia." In the United States it is known from the following counties in California: El Dorado, Placer, Nevada, Butte (of the Sierra Nevada section), and Modoc (of the Basin and Range Province). This insect has also been collected in southern Idaho, northern Utah, and Nevada. Very recently it has been discovered near Albany, N.Y.

Discussion.—Robinson (1953) has stated that the first record of this introduced insect in the United States was an infestation in the yard of a house in Nevada City, California, June 18, 1940. This population, which since has extended through parts of four additional counties in California and into areas of Idaho and Nevada, appears to consist entirely of the thelyotokic form of *Apterona crenulella* Bruand. Although the insect is abundant enough to be considered a potential pest, no males have ever been observed in this country.

Recently, perhaps within the last two years, this bagworm has been introduced into the northeastern section of the country. Through correspondence (along with a shipment of specimens), Dr. John Wilcox of the New York State Museum has informed the present writer of two recent infestations. The first individuals were discovered approximately June 21, 1962, three miles northwest of Albany, N.Y., at Loudonville, Albany County. This was reported by a homeowner who had noticed the insects in large numbers on the side of his house. A second infestation was found later near the ocean port of Albany, which may have been the point of entry of the species into the area. In other words, this eastern population probably represents another introduction of *Apterona crenulella* form *helix* from Europe, and it did not originate from our now widely established population in the western United States.

Several European authors maintain that this species includes a typically bisexual form (*crenulella*) and a form (*helix*) that is composed only of parthenogenetic females. A well-confirmed fact is that *helix* reproduces without ever mating, and some workers have considered it a separate species from *A. crenulella*. The excellent work of Seiler (1927, 1942) has demonstrated that the parthenogenetic and bisexual forms of *Solenobia triquetrella* Hübner were freely interfertile with the result that the progeny displayed a descending degree of intersexuality. This suggests the findings of Goldschmidt on the intersexes in *Porthetria dispar* (L.). It seems reasonable to suspect a similar degree of interfertility between *crenulella* and *helix* as that reported for *S. triquetrella*. Largely for this reason I have retained *helix* as a facultative, parthenogenetic form of *A. crenulella* but realize that many questions remain unanswered. It would be very enlightening to know what degree of fertility exists between crosses of *A. crenulella*

and *helix* and, especially, to what extent hybridization occurs in nature. Unfortunately, this information is not available at the present time.

No morphological distinction has been noted between *A. crenulella* and the form *helix*. The cases of both insects are spiraled and very similar as are the larval cases of a few other species described in this genus.

All members of *helix* are diploid as are the populations of similar parthenogenetic races in *Solenobia* and *Luffia*. Narbel-Hofstetter (1954) states that this normal somatic number is maintained by the fusion of the nucleus of the ovocyte II with the first polar body.

Another interesting feature of this species is the feeding habit of the larva. Generally feeding only at night, the larvae fasten their cases to the leaf surface and then mine out circular areas that resemble very closely the damage done by *Colephora* larvae.

In California this species reportedly overwinters as young larvae that usually mature by the following summer. Adult females begin to appear in early July. These disappear and are replaced by young larvae by the first of August. Prior to overwintering, the larvae evidently construct whitish, membranous septa within the empty female pupal shell, whereby each larva is enclosed eventually in a cell-like partition. The discovery of overwintering larvae in this condition has misled some observers into believing that this moth is viviparous and/or paedogenetic.

The diagnosis of the female for this genus and species was summarized from the discussions of Strand (1912), Gaede (1936), and Robinson (1953).

MATERIAL EXAMINED.—168 cases:

UNITED STATES: CALIFORNIA: Nevada City, 58 cases, USNM. IDAHO: Bear Lake Co., 17 cases, USNM. Gooding, 3 cases, USNM. NEVADA: Elko, 27 cases, USNM. NEW YORK: Loudonville, Albany Co., 3 larvae with cases, June 21, USNM. UTAH: Logan, 60 cases, USNM. Lynn, 15 cases, USNM.

Because it is possible for males of this genus and species to be introduced accidentally into this country, a diagnostic description of this form follows.

***Apterona crenulella* (Braund)**

FIGURES 4, 152, 191, 246, 246a

Psyche crenulella Braund, Mem. Soc. Emul. Donbs., p. 76, "n. 49, t. 2," fig. 49, 1853.

MALE.—(Fig. 4.) Antennae 18–20 segmented; serrations with tufts of dense cilia; broader segments unsymmetrically biserrate with broad flattened teeth gradually decreasing to obsolescence toward apex. All tibiae destitute of spurs. Abdomen with dorsal

sclerites entire, broadly triangular; ventral sclerites much reduced, divided longitudinally into pair of slender, curved plates.

Primaries with R_5 absent (possibly fused with R_4); all veins separate from cell except M_2 and $_3$, which are stalked; base of media undivided in cell of both wings; cubitals directed somewhat posteriorally; anals reduced with 2A alone appearing as distinct vein to wing margin. Secondaries with all veins separate; no connecting vein between $Sc+R_1$ and Rs. Wing expanse 12–14 mm.

Male genitalia.—(Fig. 246.) Relatively weakly sclerotized. Apex of tegumen with shallow depression. Valves with basal area undeveloped; sacculus with small apical spines. Vinculum triangular, without distinct saccus. Eighth sternite (fig. 191) base almost completely divided, furcal arms very long, slender.

5. *Prochalia* Barnes and McDunnough

Prochalia Barnes and McDunnough, Contr. Nat. Hist. Lep. N. Amer., vol. 2, no. 4, p. 171, 1913; Check List Lep. Boreal Amer., p. 125, 1917.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1179, 1936.—McDunnough, Check List Lep. Canada and USA, pt. 2, p. 103, 1939.

Type of genus.—*Prochalia pygmaea* Barnes and McDunnough, 1913. Monobasic.

Male.—Antennae broadly bipectinate, pectinations arising from apical portion of each segment. Foretibia (fig. 172) with long epiphysis, nearly equalling tibia in length. Middle tibia with single apical spur. Posterior tibia unarmed.

Forewings (fig. 153) usually 12-veined, may be reduced to 9 because of a fusion of one or more radials and loss or fusion of medial. R_4 and R_5 usually stalked, rarely completely fused; medial veins separate, with rare possibility of reduction in number; intercalary cells absent from discal cell of both wings; anal veins as in *Cryptothelea* with spur of 3A usually, but not always, present. Secondaries usually 8-veined with reduction to 7 because of loss of medial vein; oblique crossvein connecting $Sc+R_1$ and Rs absent.

Male genitalia.—Elongate. Valves with pulvilli obsolete; apex of sacculus minutely spined. Aedeagus simple. Eighth sternite (fig. 192) with slender furcations somewhat longer than base.

Female.—Vermiform with all external appendages vestigial. Head and dorsal area of thorax slightly sclerotized.

Female genitalia.—(Fig. 299.) External genitalia almost entirely membranous, extremely reduced. Internally, ductus seminalis quite short, less than bursa in length, bursa itself smaller than spermatheca in length and volume; duct of spermatheca long, approximately 2–3x that of seminal duct. Accessory glands apparently lacking.

Discussion.—The basis for the generic separation of *Prochalia* and the following genus, *Zamopsyche*, is not supported by ample evidence; indeed, *Zamopsyche* could almost be considered a subgenus of *Prochalia*. The major features of generic importance are the differences in the wing structure of these two groups. The presence or absence of tibial spurs alone cannot be considered of generic value, but often the factor does suggest a large degree of difference in this family. Likewise, the divergence in wing shape between these two genera suggests an important separation. I have placed the greatest emphasis in delimiting the two genera upon the wing venation, even though this appears to be quite variable in both groups. The basic pattern, however, which can be ascertained by examining a series of specimens, is fundamentally different, and it is believed to be of generic value.

The instability of the genetic factors controlling the pattern of venation in these two groups, as well as the great similarity between them in the female genitalia, male genitalia, larval cases, and other characters, all suggest a more or less borderline example of generic differentiation. *Prochalia* and *Zamopsyche* are retained as separate genera for the sake of uniformity in treatment and because such a basic venational difference (namely, 12 veins in the forewing of *Prochalia* versus 11 in *Zamopsyche*) is almost never encountered within any of the New World genera recognized in this paper.

5. *Prochalia pygmaea* Barnes and McDunnough

Figures 5, 67, 153, 172, 192, 247, 247a, 299, 322, 365; Map 1

Prochalia pygmaea Barnes and McDunnough, Contr. Nat. Hist. Lep. N. Amer., vol. 2, no. 4, p. 171, 1913; Check List Lep. Boreal Amer., no. 4808, 1917.—Grossbeck, Bull. Amer. Mus. Nat. Hist., vol. 37, p. 105, 1917.—Dyar, Insec. Inscit. Menst., vol. 11, p. 4, 1923.—Jones and Parks, Tex. Agric. Exp. Sta. Bull. 382, p. 31, figs. 15, 21, 1928.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1179, pl. 169b, 1936.—McDunnough, Check List Lep. Canada and USA, pt. 2, no. 9534, 1939.

Male.—(Fig. 5) Body and wings brownish fuscous. Antennae (fig. 365) 18–19 segments. Wings (fig. 153) broader, usually shorter than in *Zamopsyche commentella*, uniformly scaled, discal scales (fig. 322) of forewings relatively broad, oblanceolate with acute apices. Wing expanse 12–15 mm.

Male genitalia.—(Fig. 247.) As described for genus.

Female.—As described for genus; length 6–7 mm.

Female genitalia.—(Fig. 299.)

Case.—(Fig. 67.) Length 13–16 mm.; diameter 2–3 mm. Broad anteriorly, tapering posteriorly; appearing relatively smooth to

naked eye, granulose under low magnification; greyish silk covered with tiny fragments of bark, lichens, sand.

TYPE.—In the United States National Museum.

TYPE LOCALITY.—Everglade, Florida.

RECORDED HOSTS.—"Lichens" on bark of *Citrus sinensis* Osbeck and *Quercus* species (Barnes and McDunnough, 1913).

DISTRIBUTION.—(Map 1.) This species has been found over much of the Atlantic and Gulf Coastal Plain from South Carolina to perhaps as far west as Texas.

MATERIAL EXAMINED.—24 ♂♂, 6 ♀♀, 120 cases:

UNITED STATES: ALABAMA: Delchamps, 5 cases, USNM. Mobile, 11 cases, USNM. FLORIDA: no specific locality, 2 ♂♂ with cases, May 5, USNM. Southwest Florida, 3 ♂♂ with cases, May 15–27, USNM. DeFuniak Springs, 8 cases, USNM. Everglade, ♂ with case, May 1–7, type, USNM. Florida City, 13 ♂♂, USNM; 8 cases, USNM. Homestead, 2 ♂♂, March 7, USNM. Lakeland, 16 cases, USNM. Orlando, 6 cases, USNM. Punta Gorda, 14 cases, USNM. GEORGIA: Screven County, case, USNM. LOUISIANA: New Orleans, 3 ♂♂, 2 cases, May 23–June 6; 32 cases, 4 ♀♀, May, USNM. MISSISSIPPI: Biloxi, 2 cases, USNM. SOUTH CAROLINA: Summerville, 2 ♂♂ with cases, June 14–July 7; 22 cases, USNM. TEXAS: Dickinson, case (identification questionable), USNM.

6. *Zamopsyche* Dyar

Zamopsyche Dyar, Insec. Inscit. Menst., vol. 11, p. 4, 1923.—Dalla Torre, Ent. Jahrb., vol. 36, p. 131, 1927.—Dalla Torre and Strand, Lep. Cat., pars 4, p. 197, 1929.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1186, 1936.—McDunnough, Check List Lep. Canada and USA, pt. 2, p. 103, 1939.

TYPE OF GENUS.—*Zamopsyche commentella* Dyar, 1923. Monobasic.

MALE.—Antennae as in *Prochalia*. Legs also similar except mesothoracic tibia with apical spur absent. Primaries (fig. 154) usually with 11 veins, rarely reduced to 10 (due to loss of M_2); R_3 and R_4 usually variously stalked, sometimes connate; M_1 always widely separate; M_2 and $_3$ either narrowly separated, connate, or shortly stalked; intercalary cell absent as in hindwing, but spur at base of discal cell usually rather prominent; anals as in *Prochalia*, but base of 1A more obsolescent. Secondaries usually 8-veined, rarely 7-, with loss of M_2; oblique crossvein usually absent between $Sc+R_1$ and R_1 but sometimes may be present.

MALE GENITALIA.—Similar to *Prochalia*.

FEMALE.—Similar to *Prochalia*.

6. *Zamopsyche commentella* Dyar

FIGURES 6, 68, 154, 193, 248, 248a, 298, 323, 366; MAP 1

Zamopsyche commentella Dyar, Insec. Inscit. Menst., vol. 11, p. 4, 1923.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 197, 1929.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1186, 1936.—McDunnough, Check List Lep. Canada and USA, pt. 2, no. 9535, 1939.

MALE.—(Fig. 6.) Body and wings fuscous. Antennae (fig. 366) 19–20 segmented. Wings (fig. 154) relatively slender, more narrow than that of *Prochalia*, outer margin more oblique. Scales evenly distributed over wing, those of cell in primaries very slender, almost hairlike (fig. 323). Wing expanse 14–16 mm.

MALE GENITALIA.—(Fig. 248.)

FEMALE GENITALIA.—(Fig. 298.)

CASE.—(Fig. 68.) Similar to that of *Prochalia pygmaea*. Length 11–15 mm.; diameter 2–3 mm.

TYPE.—In the United States National Museum.

TYPE LOCALITY.—Vienna, Virginia.

RECORDED HOSTS.—"Lichens" on bark of *Pyrus malus* L., *Quercus* species, *Roystonea* species (royal palm), and *Ulmus* species (F. M. Jones, from correspondence).

DISTRIBUTION.—(Map 1.) Presently known to occur along the Atlantic Coastal Plain from Mississippi north to Delaware.

DISCUSSION.—When more information is available, this species may prove to be a synonym of "*Chalia*" *rileyi*. Heylaerts' original description of *rileyi* calls for a moth with a 10 and 7 venation pattern, elongate, slender wings, 22-segmented antennae, and other characters that for the most part could pertain to either *Prochalia pygmaea* or *Zamopsyche commentella*. Unfortunately, no mention is made by Heylaerts about the armature of the mesothoracic tibia. The described number of antennal segments in *C. rileyi* is slightly more than that observed in specimens of either *P. pygmaea* or *Z. commentella;* however, this could be attributed to slightly abnormal variation or simply to an error on Heylaerts' part in counting the segments. If one takes into consideration the variation in venation, Heylaerts' description of the adult *rileyi* probably best approximates that of *Z. commentella*, and, indeed, specimens of the latter have been examined that agree in wing structure with Heylaerts' diagnosis.

It is unlikely that *C. rileyi* represents an insect that is specifically distinct from either *P. pygmaea* or *Z. commentella*. One described feature of *rileyi*, however, is at variance with the other two species. Heylaerts briefly characterizes the larva of *C. rileyi* as "Eruca carnea, capite segmentisque tribus antioribus flavis nitidisque, brunneonigro striatis." This diagnosis does not agree with either *P. pygmaea* or *Z.*

commentella, whose larvae have dark concolorous heads and whose thoracic segments, though variably marbled in light and dark, are not darkly striate on a glistening yellow background.

Because Heylaerts' description of *C. rileyi* is so vague, this species has been treated separately along with its original description (p. 144). A more definite statement concerning the relationships of Heylaerts' species will have to await the rediscovery of this insect from its type locality, Missouri.

Material examined.—13 ♂♂, 3 ♀♀, 66 cases:

UNITED STATES: Delaware: Oak Orchard, ♀, Sept. 18; 35 cases, USNM. Sussex County, 4 ♂♂, Sept. 3–12, USNM. District of Columbia: Washington, ♂, July, USNM. Florida: Ft. Myers, ♂, Jan. 15, USNM. Mississippi: Pearl, Rankin Co., ♂, Oct. 15, USNM. North Carolina: Wilmington, ♂, Oct. 17; 2 ♂♂ with cases, Oct. 12–14; ♀, Sept. 20; 23 cases, USNM. South Carolina: Whitaker, case, USNM. Virginia: Accomac County, case, USNM. Chincoteague, case, USNM. Vienna, ♂, type, Sept. 28, USNM. Wachapreague, 5 cases, USNM. West Virginia: Jefferson County, 2 ♂♂ with case, Sept., USNM.

7. *Naevipenna*, new genus

Platoecticus, in part, of authors.

Type of genus.—*Platoecticus aphaidropa* Dyar, 1914.

Male.—Antennae broadly bipectinate, pectinations gradually diminishing in length to apex; segments short near base, gradually lengthening toward apex, pectinations arising from middle of segment or slightly beyond. Prothoracic leg with long, slender epiphysis. Meso- and metathoracic legs each with single short apical spur. Tip of abdomen slightly exceeding hind margin of secondaries.

Wings (fig. 155) uniformly scaled, 12- and 8-veined. Apex of forewings rather acute, prominent, sclerotized costal stigma directly above apex of discal cell; $R_{2, 3}$, and $_4$ stalked, R_5 either separate or connate at base; M_2 and $_3$ stalked; medial vein undivided within cell of both wings; anal veins similar to *Cryptothelea*, spur of 3A absent. Secondaries with $Sc+R_1$ and Rs fusing at point midway along cell and then immediately separating to continue as parallel veins to margin; M_2 and $_3$ stalked as in primaries.

Male genitalia.—Tegumen apex acute and entire. Valves broad, margins strongly revolute; pulvilli weak; apex of sacculus minutely spined. Vinculum abruptly tapering to elongate, rodlike saccus. Aedeagus simple, without basal expansion. Eighth sternite (fig. 194) with broad base; furcal arms parallel, short.

Female.—Unknown.

Discussion.—This genus and species is superficially very similar to *Cryptothelea* (especially *C. nigrita*), but differs greatly in the structure of the wings, the armature of the legs, and the male genitalia. In the

genitalia alone it resembles *Dendropsyche burrowsi*, but the presence of the conspicuous stigma in the forewing, which can be observed even in a fully scaled wing, establishes *Naevipenna aphaidropa* as being truly unique among our New World psychids.

7. *Naevipenna aphaidropa* (Dyar), new combination

FIGURES 7, 155, 173, 194, 249, 249a, 324, 367; MAP 7

Platoeceticus aphaidropa Dyar, Proc. U.S. Nat. Mus., vol. 47, p. 253, 1914.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 193, 1929.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1183, 1936.—Jones, Trans. Amer. Ent. Soc., vol. 71, p. 122, 1945.

MALE.—(Fig. 7.) Body slender, moderately hairy, brownish fuscous. Antennae (fig. 367) usually 21–26 segments. First and second pair of legs (fig. 178) nearly equal in size, first slightly longer. Hindlegs distinctly smaller. Epiphysis approximately ¾ length of foretibia. First tarsal segment of all legs 2–2.5x length of second.

Wings (fig. 155) somewhat thinly scaled, brownish fuscous. Forewings with discal scales (fig. 324) of two distinct kinds: thinly scattered, hairlike type and more dense, broadly oblanceolate type with bluntly rounded apices; both kinds evenly intermixed throughout both wings. Wing expanse 17–20 mm.

MALE GENITALIA.—(Fig. 249.) As described for genus.

CASE.—Unknown.

TYPE.—In the United States National Museum.

TYPE LOCALITY.—Trinidad River, Panama.

RECORDED HOSTS.—None.

DISTRIBUTION.—(Map 7.) Known from the Panamanian Arc, south to the Guiana Coastal Plain of French Guiana and the Brazilian Highland of southeastern Brazil.

MATERIAL EXAMINED.—6 ♂♂:

BRAZIL: Salto Avanhandava, SE Brazil, ♂, Sept. 15, CM.
FRENCH GUIANA: St. Jean, Maroni River, 3 ♂♂, BM.
PANAMA: Barro Colorado Island, ♂, March 29–31, CU. Trinidad River, ♂, type, March, USNM.

8. *Cryptothelea* Duncan

Chalia, *Oiketicoides*, and *Psyche*, in part, of authors.

Cryptothelea Duncan *in* Jardine, Nat. Libr., vol. 7, p. 115, 1841.—Kirby, Cat. Lep. Het., vol. 1, p. 925, 1892.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 187, 1929.—Jones, Trans. Amer. Ent. Soc., vol. 71, pp. 99–104, 1945.—Betrem, Tijdschr. Ent., vol. 95, pp. 333, 336, 1952.

Platoeceticus Packard, Guide Study Insects, p. 291, 1869; Ent. Amer., vol. 3, p. 51, 1887.—Kirby, Cat. Lep. Heter., vol. 1, p. 516, 1892.—Dyar, U.S. Nat. Mus. Bull. 52, p. 353, 1902 [1903].—Schaus, Proc. U.S. Nat. Mus., vol. 29, p. 344, 1905.—Dalla Torre, Ent. Jahrb., vol. 36, p. 131, 1927.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 192, 1929.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1183, 1936.—McDunnough, Check List Lep.

Canada and USA, pt. 2, p. 102, 1939.—Forbes, Bull. Mus. Comp. Zoology, vol. 90, no. 2, p. 368, 1942.—Jones, Trans. Amer. Ent. Soc., vol. 71, pp. 99–123, 1945.—Betrem, Tijdschr. Ent., vol. 95, p. 338, 1952.

Type of genus.—*Oiketicus macleayi* Guilding, 1827. Monobasic.

Male.—Moths of rather slender build. Antennae bipectinate, pectinations arising mostly mesad, gradually decreasing in length to apex. Forelegs (fig. 174) greatest in length, without epiphysis. Mid- and hindtibia each with one apical spur.

Wings broad, unicolorous, various shades of fuscous, uniformly scaled. Venation (fig. 156) 12 and 8 pattern, individually variable. Primaries with R_3 and $_4$ usually stalked, occasionally stalked with R_5; M_2 and $_3$ usually stalked, sometimes connate or even separate; medius unbranched within discal cell in all species except *C. surinamensis* and *C. watsoni;* 1A curved downward to fuse with 2A beyond middle of wing; 2A and 3A connected near their bases, from their junction 3A continuing as spur toward inner margin. Secondaries with $Sc+R_1$ separate throughout length, not connected by crossvein; M_1 sometimes absent, usually arising either at or below junction of crossvein r-m and M; base of medius usually undivided within cell.

Male genitalia.—Elongate, slender, with prominent apical notch in tegumen. Valves slender, pulvilli very reduced or almost nonexistent; apical extremity of sacculus minutely spined. Aedeagus slender, without bulbous expansion of base.

Eighth sternite with base frequently rather weak; furcations usually long, slender, often exceeding base in length 2–3x.

Female.—Vermiform, all external appendages vestigial. Head and dorsal area of thorax slightly sclerotized.

Female genitalia.—(Fig. 254.) External structures very weakly sclerotized, mostly membranous. Ductus seminalis short, ½ as long as spermatheca. Bursa small, approximately same volume as spermatheca.

Discussion.—In this genus the male genitalia and eighth abdominal sternite are useful in specific determination as well as generic delimitation. The antennal structure also is very helpful in certain instances.

An examination of the holotype of *Cryptothelea macleayi* has revealed that this species is congeneric with, but specifically distinct from, the other members of the genus *Platoeceticus*. It is necessary, therefore, for *Platoeceticus* to be replaced by the earlier name. This decision is based on rather circumstantial evidence, which is discussed under *C. macleayi*.

Key to the Species of *Cryptothelea*

1a. Primaries with scales of discal cell broadly oblanceolate (fig. 329); intercalary cell frequently present.
  2a. Eighth abdominal sternite of male with furcal arms distinctly longer than undivided base (figs. 196, 197).
    3a. Antennae (fig. 372) with pectinations long, sensory hairs 2 to 2.5x diameter of pectinations; male genitalia as in fig. 251 . . . **9. C. watsoni**
    3b. Antennae (fig. 371) with pectinations short, sensory hairs 1.5x diameter of pectinations; genitalia as in fig. 252 . . . . . **10. C. macleayi**
  2b. Eighth sternite with furcal arms slightly shorter than base (fig. 195). **8. C. surinamensis**
1b. Primaries with scales of discal cell narrowly oblanceolate (fig. 327); intercalary cell never present.
  4a. Antennal pectinations with sensory hairs somewhat appressed and not exceeding diameter of pectinations in length (fig. 369) . **14. C. gloverii**
  4b. Antennal pectinations with sensory hairs erect and 1.5x or more diameter of pectinations in length (fig. 368).
    5a. Wing expanse 8–14 mm.; furcations of eighth sternite relatively stout, approximately 3x length of undivided base (fig. 198). **13. C. symmicta**
    5b. Wing expanse 16–19 mm.; furcations very slender, approximately 4x length of undivided portion (fig. 201).
      6a. Antennal pectinations (fig. 370) short as in *gloverii;* larvae apparently gregarious . . . . . **12. C. congregata**
      6b. Antennal pectinations (fig. 368) longer than in *congregata;* larvae not gregarious . . . . . **11. C. nigrita**

8. *Cryptothelea surinamensis* (Möschler)

FIGURES 8, 70, 195, 250, 325; MAP 9

Psyche surinamensis Möschler, Verh. Zool.-Bot. Gesellsch. Wien., vol. 27, p. 669, 1878.

Eumeta surinamensis (Möschler) Kirby, Cat. Lep. Heter., vol. 1, p. 504, 1892.

Cryptothelea surinamensis (Möschler) Dalla Torre and Strand, Lep. Cat., pars 34, p. 190, 1929.

Clania surinamensis (Möschler) Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1183, 1936.

MALE.—(Fig. 8.) Antennae quite variable in number of segments, 13–33; sensory hairs erect, evenly spaced in definite rows, approximately 1–1.5x diameter of pectinations in length.

Wings and body fuscous. Primaries with apex more acute than in *C. gloverii;* scales (fig. 325) of discal cell broad, oblanceolate as in *C. watsoni;* R_5 usually connate with R_3+_4, may be stalked with latter for some distance; M usually branched within cell of both wings, rarely simple. Secondaries with faint basal crossvein sometimes present between $Sc+R_1$ and Rs. Wing expanse 18–26 mm.

MALE GENITALIA.—(Fig. 250.) Similar in form to other species of genus except usually much larger. Eighth sternite (fig. 195) robust with furcal arms relatively short and stout.

Female.—Unknown.

Case.—(Fig. 70.) Length 24 mm.; diameter 7 mm. Irregularly covered with tiny pieces of plant material as well as loosely attached, larger fragments of herbaceous plant stems.

Type.—Lost.

Type locality.—Paramaribo, Dutch Guiana.

Recorded hosts.—(?) "cordinia," from specimen label.

Distribution.—(Map 9.) From the Canal Zone of the Panamanian Arc, south to the Guiana Highland of Venezuela, and along the Guiana Coastal Plain to the Paraná Plateau of southern Brazil.

Discussion.—This species is related closely to *C. watsoni* and it diverges slightly from the other species of *Cryptothelea*. The similarity in structure of the male genitalia, legs, and general venation, however, clearly associates this species with the other members of the genus.

Material examined.—14 ♂♂, 2 cases:

BRAZIL: Specific locality unknown, ♂, ZMHU. Corcovado, ♂, Feb., BM. Ouro Branco, Minas Geras, 1000–1100 m., 2 ♂♂, Aug. 9, CM. Rio Grande do Sul, ♂, PM. Rio de Janeiro, ♂, Nov., CM. Santa Catarina, case, BM; ♂, USNM.

BRITISH GUIANA: Georgetown, ♂, USNM. "Pln. Tuschen," ♂, USNM. Rockstone, Essequebo River, 2 ♂♂, USNM.

FRENCH GUIANA: Cayenne, ♂, USNM.

PANAMA: Barro Colorado Island, ♂ adult with case, USNM.

VENEZUELA: Rio Caura, "Campamento e. Magalena," ♂, April–May, MCZ.

9. *Cryptothelea watsoni* (Jones), new combination

Figures 9, 71, 196, 252, 252a, 301, 329, 372; Map 6

Psyche watsoni Jones, Ent. News, vol. 34, p. 101, pls. 3–4, figs. 13–15, 17, 19, 1923.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 117, 1929.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1179, pl. 169b, 1936.

Platoecticus watsoni (Jones), Trans. Amer. Ent. Soc., vol. 71, p. 115, pl. 3, fig. 4; pl. 4, fig. 8; pl. 5, fig. 12; pl. 6, figs. 25–27; text fig. 5, 1945.

Male.—(Fig. 9.) Antennae (fig. 372) very broadly pectinated, approximately 30 segments; sensory hairs approximately 2–2.5x diameter of pectinations in length, erect, evenly spaced in definite rows.

Wings fuscous; scales (fig. 329) broadly oblanceolate, acute apices. Venation similar to that of *C. gloverii* except medial vein sometimes forked in cell of forewing. Wing expanse 15–21 mm.

Male genitalia.—(Fig. 252.) Noticeably stouter, proportionately larger than *C. gloverii*. Lower portion of vinculum almost truncate, abruptly narrowing to slender, elongate saccus. Eighth sternite (fig. 196) stout, furcations tapering, divergent.

Female.—As described for genus. Length approximately 11 mm.

Female genitalia.—(Fig. 301.)

CASE.—(Fig. 71.) Varying 15–20 mm. in length; may be nearly bare of thatching materials, usually irregularly covered with small fragments of leaves or bark.

TYPE.—In the American Museum of Natural History.

TYPE LOCALITY.—Aux Cayes, Fort Ilet District, Haiti.

RECORDED HOSTS.—"Polygonaceae: *Coccoloba* sp. (sea grape)" (Jones, 1945).

DISTRIBUTION.—(Map 6.) Known only from Haiti of the Greater Antilles.

MATERIAL EXAMINED.—3 ♂♂, 1 ♀, 8 cases:

HAITI: Aux Cayes, Fort Ilet District, ♂, holotype, Aug. 10, AMNH; ♂, June 24; ♂, Aug. 7; ♀, 8 cases, USNM.

10. *Cryptothelea macleayi* (Guilding)

FIGURES 197, 251, 371

Oiketicus macleayi Guilding, Trans. Linn. Soc. London, vol. 15, p. 375, pl. 8, figs. 1–14, 1827.

Oiketicus macleaii [sic] Guilding.—Westwood, Proc. Zool. Soc. London, p. 222, pl. 34, fig. 3, 1854.

Cryptothelea macleayi (Guilding) Duncan *in* Jardine, Nat. Libr., vol. 7, p, 115, 1841.—Dalla torre and Strand, Lep. Cat., pars 34, p. 189, 1929.—Jones, Trans. Amer. Ent. Soc., vol. 71, pp. 101, 102, 103, 104, 1945.—Betrem, Tijdschr. Ent., vol. 95, pp. 333, 336, 337, 338, 1952.

Lansdownia macleayi (Guilding) Heylaerts, Ann. Soc. Ent. Belg., vol. 25, p. 69, 1881.

Eumeta macleayi (Guilding) Kirby, Cat. Lep. Heter., vol. 1, pp. 504, 925, 1892.

Eurycyttara [sic] *macleayii* [sic] (Guilding) Meyrick and Lower, Trans. Roy. Soc. S. Australia, vol. 31, 207, 1907.

Platoeceticus macleayi (Guilding) Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1183, 169d, 1936.

MALE.—Antennae with pectinations (fig. 371) distinctly shorter than those of *C. watsoni*; sensory hairs relatively short, approximately 1.5x diameter of pectinations, evenly spaced in definite rows.

Wings fuscous; scales similar to those of *C. watsoni*. Venation variable, showing 10 and 7 pattern in pair of wings on left side of body and 11 and 7 pattern in right pair; M_1 absent in all wings, probably not typical; base of medius not forked within discal cell. Wing expanse 17 mm.

MALE GENITALIA.—(Fig. 251.) Similar to *C. gloverii*. Lower angles of vinculum rounded, sloping more gradually to saccus than in *C. watsoni*. Eighth sternite (fig. 197) similar to that of *C. watsoni* but with furcal arms more slender.

FEMALE.—Not examined.

CASE.—Not examined. In the original description of *O. macleayi*, Guiding indicates that the larval case is approximately 20 mm. long,

with a diameter of 5 mm.; the general surface is rather smooth with a few projecting fragments of lichens.

TYPE.—In the British Museum.

TYPE LOCALITY.—West Indies.

RECORDED HOSTS.—None. Guilding mentions that the larvae lived among the old branches and trunks of trees.

DISTRIBUTION.—This species is represented only by the type specimen, which bears no locality data, but originally it was reported from the West Indies.

DISCUSSION.—The original description of *C. macleayi* is lacking in many details that would have helped to prevent the considerable confusion associated with this insect for over a hundred years. Since the nomenclatural history has been discussed adequately by Jones (1945) and later by Betrem (1952), many of their comments will not be mentioned here. Because of the historical importance, however, it should be restated, that most of the confusion centering around the originally monobasic genus *Cryptothelea* and its type species *macleayi* was initiated by Walker in 1855. At that time he reported from Australia two specimens of "*Psyche macleayi*," which were described as having the "hind tibiae without spurs" (p. 955); thus they definitely were not true *macleayi* as presently recognized and they probably were not even congeneric with Guilding's species.

Since 1855 *macleayi* has been involved in a nomenclatural tangle with such genera as *Clania*, *Eumeta*, *Lansdownia*, and *Eurycyttarus;* consequently, the genus *Cryptothelea* has been misapplied to several Old World species. At the present, no evidence supports a belief that *C. macleayi* originated in the Old World, and thus, the original locality as given by Guilding ("India Occidentalis") should not be seriously doubted. The possible origin of the two species Guilding originally described in the genus *Oiketicus* has been mentioned earlier by both Jones (1945) and Betrem (1952), and it is also discussed briefly in this paper under *O. kirbyi*.

A unique specimen, which was designated the holotype of *C. macleayi* by W. H. T. Tams, has provided the basis for the specific description, even though the identity of this moth may be somewhat questionable. Such a decision should be accepted because the true identity of this specimen and of *C. macleayi* itself probably will never be decided for certain. Additional collecting on the island of St. Vincent or on adjacent islands may prove of very little value, especially if more than one species of *Cryptothelea* (e.g., *watsoni* and true *macleayi*) is found.

All available evidence, what little there is, indicates that the specimen selected by Tams as the holotype of *C. macleayi* very probably represents the species. The specimen, which is deposited in the

collections of the British Museum, was purchased originally along with the Lansdown Guilding collection. A circular specimen label that bears certain catalog numbers of the museum indicates the source of the acquisition; further, the wing expanse of *C. macleayi* as originally given (17 mm.) is the same, or nearly so, as that of the presently recognized holotype. Guilding's drawings of the adult male and larval case of *macleayi* suggest a species of *Platoecticus;* one would suspect that this genus and *Cryptothelea* were congeneric.

In 1854, Westwood redescribed *macleayi* as *O. macleaii,* basing his description on what he considered to be "a typical specimen" in the collections of the British Museum. His description and drawing of the forewing agrees in all important respects with that of the *left* forewing of the presently accepted type, except for the median vein, which was figured as being divided within the discal cell. Assuming that the specimen described by Westwood and the one currently known as *C. macleayi* are the same, however, it should be emphasized that he did not examine a cleared wing and, thus, he was unable clearly to see the veins in the cell. Westwood evidently failed also to notice the discrepancy in venation between the right and left forewings. A similar error was made by Jones (1945) in examining the same specimen; he counted the veins in the *right* wing and concluded that 11 veins were present and not 10 as Westwood had reported. The present writer believes that both reports were correct, although incomplete, and that the unique specimen presently identified as *C. macleayi* is the same moth previously described by Westwood.

Meyrick and Lower (1907), misled by Walker's reference to *macleayi,* included this species in their "Revision of the Australian Psychidae"; however, in contrast to Walker's description, their reference is based actually upon *C. macleayi* and not upon Walker's two Australian specimens. These two authors repeated Westwood's description and further stated that "*The type is unique,* and is in the British Museum."

Two important factors create some doubt concerning the acceptance of this moth as the holotype of *C. macleayi.* First, the specimen is completely devoid of labels that provide either an original determination or the source "India Occidentalis." A more significant point is found in Guilding's description of this moth: "Tertia species ni fallor mox decubenda." Conceivably the specimen presently considered as *C. macleayi* actually represents this third, undescribed species, and this "tertia species" of Guilding is specifically distinct from true *C. macleayi.* Strong possibilities also exist, however, that Guilding's undescribed moth either was conspecific with *C. macleayi* or was far removed from the genus *Cryptothelea,* perhaps not even a member of the Psychidae.

Because neither of these two factors actually refute the acceptance of the specimen in question as the holotype of *Cryptothelea macleayi* and because considerable more evidence exists to support the validity of such an acceptance, I have followed the decisions of Tams (unpublished) and, more recently, of Betrem (1952) in approving the identity of this specimen as *C. macleayi*.

MATERIAL EXAMINED.—1 ♂.

This specimen bears no other labels except a type determination label written by Mr. Tams and a circular label which indicates that this specimen was deposited in the collections of the British Museum on July 17, 1837, and was accessioned under the number 113. Beneath this number in the Museum's register is the statement: "purchased with the Lansdown Guilding Collection."

11. *Cryptothelea nigrita* (Barnes and McDunnough), new combination

FIGURES 10, 73, 201, 254, 300, 326, 368; MAP 2

Manatha nigrita Barnes and McDunnough, Contr. Nat. Hist. Lep. N. Amer., vol. 2, no. 4, p. 170, pl. 4, fig. 3, 1913.—Grossbeck, Bull. Amer. Mus. Nat. Hist., vol. 37, p. 105, 1917.—Barnes and Benjamin, Contr. Nat. Hist. Lep. N. Amer., vol. 5, no. 1, p. 46, 1922.

Psyche nigrita (Barnes and McDunnough) Dyar, Insec. Inscit. Menst., vol. 11, p. 4, 1923.

Platoeceticus nigrita (Barnes and McDunnough) Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1183, pl. 169d, 1936.—McDunnough, Check List Lep. Canada and USA, pt. 2, no. 9524, 1939.—Jones, Trans. Amer. Ent. Soc., vol. 71, p. 111, pl. 3, fig. 2; pl. 4, fig. 6; pl. 5, fig. 10; pl. 6, figs. 19–24; text fig. 3, 1945.

MALE.—(Fig. 10.) Antennae 24–25 segmented; pectinations (fig. 368) about 1.5x length of those in *C. gloverii;* hairs erect, ranging in length 1.5–2x diameter of pectinations on which borne.

Wings brownish fuscous, more thinly scaled usually than *C. gloverii*, thus appearing lighter in color. Wing venation similar to that of *C. gloverii;* scales (fig. 326) of discal cell similar, slightly more slender. Wing expanse 14–17 mm.

MALE GENITALIA.—(Fig. 254.) Aedeagus usually shorter than in *C. gloverii*. Arms of eighth sternite (fig. 201) markedly more elongate than in that species.

FEMALE.—As described for genus. Length approximately 10 mm.

FEMALE GENITALIA.—(Fig. 300.)

CASE.—(Fig. 73.) Length 18–20 mm.; diameter 5–6 mm. General structure frequently somewhat shaggy in appearance because of divergent, posterior projecting fragments of grass leaves; occasionally sacks may be almost bare.

TYPE.—In the United States National Museum.

TYPE LOCALITY.—Everglades, Florida.

Recorded hosts.—"Euphorbiaceae; tung leaves [*Aleurites* sp.?]," from specimen label. "Poaceae; grasses" (Barnes and McDunnough, 1913).

Distribution.—(Map 2.) Presently restricted to three states of the Gulf Coastal Plain from Florida to Mississippi.

Material examined.—94 ♂♂, 1 ♀, 54 cases:

UNITED STATES: Alabama: Delchamps, 8 cases, USNM. Mobile, 2 cases, USNM. Florida: Coconut Grove, ♂, March 17; 25 cases, USNM. Elfers, Anclote River, ♂, April 5, USNM. Englewood, ♂ with case, CU. Everglade, ♂, April 15, AMNH; ♂, April 8–15, ANS; ♂, type, April 8–15; 3 ♂♂, April 8–15, case, USNM. Florida City, 2 ♂♂, May 18–28, AMNH. Ft. Myers, 2 ♂♂, April 24–30, USNM. Gainesville, 2 ♂♂, Aug. 30, CPK. Homestead, 3 ♂♂, March 10–May 8; 2 ♂♂, June 25, July 10; 10 ♂♂, Aug. 19–Oct. 14, CPK; 2 ♂♂, April 10, May 1, USNM. Lakeland, ♂ with case, May; ♀, May 12; ♂, 12 cases, USNM. Lake Placid, 4 ♂♂, Jan. 3–Feb. 11, CPK; ♂, March 15; 3 ♂♂, April 27–May 11, CU; 24 ♂♂, March 27–April 4, RWH; ♂, Nov. 12, CPK; ♂, Dec. 14, CU. Orlando, ♂, Sept. 8; 2 cases, USNM. Punta Gorda, 3 ♂♂, April 18–25; 12 cases, USNM. Royal Palm State Park, ♂, USNM. St. Petersburg, 13 ♂♂, March 8–May 23; 2 ♂♂, Aug. 2, Sept.; 6 ♂♂, USNM. Tampa, 4 cases, USNM. Mississippi: Biloxi, 6 ♂♂, May 1–21; 2 cases, USNM; ♂, May 10; case, ANS.

12. *Cryptothelea congregata* (Jones), new combination

Figures 72, 199, 255, 370; Map 6

Platoeceticus congregatus Jones, Trans. Amer. Ent. Soc., vol. 71, p. 113, pl. 3, fig. 3; pl. 4, fig. 7; pl. 5, fig. 11; pl. 6, fig. 13; text fig. 4, 1945.

Male.—Antennae (fig. 370) with pectinations relatively short as in *C. gloverii*, sensory hairs longer, finer, more erect as in *C. nigrita;* composed of about 25 segments.

Wings dark fuscous. Scales of discal area narrowly oblanceolate as in *C. gloverii*. Venation essentially as in *C. gloverii* except, in forewing, R_5 separate from R_3+_4, actually arising closer to M_1. Wing expanse "16 to 18 mm." (Jones, 1945).

Male genitalia.—(Fig. 255.) Similar to *C. gloverii*. Eighth sternite (fig. 199) resembling that of *C. nigrita*, with very elongate, slender furcations.

Female.—Unknown.

Case.—(Fig. 72.) Approximately 15–20 mm. length, 5–6 mm. diameter; irregularly covered with small grass fragments. The bags in general usually do not present as shaggy an appearance as those of *C. nigrita*, which is also a grass feeder.

Type.—Present deposition unknown. In his original description, Jones stated that the "type, with some paratype material is returned to Dr. Alfonso Dampf in Mexico City."

Type locality.—Morelos, Mexico.

Recorded hosts.—Not definitely known. Jones (1945) provides some information by quoting from A. Dampf that the larval cases were sometimes found "on the trunks of leafless burseraceous trees."

Distribution.—(Map 6.) Presently known only from the state of Morelos, northern Sierra del Sur Section, between Puente de Ixtal and Taxco.

Discussion.—*Cryptothelea congregata* seems to possess the gregarious habit of attaching the larval cases in a dense cluster that may contain several dozen bags. Jones (1945), however, points out the possibility that this behavior may only be a local condition induced by a scarcity of suitable permanent supports in a very arid region. Jones reported (in correspondence with Dampf) that "in late December these clusters may be found in crevises or partly concealed by scales of bark, on the trunks of (then) leafless burseraceous trees which occurred in scattered growth under semi-desert conditions between Puente de Ixtla and Taxco in the state of Morelos, Mexico, at an altitude of about 1,000 meters." He further mentioned that the larvae may aestivate within these bags for a considerable period of time (at least three months) before pupating.

Material examined.—3 microscope slides (♂ structures), 51 cases:

MEXICO: Morelos, 45 cases, 3 microscope slides (antennae, wings, ♂genitalia), USNM; 6 cases, ANS.

13. *Cryptothelea symmicta* (Dyar), new combination

Figures 11, 198, 256, 328; Map 6

Platoeceticus symmicta Dyar, Proc. U.S. Nat. Mus., vol. 47, p. 254, 1914.—Dalla Torre and Strand, Lep. Cat., pars. 34, p. 193, 1929.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1183, 1936.—Jones, Trans. Amer. Ent. Soc. vol. 71, p. 110, 1945.

Platoeceticus gloverii Vazquez, Anales Inst. Biol., vol. 12, no. 1, p. 304, 1941, (not Packard; in part).

Male.—(Fig. 11.) Antennae about 18 segments; sensory hairs irregularly scattered, relatively long, fine, twice diameter of supporting pectinations in length.

Wings brownish fuscous. Primaries with scales of cell (fig. 328) narrowly oblanceolate as in *C. gloverii*; R_5 usually connate with R_3+_4, sometimes stemmed to latter; M_2 and $_3$ usually separate, occasionally appearing nearly connate; M_1 arising from cell distinctly closer to M_2 than R_5. Secondaries with M_1 frequently atrophied. Wing expanse 8–14 mm.

Male genitalia.—(Fig. 256.) Small, usually about ¾ to ⅔ size of genitalia of *C. gloverii*. Saccus very slender, elongate.

Eighth sternite (fig. 198) somewhat stout, basal portion nearly as long as slender furcations.

Female.—Unknown.

TYPE.—In the United States National Museum.

TYPE LOCALITY.—Ancon, Canal Zone, Panama.

RECORDED HOSTS.—"Musaceae; *Musa* X *paradisiaca* L. (banana)," from specimen labels.

DISTRIBUTION.—(Map 6.) This species has been recorded from the most southern portion of the Gulf Coastal Range in Mexico and through parts of the Central American Ranges of Mexico, Guatemala, and Honduras.

DISCUSSION. Three specimens identified by Vazquez as *C. gloverii* from Mexico (Cordoba and Presidio) have been examined and determined to be *Cryptothelea symmicta*. The specimens were small (12–14 mm. wing span) and easily separated from *C. gloverii* by their different antennal structure (long, erect sensory hairs). Vazquez's discussion (1941) of *C. gloverii* is thus based in part upon a different species, but specimens of typical *C. gloverii* also may have been included in her study.

MATERIAL EXAMINED.—16 ♂♂:

GUATEMALA: Specific locality unknown, ♂, May 15; 3 ♂♂, USNM.

HONDURAS: Specific locality unknown, 2 ♂♂, April 1, USNM; 2 ♂♂, Aug. 24, Sept. 8, USNM. La Lima, 3 ♂♂, Feb., USNM.

MEXICO: Specific locality unknown, ♂, Aug. 10, USNM. Cordoba, Veracruz, 2 ♂♂, Aug. 17, Oct. 8, USNM. Teapa, Tabasco, ♂, March, BM.

14. *Cryptothelea gloverii* (Packard), new combination

FIGURES 12, 74, 156, 174, 200, 253, 253a, 302, 327, 369; MAP 6

Platoecetieus gloverii Packard, Guide Study Insects, p. 291, 1869.—Kirby, Cat. Lep. Heter., vol. 1, p. 516, 1892.—Dyar, Ent. News, vol. 4, p. 321, 1893; U.S. Nat. Mus. Bull. 52, no. 4067, 1902 [1903].—Grossbeck, Bull. Amer. Mus. Nat. Hist., vol. 37, p. 105, 1917.—Dyar, Insec. Inscit. Menst., vol. 11, p. 4, 1928.—Jones and Parks, Tex. Agric. Exp. Sta. Bull. 382, p. 29, figs. 15, 21, 1928.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 192, 1929.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1183, pl. 169c, 1936.—McDunnough, Check List Lep. USA, pt. 2, no. 9523, 1939.—Clausen, Entomophagous Insects, p. 422, 1940.—Vazquez, Anales Inst. Biol., vol. 12, no. 1, p. 304, figs. 14–17, 18–20; pl. 3, figs. A–F, 1941 (in part).—Jones, Trans. Amer. Ent. Soc., vol. 71, p. 105, pl. 3, fig. 1; pl. 4, fig.5; pl. 5, fig. 9; pl. 6, figs. 14–18; text fig. 2, 1945.—Vazquez, *in* Mem. Congr. Cient. Mex., VII–Cienc. Biol., pp. 331, 332, 339, 1953.

Psyche gloverii (Packard) Neumoegen and Dyar, Journ. N.Y. Ent. Soc., vol. 2, p. 119, 1894 (group *Platoecetieus*).

Manatha jonesi Barnes and Benjamin, Contr. Nat. Hist. Lep. N. Amer., vol. 5, no. 1, p. 47, 1922.

Platoecetieus jonesi (Barnes and Benjamin), Contr. Nat. Hist. Lep. N. Amer., vol. 5, no. 3, p. 188, 1924.—Jones and Parks, Tex. Agric. Exp. Sta. Bull. 382, p. 29, fig. 15, 1928.—Gaede *in* Seitz, Macrolep, World, vol. 6, p. 1184, 1936.—McDunnough, Check List Lep. Canada and USA, pt. 2, no. 9525, 1939.

Chalia pizote Schaus, Proc. Ent. Soc. Wash., vol. 29, no. 8, p. 185, 1927 (new synonymy).—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1178, 1936.

Oiketicoides pizote (Schaus) Dalla Torre and Strand, Lep. Cat., pars 34, p. 100, 1929.

Oiketicoides tristis Vazquez, Anales Inst. Biol., vol. 12, no. 1, pp. 296–298, figs. 1–3, pl. 1, figs. A–C, 1941 (not Schaus, 1901).

Male.—(Fig. 12.) Antennae 22–24 segmented; pectinations (fig. 369) rather stout, blunt, with scattered hairs slightly appressed, short, approximately equalling in length the diameter of pectinations from which they arise; antennae thus present a somewhat "stubby" appearance under low magnification.

Wings dark to brownish fuscous. Forewing with R_5 connate or stalked along with R_3 and $_4$; discal scales (fig. 327) mostly elongate, narrowly oblanceolate with sharply acute apices. Secondaries with M_2 and M_3 usually stalked, occasionally connate. Wing expanse 14–18 mm.

Male genitalia.—(Fig. 253.) Arms of eighth sternite (fig. 200) comparatively shorter than those of *C. nigrita*.

Female.—As described for genus; length 9–10 mm.

Female genitalia.—(Fig. 302.)

Case.—(Fig. 74.) Length 15–23 mm.; diameter 5–6 mm. The texture of the bag varies according to the nature of the food; it may be covered with fragments of scale insects, bark, fruit rinds, leaves, or it may be comparatively bare.

Types.—Lost (*Platocceticus gloverii*). In the United States National Museum (*M. jonesi* and *C. pizote*).

Type locality.—Florida (*P. gloverii*); San Benito, Texas (*M. jonesi*); Cayuga, Guatemala (*C. pizote*).

Recorded hosts.—"Coccidae: *Pseudaonidia duplex* Ckll." (Clausen, 1940). "Coccidae: Washington palm scale; Ebenaceae: *Diospyros virginiana* L.; Fabaceae: *Acacia* sp., *Prosopis* sp.; Fagaceae: *Quercus* sp.; Juglandaceae: *Carya* sp.; Lauraceae: *Persea gratissima* Gaertn." (from specimen labels). "Rutaceae: *Citrus aurantium* L." (Packard, 1869). "Rosaceae: *Crataegus* sp." (Barnes and Benjamin, 1924). "Liliaceae: *Yucca* sp.; Anacardiaceae: *Spondias mombin* L.; Fabaceae: *Erythrina* sp.; Myrtaceae: *Psidium guajava* L.; Rosaceae: *Rosa* sp." (Vazquez, 1941).

Distribution.—(Map 6.) Widely distributed through the Atlantic and Gulf Coastal Plain, from South Carolina south to the Central American Ranges of Guatemala and Honduras.

Discussion.—The short, somewhat appressed, antennal sensory hairs of *Cryptothelea gloverii* impart to this insect a feature that apparently is unique among New World psychids. *Chalia pizote* differs from *C. gloverii* in no observable way, and it likewise possesses this characteristic feature of the antennae.

In describing their new species *Platoecetieus jonesi*, Barnes and Benjamin seemingly were very careful to compare it with *C. nigrita* and not with the more closely related form *C. gloverii*. Jones (1945) expressed his opinion that *P. jonesi* and *C. gloverii* represented the same species. I have concluded, for reasons similar to Jones', that these two names are conspecific and do not deserve even racial status.

Vazquez, in her paper on the Mexican Psychidae (1941), evidently has illustrated and described the species *C. gloverii* erroneously as *Oiketicoides tristis*. She begins her descriptions of this taxon with a quotation of Heylearts' diagnosis of *Oiketicoides* and then proceeds to the specific description, wherein she clearly has mistaken the hind-legs for the prothoracic pair. Her illustrations and written description—"Patas (fig. B, Lám. 1) del color general cuerpo, 'las anteriores con una espina en las tibias' y de tamaño menor que las posteriores"—indicate this error. Figure B, plate 1, shows a leg labelled "pata anterior" with a small apical spur on the tibia, a characteristic that is not found on the foreleg of any of the psychids of this hemisphere. Furthermore, her illustrations of the male genitalia are definitely *Cryptothelea gloverii*. A male specimen, now deposited in the American Museum of Natural History and identified by Vazquez as *Oiketicoides tristis*, has been re-examined and determined to be *C. gloverii*.

Material examined.—200 ♂♂, 10 ♀♀, 107 cases:

UNITED STATES: Arizona: White Mts., 7 cases (identification questionable), USNM. Florida: Brooksville, case, USNM. Coconut Grove, 4 ♂♂, USNM. Crescent City, ♂, Aug. 13, USNM. Deep Lake, Allen River, March 14, AMNH. Ft. Meade, ♂, April, USNM. Ft. Myers, ♂, May 1–7, USNM. Freeport, case, USNM. Gainesville, ♂, May 5, USNM. Homestead, 2 ♂♂, March 6–10; 10 ♂♂, Sept. 9–Oct. 14, CPK. Jacksonville, ♂, July 8, ANS; case, USNM. Key West, ♂, Feb. 24; ♂, Oct.; 4 ♂♂, 23 cases, USNM. Lake Placid, 3 ♂♂, March 29–May 5, CU; 2 ♂♂, Feb. 8, March 21, CPK; 20 ♂♂, March 27–April 3, RWH; ♂, Nov. 12, CPK. Miami, 3 ♂♂, Aug. 12–22; ♂, USNM. Orlando, 2 ♂♂, March 17, May 28, USNM. Paradise Key, ♂, Feb. 22; ♂, USNM. Port Sewal, 2 ♂♂, Feb. 1–9; ♂, Nov. 19, AMNH. Rockledge, ♂, April 20, USNM. Royal Palm State Park, ♂, Jan. 20; 3 ♂♂, March 20–29; ♂, USNM. St. Petersburg, ♂, April 28; ♂, June; ♂, Oct., USNM. Sebring, ♂, Sept. 10, MCZ. Siesta Key, 2 ♂♂, April 20, 29; ♂, Oct. 25, USNM. Weeki Wachi Springs, ♂, May 13, CPK. Georgia: Savannah, 2 ♂♂, June 10, 19, CU. Louisiana: New Orleans, 7 ♂♂, April 10–May 13; 2 ♂♂, Sept. 15–20, 27 cases, USNM. Mississippi: Biloxi, ♂, June 13, CU; ♂, USNM. Gulfport, 9 ♂♂ with cases, June 20–26; ♂ with case, July 24; 8 ♀♀ with cases, June 25; 29 cases, USNM. Long Beach, 5 ♂♂ with cases, Sept. 11–24, USNM. South Carolina: Charleston, 2 ♂♂, May 24, 28; ♀, Sept. 10; 12 cases, USNM. Myrtle Beach, ♂, June 25, MCZ. Texas: Brownsville, 6 ♂♂, April 13–May 29, 10 cases, USNM; 2 ♂♂, April 13, BM. Corpus Christi, 3 ♂♂, April 15–May 22; 9 ♂♂, July 10; 8 ♂♂, Aug. 3–Sept. 25, CU. Kingsville, 2 ♂♂, April 15, CU. Mercedes, 13 ♂♂, Aug. 24–Nov. 4, AMNH; 31 cases, CPK. San Antonio, 5 ♂♂, April 1–May 31; 32 cases, ♀ (identification questionable), USNM. San Benito, ♂, type, *M. jonesi*, Aug. 1–7; 3 ♂♂, May 8–23; 2 ♂♂, June 16–23;

3 ♂♂, July 8–31; 17 ♂♂, Aug. 1–7; ♂, Sept. 8–15, USNM. Victoria, 3 ♂♂, June 24, CU; ♂, July 4, USNM.

GUATEMALA: Cayuga, ♂, type, *C. pizote*, May; 2 ♂♂, May; ♂, Sept.; 2 ♂♂, USNM; ♂, May; ♂, Aug., BM. Chejel, ♂, Aug. USNM. Qeuriflia, ♂, May, BM.

HONDURAS: Lancetilla, Tela, ♂, April 30, MCZ.

MEXICO: Motzorongo, ♂, Sept., AMNH.

9. *Dendropsyche* Jones

Dendropsyche Jones, Trans. Ent. Soc. London, vol. 74, p. 509, 1926b.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 197, 1929.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1179, 1936.

Type of genus.—*Dendropsyche burrowsi* Jones, 1926. Original designation and monobasic.

Male.—Antennae bipectinate to tips, branches diminishing in length apically from middle. Legs slender; first pair longest; third pair shortest. No tibial spurs or spines. Posterior end of abdomen exceeds hindwing margin ⅓ to almost ½ length of abdomen.

Wings (fig. 157) rounded, 11 and 7 venation. No veins stalked to cell; R_3+_4 completely fused, R_5 separate at base; all medial veins arising separate or nearly so from cell; base of medius undivided within cell of both wings, or faintly forked in primaries; 1A and 2A anastomosing beyond middle, coincident, straight to margin; 3A uniting with 2A near wing base, no spur to hind margin present. $Sc+R_1$ and Rs of hindwings completely separate, parallel or weakly connected by faint crossvein about midway along discal cell.

Male genitalia.—Elongate, narrow; valves proportionately very broad, pulvilli obsolescent, apex of sacculus minutely spined. Vinculum gradually tapering to very slender, elongate saccus. Aedeagus simple. Eighth sternite with heavy basal portion, slender furcations equal to base in length.

Female.—Unknown.

15. *Dendropsyche burrowsi* Jones

Figures 13, 75, 157, 202, 202a, 257, 257a; Map 7

Dendropsyche burrowsi Jones, Trans. Ent. Soc. London, vol. 74, p. 509, pl. L., figs. 1–7, 1926b.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 197, 1929.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1179, 1936.

Male.—(Fig. 13.) Body very slender, densely hairy, uniform fuscous color. Antennae with about 18 segments. First tarsal segment of all legs long, more than twice as long as second segment.

Wings evenly, very thinly scaled; wing scales narrow, hairlike. Secondaries with faint crossvein individually variable; in some specimens present in one wing, absent in other. Wing expanse 12–13 mm.

Male genitalia.—(Fig. 257.) As described for genus. Eighth tergite (fig. 202a) unusually large, elongate, faint notch at narrow, posterior end.

