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THE AMERICAN GENERA OF MYDIDAE (DIPTERA), WITH THE DESCRIPTION OF THREE NEW GENERA AND TWO NEW SPECIES

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CONTENTS

INTRODUCTION

The two-winged flies of the family Mydidae have been of interest to entomologists for many years, partly because of their exceptional size and relative scarcity in collections. These flies range from 9 to 60 mm in length and some of the Neotropical species of *Mydas* Fabricius are believed to be the largest known Diptera. They occur all over the world but prefer rather warm climates; in fact, some of them seem to prefer the hottest climates at the hottest times of the year.

The Mydidae were placed by Stone *et al.* (1965) in the Suborder Brachycera, Superfamily Asiloidea, which includes the following families: Therevidae, Scenopinidae, Apioceridae, Mydidae, Asilidae, Nemestrinidae, Acroceridae, and Bombyliidae. From the wing venation mydids appear to be related to the Apioceridae (Cazier, 1941). From his study

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of the male genitalia, Karl (1959) considered them to be a derived, independent group, most closely related to the Asilidae. Karl's opinion seems to be supported by our studies of the male genitalia.

Paramonov (1950) summarized the characters of the Mydidae with reference to the Australian genera and species, and M. Bequaert (1961) and Hesse (1969) reviewed the characters of the Mydidae with reference to the African and Palearctic genera.

The North American (Nearctic) genera and species were listed by Curran (1965) and the genera and species from the Americas south of the United States (Neotropical) by Papavero & Wilcox (1968).

The present study of the American genera was started as an analysis of the male genitalia and other morphological characters. These characters are summarized for the family as a whole and for the genera that occur in the Americas.

MATERIAL AND METHODS

In addition to the senior author's private collection, and the collection of the Museu de Zoologia da Universidade de São Paulo (MZUSP; formerly Departamento de Zoologia, Secretaria da Agricultura, São Paulo), the authors studied the collections listed below. To the institutions and persons who loaned us specimens we are deeply obliged.

American Museum of Natural History (P. Wygodzinsky)	AMNH
Arizona State University, Tempe (Mont A. Cazier)	ASU
British Museum (Natural History), London (H. Oldroyd)	BMNH
California Academy of Sciences, San Francisco (P. H. Arnaud, Jr.)	CAS
California Department of Agriculture, Sacramento (Marius S. Wasbauer)	CDA
California Insect Survey, University of California, Berkeley (Frank R. Cole, Jerry A. Powell)	CIS
California State College, Long Beach (E. L. Sleeper)	CSCLB
Canadian National Collection, Ottawa (B. V. Peterson)	CNC
Cornell University, Ithaca (L. L. Pechuman)	CU
Eric M. Fisher, Los Angeles	EF
Florida State Collection of Arthropods, Gainesville (Howard V. Weems, Jr.)	FSCA
Hope Museum, Oxford University, Oxford (D. M. Ackland)	OXF
Instituto Oswaldo Cruz, Rio de Janeiro (H. S. Lopes)	IOC
Los Angeles County Museum, Los Angeles (Lloyd M. Martin)	LACM
Museo de Entomologia de la Universidad Agraria, Lima (M. Ortiz P.)	MEUA
Museum of Comparative Zoology, Cambridge (Howard E. Evans)	MCZ

Muséum National d'Histoire Naturelle, Paris (L. Matile)	MNHN
Ohio State University, Columbus (C. A. Triplehorn)	OhSU
Oregon State University, Corvallis (Charles H. Martin)	OrSU
R. H. Painter, Manhattan, Kansas (Elizabeth M. Painter)	RPH
San Diego Natural History Museum, San Diego (Charles F. Harbison)	SDNHM
Southern Illinois University, Carbondale (John C. Downey)	SIU
Texas Agricultural and Industrial University, Kingsville (J. E. Gillaspy)	TAIU
University of Arizona, Tucson (Floyd G. Werner)	UA
University of California, Davis (Robert O. Schuster)	UCD
University of California, Riverside (Saul I. Frommer, P. H. Timberlake)	UCR
University of Idaho, Moscow (William F. Barr)	UI
University of Kansas, Lawrence (Peter D. Ashlock)	UK
United States National Museum, Washington, D. C. (W. W. Wirth, Lloyd Knutson, U.S.D.A. Systematic Entomology Laboratory)	USNM
Utah State University, Logan (W. J. Hanson)	USU
Washington State University, Pullman (Maurice T. James)	WSU
Yale University, New Haven (C. L. Remington)	YU

The male genitalia were dissected and boiled in KOH, rinsed in alcohol and preserved in glycerine. The drawings were made with the help of a camera lucida. Gonopods and the fused hypandrium and gonopods (as occurs in most genera) are shadowed, and all bristles of the genitalia are ommited.