Case.—(Fig. 75.) "Length, 10 to 12.5 mm.; widest at the collapsible mouth (2.5 to 4 mm.), thence tapering to a diameter of about 1 mm. at the distal end. Many small fragments of vegetable matter (principally bark) are embedded or partially embedded in the silk; on the widened flexible mouth these fragments are larger and less enswathed in the silk, than on the firm-textured, tapering, tubular portion, where they scarcely project above the surface. The case is probably carried upright, not suspended, by the living larva" (Jones, 1926).

Type.—In the British Museum of Natural History.

Type locality.—Georgetown, British Guiana.

Recorded hosts.—"On bark of lime trees" (Jones, 1926).

Distribution.—(Map 7.) Known only from the Guiana Coastal Plain of British Guiana.

Discussion.—Neither adult specimens nor larval cases of this insect were available for study, but microscopic slides of the abdomen and genitalia kindly were sent to me for examination by the British Museum. As a result, the foregoing generic and specific descriptions are taken largely from the original description of F. M. Jones (1926) with some deletions and additional comments.

10. *Lumacra*, new genus

Chalia, *Clania*, *Cryptothelea*, *Eumeta*, *Oiketicoides*, and *Platoeceticus*, in part, of authors.

Type of genus.—*Eumeta brasiliensis* Heylaerts, 1884.

Male.—Body moderately robust; densely hairy; brownish to dark fuscous. Antennae (fig. 373) broadly bipectinate, pectinations long, slender, gradually diminishing in length toward apex, arising apically at least on segments of outer half of antenna; sensory hairs erect, very long, fine. Foretibia (fig. 175) with prominent epiphysis, extending almost entire length of tibia; first tarsal segment doubling second. Meso- and metathoracic tibiae completely unarmed. Abdomen exceeding hindwings by nearly ⅓ its length.

Wings (fig. 158) broad, usually evenly scaled, but apical third of primaries hyaline in one species. Primaries 12-veined, relatively acute apex, outer margin straight to slightly convex; R_3 and R_4 stalked; R_5 usually connate, may be stemmed to R_3+_4; base of medius either simple or forked within cell of both wings; M_2 and $_3$ normally stalked; anal veins similar to that of *Cryptothelea*, spur of 3A usually prominent. Secondaries normally with 8 veins; $Sc+R_1$ and Rs connected by oblique crossvein either below or beyond apex of discal cell; M_2 and $_3$ either connate or stalked.

Male genitalia.—Apex of tegumen rounded, entire. Valves broad, pulvilli well developed, partially covered with minute spines; apex of sacculus with small spines. Vinculum with lower angles often folded, thus much darker than remainder of sclerite; sloping either abruptly or gradually to saccus. Aedeagus simple, without basal dilation. Eighth sternite with undivided basal portion broad; furcal arms divergent, short, stout.

Female.—Unknown.

Discussion.—One of the important, but by no means unique, features of this new genus is the presence of an epiphysis on the foretibia. This character thus has been emphasized in the formation of the generic name "Lumacra" (leg with a thorn).

It is possible to divide this genus into two groups based essentially on the male genitalia and the eighth abdominal sternite. The lack of correlation of other characters prevents me from giving these two groups subgeneric ranking. They are presented merely to emphasize certain fundamental relationships.

Key to the Species of *Lumacra*

1a. Vinculum of male genitalia gradually tapering to indistinct saccus; lower angles not darkened (fig. 261).

"QUADRIDENTATA" GROUP

2a. Forewings with apical third largely devoid of scales, semitransparent (fig. 19) . . . . . **20. L. hyalinacra**

2b. Forewings uniformly scaled . . . . . **19. L. quadridentata**

1b. Vinculum abruptly narrowing to distinct, rodlike saccus; lower angles conspicuously darkened (fig. 258).

"BRASILIENSIS" GROUP

3a. Base of medius prominently divided within cell of both wings. **16. L. brasiliensis**

3b. Base of medius undivided in cell of forewing, but occasionally divided for short distance in secondaries.

4a. $Sc+R_1$ and Rs converging briefly beyond cell in secondaries; intercalary cells absent . . . . . **18. L. haitiensis**

4b. $Sc+R_1$ and Rs parallel beyond cell; intercalary cell sometimes present in hindwing . . . . . **17. L. künckelii**

THE "BRASILIENSIS" GROUP

Included in this group are the species *Lumacra brasiliensis*, *L. haitiensis*, and *L. künckelii*, which possess genitalia that are nearly identical but which diverge from each other in certain minor features of the wing venation.

Male genitalia.—Vinculum with lower angles folded, appearing quite dark; abruptly constricted to form rodlike, moderately long

saccus. Eighth sternite with very short, stout, often widely divergent furcations.

16. *Lumacra brasiliensis* (Heylaerts), new combination

FIGURES 15, 79, 158, 175, 205, 258, 258a, 330, 373; MAP 8

Eumeta brasiliensis Heylaerts, Ann. Soc. Ent. Belg., Compt.-Rend., vol. 28, p. XL, 1884.—Kirby, Cat. Lep. Het., vol. 1, p. 504, 1892.

Cryptothelea brasiliensis (Heylaerts) Dalla Torre and Strand, Lep. Cat., pars 34, p. 188, 1929.

Cryptotheles [sic] *brasiliensis* (Heylaerts) Costa Lima, Insetos Brazil, vol. 5, p. 193, 1945.

Clania brasiliensis (Heylaerts) Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1183, 1936.

Platoeceticus marona Schaus, Proc. U.S. Nat. Mus., vol. 29, p. 345, 1905 (new synonymy).—Dalla Torre and Strand, Lep. Cat., pars 34, p. 192, 1929. — Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1183, 1936.—Jones, Trans. Amer. Ent. Soc., vol. 71, p. 122, 1945.

Platoeceticus costaricensis Schaus, Ann. Mag. Nat. Hist., ser. 8, vol. 7, p. 634, 1911 (new synonymy).—Dalla Torre and Strand, Lep. Cat., pars 34, p. 193, 1929.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1183, 1936. — Jones, Trans. Amer. Ent. Soc., vol. 71, p. 122, 1945.

MALE.—(Fig. 15.) Body vesture fuscous to dark fuscous. Antennae (fig. 373) 30–34 segments.

Wings same color as body. Primaries with discal scales (fig. 330) oblanceolate, usually with acute, sometimes bidentate, apices; medial vein divided for considerable distance in both wings. In hindwings $Sc+R_1$ and Rs connected near middle of cell by oblique crossvein, approximately parallel to margin. Wing expanse 23–37 mm.

MALE GENITALIA.—(Fig. 258.) Saccus comparatively longer, more slender than in *L. künckelii* and *L. haitiensis*.

CASE.—(Fig. 79.) Approximately 30 mm. length, 8 mm. diameter, undoubtedly attaining greater overall size; heavily covered with short, thick twigs, longitudinally arranged in irregular fashion, few small fragments of lichens attached; external silk covering absent.

TYPES.—In the Rijksmuseum van Natuurlijke Historie, Leiden, Netherlands (lectotype, *E. brasiliensis*); United States National Museum (*P. costaricensis* and *P. marona*).

TYPE LOCALITY.—Brazil (*E. brasiliensis*); Juan Vinos, Cachi, Costa Rica (*P. costaricensis*); St. Laurent, French Guiana (*P. marona*.)

RECORDED HOSTS.—"Mosses," Costa Lima, 1945.

DISTRIBUTION.—(Map 8.) Occurring over a wide area from the Central American ranges of Guatemala and Costa Rica, south along the Andean system to Peru, and through the Guiana Coastal Plain to the Brazilian Highland as far south as the state of Santa Catarina.

DISCUSSION.—The only fundamental difference between the type specimens of *Platoeceticus marona* and *P. costaricensis* is one of size:

the latter specimen exceeds the former in wing expanse by about 9 mm. This character is quite variable and uniformly distributed in the series of 18 males examined. In no case, between any two consecutive specimens, was there a separation of wing measurments of more than 2 mm., but the total range observed was 14 mm.

The lectotype specimen of *Eumeta brasiliensis* was examined and found to be conspecific with the two species of Schaus.

MATERIAL EXAMINED.—18 ♂♂, 1 case:

BRITISH HONDURAS: Camp Sibun, Cayo District, 3 ♂♂, July 28, DRD.

COSTA RICA: Cachi, ♂, Nov., USNM. Juan Vinas, ♂, holotype, *P. costaricensis*, Feb., USNM; 2 ♂♂, Feb., BM.

GUATEMALA: Cayuga, ♂, USNM. Quirigua, ♂, July, USNM.

BRAZIL: Specific locality unknown, ♂, lectotype, *L. brasiliensis*, case, RNH. Blumenau, Sta. Catarina, ♂, ZSBS. Neu Bremen, Sta. Catarina, ♂, Feb. 18, CU.

COLOMBIA: Specific locality unknown, 2 ♂♂, BM. Rio Micay, W. Colombia, ♂, ZSBS.

FRENCH GUIANA: St. Laurent, Maroni, ♂, holotype, *P. marona*, ♂, Nov., USNM.

PERU: La Oroga, R. Inambari, SE Peru, ♂, Oct., BM.

17. *Lumacra künckelii* (Heylaerts), new combination

FIGURES 16, 80, 206, 259, 331; MAP 8

Chalia künckelii Heylaerts, Ann. Soc. Ent. Belg., vol. 45, p. 97, 1901; Nouv. Arch. Mus. Hist. Nat., ser. 4, vol. 10, pp. 225–232, 1908.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1178, 1936.

Chalia küenkeli [sic] Koehler, Sonderheft Zeitschr. wissen. Insektenbiol., vol. 19, p. 25, pl. 3, fig. 24; pl. 8, fig. 20a–e, 1924.

Chalia künckeli [sic] Koehler, Physis, vol. 17, p. 460, 1939.

Oiketicoides künckeli [sic] Dalla Torre and Strand, Lep. Cat., pars 34, p. 100, 1929.—Koehler, Rev. Soc. Ent. Argentina, vol. 17, p. 349, fig. 5, 1931.—Costa Lima, Insetos Brasil, vol. 5, p. 193, fig. 87, 1945.

MALE.—(Fig. 16.) Vesture of body light yellowish brown to light fuscous. Antennae of approximately 32 segments. Color of wings same as body. Discal scales (fig. 331) of forewing oblanceolate with either acute or sharply bidentate tips; base of medius usually undivided within cell of both wings (one specimen examined with medius shortly divided in hindwing). Secondaries with $Sc+R_1$ and Rs connected near middle of cell by oblique crossvein, then separate to margin. Wing expanse 20–26 mm.

MALE GENITALIA.—(Fig. 259.) Saccus slender, relatively short. Furcal arms of eighth sternite (fig. 206) as long as undivided base of sternite.

CASE.—(Fig. 80.) Length 35–40 mm.; greatest diameter 7 mm. Main body of case characteristically shingled with short (7–10 mm.),

slender, herbaceous stems along long axis of bag; sticks near posterior end long (20–30 mm.), projecting far beyond tip of case.

LECTOTYPE.—In the Muséum National d'Histoire Naturelle, designated by the author.

TYPE LOCALITY.—Ceres, Prov. of Sante Fe, Argentina.

RECORDED HOSTS.—"Poaceae: *Aristida* sp." (Costa Lima, 1945). "Asteraceae: *Baccharis cordifolia* DC" (Heylaerts, 1901).

DISTRIBUTION.—(Map 8.) This species occurs over much of the Paraná Paraguay Plain of Argentina and Paraguay.

DISCUSSION.—A lectotype for this species has been selected from three syntypes and the specimen is now deposited in the collections of the Paris Museum. This taxonomic action is in accordance with Heylaerts' published statement (1908) on the type deposition of *Chalia künckelii:* "Les spécimens types font partie des collections du Muséum d'Histoire naturelle de Paris." Koehler (1924) has stated that the type is in the Buenos Aires Museum, but this is not possible as none of Heylaerts' syntypes were ever deposited there.

MATERIAL EXAMINED.—5 ♂♂, 2 cases:

ARGENTINA: Buenos Aires, ♂, USNM. Ceres, ♂, lectotype; ♂, lectoparatype, case, PM; ♂, lectoparatype, case, RNH.

PARAGUAY: Villarrica, ♂, Feb., USNM.

18. *Lumacra haitiensis*, new species

FIGURES 17, 207, 260, 332; MAP 7

MALE.—(Fig. 17.) Body vesture light brown. Antennae with approximately 31 segments. Wings light fuscous; broad as in *L. brasiliensis*. Discal scales (fig. 332) in forewing oblanceolate with mostly bidentate apices, few scattered scales with bluntly rounded tips; base of M undivided within cell of both wings. $Sc+R_1$ and Rs in hindwing connected near middle of cell by oblique crossvein, converging at point beyond cell again to diverge, continuing to margin as two separate veins. Wing expanse 27 mm.

MALE GENITALIA.—(Fig. 260.) Saccus stouter, relatively shorter than in *L. brasiliensis* and *L. künckelii*. Arms of eighth sternite (fig. 207) nearly as long as those of *L. künckelii* but distinctly more divergent.

CASE.—Unknown.

HOLOTYPE.—In the United States National Museum, no. 66369.

TYPE LOCALITY.—Port-au-Prince, Haiti.

RECORDED HOSTS.—None.

DISTRIBUTION.—(Map 7.) Known only from the type specimen, which was collected February 19–28, 1922, at Port-au-Prince, Haiti, at an elevation of about 300 feet.

Discussion.—The outer convergence and separation of $Sc+R_1$ and Rs in the secondaries is possibly, but not probably, attributable to intraspecific variation. The precise definition of this character will have to await further collecting of the species. In addition to this venational feature, *L. haitiensis* can be separated from *L. künckelii*, which it most resembles, by a distinctly different eighth sternite and by the relatively broader primaries. *L. haitiensis* can be distinguished easily from *L. brasiliensis* by the absence of intercalary cells in the wings.

THE "QUADRIDENTATA" GROUP

This group is comprised of only two species, *Lumacra quadridentata* and *L. hyalinacra*, both of which previously were undescribed. As in the first group, these two species exhibit very similar genitalia, but they differ remarkably in their pattern of scaling.

Male genitalia.—Vinculum with lower angles not doubled, thus no darker than rest of sclerite; gradually tapering to indistinct saccus. Eighth sternite furcations noticeably more slender than previous group.

19. *Lumacra quadridentata*, new species

Figures 18, 204, 261, 333; Map 9

Male.—(Fig. 18.) Body and wings fuscous. Antennae 24–27 segments. Wings fully scaled. Discal scales (fig. 333) of forewings broadly oblanceolate with variable apices, usually quadridentate; scales over rest of wing also broad and strongly dentate; median vein undivided within cell of both wings. Wing expanse 20–21 mm.

Male genitalia.—(Fig. 261.) As described for group.

Case.—Unknown.

Holotype.—In the British Museum of Natural History.

Type locality.—St. Jean de Maroni, French Guiana.

Recorded hosts.—None.

Distribution.—(Map 9.) Presently known from the Orinoco Plain of Venezuela, east along the Guiana Coastal Plain to French Guiana.

Discussion.—This new species is represented presently by only three specimens, consisting of two paratypes (both with abdomens missing) and the holotype (male genitalia on slide no. 47, DRD). *Lumacra quadridentata* can readily be separated from the three species of the "brasiliensis" group by the distinctly different genitalia, and from *L. hyalinacra* in possessing fully scaled primaries. It can be further distinguished from most members of this genus by the characteristic dentate scaling in the discal cell which the specific name has indicated.

Material examined.—3 ♂♂:

FRENCH GUIANA: St. Jean de Maroni, ♂, type, BM.

VENEZUELA: Caracas, ♂, paratype, "Berg Avila, P. Cor. Vogl," ZSBS; ♂, paratype, "Berg Avila, P. Cor. Vogl," 22-26-5-36, USNM.

20. *Lumacra hyalinacra*, new species

FIGURES 19, 203, 262, 334; MAP 7

MALE.—(Fig. 19.) Body and greater part of wings dark fuscous. Antennae with 24 segments. Forewings unevenly scaled; outer one-third semitransparent, with a sparse scattering of very narrow, curved scales, most possessing minutely bidentate apices; basal two-thirds and all of hindwing uniformly covered by broad scales with variable tips; scales of discal cell (fig. 334) of primaries usually with bluntly rounded apices, becoming tridentate further out; base of medius not distinctly forked in either wing. Secondaries 7-veined, M_1 absent; $Sc+R_1$ and Rs parallel throughout length, connected by crossvein slightly below apical corner of cell. Wing expanse 22 mm.

MALE GENITALIA.—(Fig. 262.) As described for group.

CASE.—Unknown.

HOLOTYPE.—In the United States National Museum, no. 66370.

TYPE LOCALITY.—Juayua, El Salvador.

RECORDED HOSTS.—"Rubiaceae: coffee [*Coffea arabica* L.]," from specimen label.

DISTRIBUTION.—(Map 7.) Known from only one specimen, the holotype, which was collected June 15, 1953, by "P.A.B." The specimen label bears the additional data "No. 396; 53-9575 P."

DISCUSSION.—This insect is one of the most singular species of the New World psychids; it is distinguished easily from all other species included in this study by the transparent tips of the primaries (hence the name "hyalinacra") and by the fully scaled secondaries.

The loss of M_1 in the hindwings is not believed to be significant but due to merely individual variation, which is suggested by the conspicuous gap between Rs and M_2 as well as the partially atrophied condition (not reaching margin) of M_1 in the primaries. Further collecting of this unique insect should clarify the uncertainty.

11. *Curtorama*, new genus

Platoeceticus, in part, of authors.

TYPE OF GENUS.—*Psyche cassiae* Weyenbergh, 1884.

MALE.—Antennae bipectinate nearly to apex; segments relatively short, pectinations tend to arise basad. Legs (fig. 176) slender; tibiae without armature. Tip of abdomen equalling or slightly exceeding hindmargin of secondaries.

Wings (fig. 159) moderately rounded, uniformly scaled. Primaries with 12 veins; R_3 and $_4$ stalked, R_5 shortly stemmed at base; M_2

and $_3$ stalked; base of M simple in cell of both wings; anal veins as in *Cryptothelea*, base of 1A partially atrophied; 3A usually continuing toward hindmargin after separating from 2A as faint spur. Secondaries with 8 veins; $Sc+R_1$ and Rs either anastomosing at a point or connected by crossvein midway along discal cell, continuing as parallel veins to margin; M_2 and $_3$ either connate or shortly stalked.

Male genitalia.—Tegumen broadly acute, apex entire. Valves with pulvilli well developed, minutely spined; sacculus with few minute spines at apex. Vinculum rectangular, abruptly constricted to form elongate, slender saccus. Aedeagus simple, without basal expansion. Eighth sternite with stout divergent furcations.

Female.—Body vermiform, all external appendages vestigial. Head and dorsum of thorax slightly sclerotized. Body naked except for anal tuft.

Female genitalia.—(Fig. 303.) Two pairs of apodemes present; posterior pair slender, extending into apical segment of abdomen; anterior pair within penultimate segment, basal portion rodlike, remainder expanded into broadly sclerotized areas, extending ventrally, uniting near ostium. Internal genitalia with bursa enlarged, exceeding volume of spermatheca several times; ductus seminalis short (less than length of bursa), stout; accessory glands bifid, well developed, arising from vestibulum.

Discussion.—This genus closely resembles *Lumacra* both in general appearance and in the structure of the male genitalia, but it differs from that genus in the loss of the epiphysis and in the basal origin of the antennal pectinations. Another feature of the antenna that characterizes this genus is the very short rami, which has suggested the name "Curtorama." *Curtorama* also superficially resembles the predominantly North American genus *Astala*, but it differs primarily from the latter by the retention of M_1 in both wings.

21. *Curtorama cassiae* (Weyenbergh), new combination

Figures 14, 76, 77, 78, 159, 176, 208, 263, 263a, 303, 335, 374; Map 7

Psyche cassiae Weyenbergh, Tijdschr. Ent., vol. 27, p. 9, figs. 1–6, 1884.

Platocceticus cassiae (Weyenbergh) Heylaerts, Ann. Soc. Ent. Belg., Compt-Rend., vol. 31, p. viii, 1887.—Kirby, Cat. Lep. Heter., p. 516, 1892.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 192, 1929.—Koehler, Physis, vol. 17, p. 462, 1939.—Jones, Trans. Amer. Ent. Soc., vol. 71, p. 121, 1945.

Chalia rebeli Koehler, Sonderheft Zeitschr. wissen., Insektenbiol., vol. 19, p. 25, table 3, fig. 24; table 8, fig. 20a–e, 1924 (new synonymy).

Platoeceticus rebeli (Koehler), Rev. Soc. Ent. Argentina, vol. 3, pp. 350, 352, fig. 8, 1931.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1183, pl. 169d, 1936.—Koehler, Physis, vol. 17, pp. 461, 471, fig. 12, 1939.—Jones, Trans. Amer. Ent. Soc., vol. 71, p. 122, 1945.

Platoeceticus rugosus Koehler, Rev. Soc. Ent. Argentina, vol. 3, pp. 351, 352, fig. 7, 1931 (new synonymy).—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1184, 1936.—Jones, Trans. Amer. Ent. Soc., vol. 71, p. 122, 1945.
Prochalia rugosa (Koehler), Physis, vol. 17, pp. 461, 471, fig. 8, 1939.

Male.—(Fig. 14.) Body moderately stout, densely hairy; dark fuscous. Antennae (fig. 374) usually with 26–28 segments; pectinations relatively short, somewhat stocky. Foreleg greatest in length, first tarsal segment approximately doubling second. Meso- and metathoracic legs with first tarsal segments slightly exceeding second, distinctly less than twice its length.

Wings rather heavily scaled, fuscous. Forewing with discal scales of two types: either long and slender with very pointed apices; or shorter and broader with sharply bidentate tips. Wing expanse 20–23 mm.

Male genitalia.—(Fig. 263.) As described for genus.

Female.—Length 13 mm. As described for genus.

Female genitalia.—(Fig. 303.) As described for genus.

Case.—(Figs. 76–78.) Length 15–27 mm.; diameter 5–7 mm. Exterior of case densely covered by short (4–10 mm. long) sections of slender twigs, laid obliquely across bag, somewhat spirally arranged. The tips of these small twigs frequently are sharply pointed and sometimes project in a divergent fashion outward, thus often presenting a rather jagged outline to the case. One larval case, bearing a Weyenbergh determination label, differs from the foregoing description in being heavily covered with leaf fragments.

Types.—In the Rijksmuseum van Natuurlijke Historie (lectotype, *Psyche cassiae*, designated by the author); Zoologische Sammlung der Bayerischen Staates (cotypes, *Chalia rebeli* and *Platoeceticus rugosus*).

Type localities.—Cordoba, Argentina (*P. cassiae*); Buenos Aires, Argentina (*C. rebeli*); "la sierra alta de" Tandil, Province de Buenos Aires, Argentina (*P. rugosus*).

Recorded hosts.—"Asteraceae: *Cynara cardunculus* L.; Poaceae: grasses" (Koehler, 1931). Fabaceae: "*Cassia aphylla* Cav." (Weyenbergh, 1884).

Distribution.—(Map 9.) Present records indicate that this species occurs in the Paraná Plateau of Uruguay and west through parts of the Paraná Paraguay Plain of Argentina.

Discussion.—The adult males of *Curtorama cassiae* and *Platoeceticus rebeli* have been compared and found to be identical. In separating these two "species," Koehler relied primarily on the pygidium of the female pupa. According to him, these two insects could be distinguished by the fact that the pupa of *P. rebeli* possessed two anal hooks and that of *C. cassiae* bore only one. The female pupa of

C. cassiae was not available for study, but the specimen upon which the original description of *P. rebeli* was based was examined. This pupa possessed two very minute anal hooks of unequal lengths. Very likely the relative development of these small protrusions may vary; perhaps the specimen of *C. cassiae* that Koehler (1939) described represented such a variation. The present author currently believes that *C. cassiae* and *P. rebeli* are synonymous.

For similar reasons *Prochalia rugosa* also has been synonymized under *Curtorama cassiae*. The differences of the larval cases and the pygidia of the female pupae between *P. rugosa* and *C. cassiae* are too insignificant to be of specific importance.

Material Examined.—9 ♂♂, 1 ♀, 28 cases:

ARGENTINA: Specific locality unknown, case, RNH. Buenos Aires, 3 ♂♂, 12 cases, ZSBS. Cordoba, ♂, lectotype, Feb., RNH. Sierra de la Ventana, ♀, 5 cases, ZSBS. Tandil, 10 cases, ZSBS. Tucuman, ♂, BM.

URUGUAY: Specific locality unknown, 4 ♂♂, CU.

12. *Astala*, new genus

Eurukutturus, Eurycyttarus, Manatha, Pachythelia, Platoeceticus, and *Psyche,* in part, of authors.

Type of genus.—*Psyche confederata* Grote and Robinson, 1868.

Male.—Body and wings usually various shades of fuscous. Antennae (fig. 375) broadly bipectinate; pectinations gradually decreasing in length toward tip, arising from middle or slightly above middle of each segment; sensory hairs erect, very fine, 3–5x diameter of pectinations in length. Vesture of thorax variable; wooly or less so. Legs (fig. 178) without epiphysis or tibial spurs. Forelegs greatest in length; first tarsal segment of forelegs longest, longer than that of second pair of legs. End of abdomen slightly surpassing hindmargin of secondaries.

Wings (fig. 160) uniformly scaled except in *A. hoffmanni*. Forewings 11-veined; apex slightly acute or moderately rounded; discal scales broad or extremely slender, hairlike; if hairlike, majority with bidentate tips; R_3 and $_4$ stalked, R_5 most frequently separate; in both wings M_1 absent, M_2 and M_3 usually separate, base of medius undivided in cell (in one specimen of *A. confederata* intercalary cell present); base of 1A vestigial, becoming prominent at point where it bends abruptly down to join 2A, occasionally short spur continuing toward outer margin; 2A angulate at juncture of 1A; 2A and 3A separate at base, fusing for some distance, finally forking again, 3A continuing down toward hindmargin as short spur. Secondaries 7-veined; S+ *M* R_1 and Rs connected by crossvein; M_2 and $_3$ sometimes shortly stalked.

Male genitalia.—Tegumen undivided at apex. Valves with pulvilli moderately to well developed, minutely spined; sacculus with apical spinules. Vinculum quadrate, longer than broad, abruptly narrowing to relatively elongate, rodlike saccus. Eighth sternite furcations slender, usually slightly curved, knoblike tips, somewhat divergent.

Female.—Vermiform, all external appendages vestigial. Head, dorsal area of thorax somewhat sclerotized. Body naked except for circular mat of hairs near posterior tip of abdomen.

Female genitalia.—(Fig. 305.) Similar to that of *Cryptothelea*. External structures weakly sclerotized, mostly membranous. Ductus seminalis extremely short, less than ¼ length of spermatheca. Bursa copulatrix slightly exceeding spermatheca in volume. Accessory gland strongly bilobed, arising from median oviduct opposite seminal duct.

Discussion.—It has been necessary to erect two new generic names for the New World species formerly included in the genus *Eurukuttarus*, which was found to consist of two distinct groups. This Old World genus cannot be used for either group because it was diagnosed erroneously by Hampson and, consequently, has been misapplied by several authors to certain species of our hemisphere.

Hampson (1891) originally stated that *Eurukuttarus* lacked a spine on the foretibia and that vein 6 (M_1) was absent in both wings. The type species of Hampson's genus, *Eurukuttarus pileatus*, consists of only two specimens, both without abdomens, in the collection of the British Museum; one of the specimens is the holotype. The present author examined the foreleg of the holotype and the entire second specimen, which resulted in the discovery of a very prominent epiphysis. The inclusion of our species under this genus and the correct generic placement of *E. pileatus*, thus, became somewhat doubtful. According to Hampson's key in the "Moths of India" (1892), *E. pileatus* would then fall under the genus *Acanthopsyche*, subgenus *Oeceticoides*. Such a placement seems unlikely, but this problem has not been pursued.

In addition to the epipysis, *E. pileatus* differs further from *Astala* in the fact that the antennal pectinations arise basad. These two features separate the two genera adequately. The male genitalia and abdominal plates of *E. pileatus*, when eventually described, may serve to further separate "*Eurukuttarus*" from both *Astala* and *Basicladus*.

The genus *Astala* represents a somewhat heterogeneous-appearing group of moths that, however, are related closely as shown by their very similar male genitalia, antennae, leg and wing structure. The diversity is observed almost entirely in scale structure and pattern.

Astala confederata, with its broadly and closely scaled wings, seems to represent one extreme of the group, and *A. vigasi*, a very frail-looking and thinly scaled insect, the opposite. The nearest species to *A. vigasi*, both morphologically and distributionally, is *A. zacualpania*, which is somewhat intermediate between *A. vigasi* and *A. edwardsi* or *A. tristis* in general habitus.

Because these differences appear to be gradual and particularly because strong similarities unite these species, all members included herein are believed to represent a single genus.

Some uncertainty arises in separating *Astala* from the almost morphologically identical group *Hyaloscotes*. Superficially, the two species of *Hyaloscotes* appear rather remote from all members of *Astala*, except *A. vigasi* and *A. zacualpania*. *Hyaloscotes*, however, may be separated from these two Mexican species on the basis of the male genitalia and the different structure of the wing scale apices. In addition, there may exist reliable generic differences in the female genitalia. The females of *Astala confederata* and *A. edwardsi* possess genitalia that are less sclerotized and accessory glands that are less well developed than those of *Hyaloscotes pithopoera*. Before such a basic distinction can be confirmed, it will be necessary to examine the females of more species belonging to these two groups.

Whether or not this separation is justified will depend also upon further knowledge of the immature stages. For the present, however, the recognition of two separate genera appears to be the best procedure to follow, especially when one considers the great lack of morphological divergence that is demonstrated by many members of this family.

Key to the Species of *Astala*

1a. Forewings with discal scales slender, somewhat hairlike (fig. 339).
  2a. Vesture of thorax consisting of whitish hairs. . . . . **26. A. tristis**
  2b. Vesture of thorax greyish to fuscous.
    3a. Wings and body densely scaled, fuscous in color (fig. 23). **25. A. edwardsi**
    3b. Wings and body more thinly scaled, greyish.
      4a. Wing expanse 16 to 20 mm.; wings semitransparent (fig. 26). **28. A. vigasi**
      4b. Wing expanse 23 to 28 mm.; wings more heavily scaled (fig. 25). **27. A. zacualpania**
1b. Forewings with discal scales broader, oblanceolate (fig. 336).
  5a. Wings with outer marginal area largely devoid of scales and translucent (fig. 21) . . . . . **23. A. hoffmanni**
  5b. Wings more evenly scaled.
    6a. Outer marginal fringe of wings white; larval case smoothly cylindrical. **24. A. polingi**
    6b. Outer marginal fringe fuscous; larval case irregularly covered with longitudinally arranged sections of small stems . . **22. A. confederata**

22. *Astala confederata* (Grote and Robinson), new combination

FIGURES 20, 81, 160, 178, 211, 264, 264a, 305, 336, 375; MAP 4

Psyche confederata Grote and Robinson, Trans. Amer. Ent. Soc., vol. 2, p. 191, 1868.—Kirby, Cat. Lep. Heter., vol. 1, p. 515, 1892.—Dyar, Ent. News, vol. 4, p. 321, 1893.—Neumoegen and Dyar, Journ. N.Y. Ent. Soc., vol. 2, p. 119, 1894.

Eurycyttarus confederata (Grote and Robinson) Dyar, U.S. Nat. Mus. Bull 52, no. 4068, 1902 [1903].—Holland, Moth Book, p. 363, pl. 41, fig. 8, 1905. —Forbes, Cornell Univ. Agric. Exp. Sta. Mem. 68, p. 141, fig. 102, 1923; *in* Leonard, Cornell Univ. Agric. Exp. Sta. Mem. 101, p. 539, 1928. —Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1179, pl. 169b, 1936.

Pachytelia [sic] *confederata* (Grote and Robinson) Dyar, Insec. Inscit. Menst., vol. 11, p. 2, 1923.

Eurukuttarus confederata (Grote and Robinson) Jones and Parks, Tex. Agric. Exp. Sta. Bull. 382, p. 29, figs. 15, 21, 1928.—Dalla Torre and Strand Lep. Cat., pars 34, p. 131, 1929.—McDunnough, Check List Lep. Canada and USA, pt. 2, no. 9526, 1939.—Vazquez, *in* Mem. Congr. Cient. Mex., VII-Cienc. Biol., pp. 330, 334, 335, 336, 338, figs. 6a,b, 1953.

Pachythelia lepidopteris Dyar, Insec. Inscit. Menst., vol. 14, p. 146, 1926 (new synonymy).—Dalla Torre and Strand, Lep. Cat., pars 34, p. 161, 1929.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1180, 1936.

MALE.—(Fig. 20.) Body and wings dark fuscous. Body with somewhat sparse covering of hairs. Antennae (fig. 375) 22- to 24-segmented. Abdomen reaching to hindmargin of secondaries.

Wings closely scaled; discal scales (fig. 336) of forewing moderately broad, oblanceolate, apex usually acute. Primaries with spur 1A often atrophied. Secondaries with oblique crossvein between $Sc+R_1$, Rs closer to apex of discal cell than in other species; M_2 and $_3$ usually widely separate, rarely connate. Wing expanse 16–20 mm.

MALE GENITALIA.—(Fig. 264.) As described for genus. Eighth sternite (fig. 211) base sharply flared out.

FEMALE.—As described for genus. Length 7–10 mm.

FEMALE GENITALIA.—(Fig. 305.)

CASE.—(Fig. 81.) Length 15–20 mm.; diameter 4–5 mm. Silk greyish white, heavily covered, interwoven with minute plant fragments, characteristically overlaid by many longitudinal pieces of grass culms, other small stems attached firmly anteriorally, diverging somewhat as they project backward, extending usually most of bag length.

TYPES.—Lost (*Psyche confederata*); in the United States National Museum (*Pachythelia lepidopteris*).

TYPE LOCALITY.—Texas (*Psyche confederata*); Colima, Mexico (*Pachythelia lepidopteris*).

RECORDED HOSTS.—This species is probably a general grass feeder as the structure of its case indicates. Cases with pupae have been recorded (from specimen labels) on the bark of oaks, apple trees, and *Castanea dentata* Marsh.

Distribution.—(Map 4.) This is a widely occurring species, found from the Appalachian Highlands of Canada(?) and the eastern Interior Plains through much of the Atlantic Plain, south and west to the southern portions of the Intermontane Plateau Systems of Mexico. One rather disjunct locality in North Dakota may represent only a very local and perhaps temporary infestation.

Material examined.—170 ♂♂, 9 ♀♀, 80 cases:

CANADA: Specific locality unknown, ♂, BM.

UNITED STATES: Arizona: Peppersauce Canyon, Santa Catalina Mts., 4500–5500 ft., 18 cases, USNM. Redington, ♂, USNM. Connecticut: South Kent, 2 cases, USNM. Tolland, 5 cases, USNM. Delaware: New Castle County, 2 ♂♂, June 19–21, USNM; case, BM. District of Columbia: Washington, 10 cases, USNM. Georgia: Dalton, 3 cases, USNM. Louisiana: New Orleans, 2 ♂♂ with cases, June 5; ♀, June 6, USNM. Sabine River, opposite Orange, Texas, ♂, June 20, CU. Maryland: Cecil County, 4 ♂♂, case, June 20–July 5, USNM. Plummers Island, ♂, June 16–19, USNM. Massachusetts: Martha's Vineyard, ♀, July 8, USNM. Newton, ♂, June 25, MCZ. Peabody Academy, 3 ♂♂, MCZ. South Natick, 2 ♂♂ and case, MCZ. Michigan: Clayton, ♂, June 18, MSU. Flat Rock, 3 ♂♂, June 16–20, MSU. Hudson, ♂, June 17, MSU. Prattville, ♂, June 23, MSU. Mississippi: Biloxi, ♂ with case, USNM. Clinton, ♂, June 19, B. Mather. Missouri: St. Louis, ♂ with case, July, USNM. New Jersey: Specific locality unknown, ♂, USNM. Angelesea, 5 ♂♂, Aug. 21, AMNH. Edgewater Heights, ♂, AMNH. Montclair, ♂, June 8, USNM. Torus River, ♂ with case, May 27, USNM. New York: Specific locality unknown, 2 ♂♂, BM; ♂, Oct. 18, ZMHU; ♂, AMNH. Brooklyn, Bergen Beach, ♂, July 20, USNM. Ithaca, ♂, July, CU. Staten Island, ♂, Aug. 5, USNM. North Dakota: Fargo, ♂ and 4 cases, USNM. Ohio: Columbus, 2 ♂♂, June 1, 23, USNM. Pennsylvania: Finleyville, 16 ♂♂, June 6–21, CM. Flinton, 3 ♂♂, July 6–12, USNM. Hanover, ♂, June 15–30 USNM. Longwood, 2 ♀♀, June, USNM. New Brighton, 10 ♂♂, June 16–July 11, USNM; 2 ♂♂, June 19, ANS. Oak Station, 7 ♂♂, June 14–24, CM. Philadelphia, 9 ♂♂, June 10–12, AMNH; 5 ♂♂, May 30–June 10, PAS; 3 ♂♂, June, CU. Pittsburgh, 3 ♂♂, June 12–29, INHS; 26 ♂♂, May 20–July 20, CM. Roxboro, case, ANS. Swissvale, 3 ♂♂, CM. South Carolina: Isle of Palms, case, USNM. Tennessee: Townsend, White Oak Sink, 4 cases, USNM. Texas: Austin, 7 ♂♂, May 2–18, USNM. Dallas, ♂, MCZ; case, USNM. Kerrville, case, USNM. Point Isabel, 12 cases, USNM. San Antonio, ♂, May 2; 21 ♂♂, April 18–May 22; 5 ♀♀, April; 7 cases, USNM. Virginia: Accomac County, ♂, July 5, USNM.

MEXICO: Nayarit: Tepic, 2 ♂♂, Sept. 6–11; ♀, Aug. 15; 3 cases, USNM. Colima: Colima(?), 2 ♂♂ (type and allotype, *Pachythelia lepidopteris*), June; ♂, USNM.

23. *Astala hoffmanni* (Vazquez), new combination

Figures 21, 82, 212, 265, 337; Map 7

Eurukuttarus hoffmanni Vazquez, Anales Inst. Biol., vol. 12, no. 1, p. 302, figs. 12–13; pl. 1, fig. D, 1941; *in* Mem. Congr. Cient. Mex., VII–Cienc. Biol., pp. 335, 338, 1953.

Male.—(Fig. 21.) Body relatively robust, densely covered with long greyish white hair, also present to some extent on anal area of

hindwing. Antennae with 22–30 segments. Abdomen extending slightly beyond secondaries.

Wings with basal two-thirds fuscous, with closely arranged, broad scales; outer third or fourth of both wings translucent because of sparse scattering of extremely slender, hairlike scales; marginal fringe fuscous. Primaries with apical angle relatively acute; discal scales (fig. 337) broad, 3–4 minutely lobed apices; M_2 and $_3$ of both wings either separate or connate. Wing expanse 16–22 mm.

Male genitalia.—(Fig. 265.) Tegumen rather broad at base. Vinculum somewhat gradually narrowing to slender saccus.

Female.—Unknown.

Case.—(Fig. 82.) Length 21 mm.; diameter 4–5 mm. Surface of bag irregularly covered by short, closely appressed plant stems, small pieces of bark. Fragments, for most part, laid longitudinally.

Type.—In the American Museum of Natural History.

Type locality.—Southern slopes of the Malinche Hills, state of Puebla, Mexico.

Recorded hosts.—None.

Distribution.—(Map 7.) Presently reported only from the states of Puebla and Guerrero in the Volcanic and the Sierra del Sur Sections of Central Mexico.

Material examined.—2 ♂♂, 1 case:

MEXICO: Guerrero: Ahucuipan(?), Tepecoacuilco, ♂, Dec. 4, collected by Dampf, USNM. Puebla: Cerro de la Malinche, ♂ with case, holotype, collected by Hoffmann, AMNH.

24. *Astala polingi* (Barnes and Benjamin), new combination

Figures 22, 83, 266, 338; Map 4

Eurukuttarus polingi Barnes and Benjamin, Contr. Nat. Hist. Lep. N. Amer., vol. 5, no. 3, p. 186, 1924.—Jones, Ent. News, vol. 36, pp. 33–39, 2 pls., 1925.—Jones and Parks, Tex. Agric. Exp. Sta. Bull. 382, pl. 31, figs. 15, 21, 1928.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 131, 1929.—McDunnough, Check List Lep. Canada and USA., pt. 2, no. 9531, 1939.—Vazquez, Anales Inst. Biol., vol. 12, no. 1, p. 301, figs. 8–11; pl. 3, figs. G–H, 1941.

Eurycyttarus polingi (Barnes and Benjamin) Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1180, pl. 169c, 1936.

Male.—(Fig. 22.) Body relatively robust, abundantly clothed with very light brown, almost whitish, hairs, becoming darker along abdomen. Antennae approximately 29- to 30-segmented. Abdomen distinctly extending beyond hindmargin of secondaries.

Wings fuscous, lighter in color toward outer margin (especially in forewing) owing to nature of scaling; outer marginal fringe of both wings white; discal scales (fig. 338) of primaries rather broad, mostly with tridentate apices; scales in outer third forewing very narrow, giving effect of much more sparsely scaled condition; apical angle

relatively acute; M_2 and $_3$ usually shortly stalked. Secondaries with M_2 and $_3$ either connate or shortly stalked. Wing expanse 19–22 mm.

Male genitalia.—(Fig. 266.) As described for genus. Most similar to *A. edwardsi* and *A. tristis*.

Female.—Unknown.

Case.—(Fig. 83.) Length approximately 35 mm.; greatest diameter 4 mm. Nearly cylindrical, tapering slightly posteriorally; covering somewhat smooth in normal observation, but slight magnification reveals mosaic of minute plant fragments firmly embedded in silk, giving case rather tough texture; posterior end usually with few larger fragments applied longitudinally; variously colored, shades of grey and white.

Type.—In the United States National Museum.

Type locality.—Indian Oasis, Sells P. O., Arizona.

Recorded hosts.—Possibly feeds on grasses or other low vegetation. Cases collected on "tar weed [*Madia* sp. ?]" (Barnes and Benjamin, 1924).

Distribution.—(Map 4.) Presently known only from Arizona in the Basin and Range Province and Guerrero in the Sierra del Sur Section of central Mexico. This species may also occur in the Davis Mts., Texas (see *A. edwardsi*).

Material examined.—50 ♂♂, 11 cases:

UNITED STATES: Arizona: Baboquivari Mts., 11 cases, USNM. Indian Oasis, Sells P. O., ♂, holotype, April 1–15; 46 ♂♂, April 1–30, USNM.

MEXICO: Guerrero: Mexcala, Rio Balsas, ♂, Dec. 13, USNM. Zumpango del Rio, 2 ♂♂, Dec. 15, USNM.

25. *Astala edwardsi* (Heylaerts), new combination

Figures 23, 84, 213, 267, 339; Map 1

Manatha edwardsi Heylaerts, Ann. Soc. Ent. Belg., Compt.-Rend., vol. 28, p. ci, 1884.—Kirby, Cat. Lep. Heter., vol. 1, p. 502, 1892.

Platoeceticus edwardsii [sic] (Heylaerts) Dyar, U.S. Nat. Mus. Bull. 52, no. 4067, 1902 [1903] (synonym of *P. gloveri* Packard).

Eurukuttarus edwardsii [sic] (Heylaerts) Jones, Ent. News, vol. 36, p. 33, pls. 2, 3, 1925.—McDunnough, Check List Lep. Canada and USA, pt. 2, no. 9530, 1939.

Eurcyttarus edwardsi (Heylaerts) Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1180, pl. 169b, 1936.

Psyche carbonaria Packard, Ent. Amer., vol. 3, p. 51, 1887.—Kirby, Cat. Lep. Heter., vol. 1, p. 515, 1892.—Dyar, Ent. News, vol. 4, p. 320, 1893.—Neumoegen and Dyar, Journ. N.Y. Ent. Soc., vol. 2, p. 119, 1894.

Eurycyttarus carbonaria (Packard) Dyar, U.S. Nat. Mus. Bull. 52, no. 4069, 1902 [1903].

Pachytelia [sic] *carbonaria* (Packard) Dyar, Insec. Inscit. Menst., vol. 11, p. 2, 1923.

Eurukuttarus carbonaria (Packard) Jones, Ent. News, vol. 36, pp. 33–39, 2 pls., 1925 (synonym of *E. edwardsi*).—Dalla Torre and Strand, Lep. Cat., pars 34, p. 131, 1929.—McDunnough, Check List Lep. Canada and USA, pt. 2, no. 9530, 1939 (synonym of *E. edwardsi*).

MALE.—(Fig. 23.) Body and wings dark fuscous; body relatively robust, densely hairy. Antennae usually with 27–28 segments. Abdomen slightly surpassing secondaries.

Wings abundantly scaled, scales (fig. 339) very slender, hairlike, usually minutely bidentate at apex; marginal fringe fuscous. Primaries with apex moderately rounded; spur of 1A not present. Wing expanse 19–22 mm.

MALE GENITALIA.—(Fig. 267.) As described for genus.

FEMALE.—As described for genus. Length 12 mm.

FEMALE GENITALIA.—Similar to that of *A. confederata* except even less sclerotized.

CASE.—(Fig. 84.) Length 23–27 mm.; diameter 4 mm. Very similar in structure to *A. polingi*.

TYPE.—In the United States National Museum (*Psyche carbonaria* and *M. edwardsi*).

TYPE LOCALITY.—Texas (*Psyche carbonaria* and *Manatha edwardsi*).

RECORDED HOSTS.—None; may feed on various grasses and other types of low vegetation.

DISTRIBUTION.—(Map 1.) Presently restricted to the southern Interior Plains of Oklahoma and Texas.

MATERIAL EXAMINED.—24 ♂♂, 1 ♀, 23 cases:

UNITED STATES: OKLAHOMA: Norman, ♂, Oct. 12, DRD. TEXAS: Specific locality unknown, ♂, holotype, *A. carbonaria;* ♂, holotype, *A. edwardsi;* 4 ♂♂, ♀, USNM; ♂, AMNH; ♂ with case, BM. Alpine, Musquiz Canyon, 12 cases, *A. polingi*?, USNM. Blanco, ♂ and case, USNM. Dallas, case USNM. Davis Mts., near Ft. Davis, 5000 ft., 5 cases, *E. polingi*?, USNM. Ft. Worth, 8 ♂♂ with 1 case, USNM; 4 ♂♂, Oct. 21–Nov. 7, USNM. Nueces River, ♂, USNM. Plano, ♂, Nov., USNM. San Antonio, ♂ and 2 cases, USNM.

26. *Astala tristis* (Schaus), new combination

FIGURES 24, 214, 268, 340; MAP 7

Chalia tristis Schaus, Journ. N.Y. Ent. Soc., vol. 9, p. 45, 1901.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1178, 1936.

MALE.—(Fig. 24.) Body somewhat slender. Head and thorax clothed with long whitish hairs, vesture of abdomen slightly darker, pale brown. Antennae approximately 26- to 27-segmented. Abdomen exceeding posterior margin of secondaries by about ¼ its length.

Wings fuscous. Primaries with discal scales (fig. 340) variable, ranging from a slender, hairlike type with usually minutely bidendate

apices, to a broader, oblanceolate scale with more deeply bidendate tips. Wing expanse 17–18 mm.

Male genitalia.—(Fig. 268.) As described for genus.

Female and Case.—Unknown.

Type.—In the United States National Museum.

Type locality.—Jalapa, Mexico.

Recorded hosts.—None.

Distribution.—(Map 7.) Presently known only from the states of Veracruz at the southern extremity of the Atlantic Plain and Colima of the Sierra del Sur Section of central Mexico.

Discussion.—This species closely resembles *A. edwardsi* but differs overall in its slightly smaller size and very distinctly in the paler color of the thoracic vesture.

Material examined.—3 ♂♂.

MEXICO: Colima: Colima(?), ♂, May, USNM. Veracruz: Jalapa, ♂, holotype, ♂, USNM.

27. *Astala zacualpania* (Dyar), new combination

Figures 25, 215, 270, 341; Map 7

Chalia zacualpania Dyar, Proc. U.S. Nat. Mus., vol. 51, p. 35, 1916.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1178, 1936.

Oiketicoides zacualpania (Dyar) Dalla Torre and Strand, Lep. Cat., pars 34, p. 101, 1929.

Male.—(Fig. 25.) Body relatively slender. Antennae with about 27 segments.

Forewings thinly scaled, somewhat variable in shape, apex noticeably more extended in some specimens, causing outer margin to be more oblique; scales (fig. 341) of discal cell hairlike with minutely bidentate apices; R_5 usually separate; M_2 of secondaries either connate or shortly stalked to M_3. Wing expanse 23–28 mm.

Male genitalia.—(Fig. 270.) As described for genus.

Female and Case.—Unknown.

Type.—In the United States National Museum.

Type locality.—Zacualpan, Morelos(?), Mexico.

Recorded hosts.—None.

Distribution.—(Map 7.) Known from only two states, Guerrero and probably Morelos, in the Volcanic and Sierra del Sur Sections of central Mexico.

Discussion.—The type locality of this species is somewhat questionable. Dyar gave the locality merely as "Zacualpan" without designating in which of three states—Mexico, Morelos, Veracruz, each containing a village of this name—the particular site was located. He did state, however, that R. Müller was the collector of the type specimen. This fact, plus consideration of road conditions and likely

routes of travel in these areas, strongly suggests the town of Zacualpan in the state of Morelos as the most probable place of origin for the species.

MATERIAL EXAMINED.—6 ♂♂:

MEXICO: GUERRERO: Ayotizinapa, Tixtla Valley, 1300 m., ♂, Jan. 23, USNM. MORELOS(?): Zacualpan, ♂, holotype, March; 2 ♂♂, March, USNM; ♂, March, DEI; ♂, March, ZSBS.

28. *Astala vigasi* (Schaus), new combination

FIGURES 26, 216, 269, 342; MAP 7

Chalia vigasi Schaus, Journ. N.Y. Ent. Soc., vol. 9, p. 45, 1901.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1178, 1936.

MALE.—(Fig. 26.) Body very slender. Antennae with approximately 23 segments, majority of pectinations arising subapically. Wings thinly scaled, translucent. Primaries with apex extended; scales (fig. 342) of cell as in *A. zacualpania*, hairlike with usually bidentate tips; R_5 either connate or shortly stalked to R_3+_4. Hindwing M_2 and $_3$ either separate or connate. Wing expanse 16–20 mm.

MALE GENITALIA.—(Fig. 269.) Similar to *A. zacualpania*, but more slender. Vinculum proportionately more elongate.

FEMALE and CASE.—Unknown.

TYPE.—In the United States National Museum.

TYPE LOCALITY.—Las Vigas, Mexico.

RECORDED HOSTS.—None.

DISTRIBUTION.—(Map 7.) Definitely known only from the state of Veracruz of the Atlantic Plain in East Central Mexico.

MATERIAL EXAMINED.—3 ♂♂:

MEXICO: Specific locality unknown, 2 ♂♂, March 13, 14, USNM. Las Vigas, Veracruz, ♂, holotype, USNM.

13. *Hyaloscotes* Butler

Pachythelia, in part, of authors.

Hyaloscotes Butler, Annals Mag. Nat. Hist., vol. 8, p. 314, 1881.—Kirby, Cat. Lep. Het., vol. 1, p. 290, 1892.—Dyar, U.S. Nat. Mus. Bull. 52, p. 354, 1902 [1903].—Schaus, Proc. U.S. Nat. Mus., vol. 29, p. 344, 1905.—Jones, Ent. News, vol. 36, p. 161, 1925.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 197, 1929.—McDunnough, Check List Lep. Canada and USA, pt. 2, p. 103, 1939.

Hyaloscotus [sic] Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1185, 1936.

TYPE OF GENUS.—*Hyaloscotes fumosa* Butler, 1881. Original designation and monobasic.

MALE.—Body slender build; covered with long, greyish to light brown hair. Antennae (fig. 376) broadly bipectinate; pectinations decreasing in length gradually toward apex, arising from middle of each segment, tending to arise more apically in segments in distal

third of antenna; shaft, branches sparsely covered with very slender, almost hairlike, scales, closely appressed; sensory hairs very fine, erect, arranged in definite rows. Legs (fig. 177) somewhat similar in size, hindlegs smallest; first tarsal segment longer in forelegs than in posterior pairs. Foretibia with or without epiphysis. Meso- and metathoracic tibia without spurs.

Wings (fig. 161) broad, translucent, evenly, thinly covered with long, sharply acute, hairlike scales, giving wings a light fuscous to greyish color; apices of both wings evenly rounded; 11 and 7 veined, M_1 absent, base of M undivided within cell of both wings. Primaries R_3 and $_4$ stalked, R_5 connate at base or separate; M_2 and $_3$ separate; 1A sometimes with base partly atrophied, curving down to fuse with 2A; 2A and 3A separate at wing base, uniting for short distance, finally separating, 2A joining 1A, 3A continuing toward hind margin. Secondaries with oblique vein connecting base of Sc and Rs; M_2 connate or separate.

Male genitalia.—Very broad, relatively short. Apex of tegumen rounded, entire. Valves with pulvilli moderately developed; apex of sacculus with few to several minute spines. Vinculum broader than long, constricting abruptly to form relatively short saccus. Aedeagus simple and stout. Eighth sternite broader than long; furcations parallel or slightly divergent, usually longer than undivided base.

Female.—Vermiform; all appendages of body vestigial; dorsum of head and thorax darkly sclerotized, remainder of body wall membranous; posterior end of abdomen with dense encirclement of hairs.

Female genitalia.—(Fig. 304.) External genitalia weakly sclerotized, mostly membranous, two pairs of sclerotized areas, inner pair tapering anteriorally into abdomen as apophyses. Internal genitalia with ductus seminalis very short, less than ½ length of prominent spermatheca; accessory glands large, irregularly forked; bursa copulatrix rather small, approximately equalling spermatheca in volume.

Key to the Species of *Hyaloscotes*

1a. Wing expanse 26–30 mm.; foretibia with slender epiphysis . **29. H. fumosa**
1b. Wing expanse 18–22 mm.; foretibia unarmed . . . . **30. H. pithopoera**

29. *Hyaloscotes fumosa* Butler

Figures 27, 177, 209, 271, 271a, 351, 376; Map 4

Hyaloscotes fumosa Butler, Ann. Mag. Nat. Hist., vol. 8, p. 314, 1881.—Kirby, Cat. Lep. Heter., vol. 1, p. 290, 1892.—Neumoegen and Dyar, Journ. N.Y. Ent. Soc., vol. 1, p. 114, 1893.—Dyar, U.S. Nat. Mus. Bull. 52, no. 4073, 1902 [1903]; Insec. Inscit. Menst., vol. 11, p. 3, 1923.—Jones, Ent. News, vol. 36, p. 163, pl. 4, 1925.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 197, 1929.—McDunnough, Check List Lep. Canada and USA, pt. 2, p. 103, 1939 (synonym of *H. fragmentella* Henry Edwards).

Hyaloscotus [sic] *fumosa* Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1185, pl. 169f, 1936.

Male.—(Fig. 27.) Antennae with approximately 29 segments; pectinations extremely long, slender. Foretibia with slender epiphysis, nearly equalling tibia in length.

Primaries R_5 usually connate to base of R_3+_4, sometimes slightly separate. Secondaries with M_2 usually separate from M_3, in one instance observed connate. Wing expanse 26–30 mm.

Male genitalia.—(Fig. 271.) Sacculus minutely toothed at apex. Saccus broad at base, tapering gradually to tip. Eighth sternite (fig. 209) with lateral margins nearly straight; furcations paralled to slightly divergent.

Female.—Unknown.

Case.—Unknown, but may be represented by the larval case of *H. fragmentella*.

Type.—In the British Museum of Natural History.

Type locality.—Mt. Shasta, California.

Recorded hosts.—None.

Distribution.—(Map 4.) This species is represented by only five males, all of which were collected by Lord Walsingham in 1871 from the Pacific Mountain System of northern California. One specimen, the holotype, is labelled "Mt. Shasta"; the others, merely "Siskiyou Co."

Discussion.—This insect differs from the following species in a very fundamental character: the presence of an epiphysis, which, by itself, as mentioned previously, cannot be considered the sole basis for generic separation. Other, very similar features, such as genitalia, scale structure, antennae, and general habitus provide ample reason for maintaining these two species in a single genus.

Dyar (1923) has synonymized *H. fumosa* under *H. fragmentella* Henry Edwards (and its supposed synonym *H. coniferella* Henry Edwards), giving *H. fragmentella* priority. This association probably will prove correct when the pertinent stages of all three are better known and, in addition, the distribution of *H. pithopoera* is more fully understood. The exact relationships cannot be stated definitely at present as the known larval cases in this genus are inseparable on a specific level. Thus, it is possible that some of the cases currently identified as *H. fragmentella* and *H. coniferella* actually pertain to *H. pithopoera*, which was described from Idaho. For these reasons, *H. fragmentella* and *H. coniferella* are discussed separately (pp. 148–149, 152).

The flight time of this species is probably in the interval from mid- to late summer, which can be ascertained from Lord Walsingham's itinerary in California and Oregon during the years 1871–1872 (Essig,

1941). He reports in his diaries that he was on Mt. Shasta approximately from August 1 to September 1 and in Siskiyou County from July 29 to September 15.

MATERIAL EXAMINED.—3 ♂♂:

UNITED STATES: CALIFORNIA: Siskiyou County, 3 ♂♂, BM.

30. *Hyaloscotes pithopoera* (Dyar)

FIGURES 28, 85, 161, 210, 272, 304, 352; MAP 4

Pachytelia [sic] *pithopoera* Dyar, Insec. Inscit. Menst., vol. 11, p. 3, 1923.

Hyaloscotes pithopoera (Dyar) Jones, Ent. News, vol. 36, p. 164, 1925.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 197, 1929.—McDunnough, Check List Lep. Canada and USA, pt. 2, no. 9533, 1939.

Pachythelia pithopoera (Dyar) Dalla Torre and Strand, Lep. Cat., pars 34, p. 161, 1929.

Hyaloscotus [sic] *pithopoera* (Dyar) Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1185, 1936.

Hyaloscotes sheppardi Freeman, Can. Ent., vol. 76, no. 9, p. 186, 1944 (new synonymy).

MALE.—(Fig. 28.) Considerably smaller than *H. fumosa*. Antennae with 18–22 segments; pectinations relatively shorter than in preceding species, appearing more stout. Foretibia without epiphysis.

Primaries with R_5 usually separate from base of R_3+_4, may be connate as observed in one wing. Hindwing with M_2 separate from M_3 in all specimens studied. Wing expanse 18–22 mm.

MALE GENITALIA.—(Fig. 272.) Apex of tegumen bluntly rounded. Tip of sacculus with 2–6 spinules. Saccus rod-shaped, base not expanded; relatively longer than in *H. fumosa*. Eighth sternite (fig. 210) with lateral margins strongly concave; furcations strongly divergent.

FEMALE.—As described for genus. Genitalia (fig. 304) with inner pair of sclerotized areas prominently forked at tapered, proximal ends. Bursa elongate, slender.

CASE.—(Fig. 85.) 21–27 mm. length; 5–6 mm. greatest diameter anteriorally, tapering gradually toward posterior end; covered longitudinally with short pieces of leaves, grass blades.

TYPES.—In the United States National Museum (*H. pithopoera*); Canadian National Collection (*H. sheppardi*).

TYPE LOCALITY.—Collins, Idaho (*H. pithopoera*); Shawbridge, Quebec (*H. sheppardi*).

RECORDED HOSTS.—Probably feeds, at least in part, on grasses, as evidenced by case construction.

DISTRIBUTION.—(Map 4.) Reported from the Appalachian Highlands of the extreme Northeastern United States, west to the Rocky Mountain System, from Colorado north to Alberta, Canada.

Discussion.—The type specimen along with two slide preparations of *Hyaloscotes pithopoera* have been re-examined closely with the resulting discovery that certain minor morphological features, although taxonomically important, were given incorrectly in Dyar's original description.

In separating his new species from *H. pithopoera*, Freeman (1944) presented the following diagnosis: "*Sheppardi* is closely allied to *pithopoera* Dyar but in this latter species, the apex of the sacculus is not spined as correctly stated by Dyar (1923) and kindly confirmed by Mr. Carl Heinrich, U.S.N.M., Washington, D.C. The anterior arms of the eighth ventral plate of *pithopoera* are parallel and not divergent from their bases as in *sheppardi*."

Dyar erroneously described both of these "key" characters in *H. pithopoera*. The present author remounted the abdomen and male genitalia of the type specimen of this species since Dyar's preparation, like his drawings, was carelessly executed. Under high magnification the termination of the sacculus, although somewhat pointed, was observed to be spined and the number of spinules was observed to be slightly variable (two spinules on one sacculus and three at the apex of the other). Dissection of one specimen of "*sheppardi*" from Maine showed four spinules on one sacculus and six on the opposite one. Furthermore, the eighth sternite of *H. pithopoera* was identical to that of "*sheppardi*" with divergent furcations. This re-evaluation has proven *H. sheppardi* to be a synonym of Dyar's species.

For the reasons discussed under *H. fumosa*, the identification of the larval cases that are recorded below as *H. pithopoera* is not positively certain. Conceivably, when adequate material from the type locality of *H. fragmentella* and especially *H. coniferella* are known, these two insects (or one of them) and *H. pithopoera* will be found to be conspecific.

Material examined.—8 ♂♂, 4 ♀♀, 34 cases:

CANADA: Alberta: Banff, Sulphur Mt., 5000–7000 ft., ♂, July 7, CU. Lazzan, Mt. St. Piran, 5500 ft., ♂, July 20, CNC. Quebec: Shawbridge, 2 ♂♂, June 22–29; ♀ with case, June; 3 cases, USNM; case, CNC.

UNITED STATES: Colorado: Webster, Park County, 2 cases, USNM. Idaho: Collins, ♂, holotype, *H. pithopoera*, with case, USNM. Maine: Augusta, ♂ with case, June 11; ♂, June 20, USNM. Montana: Gallatin County, near West Yellowstone, 2 cases, USNM. Washington: Winthrop, Okanogan Co., ♂, July 26 (USNM).

14. *Basicladus*, new genus

Eurukuttarus, Eurycyttarus, Pachythelia, Platocceticus, and *Psyche,* in part, of authors.

Type of genus.—*Eurycyttarus tracyi* Jones, 1911.

Male.—Body with densely hairy vesture; brownish fuscous.

Antennae (fig. 377) broadly bipectinate, gradually decreasing in width to apex, pectinations arising basally from each segment; sensory hairs erect, very slender, approximately 4x diameter of pectination in length. Legs (fig. 179) unarmed. Forelegs greatest in length, first tarsal segment longest, greater than that of mesothoracic legs; second pair of legs with femur slightly but distinctly longer than that of forelegs. Posterior end of abdomen equalling extent of secondaries.

Wings (fig. 162) evenly scaled, brownish fuscous. Forewing with scales of cell very slender, hairlike, with acute tips; apical angle, outer margin of both wings strongly rounded; primaries 11-veined; R_3 and $_4$ occasionally connate, usually stalked; base of M simple within cell of both wings; 1A completely absent; 2A smoothly curved beyond departure of 3A spur, not angulate. Secondaries 7-veined; Rs either fused with Sc+R for short distance or connected to it by oblique crossvein as in *B. tracyi;* M_2 and $_3$ usually separate, but may be connate.

Male genitalia.—In general, weakly sclerotized. Tegumen without apical cleft. Valves with bases extended internally into prominent apodemes; pulvilli only slightly developed, minutely spined; sacculus with apical spinules. Vinculum gradually tapering to rather elongate saccus. Aedeagus simple. Eighth sternite with shallow base; furcal arms long, slender, divergent, either with or without distal knobs.

Female.—Unknown.

Discussion.—*Basicladus* differs from the preceding genus *Astala* in certain major features that are believed to be of generic value: the loss of 1A and the smoothly curved 2A in the forewing; the decidedly different structure of the male genitalia; the basal origin of the antennal pectinations; and, most obvious, the broad, bluntly rounded wings. *Astala,* in contrast, possesses an angulate 2A and has some vestige of 1A, pectinations that arise near the middle of each segment, and wings with the apical angle more produced. *Eurukuttarus pileatus,* closely resembling *Astala* in venation, agrees with *Basicladus* in only one feature, the point of origin of the antennal pectinations. Thus, *Eurukuttarus* also is very distinct from *Basicladus.*

The basal origin of the antennal pectinations, which is believed to be of generic importance in the Psychidae, has suggested the name "Basicladus" (basal branch).

Key to the Species of *Basicladus*

1a. Wing expanse 16–19 mm.; saccus as long as main body of genitalia (fig. 273) . . . . . **31. B. tracyi**

1b. Wing expanse 10–13 mm.; male genitalia with saccus less well developed (fig. 274) . . . . . **32. B. celibatus**

31. *Basicladus tracyi* (Jones), new combination

FIGURES 29, 86, 87, 162, 179, 218, 273, 273a, 343, 377; MAP 3

Eurycttarus [sic] *tracyi* Jones, Ent. News, vol. 22, p. 193, pl. 6, 1911.
Platoecticus tracyi (Jones) Barnes and McDunnough, Check List Lep. Boreal Amer., no. 4802, 1917.
Pachytelia tracyi [sic] (Jones) Dyar, Insec. Inscit. Menst., vol. 11, p. 2, 1923.
Eurukuttarus tracyi (Jones) Dalla Torre and Strand, Lep. Cat., pars 34, p. 131, 1929.
Eurukuttarus tracyi [sic] (Jones) McDunnough, Check List Lep. Canada and USA, pt. 2, no. 9527, 1939.
Eurycyttarus tracyi (Jones) Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1179, pl. 169b, 1936.
Psyche cacocnemos Jones, Ent. News, vol. 33, p. 131, pls. 7–8, 1922 (new synonymy).—Dalla Torre and Strand, Lep. Cat., pars 34, p. 114, 1929.
Pachytelia [sic] *cacocnemos* (Jones) Dyar, Insec. Inscit. Menst., vol. 11, p. 2, 1923.
Eurycyttarus cacocnemos (Jones) Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1180, pl. 169b, 1936.
Eurukuttarus cacocnemos (Jones) McDunnough, Check List Lep. Canada and USA, pt. 2, no. 9529, 1939.

MALE.—(Fig. 29.) Body robust, densely hairy, vesture consisting mostly of light brown hairs with slight admixture of greyish white. Antennae with 28–34 segments. Legs of variable length. Abdomen with caudal segments somewhat widely tufted laterally.

Wings fuscous. Primaries with apex reduced, strongly rounded. Secondaries with Rs variable, fused with $Sc+R_1$ for short distance as in *B. celibatus* or touching at point or connected to it by oblique vein as in *Astala*. Wing expanse 16–19 mm.

MALE GENITALIA.—(Fig. 273.) Internal apodemes of valves relatively short and stout. Saccus long with apex dilated or simple. Furcal arms of eighth sternite (fig. 218) variable, sometimes stouter than illustrated, with distinctly clubbed tips.

CASE.—(Figs. 86, 87.) Length 25–30 mm., width variable, depending upon amount of extraneous material applied, usually 6–8 mm. Covering of case usually consisting of grass or sedge leaves and stems, attached anteriorally, applied longitudinally in overlapping fashion. Blades usually cut short, but may surpass length of bag.

Types.—In the United States National Museum (*Psyche cacocnemos* and *Eurukuttarus tracyi*).

TYPE LOCALITY.—Jacksonville, Florida (*P. cacocnemos*); Biloxi, Mississippi (*E. tracyi*).

RECORDED HOSTS.—"Sarraceniaceae: *Sarracenia sledgei* Macfarl. (flower petals); Poaceae: grasses," Jones (1911). "Grasses, sedges, and rushes" (Jones, 1922). "Arecaceae: palm," (from specimen label).

DISTRIBUTION.—(Map 3.) Found through parts of the Atlantic Plain from North Carolina to Mississippi.

Discussion.—This insect reportedly (Jones, 1911) overwinters in the last larval instar and feeds for a short time in early spring before suspending its case from some tree, shrub, or other support. The adults emerge in late spring. In 1921 Jones reared a few Florida males of the type series of *P. cacocnemos* in Delaware and observed them to emerge from September to November. This was submitted as a possible biological difference from the spring-emerging *E. tracyi*. All wild captures of this species, however, including the short-legged forms, demonstrate a spring emergence.

In separating *P. cacocnemos* from *E. tracyi*, Jones (1922) relied upon the following distinguishing characteristics in *P. cacocnemos:* wings darker than *E. tracyi;* legs shorter and more slender; primaries apically more acute; secondaries proportionately longer and narrower. The case of *P. cacocnemos* was thought to be narrower, with the plant fragments less uniform in size, often possessing long slender pine needles loosely diverging from the case. Jones also thought that the smaller subcostal cell (with Rs fused for a short distance to $Sc+R_1$) was perhaps a specific difference.

I consider all of these differences to be variations of a single species since intermediate conditions exist for each character and there appears to be no correlation among any of them. The coloring of the wing depends largely on the relative number of intact scales. Specimens with a short subcostal cell were found to have legs approaching the longest extreme. The cases themselves, although slightly variable, are certainly much less so than certain other species of psychids, e.g., *Oiketicus abbotii.*

Material examined.—17 ♂♂, 43 cases:

UNITED STATES: Alabama: Delchamps, case, USNM. Mobile, 3 ♂♂, April 4–23, 4 cases, USNM. Theodore, 4 cases, USNM. Florida: Charlotte Harbor, 3 cases, USNM. Crestview, case, USNM. De Funiak Springs, 3 cases, USNM. Ft. Myers, 2 cases, USNM. Homestead, ♂ with case, April 30, USNM. Jacksonville, ♂, holotype, *B. cacocnemos,* Sept. 28; 2 ♂♂, Sept. 14–Oct. 4; ♂, 2 cases, USNM. Lakeland, case, BM. Royal Palm State Park, ♂, April 11, 7 cases, USNM. Tampa, case, USNM. Mississippi: Biloxi, ♂, holotype, *B. tracyi,* May; 2 ♂♂, May; ♂ with case, May 14; 8 cases, USNM; case, ANS. North Carolina: Leland, 3 ♂♂, June 19–20, USNM. Wilmington, ♂, May 15, USNM. South Carolina: Summerville, 4 cases, USNM.

32. *Basicladus celibatus* (Jones), new combination

Figures 30, 88, 217, 274, 344; Map 4

Psyche celibata Jones, Ent., News, vol. 33, p. 130, pls. 7–8, 1922.—Dalla Torre and Strand, Lep. Cat., pars 34. p. 114, 1929.

Pachytelia [sic] *celibata* (Jones) Dyar, Insec. Inscit. Menst., vol. 11, p. 2, 1923.

Eurycyttarus celibata (Jones) Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1180, pl. 169c, 1936.

Eurukuttarus celibata (Jones) McDunnough, Check List Lep. Canada and USA, pt. 2, no. 9528, 1939.

MALE.—(Fig. 30.) Moth of small size, rather slender body; light brown body hairs about equally mixed with much paler, whitish hairs. Antennae 23- to 24-segmented.

Wings brownish fuscous. Primaries with apex slightly less rounded, more extended than in *B. tracyi*. Secondaries with Rs fusing to $Sc+R_1$ for short distance, producing relatively short subcostal cell; Rs usually arising separate from $Sc+R_1$ at discal cell, may be stalked with latter vein in rare instances; M_2 and M_3 usually separate, occasionally connate or shortly stalked. Wing expanse 10.5–12.5 mm.

MALE GENITALIA.—(Fig. 274.) Valves with apodemes relatively longer, more slender than in *B. tracyi*. Saccus shorter, more tapering. Lateral margins of eighth sternite (fig. 217) not deeply excavated; furcations gradually tapering to pointed apex.

CASE.—(Fig. 88.) Length 11–15 mm.; diameter 2–3 mm. Bag slender, roughly cylindrical; exterior overlaid with thin flakes of pine bark, usually with number of elongate sections of pine needles or small plant stems arranged longitudinally.

TYPE.—In the United States National Museum.

TYPE LOCALITY.—De Funiak Springs, Walton County, Florida.

RECORDED HOSTS.—Ericaceae: *Vaccinium corymbosum* L., from specimen labels. Probably a general feeder on low vegetation. Cases usually are found attached rather low to the trunks of such trees as oaks and pines (Jones, 1922).

DISTRIBUTION.—(Map 4.) Through the Atlantic Plain from North Carolina to Florida.

DISCUSSION.—No adult females of this species are known but F. M. Jones has reared more than 40 males from an even greater number of cases gathered at De Funiak Springs. Jones concluded from the scarcity of females that perhaps female larvae sought out different situations for pupation (hence the specific name "celibata"). This difference in habit between the sexes has been noted for certain European species (Hofmann, 1860).

MATERIAL EXAMINED.—26 ♂♂, 46 cases.

UNITED STATES: FLORIDA: specific locality unknown, 2 cases, BM. De Funiak Springs, ♂, holotype, June 21; 23 ♂♂, June 3–28, 35 cases. USNM. Paradise Key, case, USNM. Walton County, ♂, June 20, PAS. NORTH CAROLINA: Ammon, ♂ with case, July 7, USNM. Wilmington, ♂, 8 cases, USNM.

15. *Coloneura*, new genus

Apterona, *Cochliotheca* *Rebelia*, in part, of authors.

TYPE OF GENUS.—*Apterona fragilis* Barnes and McDunnough, 1916.

MALE.—Moths of small size, slender body. Antennae (fig. 378)

broadly bipectinate, gradually tapering to apex. Foretibia (fig. 180) without epiphysis; legs not spurred.

Wings (fig. 163) rounded, uniformly, very thinly scaled, translucent; usually 10- and 7-veined. Primaries with radial, medial veins all separate; base of medius undivided within cell, vestigial branch sometimes faintly observed; 1A mostly obsolete, faint vestige curving down to join 2A; 2A and 3A united near base of wing, fused for some distance, 3A separating again as spur along hindmargin. Secondaries $Sc+R_1$ uniting with Rs just before apex of cell, separating again as very short spur to costal margin; M_1 absent; M_2 and M_3 separate; base of M undivided.

Male genitalia.—Relatively broad, apex of tegumen evenly rounded. Valves with pulvilli prominent, minutely spined; apex of sacculus with small spines. Vinculum gradually narrowing to moderately long saccus. Aedeagus simple, without expanded base. Eighth sternite (fig. 219) with relatively long, slender furcal arms.

Female.—Unknown.

Discussion.—The sole species of this genus, *Coloneura fragilis*, represents an insect that diverges greatly from moths of the genus *Apterona* as typified by *A. crenulella*, and so the species has required a new generic placement. *Coloneura fragilis*, with its broadly bipectinate antennae and relatively unique venation, contrasts sharply with *A. crenulella*, which possesses simple antennae and very different venation in both the fore- and hindwings. Further, these two groups differ considerably in genitalic characters and in leg structure: *Apterona* has shorter, stockier tarsal segments.

The unique and extremely short subcostal vein in the hindwing of *C. fragilis* has suggested the name "Coloneura" for this genus.

33. *Coloneura fragilis* (Barnes and McDunnough), new combination

Figures 31, 163, 180, 219, 275, 275a, 345, 378; Map 1

Apterona fragilis Barnes and McDunnough, Contr. Nat. Hist. Lep. N. Amer., vol. 3, no. 1, p. 34, pl. 3; fig. 21, 1916.—Barnes and McDunnough, Check List Lep. Boreal Amer., no. 4808, 1, 1917.—Dyar, Insec. Inscit. Menst., vol. 11, p. 5, 1923.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 105, 1929.—McDunnough, Check List Lep. Canada and USA, pt. 2, no. 9537, 1939.

Rebelia fragilis (Barnes and McDunnough) Dalla Torre and Strand, Lep. Cat., pars 34, p. 76, 1929.

Coehliotheca fragilis (Barnes and McDunnough) Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1179, pl. 169b, 1936.

Male.—(Fig. 31.) Head and thorax sparsely clothed with long, whitish hair. Antennae (fig. 370) 17- to 18-jointed, pectinations long, slender, arising mesad from each segment. Abdomen only slightly surpassing posterior margin of secondaries. Scales of both wings

(fig. 345) uniformly very fine, hairlike, brownish to greyish fuscous. Wing expanse 10–11 mm.

MALE GENITALIA.—(Fig. 275.) As described for genus.

CASE.—Unknown.

TYPE.—In the United States National Museum.

TYPE LOCALITY.—Redington, Arizona.

RECORDED HOSTS.—None.

DISTRIBUTION.—(Map. 1.) Presently known from the Basin and Range Province of southern Arizona and New Mexico.

MATERIAL EXAMINED.—16 ♂♂:

UNITED STATES: ARIZONA: Specific locality unknown, ♂, USNM. Madera Canyon, Santa Rita Mts., 4880 ft., ♂, July 9, RWH; 10 ♂♂, June 11–14, CU. Paradise, ♂, July, USNM; 2 ♂♂, USNM. Redington, ♂, type, USNM. NEW MEXICO: Jemez Springs, ♂, June 14, ANS.

16. *Thanatopsyche* Butler

Thanatopsyche Butler, Trans. Ent. Soc. London, p. 9, 1882.—Kirby, Cat. Lep. Heter., vol. 1, p. 524, 1892.—Dalla Torre, Ent. Jahrb., vol. 36, p. 131, 1927.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 183, 1929.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1181, 1936.

TYPE OF GENUS.—*Thanatopsyche canescens* Butler, 1882. Monobasic.

MALE.—Body densely clothed with long hair. Antennae (fig. 379) bipectinate, pectinations gradually decreasing in length to apex; sensory hairs relatively short, stout, equalling or slightly exceeding diameter of pectinations in length, uniformly spaced in definite rows. Foretibia (fig. 182) without epiphysis; mid- and hindtibiae each with an apical spur.

Wings (fig. 164) more or less transparent with sparsely scattered scales, most heavily concentrated along veins causing latter to stand out prominently. Forewing 12-veined; discal scales usually narrowly oblanceolate, truncate apices or nearly so; R_3 and $_4$ stalked, R_5 usually connate at base; in rare instances R_1 and $_2$ stalked or R_2 stalked along with R_3 and $_4$; M_1 arising from cell much nearer R_5 than M_2+_3; M_2 and $_3$ always stalked; base of M variable, branched or unbranched within cell of fore- and hindwings; 1A curved downward, fusing with 2A ⅔ distance along hindmargin; 2A and 3A joined near wing base, 3A completely fused, not continued as spur. Secondaries 8-veined, $Sc+R_1$ and Rs usually joined at base, separated along most of cell, joining again just beyond apex of cell, finally separating as $Sc+R_1$ and Rs before reaching outer margin of wing; M_2 stalked with M_3 in all specimens examined.

MALE GENITALIA.—Apex of tegumen acute. Valves with pulvilli moderately developed; apex of sacculus minutely toothed; posterior

margin abruptly narrowing, producing prominent notch ⅔ distance from base. Aedeagus slender, without expanded base. Eighth sternite with posterior margin sharply truncate; furcations convergent or parallel, slender, acutely pointed, variable in length.

Female.—Unknown.

Key to the Species of *Thanatopsyche*

1a. Vesture of thorax greyish white . . . . . **35. T. canescens**
1b. Vesture of thorax black . . . . . **34. T. chilensis**

34. *Thanatopsyche chilensis* (Philippi)

Figures 33, 224, 277, 277a; Map 8

Psyche chilensis Philippi, Linn. Ent., vol. 14, p. 290, 1860.—Walker, List Lep. Insects Brit. Mus., vol. 32, suppl. 2, p. 405, 1865.—Butler, Trans. Ent. Soc. London, p. 9, 1882.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 114, 1929.

Thanatopsyche chilensis (Philippi) Kirby, Cat. Lep. Heter., vol. 1, p. 524, 1892.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 184, 1929.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1181, pl. 169c, 1936.

Male.—(Fig. 33.) Vesture of body unicolorous, black, denser than that of *T. canescens*. Antennae black, usually 40–44 segments. Base of M within discal cell frequently divided. Wing expanse 29–36 mm.

Male genitalia.—(Fig. 277.) Very similar to that of *T. canescens* but larger. Eighth sternite (fig. 224) equal to that of *T. canescens* in length but with broader base; furcal arms shorter and convergent.

Case.—Philippi in the original description states that the mature bag is approximately 63 mm. long, 16–18 mm. in diameter, and is spindle-shaped. The case may sometimes be nearly bare with only traces of small pieces of bark; it is brownish grey with the consistency of parchment.

Type.—Lost.

Type locality.—Chile.

Recorded hosts.—"Die Raupen scheint die zarte Rinde der Zweige zu fressen, und lebt auf sehr verschiedenen Gewächsen, namentlich Pflaumen—und andern Obstbäumen, Rosen, selbst auf Lebensbaum, aber auch auf wildwachsenden Bäumen und Sträuchern" (Philippi, 1860).

Distribution.—(Map 8.) Recorded from the Vale of Chile and the Coastal Range of central Chile.

Material examined.—11 ♂♂.

CHILE: Specific locality unknown, ♂, CAS; ♂, ZMHU; 2 ♂♂, ZSBS. Baños Cauqueas, ♂, Nov., CAS. Santiago, 2 ♂♂, BM; ♂, July; ♂, CAS; ♂, Feb. 22, USNM. Valparaiso, ♂, CAS.

35. *Thanatopsyche canescens* Butler

FIGURES 32, 89, 164, 182, 225, 276, 379

Thanatopsyche canescens Bulter, Trans. Ent. Soc. London, p. 9, 1882.—Kirby, Cat. Lep. Heter., vol. 1, p. 524, 1892.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 183, 1929.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1181, pl. 169d, 1936.

MALE.—(Fig. 32.) Vesture of head and abdomen black; thorax covered with long greyish white hair; legs and thorax less abundantly clothed than *T. chilensis*. Antennae black, approximately 37–40 segments. Wing expanse 22–27 mm.

MALE GENITALIA.—(Fig. 276.) As described for genus. Eighth sternite (fig. 225) equal to that of *T. chilensis* in length, but more narrow and less massive; furcal arms parallel and longer than in *T. chilensis*.

CASE.—(Fig. 89.) Length approximately 38–40 mm., diameter 6–7 mm. Fusiform in outline; silk greyish white, thin, paper-like consistency, essentially naked with only sparse scattering of dark brown, tiny plant fragments; near middle of bag a zone of small outwardly projecting segments of stems present, probably quite variable.

TYPE.—In the British Museum.

TYPE LOCALITY.—Chile.

RECORDED HOSTS.—"Polygonaceae: *Muehlenbeckia sagittaefolia* Remy, and other shrubs" (Butler, 1882).

DISTRIBUTION.—Presently recorded only from Chile and perhaps from the Vale of Chile, although the exact localities are not known.

MATERIAL EXAMINED.—14 ♂♂, 1 case:

CHILE: Specific locality unknown, 6 ♂♂, USNM; 2 ♂♂, case, BM. Auraucanie(?), 5 ♂♂, USNM. Pamehue(?), ♂, USNM.

17. *Animula* Herrich-Schäffer

Animula Herrich-Schäffer, Samml. bekannt. Aussereur. Schmett., pp. 3, 8, 59, fig. 520, 1856.—Heylaerts, Ann. Soc. Ent. Belg., vol. 25, pp. 45, 66, 69, 1881.—Kirby, Cat. Lep. Heter., vol. 1, p. 506, 1892.—Dalla Torre, Ent. Jahrb. vol. 36, p. 131, 1927.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 185, 1929.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1182, 1936.—Betrem, Tijdschr. Ent., vol. 95, pp. 332, 336, 1952.

TYPE OF GENUS.—*Animula dichroa* Herrich-Schäffer, 1856. Monobasic.

MALE.—Body robust, densely covered with dark wooly hair. Antennal (fig. 380) pectinations relatively short, gradually decreasing in length to apex; arising from middle or slightly beyond middle of each segment; sensory hairs long, slender, arranged in definite rows.

Forelegs (fig. 181) without epiphysis; first tarsal segment long, approximately 3x length of second. Middle and hindtibiae usually with prominent apical spur, sometimes unarmed (*A. seitzi*); first tarsal segment of these legs doubling second in length. Abdomen usually surpassing hindmargin of secondaries by nearly half its length.

Wings (fig. 165) largely free of scales, transparent. Primaries elongate, tornus usually indistinct or absent; outer margin strongly oblique, as long or longer than hindmargin; either 9- or 10-veined; R_1 and $_2$ very short, usually fused, sometimes dividing just before margin; R_3 and $_4$ either fused or separate, R_5 connate at base; discal cell prominent, very near costal margin; base of medius undivided within cell of both wings; M_2 and $_3$ completely fused, occasionally connate with Cu_1; base of 1A usually atrophied, outer third curving down to fuse with 2A; 2A strongly angulate at juncture of 1A; 2A and 3A separate at extreme base, then fusing with short spur sometimes given off toward hind margin. Secondaries slender in outline, termen strongly rounded; usually with 6, sometimes 5, veins (*A. seitzi*); all veins arising separate from cell; $Sc+R_1$ and Rs separate at base, fusing midway along cell, usually continuing as one vein to margin; M_2 and $_3$ fused.

Male genitalia.—Elongate. Apex of tegumen not extended, usually bluntly triangular. Valves with pulvilli slightly developed; tip of sacculus with usually two minute spines. Vinculum relatively slender, approximately 2x as long as wide. Saccus well developed, rodlike. Aedeagus base sometimes slightly enlarged. Eighth sternite with furcations long, slender; undivided base weak with only a narrow bridge connecting two furcations.

Female.—Unknown.

Key to the Species of *Animula*

1a. Tibiae without spurs; M_2+_3 and Cu_2 of primaries arising equidistant from Cu_1 . . . . . **39. A. seitzi**

1b. Mesothoracic and metathoracic tibiae each with single apical spur; M_2+_3 arising much closer to Cu_1 than does Cu_2

2a. R_3 and $_4$ stalked; male genitalia with greatest width above middle, near apex of tegumen (fig. 281) . . . . . **36. A. limpia**

2b. R_3 and $_4$ completely fused; greatest width of genitalia below middle.

3a. Saccus less than ⅓ length of main body of genitalia (fig. 278); eighth sternite with lateral margins of base not greatly extended (fig. 221) . . . . . **38. A. dichroa**

3b. Saccus more than ½ length of main body of genitalia (fig. 279); eighth sternite with lateral margins of base greatly extended (fig. 223) . . . . . **37. A. microptera**

Animula, subgenus sensu stricto

Type of subgenus.—*Animula dichroa* Herrich-Schäffer, 1856.

Male.—Meso- and metathoracic tibiae each with single apical spur.

Primaries with outer fourth of costa only slightly curved; M_2+_3 narrowly separate or connate with Cu_1. Secondaries 6-veined, less than ½ area of forewings, not extending as far as apex of cell in primaries; usually more heavier scaled than forewings, never with dense, apical patch of scaling.

36. *Animula limpia* Dognin

FIGURES 38, 90, 165, 222, 281, 380; MAP 8

Animula limpia Dognin, Ann. Soc. Ent. Belg., vol. 38, p. 241, 1894.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 185, 1929.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1182, 1936.

MALE.—(Fig. 38.) Antennae with 36–38 segments. Primaries 10-veined with outer margin not as strongly oblique or evenly curved as *A. dichroa;* veins usually with heavy scattering of dark, broad scales; R_3 and $_4$ invariably stalked. Secondaries more sparsely scaled than in other species. Wing expanse 24–30 mm.

MALE GENITALIA.—(Fig. 281.) Greatest width above middle near apex of tegumen. Saccus relatively long, over ⅔ length of main body of genitalia. Eighth sternite (fig. 222) with furcal arms usually parallel.

CASE.—(Fig. 90.) Length 32–40 mm.; diameter 6–8 mm. Exterior partially naked, sparse scattering of minute plant fragments, rather short (5–7 mm. long), slender segments of twigs, applied, for most part, longitudinally along case; walls of case thin, greyish white, consistency like that of parchment.

TYPE.—In the United States National Museum.

TYPE LOCALITY.—Loja, Ecuador.

RECORDED HOSTS.—None.

DISTRIBUTION.—(Map 8.) This insect is known only from the Andes of southern Ecuador.

MATERIAL EXAMINED.—10 ♂♂, 5 cases:

ECUADOR: Loja, ♂, holotype, 2 ♂♂, with cases, May, July 13; 2 ♂♂, May 23, June; 2 ♂♂, 3 ♂♂ with cases, USNM.

37. *Animula microptera* (Schaus), new combination

FIGURES 39, 223, 279; MAP 8

Thyridopteryx microptera Schaus, Proc. U.S. Nat. Mus., vol. 29, p. 345, 1905.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 185, 1929.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1182, 1936.

MALE.—(Fig. 39.) Very similar in appearance and structure to *A. dichroa.* Antennae with approximately 39 segments. Wing expanse 24–26 mm.

MALE GENITALIA.—(Fig. 279.) Greatest width below middle; relatively more slender, with saccus proportionately longer than

A. dichroa. Eighth sternite (fig. 223) furcations parallel to slightly divergent; sides of base extended some distance laterally.

CASE.—Unknown.

TYPE.—In the United States National Museum.

TYPE LOCALITY.—St. Jean, French Guiana.

RECORDED HOSTS.—None.

DISTRIBUTION.—(Map 8.) Presently known from three widely scattered localities: from the Atlantic Plain of Veracruz, Mexico, and the Maracaibo Basin of Venezuela, to the Guiana Coastal Plain of French Guiana.

DISCUSSION.—After much more collecting has been done in the group, this species may be reduced to a synonym of *A. dichroa.* For the present, however, good genitalic differences separate these two very closely related species.

MATERIAL EXAMINED.—3 ♂♂:

FRENCH GUIANA: St. Jean, Maroni, holotype, ♂, USNM.
MEXICO: Rinconada, Veracruz, ♂, USNM.
VENEZUELA(?): Merida, ♂, USNM.

38. *Animula dichroa* Herrich-Schäffer

FIGURES 40, 181, 221, 278, 278a

Animula dichroa Herrich-Schäffer, Samml. bekannt. Aussereur. Schmett., p. 59, fig. 520, 1856.—Heylearts, Ann. Soc. Ent. Belg., vol. 25, p. 69, 1881; Compt.-Rend., vol. 28, p. xcvii, 1884.—Kirby, Cat. Lep. Heter., vol. 1, p. 506, 1892.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 185, 1929.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1182, pl. 169d, 1936.—Betrem, Tijdschr. Ent., vol. 95, pp. 332, 336, 1952.

MALE.—(Fig. 40.) Antennae with 34–37 segments. Primaries with tornus absent, outer margin smoothly curved; veins largely devoid of scales, R_3 and $_4$ fused; R_1 and $_2$ fused, sometimes faintly separating just before margin; usually 9-veined. Wing expanse 26–28 mm.

MALE GENITALIA.—(Fig. 278.) Greatest width below middle; saccus relatively short, less than ⅓ length of main body of genitalia. Eighth sternite (fig. 221) furcations slightly to strongly convergent.

CASE.—Not examined. Described by Heylaerts (1884c).

TYPE.—In the British Museum of Natural History.

TYPE LOCALITY.—Venezuela.

RECORDED HOSTS.—None.

DISTRIBUTION.—No precise records for this species are known. It has been recorded from Colombia and Venezuela.

MATERIAL EXAMINED.—3 ♂♂:

Locality unknown, 2 ♂♂, BM.
COLOMBIA: Specific locality unknown, ♂, RNH.

Artipenna, new subgenus

TYPE OF SUBGENUS.—*Thyridopteryx seitzi* Gaede, 1936.

MALE.—Tibiae of all legs completely lacking in armature.

Primaries with outer fourth of costa sharply curved to wing apex; outer margin relatively straight, with rather distinct tornus, hindmargin subequal in length; 10 veins present; R_3+_4 completely united, R_5 connate at base; M_2+_3 widely separate from Cu_1, equalling distance of Cu_1 from Cu_2. Secondaries elongate, narrow (hence, subgeneric name "Artipenna"), and approximately ⅔ area of primaries; termen somewhat acute, extending as far as apex of discal cell in forewings; 5(?) veins present; Cu_1 extending from very prominent cell into wing apex; M_2+_3 and Cu_2 arising from cell above and below Cu_1 at equal distances; M_1 absent(?); above, cell bends outward almost to costal margin, sending off short vein ($Sc+R_1+Rs$) from anterior bend to margin.

39. *Animula seitzi* (Gaede), new combination

FIGURES 37, 220, 280; MAP 8

Thyridopteryx seitzi Gaede, Macrolep. World, vol. 6, p. 1182, pl. 169e, 1936.

MALE.—(Fig. 37.) Primaries completely transparent except for scattering of dark scales along costal margin. Secondaries mostly transparent, terminal third densely scaled, dark fuscous; inner margin with long white hairs. Wing expanse 16 mm.

MALE GENITALIA.—(Fig. 280.) Greatest width near middle of genitalia, lateral margins nearly parallel. Saccus well developed, approximately ⅔ as long as main body of genitalia. Base of aedeagus very slightly enlarged. Furcations of eighth sternite (fig. 220) parallel to slightly divergent; apices noticeably enlarged.

CASE.—Unknown.

TYPE.—In the Senckenberg Museum.

TYPE LOCALITY.—Rio de Janeiro, Brazil.

RECORDED HOSTS.—None.

DISTRIBUTION.—(Map 8.) This species is represented by a single specimen, collected by Adalbert Seitz, from Rio de Janeiro (of the Parana Plateau).

DISCUSSION.—The above descriptions are somewhat incomplete owing to the lack of available study material. It is possible that the hindwings of the unique specimen are deformed to some extent, but at present this cannot be decided. The wings of the type were not available for examination; however, the writer was able to study photographs of the specimen as well as slide preparations of the legs, abdomen, and genitalia. The foregoing subgeneric and specific descriptions were acquired from these materials and from the original

description (Gaede, 1936). As shown in the photograph of the male (fig. 37), the head and the right hindwing are now missing.

This species obviously is related closely to the other three members of *Animula*. Certain important divergences, however, have made it necessary to erect a new subgenus for this insect. The more important of these differences, demonstrated by *A. seitzi*, is the absence of tibial spurs and certain venational characters in the forewings (e.g., relative position of M_2+_3) and perhaps also in the secondaries, but a cleared preparation of the latter will have to be examined before a conclusion can be drawn.

18. *Biopsyche* Dyar

Thyridopteryx, in part, of authors.

Biopsyche Dyar, Proc. U.S. Nat. Mus., vol. 29, p. 178, 1905.—Schaus, Proc. U.S. Nat. Mus., vol. 29, p. 344, 1905.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 183, 1929.—Kozhantshikov, Fauna SSSR, vol. 3, no. 2, p. 316, 1956.

Hymenopsyche Grote, Proc. Ent. Soc. Phila., vol. 5, p. 248, 1865 (in part).

Type of genus.—*Thanatopsyche apicalis* Hampson, 1904. Original designation and monobasic.

Male.—Antennae (fig. 381) broadly bipectinate at lower half, tapering gradually outward, becoming serrate for outer third or fourth of length; segments numerous (over 30), very short, pectinations arising for most part mesad, becoming apical for distal third of antenna. Thorax clothed with dense, wooly hair. Epiphysis (fig. 183) present on foretibia, ¾ or more length of tibia. Meso- and metathoracic tibiae each with single apical spur.

Wings (fig. 166) mostly transparent with greater or lesser concentration of scales along costal and hind margins of wings, frequently along veins. Primaries elongate, 12-veined; R_3 and $_4$ variously stalked, rarely completely fused; intercalary cell absent from both wings; base of 1A usually atrophied, curving abruptly down, connecting with 2A halfway out along hindmargin, usually sending short, faint spur toward outer margin; 2A and 3A separate at base with 3A joining 2A, separating as short spur toward hindmargin. Secondaries approximately half size of primaries, triangular, either 7- or 8-veined because of variation in union of M_2 and $_3$; $Sc+R_1$ and Rs converging at point beyond apex of cell, immediately separating again; M_2 and M_3 stalked or fused throughout length.

Male genitalia.—Tegumen with shallow apical notch. Valves with pulvilli slightly developed, sparsely spinulose; apex of sacculus minutely toothed. Vinculum abruptly narrowing to elongate saccus. Aedeagus with membranous, bulbous basal expansion. Eighth

sternite with shallow base; furcate arms rather long, parallel, with curved, knoblike tips.

FEMALE.—Unknown.

Key to the Species of *Biopsyche*

1a. Epiphysis ⅗ length of foretibia and arising ⅗ distance from base; vesture of head completely fuscous . . . . . **41. B. apicalis**

1b. Epiphysis ⅘ length of foretibia and arising ⅓ distance from base; head vesture largely fuscous with area around antennal bases greyish white. **40. B. thoracica**

40. *Biopsyche thoracica* (Grote), new combination

FIGURES 35, 36, 91, 282, 347; MAP 6

Hymenopsyche thoracicum Grote, Proc. Ent. Soc. Phila., vol. 5, p. 249, 1865.

Thyridopteryx thoracicum (Grote) Gunlach, Contr. Ent. Cubana, p. 276, 1881.—Kirby, Cat. Lep. Heter., vol. 1, p. 501, 1892.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 185, 1929.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1182, 1936.

MALE.—(Figs. 35, 36.) Antennae with 33–40 segments. Dorsum of head with two areas (around bases of antennae) of greyish white hairs. Pronotum clothed with greyish white hairs; neck, remainder of head, thorax, abdomen clothed with fuscous hairs. Epiphysis ⅘ length of foretibia, arising from basal fifth of that segment.

Wing membrane very smooth, lustrous, reflecting at times with a somewhat milky sheen. Forewing with outer half of costal margin and inner half of anal area usually with sparse scattering of broad to somewhat narrow, short scales (fig. 374). Secondaries with costal area sparsely covered with rather broad scales; anal area with long hairs, scattering of short broad scales near hindmargin; scales of both wings dark fuscous. M_2 and $_3$ of hindwing frequently fused, sometimes separating just before reaching hindmargin. Wing expanse 18–25 mm.

MALE GENITALIA.—(Fig. 282.) As described for genus; very similar to *B. apicalis*.

CASE.—(Fig. 91.) Length 20–25 mm.; diameter 7–10 mm. Roughly covered with short sections of small twigs, spines, oriented in a somewhat spiral pattern.

TYPE.—In the Academy of Natural Sciences, Philadelphia.

TYPE LOCALITY.—Cuba.

RECORDED HOSTS.—"Casuarinaceae: *Casuarina equisetifolia* Blanco" from specimen label.

DISTRIBUTION.—(Map 6.) Cuba.

MATERIAL EXAMINED.—7 ♂♂, 24 cases:

CUBA: Specific locality unknown, 2 ♂♂, holotype, paratype, ANS; 2 ♂♂, 2 cases, USNM. Havana, ♂, July 15–18; ♂, 22 cases, DEI; ♂, April 12, USNM.

41. *Biopsyche apicalis* (Hampson)

FIGURES 34, 166, 183, 226, 283, 283a, 346, 381; MAP 6

Thanatopsyche apicalis Hampson, Ann. Mag. Nat. Hist., ser. 7, vol. 14, p. 180, 1904.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 184, 1929.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1181, 1936.

Biopsyche apicalis (Hampson) Dyar, Proc. U.S. Nat. Mus., vol. 29, p. 178, 1905.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 183, 1929.

MALE.—(Fig. 34.) Antennae with approximately 40 segments. Pronotum clothed with white hairs; head, remainder of thorax, abdomen with fuscous hairs. Epiphysis ⅗ length of foretibia, arising about ⅔ distance from base of that segment.

Membrane of wing not as lustrous as *B. thoracica;* wings more abundantly scaled: scales (fig. 346) browner, slightly narrower (in corresponding positions) than in *B. thoracica;* veins darkly outlined (because of heavier scaling); dark area of scaling along terminal half of costal margin quite prominent. M_2 and $_3$ of hindwing stalked ½ or more their length, not completely fused in any of four wings examined. Wing expanse 22–26 mm.

MALE GENITALIA.—(Fig. 283.) As described for genus.

CASE.—Unknown.

TYPE.—In the British Museum of Natural History.

TYPE LOCALITY.—Abaco, Bahamas.

RECORDED HOSTS.—None.

DISTRIBUTION.—(Map 6.) Bahama Islands.

MATERIAL EXAMINED.—3 ♂♂:

BAHAMAS: Specific locality unknown, ♂, BM; ♂, USNM. Bimini, ♂, CM.

19. *Oiketicus* Guilding

Oiketicus Guilding, Trans. Linn. Soc. London, vol. 15, p. 373, 1827.—Doubleday, Entomologist, no. 7, p. 97, 1841.—Westwood, Proc. Zool. Soc. London, p. 219, 1854.—Walker, List Lep. Insects Brit. Mus., pt. IV, p. 961, 1855.—Heylaerts, Ann. Soc. Ent. Belg., vol. 25, pp. 45, 66, 69, 1881.—Kirby, Cat. Lep. Heter., vol. 1, p. 500, 1892.—Neumoegen and Dyar, Journ. N.Y. Ent. Soc., vol. 2, p. 118, 1894.—Dyar, U.S. Nat. Mus. Bull. 52, p. 352, 1902 [1903].—Schaus, Proc. U.S. Nat. Mus., vol. 29, p. 344, 1905.—Dalla Torre, Ent. Jahrb., vol. 36, p. 131, 1927.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 193, 1929.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1184, 1936.—McDunnough, Check List Lep. Canada and USA, pt. 2, p. 102, 1939.—Forbes, Bull. Mus. Comp. Zool., vol. 90 no. 2, p. 368, 1942.—Vazquez, Anales Instit. Biol., vol. 13, no. 1, p. 260, 1942.—Betrem, Tijdschr. Ent., vol. 95, p. 334, 1952.—Kozhantshikov, Fauna SSSR, vol. 3, no. 1, p. 320, 1956.

Oeketicus [sic] Lefebre, Ann. Soc. Ent. France, vol. 11, p. 29, pl. 2, fig. 7, 1842.—Pagenstecher, Geogr. Verbreit. Schmett., p. 434, 1909.

Oeceticus [sic] Burmeister, Descr. Phys. Rep. Argent., Lep., vol 5, p. 395, 1878.—Gaede *in* Seitz, Macrolep. World, vol. 14, p. 483, 1929.

TYPE OF GENUS.—*Oiketicus kirbyi* Guilding, 1827. Original designation.

MALE.—Relatively large-size moths, containing some of largest members of family. Body very stout, densely hairy. Antennae (figs. 382, 384, 385) with segments short, broadly bipectinate, pectinations diminishing in length gradually to apex or decreasing abruptly about ½ way out, sharply biserate, with various intermediate conditions. Foreleg equalling or slightly exceeding mesothoracic leg, differing in structure between subgenera; epiphysis present in all species except *O. platensis*. Mesothoracic tibia with 1–2 minute spurs. Hindlegs most reduced in size, femur varying in outline from slightly expanded in most species to globose in *O. zihuatanejensis;* 1–2 small apical spurs present. Abdomen exceeding hindmargin of secondaries some distance, frequently by about ½ length.

Wings variously scaled; may be transparent and without scales, or unicolorous and moderately scaled, or more heavily scaled and possessing distinct color pattern. Venation (fig. 146, 167) rather variable in certain species. Forewings more or less elongate, usually with prominent apex; 12–veined; R_3 and $_4$ stalked, R_5 usually connate or stalked; base of M forked for some distance; 1A curving down, joining 2A, sometimes giving off short spur before juncture; 2A occasionally sending off 1–2 slender spurs toward hindmargin; 2A and 3A connected by crossvein near basal third of wing, 3A directed down toward margin. Hindwing triangular, outer margin weakly rounded, straight, or excavated; approximately ⅔ the area of forewings; normally 8-veined; Sc usually giving off 1–2 short spurs toward costal margin; Sc + R_1 and Rs connected by basal crossvein, also by second vein slightly beyond apex of discal cell; M_2 and $_3$ either connate or stalked; base of M divided within cell (in *O. zihuatanejensis*, M may be simple or even absent); 1A often partially atrophied, sometimes connected to 2A by faint crossvein.

MALE GENITALIA.—Elongate, apex of tegumen cleft or entire. Valves with pulvilli well developed, minutely spined; apex of sacculus with several spinules. Vinculum elongate, gradually tapering to long, slender saccus. Aedeagus base strongly dilated or only slightly so. Eighth sternite with furcal arms, broad, stout, usually slightly divergent.

FEMALE.—Vermiform, all body appendages vestigial or completely absent. Dorsum of head and thorax sclerotized, darker than rest of body; usually completely naked except for characteristic posterior ring of dense hair.

FEMALE GENITALIA.—(Fig. 310.) Very similar to *Thyridopteryx*. External genitalia with pair of short, rodlike apodemes; dorsal pair

of broad, irregularly shaped sclerotizations present on eighth segment. Internal genitalia with bursa several times larger than spermatheca; ductus seminalis extremely long, convoluted; spermatheca normal; accessory glands variously bilobed, arising posterior to vestibulum; vestibulum frequently bilobed.

Discussion.—This genus presents the greatest difficulty in species delimitation of all the New World genera, largely because of the paucity of reared and associated material representing the immature stages as well as the adults. The lack of reliable, morphological specific characters and the variation expressed in color and size have added greatly to the problem. So little field work has been accomplished in this complicated group that any assumptions on probable patterns of speciation and evolution would have to be based on slight and probably misleading evidence. The principal areas of uncertainty involve the forms of the West Indies and especially of Mexico.

Key to the Species of *Oiketicus*

1a. Tarsus of foreleg (figs. 184, 186) exceeding tibia in length; epiphysis approximately ⅓ length of tibia and extending to, or surpassing, apex of that segment; primaries either unicolorous or semitransparent (subgenus *Paraoiketicus*).

2a. Wings devoid of scales, semitransparent; medius undivided within cell of secondaries . . . . . **45. O. zihuatanejensis**

2b. Wings usually evenly scaled, rarely semitransparent; base of medius consistently forked in both wings.

3a. Antennal pectinations gradually decreasing in length to apex (fig. 384).

4a. Larval case smoothly cylindrical (fig. 94) . . . . . **43. O. borsanii**

4b. Larval case elliptical in outline (figs. 92, 93), usually covered with few scattered fragments of plant material . . . . . **42. O. bergii**

3b. Antennal pectinations diminishing in length before apex with outer fourth of shaft bisserate (fig. 385) . . . . . **44. O. geyeri**

1b. Tarsus of foreleg (fig. 185) distinctly less than tibia in length; epiphysis usually less than ⅔ length of tibia and never extending to distal end of that segment; primaries usually with distinct color pattern (fig. 58), but sometimes with wings semitransparent (subgenus *Oiketicus*).

5a. Wings semitransparent with usually no color pattern detectable.

6a. Larval case with relatively few, scattered twigs arranged longitudinally along case (fig. 98); adult with termen of secondaries only slightly sinuate . . . . . **46. O. toumeyi**

6b. Larval case with exterior covered by heavy thatching of short twigs arranged in circular fashion around bag (fig. 100); secondaries with termen strongly sinuate to excavate . . . . . **47. O. assimilis**

5b. Wings more heavily scaled with characteristic pattern easily observable.

7a. Foretibia without epiphysis . . . . . **52. O. platensis**

7b. Foretibia with epiphysis.

8a. Wings of pale pattern, thinly scaled with outer areas normally appearing rather translucent; relatively broad wing (fig. 49); wing expanse 44–53 mm. . . . . **48. O. specter**

8b. Wings with more contrasting pattern and more heavily scaled (fig. 50, etc.); expanse 28–52 mm.

9a. Architecture of larval case consisting of dense covering of twigs applied longitudinally (figs. 101, 103, etc.); wings of male relatively broad; lighter areas of wing yellowish brown (*O. townsendi*).

10a. Forewings with discal cell only partially darkened (fig. 50). **O.t. townsendi** and **O.t. dendrokomos**

10b. Forewings with cell completely filled with dark scales (fig. 51). **O.t. mexicanus**

9b. Larval case (figs. 108, 112, etc.) with heavy thatching of short twigs arranged in circular pattern around case; wings comparatively slenderer with lighter areas usually of brownish to fuscous color.

11a. Exterior of larval case almost invariably without layer of silk covering twigs; primaries with lower margin of dark apical area straight and usually continuing without interruption into discal cell (fig. 52); wing expanse 28–37 mm. **50. O. abbotii**

11b. Exterior of case with firm sheet of silk covering underlying structure of twigs; primaries with lower margin of dark apical area curved and indented at point of juncture with lower margin of cell (fig. 55); wing expanse 35–52 mm . . **51. O. kirbyi**

Paraoiketicus, new subgenus

Type of subgenus.—*Oiketicus geyeri* Berg, 1877.

Male.—Antennal pectinations gradually decreasing in length to tip or strongly biserrate in outer fourth. Prothoracic leg (figs. 184, 186) with tibia short, tarsus exceeding it in length; first tarsal segment longer than second, sometimes over 2x as long; epiphysis approximating tibia in length, arising near base, reaching or slightly surpassing distal end. Mesothoracic leg with tibia and tarsus nearly equal. Metathoracic leg with femur dilated, sometimes extremely so.

Wings usually uniformly and thinly scaled, unicolorous, or essentially lacking in scales (*O. zihuatanejensis*). Forewing (fig. 146) with spurs from 2A to hindmargin absent. Outer margin of secondaries evenly rounded or slightly sinuated.

Male genitalia.—Relatively shorter, broader than other subgenus. Saccus not as long in proportion to total length of genitalia. Aedeagus comparatively shorter, stouter; gradually enlarging toward base.

Case.—Usually evenly cylindrical, gradually tapering toward posterior end; broadly fusiform in *O. bergii;* surface usually smooth, uniform, little or no extraneous vegetable or mineral matter attached; usually light greyish to brownish color; structure a comparatively hard, firmly packed silk in all species except in male cases of *O. bergii* in which walls are rather papery.

Discussion.—This subgroup could be considered distinct enough almost to merit a separate generic status if it were not for certain

intermediate or unique characters expressed by *O. zihuatanejensis*. The tarsal segments of this species are very similar to those of true *Oiketicus*. Most of the other leg characters, the genitalia, and especially the larval case are related distinctly to those of *O. geyeri*. The general structure of the foreleg, the wing venation (the condition of the base of media of the secondaries in particular), and the overall habitus of *O. zihuatanejensis* suggest a possible third group within the genus. The close biological affinity of the larva, however, at least as evidenced by the similarity of case construction, obscures the uniqueness of such an additional group. Consequently, only two subgenera presently are recognized.

42. *Oiketicus bergii* (Weyenbergh), new combination

FIGURES 41, 92, 93, 146, 228, 229, 284, 284a, 308, 348, 384; MAP 9

Psyche bergii Weyenbergh, Tijdschr. Ent., vol. 27, p. 17, figs. 9–11, 1884.—Heylaerts, Ann. Soc. Ent. Belg., Compt.-Rend., vol. 28, p. c, 1884.—Kirby, Cat. Lep. Heter., vol. 1, p. 516, 1892.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 114, 1929.—Koehler, Rev. Soc. Ent. Argent., vol. 3, no. 17, p. 350, 1931.—Gaede *in* Sietz, Macrolep. World, vol. 6, p. 1179, 1936.

Oiketicus oviformis Koehler, Physis, vol. 17, p. 462, 1939 (new synonymy).

Clania oviformis (Koehler), Rev. Soc. Ent. Argent., vol. 16, no. 1, p. 23 fig. 6, 1953.

MALE.—(Fig. 41.) Antennae (fig. 384) with 32–35 segments, pectinations gradually decreasing in length to antennal apex; length of longest pectination (at 8th segment) 0.9–1.0 mm. Body vesture light fuscous. First tarsal segment of pro- and mesothoracic legs 2x length second segment. Middle and hindtibiae each with two apical spurs. Abdomen equalling or slightly surpassing hindmargin of secondaries.

Wings (fig. 146) evenly scaled; light fuscous in color. Apex of forewing not as extended, outer margin not as oblique as *O. geyeri;* discal scales (fig. 348) slender, apices bluntly rounded to distinctly bidentate; venation as in *O. geyeri*. Secondaries with outer margin evenly rounded. Wing expanse 21–23 mm.

MALE GENITALIA.—(Fig. 284.) Very similar to *O. geyeri* except relatively smaller.

FEMALE.—As described for genus. Length 17 mm.

FEMALE GENITALIA.—(Fig. 308.) Vestibulum elongate, similar in shape, size to spermatheca, accessory glands arising midway along length.

CASE.—(Figs. 92, 93.) Length 21–30 mm.; greatest diameter 6–7 mm. Exterior of case sometimes naked, usually with sparse scattering of tiny plant fragments concentrated at either end of bag; elliptical shape, greatest diameter at area ⅓ to ⅔ distance from

anterior end; walls of case thin, flexible in male, distinctly thicker and firmer in female.

TYPES.—Lost (*P. bergii*). In the Zoologische Sammlung der Bayerischen Staates (cotype, *O. oviformis*).

TYPE LOCALITY.—Argentina (*P. bergii*); Mendoza, Argentina (*O. oviformis*).

RECORDED HOSTS.—"Fabaceae: *Cassia aphylla* Cav." (Weyenbergh, 1884); "*Prosopis strombulifera* Benth." (Koehler, 1939).

DISTRIBUTION.—(Map 9.) Present records indicate that this insect occurs from the Argentine Pampas west to the Andes.

DISCUSSION.—The larval cases, with their unique structure and peculiar sexual dimorphism, are very distinctive. The adult moths, however, have differentiated far less and are identical to, or superficially very similar to, certain other members of this subgenus. The antennae of *O. bergii* (and of the following species *O. borsanii*) are somewhat distinct in that they are characteristically less broadly pectinated than those of the other members of the genus *Oiketicus*.

Since the original description of *P. bergii* offers relatively few diagnostic characters for this species, the description largely has been ignored by later workers. Certain essential characters mentioned in this description, however, seem to show that "*Clania*" *oviformis*, a species later described by Koehler, is actually Weyenbergh's species. Several adult males and larval cases of *C. oviformis* were examined and were found to agree with Weyenbergh's description of *P. bergii*. The original drawing of the larval case, its measurements, and the overall description of the male are essentially the same.

Six additional male specimens from southern Brazil and Argentina, representing perhaps three new species, also could have been named at this time, but, because of the paucity of diagnostic characters in the adult and the lack of knowledge of the immature stages, this has not been done. In regard to general structure, these moths are very similar to *O. bergii* and *O. borsanii*.

MATERIAL EXAMINED.—4 ♂♂, 1 ♀, 21 cases:

ARGENTINA: Cordoba, 2 cases, BM; 6 cases, ZSBS; 3 cases, USNM. Cordoba, Rio Cebajjos, ♀, ZSBS; case, BM. Mendoza, 4 ♂♂, ZSBS. Prov. of Mendoza, 6 cases, ZSBS. San Juan, case, BM; 2 cases, USNM.

43. *Oiketicus borsanii* (Koehler)

FIGURES 42, 94; MAP 9

Clania borsanii Koehler, Rev. Soc. Ent. Argent., vol. 16, no. 1, p. 23, fig. 7, 1953.

MALE.—(Fig. 42.) Similar in all observable respects to *O. bergii*. Wing expanse 24 mm.

Male genitalia.—Not examined. Koehler (1953), illustrating the genitalia of this species, indicates that the genitalia (especially the saccus) are somewhat shorter than that in *O. bergii* (=*oviformis*). This, however, may not be of specific importance.

Female.—Unknown.

Case.—(Fig. 94.) Length 28–40 mm.; diameter 4–6 mm. Structure of bag very similar to that of *O. geyeri;* exterior completely naked, walls very firm; elongate-fusiform shape, greatest diameter at anterior end, gradually tapering posteriorly.

Lectotype.—In the Zoologische Sammlung der Bayerischen Staates, designated by the writer.

Type locality.—Mendoza, Argentina.

Recorded hosts.—"Fabaceae: leguminosas arboreas" (Koehler, 1953).

Distribution.—(Map 9.) Presently known only from the Province of Mendoza in the Monte region of the Paraná Paraguay Plain of western Argentina.

Discussion.—The larval case of this insect serves to separate *O. borsanii* from its closest relative *O. bergii,* but the adult males of these two species, as far as can be determined, are inseparable. There seems to be no reason to suspect that an error in the rearing or association of these males has occurred, but it would be desirable if more males of *O. borsanii* could be reared and thus definitely be associated with these very characteristic cases.

Material examined.—2 ♂♂, 11 cases:

ARGENTINA: Mendoza, ♂, lectotype, ZSBS. Prov. of Mendoza, ♂, 10 cases, ZSBS.

44. *Oiketicus geyeri* Berg

Figures 43, 95, 96, 184, 230, 287, 307, 349, 385; Map 11

Oiketicus geyeri Berg, Anales Soc. Cient. Argent., vol. 4, p. 98, 1877; Bull. Soc. Nat. Moscou, vol. 52, no. 2, p. 13, 1877.—Heylaerts, Ann. Soc. Ent. Belg., vol. 25, p. 69, 1881.—Berg, Anales Soc. Cient. Argent., vol. 13, p. 217, 1882.—Kirby, Cat. Lep. Heter., vol. 1, p. 500, 1892.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 194, 1929.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1184, pl. 169e, 1936.—Koehler, Physis, vol. 17, p. 468, 1939.—Forbes, Bull. Mus. Comp. Zool., vol. 90, no. 2, p. 368, 1942.—Vazquez, Anales Instit. Biol., vol. 13, no. 1, p. 262, figs. 1–4, 3a, 5–6, 1942; *in* Mem. Congr. Cient. Mex., VII-Cienc. Biol., pp. 334, 335, 336, 339, fig. 5, 1953.

Oecticus [sic] *geyeri* Berg, Burmeister, Descr. Phys. Rep. Argent., Lep., vol. 5, p. 402, 1878.

Oiketicus tabaeillus Weyenbergh, Tijdschr. Ent., vol. 27, p. 20, figs. 12, 13, 1884.—Heylaerts, Ann. Soc. Ent. Belg., Compt.-Rend., vol. 28, p. xciv, 1884 (synonym of *O. geyeri*).—Kirby, Cat. Lep. Heter., vol. 1, p. 500, 1892 (synonym of *O. geyeri*).—Dalla Torre and Strand, Lep. Cat., pars 34, p. 194, 1929 (synonym of *O. geyeri*).