ACKNOWLEDGEMENTS

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The junior author is particularly indebted to the Fundação de Amparo à Pesquisa do Estado de São Paulo, and to the Conselho Nacional de Pesquisas (Brasil), for the grants "Biológicas 68/604", and "69/3289", which made possible the study of several collections in the United States, Canada, England, and France; also for the grants "69/882 and 69/883" of the Fundação de Amparo à Pesquisa do Estado de São Paulo, which permitted the acquisition of very valuable collections.

Our best thanks are also due to Mr. Rolf Grantsau for the drawing of *Plyomydas peruviensis,* to Miss Francisca C. do Val for the preparation of Tables 1 and 2, and to Mr. G. Pastore for the photographs.

ECOLOGY AND BIOLOGY

The ecological preferences of the Mydidae have not been investigated. It is rather difficult to evaluate what ecological barriers are for this group. The few data assembled up to the present, which permit us to have a preliminary insight in this subject, come from three different directions:

(i) Direct evidence. *Nemomydas lara* Steyskal "seems (...) to be associated with two of the most distinctive xeric environments of the Florida peninsula — sand scrub, and high pine-turkey oak (or sand hills)" (Steyskal, 1956: 4). *Messiasia dalcyana* d'Andretta has been collected by the junior author on the sand dunes at Cabo Frio, Rio de Janeiro, Brazil, on flowers of *Cassia* sp. Dr. Hugo Souza Lopes also collected the same species in sand dune areas. *Dolichogaster brevicornis* (Wiedemann) was collected by Miss Francisca C. do Val in Oriximiná, State of Pará, Brazil, on low vegetation in a sandy area, in the outskirts of a second-growth forest.

(ii) Indirect evidence. Some species of mydids are known from areas so uniform in ecology that it is possible to make inferences about preferred habitats. *Pseudorhopalia mirandai* (d'Andretta & Carrera) was described from Icó, State of Ceará, Brazil. This region is covered by semi-arid xerophytic formations known as "caatingas". Although isolated areas of forests exist in the middle of the caatingas (the "brejos" of northeastern Brazil), none of these are known in the region of Icó (Prof. Aziz N. Ab'Saber, personal communication). *Plyomydas peruviensis,* gen. n., sp. n., is known from the arid coasts of Peru. *Ceriomydas fraudulentus* Williston, and *Mydas claripennis* Williston were described from Chapada (dos Guimarães), State of Mato Grosso, Brazil. This is a small locality east of Cuiabá, situated in the core area of the "cerrados" (savanna-like formations) of West-Central Brazil.

The same type of indirect evidence could be produced for several North American species, described from deserts or semi-arid regions of the United States and Mexico.

(iii) Inferential evidence. The distributional maps show that the regions of highest density of mydid species are predominantly occupied by open formations of varying degrees of dryness. The great equatorial belt of tropical rain forest is an area of minimal density. On the other hand, the desert areas of the United States and Mexico, and the areas of Brazil where cerrados and caatingas predominate show higher numbers of species.

Thus, it is reasonable to accept that mydids are characteristically dwellers of open formations, at least in the Americas, and that forests are probably an ecological barrier to their dispersal, or that at least forests are invaded only by secondarily adapted species.

Data on the biology of mydids are also sparse and insufficient. Many important details remain to be investigated. In general, it is believed that adult mydids either prey on other insects, a feature probably inherited from their asilid ancestors, or feed on the nectar of flowers. The larvae seem to be predatory upon coleopterous (and other) larvae, and some became adapted to life in ants' nests as a secondary result of their feeding habits.

The most informative papers on the subject are those of Zikán (1942, 1944). This author spent several years observing the biology of a few species of *Mydas* (especially *M. heros* Perty) in the National Park of Itatiaia, State of Rio de Janeiro, Brazil. Many of his observations require confirmation. Other informations, from other sources, are added at the end of our exposition of Zikán's findings.

Adult feeding. Adult males commonly feed on the nectar of flowers. Zikán (1942) found *Mydas* males on flowers of *Acacia paniculata* Wildenow, *Mimosa adherens* Martius, and other Leguminosae and Compositae. Females seem to rely solely on the fatty substances accumulated in their abdomens for subsistence. Zikán never observed females feeding on flowers.