Oiketicus jonesi Schaus, Journ. N.Y. Ent. Soc., vol. 4, p. 154, 1896 (new synonymy).—Vazquez, Anales Instit. Biol., vol. 13, no. 1, p. 266, figs. 3b–c 1942; *in* Mem. Congr. Cient. Mex., VII-Cienc. Biol., pp. 335, 339, 1953.

Thanatopsyche thoracica Schaus, Proc. U.S. Nat. Mus., vol. 29, p. 344, 1905 (new synonymy).—Dalla Torre and Strand, Lep. Cat., pars 34, p. 184, 1929.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1181, 1936.

MALE.—(Fig. 43.) Antennal (fig. 385) pectinations gradually decreasing in length before apex, biserrate in outer fourth. Body vesture light brown to dark reddish brown. Foreleg (fig. 184) with first tarsal segment over twice length of second. Metathoracic leg with first segment of tarsus doubling second in length.

Wings moderately and evenly scaled, ranging in color from light brown to fuscous. Forewing with scales (fig. 349) of cell long, slender, with narrow, rounded apices; venation relatively constant; R_3+_4 invariably stalked; M_2 and $_3$ stalked or connate. Hindwing with basal crossvein sometimes absent; outer radial crossvein usually beyond apex of discal cell; M_2 and $_3$ as in forewing; outer margin sinuate, curving slightly outward at middle. Wing expanse 25–47 mm.

MALE GENITALIA.—(Fig. 287.) Apex of tegumen consisting of three evenly rounded lobes, median one very minutely clefted.

FEMALE.—Length approximately 35 mm. As described for genus.

FEMALE GENITALIA.—(Fig. 307.)

CASE.—(Figs. 95, 96.) Length 45–90 mm.; greatest diameter 7–12 mm. As described for subgenus.

TYPES.—Lost (*O. geyeri* and *O. tabacillus*); in the United States National Museum (*O. jonesi* and *T. thoracica*).

TYPE LOCALITY.—Patagonia (*O. geyeri*); Argentina (*O. tabacillus*); São Paulo, Brazil (*O. jonesi*); Omai, British Guiana (*T. thoracica*).

RECORDED HOSTS.—"Fabaceae: *Acacia farnesiana* Willd., *Acacia cavenia* Hook. and Arn." (Berg, Anales, etc., 1877). "Cupressaceae, *Juniperus* sp." (from specimen label).

DISTRIBUTION.—(Map 11.) Widely distributed; occurring from the Volcanic Section of Central Mexico through the Central American Ranges, southeast along the Guiana Coasts to French Guiana, and south through much of the Amazon and Paraná Paraguay Plains and the Brazilian Highland.

DISCUSSION.—*Oiketicus jonesi* and *Thanatopsyche thoracica* are nothing more than color variants of *O. geyeri*. This and the slight variation observed in the male genitalia are of no greater significance than that present in any other species represented by an adequate series.

MATERIAL EXAMINED.—83 ♂♂, 1 ♀, 22 cases:

GUATEMALA: Cayuga, ♂, Jan.; 2 ♂♂, Feb.; 6 ♂♂, USNM.
HONDURAS: Lancetilla, Tela, ♂, Feb. 25, MCZ.
MEXICO: Specific locality unknown, 2 ♂♂, USNM. Chichen Itza, 9 ♂♂,

Feb. 28–March 18, USNM. Colima, ♂, May 24, BM. Guadalajara, 4 ♂♂, May; ♀, April 18, case USNM; 4 cases, AMNH. Misantla, case, BM. Tabasco, 2 ♂♂, Feb. 14, DEI.

ARGENTINA: Chaco Austral, Ingenio Las Palm., case, DEI. La Rioja, 4 ♂♂, BM; case, CU; ♂, 9 cases, USNM. Tucuman, ♂, May 1–15, BM.

BOLIVIA: Cochabamba, case, ZSBS.

BRAZIL: Amazon, de Teffè á Tonantins, ♂, Nov., USNM. Castro, Paraná, 4 ♂♂, Jan.; 4 ♂♂, BM; ♂, Feb., USNM. Fonte Boa, Upper Amazon, 2 ♂♂, May, BM. Kourou River mouth, ♂, Feb., BM. Neu Bremen, Sta. Catarina, 4 ♂♂, Feb. 16–March 10, CU. Nova Teutonia, 9 ♂♂, Jan. 15–28; ♂, Feb. 11; 4 ♂♂, Dec. 4–9, USNM. Obidos, ♂, Aug. 21, CM. Pelotas, ♂, Jan. 29; 4 cases, CU. Ponta Grossa, Paraná, ♂, March, MCZ. Rio, ♂, BM. São Paulo, Alto de Serra, ♂, Oct.; 2 ♂♂, Nov.; 2 ♂♂, Dec., BM.

BRITISH GUIANA: Aroewarwa Creek, Maroewyn Valley, ♂, April; 3 ♂♂, May; ♂, July, BM.

FRENCH GUIANA: St. Jean de Maroni, ♂, July; ♂, BM.

URUGUAY: La Estanzuela, ♂, Jan., MCZ.

VENEZUELA: San Esteban, ♂, June, BM.

45. *Oiketicus zihuatanejensis* Vazquez

Figures 44, 45, 97, 186, 227, 286, 286a; Map 10

Oiketicus zihuatanejensis Vazquez, Anales Instit. Biol., vol. 22, no. 1, p. 323, photos 1–5, pls. 1–3, 1951; *in* Mem. Congr. Cient. Mex., VII-Cienc. Biol., pp. 325, 333, 336, 339, fig. 7f, 1953.

Male.—(Figs. 44, 45.) Antennae with approximately 40 segments; pectinations decreasing gradually in length toward apex, strongly biserrate in outer fourth or fifth. Hairs of body dark fuscous. Foreleg with (fig. 186) tibia relatively broad, flat; first tarsal segment 1.5x length of second. First tarsal segment of middle leg slightly longer than second. Femur of hindleg greatly dilated, globose. Tibiae of second and third legs each with pair of apical spurs.

Wings essentially lacking in scales, semitransparent; venation extremely variable (see Vazquez, 1951). Primaries with outer margin strongly oblique; either 11- or 12-veined; R_3 and R_4 normally stalked, sometimes partially atrophied or completely fused; M_2 and $_3$ usually completely fused, occasionally separate or stalked, M_2 in various stages of atrophy. Cu_1 in few examples dividing just before margin. Secondaries normally 8-veined, may be reduced down to 4; $Sc+R_1$ often partially atrophied; basal crossvein, spurs of Sc absent; M_1 frequently missing, sometimes M_2; base of M simple in cell, occasionally absent; termen evenly rounded. Wing expanse 25–30 mm.

Male genitalia.—(Fig. 286.) Apex of tegumen with shallow, distinct notch.

Female.—Not examined. Length "18 to 19 mm., in alcohol" (Vazquez, 1951).

Case.—Length "35 to 53 mm." (Vazquez, 1951); diameter 6–7 mm. As described for subgenus.

TYPE.—In the Instituto de Biologia, Mexico City.

TYPE LOCALITY.—Zihuatanejo, Guerrero, Mexico.

RECORDED HOSTS.—"Fabaceae: *Caesalpinia palmeri* Wats.; Burseraceae: *Bursera* sp. (cuajiote)" (Vazquez, 1951).

DISTRIBUTION.—(Map 10.) Known only from Zihuatanejo, in the Sierra del Sur Section of west central Mexico.

MATERIAL EXAMINED.—2 ♂♂, 1 case:

MEXICO: GUERRERO: Zihuatanejo, 2 ♂♂, June 18, 29, case, (USNM).

Oiketicus, subgenus sensu stricto

TYPE OF SUBGENUS.—*Oiketicus kirbyi*, Guilding, 1827.

MALE.—Antennal pectinations rather abruptly decreasing in length, strongly biserrate outer half to ⅓ length. Prothoracic leg (fig. 185) with tibia long, greater in length than tarsus; first tarsal segment slightly longer than second, never doubling it in length; epiphysis somewhat reduced, usually arising ⅓ distance from proximal end, never reaching distal end of tibia, or epiphysis absent (*O. platensis*). Mesothoracic tibia conspicuously longer than tarsus. Femur of hindleg dilated.

Wings usually with distinct pattern. Primaries with discal cell usually completely filled with dark scales; outer margin of cell devoid of scales, forming irregular hyaline bar; apical third or fourth of wing with dark area of scales fanning out from cell; this area usually approaches cell in color, extending from apex of cell to wing apex and from midway along lower margin of cell to tornus; cell 2A with dark patch of scaling; remainder of forewing usually of a much lighter fuscous or brown color. In some species (*O. toumeyi* and *O. assimilis*) wing scales deciduous or nearly so, but in some a faint pattern can be detected. Spurs from 2A to hindmargin frequently present. Secondaries unicolorous, outer margin various, often rather deeply excavate.

MALE GENITALIA.—Relatively long, slender as compared to *Paraoiketicus*. Saccus very long, sometimes equalling remainder of genitalia in length. Aedeagus slender, neck region very elongate, abruptly enlarging to bulbous base.

CASE.—Variously ornamented; never naked or smoothly cylindrical as in *Paraoiketicus*. Exterior frequently covered by thatching of small sticks, which may be covered by thin layer of silk; sometimes leaves are only extraneous material incorporated into structure.

46. *Oiketicus toumeyi* Jones

FIGURES 46, 47, 98, 99, 238, 289, 314, 350; MAP 10

Oiketicus toumeyi Jones, Ent. News, vol. 33, p. 12, 1922; Ent. News, vol. 33, p 133, pls. 7–8, 1922.—Jones and Parks, Tex. Agric. Exp. Sta. Bull. 382, p. 25 figs. 15, 19, 1928.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 117,

1929.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1185, pl. 169f, 1936.—McDunnough, Check List Lep. Canada and USA, pt. 2, no. 9517, 1939.—Vazquez, Anales Instit. Biol., vol. 13, no. 1, p. 268, figs. 44, 46, 1942; *in* Mem. Congr. Cient. Mex., VII–Cienc. Biol., p. 339, 1953.

Oiketicus mortonjonesi Vazquez, Anales Instit. Biol., vol. 20, nos. 1–2, p. 339, figs. 1–2, 1–8, 1949 (new synonymy); *in* Mem. Congr. Cient. Mex., VII-Cienc. Biol., pp. 325, 330, 333, 336, 339, fig. 7e, 1953.

Male.—(Figs. 46, 47.) Body vesture yellowish brown. Antennae 33- to 38-segmented; apical third strongly biserrate. Epiphysis less than ½ length fore tibia. Tibiae of meso- and metathoracic legs each with single apical spur.

Wings slender, usually semitransparent, with a few sparsely scattered dark scales; some specimens with more scales persisting, thus demonstrating somewhat clearly the characteristic color pattern of this subgenus; venation varying slightly, essentially only in outer medial veins of secondaries. Forewing apex extended, termen strongly oblique; discal scales oblanceolate with acute or bluntly rounded apices. Secondaries with basal crossvein and one or two subcostal spurs present; outer radial crossvein distinctly separated from apex of cell; termen shallowly excavate to nearly straight. Wing expanse 28–35 mm.

Male genitalia.—(Fig. 289.) Very slender. Valves with pulvilli well developed. Neck of aedeagus smoothly curved.

Female.—Length approximately 27 mm. As described for genus.

Female genitalia.—(Fig. 314.)

Case.—(Figs. 98, 99.) Length 60–90 mm.; diameter at widest part 10–12 mm. Elongate fusiform, composed of greyish-white silk, frequently largely exposed because of small amount of attached material used in construction; extraneous material consisting of short (approximately 15 mm.) segments of slender twigs applied longitudinally, or covered by leaf fragments tightly appressed to surface; sometimes mixture of both.

Types.—In the United States National Museum (*O. toumeyi*); Instituto de Biologia, Mexico City (*O. mortonjonesi*).

Type localities.—Tucson, Arizona (*O. toumeyi*); Camino entre Ixtapan de la Sal y Tonatico, Mexico (*O. mortonjonesi*).

Recorded hosts.—"Asteraceae: *Baccharis ramulosa* (DC) A. Gray" (Vazquez, 1949). "Cupressaceae: *Juniperus sempervirens;* Fabaceae: *Mimosa* sp., *Robinia neomexicana* A. Gray" ((from specimen labels), "*Prosopis juliflora* (Swartz) DC" (Vazquez, 1949). "Rosaceae: *Prunus Armeniaca* L., *Pyrus malus* L.; Sapindaceae: soapberry bush [*Sapindus* sp.]; Simaroubaceae: *Ailanthus altissima* (Mill.) Swingle" (from specimen labels).

Distribution.—(Map 10.) This species occurs from the Basin and Range Province of southern Arizona, south to the states of Colima

and Veracruz in the Sierra del Sur Section and Atlantic Plain, respectively, of southern Mexico.

Discussion.—Vazquez's published photograph of the type of *O. mortonjonesi* appears to be nothing more than a rather heavily scaled example of *O. toumeyi*. In the collection of the United States National Museum there are specimens of *O. toumeyi* from Tucson, Arizona, in which the wings are intermediate in scaling between Vazquez's type and the typical, nearly scaleless form of *O. toumeyi*. In the same collection from Misantla, Mexico, two specimens agree very closely with typical *O. toumeyi*. Further, the larval cases of *O. mortonjonesi* and *O. toumeyi* are indistinguishable. For these reasons, it is believed that these two names represent the same species.

Material examined.—58 ♂♂, 1 ♀, 89 cases:

UNITED STATES: Arizona: Baboquivari Mts., 18 ♂♂, June, July; 9 cases, USNM. Redington, ♂, USNM. Tucson, ♂, holotype, June 19; 34 ♂♂, May 20–Aug. 1; ♀, July 4; 54 cases, USNM; ♂, June 15, BM; ♂, May 20, ANS; Santa Rita Mts., 26 cases, USNM. New Mexico: Las Cruces, 5 cases, USNM.

MEXICO: State unknown. Aranjuez, case, USNM. Mexico: Tonatico, case, USNM. Veracruz: Misantla, 2 ♂♂, USNM.

47. *Oiketicus assimilis* Vasquez

Figures 48, 100, 237; Map 10

Oiketicus assimilis Vazquez, Anales Instit. Biol., vol. 13, no. 1, p. 268, figs. 32–35, 45, 1942; *in* Mem. Congr. Cient. Mex., VII–Cienc. Biol., pp. 324, 339, 1953.

Male.—(Fig. 48.) Antennae approximately 35-segmented with apical ⅔ strongly biserrate. Vesture of body dark brown. Epiphysis about ½ length of foretibia.

Wings slender, semitransparent, with a sparse scattering of dark fuscous scales. Discal scales of forewing linear oblanceolate, bluntly rounded to truncate tips; outer margin of primaries as in *O. toumeyi*, that of hindwing decidedly more excavate, range of variation not known. Wing expanse 35 mm.

Male genitalia.—As described for genus.

Female.—Unknown.

Case.—(Fig. 100.) Length 60 mm.; greatest diameter 15–20 mm. Heavily ornamented with circular thatching of short twigs and very small leaf fragments, imparting extremely irregular, spindle-shaped outline to case, partially covered by very thin, incomplete sheet of greyish white silk.

Type.—In the Instituto de Biologia, Mexico City.

Type locality.—Not definitely stated; either Patzcuaro, Michoacán, or Tepoztlán, Morelos, Mexico.

Recorded hosts.—None.

Distribution.—(Map 10.) Presently known only from the states of Michoacan and Morelos in the Volcanic Section of central Mexico.

Discussion.—This species, when better known, either may turn out to be a synonym of *O. toumeyi*, since the adult males of the two species scarcely can be told apart, or its status as a sibling species may be confirmed. There appears to be a difference in the shape of the wing scales: those of *O. assimilis* are more slender. This character, however, needs to be studied from a series of specimens, as the shape of scales has been observed to vary in some species of *Oiketicus* (e.g., *O. geyeri* and *O. townsendi*). On the other hand, the striking difference between the larval cases strongly suggests separate status for these two insects. An extensive series of cases of *O. toumeyi* was studied, and none were observed even to approximate those of *O. assimilis*. Differences in food plants, in some species, cause a great range of variation in the general appearance of a species' case; however, the basic construction of a larval case is not known to change because of these reasons alone. Since this fundamental behavior seems to be an inherited characteristic, *O. toumeyi* and *O. assimilis* are considered separate entities.

Material examined.—1 ♂, 1 case:

MEXICO: Specific locality unknown, ♂ with case, April 4, USNM.

48. *Oiketicus specter* Schaus

Figures 49, 235, 236, 285, 285a 353; Map 9

Oiketicus specter Schaus, Proc. U.S. Nat. Mus., vol. 29, p. 344, 1905.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 194, 1929.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1184, 1936.

Male.—(Fig. 49.) Antennae with apical third strongly biserrate; Foretibia with epiphysis approximately ½ as long as tibia. Mid- and hindtibia each with single apical spur.

Wings relatively broad for genus, normally uniformly but somewhat thinly scaled; outer fourth frequently semitransparent in rubbed specimens. Primaries with discal scales (fig. 353) oblanceolate, possessing rounded or minutely clefted apices; cell dark fuscous; lighter areas of wing light to medium brown; hyaline bar very oblique, parallel with termen; venation rather constant; M_2 and $_3$ of both wings usually stalked, sometimes connate. Secondaries with outer margin rounded or very slightly sinuate. Wing expanse 44–53 mm.

Male genitalia.—(Fig. 285.) Darkly sclerotized, very elongate. Valves with pulvilli only moderately developed. Vinculum very gradually narrowing to saccus, as long or longer than main body of genitalia. Aedeagus with sharp bend in upper portion of neck.

FEMALE and CASE.—Unknown.

TYPE.—In the United States National Museum.

TYPE LOCALITY.—Mérida, Venezuela.

RECORDED HOSTS.—None.

DISTRIBUTION.—(Map 9.) Known from the Maracaibo Basin of Venezuela south through the lower altitudes of the Andean System to Peru.

DISCUSSION.—The large size, broad wings, and wing scaling separate this species rather easily from all other members of *Oiketicus*. Superficially, however, certain large specimens of *O. platensis* may closely resemble *O. specter* but differ decisively in the condition of the epiphysis and in the distribution ranges. These two species can be separated further by the relative obliqueness of the hyaline bar, that of *O. specter* being more slanted.

MATERIAL EXAMINED.—14 ♂♂:

COLOMBIA: Popayan, ♂, USNM. South Antonio, 2 ♂♂, April 18, BM.
PERU: Heeda Taulis, 6°50′ S., 79°10′ W., ♂, April 18, BM.
VENEZUELA: Mérida, ♂, type, 2 ♂♂, USNM; 4 ♂♂, BM; 2 ♂♂, PM; ♂, ZMHU.

49. *Oiketicus townsendi townsendi* Townsend

FIGURES 50, 101, 102, 147, 148, 290, 309, 356; MAP 12

Oiketicus townsendi Townsend, Zoe, vol. 4, p. 356, Jan. 1894.—Dyar, Ann. N.Y. Acad. Sci., vol. 8, pp. 198, 205, May 1894.—Cockerell, Ann. Mag. Nat. Hist., vol. 15, pp. 208–209, 1895.—Dyar, Can, Ent., vol. 27, p. 242, 1895; U.S. Nat. Mus. Bull. 52, no. 4063, 1902 [1903].—Cockerell, Entomologist, vol. 46, p. 73, figs. 1–6, 1913.—Jones, Trans. Amer. Ent. Soc., vol. 52, pp. 5–6, 1926.—Jones and Parks, Tex. Agric. Exp. Sta. Bull. 283, p. 21, figs. 15, 18, 1928.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 194, 1929.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1185, 1936.—McDunnough, Check List Lep. Canada and USA, pt. 2, no. 9515, 1939.—Vazquez, Anales Institut. Biol., vol. 13, no. 1, p. 280, 1942.

Oiketicus bonniwelli Barnes and Benjamin, Bull. Brook. Ent. Soc., vol. 19, p. 24, 1924 (new synonymy).—Jones and Parks, Tex. Agric. Exp. Sta. Bull. 382, p. 22, figs. 15, 18, 1928.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 193, 1929.— Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1185, 1936.

Oiketicus townsendi var. *bonniwelli* Barnes and Benjamin.—Jones, Trans. Amer. Ent. Soc., vol. 52, p. 5, 1926.—McDunnough, Check List Lep. Canada and USA, pt. 2, no. 9515a, 1939.

MALE.—(Fig. 50.) Vesture of body dark yellowish brown. Antennae with outer fourth biserrate, 34–41 segments. Epiphysis weak, approximately ⅓ foretibia in length. Mid-, hindtibiae each with single apical spur.

Wings relatively broad, evenly scaled; venation with little variation, usual 12 and 8 pattern. Primaries with outer margin not strongly oblique, hyaline bar slanting parallel to it; discal scales (fig. 356) oblanceolate, distinctly carinate, with variable apices usually minutely

bi- or tridentate, sometimes subacute; cell largely fuscous with noticeable infusion of tawny scales along upper margin, in some specimens invading almost half of cell; dark apical area beyond cell abruptly fading to light brown along outer margin of wing; lighter areas of forewing yellowish brown; M_2 and $_3$ usually shortly stalked in both fore- and hindwings, rarely connate or separate; spurs of 2A absent. Secondaries almost invariably with cell R_1 stalked, outer radial crossvein rising beyond apex of discal cell; Sc usually with one or two costal spurs; outer margin evenly rounded to slightly sinuate. Wing expanse 35–32 mm. ($\bar{x}$=39.35 mm., n=43).*

Male genitalia.—(Fig. 290.) Valves with pulvilli reduced. Aedeagus smoothly curved.

Female.—Length 30–35 mm. As described for genus.

Female genitalia.—(Fig. 309.)

Case.—(Figs. 101, 102.) Length 55–100 mm.; diameter 11–15 mm. Spindle-shaped, usually ½ of underlying silk surface exposed; remainder of bag covered by several short sections of twigs arranged longitudinally; leaf fragments also may be attached.

Type.—In the United States National Museum (*O. townsendi* and *O. bonniwelli*).

Type locality.—Las Cruces, New Mexico (*O. townsendi*); El Paso, Texas (*O. bonniwelli*).

Recorded hosts.—"Fabaceae: *Robinia* sp." (Jones, 1928); "*Prosopis odorata* Torr. and Frem., *Prosopis* sp." (from specimen labels).

Distribution.—(Map 12.) Known only from the Open Basin Section of southern Arizona and New Mexico and the extreme western part of Texas.

Discussion.—On the basis of present knowledge, this species can be divided into a subspecies of slightly larger moths, *O. t. dendrokomos*, inhabiting the Big Bend region of Texas, and a subspecies of darker moths, *O. t. mexicanus*, occurring farther south in central Mexico.

Material examined.—45 ♂♂, 2 ♀♀, 91 cases:

UNITED STATES: Arizona: Chiricahua Mts., ♂, June 1-7, USNM. Prescott, ♂, USNM. Tucson, 4 cases, USNM. New Mexico: Specific locality unknown, 2 ♀♀, May 27, July 6, USNM. Las Cruces, 25 ♂♂, April 4–June 1; ♂, type, *O. townsendi*, May 24; 50 cases, USNM; ♂, BM. Texas: El Paso, 13 ♂♂, April 20–29; ♂, type, *O. bonniwelli*; 2 ♂♂, 37 cases, USNM.

*Standard statistical symbols used in this paper:

$\bar{x}$=sample mean

n=total number of individuals measured

t=(sample mean minus population mean) divided by standard deviation of sample mean

P=probability

***Oiketicus townsendi dendrokomos* Jones, new combination**

FIGURES 104, 105, 306; MAP 10

Oiketicus dendrokomos Jones, Trans. Amer. Ent. Soc., vol. 52, p. 2, pl. 1, 1926a.—Jones and Parks, Tex. Agric. Exp. Sta. Bull. 382, p. 22, figs. 15, 18, 1928.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 193, 1929.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1185, pl. 169e, 1936.—McDunnough, Check List Lep. Canada and USA, pt. 2, no. 9516, 1939.

MALE.—Body and legs as in *O. t. townsendi.* Antennae usually with 39–42 segments. Wings similar to those of *O. t. townsendi* except in size and venational differences; M_2 and $_3$ of both wings usually separate or connate, seldom stalked. Secondaries with cell R_1 usually sessile; outer radial crossvein usually arising slightly below or from apex of cell. Wing expanse 35–49 mm. ($\bar{x}$=43.3 mm.; n=44).*

MALE GENITALIA.—As described for *O. t. townsendi*, but relatively larger.

FEMALE.—Length approximately 40 mm. As described for genus.

FEMALE GENITALIA.—(Fig. 306.)

CASE.—(Figs. 104, 105.) Length 75–115 mm.; greatest diameter 13–18 mm. Exterior of case heavily covered with series of usually long (10–50 mm.), comparatively large twigs, somewhat loosely attached at upper ends, diverging slightly as they project posteriorally, imparting rather shaggy appearance to bag; case more strongly dimorphic than *O. t. townsendi;* posterior fourth to third of male case bare of any ornamentation; that of female heavily covered by sticks throughout.

TYPE.—In the United States National Museum.

TYPE LOCALITY.—Alpine, Brewster County, Texas, altitude 4485 ft.

RECORDED HOSTS.—"Fabaceae: *Robinia* sp.; Platanaceae: *Platanus* sp.; Tamaricaceae: *Tamarix* sp.; Verbenaceae: *Aloysia wrightii* Heller" (Jones, 1926).

DISTRIBUTION.—(Map 10.) Presently restricted to the Great Bend Section of Texas.

DISCUSSION.—The taxonomic status of *O. t. dendrokomos* is at present very questionable. This insect differs in no appreciable way from the nominate race *O. t. townsendi* except size, in which there is a conspicuous overlap of intermediates. Eventually, this population may be found to represent a group that is isolated genetically from both *O. t. townsendi* and *O. t. mexicanus*, and thus it would deserve consideration as a separate species; or its present position as a race may be considered too extreme and it may be reduced to a synonym of *O. townsendi.* In the absence of any evidence other than size, *O. t. dendrokomos* has been treated in this paper as a subspecies of *O. townsendi.*

*For explanation of symbols, see ftn., p.114.

Jones (1926) has stated that the male of *O. dendrokomos* differed from the male of *O. townsendi* (and *O. bonniwelli*) in the fact that in the former species the lower margin of the discal cell is darkened in the primaries whereas in the latter species the entire cell is filled solidly with blackish brown. This observation is not correct as the two insects agree closely in their color pattern, with the discal cell of both being only partially darkened.

The prime difference of size between *O. t. dendrokomos* and *O. t. townsendi* involves both larval case (and larva) and adult male. Wing measurements were made of 44 males from Alpine, Texas (type locality of *O. t. dendrokomos*); the average expanse was 43.3 mm. with a range of 33–49 mm. Forty-three specimens of *O. t. townsendi* were measured, of which 41 were captured either at El Paso, Texas (type locality of *O. bonniwelli*) or at Las Cruces, New Mexico (type locality of *O. townsendi*). The range of this sample was 35–42 mm. with a mean of 39.35 mm. The difference, tested by Student's t-test (Simpson, et al., 1960), was found to be very significant: $t=6.728$, $P<.001$.* The means of the larval cases show an even greater difference. For *O. t. dendrokomos* the male cases averaged 90 mm. in length with an observed range of 75–110 mm. (n=10); the female cases exhibited a mean of 102 mm. with a range of 80–115 mm. (n=17). In *O. t. townsendi* the larval cases were considerably smaller with a mean of 65.5 mm. for the male sacks (n=31) and 80.4 mm. for the female (n=12); the size range of the male was 55–80 mm. and 75–100 mm. for the female.

Material examined.—52 ♂♂, 1 ♀, 31 cases:

UNITED STATES: Texas: Alpine, 40 ♂♂, April 23–June 7; ♂, type, May 5; ♂, May 3; 8 ♂♂, USNM; ♂, May 6; 2 ♂♂ with cases, ANS. Alpine, Mitre Peak, 24 cases, USNM. Musquiz Canyon, 20 miles W. of Alpine, 5 cases, USNM.

Oiketicus townsendi mexicanus Gaede, new combination

Figures 51, 103, 355; Map 10

Oiketicus mexicanus Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1184, pl. 169f, 1936.

Oiketicus townsendi form *dendrokomos* Vazquez, Anales Instit. Biol., vol. 13, no. 1, p. 280, figs. 25–31, 41; pl. 1, figs. E–R; pl. 2, fig. E, 1942, (not Jones, 1926); *in* Mem. Congr. Cient. Mex., VII–Cienc. Biol., pp. 329, 330, 332, 333, 334, 335, 336, 339, fig. 3, 1953.

Oiketicus multidentatus Vazquez, Anales Instit. Biol., vol. 13, no. 1, p. 289, pl. 3, fig. 10, 1942 (new synonymy); *in* Mem. Congr. Cient. Mex., VII–Cienc. Biol., pp. 325, 339, fig. 7a, 1953.

Male.—(Fig. 51.) Antennae with 32–40 segments; outer fourth serrate. Vesture of body light yellowish to dark brown. Epiphysis sometimes well developed, ranging from ⅖ to ⅗ length of foretibia. Meso- and metathoracic legs each with apical spur.

*For explanation of symbols, see ftn., p. 114.

Wings similar to *O. t. townsendi* in shape and general pattern, but with more fuscous scaling, distinctly darker. Primaries with discal cell completely filled with dark, fuscous scales, usually broadly oblanceolate (fig. 355), flat to slightly carinate, with bluntly rounded to slightly dentate apices; dark apical area beyond cell gradually becoming lighter toward wing margin; remainder of wing yellowish brown as in *O. t. townsendi;* costa relatively straight; apex acute; termen and venation similar to other subspecies; M_2 and $_3$ in both wings usually stalked or connate, rarely separate. Secondaries with cell R_1 invariably stalked; termen slightly excavate to nearly straight. Wing expanse 36–45 mm.

Male genitalia.—Very similar to *O. t. townsendi.*

Female.—Not examined.

Case.—(Fig. 103.) Length 70–90 mm.; diameter approximately 15 mm. Very similar to typical subspecies in size and construction; bag heavily covered with sections of twigs, 20–30 mm. long usually, loosely applied longitudinally; posterior 15–20 mm. of male case bare.

Type.—In the Zoologisches Museum der Humboldt-Universität (*O. mexicanus*); American Museum of Natural History (*O. multidentatus*).

Type locality.—Mexico (*O. mexicanus*); Misantla, Mexico (*O. multidentatus*).

Recorded hosts.—"Pinaceae: *Araucaria* sp., *Pinus leiophylla* Schlecht. & Cham., *Pinus oocarpa* Schiede, *Pinus teocote* Cham. & Schlecht.; Taxodiaceae: *Taxodium mucronatum* Tenore; Anacardiaceae: *Schinus molle* L.; Asteraceae: *Baccharis conferta* H. B. & K., *Montanoa tormentosa* Cerv., *Stevia* sp.; Fabaceae: *Acacia* sp., *Prosopis juliflora* (Swartz) DC.; Fagaceae: *Quercus* sp.; Oleaceae: *Ligustrum japonicum* Buch.-Ham.; Rosaceae: *Rosa* sp." (Vazquez, 1942).

Distribution.—(Map 10.) Recorded from the Volcanic Section and Atlantic Plain of central Mexico, from Guadalajara east to Misantla, Veracruz.

Discussion.—Fortunately, I was able to examine Gaede's type specimen of *O. mexicanus* and I am convinced that it is identical with the other members of this taxon. Previous workers (e.g., Vazquez, 1942, 1953), misled by the brief and inadequate original description, erroneously had applied this name to the light color phase of *O. kirbyi,* from which the type of *O. mexicanus* clearly differs.

The wing outline of this subspecies is quite similar to that of *O.t. townsendi*: the front costa is straight and the hindwings are relatively broad and rounded. The termen of the primaries, likewise, is not as strongly oblique as observed in most specimens of *O. kirbyi.* The wing pattern is also similar to that of the typical subspecies, but it differs primarily in its darker shade, especially of the entire cell.

In Mexico some variants of *O. kirbyi* approach *O. t. mexicanus* in appearance, and a few specimens in poor condition can be determined

with only questionable certainty. However, the principal feature that separates these two sympatric species is the pronounced difference in the architecture of their larval cases. The case of *O. t. mexicanus*, with longitudinally arranged twigs and complete absence of external silk covering, is quite distinct from *O. kirbyi*, a feature that further suggests the subspecies' close affinities to *O. townsendi*.

Material examined.—16 ♂♂, 2 cases:

MEXICO: Specific locality unknown, ♂, type, *O. mexicanus*, ♂, ZMHU; ♂, AMNH; ♂, USNM. Jalisco: Guadalajara, ♂, USNM. Mexico: Chapultepec, 2 ♂♂, April 6–20; 2 cases, AMNH; ♂, April 3; ♂, USNM; Lomos de Chapultepec, 4 ♂♂, March 20–April 5; 2 ♂♂, USNM; Molino del Rey, Chapultepec, ♂, April 2, USNM. Veracruz: Misantla, ♂, type, *O. multidentatus*, AMNH.

50. *Oiketicus abbotii* Grote

Figures 52, 53, 106, 107, 108, 109, 232, 292, 313, 358; Map 12

Oiketicus abbotii Grote, N. Amer. Ent., vol. 1, no. 7, p. 52, 1880.—Slossen, Ent. News, vol. 3, p. 49, 1892.—Kirby, Cat. Lep. Heter., vol. 1, p. 500, 1892.—Dyar, Ent. News, vol. 4, p. 321, 1893.—Neumoegen and Dyar, Journ. N.Y. Ent. Soc., vol. 2, p. 118, 1894.—Dyar, U.S. Nat. Mus. Bull. 52, no. 4062, 1902 [1903].—Grossbeck, Bull. Amer. Mus. Nat. Hist., vol. 37, p. 104, 1917.—Jones and Parks, Tex. Agric. Exp. Sta. Bull. 382, p. 21, figs. 14, 15, 1928.—McDunnough, Check List Lep. Canada and USA, pt. 2, no. 9514, 1939.

Oiketicus abboti [sic] Holland, Moth Book, p. 361, fig. 208, 1905.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 193, 1929.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1185, 1936.

Male.—(Figs. 52, 53.) Antennae usually with 28–32 segments, outer two-fifths strongly biserrate to serrate. Vesture of body light brown to fuscous. Epiphysis reduced, approximately ¼ to ⅓ length of foretibia. Meso- and metathoracic tibiae each with single, minute apical spur.

Wings elongate, uniformly scaled. Primaries with scales (fig. 358) of cell broadly oblanceolate, more or less rounded apices; discal area and beyond usually dark fuscous (sometimes much paler in certain Florida specimens), lower margin of dark apical area straight, usually continuing without interruption to lower margin of cell; lighter areas of forewing, entire hindwing, usually much paler, light brown to fuscous color; hyaline bar nearly but not quite parallel, strongly oblique outer margin. Venation relatively constant; primaries normally with 12 veins; rarely 11 (because of complete fusion of M_2 and $_3$); 2A frequently with spur toward hindmargin. Secondaries almost always 8-veined, sometimes $Sc+R_1$ not reaching margin; basal crossvein present, well developed; Sc with 1–2 costal spurs; outer margin slightly excavate to nearly straight. Wing expanse 28–37 mm., $\bar{x}=34.1$ mm. (n=92).*

*For explanation of symbols, see ftn., p. 114.

Male genitalia.—(Fig. 292.) Valves with pulvilli moderately developed. Aedeagus smoothly curved.

Female.—Length 24–30 mm. As described for genus.

Female genitalia.—(Fig. 313.)

Case.—(Figs. 106–109.) Length 60–70 mm.; diameter 13–20 mm. General appearance quite variable, depending upon particular host plant; basic architecture rather constant. When small twigs are incorporated into structure, these consistently are placed transversally in circular pattern around case; rarely is silk used externally; on *Acacia* thin sheet of greyish silk may be present; on oak, bag usually heavily covered with projecting leaf fragments; on mangrove, sacks may be largely bare, with just few attached leaves.

Type.—In the United States National Museum.

Type locality.—Texas.

Recorded hosts.—"Cupressaceae: cypress [?*Cupressus* sp.]; Aceraceae: *Acer negundo* L.; Fabaceae: catsclaw [?*Acacia greggii* A. Gray]; Fagaceae: live oak [*Quercus* sp.]; Myricaceae: bayberry [*Myrica* sp.]; Platanaceae: *Platanus occidentalis* L.; Rosaceae: *Rosa* sp.; Ulmaceae: *Celtis* sp." (Jones, 1928). "Cupressaceae: *Juniperus* sp.; Pinaceae: *Pinus* sp.; Arecaceae: palm[?]; Liliaceae: *Smilax* sp.; Annonaceae: *Annona glabra* L.; Fabaceae: *Acacia farnesiana* (L.) Willd., *Acacia contorta* DC, *Acacia* sp., *Robinia* sp.; Hamamelidaceae: *Liquidambar styraciflua* L.; Rhizophoraceae: *Rhizophora mangle* L.; Salicaceae: *Salix* sp.; Sapindaceae: *Aesculus* sp.; Solanaceae: *Solanum pseudo-capsicum* L." (from specimen labels).

Distribution.—(Map 12.) Occurs over a great part of the Atlantic Plain from North Carolina to Texas.

Discussion.—In southern Florida occurs a form of this moth that is paler in color than most specimens from other parts of the range. This distinction is not very definite, however, for specimens as far south as Everglades, Florida, show intermediate coloring and occur occasionally as dark as the other extreme of this species. This pattern of variation should not be given nomenclatural recognition; it is mentioned only as a noticeable, regional variation of the moth.

In regard to wing size and outline, *Oiketicus abbotii* is remarkably uniform throughout its range in the United States. Probably the species extends farther south into Cuba and perhaps other West Indian Islands, but this cannot be confirmed. Specimens from this area most closely resembling *O. abbotii* are represented by a few moths from Jamaica. In general, through the West Indies, there seems to be a gradation of forms from *O. abbotii* to *O. kirbyi*. To consider these species as races of a single species, however, is still premature. When more information, especially evidence of hybridization of these two

moths in the Greater Antilles or other regions, is available, the taxonomic relationships of both *O. abbotii* and *O. kirbyi* will have to be re-examined.

The difference between the mean wing measurements of *O. abbotii* (as sampled from the United States) and *O. kirbyi* (sampled throughout its range) has proven to be highly significant ($P<.001$), as tested by the procedure already mentioned (see p. 114).

Material examined.—109 ♂♂, 3 ♀♀, 238 cases:

UNITED STATES: Alabama: Mobile, ♂, July 28; ♂, May 24; 2 cases. USNM. Florida: Specific locality unknown, 4 ♂♂, AMNH; ♂, USNM, Southern Florida, ♂, MCZ. SW Florida, 3 cases, USNM. Charles Harbor, 2 ♂♂, AMNH. De Funiak Springs, 6 cases, USNM. De Land, 8 cases, USNM. Everglades, ♂, May 16–23, USNM. Fort Meyers, ♂, March 30, AMNH; 6 cases, USNM. Gainesville, 2 cases, AMNH. Jupiter, case, AMNH. Key West, 6 ♂♂, April 27–29; ♀, April 16; 11 cases, USNM. Lakeland, 4 cases, USNM. Little River, 4 cases, USNM. Lower Matacumbe Key, 6 cases, USNM. Lutz, ♂, March 4; 8 ♂♂, Aug. 15–Sept. 23, CM. Marco, case, AMNH. Orlando, 5 ♂♂, Feb. 25, USNM. Palm Beach, case, USNM. Port Sewall, 2 cases, AMNH. Punta Gorda, ♂, 11 cases, USNM; case, BM. Royal Palm State Park, ♂ March 11; 4 ♂♂, April 11–May 2; 4 cases, USNM. St. Petersburg, ♂, March 28; 10 ♂♂, April, USNM. Stemper, 2 ♂♂, March 9, 12, CM. Tallahassee, ♂, AMNH. Termandia, case, USNM. Georgia: Savannah, ♂, ♀, May 29, USNM. Tybee Island, case, USNM. Louisiana: New Orleans, ♂, May 25; ♂, June 2; ♂, July 1; ♂, 22 cases, USNM. Mississippi: Biloxi, ♂, May 1; ♂, June 11, USNM. North Carolina: Wilmington, 6 cases, USNM. South Carolina: Summerville, 4 cases, USNM. Texas: Specific locality unknown, ♂, type, collected by E. L. Graef, USNM. Brownsville, 12 ♂♂, Sept. 14–Oct. 6; ♀, Sept. 2; 37 cases, USNM. Harris County, ♂, April, USNM. San Antonio, 23 ♂♂, March 31–April 14; 4 ♂♂, July 16–25; 2 ♂♂, Aug. 10, 25; 4 ♂♂, Sept. 16–23; 90 cases, USNM. Taft, case, USNM. Virginia: Accomac, ♂ with case, June 24; 2 ♂♂, 2 cases, USNM.

51. *Oiketicus kirbyi* Guilding

Figures 54, 55, 56, 57, 112, 167, 185, 233, 234, 288, 310, 311, 312, 357, 382; Map 12

Oiketicus kirbyi Guilding, Trans. Linn. Soc. London, vol. 15, p. 374, 1827.—Doubleday, Entomologist, no. 7, p. 97, 1841.—Duncan *in* Jardine, Nat. Libr., vol. 7, p. 110, 1841.—Westwood, Proc. Zool. Soc. London, vol. 20, p. 221, pl. 34, fig. 2, 1854.—Lucas *in* Sagra, Hist. Cuba, vol. 7, p. 303, 1857.—Zeller, Stett. Ent. Zeit., vol. 32, p. 80, 1871.—Heylaerts, Ann. Soc. Ent Belg., vol. 25, pp. 45, 69, fig. 2, 1881; Compt.-Rend., vol. 31, p. lxxxviii, 1887.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 194, 1929.—Forbes, N.Y. Acad. Sci., vol. 12, no. 1, p. 150, 1930.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1184, 1936.—Wolcott, Journ. Agric. Univ. Puerto Rico, vol. 20, no. 1, p. 506, 1936.—Forbes, Bull. Mus. Comp. Zool., vol. 90, no. 2, p. 368, 1942.—Vazquez, Anales Instit. Biol., vol. 13, no. 1, p. 370, 1942.—Costa Lima, Insetos Brasil, vol. 5, pp. 188, 190, 192, figs. 82, 84, 85, 1945.—Martorell, Journ. Agric. Univ. Puerto Rico, vol. 29, p. 544, 1945.—Wolcott, Journ. Agric. Univ. Puerto Rico, vol. 32, no. 3,

p. 738 (1948), 1951.—Kozhantshikov, Fauna SSSR, vol. 3, no. 1, p. 320, 1956.

Oiketicus kirbii [sic] Walker, List Lep. Insects Brit. Mus., pt. 4, p. 961, 1855.—Kirby, Cat. Lep. Heter., vol. 1, p. 500, 1892.

Oeceticus [sic] *kirbii* [sic] Druce, *in* Godman and Salvin, Biol. Centr.-Amer. vol. 1, p. 229, 1887.

Oeceticus [sic] *fulgurator* Herrich-Schäffer, Samml. Aussereur. Schmett., pl. 84, fig. 519, 1856; p. 59, 1858.—Burmeister, Descr. Phys. Rep. Argent., vol. 5, p. 401, 1878 (synonym of *O. kirbii*).

Oeceticus [sic] *fulgerator* [sic] Grote, Proc. Ent. Soc. Phila., vol. 5, p. 247, 1865.

Oiketicus fulgerator [sic] Kirby, Cat. Lep. Heter., vol. 1, p. 500, 1892 (synonym of *O. kirbii*).

Oiketicus fulgurator Herrich-Schäffer.—Dalla Torre and Strand, Cat. Lep., pars 34, p. 194, 1929 (synonym of *O. kirbyi*).

Oiketicus poeyi Lucas *in* Sagra, Hist. Cuba, vol. 7, p. 303, pl. 17, fig. 6, 1857.—Herrich-Schäffer, Corresp.-Blatt Zool.-Mineral. Ver. Regensburg, vol. 20, p. 133, 1866; vol. 25, p. 41, 1871.—Gunlach, Contr. Ent. Cubana, pp. 276–277, 1881.—Kirby, Cat. Lep. Heter., vol. 1, p. 500, 1892 (synonym of *O. kirbii*).—Dalla Torre and Strand, Lep. Cat., pars 34, p. 194, 1929 (synonym of *O. kirbyi*).—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1184, pl. 169e, 1936.

Oeceticus [sic] *poeyi* Lucas.—Grote, Proc. Ent. Soc. Phila., vol. 5, p. 247, 1865.

Psyche (*Oiketicus*) *gigantea* Zeller, Stett. Ent. Zeit., vol. 32, pp. 49, 80, pl. 2, figs. 1–5, 1871.—Kirby, Cat. Lep. Heter., vol. 1, p. 500, 1892 (synonym of *O. kirbii*).

Oiketicus gigantea (Zeller) Dalla Torre and Strand, Lep. Cat., pars 34, p. 194, 1929 (synonym of *O. kirbyi*).

Oiketicus orizavae Schaus, Journ. N.Y. Ent. Soc., vol. 9, p. 45, 1901 (new synonymy).—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1185, 1936.—Vazquez, Anales Instit. Biol., vol. 13, no. 1, p. 288, 1942; *in* Mem. Congr. Cient. Mex., VII-Cienc. Biol., pp. 335, 339, fig. 7d, 1953.

Oiketicus sinaloanus Vazquez, Anales Instit. Biol., vol. 13, no. 1, p. 274, fig. L; pl. 1, fig. D; pl. 2, figs. B, D, H, J, L, N, Q, U; pl. 3, figs. 8, 12, 14, 16; pl. 4, fig. 17, 1942 (new synonymy); *in* Mem. Congr. Cient. Mex. VII-Cienc. Biol., pp. 324, 339, fig. 7b, 1953.

Oiketicus ochoterenai Vazquez, Anales Instit. Bio., vol. 13, no. 1, p. 277, pl. 1, figs. A-C; pl. 2, figs. A, C, H, I, K, M, P, R-T; pl. 3, figs. 7, 11, 13, 15; pl. 4, figs. 18, 20–21, 1942 (new synonymy); *in* Mem. Congr. Cient. Mex. VII-Cienc. Biol., pp. 324, 339, fig. 7b, 1953.

Oiketicus fasciculatus Vazquez, Anales Instit. Biol., vol. 13, no. 1, p. 290, figs. 36–39, 1942 (new synonymy); *in* Mem. Congr. Cient. Mex., VII-Cienc. Biol, pp. 330, 339, 1953.

Male.—(Figs. 54–57.) Antennae 35- to 43-segmented, outer half to outer third strongly serrate. Epiphysis moderately developed (fig. 185), ⅓ to ⅔ length of tibia. Meso- and metathoracic tibiae armed with usually single apical spur.

Primaries uniformly scaled, comparatively long, slender, with acute apex, very oblique outer margin; discal scales (fig. 357) smooth, broadly oblanceolate with evenly rounded to slightly acute apices, ranging in color from light to dark fuscous; apical area beyond cell

usually dark to termen, gradually fading outward in rubbed specimens; lower margin of this area slightly curved, never continuing uninterrupted to lower margin of cell, but, instead, with small pale indention of margin where it joins cell; light area of forewing pale brown to fuscous. Secondaries usually darker, especially on outer half· outer radial crossvein beyond apex of discal cell; termen slightly to strongly excavate. Wing venation remarkably constant; M_2 and $_3$ strongly stalked in both wings. Wing expanse 35–52 mm., $\bar{x}$=42.95 mm. (n=151). *

Male genitalia.—(Fig. 288.) Very elongate, similar to *O. specter.*

Female.—Length 30–40 mm. As described for genus.

Female genitalia.—(Figs. 310–312.)

Case.—(Fig. 112.) Length 60–110 mm.; greatest diameter usually 20–35 mm. Cases heavily constructed of short, usually stout sections of twigs, and a few tiny leaf fragments arranged in circular pattern around bag; over this irregular outline a thin but firm covering of greyish-brown silk laid down.

Type.—Lost (*O. kirbyi, O. fulgurator, O. poeyi);* in the United States National Museum (*O. orizavae);* Instituto de Biologia, Mexico City (*O. fasiculatus, O. ochoterenai, O. sinaloanus*).

Type locality.—West Indies (*O. kirbyi);* Brazil (*O. fulgurator);* Cuba (*O. poeyi);* Orizaba, Mexico (*O. orizaba);* Presidio, Veracruz, Mexico (*O. fasiculatus);* Guadalajara, Mexico (*O. ochoterenai);* Mazatlan, Mexico (*O. sinaloanus*).

Recorded hosts.—"Bignoniaceae: *Tabebuia pallida* Miers, *Tabebuia rigida* Urban; Bombacaceae: *Ceiba pentandra* (L.) Gaertn., *Montezuma speciosissima* Sesse & Moc., *Ochroma lagopus* Sw.; Boraginaceae: *Cordia sulcata* DC.; Casuarinaceae: *Casuarina equisetifolia* L.; Combretaceae: *Terminalia catappa* L.; Flacourtiaceae: *Casearia sylvestris* Sw.; Lauraceae: *Persea americana* Mill.; Nyctaginaceae: *Pisonia albida* (Heimerl.) Britton; Pinaceae: *Thuja orientalis* L.; Rubiaceae: *Randia aculeata* L.; Sapindaceae: *Cupania americana* L.; Sapotaceae: *Chrysophyllum pauciflorum* Lam.; Verbenaceae: *Petitia domingensis* Jacq." (Martorell, 1948). "Cupressaceae: *Cupressus* sp.; Fabaceae: *Acacia* sp.; Taxodiaceae: *Taxodium* sp." (Vazquez, 1942.) "Oleaceae: *Fraxinus* sp." (Wolcott, 1951). "Fabaceae: *Calliandra* sp.; Musaceae: *Musa* sp." (from specimen labels).

Distribution.—(Map 12.) A very common neotropical species, ranging widely from the Volcanic Section of Central America, through the Central American Ranges and several islands of the Greater and Lesser Antilles, south into almost every major physiographic

* For explanation of symbols, see ftn., p. 114.

area of South America except the southern regions of the Paraná Paraguay Plain and the Patagonian Plateau.

Discussion.—In this troublesome genus, *Oiketicus kirbyi* presents the greatest difficulties.

Comparatively little is known about the variation in case construction of this common species; owing to the paucity of rearing data, few bags can be linked with certainty to the adults. Within certain parts of the range, various forms of cases have been found, notably some that lack the outer covering of silk and have a small number of twigs incorporated in their construction. Such larval cases have been found in Cuba (see p.157). They may belong to other species or they may represent extreme variations of *O. kirbyi*. For the present, until proven otherwise, it is probably best to assume that these cases pertain to other species and that the larval case of *O. kirbyi* consistently is swathed in silk.

The loss of the type material, the absence of any designation more definite than "India Occidentalis" as the type locality, and the inadequacy of Guilding's description and illustrations make positive specific identification and application of the name "*kirbyi*" somewhat doubtful. However, specimens from areas of the West Indies that are very similar to specimens from Central and South America remove most of the doubt.

The original locality of *O. kirbyi* has been referred rather doubtfully to Jamaica by some authors (Forbes, 1942, and Wolcott, 1951). Frank M. Jones, investigating the origin of *O. kirbyi*, concluded that St. Vincent of the Lesser Antilles probably was the type locality. The present writer concurs with the latter.

The author of both the genus and species of *Oiketicus kirbyi*, Rev. Lansdown Guilding, was an English clergyman who resided on the island of St. Vincent. In his paper on *Oiketicus kirbyi*, Guilding states that he observed this insect, among others, from 1817 to 1826. Author of at least twelve papers and one book dealing with West Indian biology, he based his studies on the one island of St. Vincent. It seems reasonable that this island is the type locality for *O. kirbyi* as well as *Cryptothelea macleayi* (Guilding). Jones (1945), however, rightfully has cautioned that the origin of *O. kirbyi* and/or *C. macleayi* may have been elsewhere since Guilding probably made visits to adjacent islands. Moreover, the presence of a botanical garden on St. Vincent during Guilding's tenure offers the additional possibility of accidental introductions of such insects as bagworms.

Guilding's illustration of *O. kirbyi* also has presented problems because it is unlike almost any known specimen of this species or any native psychid of that area. The moth was pictured as being uniformly dark; although the primaries lacked a darker discal spot

or hyaline bar, the drawing definitely represented a true *Oiketicus* as presently understood. There exists in the British Museum a tattered specimen from St. Lucia that, approximating Guilding's figures and description, possesses extremely dark wings in which the discal spots (now largely obliterated) perhaps were not as contrasted as in most *O. kirbyi*. In addition, two specimens from Jamaica, although resembling *O. abbotii* in wing outline, are remarkably unicolorous, the cell being only slightly darker than the rest of the forewing.

A total of only 14 males of the genus *Oiketicus* were available for examination from the West Indies. This small series reflected considerable variation that seemed to be identical with, or most similar to, *O. kirbyi*. For this reason I have not extended *O. abbotii's* range into the West Indies, but further collecting and study may do this. Since some hybridization may have occurred in the past between *O. kirbyi* and *O. abbotii* in this general area, a clear separation of these two insects may have been further obscured.

Four specimens from Cuba were studied. Three of these, like some of the Jamaica specimens, were similar in size to *O. abbotii* but possessed deeply excavated hindwings as in *O. kirbyi*. A fourth, very dark specimen (Paris Museum) with a wing expanse of 46 mm. is identical with "typical" *O. kirbyi* from South America, and thus, it definitely establishes the presence of this species in Cuba. The type of *O. poeyi*, recorded from Cuba, is presumably lost, but from its original description and from existing specimens, its status as a synonym of *O. kirbyi* seems almost certain.

The nomenclature of *Oiketicus kirbyi* has been complicated further in Mexico by the assignment of names to several variants that also can be observed within a large series of specimens from South America: *O. orizavae*, *O. fasciculatus*, *O. ochoterenai*, and *O. sinaloanus*, all of which are synonymized.

Oiketicus orizavae, originally described from one specimen, appears to be nothing more than a rubbed and slightly stunted variant of *O. kirbyi*. Specimens showing intermediate conditions are from Misantla and Jacala, Mexico.

Oiketicus fasciculatus was described from a single, somewhat torn specimen and represents the darker and more common variety of *O. kirbyi*. The associated case of *O. fasciculatus*, like that of Guilding's species, characteristically is covered with an external sheath of silk.

Oiketicus ochoterenai and *O. sinaloanus* are very similar. Although no keys for separation or specific diagnostic characters originally were provided by Vazquez (1942), apparently the relative sinuation of the secondaries and the maculation of the larva (especially the head)

were considered to be of prime importance. Vazquez stated that the amount of curvature of the termen of the hindwings is a fixed character, but this has been observed to vary considerably as demonstrated by large series of specimens of *O. kirbyi* and *O. platensis*. Among those species represented by sufficient series, only in *Oiketicus abbotii* does this character appear relatively stable. The head maculation of the larva also may be quite variable as demonstrated by specimens of *O. toumeyi*. Further, the larval cases of *O. ochoterenai* and *O. sinaloanus* are identical and are of the standard *O. kirbyi* construction.

Specimens identified by Vazquez as *Oiketicus ochoterenai* intergrade into a light phase of *O. kirbyi*, which was discussed in Vazquez's papers (1942, 1953) as *Oiketicus mexicanus* Gaede (see discussion under *O. townsendi*, subspecies *mexicanus*). These insects represent the lightest extreme of color variation of *O. kirbyi*, and perhaps they do inhabit a definite geographical range in the higher and more arid regions along the Mexican Plateau. Further collecting and ecological studies may validate a subspecific name for this somewhat regional color phase of *O. kirbyi*, but on the basis of present information there appears to be a gradual intergradation to the "typically" dark specimens of *O. kirbyi* as represented by examples from Misantla, Mexico.

As in the West Indies, specific demarcation may be complicated further in Mexico by hybridization between *O. kirbyi* and *O. townsendi mexicanus*.

In an attempt to summarize what is known at present about the *Oiketicus kirbyi* complex, a few general observations can be stated. First, there is a considerable amount of color variation in *O. kirbyi* that apparently is correlated with the climate of its habitat. Such a phenomenon is not unexpected for such a widespread species and is in accordance with Golger's Rule. In the more arid sections of its distribution, *O. kirbyi* appears as a light phase and in the more humid sections (Costa Rica and Panama) it occurs as its darkest extreme. Pale forms nearly as light as some of those from central Mexico (Guadalajara) also occur in Loja, Ecuador, which provides a good reason for not naming this form as it occurs in Mexico. Throughout most of its range *O. kirbyi* evidently occupies a rather humid environment, and thus most specimens are dark.

Such reasoning at present is not sufficient to explain the color variation observed in *O. abbotii*. Some of the palest specimens occur in southern Florida, whereas the darkest forms, which are from Texas, have been collected in areas (San Antonio and Brownsville) that are certainly more arid. Further collecting (especially in Texas) may aid in understanding this difference.

Another observation concerning *O. kirbyi* that should be mentioned involves the apparent circular transition in general appearance of the three species *O. abbotii, O. kirbyi,* and *O. townsendi.* In the southwestern United States, specimens of *O. abbotii* and *O. townsendi* are abundantly distinct, and the two species apparently are allopatric. However, as pointed out previously, the morphological distinction between *O. abbotii* and *O. kirbyi* in the West Indies is vague, and there appears to be a transition of one into the other. Through the Lesser Antilles, South America, and a major portion of Central America the typically large and dark form of *O. kirbyi* predominates. In Mexico a similar phenomenon occurs as witnessed in the Greater Antilles: the dark phase of *O. kirbyi* extends along the eastern coast as far north as the state of Veracruz, becomes lighter in the higher altitudes, and merges in appearance with *O. townsendi mexicanus,* which in turn changes to an even paler form northward, represented in the United States by *O. t. townsendi.*

The possibility that *Oiketicus kirbyi* is a single polytypic species encompassing both *O. abbotii* and *O. townsendi* may be suggested by the above information, but such a conclusion does not seem reasonable because the larval cases are apparently diagnostic for each species.

Material examined.—180 ♂♂, 8 ♀♀, 35 cases:

CENTRAL AMERICA

Costa Rica: Specific locality unknown, ♂, Nov. 25, ZSBS. Guapiles, ♂, Nov., USNM. La Emilia, ♂, Nov. 16, ANS. Palmar, 2 ♂♂, March 11, 12; 5 ♂♂, 2 ♀♀, USNM; ♂, May 23, FSPB.

Honduras: La Cambre, ♂, March 20–22, BM.

Mexico: Colima, 2 ♂♂, USNM; ♂, May, BM. Cuernavaca, ♂, May, BM; 4 ♂♂, May 11–14, DEI; 2 ♂♂, May; ♂, June; ♂, July, USNM; ♂, May, SNG; 2 ♂♂, May, ZSBS. Guadalajara, Jalisco, 2 ♂♂, May 10, 24, AMNH; 3 ♂♂, June 4–20; 2 ♂♂, ♀, case, May 24, USNM; ♂, 1500 m., PM. Jacala, Hidalgo, ♂, June 21, MCZ. Mexico City, ♂, USNM. Misantla, Veracruz, 2 ♂♂, PM; 3 ♂♂, USNM. Orizaba, ♂ (type, *O. orizaba*), USNM. Villa Juarez, Pueblo, ♂, May, ZSBS. Zacualpan, ♂, May, DEI.