Mating. Adult males of *Mydas* (especially *M. heros* Perty) are found in the vicinity of the large nests of "saúva" ants (*Atta* spp.), in southern Brazil, either flying around the nests or sitting on nearby bushes and herbs. As a rule, only one male is to be seen in the neighborhood of an ants' nest. If another male approaches an aerial battle ensues, such as happens between male hummingbirds when one invades the territory of the other. The attacks between the two mydid males are followed by brief respites, during which the two fighters keep flying, one facing the other. The attacks are then renewed, ending with the "defeat" of one of the males, who leaves the field. It is not known whether the weaker male or the invader of the territory (if there is a territorial behavior) loses. Males seem to be attracted to areas with saúva nests by the sight of the large, bare, denuded earth mounds (in some cases several meters across) accumulated by worker ants. They also seem to be attracted to similar areas resulting from other natural causes or even to manmade mounds. Near these sites mating takes place. Sometimes the males make mistakes and try to copulate with females of other species, with other males, or with large black Hymenoptera (such as the Psammocharidae, which they seem to mimic). Copulation is effected in flight. If the pair is disturbed the female flies away very rapidly, carrying along the hanging male until eventual separation.

Oviposition. Gravid females oviposit in the interior of the ants' nest. Zikán frequently found females with the body partially covered with earth, indicating that they were laying in the loose soil of the nest's entrance.

Immature stages. The larvae live in the "pans" (panelas de sauveiro) of the *Atta* nests, where the workers accumulate the garbage from the nest ("panelas de lixo") and the exhausted plant medium on which the fungus *Rhozites gongylophora* Moeller is maintained by the ants. These residues of decaying plants attract several Coleoptera, especially Dynastidae of the genus *Coelosis (C. biloba* L., *C. bicornis* Fabr., and *C. inermis* Sternb.), whose larvae feed on the debris. Zikán, although he reported no actual observations, believed that the mydid larvae preyed on these dynastid larvae. Certainly the mouthparts of the mydid larvae, as described by Zikán, seem to be excellently adapted to suck other insect larvae.

Pupation and emergence of the imago. After leaving the garbage pan the larva (Fig. 1) digs upwards in the soil to a depth of 10-20 cm below the surface, where it constructs a pupation chamber. The pupal chamber or cell is always situated above the garbage pan, sometimes quite far. There the pupa remains until the day of the emergence of the imago. Then, with the help of its strong spines (Fig. 2), the pupa makes its way to the surface. Here it remains half-buried until the hottest hours of the day, when the imago finally emerges. The adult walks for some distance and climbs onto a low bush or herb, where it dries its wings. The females can copulate a few moments later.

Not all saúva nests harbor mydid larvae. The larvae are usually found in large nests with many garbage pans. Zikán found up to 16 exuviae (of two different species of *Mydas*) in a nest of *Atta sexdens rubropilosa.*

Zikán (1944) also found another species of *Mydas* (which unfortunately has not been identified) trying to oviposit among dead leaves on the soil. Nearby there were no nests of *Atta,* but there was one nest of *Eciton* and another of a meliponid bee (*Melipona ruficrus* Latr.). Zikán believed that the larvae of this species of *Mydas* could feed upon soil arthropods living among the dead leaves.

Additional data on the biology of the family have been supplied by other authors and are here included to supplement Zikán's observations.

Since the 19th century it was believed that mydids also preyed upon insects in a manner similar to the Asilidae. Olivier (1811: 80-81), who may possibly have observed this while in Africa (as pointed out by Westwood, 1841: 50), said: "Ils (the mydids) vivent de rapine et font une guerre continuelle aux autres insectes, qu'ils attrapent en volant, et dont ils retirent tous les sucs au moyen de leur trompe. On les voit attaquer les Hyménoptères les plus forts et les mieux armés, et les emporter entre leurs longues pattes, sans que l'aiguillon de ceux-ci puisse les atteindre". Davis (1921) reports a specimen of *Mydas clavatus* (Drury) that, when captured, struck him on the finger, the bite being momentarily painful. Norris (1938: 44) says about *Miltinus stenogaster* Westwood: "One specimen in the Perth Museum collection is mounted on the same pin as a species of Mantispidae to indicate that the fly was taken with the lacewing as prey". Finally, Paramonov (1950: 8)