Panama: Almirante, ♂, June 5; ♀, 12 cases, USNM. Canal Zone, 2 ♂♂, July, CM. La Chorrera, ♂, April, USNM.

WEST INDIES

Antigua: 11 cases, USNM.

Cuba: 2 ♂♂, ANS; ♂, PM; ♂, ZMHU.

Jamaica: Kingston, ♂, Aug. 27, USNM. Montego Bay, ♂, Dec. 24, BM. Mt. Mansfield House, Gordontown, ♂, July 12, CM. Runaway, ♂, Feb. 24, BM. Sandy Gully, St. Katherine, ♂, March 27, AMNH.

Puerto Rico: 2 cases, ZMHU. Mayaguez, ♂, May 14, USNM.

Santa Lucia: ♂, BM.

Tobago: 2 ♂♂, BM.

Trinidad: ♂, USNM.

SOUTH AMERICA

Brazil: Specific locality unknown, 2 ♂♂, BM; ♂, ZMHU. Alto de Serra, São Paulo, 2 ♂♂, Nov., BM. Amatura, R. Solimoes, ♂, Feb. 19, CU. Breves, Para, ♂, Jan. 13, BM. Calama, Rio Madeira, 2 ♂♂, BM. Campo Bello, Rio de Janeiro, 2 ♂♂, USNM. Cariacica, Espirito Santo, ♂, ZMHU. Castro, Parana, ♂, BM. Corcovado Rio, ♂, Feb., BM. Espirito Santo, 6 ♂♂, USNM. Fonte Boa, Amazonas, ♂, June; 2 ♂♂, July; ♂, Nov., BM. Hyutanahan, Rio Parus, ♂, Jan.; ♂, Feb.; ♂, April, CM. Mawajo, Amazon, ♂, USNM. Nova Friburgo, ♂, USNM. Rio, S. Brazil, ♂, BM. Rio de Janeiro, 2 ♂♂, CU; ♂, BM. São Paulo, ♂, Jan; ♂, Nov.; 2 ♂♂, BM; ♂, March, CM; ♂, Nov., SNG; ♂, Oct; ♂, Dec., USNM. Santa Catarina, ♂, BM; ♂, ZMHU. Taperinha, Amazonas, 2 ♂♂, USNM.

British Guiana: Specific locality unknown, ♂, BM.

Colombia: Juntas, Rio Tamana, Rio San Juan, Chaco, ♂, Feb., BM. Muzo R. Cantinero, ♂, BM. Nari River, Antioquia, 3 ♂♂, USNM. Novita, Rio Tamana, Rio San Juan, Chaco, ♂, BM. Popayan, ♂, USNM. Rio Dagua, W. Colombia, 7 ♂♂, ZMHU.

Dutch Guiana: Aroewarwa Creek, Maroewym Valley, ♂, March, BM. Moengo, Boven Cottica R., 5 ♂♂, May 22–26, CU.

Ecuador: Guayllabamba, 2 ♂♂, Jan. 30, Feb. 20; 2 ♀♀, March 13, 27; 10 cases, RWH. Loja, 5 ♂♂, Sept.; 4 ♂♂, USNM. Loxa, 3 ♂♂, BM. Naramkapa, ♂, Nov., USNM. Santo Domingo de los Colorados, Pichincha, ♂, Nov., ZSBS. Zamora, ♂, USNM.

French Guiana: Specific locality unknown, ♂, BM. St. Jean, Maroni River, ♂, Feb.; ♂, July–Aug.; 3 ♂♂, BM; 2 ♂♂, USNM. St. Laurent, Maroni River, ♂, March, USNM.

Paraguay: Villarica, ♂, BM.

Peru: River Tabaconas, N. Peru, ♂, BM. San Gaban, ♂, March–April, BM. Yahuamango, SE Peru, 3 ♂♂, Feb., March, BM.

Venezuela: Aroa, 5 ♂♂, USNM. Caracas, 2 ♂♂, May 14, USNM. Ciudad Bolivar, ♂, June 8, BM. Maracay, ♂, Jan.–Feb.; 2 ♂♂, April–May; ♂, June–July; 2 ♂♂, July; ♂, Aug.; ♂, Nov.; 2 ♂♂, ZSBS. San Esteban, ♂, June; ♂, July, BM.

52. *Oiketicus platensis* Berg

Figures 58, 110, 111, 231, 291, 315, 354; Map 12

Oeceticus [sic] *platensis* Berg, An. Soc. Argent., vol. 14, p. 276, 1883.—Caride Massini and Brethes, An. Soc. Rural Argent., vol. 52, no. 4, p. 207, 1918.

Oiketicus platensis Berg, Heylaerts, Ann. Soc. Ent. Belg., Compt.-Rend., vol. 29, p. lx, 1885.—Kirby, Cat. Lep. Heter., vol. 1, p. 501, 1892.—Abderhalden and Landau, Zeitschr. Physiol. Chem., vol. 71, pp. 443–448, 1911.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 194, 1929.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1184, pl. 169e, 1936.

Oiketikus [sic] *platensis* Seitz, Ent. Rundsch., vol. 36, pp. 48, 52, 1919.

Oiketicus kirbyi Berg, Stett. Ent. Zeit., vol. 35, p. 230, 1874 (not Guilding, 1827); Bull. Soc. Imp. Nat. Moscou, vol. 49, no. 2, pp. 213, 247, 1875.—Katter, Ent. Nachr., vol. 1, p. 190, 1875.—Berg, Ann. Soc. Cient. Argent., vol. 4, p. 98, 1877; vol. 13, p. 217, 1882; vol. 14, pp. 275–277, 1882.—Koehler, Rev. Soc. Ent. Argent., vol. 3, no. 17, pp. 351, 352, fig. 1, 1931.

Oeceticus [sic] *kirbii* [sic] Burmeister, Descr. Phys. Rep. Argent., vol. 5, p. 400, 1878.

Oicocestis [sic] *kirbyi* Koehler, Sonderheft Zeitsch. Wiss. Insektenbiol., vol. 19, no. 2, p. 25, 1924.

Oiceticus [sic] *kerbyi* [sic] Lahille, Minist. Agric. Rep. Argent., circ. 583, p. 97, 1926.

Oiketicus kirbyi subspecies *platensis* Berg.—Koehler, Physis, vol. 17, pp. 470, 471, 1939.

Male.—(Fig. 58.) Antennae with 28–41 segments; apical third strongly serrate. Body vesture light brown to fuscous. Prothoracic tibia with epiphysis absent. Meso- and metathoracic tibiae with 1–2 apical spurs.

Wings fully scaled; relatively short, broad for genus. Primaries with discal scales (fig. 354) broadly triangular, with rather blunt, rounded apices; cell dark fuscous; hyaline bar not strongly oblique, giving outer margin of discal spot a somewhat truncated appearance; paler areas of wings light to dark brown. Venation relatively constant, 12- and 8-veined. Outer margin of secondaries evenly rounded or slightly sinuate; in few specimens margin excavated. Wing expanse 31–47 mm., $\bar{x}$=36.7 mm. (n=69).*

Male genitalia.—(Fig. 291.) Valves with pulvilli well developed.

Female.—Length 25–33 mm. As described for genus.

Female genitalia.—(Fig. 315.)

Case.—(Figs. 110, 111.) Length 55–75 mm.; diameter 20–25 mm. Broadly fusiform, very loose construction, circular thatching of small leaves, petioles, and short, slender twigs, usually overlaid by thin, more or less incomplete sheet of grey silk; some specimens show no exterior silk covering.

Type.—Lost.

Type locality.—Argentina.

Recorded hosts.—"Fabaceae: *Cytisus* sp.; Rosaceae: *Prunus persica* (L.) Batsch., *Pyrus malus* L." (from specimen labels). Apocynaceae: *Vinca minor* L., Corylaceae: *Ostrya virginiana* (Mill.) K. Koch; Fabaceae: *Robinia pseudo-acacia* L.; Ulmaceae: *Ulmus americana* L.

Distribution.—(Map 12.) At present known only from the southern portion of South America below the 20° line of latitude; commonly occurring through the Paraná Paraguay Plain and the Paraná Plateau of southern Brazil.

Discussion.—*Oiketicus kirbyi* is not known definitely to occur in Argentina. All specimens from that country previously identified as *O. kirbyi* were found, upon examination, to be *O. platensis;* thus all references in the literature to *O. kirbyi* occurring in Argentina are believed to pertain to *O. platensis.* Some authors (e.g., Berg, Koehler)

*For explanation of symbols, see ftn., p. 114.

have, in part, regarded *O. platensis* as a synonym of, or a subspecies of, *O. kirbyi;* in these instances their usage is quite clear.

MATERIAL EXAMINED.—85 ♂♂, 6 ♀♀, 97 cases:

ARGENTINA: Specific locality unknown, ♂, Jan. 12; ♂, USNM; 2 ♂♂, case, BM. Belgrano, 2 ♂♂, BM. Buenos Aires, 6 ♂♂, 3 cases, BM; 4 ♂♂, AMNH; 2 ♂♂, 26 cases, USNM; 9 ♂♂, 5 cases, ZMHU; Palermo Park, ♂, April, MCZ. Goya, ♂, BM. La Rioja, 2 ♂♂, PM; 18 ♂♂, 6 ♀♀, 10 cases, USNM. Mendoza, 10 ♂♂ with cases, March 7; 50 cases, USNM. Salta, ♂, BM. Tucuman, ♂, June; 2 ♂♂, BM; 4 ♂♂, USNM. Villa Ana, Sante Fe, ♂, Feb.; ♂, March; ♂, April 6, BM.

BOLIVIA: Cochabamba, case, ZSBS.

BRAZIL: Specific locality unknown, ♂, USNM. Iguassu, Parana, ♂, Oct., BM. Pelotas, ♂, DEI; ♂, March 19; ♂, April 5; 4 ♂♂, CU; ♂, March 19, MCZ. Rio de Janeiro, ♂, BM; Rio Grande do Sul, ♂, USNM. São Paulo, Ypiranga, 2 ♂♂, Aug., USNM.

PARAGUAY: Sapucay, ♂ with case, Aug. 26, USNM.

URUGUAY: Carmelo City, 2 ♂♂, March 22, MCZ. Montevideo, 2 ♂♂, April 6, CU.

14. *Thyridopteryx* Stephens

Thyridopteryx Stephens, Illustr. Brit. Ent., vol. 4, p. 387, 1834; Trans. Ent. Soc. London, vol. 1, ser. 1, p. 76, 1836.—Doubleday, Entomologist, vol. 1, no. 7, p. 97, 1841.—Walker, List Lep. Insects Brit. Mus., pt. 4, p. 959, 1855.—Morris, Synop. Lep. N. Amer., Smiths. Misc. Coll., pt. 1, p. 142, 1862.—Kirby, Cat. Lep. Heter., vol. 1, p. 501, 1892.—Neumoegen and Dyar, Journ. N.Y. Ent. Soc., vol. 2, p. 118, 1894.—Dyar, U.S. Nat. Mus. Bull. 52, p. 353, 1902 [1903].—Schaus, Proc. U.S. Nat. Mus., vol. 29, p. 344, 1905—Forbes, Cornell Univ. Agric. Exp. Sta. Mem. 68, p. 144, 1923.—Dalla Torre, Ent. Jahrb., vol. 36, p. 131, 1927.—Forbes *in* Leonard, Cornell Univ. Exp. Sta. Mem. 101, p. 539, 1928.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 184, 1929.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1181, 1936.—McDunnough, Check List Lep. Canada and USA, pt. 2, p. 102, 1939.—Kozhantshikov, Fauna SSSR, vol. 3, no. 2, p. 320. 1956 (synonym of *Oiketicus*).

Hymenopsyche Grote, Proc. Ent. Soc. Phila., vol. 5, p. 248, 1865 (type, *Occeticus* [sic] *coniferarum*).—Kirby, Cat. Lep. Heter., vol. 1, p. 501, 1892 (synonym of *Thyridopteryx*).—Dalla Torre and Strand, Lep. Cat., pars 34, p. 184 (synonym of *Thyridopteryx*).—Kozhantshikov, Fauna SSSR, vol. 3, no. 2, p. 320, 1956 (synonym of *Oiketicus*).

TYPE OF GENUS.—*Sphinx ephemeraeformis* Haworth, 1803. Monobasic.

MALE.—Medium to relatively large moths, very stout, densely hairy body. Antennae (fig. 383) broadly bipectinate, individual segments short, stocky; those of basal fourth broader than long, gradually longer, more slender toward apex; pectinations more or less compressed, long near base of antenna gradually diminishing in length before apex, distal fourth or fifth strongly serrate. Prothoracic legs (fig. 187) longest, without epiphysis. Meso- and metathoracic legs

with 1–2 minute apical spurs. Hindlegs most reduced, femur subglobose, tarsal segments very short, compact. Abdomen exceeding hindmargin of secondaries by usually half its length.

Wings mostly transparent, nearly devoid of scales in flown specimens, some scaling concentrated in anal area of hindwing, less in that of forewing; venation (fig. 168) extremely variable, at least in *Thyridopteryx ephemeraeformis*. Primaries elongate, usually 11-veined; R_3 and $_4$ almost always long stalked; M_2 and $_3$ usually completely fused in both wings, frequently separating near margin; M_1 widely separate from M_2+_3; base of M divided within cell of both wings; 1A curving abruptly down to connect with 2A, with often a short spur toward outer margin; 2A and 3A separate near wing base, then joining and immediately separating, with 2A continuing to outer margin, 3A a short spur directed toward hindmargin. Secondaries ovoid-triangulate, approximately ½ area of primaries, outer margin more or less evenly rounded; frequently 7-veined, often 6 veins, depending on fused or separate condition of $Sc+R_1$ and Rs at apex of wing; Sc frequently with 1–2 spurs arising near an oblique crossvein usually present midway along cell between $Sc+R_1$ and Rs; Rs converging with $Sc+R_1$ beyond apex of cell, usually separating again, sometimes remaining fused to margin; 1A completely atrophied or with faint vestige curving abruptly downward into 2A somewhat as in forewing.

Male genitalia.—Elongate. Apex of tegumen with shallow cleft. Valves with pulvilli moderately to well developed, partially covered with spinules; apex of sacculus minutely spined. Vinculum long, narrow, gradually tapering to elongate saccus. Base of aedeagus prominently expanded.

Eighth sternite with furcal arms well developed, more or less parallel; base relatively robust, nearly truncate at posterior margin.

Female.—Vermiform. All body appendages vestigial, reduced to tiny tubercules or completely absent. Dorsum of head, thorax lightly sclerotized; remainder of body membranous, whitish. Posterior end of abdomen with complete circle of dark, woolly hair.

Female genitalia.—(Fig. 316.) External genitalia largely membranous, single pair of short rodlike apodemes extending from about level of ostium into terminal segment (9+10); dorsum of eighth abdominal segment with two broad, symmetrical pairs of apodemes along anterior margin, which taper forward into seventh segment. Internal genitalia with extremely long, convoluted ductus seminalis; bursa large, several times volume of spermatheca; spermatheca as in other psychids examined; accessory glands arising posterior to vestibulum, branched.

Discussion.—In 1865 Grote described a new genus and species of psychid from Cuba, *Hymenopsyche thoracicum*. He correctly

distinguished his new genus from "*Oeceticus*" [sic] but made no mention of a more related genus, *Thyridopteryx*. This latter name evidently was unknown to Grote, for instead of designating his new species as the type of *Hymenopsyche*, he selected *Oeceticus coniferarum* Harris, a name which is now known to be a synonym of *T. ephemeraeformis*. *Thoracicum* is a valid species that does not belong in either *Oiketicus* or *Thyridopteryx* but instead is very close to *Biopsyche apicalis*, where it has been placed. Because of Grote's original type designation, *Hymenopsyche* has to be synonymized with *Thyridopteryx* and thus it is no longer available for *thoracicum*.

A general pattern of wing venation is difficult to summarize for *Thyridopteryx* as a whole because of the extreme variation of one of its species, *T. ephemeraeformis*. Among our new world psychids probably no species is more variable in venation than this one. Jones (1923) has demonstrated that a composite based upon the examination of fifty males of this species would show a range from 14- and 8-veined wings, with a whole series of cells and crossveins, to 9- and 5-veined wings, without any accessory cells. Also, as often observed, the venation of the wings on one side may differ from that of the other side. *Thyridopteryx meadi*, which apparently possesses a rather stable venation, is helpful in arriving at a typical pattern for the genus. *T. alcora* also seems to display a stable pattern but no series of this species is available for studies of this nature.

Key to the Species of Thyridopteryx

1a. Wing membrane semitransparent, somewhat opaque . . . . **53. T. meadi**

1b. Wing membrane transparent, not opaque.

2a. Tornus distinct; forewing with majority of scales in cell 2A relatively broad with dentate apices (fig. 359) . . . . . **54. T. alcora**

2b. Tornus indistinct or absent with termen smoothly curved to hind margin; majority of scales in cell 2A slender with acute apices (fig. 360). **55. T. ephemeraeformis**

53. *Thyridopteryx meadi* Henry Edwards

FIGURES 61, 113, 114, 240, 295, 318; MAP 5

Thyridopteryx meadi Henry Edwards, Papilio, vol. 1, p. 116, 1881.—Barnes and McDunnough, Check List Lep. Boreal Amer., no. 4800, 1917.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 185, 1929.—McDunnough, Check List Lep. Canada and USA, pt. 2, no. 9522, 1939.

Thyridopteryx meadii [sic] Kirby, Cat. Lep. Heter., vol. 1, p. 501, 1892.—Dyar, Ent. News, vol. 4, p. 321, 1893.—Neumogen and Dyar, Journ. N.Y. Ent. Soc., vol. 2, p. 119, 1894.—Dyar, U.S. Nat. Mus. Bull. 52, no. 4066, 1902 [1903].—Jones and Parks, Tex. Agric. Exp. Sta. Bull. 382, p. 27, figs. 15, 20, 1928.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1181, 1936.

MALE.—(Fig. 61.) Body more slender than in other two species; vesture black. Antennae with 30–37 segments, more than ½ of segments

broader than long. Meso- and metathoracic tibiae with minute apical spur.

Wings very sparsely scaled, semitransparent, membrane more opaque than in other species. Forewing R_2 stalked with R_3+_4; discal scales, when present, very narrowly oblanceolate with acute tips. Hindwing usually with M_2 and $_3$ stalked for considerable distance, separating just before margin. Wing expanse 20–33 mm.

Male genitalia.—(Fig. 295.) As described for genus.

Female.—Length approximately 22 mm. As described for genus.

Female genitalia.—(Fig. 318.)

Case.—(Figs. 113, 114.) Length 30–40 mm.; diameter 6–8 mm. Somewhat variable in appearance, completely covered by small, flat, firmly attached fragments of leaves, or by short (usually less than 6 mm. long) sections of twigs laid obliquely on bag and somewhat spirally arranged. All possible intergrades exist between two conditions.

Type.—In the American Museum of Natural History.

Type locality.—Mojave Desert, California.

Recorded hosts.—"Fabaceae: *Prosopis sp.;* Zygophyllaceae: *Larrea tridentata* (D.C.) Coville" (Jones, 1928).

Distribution.—(Map 5.) Known from the Intermontane Plateau and Pacific Mountain Systems of the southwestern United States.

Discussion.—*Thyridopteryx meadi* seems to be associated largely with a single food plant, the extremely abundant "creosote bush," *Larrea tridentata*, of our southwestern deserts. This shrub is capable of surviving long periods of drought; it grows over extensive areas, often in almost pure strands, from southern California to southwestern Texas and thence south into Mexico.

With the information available from various correspondents of the late Dr. Frank M. Jones, especially Dr. C. T. Vorhies, formerly of the University of Arizona, it is apparent that the life history of *T. meadi* is quite variable. This fact is important not only in understanding the seasonal fluctuation of the insect but also in contributing to a better understanding of the life histories of other psychids, in particular *Thyridopteryx ephemeraeformis*.

As *Larrea tridentata* responds to rainfall with new vegetative growth, the life cycle of *T. meadi* likewise is speeded to maturity by the presence of moisture and more abundant, succulent food. During periods of drought the larvae become lethargic. Vorhies observed some larvae that suspended and closed their cases in mid-September as if for pupation; in July of the next year they were still larvae and had not moved or opened their cases although apparently still in healthy condition. He further noted that sprinkling egg-filled cases with water resulted, within a few hours, in the hatching of the enclosed eggs. In one limited area of dense infestation, where newly hatched larvae

abounded in late April, Vorhies found that larval growth had been completed and the moths had emerged when he examined the same infestation in early July. Thus, the larval period may last only a few weeks, or it may be extended over several months. Vorhies has observed both the hatching of eggs and the presence of larvae of various ages as late as October 16 and as early as March 31, which indicates winter survival of both eggs and larvae. The main period of adult emergence is probably during June and July but varying dates have been reported from March 31 to October 19.

MATERIAL EXAMINED.—20 ♂♂, 2 ♀♀, 128 cases:

ARIZONA: Specific locality unknown, 40 cases, USNM. Tucson, 2 ♂♂, June 10, July 9; ♂, Sept. 12; ♀, May 1; ♀, Oct. 1; 65 cases, USNM. Phoenix, 5 ♂♂, June 14, ANS.

CALIFORNIA: Cabazon, 9 cases, USNM. Los Angeles, 5 cases, USNM. Mojave, 10 miles north of, 5 ♂♂, June 28–July 25, USNM. Mojave Desert, 7 ♂♂, July 10–12, USNM. San Bernardino Mts., 2700 ft., ♂ with case, USNM. Whitewater, Colorado Desert, 4 cases, CU.

TEXAS: El Paso, 3 cases, USNM. Terlingua, 12 miles north of, case, USNM.

54. *Thyridopteryx alcora* Barnes

FIGURES 60, 115, 239, 293, 293a, 359; MAP 5

Thyridopteryx alcora Barnes, Can. Ent., vol. 37, p. 214, 1905.—Jones and Parks, Tex. Agric. Exp. Sta. Bull. 382, p. 32, figs. 15, 20, 1928.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 184, 1929.—McDunnough, Check List Lep. Canada and USA, pt. 2, no. 9521, 1939.

MALE.—(Fig. 60.) Very similar to *T. ephemeraeformis* in general appearance. Vesture of body fuscous to black. Antennae 36- to 40-segmented, segments longer than broad beyond basal fourth. Middle, hindtibiae each with single, small apical spur.

Apex of primaries not as extended as in *T. ephemeraeformis*, thus outer margin less oblique, less curved; tornus more prominent than in other species. Wings of flown specimens in general with somewhat more abundant scaling than *T. ephemeraeformis;* membrane transparent; majority of scales (fig. 359) of cell 2A in forewing relatively broad with dentate apices, those at base of cell usually quadridentate, gradually tridentate further out; M_2+_3 sometimes separating before margin in both wings. Wing expanse 24–26 mm.

MALE GENITALIA.—(Fig. 293.) Very similar to *T. ephemeraeformis* except vinculum tapering more abruptly to saccus.

FEMALE.—Unknown.

CASE.—(Fig. 115.) Length 30–40 mm.; diameter 7–9 mm. All cases examined completely overlaid with small stems, twigs arranged in oblique manner, thereby resembling stick cases of *T. meadi.* In *T. alcora* sticks relatively longer, posterior ends frequently diverging from bag, thus imparting to case a bulkier appearance.

TYPE.—In the United States National Museum.

TYPE LOCALITY.—Santa Catalina Mountains, Arizona.

RECORDED HOSTS.—None.

DISTRIBUTION.—(Map 5.) Presently known only from the Basin and Range Province of southern Arizona.

DISCUSSION.—The adults of this moth, like those of *T. meadi*, seem to emerge either in early summer or in late summer and early fall. Jones (1928) reports finding full grown larvae and pupae in May and the moths emerging in June. One specimen (the type) was collected in August.

MATERIAL EXAMINED.—6 ♂♂, 21 cases:

ARIZONA: Specific locality unknown, case, USNM. Baboquivari Mts., ♂ with case, July 1–15, case, USNM. Dewey to Salome, en route, case, USNM. Peppersauce Canyon, 3 cases, USNM. Roosevelt, case, USNM. Santa Catalina Mts., 4 ♂♂, June 20–24; ♂, type, Aug. 24–30; 3 cases, USNM. Santa Rita Mts., 10 cases, USNM.

55. *Thyridopteryx ephemeraeformis* (Haworth)

FIGURES 59, 116, 117, 118, 144, 145, 168, 187, 241, 242, 294, 316, 317, 360, 383; MAP 5

Sphinx ephemeraeformis Haworth, Lep. Brit., p. 72, 1803.

Aegeria ephemeraeformis (Haworth) Stephens, Illustr. Brit. Ent. Haust., vol. 1, p. 145, 1828.

Thyridopteryx ephemeraeformis (Haworth) Stephens, Trans. Ent. Soc. London, vol. 1, p. 76, pl. 10, fig. 1, 1836.—Wood, Index Ent., p. 239, pl. 52, fig. 1658, 1839.—Doubleday, Entomologist, p. 97, 1841.—Gosse, Zoologist, vol. 2, pp. 537–540, 1844.—Walker, List Lep. Insects Brit. Mus., pt. 4, p. 959, 1855.—Morris, Smiths. Misc. Coll., pt. 1, p. 142, 1862.—Clemens, Proc. Ent. Soc. Phila., vol. 6, p. 221, 1866.—Lintner, First Ann. Rep. Insects N.Y., vol. 1, p. 81, fig. 13, 1882.—Kellicott, Can. Ent., vol. 16, p. 180, 1884.—Kilman, Can. Ent., vol. 16, p. 200, 1884.—Riley, Bull. U.S. Dep. Agric., Ent., no. 10, p. 22, 1887.—Kirby, Cat. Lep. Heter., vol. 1, p. 501, 1892.—Dyar, Ent. News, vol. 4, p. 321, 1893.—Packard, Ann. N.Y. Acad. Sci., vol. 8, p. 54, 1893.—Neumoegen and Dyar, Journ. N.Y. Ent. Soc., vol. 2, p. 118, 1894.—Tutt, Ent. Rec. Journ. Var., vol. 7, pp. 121–123, 1 pl., 1895; Nat. Hist. Brit. Lep., vol. 2, p. 374, pl. 5, 1900.—Girault, Ent. News, vol. 12, pp. 304–305, 1901.—Dyar, U.S. Nat. Mus. Bull. 52, no. 4065, 1902 [1903].—Holland, Moth Book, p. 361, pl. 41, fig. 12, 1905.—Howard and Chittenden, U.S. Dep. Agric., Bur. Ent., circ. 97, 10 pp., 11 figs., 1908.—Harris, Psyche, vol. 16, pp. 65–67, 1909.—Haseman, Missouri Agric. Coll. Exp. Sta. Bull. 104, pp. 309–330, figs. 1–16, 1912.—Grossbeck, Bull. Amer. Mus. Nat. Hist., vol. 37, p. 104, 1917.—Sharp, Cambridge Nat. Hist., Insects, vol. 2, p. 394, 1918.—Jones, Ent. News, vol. 34, pp. 97–100, 1923.—Forbes, Cornell Univ. Agric. Exp. Sta. Mem. 68, p. 144, figs. 101, 105, 1923.—Jones and Parks, Tex. Agric. Exp. Sta. Bull. 382, p. 19, figs. 15, 16, 1928.—Forbes *in* Leonard, Cornell Univ. Agric. Exp. Sta. Mem. 101, p. 539, 1928.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 184, 1929.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1181, pl. 169c, 1936.—McDunnough, Check List Lep. Canada and USA, pt. 2,

no. 9519, 1939.—Tietz, Lep. Penn., p. 156, 195?.—Metcalf, Flint, and Metcalf, Destructive and Useful Insects, p. 771, 1951.

Oecticus [sic] *coniferarum* Packard, Proc. Ent. Soc. Phila., vol. 3, p. 351, 1864. —Grote, Proc. Ent. Soc. Phila., vol. 5, p. 248, 1865.

Thyridopteryx coniferarum (Packard) Kirby, Cat. Lep., vol. 1, p. 501, 1892 (synonym of *T. ephemeraeformis*).—Dyar, U.S. Nat. Mus. Bull. 52, no. 4065, 1902 [1903].—Dalla Torre and Strand, Lep., Cat., pars 34, p. 184, 1929.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1181, 1936.—McDunnough, Check List Lep. Canada and USA, pt. 2, no. 9519, 1939.

Thyridopteryx pallidovenata Grossbeck, Bull. Amer. Mus. Nat. Hist., vol. 37, p. 104, 1917 (new synonymy).—Dalla Torre and Strand, Lep. Cat., pars 34, p. 185, 1929.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1182, 1936.—McDunnough, Check List Lep. Canada and USA, pt. 2, no. 9519, 1, 1939.

Thyridopteryx vernalis Jones, Ent. News, vol. 34, p. 100, pls. 3–4, figs. 11, 12, 1923 (new synonymy).—Jones and Parks Tex. Agric. Exp. Sta. Bull. 382, p. 27, figs. 15, 20, 1928.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1181, pl. 169d, 1936.—McDunnough, Check List Lep. Canada and USA, pt. 2, no. 9520, 1939.

Male.—(Fig. 59.) Body vesture fuscous. Antennae with 28–33 segments; basal third with segments broader than long, beyond that segments become lengthened. Meso- and metathoracic tibiae usually with pair of apical spurs, sometimes with shorter member of pair absent.

Wings in general almost devoid of scales except for concentrations along costal margin and anal area of both wings; membrane transparent; venation extremely variable. Forewing with apex produced, termen strongly curved, tornus indistinct or absent; scales (fig. 360) of cell 2A, for most part, long, slender with acute apices; a few bidentate scales sometimes present, especially toward base of cell. Wing expanse 17.5–36 mm.

Male genitalia.—(Fig 294.) As described for genus.

Female.—(Fig. 144.) Length 20–24 mm. As described for genus.

Female genitalia.—(Figs. 316, 317.)

Case.—(Figs. 116–118.) Length 30–50 mm.; diameter 10–15 mm. Elliptical, greatest diameter usually at or near middle; ornamentation quite variable, dependent upon food plant, never with external sheet of silk; when sticks incorporated in architecture, they are applied longitudinally and usually are of moderate length (15 mm. or less), occasionally may be longer; on cedar, cases frequently adorned with fruit of host.

Type.—Lost (*Sphinx ephemeraeformis* and *Oiceticus coniferarum*); in the American Museum of Natural History (*Thyridopteryx pallidovenata*); United States National Museum (*T. vernalis*).

Type locality.—Great Britain(?) (*S. ephemeraeformis*); "Middle States" (*O. coniferarum*); Fort Myers, Florida (*T. pallidovenata*); Seaford, Sussex County, Delaware (*T. vernalis*).

Recorded hosts.—"Cupressaceae: *Chamaecyparis thyoides* (L.) B. S. & P., *Juniperus communis* L., *Juniperus virginiana* L., *Thuja occidentalis* L.; Pinaceae: *Larix laricina* (DuRoi) K. Koch, *Picea* spp. (spruces), *Picea abies* (L.) Karst., *Pinus* spp. (pines), *Pinus strobus* L., *Tsuga canadensis* (L.) Carr.; Taxodiaceae: *Taxodium distichum* (L.) Rich.; Iridaceae: *Iris* sp.; Liliaceae: *Smilax rotundifolia* L.; Poaceae: *Zea mays* L.; Aceraceae: *Acer* sp. (maples), *Acer negundo* L.; *Acer platanoides* L., *Acer pseudo-platanus* L., *Acer rubrum* L., *Acer saccharinum* L., *Acer saccharum* Marsh.; Anacardiaceae: *Rhus* spp. (sumacs); Asteraceae: *Ambrosia trifida* L., *Erigeron canadensis* L., *Eupatorium ageratoides* L., *Helianthus decapetalus* L., *Vernonia noveboracensis* (L.) Michx.; Berberidaceae: *Berberis vulgaris* L.; Bignoniaceae: *Catalpa bignoniodes* Walt.; Brassicaceae: *Lepidium virginicum* L.; Caprifoliaceae: *Sambucus canadensis* L., *Sambucus caerulea* Raf.; Chenopodiaceae: *Kochia scoparia* (L.) Roth, *Rumex obtusifolius* L.; Cornaceae: *Cornus* sp.; Corylaceae: *Betula papyrifera* Marsh., *Carpinus caroliniana* Walt.; Ebenaceae: *Diospyros virginiana* L.; Ericaceae: *Gaylussacia baccata* (Wang.) K. Koch; Fabaceae: *Cercis canadensis*, L., *Gleditsia triacanthos* L., *Robinia pseudo-acacia* L., *Robinia viscosa* Vent., *Trifolium* sp. (clover), *Wisteria chinensis* DC.; Fagaceae: *Castanea dentata* (Marsh.) Borkh., *Castanea vesca* Gaertn., *Fagus grandifolia* Ehrh., *Fagus laciniata* Vignet., *Fagus purpurea Ait., Fagus sylvatica* L., *Quercus alba* L., *Quercus coccinea* Muenchh., *Quercus macrocarpa* Michx., *Quercus nana* Sarg., *Quercus palustris* Muenchh., *Quercus prinus* L., *Quercus subobtusifolia* A. Camus; Hamamelidaceae: *Hamamelis virginiana* L., *Liquidambar styraciflua* L.; Lauraceae: *Sassafras albidum* (Nutt.) Nees; Magnoliaceae: *Liriodendron tulipifera* L.; Malvaceae: *Gossypium* sp. (cotton), *Hibiscus syriacus* L.; Moraceae: *Humulus lupulus* L. (hops), *Maclura pomifera* (Raf.) Schneid.; Oleaceae: *Fraxinus americana* L.; Phytolaccaceae: *Phytolacca americana* L.; Platanaceae: *Platanus occidentalis* L., *Platanus orientalis* L.; Ranunculaceae: *Clematis* sp.; Rhamnaceae: *Rhamnus cathartica* L.; Rosaceae: *Amelanchier canadensis* (L.) Medic., *Crataegus* sp. (thorns), *Crataegus oxyacantha* L., *Cydonia oblonga* Mill. (quince), *Physocarpus opulifolius* (L.) Maxim., *Prunus americana* Marsh., *Prunus armeniaca* L. (apricot), *Prunus cerasus* L. (cherry), *Prunus domestica* L. (plum), *Prunus maritima* Marsh, *Prunus persica* (L.) Batsch (peach), *Prunus serotina* Ehrh., *Prunus virginiana* L., *Punica granatum* L., *Pyrus communis* L. (pear), *Pyrus malus* L., *Rosa* sp.; Salicaceae: *Populus alba* L., *Populus balsamea* L., *Populus deltoides* Marsh., *Populus nigra* var. *italica* (Muenchh.) DuRoi, *Populus tremuloides* Michx., *Salix* sp. (willows), *Salix babylonica* L., *Salix fragilis* L., *Salix lucida* Muhl.;

Sapindaceae: *Aesculus hippocastanum* L.; Tiliaceae: *Tilia* sp. (linden) *Tilia europaea* L., *Tilia americana* L., *Tilia heterophylla* Vent.; Ulmaceae: *Ulmus americana* L., *Ulmus campestris* L., *Ulmus fulva* Michx."(Tietz, 195?). "Pinaceae: *Cedrus* sp.; Arecaceae: *Roystonea* sp.; Aquifoliaceae: *Ilex* sp., *Ilex crenata* Thunb.; Anacardiaceae: *Mangifera indica* L., *Schinus terebinthifolius* Raddi; Annonaceae: *Annona glabra* L.; Asteraceae: *Anthemis cotula* L.; Casuarinaceae: *Casuarina* sp.; Fabaceae: *Bauhinia* sp.; Juglandaceae: *Carya* sp. (pecan); Lauraceae: *Persea* sp. (avocado); Lythraceae: *Lagerstroemia* sp. (crape myrtle); Malvaceae: *Thespesia populnea* (L.) Soland.; Myrtaceae: *Callistemon* sp., *Melaleuca* sp., *Psidium guajava* L.; Polygonaceae: *Coccoloba uvifera* (L.) Jacq.; Rosaceae: *Prunus amygdalus* Batsch, *Pyracantha* sp.; Rubiaceae: *Ixora* sp.; Rutaceae: *Citrus* sp. (orange); Sapindaceae: *Litchi chinensis* Sonn.; Verbenaceae: *Lantana* sp." (from specimen labels).

Distribution.—(Map 5.) This species is very common over much of its range, which is restricted primarily to the eastern half of the United States. In addition, it is represented by unique specimens from Haiti, the Bahamas, and Islapa, Mexico. In the United States *T. ephemeraeformis* is known to occur in the Appalachian Highlands as far north as New York, and south and west through the Atlantic and Interior Plains to Texas and Nebraska.

Discussion.—Because of the relative abundance, wide distribution, and polyphagous habit of the voraciously feeding larva, *Thyridopteryx ephemeraeformis* has become the most economically important psychid in North America, where it is primarily a pest of woody ornamentals. Through much common usage and extensive scientific application of the name, the identity of this moth is firmly established. The earliest references, however, cast some doubt on the original application because it assigned this species to Great Britain. Apparently, not until 1841 was the fact definitely established (by Doubleday) that *T. ephemeraeformis* occurred in the New World. The precise origin and identity of Haworth's original specimen probably will never be known. Wood (1839) supposedly figured the type specimen, and his illustration superficially resembles the presently recognized insect. He stated that this specimen was "taken by the late Mr. Bolton in Yorkshire" and provided it with the common name "beltless clearwing." Assuming that the present application of the name and the origin of the type specimen are correct, conceivably the original moth represented a temporary and accidental introduction into Great Britain. More than likely, however, the type specimen of *T. ephemeraeformis* actually was collected in the United States but for some reason

mistakenly was accredited to the British fauna. Occasionally the fact has emerged that material collected by John Abbott from Georgia and sent to Francillon, a London dealer, sometimes was mislabelled by the latter with the result that the insects later were described as originating in England. Thus, there is a reasonable possibility that the type locality of *T. ephemeraeformis* is Georgia. Whatever the case, the application of this name as it is presently recognized should be retained because of its widely accepted usage. Because of the loss of the type specimen, moreover, the name of this common American insect probably will never be seriously challenged.

Thyridopteryx pallidovenata was first described from Ft. Myers, Florida. Its diagnostic features were its larger size and its supposedly paler wing veins. In later years a belief developed that this insect could be further separated from *T. ephemeraeformis* by the disjunct populations of the two species: *T. ephemeraeformis* being limited in its southward distribution to the extreme northern part of Florida and *T. pallidovenata* occurring in only the southernmost portion of that state. This misconception probably originated because more collecting was done in southern Florida than in the central and northern localities. Additional specimens gradually have accumulated which show that *T. ephemeraeformis* is evenly distributed throughout the state, as would be expected. Records from the Florida State Plant Board list the occurrence of this species in approximately 19 different counties with no concentration in any area.

The wing veins of "typical" *T. pallidovenata* are no paler, on the average, than those of specimens from a large series of *T. ephemeraeformis*. The "paleness" depends largely on the relative number of intact scales present along the veins, a condition that is very variable.

Specimens previously identified as *T. pallidovenata* from southern Florida are, on the whole, larger than examples of *T. ephemeraeformis* from more northern localities. There appears to be a gradual decrease in size from south to north, with some variation occurring at all latitudes. The smallest (wing span 17.5 mm.) specimen examined by the present writer came from New York. Specimens only slightly more southern—from Delaware—attain a maximum expanse of 29 mm., which is as great as some Florida examples from Dade County. The largest moth available in this study, from the Bahamas, measured 36 mm. across the primaries. As more collecting (especially in Florida) is done, the supposed size difference of *T. pallidovenata* probably will have even less significance than it now has. For the

foregoing reasons, *T. pallidovenata* is not considered to be a valid species separate from *T. ephemeraeformis*.

Another species which was considered distinct but which has been synonymized herein is *Thyridopteryx vernalis*. This insect differs from *T. ephemeraeformis* even less than does *T. pallidovenata*, and, for all purposes, is identical with the former. *T. vernalis* supposedly represented a spring facsimile of *T. ephemeraeformis*; it, therefore, was considered a good biological species since potentially it was isolated genetically from the almost exclusively fall-emerging *T. ephemeraeformis*. Indeed, if the fact were positively established that *T. vernalis* was consistently a spring-emerging population or that it had developed genetic barriers against crossing with typical *T. ephemeraeformis*, the validity of *T. vernalis* as a species would be more certain. This has not been demonstrated, however, and the available evidence shows that the situation is more nearly the opposite, namely, that *T. ephemeraeformis*, like *T. alcora* and especially *T. meadi*, possesses a life cycle that occasionally may vary. Thus, as now understood by the present author, *T. ephemeraeformis* is predominantly a fall-emerging insect but one that may be represented by spring adults on certain occasions because of local and scattered environmental changes that modify the life cycle. Many of these spring-emerging specimens probably have no great significance and are not perpetuated because they are isolated individuals. In the warmer coastal and southern areas of this species' range, however, survival through the winter in the larval stage is possible; thus, spring populations are probably able to survive indefinitely. Indeed, after examining the distribution records of *T. ephemeraeformis*, the writer finds this speculation to be justified. Isolated records from Georgia, Louisiana, Missouri, and Texas indicate the presence of spring and summer males in these areas. Relatively abundant spring material has been noted from Delaware, Florida, and Mississippi (in correspondence), evidently representing, in part at least, established populations. However, it is believed that these spring populations, as in the other members of the genus, are not isolated rigidly from the autumn form and that some gene flow does occur between the two seasonal groups because of life cycle fluctuations in both directions. Thus, the spring emerging forms of *T. ephemeraeformis* are no more entitled to a special name than are the seasonal forms of *T. alcora* or *T. meadi*.

963-052—64——10

MATERIAL EXAMINED.—353 ♂♂, 15 ♀♀, 288 cases:

UNITED STATES: ALABAMA: Mobile, 2 cases, USNM. Pleasant Hills, case, USNM. DELAWARE: Specific locality unknown, 4 cases, USNM. Concord, ♂, May 28, USNM. New Castle County, ♂ with case, Sept. 26, BM; 29 ♂♂, Sept. 1–29, 15 cases, USNM. Rehoboth, ♂, June 10; 2 cases, USNM. Seaford, ♂ (type, *T. vernalis*), May 25; 2 ♂♂, May 14, 16; 3 cases, USNM. Sussex County, 3 ♂♂, April 28–May 12; 7 cases, USNM. Wilmington, 31 ♂♂, Sept. 11–30; 13 cases, USNM. DISTRICT OF COLUMBIA: Washington, 24 ♂♂, Sept., USNM. FLORIDA: Biscayne Bay, ♂, AMNH; ♂, USNM. Crescent Beach, ♂, June 5, CM. Florida City, ♂, March 26, USNM. Homestead, 2 ♂♂, March 6, FSPB. Lake County, ♂, Nov. 21, FSPB. Miami, ♂, March 17, ANS. Moultrie, ♂, June 22, CM. Orlando, ♂, Sept. 20, USNM. St. Petersburg, ♂, April, USNM. GEORGIA: Rome, ♂, June 29, USNM. Tallulah, 2 cases, USNM. ILLINOIS: Carbondale, ♂, Sept. 6, USNM. Oconee, 22 ♂♂, Sept. 1–30, USNM. KANSAS: Specific locality unknown, 15 ♂♂, Sept. 7–Oct. 26, USNM. Lawrence, ♂, Oct. 1, DRD. LOUISIANA: Harahan, ♂, July 25, MCZ. Louisiana Agricultural Experiment Station, 3 ♂♂, Sept. 5, USNM. Shreveport, 2 ♂♂, Sept. 23, USNM. MARYLAND: Oak Hall, case, USNM. Salisbury, ♂, case, USNM. Tilghmanus Island, ♂, May 14, case, USNM. MASSACHUSETTS: Boston, Harvard Arboretum, ♂, MCZ. MISSISSIPPI: Lanedale, case, USNM. MISSOURI: Chesterfield, ♂, Oct. 9, UM. Columbia, 3 ♂♂, Aug. 22–Oct. 6, UM. Deer Park, Boone Co., ♂, Sept. 16, UM. Sapp, ♂, June 2, UM. St. Louis, 2 ♂♂, Sept. 27; 6 ♂♂, USNM. NEBRASKA: Omaha, 23 cases, CAS. NEW JERSEY: Specific locality unknown, 2 ♀♀, ♂, DRD. Elizabeth, ♂, AMNH. Lakehurst, case, USNM. New Brunswick, 5 ♂♂, Sept. 5–Oct. 7, AMNH. New Lisbon, 3 ♂♂, Sept. 24–Oct. 1, ANS; case, USNM. NEW YORK: Specific locality unknown, ♂, BM; 3 ♂♂, case, ZMHU. New York City, 2 ♂♂, AMNH; 10 cases, DRD. NORTH CAROLINA: Wilmington, 30 ♂♂, Sept. 1–Oct. 9, 20 cases, USNM. OKLAHOMA: Oklahoma City, 7 ♂♂, Aug. 24–Sept. 12; 25 cases, DRD. PENNSYLVANIA: Chester County, 7 ♂♂, Sept. 6–25; 20 cases, USNM. Edgewood, ♂, Sept. 16–19, CM. Finleyville, 34 ♂♂, Sept. 15–Nov. 14; 2 ♀♀, Sept. 15–30, CM. Pittsburgh, 34 ♂♂, Sept. 9–22; 9 ♀♀, Sept. 31; 5 ♂♂, CM. Tulleytown, 9 ♂♂, Sept. 4–11, ANS. West Grove, ♂, Sept. 25, USNM. SOUTH CAROLINA: Summerville, 2 cases, USNM. TEXAS: Specific locality unknown, 2 ♀♀, USNM. Amarillo, 3 cases, AMNH. Brazos County, case, USNM. College Station, 8 ♂♂, Sept. 1–16; 7 cases, USNM. Dallas, case, BM; 10 ♂♂, Sept. 12–19; 28 cases, USNM. Dickinson, ♂, April 29; 2 cases, USNM. Elkmont, case, USNM. Fort Worth, 8 cases, USNM. Houston, 2 cases, USNM. Kerrville, 3 cases, USNM. San Antonio, 10 cases, USNM. VIRGINIA: Accomac, 11 ♂♂, Sept. 25–Oct. 7, USNM. Ballston, ♂, Sept. 12, USNM. Charlottesville, ♂, Sept. 25, USNM. Chincoteague, 2 ♂♂, May 16, 18; 9 cases, USNM. Suffolk, ♂, Sept. 17, USNM.

MEXICO: Islapa(?), ♂, BM.

BAHAMAS: Specific locality unknown, ♂, BM. Nassau, ♂, Jan. 3, BM.

HAITI: Port-au-Prince, ♂, ZMHU.

Species of Uncertain Generic Position

Adult Males Known But Not Examined

Five species exist that I have been unable to treat or describe properly because of the absence of material or of adequate descriptions. They will continue to occupy a questionable taxonomic status until the male moths have been adequately diagnosed and illustrated. Most of the names may represent valid species. Arranged alphabetically, the five names are followed by the original descriptions or a summary thereof, along with additional comments of my own.

1. *Psychoglene basinigra* Felder

FIGURE 62

Psychoglene basinigra Felder, *in* Reise der *Novara*, Zool. Theil Bd. 2, Abth. 7, Heft. 2, p. 8, pl. 83, fig. 22, 1874.

Animula basinigra (Felder) Kirby, Cat. Lep. Heter., vol. 1, p. 506, 1892.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 185, 1929.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1182, pl. 169d, 1936.

MALE.—(Fig. 62.) Body robust, greyish hairs on thorax. Wings unevenly scaled; outer third of both wings devoid of scales, transparent; basal third densely covered with dark scales. Primaries with 11 veins; R_3 and $_4$ stalked for considerable distance; R_5 apparently absent; base of M simple within cell; M_1 and M_2 arising equidistant from cell on either side of base of medius; M_2 and $_3$ connate. Secondaries 8-veined; M_1 and $_2$ stalked. Wing expanse approximately 18 mm.

FEMALE and CASE.—Unknown.

TYPE.—In the British Museum.

TYPE LOCALITY.—"Brasilia."

RECORDED HOSTS.—None.

DISTRIBUTION.—Known only from Brazil.

DISCUSSION.—With the exception of a brief diagnosis by Gaede (1936), there is no other written description of this genus and species. The original reference consists of a listed name (with locality) and a colored figure. The above, very incomplete description is my own, based solely on the original drawing, and a wing sketch by F. M. Jones, who examined the type while at the British Museum.

If the original locality reference is correct, this species and perhaps also the genus is unique among New World psychids; only two species, *Lumacra hyalinacra* and *Astala hoffmanni*, approach it in pattern.

Species that closely resemble *P. basinigra* in superficial appearance presently are known to exist only in the Old World.

Heylaerts (1884a) described two species of psychids, *basalis* (from the Staudinger collection) and *dimidiata* (from the Oberthür collection), and erroneously placed them in the genus *Animula*, giving as the habitat "Patria incognita." Probably because of their resemblance to *P. basinigra*, Gaede (1936) believed there was a possibility these two insects were native to the Western Hemisphere. The two species were not described thoroughly by Heylaerts, but supposedly they differ from *P. basinigra* by having one less vein in the hindwing. Because there is no firm reason to suspect a New World origin for *A. basalis* and *A. dimidiata*, they have not been included in this paper. Indeed, after examining certain Old World specimens, I believe it more likely that the original habitat of these two species is South Africa, but this cannot be stated with much confidence.

2. "*Zamopsyche*" *haywardi* Koehler

FIGURE 119

Zamopsyche haywardi Koehler, Physis, vol. 17, pp. 470, 471, fig. 4, 1939.

The following is quoted from the original description:

Macho: Cabeza, patagias, tégulas, tórax y abdomen de color parduseo; del mismo color se presentan la faz ventral y los fémures y tibias, estas últimas con pelos más ralos; tarsos desnudos.

Ala anterior pardusca, más ennegrecida en la parte ancha de las células hasta las De; sobre éstas una línea angulada transparente (sin escamas). Alas posteriores uniformemente pardas. Faz inferior como la superior, algo más pálida.

Aspecto general como *O. Kirbyi* Guild., diferenciándose muy bien por la nervadura, características del cesto y crisálida femenina.

Exp. al. 28 mm.

Holotipo y tres paratipos con sus cesto (colección del autor).

Cestos cotipos: Museo Argentino de Ciencias Naturales, Laboratorio de Zoología agrícola, colección Lizer y Trelles, Hayward, British Museum, Breyer, Köhler.

Habitat: Carranza-La Rioja (Hayward), Cuesta de la Chilca-Andalgalá (Köhler); 28. XII 36, Córdoba (Köhler).

Cesto: Muy prolijamente confeccionado, de pedacitos de ramitas delgadas; éstas están fijadas transversalmente sobre el cesto y siempre cubiertas por un buen tejido, muy fuerte con excepción de la parte superior en la cual quedan unos palitos sin tejido superpuesto; la parte posterior consiste de un tubo de seda sin revestimiento de partículas vegetales; todas las puntas de las ramitas están cubiertas por la seda; la superficie exterior tejida, parece como gruesamente granulada, 8–9 mm de ancho por 26–32 mm de largo.

Crisálida hembra: Muy poco inclinado el cremáster, trunco; con 6 a 8 cerdas cortas; depresión anal con pocos surcos y líneas radiales dentro y sobre su borde; ventralmente con las dos verrugas anales achatadas, rugosas; sin surco anal bien delimitado; debajo de las verrugas anales y arriba de la apertura genital, marcada como depresión linear de un campo finamente punteado se hallan otras dos verrugas, rugosas y muy sobresalientes, que terminan en una punta cada una (no

son los ganchos anales comunes!); la demás superficie transversalmente y medianamente rugosa; la apertura genital se halla colocada en el último segmento que se prolonga como placa genital en forma de un triángulo hasta más de la mitad del segmento siguiente, interrumpiendo la continuidad del mismo. La parte intersticial transversal y finamente rugosa; el penúltimo segmento con finas rugosidades longitudinales; antes del intersticio un peine de espinas dorsales, dirigidas hacia atrás.

Discussion.—This species certainly does not belong in the genus in which it originally was placed because it actually is very remote from *Zamopsyche*. After the male has been examined more thoroughly the species probably will prove to be a rather small species of *Oiketicus*.

Material examined.—8 cases:

Argentina: Andalgola, 2 cases, BM; case, DEI. Carranza, La Rioja, case, BM; case, DEI. Dunes of San Jose, La Rioja, 3 cases, USNM.

3. *Oiketicus lizeri* Koehler

Figure 120

Oiketicus lizeri Koehler, Physis, vol. 17, pp. 465, 471, figs. 2, 6, 1939.

The following is quoted from the original description:

Macho: Sumamente parecido al *O. kirbyi poeyi*, pero el borde exterior del ala posterior más escotado. Características de colores y dibujos casi iguales diferenciándose el color por ser más negruzco en general.

Exp. 33 mm.

Holotipo en la colección del autor.

Cesto: Muy parecido al de *O. kirbyi* Guild., del cual se diferencia por la disposición de los palitos usados en la confección del revestimiento del habitáculo; éstos no son transversalmente dispuestos sino en forma longitudinal-oblicua, radial y desde la apertura hacia atrás; las partes anal y superior no están cubiertas por el tejido sedoso exterior; alrededor de la apertura vemos los palitos dispuestos radialmente, formando algo así como un capucho sobre el cesto. 16–19 mm de ancho por 70 a 80 mm de largo.

Crisálida hembra: Cremáster algo inclinado; sin ganchos anales ni verrugas desarrolladas; la depresión anal imprecisa; toda esta zona gruesamente rugosa; una faja de gruesas rugosidades antes del borde superior del último segmento; otra sobre el margen inferior del penúltimo, la placa genital, limitada debajo por una doble línea ondulada, se extiende como prolongación del último segmento en forma de una lengua hasta el antepenúltimo segmento, donde se encuentra la apertura sexual. Cuatro cerdas sobre la granulación posterior del cremáster, dos lateral-dorsales sobre el segundo y otras dos sobre el siguiente segmento.

Plantas alimenticias: Quebracho, Santa María, palmera, aromo, espinillo, tusca, etc.

Habitat: Salta (Köhler), Tabacal (Daguerre), Valderramas-Metán (Köhler), Reconquista (Köhler).

Cotipos: Museo Argentino de Ciencias Naturales, Laboratorio de Zoología agrícola, colecciones Lizer y Trelles, Breyer y del autor.

Nota: El adulto de esta especie nace a fines de noviembre, después de haber invernado en estado de crisálida; la especie *O. kirbyi* inverna en estado de huevo y da el adulto de fines de enero a principios de marzo.

Material examined.—3 cases:

Argentina: Chaco Austral, Ingenio Las Palm, case, DEI. Reconquista, case, DEI. Valderramas, case, DEI.

4. "*Chalia*" *rileyi* Heylaerts

Chalia rileyi Heylaerts, Ann. Soc. Ent. Belg., Compt.-Rend., vol. 28, p. ccviii, 1884.—Kirby, Cat. Lep. Heter., vol. 1, p. 508, 1892.—Dyar, Ent. News, vol. 4, p. 321, 1893.—Neumoegen and Dyar, Journ. N.Y. Ent. Soc., vol. 2, p. 120, 1894.—Dyar, Nat. Mus. Bull. 52, no. 4070, 1902 [1903].—Forbes, Cornell Univ. Agric. Exp. Sta. Mem. 68, p. 144, 1923.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1178, 1936.

Apterona rileyi (Heylaerts) Dyar, Insec. Inscit. Menst., vol. 11, p. 5, 1923.—McDunnough, Check List Lep. Canada and USA, pt. 2, no. 9536, 1939.

Oiketicoides rileyi (Heylaerts) Dalla Torre and Strand, Lep. Cat., pars 34, p. 101, 1929.

The following is quoted from the original description:

Mas. Flavo-griseus, dense hirtus; capite flavo-brunneo; antennis brevibus, longitudine marginis anterioris tertii, ciliis longioribus a medio apicem versus decrescentibus, 22-articulatis; pseudopalpis brevibus brunneo-griseis; thorace (abdomen deest) bruneo-griseo piloso. Pedibus bruneo-griseis tarsisque flavis. Tibiis anterioribus spina maxima. Alis concoloribus flavo-griseis, anguste brunneo-marginatis fimbriisque longis atque brunneo-griseis.

Alis anterioribus elongatis basi multo angustiori, apice subrotundato, margine anteriori fere recto ut margo interior; margine exteriori obliquo; costis 10; la et lb ut apud genus *Chalia* Moore, 2 et 3 ex margine inferiori, 4, 5, 6, 7 et 8 (ex eodem puncto) ex margine exteriori, 9 ex margine superiori cellulae mediae; 10 libera ex basi. 'Cellula intrusa' nulla.

Alis posterioribus elongatis, margine anteriori subrotundato; margine exteriori obliquo, in medio paulo truncato; margine interiori subobliquo, apice anguloque anali non productis; costis 7 liberis: 7 tota libera ex basi. Cellulae mediae parte anteriori brevi et angustiori, parte posteriori latiori longiorique.

Expansio alae anterioris 5 mill.; id posterioris 4 mill.

Feminam non vidi.

Involucrum cylindricum, longitudine 11 mill., cinereum, omnino granis sabulosis (fragmentisque lignosis aut lichenum?) obtectum.

Eruca carnea, capite segmentisque tribus antioribus flavis nitidisque, brunneo-nigro striatis.

Habitat: Unio Americana, Missouri.

Male, larva cum involucris in Museo Prof. C. V. Riley.

Espèce très petite, pas plus grande qu'une *Epichnopteryx pulla* Esp. de petite taille.

Les chenilles furent trouvèes sur le troue de pommiers et de pêrchers dans le Missouri.

Discussion.—This insect already has been discussed rather fully in connection with *Zamopsyche commentella*, a species which eventually may be considered identical to *C. rileyi*. Since the type of *C. rileyi* has been lost, specimens of this moth will have to be collected from the type locality before the problems of its identity and possible synonymy can be resolved.

5. *Oiketicus westwoodii* Berg

FIGURES 63, 121, 122

Oeceticus [sic] *westwoodii* Berg, Anales Soc. Cient. Argent., vol. 13, p. 217, 1882.
Oiketicus westwoodi [sic] Berg.—Kirby, Cat. Lep. Heter., vol. 1, p. 500, 1892.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 195, 1929.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1184, 1936.—Koehler, Rev. Soc. Ent. Argent., vol. 3, pp. 351, 352, fig. 3, 1931.—Koehler, Physis, vol. 17, pp. 468, 471, fig. 4, 1939.

CASE.—(Figs. 121, 122.) Length 55–90 mm.; greatest diameter 10–15 mm. Walls of case very thin, flexible; variously ornamented with small leaf fragments, sometimes with sparse scattering of tiny twigs. Larval bags frequently completely bare of vegetation and resemble somewhat those of *O. geyeri*, but differ radically from *O. geyeri* in structure of case wall.