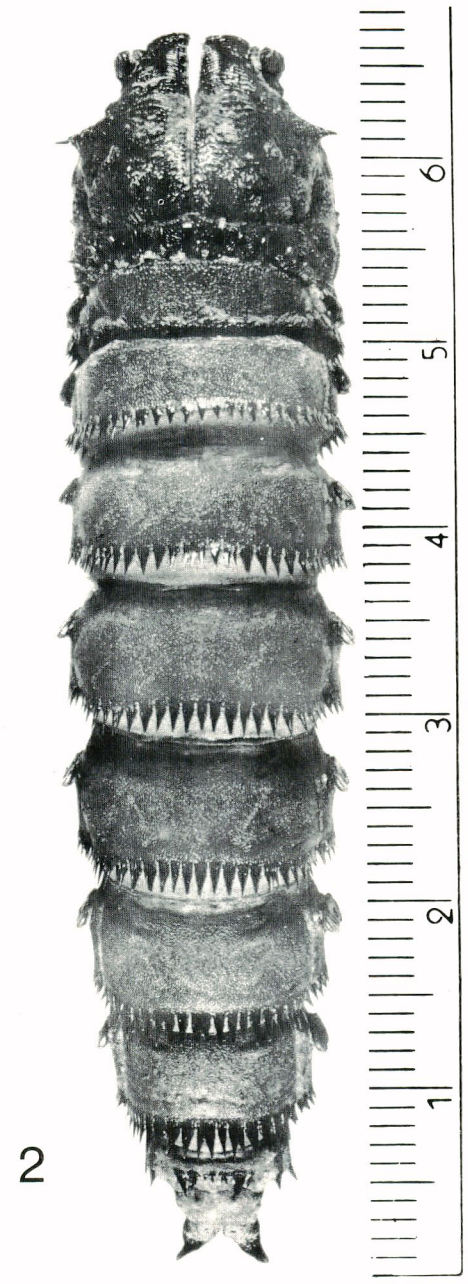


Fig. 2, *Mydas heros* (Perty), puparium.

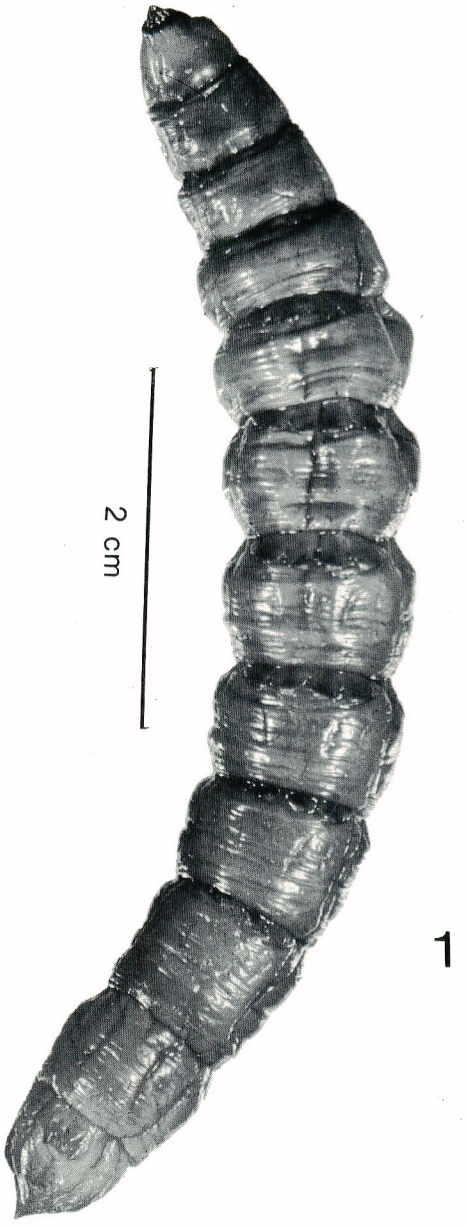


Fig. 1, *Mydas heros* (Perty), larva.

found in the Kara-Kum desert (Turkestan) "many Mydids capturing other insects in a manner similar to Asilidae". As pointed out by Papavero & Wilcox (1968: 1): "The labrum which supports the proboscis is found disengaged and is quite sharp pointed, so these incidents appear quite probable".

Westwood (1841: 50) reports that MacLeay found larvae of *Mydas tricolor* Wiedemann "parasitic" on the larvae of a giant Prionidae (?*Stenodontes*) in Cuba. Walsh (1864), in Illinois, reared *Mydas tibialis* Wiedemann from fibrous debris found in a hollow sycamore which contained coleopterous larvae and to which lepidopterous pupae were added. Norris (1938) says about *Miltinus mackerrasi* Norris: "the larva was given a broken egg of a Phasmid... to feed upon, and was seen to bury its head in the yolk, which was later visible filling the alimentary canal. Unfortunately the larva did not survive until the third instar, the diet no doubt proving unsuitable". Genung (1959) reared *Mydas maculiventris* Westwood on scarab grubs infesting grass sods in sandy soils in Florida. These isolated findings seem to corroborate Zikán's hypothesis on the type of feeding of the mydid larvae in saúva nests.

Three different types of structures of the female genitalia are known (see next chapter), seeming to indicate three different types of digging and oviposition, as commented on by Hesse (1969: 7):

"As in the case of the Asilidae, and also other insects, with circlets of spines at the apex of the abdomen of the females and where egg-laying habits are better known, this armature at the end of the abdomen of most genera of Mydidae, however, suggests scooping or digging operations in loose soil or sand for oviposition, indicating the biology of a type of larva which lives and develops in soil or sand like the larvae of Asilidae, or which parasitizes the subterranean larvae or pupae of other kinds of insects. Members of the South African Museum staff have in fact witnessed such digging operations carried out by females of the species *Cephalocera longirostris*".

"With the exception of species of *Mydaselpis* and *Vespiodes* the representatives of all the other known genera in southern Africa have this circlet of spines at the end of the abdomen, an adaptive structure which suggests a different type of biology from that of genera lacking distinct spines as in the case of the two South African ones mentioned above and foreign genera such as *Mydas*. Not before we know more of the biology of the genera armed with spines on the oviscape is it possible to generalize for the family as a whole".

From what is known of the biology of mydids, it appears that two types of adult feeding patterns (predation and flower nectar) and two types of larval biology ("freeliving" and myrmecophile predators) exist. Although these reports must be confirmed by more careful observations and the case of adults preying on other insects may perhaps be interpreted as mydid males trying to copulate with other insects, it is probable that these two types of feeding pattern correspond to two evolutionary lines. This would be an interesting line of investigation in the future.