The following is quoted from Koehler (1939):

Crisálida hembra: Cremáster muy poco inclinado; sin gancho anal y con finas líneas radiales; surco anal en forma de Y invertida; en su bifurcación inferior, está limitada por una línea curva con rugosidades; lateralmente del surco finamente rayado; las verrugas anales alargadas, poco elevadas y de superficie rugosa, su exterior algo rayado; la placa genital está dividida en dos mitades por una línea que baja de la apertura gential, se extiende hasta el borde de la circunvalación anal, donde se bifurca, formando dos brazos laterales que forman casi una línea recta, hasta que se unen con el surco marginal, dorsal, sobre el antepenúltimo segmento una rugosa verruga transversal, alargada. Superficie total lisa.

Macho; Poseemos dos ejemplares masculinos sumamente mutilados que no permiten una descripción exacta, pero no dejaremos pasar la oportunidad para decir que su parecido es muy grande con el adulto *O. geyeri*, diferenciándose por su color rojizo algo anaranjado, muy brillante; está cubierta con escamas más densamente que la especie de comparación. Patas, palpos, abdomen, todo del mismo color.

RECORDED HOSTS.—"Fabaceae: *Piptadenia communis* Benth., *Piptadenia cebil* Griseb., *Prosopis* sp." (Berg, 1882).

DISCUSSION.—The above description of the case is not the original, but it has been summarized from available material which agrees with the original diagnosis and which is believed to be identical with typical *O. westwoodii*. In addition to case dissimilarities, Berg separated *O. westwoodii* from *O. kirbyi* (=*platensis*?) on the basis of the larva. He stated the larva was very similar to that of *O. kirbyi*, but that it could be distinguished easily from that of the latter by the presence of white dots on the dorsum of segments 4–6, features that are hardly noticeable in *O. kirbyi*.

In time, after much more collecting and rearing has been done, *O. westwoodii* and *O. horni* may be shown to be conspecific since their larval cases seem to represent nothing more than two extremes of structural variation.

Some evidence exists that the cases of this species (or at least of larva bags quite similar to *O. westwoodii*) are sexually dimorphic. In a group of cases collected by Paul Koehler on *Prosopis* species from La Rioja, Argentina, this dimorphism was very obvious. From a series of 49 bags, 27 leaf-covered bags had been made by larvae that produced male moths, and 20 leafless cases contained females. I found only two exceptions, bags that had produced females but were heavily covered with leaves. No intermediate conditions were present in this series.

I examined one adult male that had been identified questionably by Koehler as *O. westwoodii*. This specimen is indistinguishable from the males of *O. geyeri*, and it actually may represent that species. In addition, this specimen possibly may have been the moth upon which Koehler's description (1939) was based.

MATERIAL EXAMINED.—1 ♂, 65 cases:

ARGENTINA: Specific locality unknown, ♂ (identification questionable), ZSBS. Catamarca, 3 cases, DEI; 6 cases, ZSBS. Coronel Vidal, 7 cases, DEI. La Rioja, 49 cases, USNM.

Adult Males Unknown

Many names in this family unfortunately have been proposed on the basis only of the larval case and sometimes on the female pupae. The males of these supposed species still are unknown, or they can not be associated with the described pupae and/or cases with any certainty.

Female pupae apparently have some characters that may be of taxonomic importance (Koehler, 1939); however, this needs to be studied further in a greater variety of species. The importance may be limited primarily to specific identification and may not be applicable as a generic criterion. The taxonomic significance of the larval case is even less than that of the pupa; considered alone, it is generally a poor and sometimes misleading specific criterion. There are instances, however, in which the case may be of prime importance, but these examples are in a definite minority.

In New World psychids, the characteristics of the adult male furnish the basis for both specific and generic separation. Also, certain species known only from the immature stages, even if recognized as specifically valid, cannot be referred safely to the correct genus. Thus, I have thought it preferable to include species based on female specimens or immature stages in this separate section.

In a description of a larval case little possibility exists for diagnostic features to be overlooked or for errors to originate because of misinterpretation of structure. For this reason and the fact that the

literature subsequent to the original descriptions has been so meager, to redescribe the species included in this section has seemed unnecessary. Consequently, the original descriptions of 14 species in which the adult has never been described are presented in alphabetical order. All except one (*Psyche burmeisteri*) have been examined and illustrated by the writer. Ten names appear to represent distinct and valid species, but the status of the remaining four is questionable.

Six more or less distinct types of cases, which are unnamed, are also included, largely to attract the attention of future students and collectors to these unique structures. The writer hopes that these unknown larval bags eventually will be named *after* the adult males have been reared and properly described.

1. "*Psyche*" *burmeisteri* Weyenbergh

Psyche burmeisteri Weyenbergh, Tijdschr. Ent., vol. 27, p. 17, pl. 2, figs. 7, 8, 1884.—Heylaerts, Ann. Soc. Ent. Belg., Compt.-Rend., vol. 28, p. c, 1884.—Kirby, Cat. Lep. Heter., vol. 1, p. 516, 1892.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 114, 1929.—Koehler, Rev. Soc. Ent. Argent., vol. 17, p. 350, 1931.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1179, 1936.

Female.—Length 9–9.5 mm. Vermiform; head shield dark brown; thoracic shield barely visible.

Pupa.—Male very dark brown, nearly black, not more than 6–7 mm. long. Female rather slender, 8–11 mm. long, 2.5–3 mm. greatest diameter; color light to dark brown.

Larva.—Much lighter in color than previous species (*Psyche cassiae*); eyespots light brown or sepia colored; first three segments greyish with a few comparatively small black spots. Thoracic legs lighter than *P. cassiae* because of smaller diameter of spots. Other body segments much darker, spots of 4th, 5th segments hardly visible. Size of larva about same as previous one (15–16 mm. length, 2.5 mm. diameter), somewhat more slender and longer. Uncommon in vicinity of Cordova (less common than *P. cassiae*), feeds on *Cassia aphylla*, and several other plant species.

Case.—Length 20 mm.; diameter 6–7 mm. Exterior of bag largely bare, grey, few long, slender twigs longitudinally arranged, loosely attached to anterior portion of case. Form of bag resembling a somewhat rigid cone, anterior necklike portion (beyond edge on cone) considerably softer, more flexible.

Discussion.—The original Dutch description of this species was too lengthy and verbose to be included here in its entirety, and so an English summarization has been presented. Very few diagnostic characters are to be noted in Weyenbergh's discussion of *P. burmeisteri;* the original drawing of the larval case appears unlike any

previously described bag, which eventually may serve to characterize this species as was the circumstance with *Oiketicus bergii.*

2. *Platoeceticus chaquensis* Koehler

FIGURE 123

Platoeceticus chaquensis Koehler, Physis, vol. 17, pp. 460, 471, pls. I, IV, figs. 5, 11, 1939.—Jones, Trans. Amer. Ent. Soc., vol. 71, p. 122, 1945.

The following is quoted from the original description:

Cesto: De forma alargada, ovalada; cubierto longitudinal-radialmente con palitos, pecíolos de hojas y ramitas delgadas de la planta alimenticia. No está cubierto con tejido de seda.

Largo 21–25, m/m ancho máximo 7–9 mm.

Crisálida hembra: Cremáster casi derecho y sin inclinación ventral; doble gancho anal fuertemente doblado; depresión anal suave, con el surco en forma de Y invertida, debajo del cual se halla una línea transversal, fina y curvada; dos verrugas anales, pequeñas, redondas y lisas, colocadas más arriba de la terminación del surco anal; placa genital sin limitación por líneas; apertura genital alargada en el medio del segmento penúltimo; superficie general lisa, solamente en el último segmento con muy pocas líneas transversales.

Planta alimenticia: Quebracho blanco (*Aspidosperma quebracho-blanco*).

Habitat: Reconquista, Obligado, Chaco (Köhler).

Cotipos: Museo Argentino de Ciencias Naturales, Laboratorio de Zoología agrícola del Ministerio de Agricultura, colecciones Lizer y Trelles, Breyer y Köhler.

MATERIAL EXAMINED.—2 cases:

ARGENTINA: Reconquista, case, BM; case, DEI.

3. *Hyaloscotes coniferella* (Henry Edwards)

FIGURE 124

Psyche coniferella Henry Edwards, Proc. Acad. Sci., vol. 7, p. 142, 1877.—Dyar, Ent. News, vol. 4, p. 320, 1893.—Jones, Ent. News, vol. 36, p. 163, pl. 4, fig. B, 1925.

Chalia coniferella (Henry Edwards) Dyar, U.S. Nat. Mus. Bull. 52, no. 4071, 1902 [1903] (synonym of *H. fragmentella* Henry Edwards).

Oiketicoides coniferella (Henry Edwards) Dalla Torre and Strand, Lep. Cat., pars 34, p. 100, 1929 (synonym of *H. fragmentella* Henry Edwards).

Hyaloscotes coniferella (Henry Edwards) McDunnough, Check List Lep. Canada and USA, part 2, no. 9532, 1939 (synonym of *H. fragmentella* Henry Edwards).

The following is quoted from the original description:

Chrysalis case a little over an inch in length, thickened anteriorally and composed of fragments of the leaves of pine, about three lines in length, laid in rows on the silken web and overlapping each other, in the manner of *P. graminella* and other European species. The fragments diminish in length on the posterior layers. Grass Valley, Cal., on palings and trunks of pine trees.

DISCUSSION.—As noted previously under *Hyaloscotes fumosa*, *H. coniferella* is probably equivalent to *H. fragmentella* as well as *H. fumosa.* If this proves to be the case, after verification of the im-

mature stages of *H. fumosa* and additional knowledge of the geographical distribution of *H. pithopoera*, the valid name for this species would be *H. fragmentella*, which has page priority over *H. coniferella*.

MATERIAL EXAMINED.—1 case:

CALIFORNIA: Mt. Shasta District, case, RNH.

4. "*Chalia*" *daguerrei* Koehler

FIGURE 125

Chalia daguerrei Koehler, Physis, vol. 17, pp. 462, 471, fig. 3, 1939.

The following is quoted from the original description:

Como para otas especies, es también ésta difícil de colocarla definitivamente dentro de un género, mientras no se dispone de ejemplares masculinos. De acuerdo con los rasgos generales y las características del cremaster de la crisálida ubicamos esta especie tal como la presentamos.

Cesto: Revestido de pedacitos de líquen; melidas en término medio: 18–23 mm de largo, 7–8 mm de ancho máximo.

Crisálida hembra: Cremáster casi derecho; la depresión anal sin surco anal en forma de Y; en su lugar una ligera depresión puntiforme; los dos ganchos anales inclinados fuertemente sobre una plaquita central, limitada hacia abajo por un corto surco cóncavo y lateralmente por simples líneas derechas; el borde superior abierto; algo más arriba una ligera depresión puntiforme que reemplaza el surco anal; mas arriba y en ambos lados—en lugar de las verrugas anales—dos campos finamente punteados de forma ovoide; la apertura genital alargada con dos surcos finos de igual largo, laterales y paralelas; en ambos lados, ventral, hay debajo y arriba lateralmente y transversalmente un campo de superficie punteada, el superior tres veces más ancho que el inferior.

Planta alimenticia: Líquenes.

Habitat: Rivadavia, Chaco salteño (Daguerre).

Cotipos: Museo Argentino de Ciencias Naturales.

DISCUSSION.—"*Chalia*" *daguerrei* and "*Clania*" *yamorkinei*, a name also included in this section, eventually may apply to the same species since the pygidia of the female pupae (as described by Koehler) differ only slightly and their larval cases are essentially identical.

MATERIAL EXAMINED.—8 cases:

ARGENTINA: CONCORDIA, Entre Rios, 8 cases, ZSBS.

5. "*Oiketicus*" *davidsoni* Henry Edwards

FIGURE 126

Oiketicus davidsoni Henry Edwards, Proc. Calif. Acad. Sci., vol. 7, p. 142, pl. 5, 1877.—Dyar, Ent. News, vol. 4, p. 320, 1893.—Beutenmueller, Amer. Mus. Nat. Hist. Bull. 9, art. xiv, p. 209, 1897.—Dyar, U.S. Nat. Mus. Bull. 52, no. 4064, 1902 [1903].—Barnes and McDunnough, Check List Lep. Boreal America, no. 4797, 1917.—Dalla Torre and Strand, Lep. Cat., pars 34, p. 194, 1929.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1184, 1936.—McDunnough, Check List Lep. Canada and USA, part 2, no. 9518, 1939.

The following is quoted from the original description:

Chrysalis case about one and a half to one and three-fourths inches in length; stout, a little thickened in the middle, and composed of pieces of sticks or twigs

from one-third to one and a quarter inches in length, laid side by side longitudinally, one or two pieces nearly always extending posteriorly some distance beyond the termination of the case. The fragments with which the case is covered, are of different lengths, and are about fifteen in number, the interstices being filled with wood dust (most probably produced by the jaws of the insect itself), closely woven into the silken groundwork of the case. The edges of the pieces of wood are always neatly rounded by the insect and all outstanding branches are bitten off. Chrysalis, with the abdominal portions, light chestnut brown, with the wing cases almost black. It is nearly tubular in form, smooth, with some small hooks on the abdominal segments. Length, 0.65 inch.

Discovered by Prof. Geo. Davidson on Mt. Diablo, on the branches of *Castaneopsis chrysophylla*, Doubl (chinquapin chestnut).

Discussion.—Since the case construction of this insect shows little affinity to that of any other known species of *Oiketicus*, *O. davidsoni* probably is misplaced in the genus to which Edwards originally ascribed it. The larval case is very similar to that constructed by some of the Old World species of *Clania*. Considering the fact that past efforts to rediscover this species in its original locale have proven futile, it is possible that *O. davidsoni* represents an Old World species which at one time was introduced accidentally into California and that now the American population is extinct.

Beutenmüller (1897) presented a rather crude and obscure description of a partially developed male moth, which he based on a specimen dissected from a pupa of one of the types in the Edwards collection. Unfortunately, any further examination of the legs or genitalia that might shed some light on the generic placement of this species is prevented since the present location of the specimen is not known.

Material examined.—1 case:

California: Mt. Diablo, case, BM.

6. "*Chalia*" *dispar* Koehler

Figure 127

Chalia dispar Koehler, Physis, vol. 17, p. 460, fig. 1, 1939.

The following is quoted from the original description:

Cestos masculinos jóvenes y femeninos adultos cubiertos con finísimas particulas vegetales y de consistencia blanda. 3 mm de ancho por 12–14 de largo.

Cestos masculinos viejos cubiertos con palitos longitudinales en forma muy típica: tienen diferentes largos, pero bastante iguales espesores y están fijados antes de la metamorfosis de la larva en crisálida; el cesto mismo cuelga de la corteza de árboles, etc., por medio de un hilito fuerte de seda y se mueve con facilidad con el menor viento.

3,5 a 5 mm de ancho por 25 a 40 mm de largo.

Habitat: Palos Blancos, Sierra Maíz Gordo, Salta (Köhler).

Cotipos: Museo Argentino de Ciencias Naturales, Laboratorio de Zoología agrícola, colecciones Lizer y Trelles, Breyer y Köhler.

Discussion.—Two larval cases in the Deutsches Entomologisches Institut, Rio de Janeiro, Brazil, are structurally very similar to *C. dispar*, if not conspecific (see p. 158).

Material examined.—2 cases:

Argentina: Sierra Maiz Gordo, Salta, case, BM; case, DEI.

7. *Oiketicus elegans* Kochler

Figure 128

Oiketicus elegans Koehler, Rev. Soc. Ent. Argent., vol. 3, pp. 351, 352, fig. 4, 1931. —Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1184, 1936.—Koehler, Physis, vol. 17, pp. 464, 471, fig. 10, 1939.

The following is quoted from the original description:

Cesto de 22 a 28 m/m. de largo; muy esbelto, muy duro y sin punta en su parte posterior. Esta parte inferior es truncada. Su color es gris, algo tirando a azul, anillado de gris claro y más oscuro en forma irregular. No tiene ningún revestimiento de partículas vegetales. La fijación del cesto (al crisalidar la oruga) es muy típica, pues el anillo del tejido, que asegura el cesto, no sale del margen sino de la superficie interior del habitáculo.

Alimentación: Leguminosas arbóreas (aroma, espinillo, etc.).

Un cesto holotipo y 3 cestos paratipos en la col. Breyer. ex Stgo. del Estero, 4 cestos paratipos en el Museo Nacional, ex Chaco.

As in other species, Koehler (1939) has described the female pupa of this moth in a later paper, and this is as follows:

Crisálida hembra: Es completamente lisa y brillante, el cremáster casi negro; este último casi sin inclinación ventral; sin ganchos anales; debajo de la leve depresión anal en cuyo centro se halla el pequeño surco anal derecho, se encuentra una muy poco pronunciada elevación quitinosa; muy pocos y finos surcos transversales en la faz ventral del último segmento; un fuerte surco que se inicia en ambos lados de la pequeña, poco alargada, apertura genital, se aleja progresivamente del borde posterior del segmento para perderse lateralmente en la superficie lisa.

Habitat; Además del habitat original (Santiago del Estero) poseemos ahora ideotipos de las siguientes localidades: Río Negro (Köhler), Córdoba (Hayward), La Rioja (Köhler), Catamarca (Köhler), Río Bermejo, Salta (Köhler) Chaco de Anta (Daguerre).

La enorme superficie de distribución de esta especie que llega desde el limite norte de nuestra República y alcanza hasta las zonas deshabitadas del sur de Río Negro y Neuquen se debe a la igual distribución de la tusca, espinillo y otras leguminosas arbustivas, que sirven de alimentación a la oruga.

Material examined.—9 cases:

Argentina: Rio Bermejo, Salta, 5 cases, USNM; 2 cases, BM; case, DEI. Rio Negro, case, DEI.

8. *Hyaloscotes fragmentella* (Henry Edwards)

FIGURE 129

Psyche fragmentella Henry Edwards, Proc. Calif. Acad. Sci., vol. 7, p. 142, 1877. —Kirby, Cat. Lep. Heter., p. 515, 1892.—Dyar, Ent. News, vol. 4, p. 320, 1893.—Jones, Ent. News, vol. 36, pp. 163, 164, 1925.

Chalia fragmentella (Henry Edwards) Dyar, U.S. Nat. Mus. Bull. 52, no. 4071, 1902 [1903].

Eurycyttarus fragmentella (Henry Edwards) Barnes and McDunnough, Check List Lep. Boreal America, no. 4805, 1917.

Pachytelia [sic] *fragmentella* (Henry Edwards) Dyar, Insec. Inscit. Menstr., vol. 11, p. 2, 1923.

Oiketicoides fragmentella (Henry Edwards) Dalla Torre and Strand, Lep. Cat., pars 34, p. 100, 1929.

Hyaloscotes fragmentella (Henry Edwards) McDunnough, Check List Lep. Canada and USA, part 2, no. 9532, 1939.

The following is quoted from the original description:

Chrysalis case about an inch in length, tapering gradually to its posterior extremity, and composed externally of portions of leaves and bark, mostly ovate in shape, and from one to two lines in greatest diameter, in most cases laid flat on the silken web, and not overlapping each other. Chrysalis, pale, tawny, shining, smooth, of uniform thickness throughout. Length 0.40 in. On trunks of pine trees, Strawberry Valley, Siskiyou County.

DISCUSSION.—This insect undoubtedly belongs in the genus *Hyaloscotes*, as does *H. coniferella*, and probably represents the immature stage of *H. fumosa*. For additional comments, see the discussions of these two species.

MATERIAL EXAMINED.—6 cases.

CALIFORNIA: Mt. Shasta, Siskiyou County, 2 cases, BM. Plumas County, 4 cases, USNM.

9. *Oiketicus ginocchionus* Koehler

FIGURE 130

Oiketicus ginocchionus Koehler, Rev. Soc. Ent. Argent., vol. 16, p. 22, 1953.

The following is quoted from the original description:

Cesto: aspecto general muy poco diferente del de *O. kirbyi* (Guild.). Llegado al tamaño mayor se presenta cubierto de ramitas de su planta alimenticia de tamaño bastante uniforme; se hallan casi a lo largo del habitáculo y todas cubiertas con un poco de finísimo tejido sedoso. Así tiene todo el cesto un aspecto gris y mate; por eso y por ser monófago se caracteriza fácilmente. Tamaño: 8 mm de espesor y 45 mm de largo.

Terminalia de la crisálida ♀ : Cremáster levemente inclinado y mostrando tres verrugas de superficie y contorno gruesamente rugosos; la sutura entre ellos en forma de Y invertida forma la depresión anal; en el margen posterior de cada segmento anal se hallan finas rugosidades; la placa genital redonda y con muy pocas cerdas en los últimos uritos; el mismo segmento dorsalmente con un peine de tres púas en el margen rugoso de este sitio.

Planta alimenticia: "olivillo" (*Plazia argentea*).
Habitat: Laguna Brava, Mar del Plata (Ginocchio leg.), Pampa (Köhler).
Cótipos: col. del autor.
Especies dedicada a su descubridor.

MATERIAL EXAMINED.—10 cases:

ARGENTINA: Pampa, 10 cases, ZSBS.

10. *"Platoeceticus" hoffmanni* Koehler

FIGURE 131

Platoeceticus hoffmanni Koehler, Arb. Morph. Taxon. Ent. Berlin-Dahlem, vol. 6, p. 41, fig. 4, 1939c.—Jones, Trans. Amer. Ent. Soc. vol. 71, p. 122, 1945.

The following is quoted from the original description:

Habitaculum: Sack mit verhältnismassig grossen Blattstücken bedeckt und an der Aufhängestelle auch noch mit frei abstehenden Stengelteilchen besetzt; ohne Seidengewebe über den Pflanzenteilchen, Ein zweiter, kleinere und noch nicht voll entwickelter Sack weist diese Stengelteilchen noch nicht auf. Es ist schwer zu sagen—auf Grund von nur zwei Exemplaren in verschiedenen Entwicklungsstadien—ob diese finalen Stengelteilchen einen Standard darstellen, oder ob sie nur eine Zufallsbekleidung sind. Jedenfalls ist aber die Blätterbedeckund gut charakteristisch und genügend für spätere Identifizierungen.

Zum Verpuppen wird das breitere Sackende mit einem vielfach verwobenen Seidenfaden verlängert und mittels einer stark verwebten Seidenhaftscheibe an der Aufhängestelle befestigt; der Seidenfaden ist etwas länger als der halbe Sack.

Dimension: 16×6 mm.

Puppe: (♀-Pygigium): Die letzen zwei Segmente ganz fein punktiert, Vorderrand des vorletzten fein längsgerunzelt; Genitalrille genau zwischen beiden Segmenten gelegen auf einer glatten Genitalplatte, zu der einige kurze Leisten konvergieren. Analfeld, gröber gekörnt, von zwei schwach gekrümmten, nach oben zusammenlaufenden Leisten eingeschlossen, an deren unteren Enden sich zwei kurze, kaum vorstehende Kremasterspitzen befinden. Ausserhalf der Umfassungsleisten und auf der Höhe des Zentrums der gabelförmigen analrille sitzt je ein kleiner, grob punktierter Höcker. Dimension: 10 x 2.5 mm, Farbe hellbraun.

Habitat: Havana, Cuba, W. H. Hoffmann, XII. 1921.

Cotypen: 2 Säcke und eine ♀-Puppe im deutschen Entomologischen Institut, Berlin-Dahlem.

Laut Originaletiquette wurde ein Sack gefunden, festgesponnen an einem Felsen, während der andere im Hohlraum eines Rinderhufes festgetreten war.

DISCUSSION.—The generic position of this species seems reasonable, although it is difficult to be certain. The larval case is very similar to that of *Cryptothelea* (=*Platoeceticus*) *gloverii* and *C. watsoni*, and the species may be conspecific with either if later it should be proved that these two occur in Cuba.

MATERIAL EXAMINED.—2 cases:

CUBA: Havana, 2 cases, DEI.

11. *Oiketicus horni* Koehler

FIGURES 132, 133

Oiketicus horni Koehler, Arb. Morph. Taxon. Ent. Berlin-Dahlem, vol. 5, p. 248, fig. 1, 1938.

The following is quoted from the original description:

Habitaculum: ♂ Hart gewobener, membranöser Sack von hellrötlich, staubgrauer Farbe. Bedeckung besteht spärlich aus vereinzelten Leguminosen-Fiederblättchen, die nur mit ihrem stärkeren Ende am Sackbefestigt sind und längsgerichtet, radial abstehen. Besonders dicht ist die Verkleidung rund um die Aufhängestelle herum, wo die Blättchen wie eine Kapuze befestigt sind.

Dimension: 60 x 13 m/m (ohne die Bekleidung).

♀ Etwas grösser und fast unbekleidet, so dass es im grossen und ganzen einem weiblichen Sack von *O. geyeri* Berg ähnelt, wobei aber das Fehlen der Querrieselung und die grössere Glätte den Sack von *horni* sp. n. charakterisiert.

Dimension: 50 x 11 m/m bis 61 x 13 m/m.

Nährpflanze: Prosopis spec. (Espinillo).

Habitat: Anta (Salta), P. Köhler leg., Ingenio Las Palmas, Chaco Austral, E. Pfeiffer leg.

Cotypen in der Sammlung des Deutschen Entomologischen Instituts und in der des Verfassers.

DISCUSSION.—This name is discussed briefly under *O. westwoodii* (p. 145) because the two possibly may represent variations of the same species.

MATERIAL EXAMINED.—3 cases:

ARGENTINA: Anta, Salta, 2 cases, DEI; Rivaderia, Salta, case, DEI.

12. "*Clania*" *licheniphilus* Koehler

FIGURE 134

Chlania [sic] *licheniphilus* Koehler, Arb. Morph. Taxon. Ent. Berlin-Dahlem, vol. 6, p. 40, fig. 6, 1939.

The following is quoted from the original description:

Habitaculum; Länglich, weich, fast glatt und von grauweisslich grüner Farbe. Der Sack ist mit allerfeinst zerkleinerten Flechtenstückchen bekleidet, die glatt angesponnen sind und ihm eine fein gekörnelte Oberfläche verleihen. Dimensionen: 15 x 3,5 mm. Säcke des ♂ und ♀ gleichartig.

Puppe: (♀-Pygidium): Oberflächer der beiden letzten Segmente feinst gekörnt; ventral einige, wenige erhabene Längsleisten; Genitalrille in der Mitte des vorletzten Segmentes umgeben von einer glänzend glatten Genitalplatte, die breit am Oberrand des Segmentes einsetzt, sich in der Nähe der Genitalrille stark verschmälert, um sich dann an der unteren Segmentgrenze nochmals zu verbreitern.

Diese glatte Platte erreicht nicht das Analfeld. Dieses ist gröber punktiert; die gabelförmige Analrille setzt ihre beiden unteren Arme in zwei länglichen Warzen fort und diese enden an der Basis der beiden Kremasterspitzen. Diese sind gut ausgebildet und leicht hornartig gebogen. Dimensionen: 7,5 x 2 mm. Farbe gelbbraun.

Nährpflanze: Vermutlich Flechten.

Habitat: Havana, Cuba. W. H. Hoffmann. III. 1922.

Cotypen: (der Säcke und ♀-Puppen) im Deutschen Entomologischen Institut, Berlin-Dahlem.

Laut Bemerkung Hoffmann's auf einer Etiquette, finden sich die Säcke an Baumstämmen und imitieren Stacheln.

Ein männlicher Sack mit vorgeschobener Puppe weist auf ziemliche Kleinheit des beflügelten Tieres hin. Die Raupe ist leider nicht gut genug erhalten, um eine zufriedenstellende Beschreibung geben zu können.

MATERIAL EXAMINED.—1 case:

CUBA: Havana, case, DEI.

13. "*Platoeceticus*" *tandilensis* Koehler

FIGURE 135

Platocceticus tandilensis Koehler, Rev. Soc. Ent. Argent., vol. 3, pp. 350, 352, fig. 6, 1931.—Gaede *in* Seitz, Macrolep. World, vol. 6, p. 1184, 1936.—Jones, Trans. Amer. Ent. Soc., vol. 71, p. 122, 1945.

The following is quoted from the original description:

Cesto de 18 a 21 m/m.; consiste únicamente de fragmentos de *hojas* de gramíneas. Estas puntas de hojas, que sirven de revestimiento al cesto, tienen diferente largo, pero nunca son más largas que el cesto entero; están dispuestas longitudinal y paralelamente. Hacia atrás están libres y todas terminan más o menos a la misma altura.

Alimentación: Gramíneas; una vez crecidas, las orugas comen los pétalos de las flores de *Pavonia cymbalaria* S. H. *Malvacea.* Un cesto, holotipo y paratipo en la col. A. Breyer, 1 paratipo en la col. Strassberger. Fueron encontrados en las sierras altas de Tandil, Prov. de Buenos Aires, 7. XII. 1929.

MATERIAL EXAMINED.—1 case:

ARGENTINA: Tandil, Prov. of Buenos Aires, case, ZSBS.

14. "*Clania*" *yamorkinei* Koehler

FIGURE 136

Clania yamorkinei Koehler, Rev. Soc. Ent. Argent., vol. 16, p. 22, fig. 5, 1953.

The following is quoted from the original description:

Cesto: confeccionado con trozos irregulares de musgo y liquen. Se parece algo al cesto de la *C. daguerrei* Khlr. por lo irregular de los trocitos empleados. Por lo mismo varía la longitud y el espesor del cesto: 18–22 mm de largo y unos 6 mm de diámetro.

Terminalia de la crisálida ♀: lisa y finísimamente rayada; punta pigidial doble e inclinada; depresión anal en forma de Y invertida y en ambos lados acompañada por finas verrugas; sin placa genital bien definida; la depresión sexual alargada y hacia atrás con una plaquita finamente rugosa en ambos lados; a la altura de éstas, dorsalmente, existe una púa dirigida hacia atrás; en el segmento anterior con un peine grueso de seis púas fuertes encima de una gruesa placa rugosa.

Planta alimenticia; líquenes y musgos.

Habitat; Alto Paraná (II–1949, S. Yamorkine Köhler).

Cotipos; Col. del autor.

Nota; dedicada a su descubridor Sr. Sergio Yamorkine, agradeciendo múltiples atenciones.

MATERIAL EXAMINED.—10 cases:

ARGENTINA: Misiones, 10 cases, ZSBS.

Unidentified Larval Cases

The following six descriptions refer to larval cases that are unnamed and should not be named until adults can be associated with them.

Case No. 1

Oiketicus species

FIGURE 137

Oiketicus sp.(?) Jones and Parks, Texas Agric. Exp. Sta. Bull. No. 382, p. 25, fig. 1, 1928.

CASE.—(Fig. 137.) Length 60–90 mm.; greatest diameter 20–30 mm. Heavily covered by cross-thatching of short stout twigs laid mostly transversely around bag. Exterior of case, for most part, rather densely swathed in greyish-white silk.

RECORDED HOSTS.—*Juniperus pachyphloea* Torr., *Juniperus* sp.

DISCUSSION.—In structure this larval case appears to be distinct from any of the species of *Oiketicus* previously recorded within the United States. An adult male of this species has been reared, but no positive determination can be made because of the extremely poor condition of the specimen. The genitalia were examined, but these are very similar within this group and thus offer no specific diagnostic characters. In construction the cases are nearly identical with those of *O. kirbyi*, and possibly they may represent the northern limits of that widespread insect.

MATERIAL EXAMINED.—1 ♂, 8 cases:

ARIZONA: Carr Canyon, Huachuca Mts., case, PAS. Continental, case, USNM. Madera Canyon, Santa Rita Mts., 4 cases, USNM; case, 5500–6000 ft., USNM. Manzanita, Santa Rita Mts., ♂ with case, Jan. 26, 6000 ft., USNM.

Case No. 2

Oiketicus species

FIGURE 138

CASE.—(Fig. 138.) Length 110 mm.; greatest diameter 35 mm. Bag mostly of a thick, densely wool covering of silk into which woven sparsely scattered fragments of twigs, leaves. Texture of case very spongy because of thick, loose mat of greyish-white silk.

RECORDED HOSTS.—None.

Discussion.—This unique specimen structurally is very different from any known species. It is possible, though unlikely, that the specimen may represent an unusual variation of *O. kirbyi*. Another possibility is that this is the larval bag of one of the largest New World psychids, *O. specter*. The case of *O. kirbyi*, as now known, is relatively distinct, consisting of a cross-thatching of twigs covered by a thin but firm layer of silk, and the larval bag of *O. specter* is unknown at present.

Material examined.—1 case:

"W. Cordillera, de los Cruces," case (♀), 2200 meters, collected by A. H. Fassl, BM.

Case No. 3

Oiketicus species

Figures 139, 140

Case.—(Figs. 139, 140.) Length 60–80 mm.; greatest diameter 15–20 mm. More or less spindle-shaped in outline; exterior of case largely naked except for sparse scattering of dried mosslike vegetation, small thorns concentrated toward posterior end. Texture of case unusually thin, parchment-like. Color, light grey to dark fuscous.

Recorded hosts.—"on barberry bushes."

Discussion.—This series of larval cases evidently represents an undescribed species, probably belonging to the genus *Oiketicus*.

Material examined.—20 cases:

Chile: Puerto Eugenia, north side of Navarino Island, 20 cases, collected by Junius Bird, USNM.

Case No. 4

Oiketicus species

Figure 141

Case.—(Fig. 141.) Mature cases 60–70 mm. length, greatest width usually 10–13 mm. Outline of case slender fusiform, with either few, closely appressed, interwoven fragments of leaves, or more leafy, attached leaves widely diverging. Color in general rather dark, very few to almost no twigs incorporated into structure. Overlying sheath of silk absent.

Recorded hosts.—"an Mandelbaum."

Discussion.—Several larval bags have been collected in Havana, Cuba, by W. H. Hoffmann. All of them undoubtedly belong to the same species, but they have not been associated definitely with any known species. The cases lack a heavy thatching of twigs and are without any whitish silk covering on the exterior, and thus they appear more similar to the known cases of *O. abbotii* and *O. toumeyi*

than to any other species. Perhaps they are evidence of the occurrence of *O. abbotii* in Cuba.

MATERIAL EXAMINED.—12 cases:

CUBA: Havana, 12 cases, DEI.

Case No. 5

FIGURE 142

CASE.—(Fig. 142.) Length main body of case 20–25 mm.; diameter approximately 6 mm., uniformly cylindrical throughout length. Structure of case consisting of a tightly appressed covering of 10–12 elongate twigs, arranged longitudinally; a few twigs projecting considerable distance posteriorally, total length more than 40 mm.

RECORDED HOSTS.—None.

DISCUSSION.—The two specimens described here already have been mentioned under *"Chalia" dispar*, which they resemble very closely. Since no adult males of either species are known, to make a specific comparison is difficult, but probably they belong to the same genus, if not to the same species. The proper generic name and position for these two larval cases, like that of *"Chalia" dispar*, await the discovery of the adult moth.

MATERIAL EXAMINED.—2 cases:

BRAZIL: Rio de Janeiro, 2 cases, collected by R. Fischer, DEI.

Case No. 6

FIGURE 143

CASE.—(Fig. 143.) Length 12–14 mm.; diameter 2–3 mm. Exterior of bag usually covered with long, slender stems of grasses and other herbaceous plants, applied longitudinally, frequently extending entire length of case, sometimes projecting in irregular fashion beyond posterior end. A few specimens examined were nearly devoid of larger stems, exposing underlying surface of case, which was densely covered with minute plant fragments.

RECORDED HOSTS.—None.

DISCUSSION.—Of the species known to occur within the general geographical area of this unidentified insect, *"Clania" licheniphilus* most closely approximates it (at least in comparison with a few of the above bags, which are nearly bare), but the two forms are believed to be specifically distinct. Structurally, these larval cases most closely resemble those of Old World genera such as *Fumaria* and *Epichnopteryx*. Eventually this unnamed series of cases may be found to represent another example of the introduction of a Palearctic psychid into the New World.

MATERIAL EXAMINED.—8 cases:

HAITI: Aux Cayes, 4 cases, March 15, 16, 18, AMNH. Petionville, 4 cases, Jan. 26–28, 1922, 1500–3000 ft., AMNH.

Literature Cited

Abderhalden, E., and Landau, B.

1911. Über die Zusammensetzung des Gespinstes von *Oecetieus platensis* (Berg). Zeitschr. Phys. Chem. Hoppe-Seyler, vol. 71, pp. 443–448.

Barnes, W.

1905. New species of North American Lepidoptera. Canadian Ent., vol. 37, pp. 213–216.

Barnes, W., et al.

1911–1924. Contributions to the natural history of the Lepidoptera of North America, 5 vols.

Barnes, W., and Benjamin, F.

1924. A new *Oiketicus* from Texas. Bull. Brooklyn Ent. Soc., vol. 19, no. 1, pp. 24–25.

Barnes, W., and McDunnough, J.

1917. Check list of the Lepidoptera of Boreal America, pp. 124–125.

Barrett, C. G.

1894. The British species of the genus *Psyche*, and its allies. Ent. Monthly Mag., vol. 30, pp. 249–251, 265–269.

1895. Occurrence of *Solenobia wockii* Hein. in Britain. Ent. Monthly Mag., vol. 31, pp. 163–164.

1897. Further notes on the British species of the genus *Solenobia*. Ent. Monthly Mag., vol. 33, pp. 125–129.

Berg, C.

1874. Ueber den Bicho canasto (*Oiketicus kirbyi* Guild). Stettiner Ent. Zeit., vol. 35, pp. 230–237.

1877a. Contribución al estudio de la fauna entomológica de Patagonia. Anales Soc. Cient. Argentina, vol. 4, fasc. 2 (Aug.), pp. 87–102.

1877b. Beiträge zu den Lepidopteren Patagonien's. Bull. Soc. Impér. Nat. Moscou, vol. 52, no. 3, pp. 1–22.

1882a. Farrago Lepidopterologica. Contribuciones al estudio de la fauna Argentina y países limítrofes. Anales Soc. Cient. Argentina, vol. 13, fasc. 5 (May), pp. 213–223.

1882b. Analecta Lepidopterologica. Contribuciones al estudio de la fauna de la República Argentina y otros países Americanos. Anales Soc. Cient. Argentina, vol. 14, fasc. 6 (Dec.), pp. 275–288.

Betrem, J. G.

1952. The genotypes of the Indo-Australian Psychidae (Lepidoptera). Tijdschr. Ent., vol. 95, pp. 331–340.

Beutenmüller, W.

1897. Notes on some species of North American moths. Bull. Amer. Mus. Nat. Hist., vol. 9, pp. 209–212.

Bourgogne, J., and Paclt, J.

1948. Fragmenta Lepidopterologica. Časopis Československé Společnosti Entomologické, vol. 45, pp. 47–50.

Bruand, C. T.

1853. Essai monographique sur le tribu des Psychides. Mem. Soc. Emul. Donbs., 127 pp.

Burmeister, C. H. C.

1878. Description physique de la République Argentine d'après des observations personnelles et etrangères . . . traduite de l'Allemand par E. Maupas (et E. Daireaux), vol. 5 (Lépidoptères), pt. 1, vi+524 pp.

Burrows, C. R. N.
1923. Notes on the psychids. Ent. Rec. Journ. Var., vol. 35, pp. 41–43, 57–62, 116–118, 129–134.
1924. Upon the suggested relationships of psychids. Ent. Rec. Journ. Var., vol. 36, pp. 81–85, 97–99.

Butler, A. G.
1881. An account of the sphinges and bombyces collected by Lord Walsingham in North America during the years 1871–72. Annals Mag. Nat. Hist., 5th ser., vol. 8, pp. 306–318.
1882. Heteroceras Lepidoptera collected in Chili by Thomas Edmonds, Esq., part I: Sphinges and bombyces. Trans. Ent. Soc. London, pp. 1–30, 1 pl.

Caride Massini, P., and Brethes, J.
1918. Metodo biologico contra las plagas aplicado al "*Oeceticus platensis*"—bicho de canasto. Anales Soc. Rural Argentina, vol. 52, no. 4, pp. 207–215, 8 figs.

Chambers, V.
1873. Micro-lepidoptera. Canadian Ent., vol. 5, pp. 72–75.
1876. Micro-lepidoptera. Canadian Ent., vol. 8, no. 1, pp. 18–19.

Chapman, T. A.
1896. Concerning *Solenobia triquetrella*, etc. Ent. Monthly Mag., vol. 31, pp. 79–80.

Clausen, C. P.
1940. Entomophagous insects, 688 pp.

Clemens, B.
1862. New American Micro-lepidoptera. Proc. Ent. Soc. Philadelphia, vol. 1, pp. 131–137.
1866. Notes on *Thyridopteryx ephemeraeformis*. Proc. Ent. Soc. Philadelphia, vol. 6, pp. 221–222.
1872. The Tineina of North America, edit. H. Stainton, xv+282 pp.

Clench, H. K.
1959. African Psychidae of the *Monda* group. Rev. Zool. Bot. Africa, vol. 60, nos. 3–4, pp. 240–256.

Cockerell, T. D. A.
1895. On some insects collected in the state of Chihuahua, Mexico. Annals Mag. Nat. Hist., ser. 6, vol. 15, pp. 204–210.
1913. Illustrations of American Lepidoptera. Entomologist, vol. 46, no. 598, p. 73, 1 pl.

Costa Lima, A. M.
1945. Insetos do Brasil, vol. 5 (Lepidopteros), pp. 186–194.

Dalla Torre, K. W. von
1927. Das System der Psychiden. Ent. Jahrb., vol. 36, pp. 129–131.
1929. Nomenklatorische Bemerkungen zu den Psychiden nach Katalog von Staudinger und Rebel 1901. Ent. Jahrb., vol. 38, pp. 143–144.

Dalla Torre, K. W. v., and Strand, E.
1929. Lepidopterorum Catalogus, pars 34, 211 pp.

Dognin, P.
1894. Hétérocères nouveaux de Loja et environs. Annales Soc. Ent. Belgique, vol. 38, pp. 238–243.

Doubleday, E.
1841. Remarks on some North American Lepidoptera. Entomologist, no. 7, pp. 97–101.

Druce, H.
1881–1900. Heterocera, 3 vols. *In* F. D. Godman and O. Salvin, Biologia Centrali-Americana.
Duncan, J.
1841. Exotic Moths. Vol. 23 (Entomology, vol. 7) *in* W. Jardine, The Naturalist's Library.
Duponchel, P. A. J.
1842. Histoire naturelle des lépidoptères ou papillons de France. Supplément, vol. 4, 554 pp.
1844–1846. Catalogue méthodique des lépidoptères d'Europe . . . pour servir de complément et de rectification à l'histoire naturelle des Lépidoptères de France, xxx+523 pp.
Durrant, J. H.
1897. Notes on the specimens of *Solenobia triquetrella* and *Chalybe pyrausta* in the Doubleday collection. Ent. Monthly Mag., vol. 33, p. 220.
Dyar, H. G.
1893. On the larval cases of North American Psychidae. Ent. News, vol. 4, pp. 320–321.
1894. A classification of lepidopterous larvae. Annals New York Acad. Sci., vol. 8, pp. 194–232, 6 figs.
1895. Notes on some southern Lepidoptera. Canadian Ent., vol. 27, pp. 242–247.
1902 [1903]. A list of North American Lepidoptera. U.S. Nat. Mus. Bull. 52, pp. 352–354.
1905. New genera of South American moths. Proc. U.S. Nat. Mus., vol. 29, pp. 173–178.
1914. Report on the Lepidoptera of the Smithsonian Biological Survey of the Panama Canal Zone. Proc. U.S. Nat. Mus., vol. 47, pp. 139–350.
1916. Descriptions of new Lepidoptera from Mexico. Proc. U.S. Nat. Mus., vol. 51, pp. 1–37.
1923. The North American short-winged Psychidae. Insec. Insc. Menstr., vol. 11, nos. 1–3, pp. 1–5.
1926. New Lepidoptera from Mexico, I. Insec. Insc. Menstr., vol. 14, nos. 7–9, pp. 140–148.
Edwards, Henry
1877. Pacific Coast Lepidoptera, no. 20: Notes on the case-bearing moths (Psychidae) with notices of Californian species. Proc. California Acad. Sci., vol. 7, pp. 140–143, 1 pl.
1881. Descriptions of some new species of Heterocera. Papilio, vol. 1, no. 7, pp. 115–121.
Esper, E.
1777–1794 [1830]. Die Schmetterlinge in Abbildungen . . . mit Beschreibungen . . . Europaische Gattungen, 11 Thiel.
Essig, E. O.
1941. Itinerary of Lord Walsingham in California and Oregon, 1871–1872. Pan-Pacific Ent., vol. 17, no. 3, pp. 97–113, 2 figs. (maps), 1 pl.
Farquhar, D.
1934. Notes on a psychid new to North America (*Fumea casta* Pallas, Lepidoptera: Psychidae). Psyche, vol. 41, no. 1, pp. 19–29.

Felder, R.
1864–1875. Heterocera (in part). *In* Reise der Osterreichischen Fregatte *Novara* um die Erde, in . . . 1857–59. . . . Zoologischer Theil, Bd. 2, Abth. 7 (Lepidoptera), 5 Hft [in 2 vols.].
Fletcher, T. B.
1929. A list of the generic names used for Microlepidoptera. Mem. Dep. Agric. India, Ent. Ser., vol. 11, ix+246 pp.
Forbes, W. T. M.
1923. The Lepidoptera of New York and neighboring states. Cornell Univ. Agric. Exp. Sta. Mem. 68, 729 pp.
1928. Lepidoptera. *In* M. Leonard, A list of the insects of New York. Cornell Univ. Agric. Exp. Sta. Mem. 101, pp. 532–687.
1930. Insects of Puerto Rico and the Virgin Islands: Heterocera. Sci. Surv. Puerto Rico and Virgin Islands, vol. 12, pt. 1, 171 pp., 2 pls.
1942. The Lepidoptera of Barro Colorado Island, Panama, no. 2. Bull. Mus. Comp. Zool., vol. 90, no. 2, pp. 265–406, 16 pls.
Ford, L. T.
1946. The Psychidae. Proc. Trans. S. London Ent. Nat. Hist. Soc., pp. 103–110.
Forster, W., and Wohlfahrt, T.
1960. Die Schmetterlinge Mitteleuropas, vol. 3, pp. 156–204.
Freeman, T. N.
1944. A new psychid from Quebec (Lepidoptera, Psychidae). Canadian Ent., vol. 76, no. 9, pp. 186–187, 1 pl.
Frey, H.
1856. Die Tineen und Pterophoren der Schweiz, xii+430 pp.
1880. Die Lepidopteren der Schweiz, xxvi+454 pp.
Gaede, M.
1929. Psychidae. *In* A. Seitz, The Macrolepidoptera of the World, vol. 14 (Fauna Africana), pp. 481–488.
1932. Psychidae. *In* A. Seitz, The Macrolepidoptera of the World, vol. 10 (Fauna Indoaustralica), pp. 729–742.
1936. Psychidae. *In* A. Seitz, The Macrolepidoptera of the World, vol. 6 (American Region), pp. 1177–1186.
Girault, A.
1901. Eggs of *Thyridopteryx ephemeraeformis*. Ent. News, vol. 12, no. 10, pp. 304–305.
Gosse, P. H.
1844. Notes on the habits of *Thyridopteryx ephemeraeformis* (Stephens). Zoologist, vol. 2, pp. 537–540.
Grossbeck, J. A.
1917. Insects of Florida, IV: Lepidoptera. Bull. Amer. Mus. Nat. Hist., vol. 37, 147 pp.
Grote, A. R.
1865. Notes on the Bombycidae of Cuba. Proc. Ent. Soc. Philadelphia, vol. 5, pp. 227–255.
1880. *Oiketicus abbotii*. North Amer. Ent., vol. 1, no. 7, pp. 52–53.
Grote, A. R., and Robinson, C. T.
1868. Descriptions of American Lepidoptera, no. 4. Trans. Amer. Ent. Soc., vol. 2, pp. 179–206, 2 pls.

Guilding, L.
1827. The natural history of *Oiketicus*. Trans. Linn. Soc. London, vol. 15, pp. 373–380.
Gundlach, J.
1881. Contribucion á la entomologia Cubana, vol. 1, 445+xxi pp.
Hampson, G. F.
1891. The Lepidoptera Heterocera of the Nilgiri District. Pt. VIII *of* Illustrations of typical specimens of Lepidoptera Heterocera in the British Museum, iv+144 pp., 17 color pls.
1892. [1893]. The fauna of British India, vol. 1 (Moths), pp. 289–304.
1904. The Lepidoptera-Phalaenae of the Bahamas. Annals Mag. Nat. Hist., ser. 7, vol. 14, pp. 165–188.
Hardenberg, C.
1917. South African bagworms: Their transformation, life history, and economic importance. Ann. Natal Mus., vol. 3, no. 3, pp. 619–686.
Harris, J. A.
1909. Note on the bag worm *Thyridopteryx*. Psyche, vol. 16, no. 3, pp. 65–67.
Haseman, L.
1912. The evergreen bagworm. Agric. Exp. Sta. Univ. Missouri Bull. 104, pp. 309-330, 16 figs.
Haworth, A.
1803–1828. Lepidoptera Britannica, sistens digestionem novam Lepidopteroram quae in Magna Britannia reperiuntur . . . adjunguntur dissertationes variae ad historiam naturalem spectantes, xxxvi+609 pp.
1812. A brief account of some rare insects announced at various times to the Society as new to Britain. Trans. Ent. Soc. London, pp. 332–340.
Healy, C.
1860. Larvae of *Fumea* carnivorous Ent. Weekly Intell., vol. 8, no. 190, p. 59.
Heinemann, H.
1859–1877. Die Schmetterlinge Deutschlands und der Schweiz . . . nebst analytischen Tabellen zum Bestimmen der Schmetterlinge, 2 Abth.
Hering, E. M.
1928. Psychidae. *In* Brohmer, Die Tierwelt Mitteleuropas, vol. 6, pp. 47–50.
Herrich-Schäffer, G. A. W.
1843–1856. Systematische Bearbeitung der Schmetterlinge von Europa, zugleich als Text, Revision und Supplement zu J. Hübner's Sammlung Europäischer Schmetterlinge, 6 Bd.
1850–1858 [1869]. Sammlung neuer, oder weinig bekannter, Aussereuropäischer Schmetterlinge, Bd. I–II, Lief. 1, 128 color pls.
1864–1871. Die Schmetterlinge der Insel Cuba . . . . Corresp.-Blatt. Zool.-Mineral. Ver. Regensburg, Jahrg. 18–25.
Heylaerts, F. J. M.
1875. Verslag. Tijdschr. Ent., vol. 18, p. xcvi.
1881. Essai d'une monographie des Psychides de la fauna Europeene. Ann. Soc. Ent. Belgique, vol. 25, pp. 29–73.

Heylaerts, F. J. M.—Continued
1884a. Observations synonymiques et autres relatives a des psychides avec descriptions de novae species. Annales Soc. Ent. Belgique, Bull. Compt.-Rend. Séances, vol. 28, pp. xxxiv–xli.
1884b. Notes synonymiques relatives a des psychides. Annales Soc. Ent. Belgique, Bull. Comp.-Rend. Séances, vol. 28, p. xciv.
1884c. Le fourreau, la chrysalide du ♂ et la femelle de l'*Animula dichroa* H.-S. Annales Soc. Ent. Belgique, Bull. Compt.-Rend. Séances, vol. 28, pp. xcvii–xcviii.
1884d. Quatre espèces nouvelles de psychides de la République Argentine. Annales Soc. Ent. Belgique, Bull. Compt.-Rend. Séances, vol. 28, pp. c–ci.
1884e. Psychide nouvelle de l'Amérique Septentrionale. Annales Soc. Ent. Belgique, Bull. Comp.-Rend. Séances, vol. 28, pp. ci–cii.
1884f. Remarques psychidologiques. Annales Soc. Ent. Belgique, Bull. Comp.-Rend. Séances, vol. 28, pp. ccvii–ccx.
1885. Une Psychide nouvelle. Annales Soc. Ent. Belgique, Bull. Compt.-Rend. Séances, vol. 29, pp. lix–lx.
1887a. Psyche helicinella H.-S. et les psychides à fourreau heliciforme. Tijdschr. Ent., vol. 30, pp. 3–8.
1887b. Notes Lépidoptérologiques. Annales Soc. Ent. Belgique, Bull. Compt.-Rend. Séances, vol. 31, pp. vii–ix.
1887c. Trois notes par F. J. M. Heylaerts. Annales Soc. Ent. Belgique, Bull. Compt.-Rend. Séances, vol. 31, pp. lxxxviii–lxxxix.
1901. Description d'une psychidae inédite de la République Argentine, *Chalia künckelii*. Annales Soc. Ent. Belgique, vol. 45, p. 97.

Höfner, G.
1883. Beobachtungen über Verkommen und Lebensweise verschiedener, besonders Gebirge und Alpen bewohnender Schmetterlings-Arten. Wiener Ent. Zeit., vol. 2, pp. 245–250.

Hoffmann, O.
1860. Ueber die Naturgeschicte der Psychiden. Berliner Ent. Zeitschr., vol. 4, pp. 1–53.

Holland, W. J.
1905. The moth book, xxiv+479 pp., 48 color pls.

Hooker, J. D., et al.
1893–. Index Kewensis . . . .

Howard, L. O., and Chittenden, F. H.
1908. The bagworm (*Thyridopteryx ephemeraeformis* Haw.). U.S. Dep. Agric., Bur. Ent., circ. 97, 10 pp., 11 figs.

Hübner, J.
1816–[1827]. Verzeichniss bekannter Schmettlinge [sic] (Anzeiger, etc.), 431+72 pp.

Jones, F. M.
1911. A new North American moth of the family Psychidae (Lepid.). Ent. News, vol. 22, pp. 193–194, 1 pl.
1922a. A new North American psychid (Lep., Psychidae). Ent. News, vol. 33, no. 1, p. 12.
1922b. Two new psychids, and notes on other species (Lepidoptera, Psychidae). Ent. News, vol. 33, no. 5, pp. 129–135, 2 pls.
1923. Variations in *Thyridopteryx*. Ent. News, vol. 34, pp. 97–103.
1925a. North American psychids: *edwardsii* Heyl. (*carbonaria* Pack.) (Lepidoptera, Psychidae). Ent. News, vol. 36, no. 2, pp. 33–39, 2 pls.

1925b. *Hyaloscotes fumosa* Butler (Lepidoptera, Psychidae). Ent. News, vol. 36, no. 6, pp. 161–164, 1 pl.

1926a. Our largest Psychidae, *Oiketicus dendrokomos* (Lepidoptera, Psychidae). Trans. Amer. Ent. Soc., vol. 52, pp. 1–6, 1 pl.

1926b. A new psychid (Lepidoptera, Psychidae) from South America. Trans. Ent. Soc. London, pp. 509–511, 1 pl.

1927. The mating of the Psychidae. Trans. Amer. Ent. Soc., vol. 53, pp. 293–312.

1934. The identity of an introduced psychid, *Fumea casta* Pallas (Lepidoptera, Psychidae). Psyche, vol. 41, no. 1, pp. 30–34, 1 pl.

1945. *Platoecetieus* and a remarkable new species of the genus. Trans. Amer. Ent. Soc., vol. 71, pp. 99–124.

Jones, F. M., and Parks, H.

1928. The bagworms of Texas. Texas Exp. Sta. Bull. 382, pp. 1–26.

Jørgensen, J. L.

1954. Larver af *Acanthopsyche atra* L. klaekket af fugleekskrementer [with English summary]. Flora og Fauna, vol. 60, pp. 122–127.

Katter, F.

1875. Biologische Mittheilungen, III: Ueber die Psycheart *Oiketieus kirbyi* Guild. Ent. Nachrichten, vol. 1, no. 24, pp. 190–193.

Kellicott, D. S.

1884. Occurrence of the basket-worm in Ontario. Canadian Ent., vol. 16, no. 9, p. 180.

Kilman, A. H.

1884. [Letter, correcting Kellicott's misidentification (1884) of *Phobetrum pithecium* A. & S.] Canadian Ent., vol. 16, no. 10, p. 200.

Kirby, W. F.

1892. A synomic catalogue of Lepidoptera Heterocera, pp. 500–524, 925.

Klots, A. B.

1956. Lepidoptera. *In* Tuxen, Taxonomist's glossary of genitalia of insects, pp. 97–111.

Koehler, P.

1924. Fauna Argentina, II teil: Heterocera. Sonderheft Zeitschr. Wissen. Insektenbiol., vol. 19, 28 pp., 8 pls.

1931. Los Psychidae Argentinos. Rev. Soc. Ent. Argentina, vol. 3, pp. 347–352.

1939a. Notas sobre Psychidae Argentinos. Physis, Buenos Aires, vol. 17, pp. 457–471.

1939b. Parasitos de "Psychidae" Argentinos. Physis, Buenos Aires, vol. 17, pp. 473–495.

1939c. Neotropische Psychiden aus dem Deutschen Entomologischen Institut. Arb. Morph. Taxon. Ent. Berlin-Dahlem, vol. 6, no. 1, pp. 38–42.

1953. Nuevas especies de Heterocera. Rev. Soc. Ent. Argentina, vol. 16, pp. 15–24.

Kozhantshikov, I. V.

1956. Fauna SSSR. Nasekomye Cheshuekrylye. Chekhlonosy-Meshechnitsy (sem. Psychidae), vol. 3, no. 2, 516 pp.

Lahille, F., and Joan, T.

1926. Contribution al estudio del bicho de cesto (*Oecetieus kirbyi* Guild). Minist. Agric. Rep. Argentina, Seccion Propag. Informes, circ. 583, pp. 1–98, 11 pls.

Lampert, K.
1906–1907. Die Grosssehmetterlinge und Raupen Mitteleuropas, mit besonderer Berücksichtigung der biologischen Verhältnisse, xx+308 pp., 95 color pls.
Lefrebre, M. A.
1842. Communication verbale sur la pterologie des lépidoptères. Annales Soc. Ent. France, vol. 11, pp. 5–35, 3 pls.
Lintner, J. A.
1882. Injurious lepidopterous insects. First Ann. Rep. Insects New York, vol. 1, pp. 81–167.
Lobeck, A. K.
1948. Physiographic provinces of North America.
Lucas, H.
1857. Tribu des Psychides, *in* F. E. Guérin-Méneville, Animaux articulés a pieds articulés, pp. 723–726, pl. 17, fig. 6. *In* R. de la Sagra, Histoire physique, politique et naturelle de l'Ile de Cuba.
Martorell, L. F.
1945. A survey of the forest insects of Puerto Rico. Journ. Agric. Univ. Puerto Rico, Rio Piedras, vol. 29, pp. 69–600.
McDunnough, J.
1939. Check list of the Lepidoptera of Canada and the United States of America, part 2 (Microlepidoptera). Mem. S. California Acad. Sci., vol. 2, no. 1, pp. 102–103.
Metcalf, C. L.; Flint, W. P.; and Metcalf, R. L.
1951. Destructive and useful insects, xiv+1071 pp.
Meyrick, E.
1928. Revised handbook of British Lepidoptera, pp. 475–479, 833–837.
Meyrick, E., and Lower, O. B.
1907. Revision of the Australian Psychidae. Trans. Roy. Soc. South Australia, vol. 31, pp. 192–208.
Millière, M. P.
1857. Création d'un genre nouveau, g. *Apterona*, et histoire des insectes qui le composent. Annales Soc. Linn. Lyon, vol. 4, pp. 181–202, 2 pls.
1872–1875. Catalogue raisonné des lépidoptères du départment des Alpes-Maritimes, 3 pts.
Möschler, H. B.
1878. Beiträge zur Schmetterlings-Fauna von Surinam, II. Verh. Zool.-Bot. Gesellsch. Wien, vol. 27, pp. 629–700, pls. 8–10.
Morris, J. G.
1862. Synopsis of the described Lepidoptera of North America, Part I: Diurnal and Crepuscular Lepidoptera. Smithsonian Misc. Collections, vol. 4, art. 2, xxvii+358 pp.
Nägeli, A.
1931. Einige Mitteilungen uber Apterona helix Sieb. (Lep). Mitteil. Schweizer Ent. Ges., vol. 15, pp. 56–61.
Narbel-Hofsetter, M.
1946. La cytologie de la parthenogenese chez *Apterona helix* Sieb. Rev. suisse Zool., vol. 53, pp. 625–681.
1954. La cytologie de la parthenogenese chez *Luffia ferchautella* Stph. Rev. suisse Zool., vol. 61, pp. 416–419.

Neumoegen, B., and Dyar, H. G.
1893. A preliminary revision of the bombyces of America north of Mexico. Journ. N.Y. Ent. Soc., vol. 1, no. 3, pp. 97–118.
1894. Preliminary revision of the bombyces of America north of Mexico, Psychidae. Journ. N.Y. Ent. Soc., vol. 2, pp. 118–120.

Nolcken, J.
1867–1871. Lepidopterologische fauna von Estland, Livland und Kurland. Naturforscher Verein Riga, neue folge, hft. 2–4, abt. 2, viii+850 pp.

Packard, A. S.
1869. Guide to the study of insects, and a treatise on those injurious and beneficial to crops, viii+702 pp.
1887. Notes on certain Psychidae, with descriptions of two new Bombycidae. Ent. Amer., vol. 3, no. 1, pp. 51–52.
1893. Studies on the life-history of some bombycine moths, with notes on the setae and spines of certain species, III. Annals New York Acad. Sci., vol. 8, pp. 41–92.
1895. On the phylogeny or classification of the Lepidoptera. *In* A. S. Packard, Monograph of the bombycine moths of America north of Mexico. Mem. Nat. Acad. Sci., vol. 7, no. 1, pp. 51–83.

Pagenstecher, A.
1909. Die geographische Verbreitung der Schmetterlinge, ix+451 pp., 2 maps.

Pallas, P. S.
1767. Phalaenarum bigae quarum alterius femina artubus prorsus destituta, nuda atque vermiformis, alterius glabra quidem et impennis attamen pedata est, utriusque vero sine habito cum masculo commercio foecunda ove parit. fig. (Psyche). Nov. Act. Acad. Natur. Curios, vol. 3, pp. 430–437.

Philippi, R. A.
1860. Beschreibung einiger neuer Chilenischer Schmetterlinge. Linnaea Ent., vol. 14, pp. 265–297.

Püngeler, R.
1893. Ueber zwei Psychiden-Arten aus Sizilien. Iris, Deutsche Ent. Zeitsch., vol. 5, pp. 133–140.

Rambur, J.
1858–1866. Catalogue systematique des lépidoptères de l'Andalousie, 2 pts., ix+412 pp., 22 colored pls.

Rau, P.
1940. Some mud-daubing wasps of Mexico and their parasites. Annals Ent. Soc. Amer., vol. 33, no. 3, pp. 590–595.

Rebel, H.
1910a. Friedrich Berge's schmetterlingsbuch, ed. 9, vi+A114+509 pp., 53 color pls.
1910b. Psychidae. *In* A. Spuler, Die Schmetterlinge Europas, vol. 2, pp. 171–188.

Reutti, C.
1898. Uebersicht der Lepidopteren-Fauna des Grossherzogthum's Baden, ed. 2. Verh. Naturw. Ver. Karlsruhe, vol. 12.

Riley, C. V.
1887. The bag-worm (*Thyridopteryx ephemeraeformis* Haw.). Bull. U.S. Dept. Agric., no. 10, pp. 22–28.

Robinson, D.
1953. Garden bagworm *Apterona crenulella* (*-helix*) in Nevada and Placer Counties, California. Bull. Dept. Agric. California, vol. 42, no. 1, pp. 1–9.

Sand, M.
1879. Catalogue raisonné des lépidoptères du Berry et l'Auvergne (Cher, Indre, Creuse, Puy-de-Dôme, Cantal) (France centrale), v+206 pp.

Sauter, W.
1956. Morphologie und Systematik der schweizerischen *Solenobia* Arten. Rev. Suisse Zool., vol. 63, no. 27, pp. 451–550.

Schaus, W.
1896. New species of Heterocera from tropical America. Journ. New York Ent. Soc., vol. 4, no. 4, pp. 147–154.
1901. New species of Heterocera from tropical America, I. Journ. New York Ent. Soc., vol. 9, pp. 40–48.
1905. Descriptions of new South American moths. Proc. U.S. Nat. Mus., vol. 29, pp. 179–345.
1911. New species of Heterocera from Costa Rica, VIII. Annals Mag. Nat. Hist., ser. 8, vol. 7, pp. 612–634.
1927. New species of Heterocera (Lepidoptera) from Central and South America. Proc. Ent. Soc. Washington, vol. 29, no. 8, pp. 185–186.

Seiler, J.
1923. Die Parthenogenese der Psychiden. Zeitschr. Indukt. Abstamm Vererbungsl., vol. 31, pp. 1–99.
1927. Ergebnisse aus der Kreuzung parthenogenetischer und zweigeschlechtlicher Schmetterlinge. Biol. Zentralblatt, vol. 47, no. 7, pp. 426–446.
1937. Die *Solenobia*-Intersexe und die Deutung des Phänomens der Intersexualität. Rev. Suisse Zool., vol. 44, no. 15, pp. 283–307.
1942. Resultate aus der Kreuzung parthenogenetischer und zweigeschlechtlicher Schmetterlinge. Arch. Klaus-Stift. Vereb.-forsch., vol.. 17, pts. 3–4, pp. 513–528.
1949. Resultate aus einer Artkreuzung zwischen *Solenobia triquetrella* F. R., *S. fumosella* Hein. mit Intersexualität in F_1. Arch. Julius-Klaus Stiftung, vol. 24, pp. 124–154.

Seitz, A.
1919. Die Zucht von *Oiketicus platensis* Berg. Ent. Rundsch., vol. 36, pp. 48, 52–54.

Sharp, D.
1918. The Cambridge natural history, edit. S. Harmer and A. Shipley, vol. 6 (Insects), pt. 2, pp. 392–395.

Siebold, C. T. E. von
1850. Bericht über die Arbeiten der entomologischen Sektion im Jahre 1850, IV: Lepidoptera, Bemerkungen über Psychiden. Jahresb. Schles. Gesellsch. vaterl. Kultur, pp. 84–88.
1851. Bemerkungen über Psychiden. Stettiner Ent. Zeitung, vol. 12, pp. 341–345.

Simpson, G. G.; Roe, A.; and Lewontin, R. C.
1960. Quantitative zoology, 440 pp.

Slossen, A. T.
1892. A long-lived basket maker. Ent. News, vol. 3, no. 3, pp. 49–51.

Smith, G. H.
1935. Physiographic diagram of South America.
Snellen, P.
1882. De Vlinders van Nederland. Microlepidoptera, systematisch beschreven, 2 vols., xiii+1196 pp.
Speyer, A.
1886. Ein Beiträg zur Kenntniss der Psychiden mit spiralig gewundenen Raupengehäusen. Stettiner Ent. Zeit., vol. 47, pp. 325–350.
Stainton, H. T.
1854a. List of the specimens of British animals in the collections of the British Museum. Lepidoptera, pt. 16, p. 5.
1854b. Insecta Britannica. Lepidoptera: Tineina, vol. 3, viii+313 pp.
1856–1859. A manual of British butterflies and moths, 2 vols.
Staudinger, O., and Rebel, H.
1901. Catalog der Lepidopteren des palaearctischen Faunengebietes, ed. 3, 2 vols.: xxx+411 pp.; 368 pp.
Staudinger, O., and Wocke, M.
1861. Catalog der Lepidopteren Europa's und der angrenzenden Länder, I: Macrolepidoptera, bearbeitet von . . . O. Staudinger; II: Microlepidoptera, bearbeitet von . . . M. Wocke, xvi+192 pp.
1871. Catalog der Lepidopteren des Europaeischen Faunengebeits, I: Macrolepidoptera, bearbeitet von . . . O. Staudinger; II: Microlepidoptera, bearbeitet von . . . M. Wocke, xxxviii+426 pp.
Stephens, C. S.
1962. *Oiketicus kirbyi* (Lepidoptera: Psychidae) a pest of bananas in Costa Rica. Journ. Econ. Ent., vol. 55, no. 3, pp. 381–386, 2 figs.
Stephens, J. F.
1828–1834. Illustrations of British entomology . . . . Haustellata, vols. 1–4.
1836. On the apparent identity of *Sphinx ephemeraeformis* of Haworth with *Psyche plumifera* of Ochsenheimer, XVII. Trans. Ent. Soc. London, vol. 1, pp. 76–78.
Strand, E.
1912. Psychidae. *In* A. Seitz, The Macrolepidoptera of the World, vol. 2 (Fauna Palaearctica), pp. 351–370.
1927. Bemerkungen zu dem vorhergehenden Artikel von Dr. Wehrli über eine verkannte Psychidenart. Ent. Zeitschr., Frankfurt, vol. 41, no. 15, pp. 332–333.
Tietz, H.
[1951?] The Lepidoptera of Pennsylvania. Bull. Agric. Exp. Stat., Pennsylvania State College, xii+194 pp.
Torre-Bueno, J. R.
1950. A glossary of entomology, ix+336 pp.
Townsend, C. H. T.
1894. Notes on lepidopterous larvae. Zoe, vol. 4, pp. 353–358.
Tutt, J. W.
1895. The "basket caterpillar" and "bagworm." Ent. Rec. Journ. Var., vol. 7, no. 6, pp. 121–123, 1 pl.
1900. A natural history of the British Lepidoptera, vol. 2, pp. 102–434.

Vazquez, L.
1941. Estudio monografico de las Psychidae de Mexico, I: Generos *Oiketicoides* Heyl., *Eurukuttarus* Hamps., *Platoeceticus* Pack. Anales Instit. Biol., vol. 12, no. 1, pp. 295–310.
1942. Estudio monografico de las Psychidae de Mexico, II: Genero *Oiketicus* Guilding. Anales Instit. Biol., vol. 13, no. 1, pp. 257–300.
1949. Estudio y descripcion de una especie nueva de psiquido, *Oiketicus mortonjonesi* spec. nov. Anales Instit. Biol., vol. 20, nos. 1 and 2, pp. 399–406.
1951. Un nuevo psiquido Mexicano del genero *Oiketicus*. Anales Instit. Biol., vol. 22, no. 1, pp. 323–333.
1953. Las mariposas de la familia Psychidae en Mexico. *In* Memoria del Congreso Cientifico Mexicano, VII–Ciencias Biologicas, pp. 323–342.

Walker, F.
1854–1866. List of the specimens of lepidopterous insects in the collection of the British Museum, 35 pts.

Westwood, J. O.
1854. Descriptions of some species of lepidopterous insects belonging to the genus *Oiketicus*. Proc. Zool. Soc. London, pt. 22, pp. 219–243, 4 pls.

Weyenbergh, H.
1884. Biologische en Systematische Beschrijving van Vier Nieuwe Argentijnsche Psychiden. Tijdschr. Ent., vol. 27, pp. 9–24, 1 pl.

Williams, J. L.
1944. The comparative anatomy of the internal genitalia of three psychid moths. Journ. Morph. Philadelphia, vol. 75, no. 2, pp. 251–260.
1947. The anatomy of the internal genitalia of *Fumea casta* Pallas (Lepidoptera: Psychidae). Trans. Amer. Ent. Soc., vol. 73, pp. 77–84.

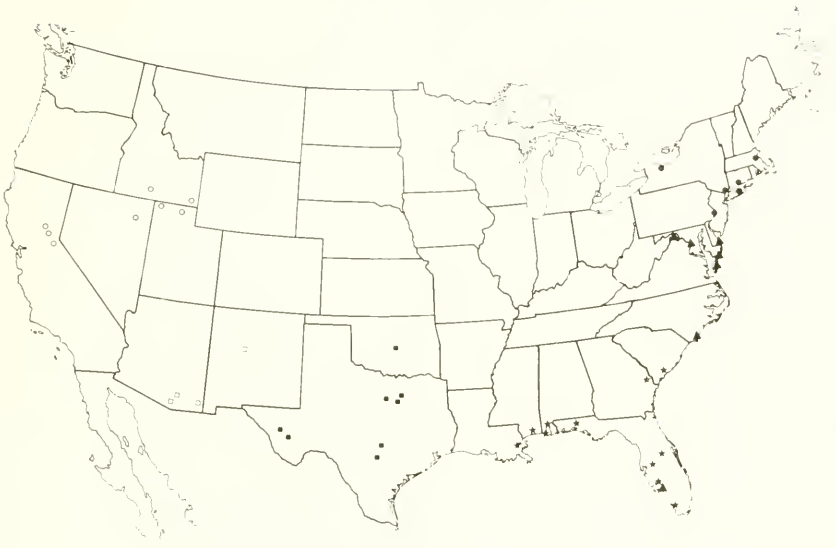
Willis, J. C.
1955. A dictionary of the flowering plants and ferns, liv+752 pp.

Wocke, M. F.
1862. Reise nach Finmarken, II: Microlepidoptera. Stettiner Ent. Zeit., vol. 23, pp. 30–78.

Wolcott, G. N.
1951. The insects of Puerto Rico. Journ. Agric. Univ. Puerto Rico, vol. 32, no. 3, p. 738.

Wood, W.
1839. Index entomologicus; or, a complete illustrated catalogue . . . of the lepidopterous insects of Great Britain, xii+267 pp., 54 color pls.

Zeller, P. C.
1852. Sieben Tineaceen-Gattungen. Linn. Ent. Berlin, vol. 7, pp. 325–367.
1871. Lepidopterologische Beobachtungen im Jahre 1870. Stettiner Ent. Zeit., vol. 32, pp. 49–81, figs. 1–5.



MAP 1.—Distribution of species

● *Fumaria casta*
○ *Apterona crenulella* form *helix*
★ *Prochalia pygmaea*
▲ *Zamopsyche commentella*
■ *Astala edwardsi*
□ *Coloneura fragilis*

MAP 2.—Distribution of species

● *Solenobia walshella* ★ *Cryptothelia nigrita*

MAP 3.—Distribution of species

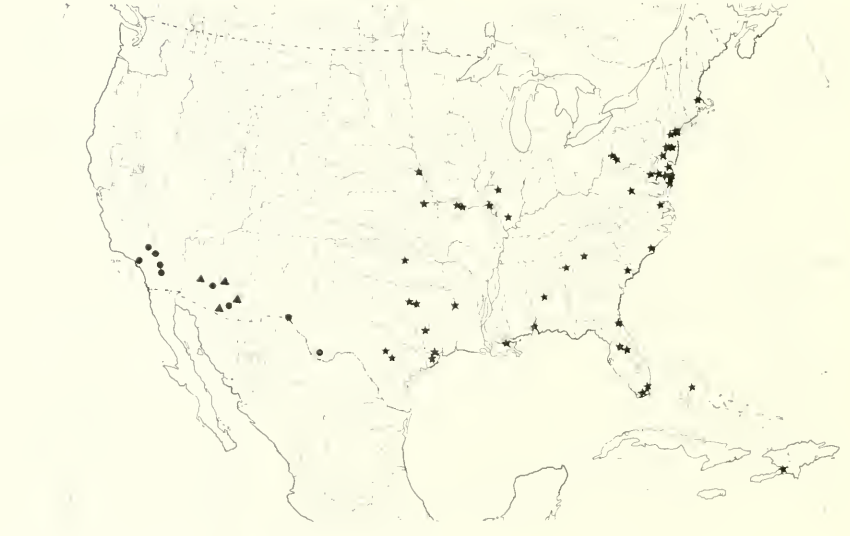
● *Basicladus tracyi*

693 052—64——12

GOODE BASE MAP SERIES, COPYRIGHT UNIV. OF CHICAGO.

MAP 4.—Distribution of species

● *Astala confederata*
□ *Astala polingi*
★ *Hyaloscotes fumosa*
▲ *Hyaloscotes pithopoera*
■ *Basicladus celibatus*



GOODE BASE MAP SERIES, COPYRIGHT UNIV. OF CHICAGO.

MAP 5.—Distribution of species

● *Thyridopteryx meadi*
▲ *T. alcora*
★ *T. ephemeraeformis*

MAP 6.—Distribution of species

▼ *Cryptothelea watsoni* ▲ *Cryptothelea congregata* ★ *Cryptothelea symmicta* ● *Cryptothelea gloverii* ■ *Biopsyche apicalis* ◆ *Biopsyche thoracica*

Map 7.—Distribution of species

◇ *Naevipenna aphaidropa* ▼ *Lumacra haitiensis* ■ *Astala hoffmanni* ● *Astala zacualpania*

○ *Dendropsyche burrowsi* ☆ *Lumacra hyalinacra* ▲ *Astala tristis* ★ *Astala vigasi*

MAP 8.—Distribution of species

● *Lumacra brasiliensis*
▲ *Lumacra künckelii*
▼ *Animula limpia*
★ *Animula microptera*
□ *Animula seitzi*
■ *Thanatopsyche chilensis*

MAP 9.—Distribution of species

● *Cryptothelea surinamensis*
▼ *Lumacra quadridentata*
▲ *Curtorama cassiae*
☆ *Oiketicus bergii*
■ *Oiketicus borsanii*
★ *Oiketicus specter*

MAP 10.—Distribution of species

▼ *Oiketicus zihuatanejensis*
● *Oiketicus toumeyi*
★ *Oiketicus assimilis*
■ *Oiketicus townsendi dendrokomos*
▲ *Oiketicus townsendi mexicanus*

Map 11.—Distribution of *Oiketicus geyeri*.

MAP 12.—Distribution of *Oiketicus townsendi townsendi, O. abbottii, O. kirbyi, O. platensis*

FIGURES 1–21.—Adult Males

1. *Solenobia walshella*, Ithaca, New York, wing expanse 14 mm.
2. *Epichnopterix pulla*, Europe, wing expanse 15 mm.
3. *Fumaria casta*, Overbrook, Ontario, wing expanse 12 mm.
4. *Apterona crenulella*, Europe, wing expanse 13 mm.
5. *Prochalia pygmaea*, Florida, wing expanse 13 mm.
6. *Zamopsyche commentella*, Wilmington, North Carolina, wing expanse 14 mm.
7. *Naevipenna aphaidropa*, SE Brazil, wing expanse 18 mm.
8. *Cryptothelea surinamensis*, Cayenne, French Guiana, wing expanse 25 mm.
9. *Cryptothelea watsoni*, type, Aux Cayes, Haiti, wing expanse 21 mm.
10. *Cryptothelea nigrita*, Lake Placid, Florida, wing expanse 16.5 mm.
11. *Cryptothelea symmicta*, Cordoba, Mexico, wing expanse 13 mm.
12. *Cryptothelea gloverii*, Lake Placid, Florida, wing expanse 17 mm.
13. *Dendropsyche burrowsi*, type, Georgetown British Guiana, wing expanse approximately 12–13 mm. (negative courtesy of British Museum).
14. *Curtorama cassiae*, lectotype, Cordoba, Argentina, wing expanse 22 mm.
15. *Lumacra brasiliensis* (type of *L. costaricensis*), Juan Vinos, Cachi, Costa Rica, wing expanse 36 mm.
16. *Lumacra künckelii*, lectotype, Ceres, Argentina, wing expanse 25 mm.
17. *Lumacra haitiensis*, type, Port-au-Prince, Haiti, wing expanse 22 mm.
18. *Lumacra quadridentata*, paratype, Caracas, Venezuela, wing expanse 20 mm.
19. *Lumacra hyalinacra*, type, Juayua, El Salvador, wing expanse 22 mm.
20. *Astala confederata*, San Antonio, Texas, wing expanse 17 mm.
21. *Astala hoffmanni*, type, Puebla, Mexico, wing expanse 16 mm.


1


2


3


4


5


6


7


8


9


10


11


12


13


14


15


16


17


18


19


20


21


22


23


24


25


26


27


28


29


30


31


32


33


34


35


36


37


38


39


40


41


42

FIGURES 22–42.—Adult Males

22. *Astala polingi*, paratype, Pima Co., Arizona, wing expanse 20 mm.
23. *Astala edwardsi*, Ft. Worth, Texas, wing expanse 21 mm.
24. *Astala tristis*, type, Jalapa, Mexico, wing expanse 18 mm.
25. *Astala zacualpania*, type, Zacualpan, Mexico, wing expanse 23 mm.
26. *Astala vigasi*, Mexico, wing expanse 20 mm.
27. *Hyaloscotes fumosa*, paratype, Siskiyou Co., California, wing expanse 27 mm
28. *Hyaloscotes pithopoera*, Augusta, Maine, wing expanse 19 mm.
29. *Basicladus tracyi*, type, Biloxi, Mississippi, wing expanse 16 mm.
30. *Basicladus celibatus*, Lake Placid, Florida, wing expanse 10 mm.
31. *Coloneura fragilis*, Santa Rita Mts., Arizona, wing expanse 12 mm.
32. *Thanatopsyche canescens*, Chile, wing expanse 27 mm.
33. *Thanatopsyche chilensis*, Chile, wing expanse 29 mm.
34. *Biopsyche apicalis*, Bahamas, wing expanse 22 mm.
35. *Biopsyche thoracica*, Havana, Cuba, wing expanse 29 mm.
36. *Biopsyche thoracica* (same specimen as fig. 35).
37. *Animula seitzi*, type, Rio de Janeiro, Brazil, wing expanse 16 mm. (photograph courtesy of Senckerbergische Naturforschende Gesellschaft).
38. *Animula limpia*, Loja, Ecuador, wing expanse 25 mm.
39. *Animula microptera*, wing expanse 25 mm.
40. *Animula dichroa*, wing expanse 28 mm.
41. *Oiketicus bergii*, Mendoza, Argentina, wing expanse 21 mm.
42. *Oiketicus borsanii*, lectotype, Mendoza, Argentina, wing expanse (left forewing) 9 mm.

FIGURES 43–63.—Adult Males

43. *Oiketicus geyeri*, São Paulo, Brazil, wing expanse 43 mm.
44. *Oiketicus zihuatanejensis*, Zihuatanejo, Mexico, wing expanse 30 mm.
45. *Oiketicus zihuatanejensis* (same specimen as fig. 44).
46. *Oiketicus toumeyi*, Tucson, Arizona, wing expanse 30 mm. (note faint pattern of forewings).
47. *Oiketicus toumeyi* (same specimen as fig. 46).
48. *Oiketicus assimilis*, Mexico, wing expanse 35 mm.
49. *Oiketicus specter*, Merida, Venezuela, wing expanse 52 mm.
50. *Oiketicus townsendi townsendi*, Las Crucas, New Mexico, wing expanse 42 mm.
51. *Oiketicus townsendi mexicanus*, Chapultepec, Mexico, wing expanse 44 mm.
52. *Oiketicus abbotii*, San Antonio, Texas, wing expanse 35 mm.
53. *Oiketicus abbotii*, Key West, Florida, wing expanse 36 mm. (pale form).
54. *Oiketicus kirbyi* (?), Montego Bay, Jamaica, wing expanse 36 mm.
55. *Oiketicus kirbyi*, Hyutanahan, Rio Purus, Brazil, wing expanse 48 mm.
56. *Oiketicus kirbyi*, Quernavaca, Mexico, wing expanse 40 mm.
57. *Oiketicus kirbyi*, Loja, Ecuador, wing expanse 34 mm.
58. *Oiketicus platensis*, La Rioja, Argentina, wing expanse 36 mm.
59. *Thyridopteryx ephemeraeformis*, New Jersey, wing expanse 26 mm.
60. *Thyridopteryx alcora*, Santa Catalina Mts., Arizona, wing expanse 26 mm.
61. *Thyridopteryx meadi*, Mojave Desert, California, wing expanse 23 mm.
62. *Psychoglene basinigra*, type, Brazil, wing expanse 18 mm. (negative courtesy of British Museum).
63. *Oiketicus westwoodii* (?), wing expanse 39 mm.


43

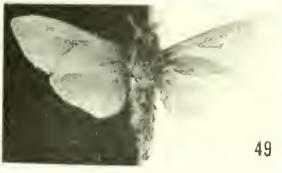

44


45


46


47


48


49


50


51


52


53


54


55


56


57


58

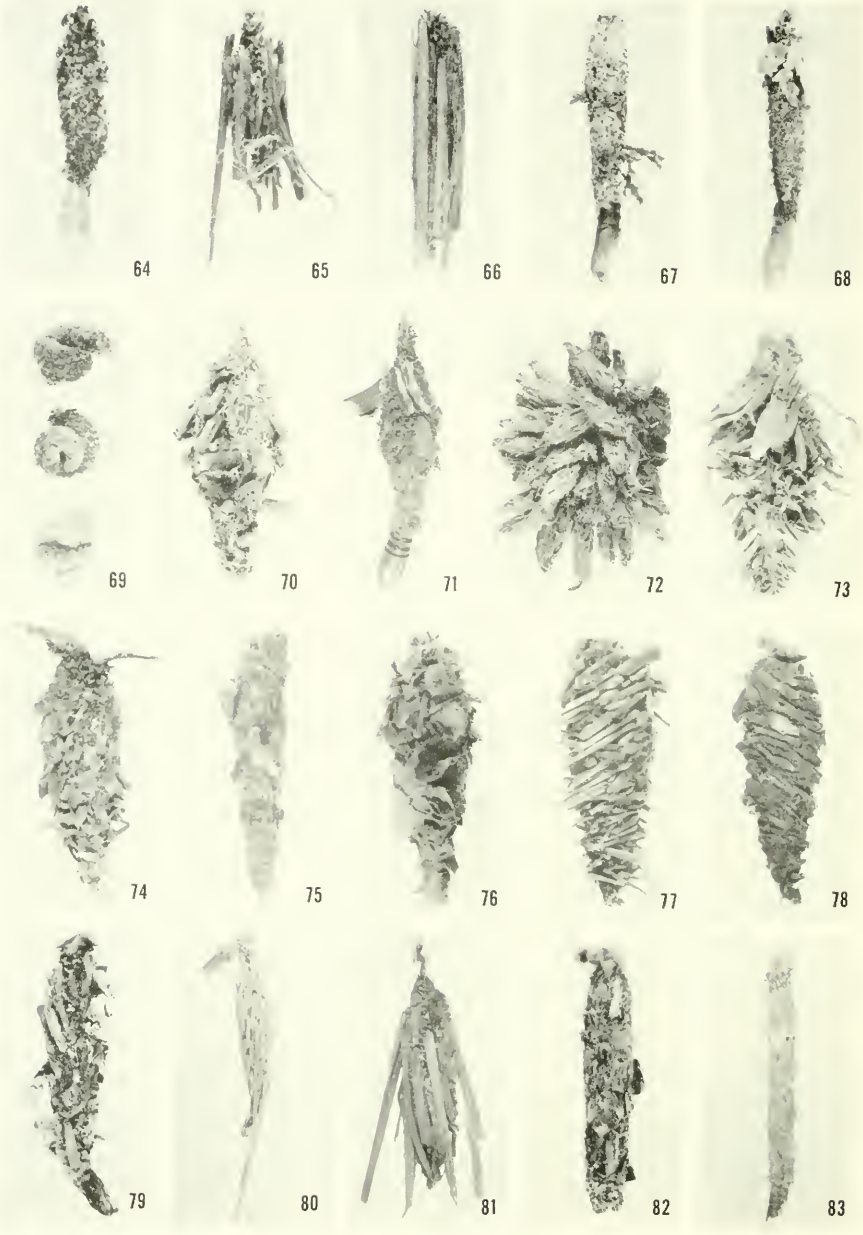

59


60


61


62


63


64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83

FIGURES 64–83.—Larval Cases

64. *Solenobia walshella*, length 7 mm.
65. *Fumaria casta*, length 10 mm. (total length 15 mm.).
66. *Epichnopteryx pulla* (Europe), length 15 mm.
67. *Prochalia pygmaea*, length 14 mm.
68. *Zamopsyche commentella*, length 13 mm.
69. *Apterona crenulella* form *helix*, diameter 4–5 mm.
70. *Cryptothelea surinamensis*, length 20 mm.
71. *Cryptothelea watsoni*, length 19 mm.
72. *Cryptothelea congregata*, length of cluster 47 mm.
73. *Cryptothelea nigrita*, length 20 mm.
74. *Cryptothelea gloverii*, length 18 mm.
75. *Dendropsyche burrowsi*, length approximately 10–12 mm. (negative courtesy of British Museum).
76. *Curtorama cassiae*, length 18 mm.
77. *Curtorama cassiae* (cotype, *Chalia rebeli*), length 21 mm
78. *Curtorama cassiae* (cotype, *Chalia rugosa*), length 18 mm.
79. *Lumacra brasiliensis*, length 32 mm.
80. *Lumacra künckelii*, length 52 mm.
81. *Astala confederata*, length 20 mm.
82. *Astala hoffmani*, length 20 mm.
83. *Astala polingi*, length 27 mm.

FIGURES 84–103.—Larval Cases

84. *Astala edwardsi*, length 36 mm.
85. *Hyaloscotes pithopoera*, length 21 mm.
86. *Basicladus tracyi*, length 30 mm.
87. *Basicladus tracyi* (*Psyche cacocnemos*), length 25 mm. (total length 36 mm.).
88. *Basicladus celibatus*, length 14 mm.
89. *Thanatopsyche canescens*, length 40 mm.
90. *Animula limpia*, length 32 mm.
91. *Biopsyche thoracica*, length 27 mm.
92. *Oiketicus bergii*, male, length, 21 mm.
93. *Oiketicus bergii*, female, length 30 mm.
94. *Oiketicus borsanii*, length 35 mm.
95. *Oiketicus geyeri*, male, length 64 mm. (note characteristic subapical region of case from which adult emerges).
96. *Oiketicus geyeri*, female, length 90 mm.
97. *Oiketicus zihuatanejensis*, length 51 mm.
98. *Oiketicus toumeyi*, length 80 mm. (reared on *Prosopis juliflora*).
99. *Oiketicus toumeyi*, length 70 mm. (reared on *Ailanthus altissima*).
100. *Oiketicus assimilis*, length 60 mm.
101. *Oiketicus townsendi townsendi*, length 77 mm.
102. *Oiketicus townsendi townsendi*, length 85 mm. (reared on *Prosopis odorata*).
103. *Oiketicus townsendi mexicanus*, male, length 85 mm.


84


85

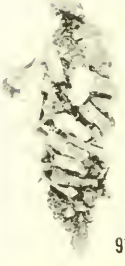

86


87


88


89


90


91


92


93


94


95


96


97


98


99


100


101


102


103


104


105


106


107


108

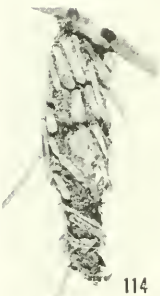

109


110


111


112


113


114


115


116


117


118


119


120


121


122


123

FIGURES 104–123.—Larval Cases

104. *Oiketicus townsendi dendrokomos*, male, length 80 mm.
105. *Oiketicus townsendi dendrokomos*, female, length 120 mm.
106. *Oiketicus abbotii*, length 60 mm. (reared on *Platanus occidentalis*).
107. *Oiketicus abbotii*, length 60 mm. (reared on *Thuja occidentalis*).
108. *Oiketicus abbotii*, length 58 mm.
109. *Oiketicus abbotii*, length 70 mm. (reared on *Acacia* sp.).
110. *Oiketicus platensis*, length 55 mm.
111. *Oiketicus platensis*, length 72 mm.
112. *Oiketicus kirbyi*, length 100 mm.
113. *Thyridopteryx meadi*, length 40 mm.
114. *Thyridopteryx meadi*, length 28 mm.
115. *Thyridopteryx alcora*, length 40 mm.
116. *Thyridopteryx ephemeraeformis*, length 50 mm. (reared on *Prunus* sp.).
117. *Thyridopteryx ephemeraeformis*, length 53 mm. (reared on *Pinus* sp.).
118. *Thyridopteryx ephemeraeformis*, length 46 mm. (reared on *Juniperus* sp.).
119. "*Zamopsyche*" *hayzeardi*, length 35 mm.
120. *Oiketicus lizeri*, length 62 mm.
121. *Oiketicus westwoodii*, female, length 70 mm.
122. *Oiketicus westwoodii*, male, length 50 mm.
123. *Oiketicus chaquensis*, length 27 mm.

FIGURES 124–143.—Larval Cases

124. *Hyaloscotes coniferella*, length 25 mm.
125. "*Chalia*" *daguerrei*, length 23 mm.
126. "*Oiketicus*" *davidsoni*, length 35 mm.
127. "*Chalia*" *dispar*, length 23 mm. (total length 40 mm.).
128. *Oiketicus elegans*, length 31 mm.
129. *Hyaloscotes fragmentella*, length 23 mm.
130. *Oiketicus ginocchionus*, length 55 mm.
131. "*Platoeceticus*" *hoffmani*, length 16 mm.
132. *Oiketicus horni*, length 67 mm.
133. *Oiketicus horni*, length 62 mm.
134. "*Clania*" *lichenophilus*, length 15 mm.
135. "*Platoeceticus*" *tandilensis*, length 15 mm.
136. "*Clania*" *yamorkinei*, length 23 mm.
137. *Oiketicus* sp., unknown case no. 1, length 90 mm.
138. *Oiketicus* sp., unknown case no. 2, length 115 mm.
139. *Oiketicus* sp., unknown case no. 3, length 80 mm.
140. *Oiketicus* sp., unknown case no. 3, length 58 mm.
141. *Oiketicus* sp., unknown case no. 4, length 75 mm.
142. Unknown case no. 5, length 24 mm. (total length 45 mm.).
143. Unknown case no. 6, length 12 mm. (total length 19 mm.).


124


125


126


127


128


129


130


131


132


133


134


135


136


137


138


139


140

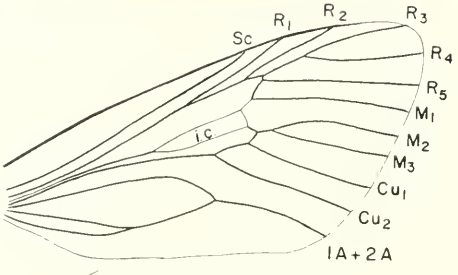

141

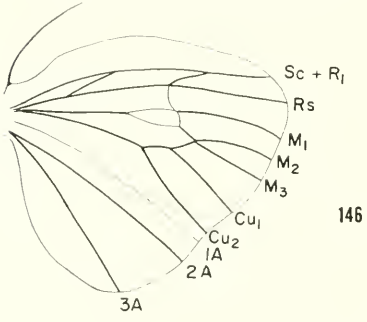

142


143

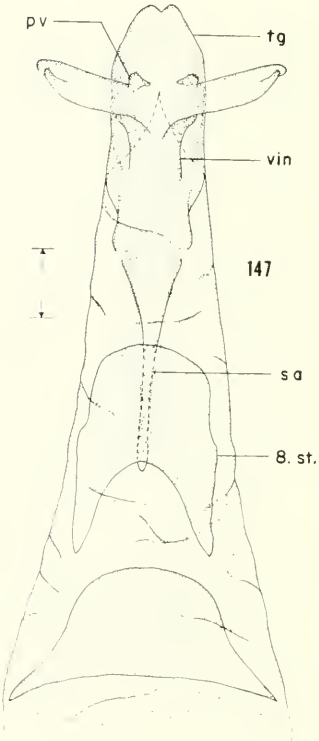
144

145

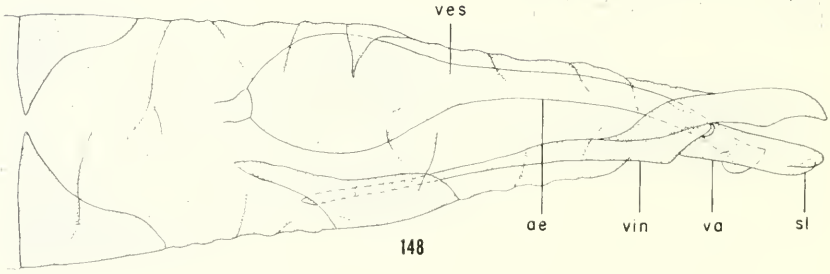




146



147



148

FIGURES 144–148

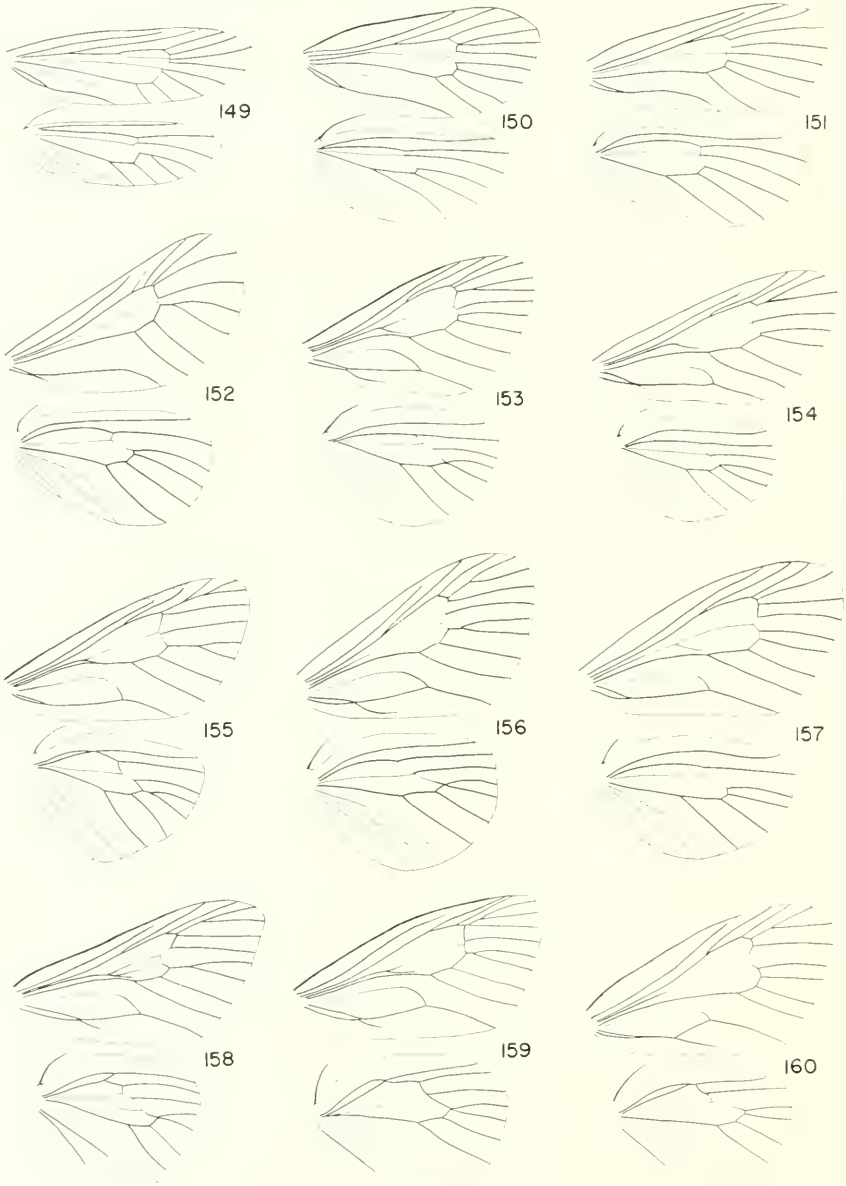
144. *Thyridopteryx ephemeraeformis*, adult female, length 25 mm. (note ovipositor, anal hair tuft, egg tubes through semitransparent body wall, rudimentary legs and head).

145. *Thyridopteryx ephemeraeformis*, male mating with female (inside pupal case, which has been removed from larval case; note extended intersegmental membrane of male abdomen and cephalic end of adult female)

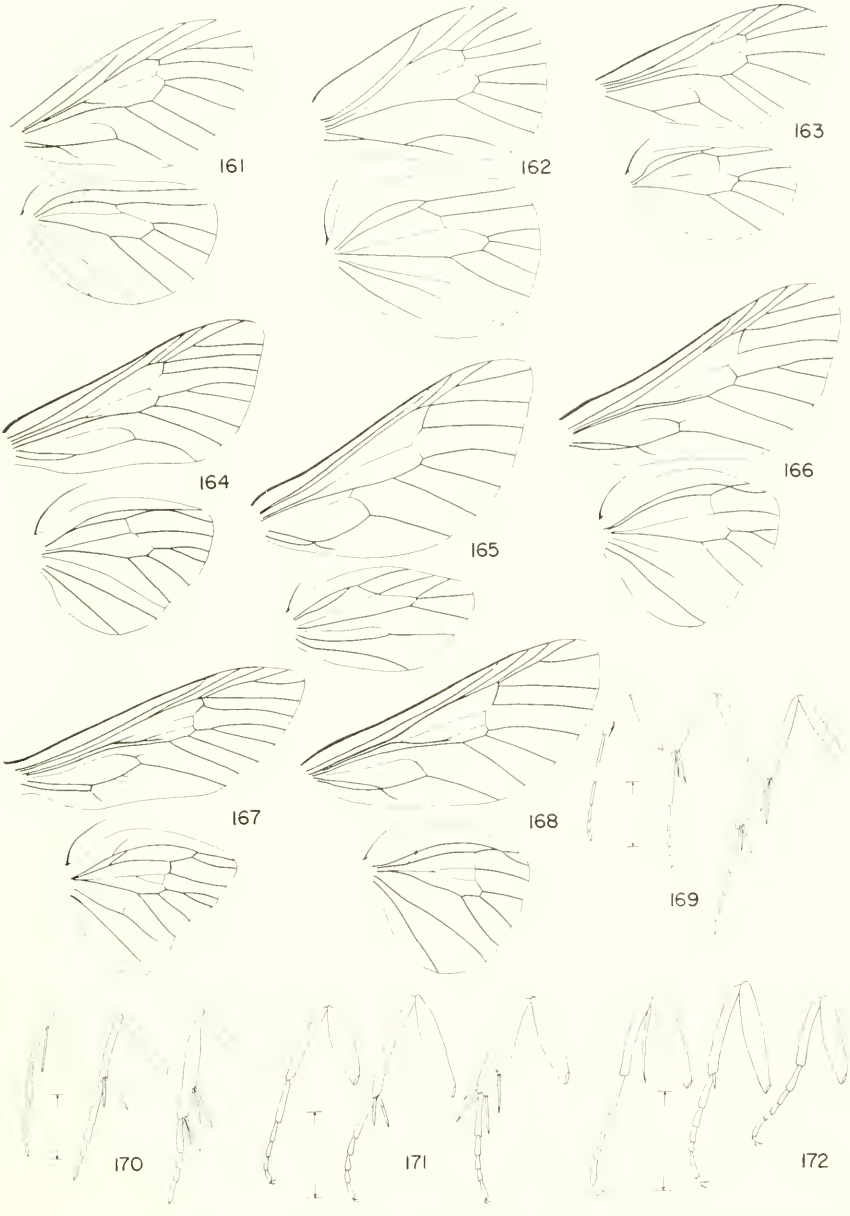
146. *Oiketicus bergii*, wing venation.
i.c. = intercalary cell.

147. *Oiketicus townsendi*, caudal end of male abdomen (extended condition), ventral view. Scale represents 1 mm.
pv = pulvillis vin = vinculum
sa = saccus 8. st = eighth sternite
tg = tegumen

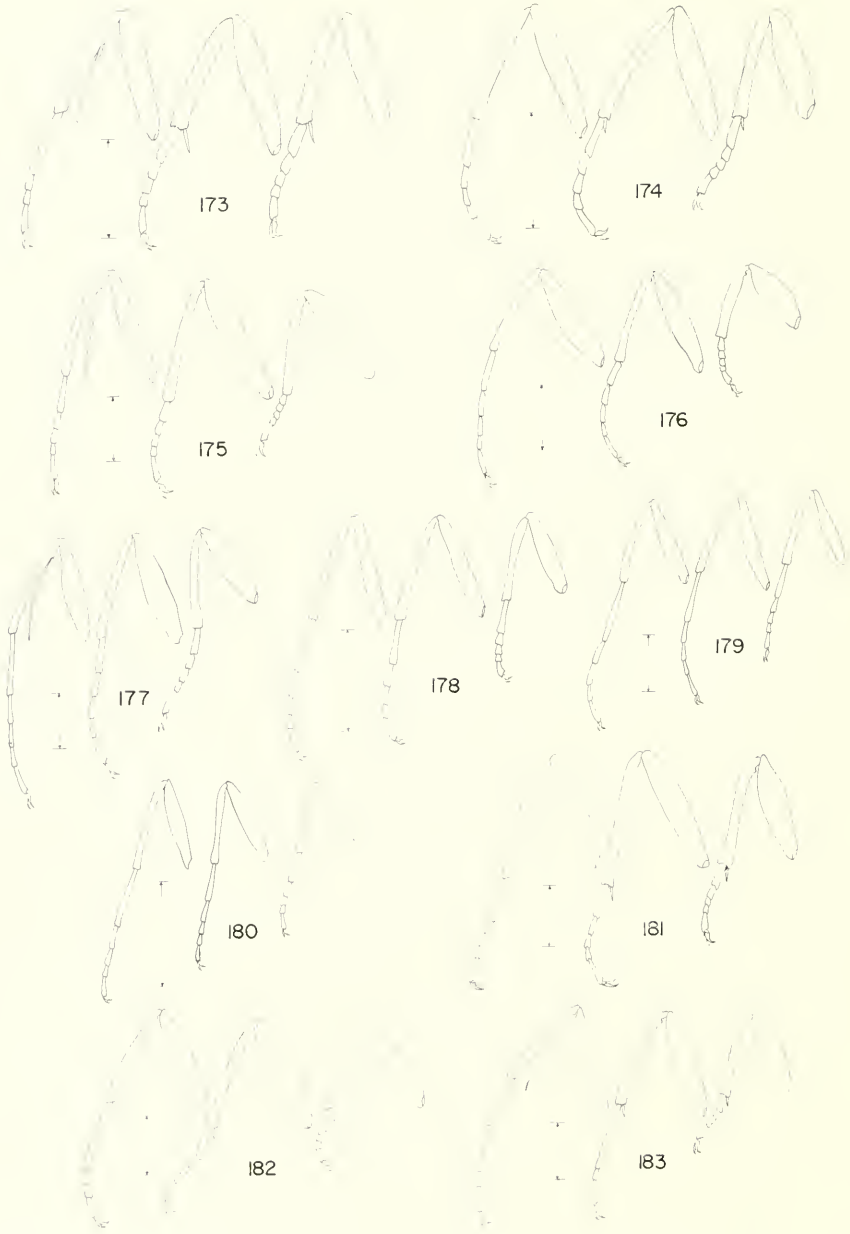
148. Lateral view of fig. 147.
ac = aedeagus va = valva
sl = sacculus ves = vesica



FIGURES 149–160.—Wing venation: 149, *Solenobia walshella;* 150, *Fumaria casta;* 151, *Epichnopterix pulla;* 152, *Apterona crenulella* (Europe); 153, *Prochalia pygmaea;* 154, *Zamopsyche commentella;* 155, *Naevipenna aphaidropa;* 156, *Cryptothelea gloverii;* 157, *Dendropsyche burrowsi;* 158, *Lumacra brasiliensis;* 159, *Curtorama cassiae;* 160, *Astala confederata.*



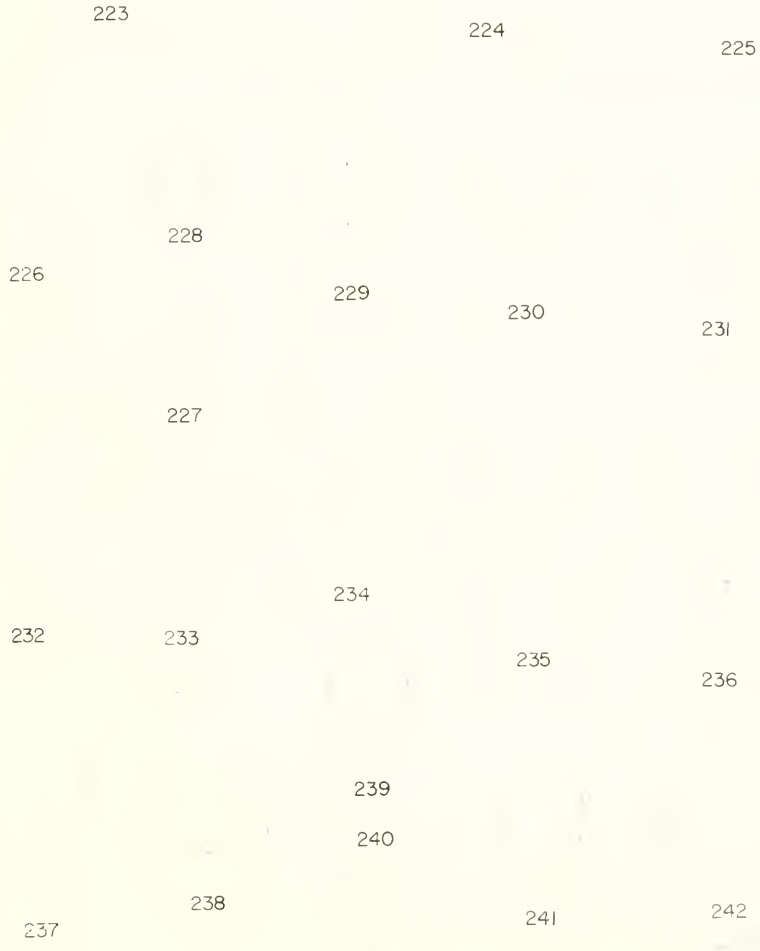
FIGURES 161–172.—Wing venation and legs: 161 *Hyaloscotes pithopoera;* 162, *Basicladus tracyi;* 163, *Coloneura fragilis;* 164, *Thanatopsyche canescens;* 165, *Animula limpia;* 166, *Biopsyche apicalis;* 167, *Oiketicus kirbyi;* 168, *Thyridopteryx ephemeraeformis;* 169, *Solenobia walshella;* 170, *Fumaria casta;* 171, *Epichnopterix pulla;* 172, *Prochalia pygmaea.* (Figs. 169–172, scale = 1 mm.)



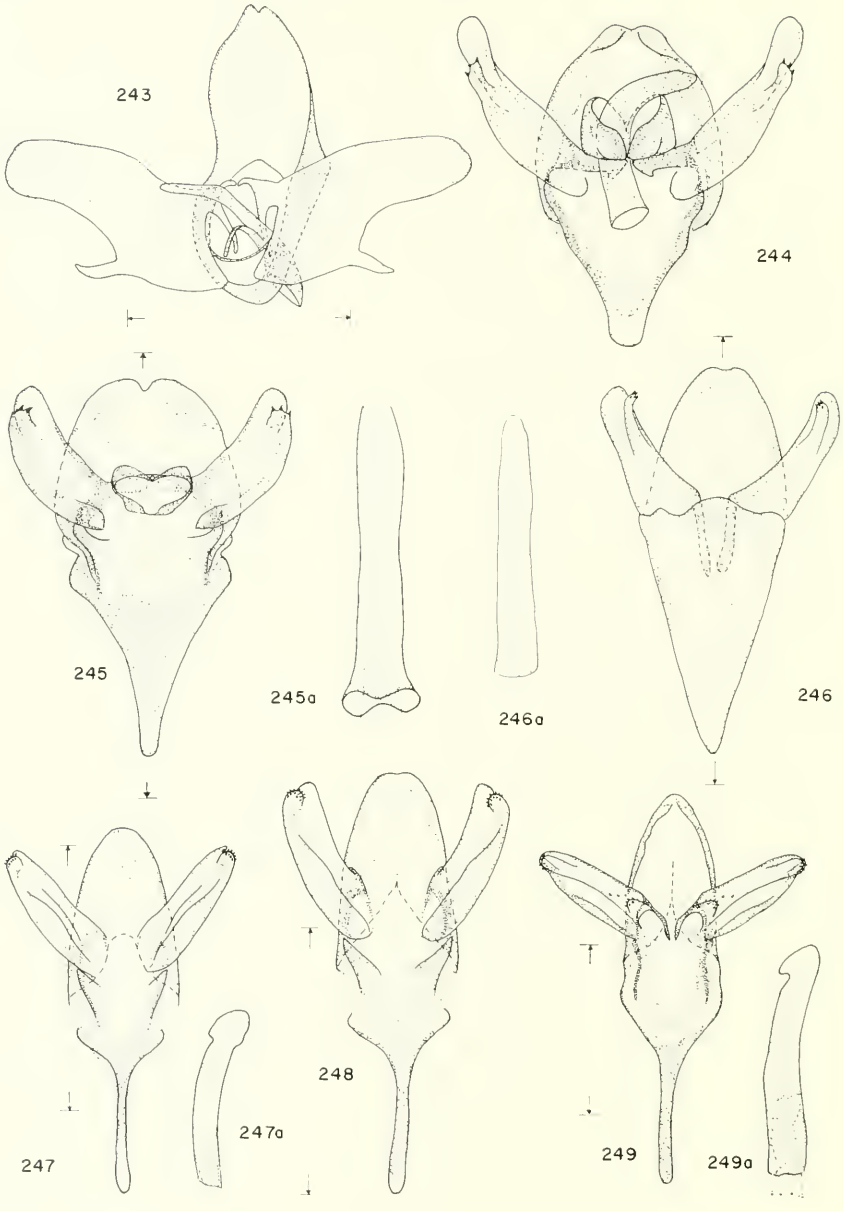
FIGURES 173–183.—Legs: 173, *Naevipenna aphaidropa;* 174, *Cryptothelea gloverii;* 175, *Lumacra brasiliensis;* 176, *Curtorama cassiae;* 177, *Hyaloscotes fumosa*, paratype; 178, *Astala confederata;* 179, *Basicladus tracyi;* 180, *Coloneura fragilis;* 181, *Animula dichroa;* 182, *Thanatopsyche canescens;* 183, *Biopsyche apicalis.* (Scale=1 mm.)

FIGURES 184–202a.—Legs and eighth abdominal sternites of male: 184, *Oiketicus geyeri;* 185, *O. kirbyi;* 186, *O. zihuatanejensis;* 187, *Thyridopteryx ephemeraeformis;* 188, *Solenobia walshella*, 8th sternite; 188a, 8th tergite; 189, *Fumaria casta;* 190, *Epichnopterix pulla;* 191, *Apterona crenulella* (Europe); 192, *Prochalia pygmaea;* 193, *Zamopsyche commentella;* 194, *Naevipenna aphaidropa;* 195, *Cryptothelea surinamensis;* 196, *C. watsoni;* 197, *C. macleayi*, type; 198, *C. symmicta;* 199, *C. congregata*, paratype; 200, *C. gloverii;* 201, *C. nigrita;* 202, *Dendropsyche burrowsi*, type, 8th sternite; 202a, 8th tergite. (Scale = 1 mm.; figs. 188–202a same magnification as fig. 201.)

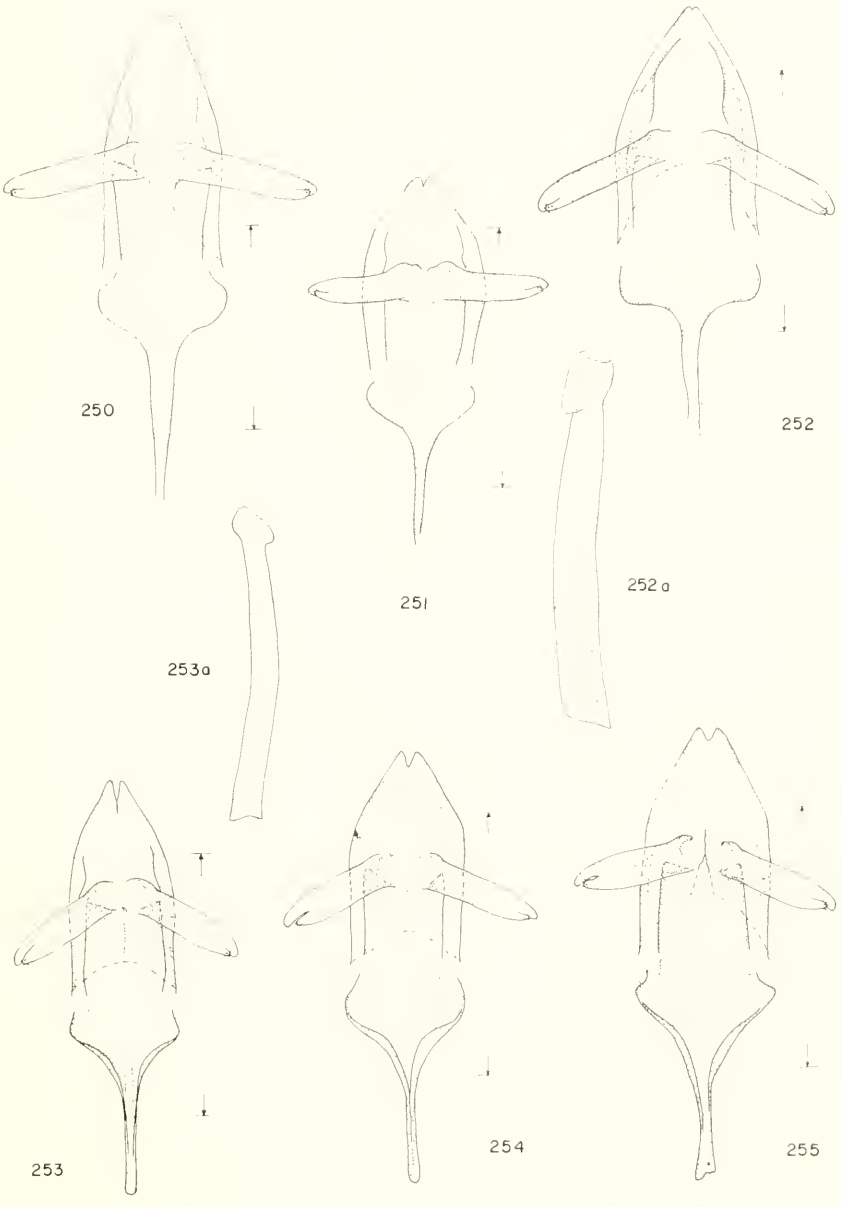
FIGURES 203–222.—Eighth abdominal sternites of male: 203, *Lumacra hyalinacra*, type; 204, *L. quadridentata*, type; 205, *L. brasiliensis;* 206, *L. küinckelii;* 207, *L. haitiensis*, type; 208, *Curtorama cassiae;* 209, *Hyaloscotes fumosa*, paratype; 210, *H. pithopoera;* 211, *Astala confederata;* 212, *A. hoffmanni*, type; 213, *A. edwardsi;* 214, *A. tristis;* 215, *A. zacualpania;* 216, *A. vigasi;* 217, *Basicladus celibatus;* 218, *B. tracyi;* 219, *Coloneura fragilis;* 220, *Animula seitzi*, type; 221, *A. dichroa;* 222, *A. limpia*, type. (Scale=1 mm.; figs. 203, 204, 206–219 same magnification as fig. 213; figs. 220–222 same as fig. 221.)



FIGURES 223–242.—Eighth abdominal sternites of male: 223, *Animula microptera;* 224, *Thanatopsyche chilensis;* 225, *T. canescens;* 226, *Biopsyche apicalis;* 227, *Oiketicus zihuatanejensis;* 228, *O. bergii;* 229, *O. bergii* (?); 230, *O. geyeri;* 231, *O. platensis;* 232, *O. abbotii;* 233, *O. kirbyi;* 234, *O. kirbyi;* 235, *O. specter;* 236, *O. specter;* 237, *O. assimilis;* 238, *O. toumeyi;* 239, *Thyridopteryx alcora;* 240, *T. meadi;* 241, *T. ephemeraeformis;* 242, *T. ephemeraeformis.* (Scale = 1 mm.; figs. 223–226 same magnification as fig. 223; figs. 227–242 same as fig. 229.)

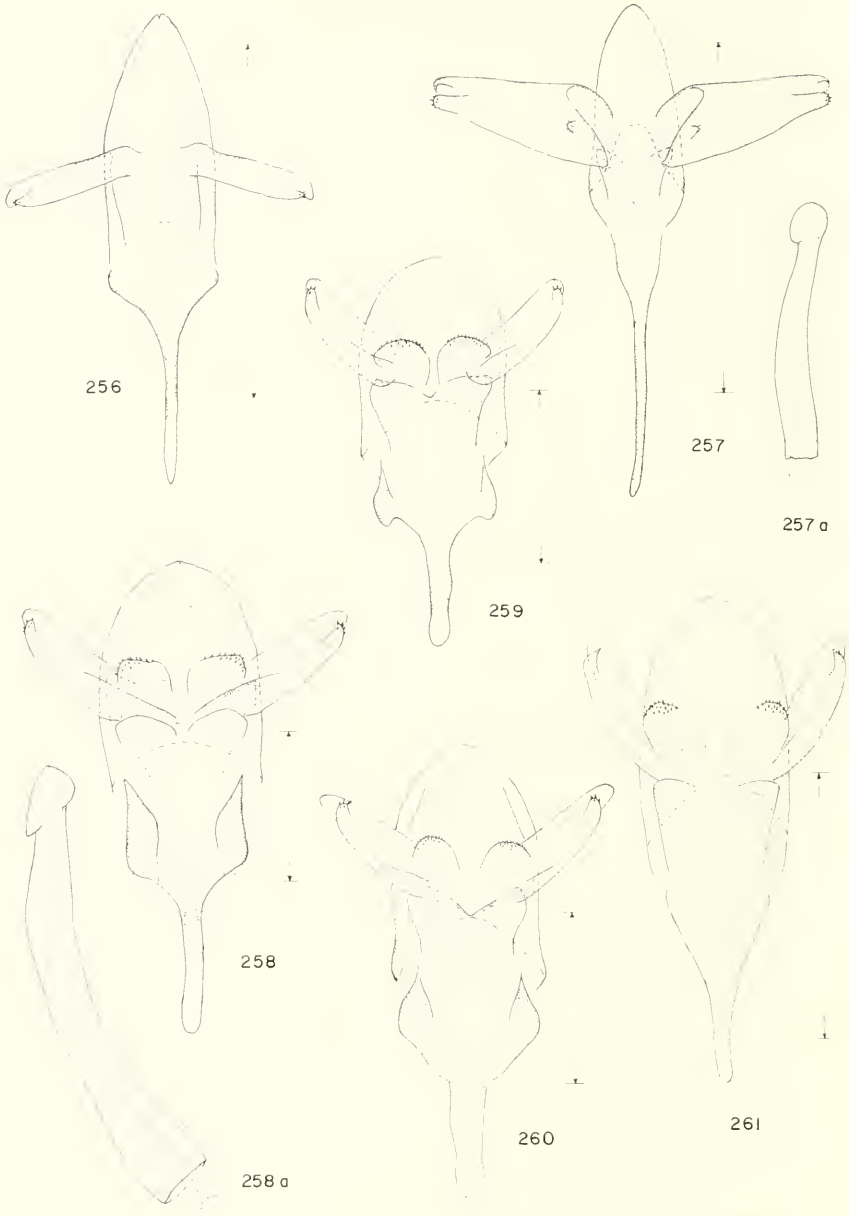


FIGURES 243–249a.—Male genitalia: 243, *Solenobia walshella;* 244, *Fumaria casta* (same scale as fig. 245); 245, *Epichnopterix pulla;* 245a, aedeagus; 246, *Apterona crenulella* (Europe); 246a, aedeagus; 247, *Prochalia pygmaea;* 247a, aedeagus; 248, *Zamopsyche commentella;* 248a, aedeagus; 249, *Naevipenna aphaidropa,* type; 249a, aedeagus. (Scale=1 mm.)

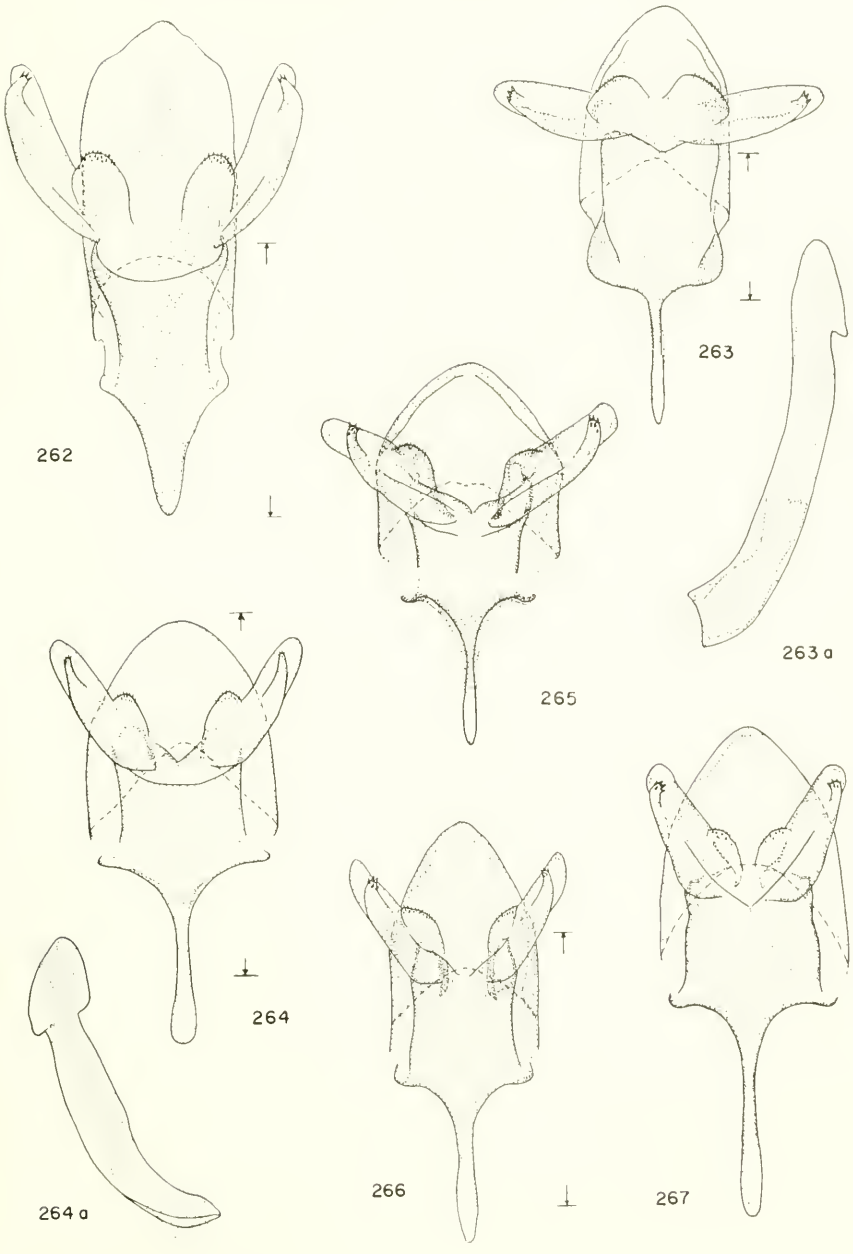


FIGURES 250–255.—Male genitalia: 250. *Cryptothelea surinamensis;* 251, *C. macleayi*, type; 252, *C. watsoni*, paratype; 252a, aedeagus; 253, *C. gloverii;* 253a, aedeagus; 254. *C. nigrita;* 255, *C. congregata.* (Scale = 1 mm.)

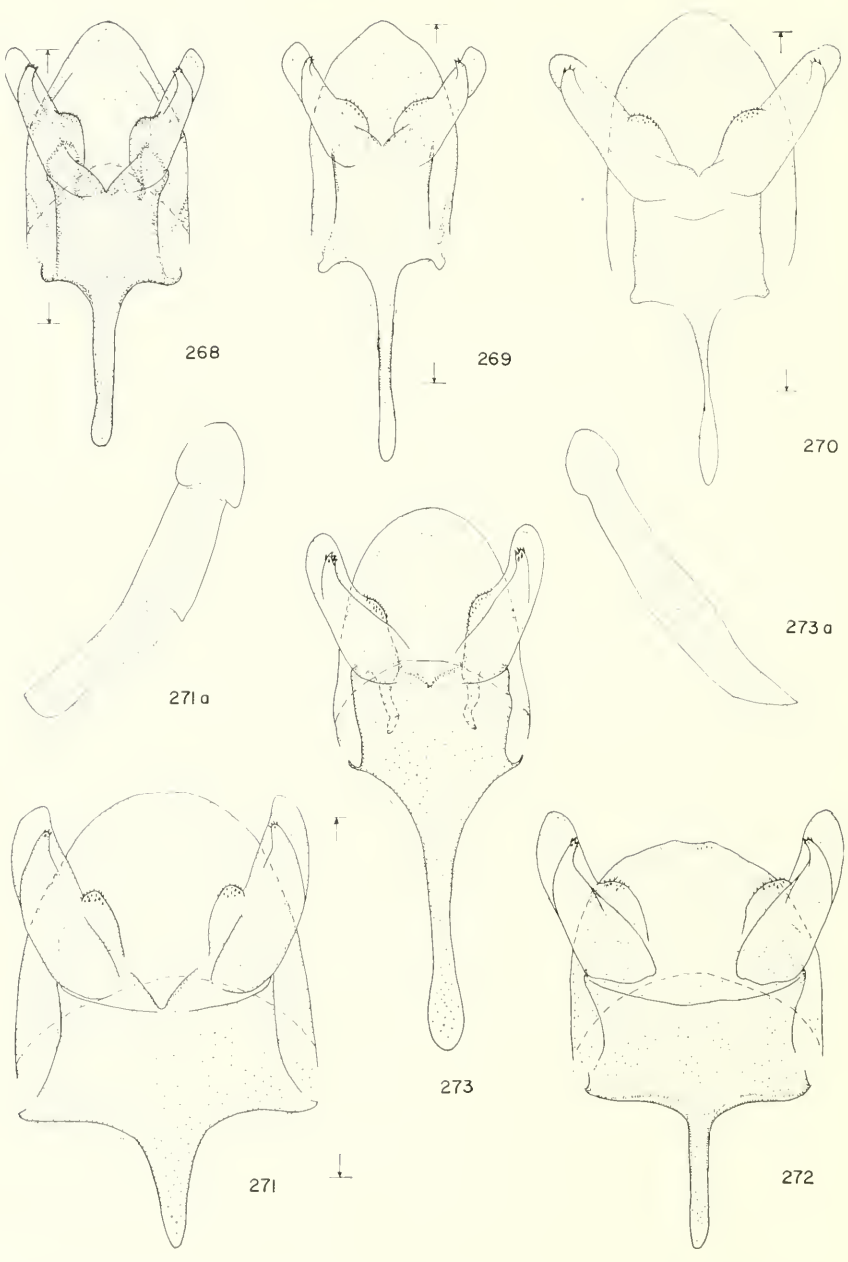
693-052—64——14



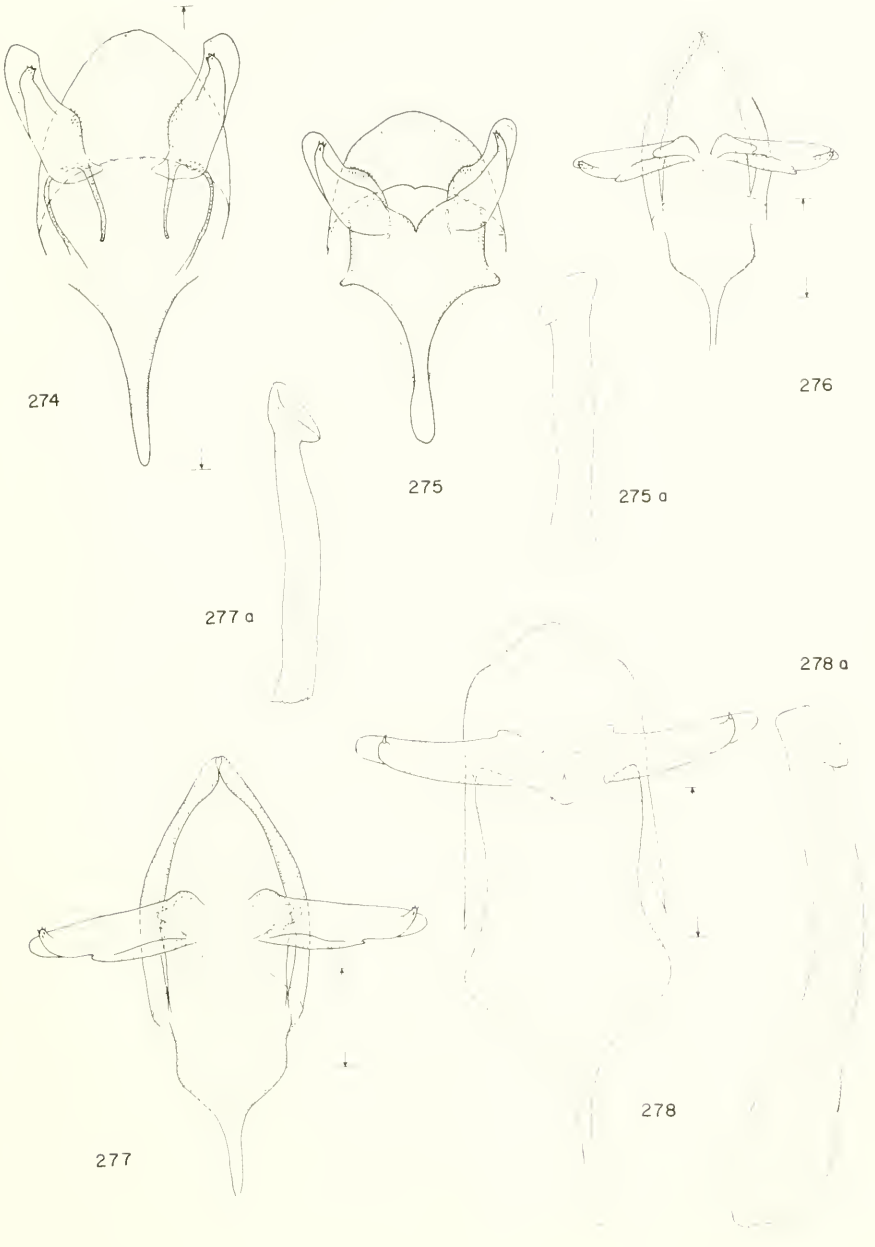
FIGURES 256–261.—Male genitalia: 256, *Cryptothelea symmicta;* 257, *Dendropsyche burrowsi,* type; 257a, aedeagus; 258, *Lumacra brasiliensis;* 258a, aedeagus; 259, *L. künckelii;* 260, *L. haitiensis,* type; 261, *L. quadridentata,* type. (Scale=1 mm.)



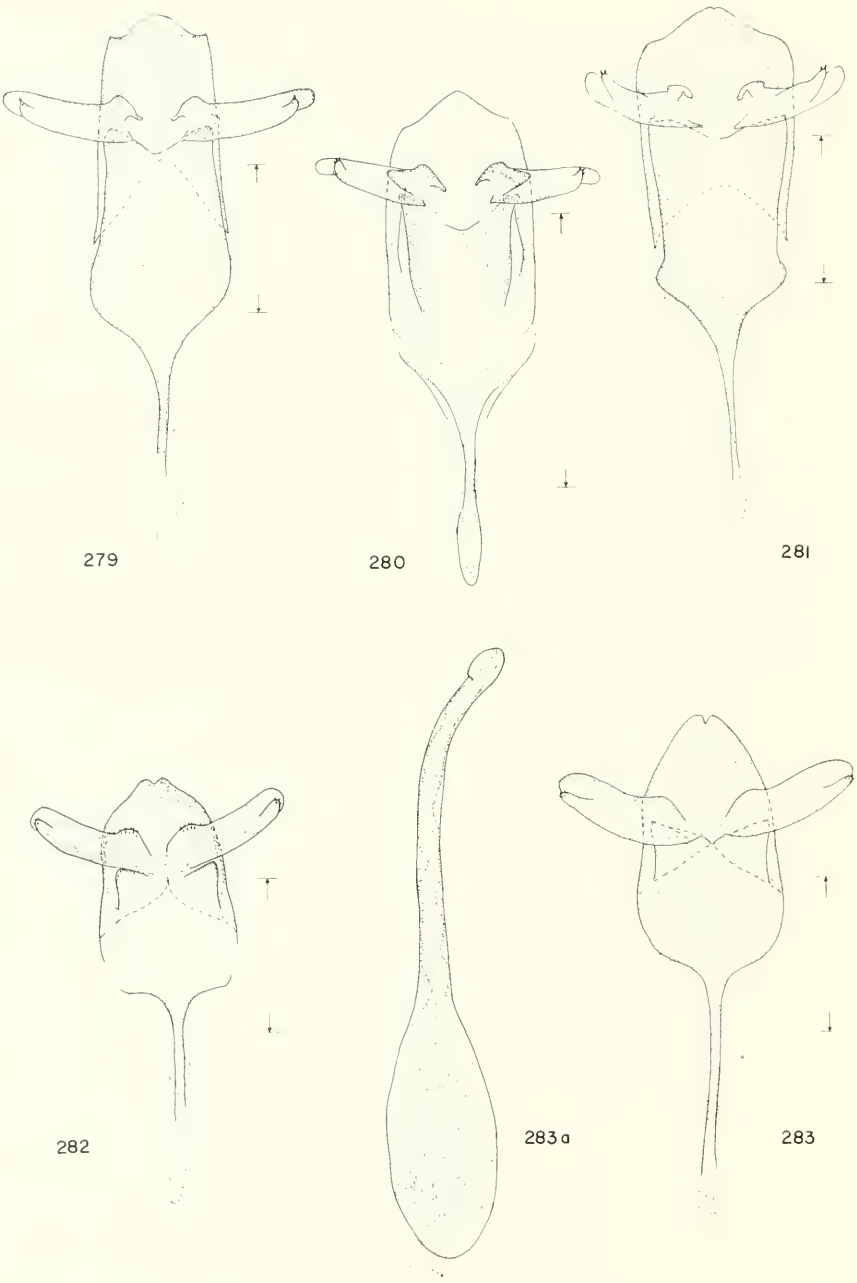
FIGURES 262–267.—Male genitalia: 262. *Lumacra hyalinacra*, type; 263. *Curtorama cassiae*; 263a, aedeagus; 264, *Astala confederata*; 264a, aedeagus; 265, *A. hoffmanni*, type; 266, *A. polingi*, paratype; 267. *A. edwardsi* (same scale as fig. 266). (Scale=1 mm.)



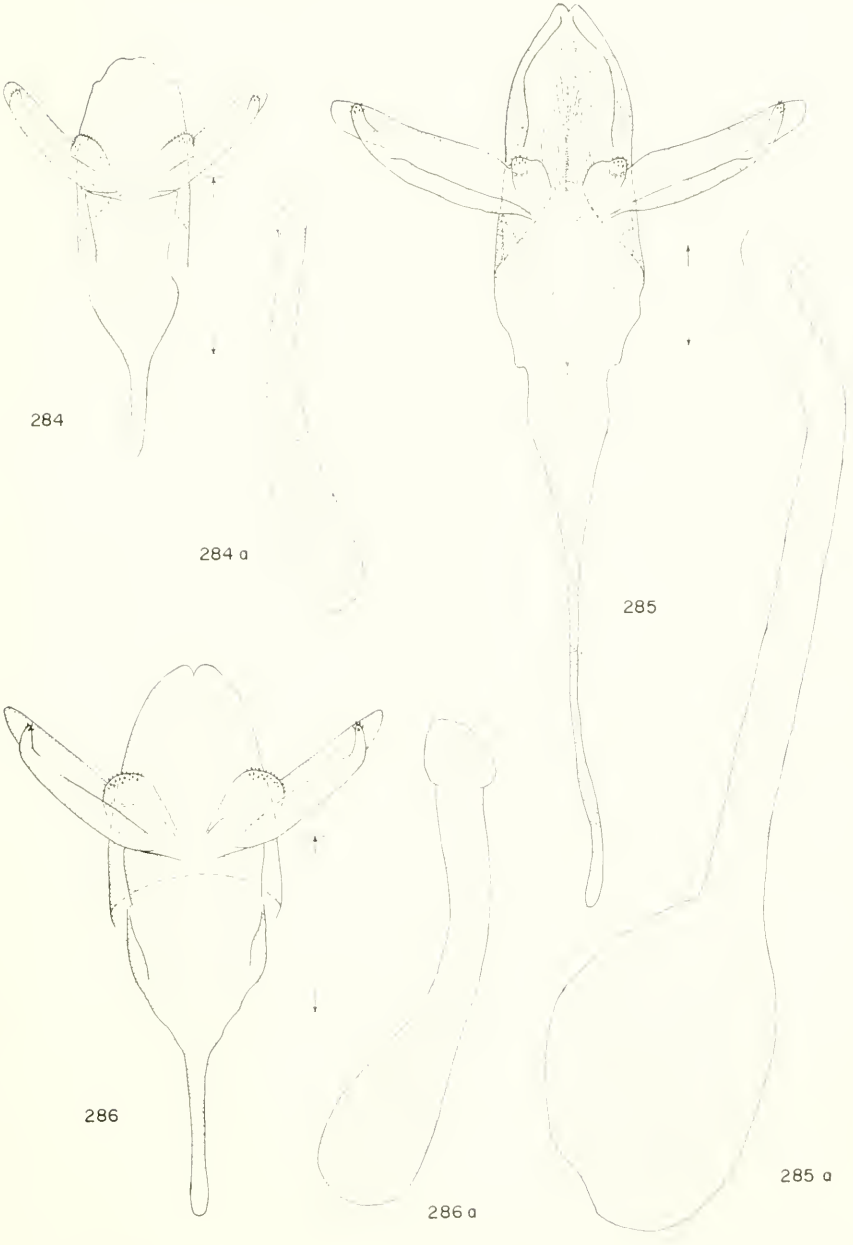
FIGURES 268–273a.—Male genitalia: 268, *Astala tristis*, type; 269, *A. vigasi;* 270. *A. zacualpania;* 271, *Hyaloscotes fumosa*, paratype; 271a, aedeagus; 272, *H. pithopoera* (same scale as fig. 271); 273, *Basicladus tracyi* (same scale as fig. 268); 273a, aedeagus. (Scale = 1 mm.)



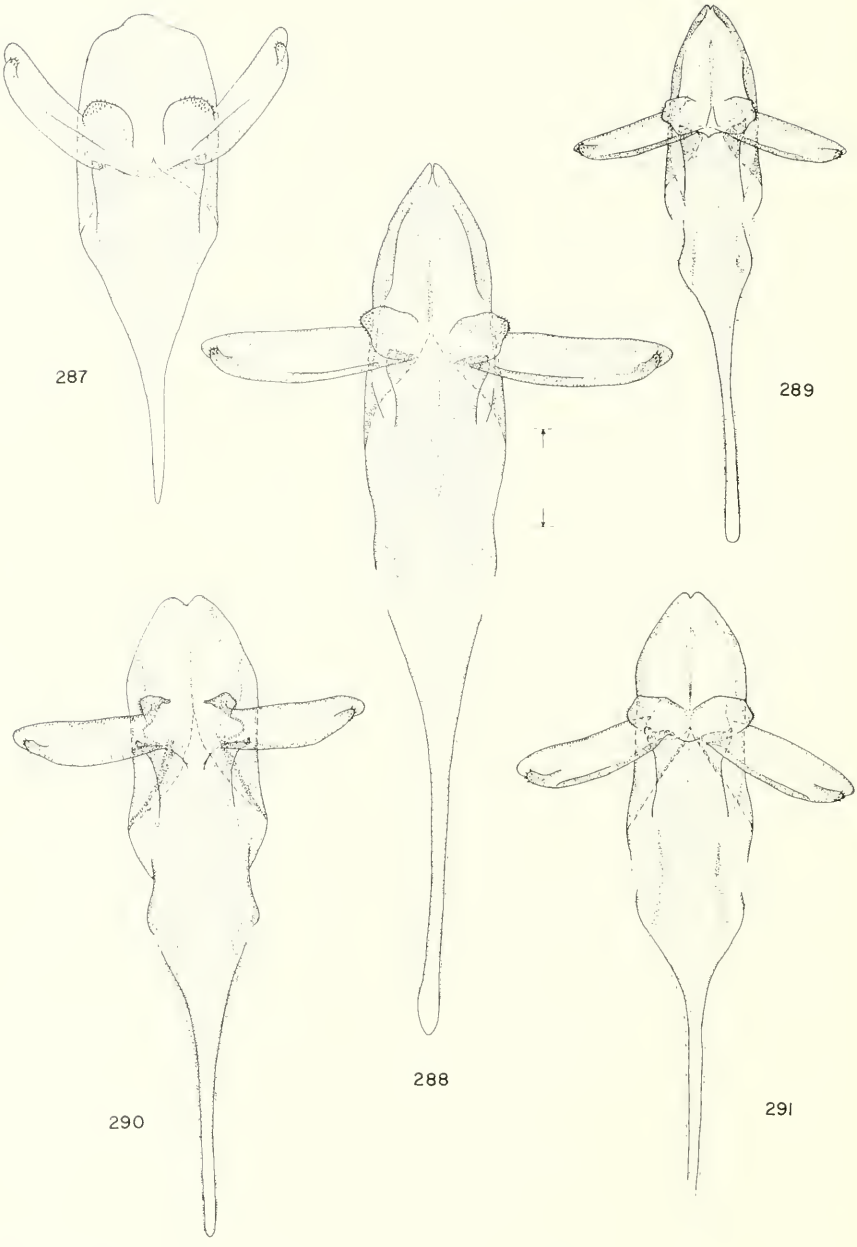
FIGURES 274–278a.—Male genitalia: 274, *Basicladus celibatus;* 275, *Coloneura fragilis* (same scale as fig. 274); 275a, aedeagus; 276, *Thanatopsyche canescens;* 277, *T. chilensis;* 277a, aedeagus; 278, *Animula dichroa;* 278a, aedeagus. (Scale = 1 mm.)



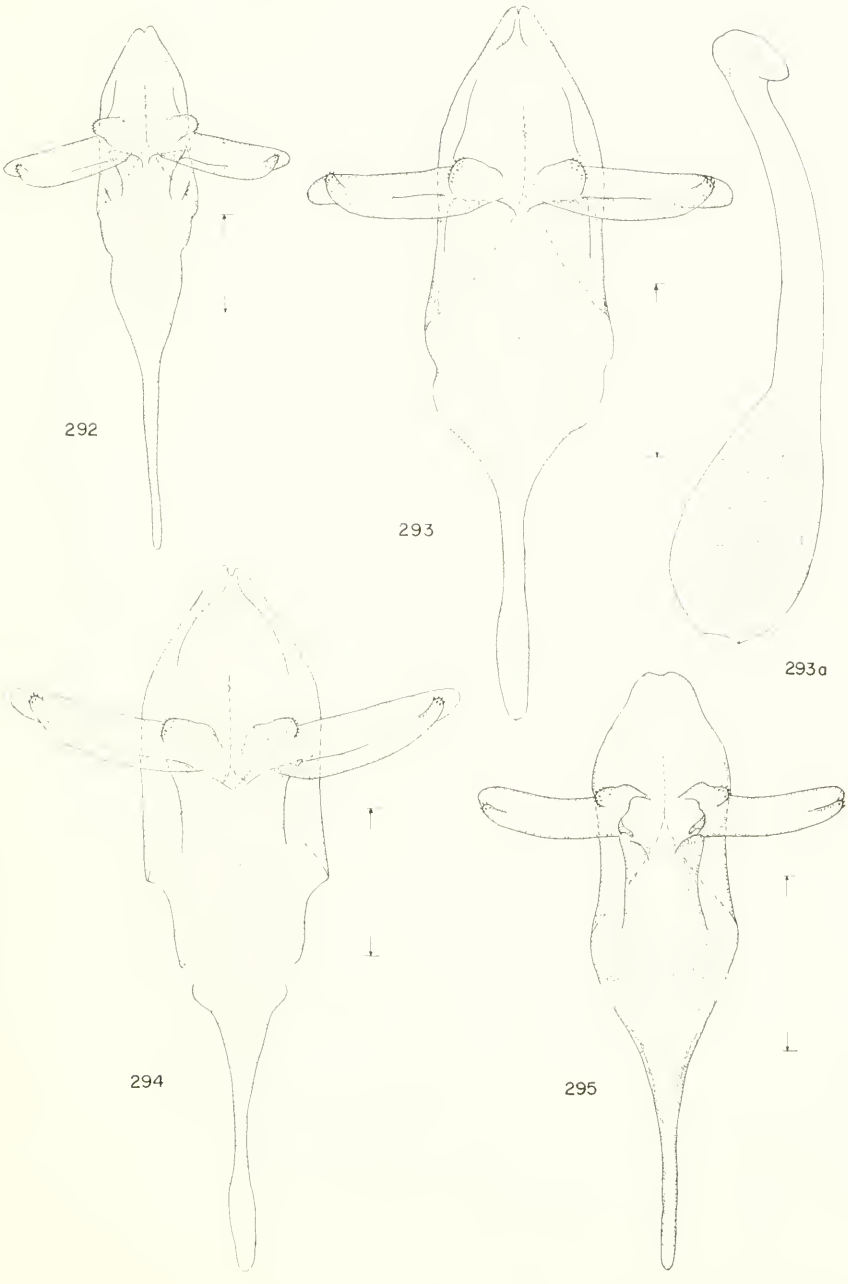
FIGURES 279–283a.—Male genitalia: 279, *Animula microptera;* 280, *A. seitzi*, type; 281, *Animula limpia;* 282, *Biopsyche thoracica;* 283, *B. apicalis;* 283a, aedeagus. (Scale = 1 mm.)



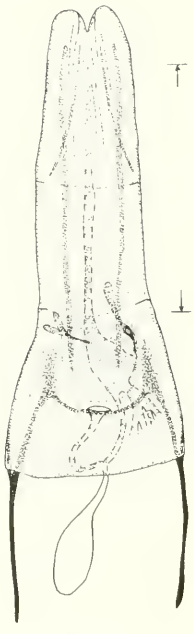
FIGURES 284–286a.—Male genitalia: 284, *Oiketicus bergii;* 284a, aedeagus; 285, *O. specter;* 285a, aedeagus; 286, *O. zihuatan-jensis;* 286a, aedeagus. (Scale = 1 mm.)



FIGURES 287–291.—Male genitalia: 287, *Oiketicus geyeri;* 288, *O. kirbyi;* 289, *O. toumeyi;* 290, *O. townsendi townsendi;* 291, *O. platensis.* (Scale = 1 mm.; same magnification as fig. 288.)

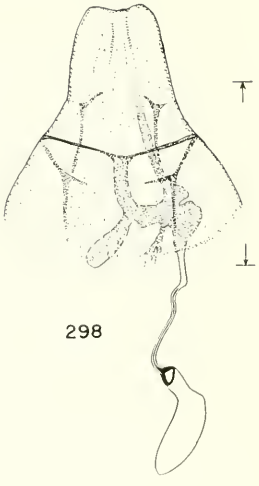


FIGURES 292–295. Male genitalia: 292, *Oiketicus abbotii;* 293, *Thyridopteryx alcora;* 293a, aedeagus; 294, *T. ephemeraeformis;* 295, *T. meadi.* (Scale = 1 mm.)

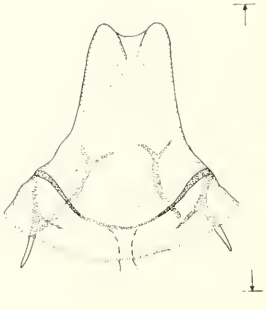


296

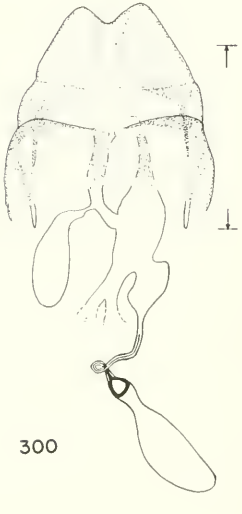
297



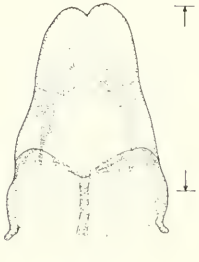
298



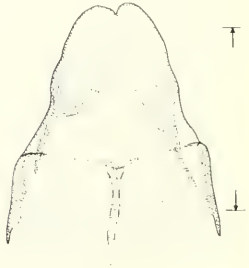
299



300

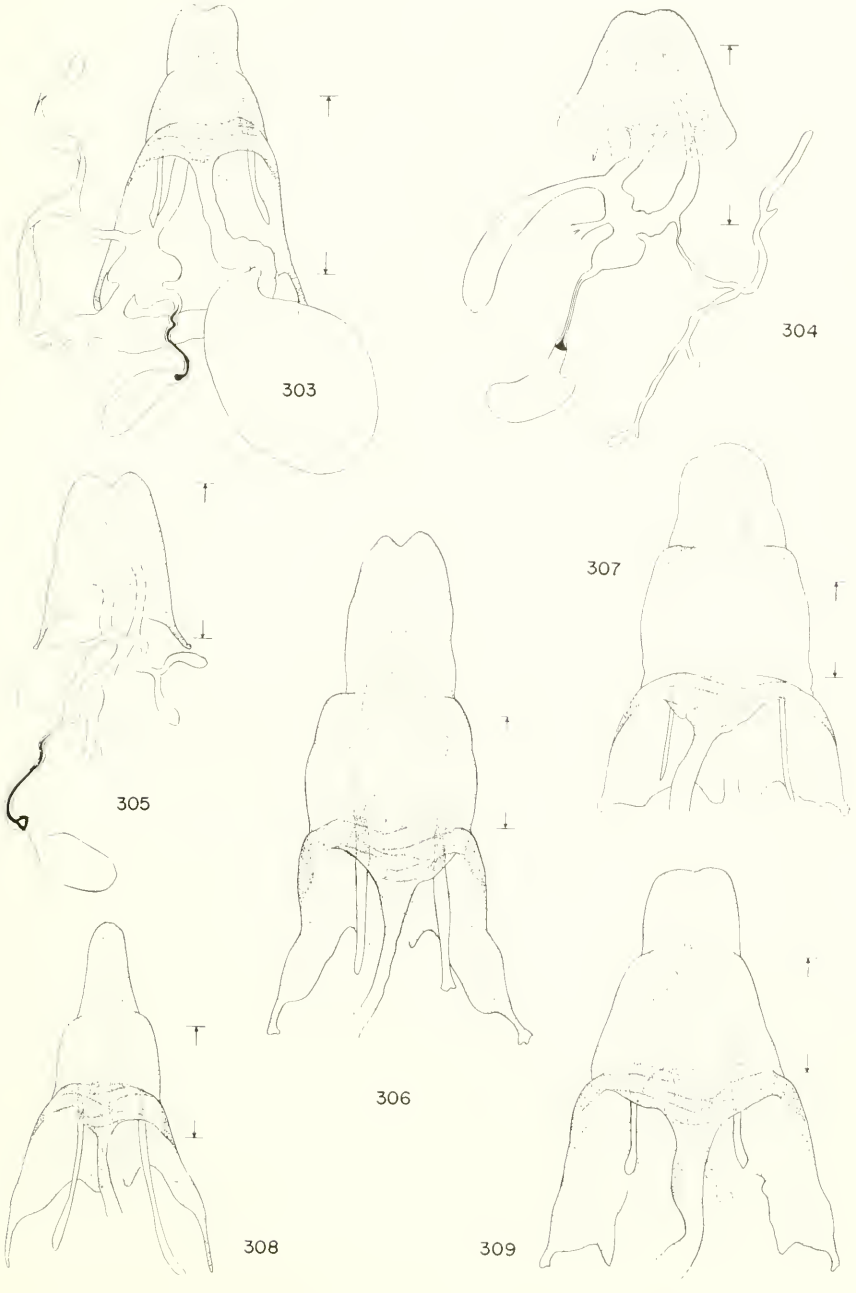


301

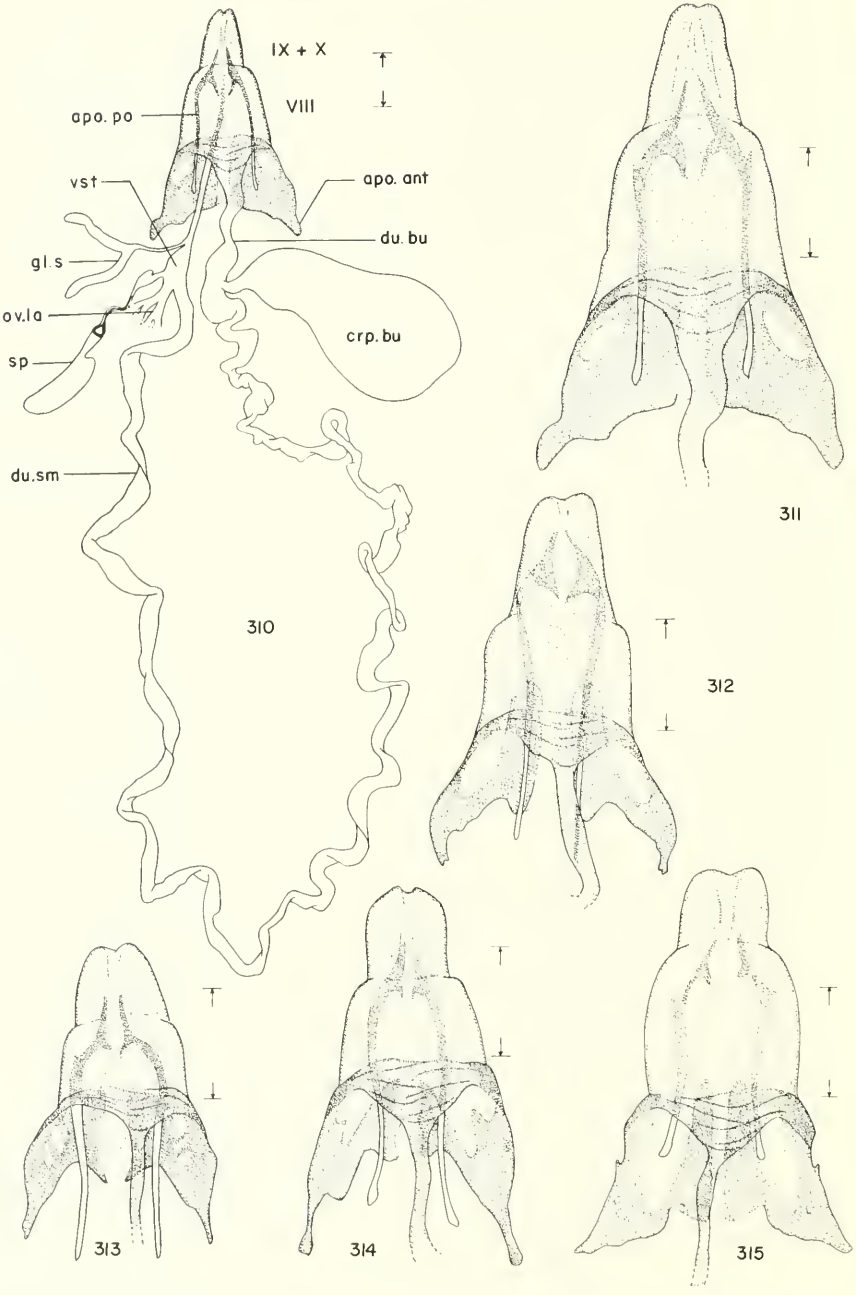


302

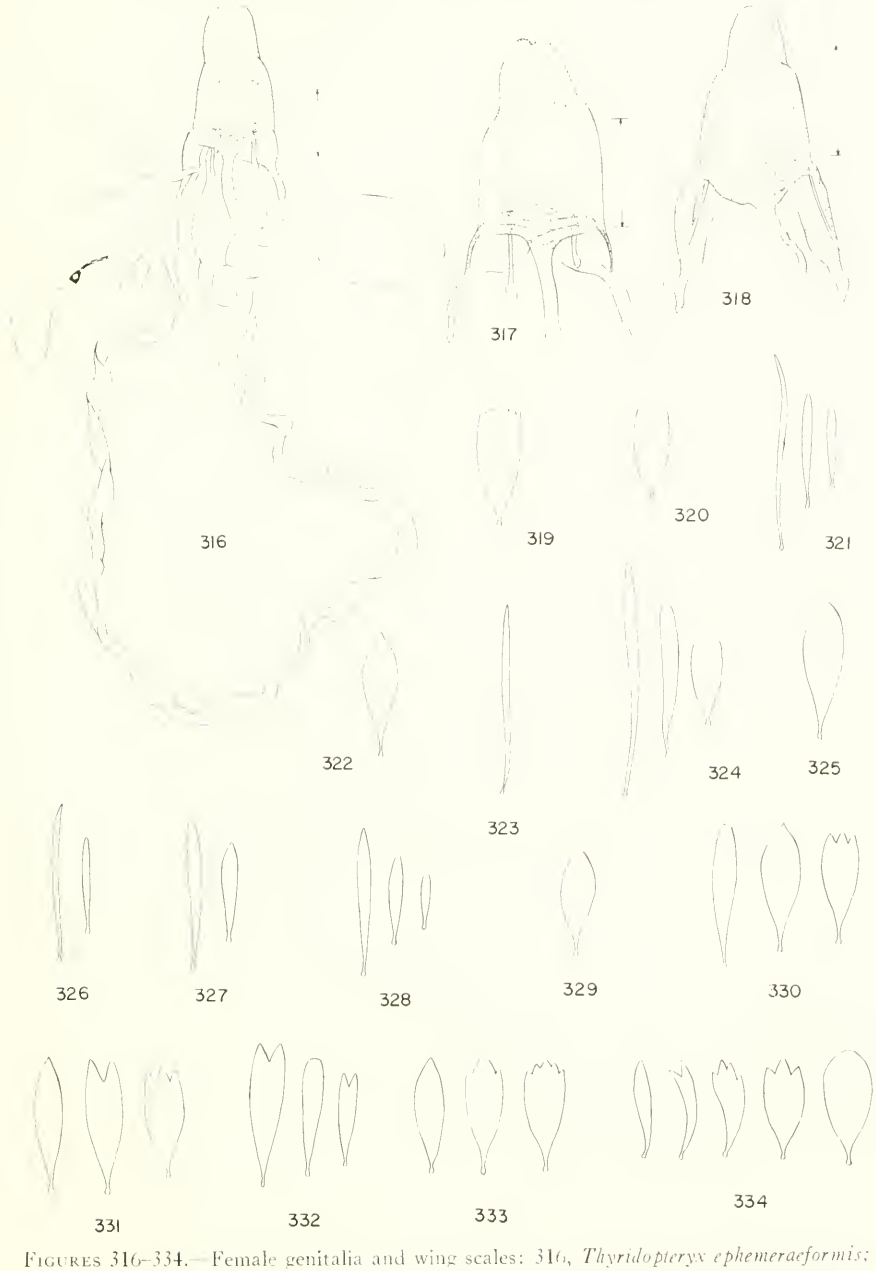
FIGURES 296–302.—Female genitalia: 296, *Solenobia walshella;* 297, *Fumaria casta;* 298, *Zamopsyche commentella;* 299, *Prochalia pygmaea;* 300, *Cryptothelea nigrita;* 301, *C. watsoni;* 302, *C. gloverii.* (Scale = 1 mm.)



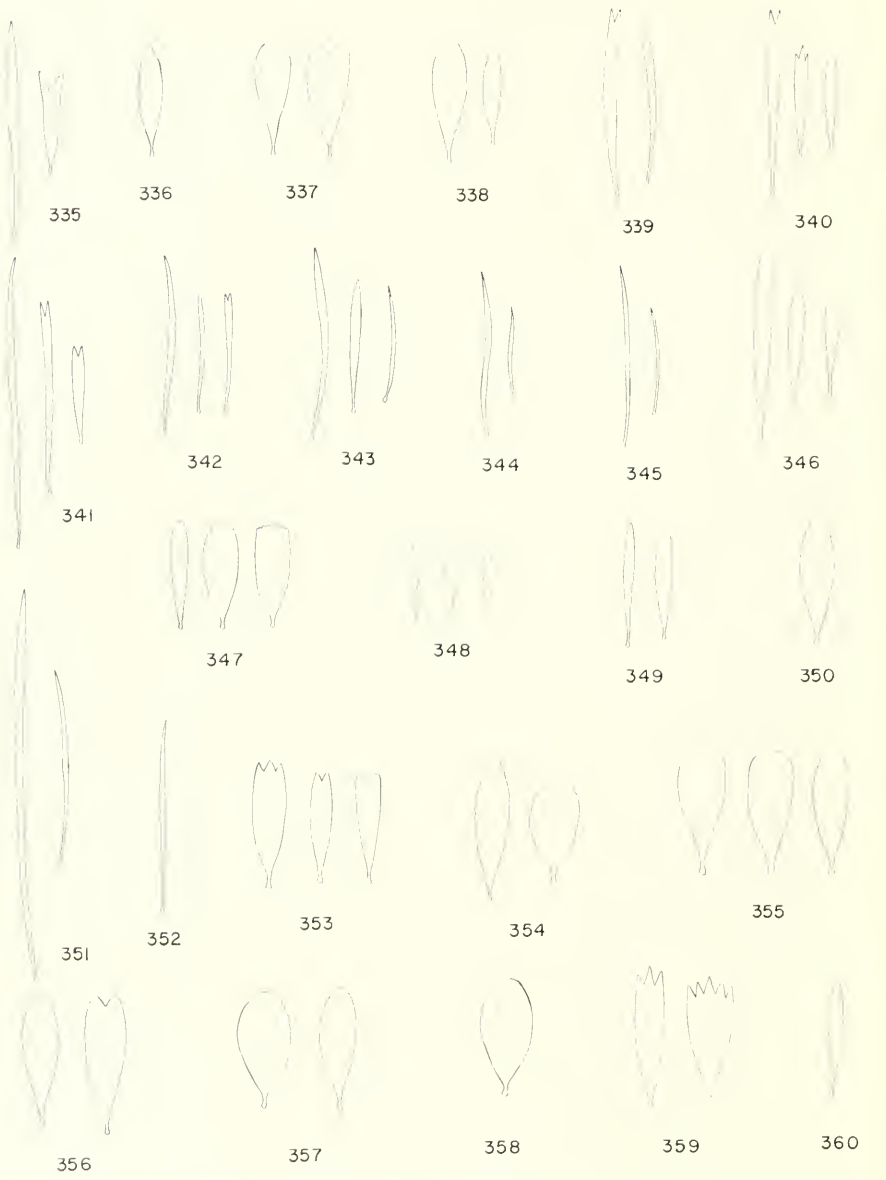
FIGURES 303–309.—Female genitalia: 303, *Curtorama cassiae* (type of *Chalia rebeli*); 304, *Hyaloscotes pithopoera;* 305, *Astala confederata;* 306, *Oiketicus townsendi dendrokomos;* 307, *O. geyeri;* 308, *O. bergii;* 309, *O. townsendi townsendi.* (Scale = 1 mm.)



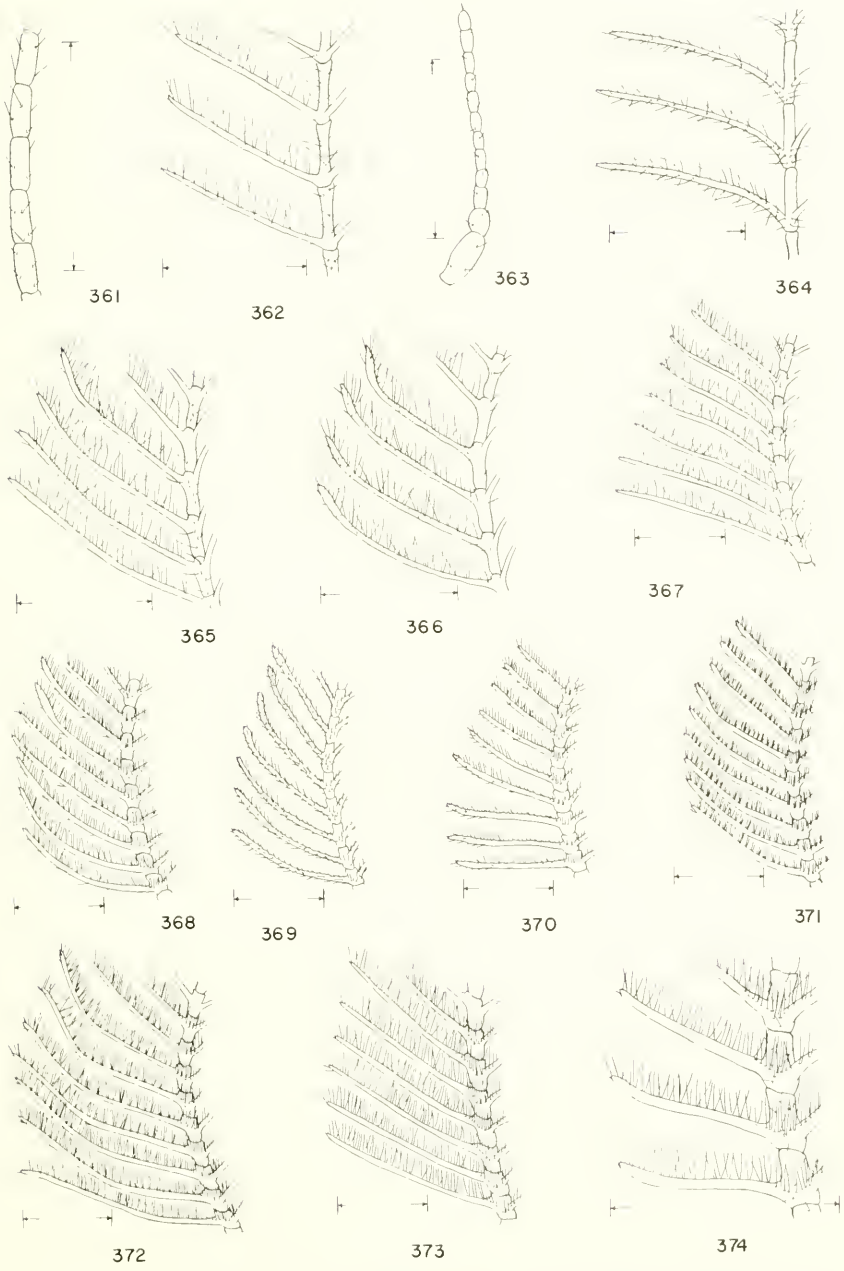
FIGURES 310–315.—Female genitalia: 310, *Oiketicus kirbyi* (apo. ant = apophysis anterior; apo. po = apophysis posterior; crp. bu = corpus bursae; du. bu = ductus bursae; du. sm = ductus seminalis; gl. s = glandula sebacea, accessory gland; ov. la = oviductus lateralis; sp. = spermatheca; vst = vestibulum); 311, *O. kirbyi;* 312, *O. kirbyi;* 313, *O. abbotii;* 314, *O. toumeyi;* 315, *O. platensis.* (Scale = 1 mm.)



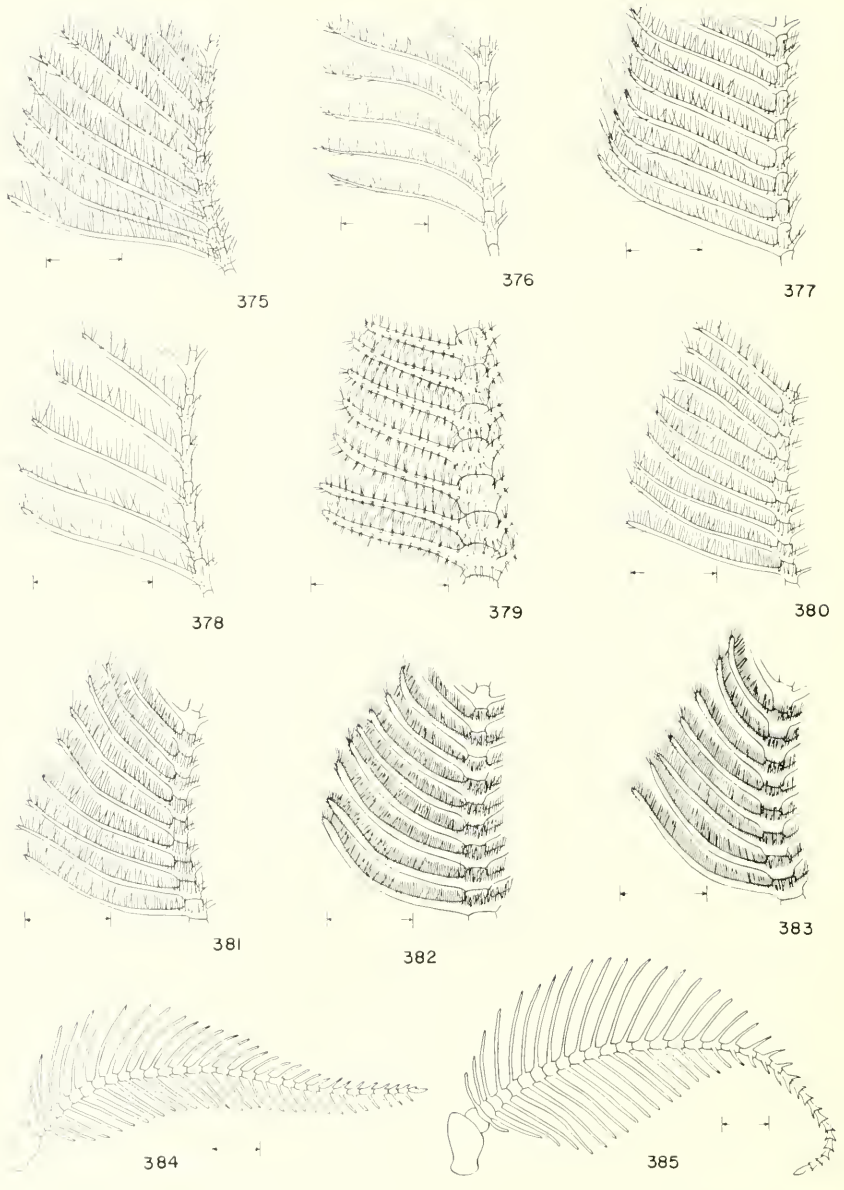
FIGURES 316–334.—Female genitalia and wing scales: 316, *Thyridopteryx ephemeraeformis;* 317, *T. ephemeraeformis;* 318, *T. meadi;* 319, *Solenobia walshella;* 320, *Fumaria casta;* 321, *Epichnopteryx pulla;* 322, *Prochalia pygmaea;* 323, *Zamopsyche commentella;* 324, *Naevipenna aphaidropa;* 325, *Cryptothelea surinamensis;* 326, *C. nigrita;* 327, *C. gloverii;* 328, *C. symmicta;* 329, *C. watsoni,* paratype; 330, *Lumacra brasiliensis;* 331, *L. künckelii;* 332, *L. haitiensis,* type; 333, *L. quadridentata,* type; 334, *L. hyalinacra,* type. (Figs. 316–318, scale 1 mm.; all wing scales 108×; figs. 319–334 from discal cell of forewing.)



FIGURES 335–360.—Wing scales: 335, *Curtorama cassiae;* 336, *Astala confederata;* 337, *A. hoffmanni;* 338, *A. polingi,* paratype; 339, *A. edwardsi;* 340, *A. tristis;* 341, *A. zacualpania;* 342, *A. vigasi;* 343, *Basicladus tracyi;* 344, *B. celibatus;* 345, *Coloneura fragilis;* 346, *Biopsyche apicalis* (from cell 1A of forewing); 347, *B. thoracica* (from cell 1A of forewing); 348, *Oiketicus bergii;* 349, *O. geyeri;* 350, *O. toumeyi;* 351, *Hyaloscotes fumosa,* paratype; 352, *H. pithopoera,* type; 353, *Oiketicus specter;* 354, *O. platensis;* 355, *O. townsendi mexicanus;* 356, *O. t. townsendi;* 357, *O. kirbyi;* 358, *O. abbotii;* 359, *Thyridopteryx alcora* (from cell 2A of forewing); 360, *T. ephemeraeformis* (from cell 2A of forewing). (All wing scales 108×; figs. 335–345, 348–358 from discal cell of forewing.)



FIGURES 361–374.—Antennae: 361, *Solenobia walshella*, male; 362, *Fumaria casta*, male; 363, *F. casta*, female; 364, *Epichnopterix pulla*; 365, *Prochalia pygmaea*; 366, *Zamopsyche commentella*; 367, *Naevipenna aphaidropa*; 368, *Cryptothelea nigrita*; 369, *C. gloverii*; 370, *C. congregata*; 371, *C. macleayi*, type; 372, *C. watsoni*, paratype; 373, *Lumacra brasiliensis*; 374, *Curtorama cassiae*. (Scale = 0.5 mm.).



FIGURES 375–385.—Antennae: 375, *Astala confederata;* 376, *Hyaloscotes fumosa*, paratype; 377, *Basicladus tracyi;* 378, *Coloneura fragilis;* 379, *Thanatopsyche canescens;* 380, *Animula limpia;* 381, *Biopsyche apicalis;* 382, *Oiketicus kirbyi;* 383, *Thyridopteryx ephemeraeformis;* 384, *O. bergii;* 385, *O. geyeri.* (Scale=0.5 mm.)

Index

(Names of new genera and species, page numbers of principal accounts in *italics*)

693-052—64——15