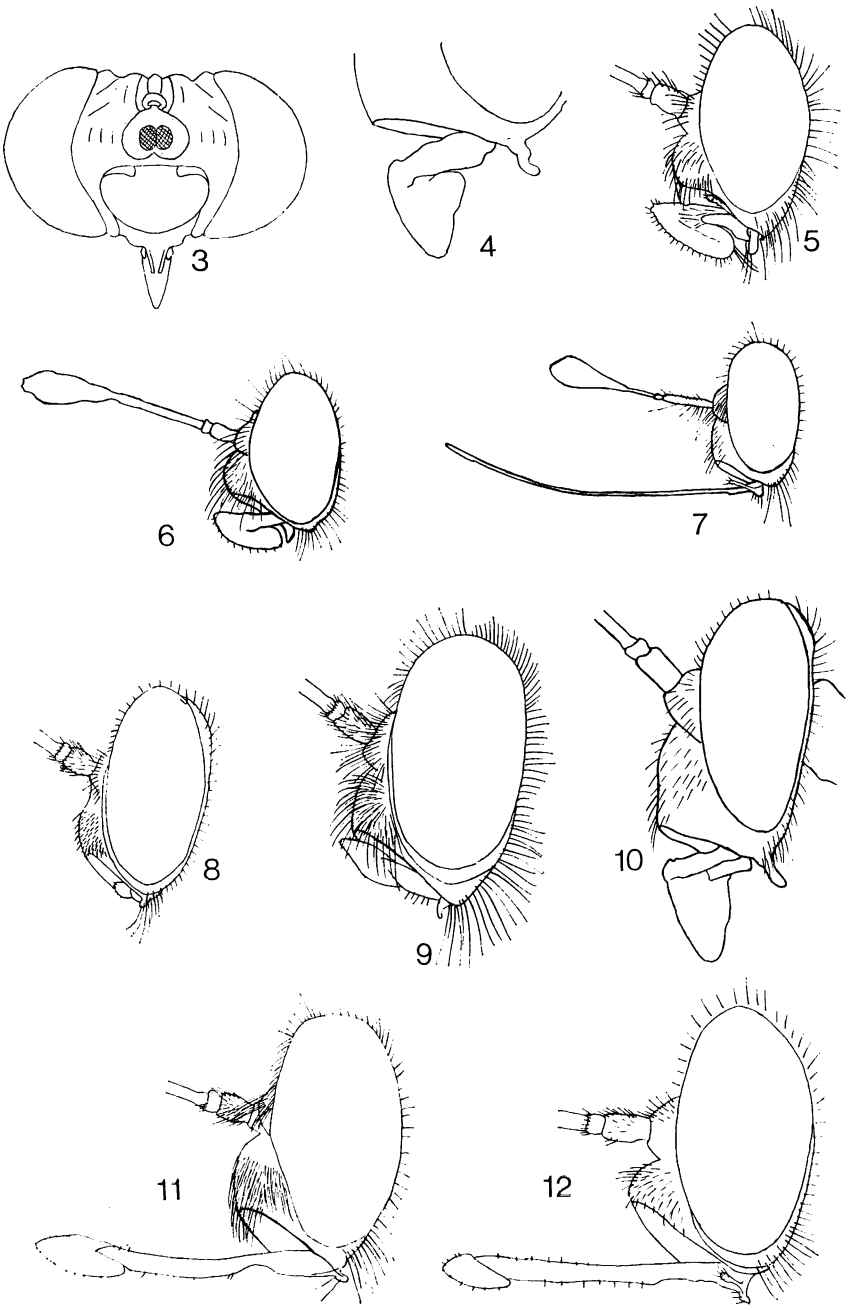
CHARACTERS OF THE MYDIDAE

The Head

The head in anterior view (Fig. 3) is broader than high and consists mainly of the compound eyes, divided by the face below the antennae, and the frons above the antennae. The face at the antennae is broad, varying from one-third to one-half the width of the head; opposite the lower eye margin it is much narrower, in most genera about one-half as wide as at the antennae; also the frons at the vertex is narrower than at the antennae but only slightly so, probably at most one-fourth narrower than at the antennae. The compound eyes are made up of numerous small facets which are nearly uniform in size (Séguy, 1928, says they are larger on antero-interior part). The large central area of the face is swollen and is the *gibbosity*: it is usually bare of pollen but can be densely pollinose; it is always pilose; the hairs and bristles of the *mystax* may be short and sparse or dense and long; the sides of the face are usually pollinose, without hairs, narrow, and separated by a deep groove which curves inwards and becomes shallow below the antennae. The lateral margins of the frons are usually pollinose and pilose, the hairs are usually longer at the sides of the antennae and on the upper part; the central area (ocellar area) is usually bare and shining black with a single ocellus just above the antennae and with ridges and grooves above but no ocelli (Paramonov, 1950, reports from 0 to 4 ocelli in the Australian Mydidae). The occiput (posterior surface of the head) is usually pollinose along the eye margins and densely or sparsely pilose (Paramonov, 1950, reports weak occipital bristles in the Australian species).

The oral cavity. This is the area below the gibbosity and margined by the lower, narrowing sides of the latter. The proboscis arises from the inside of the lower part of the oral cavity. It is usually concave but in some of the species with the proboscis atrophied, it may be convex; reference to it as the "oral opening" seems incorrect as no opening exists. The upper apex is called the *oral margin* which in most genera is situated well above the lower eye margin and its position is expressed as the distance between the lower eye margin and the antennae; in *Mydas* Fabricius and *Phyllomydas* Bigot it is opposite the lower eye margin.

The proboscis. The basal part which is usually slender, is the *stem* and consists of several parts (Peterson, 1916), the paired upper part which is usually wider than the stem is the *labella.* The size, shape and length of the proboscis is of value in separating most genera, but in a few it is unreliable. In *Mydas* and *Phyllomydas* the stem is subequal to the length of the oral cavity and the labella is attached to the apical half or more and extends out at a right angle (Figs. 4, 10). In *Apiophora* (Fig. 5), *Dolichogaster, Heteromydas* (Fig. 6), *Messiasia, Midacritus, Paramydas,* and the three new genera, the stem is about half the length of the oral cavity and is attached at about the middle of the



Heads: 3, *Phyllomydas bruesii* Johnson, frontal view; 4, same, detail of proboscis; 5, *Apiophora rubrocincta* (Blanchard), lateral view; 6, *Heteromydas bicolor* Hardy, lateral view; 7, *Mitrodetus* sp., lateral view; 8, *Nemomydas melanopogon* Steyskal, lateral view; 9, *Nemomydas pantherinus* (Gerstaecker), lateral view; 10, *Mydas clavatus* (Drury), lateral view; 11, *Nemomydas lamia* (Séguy), lateral view; 12, *Pseudonomoneura californica* (Hardy), lateral view.

labella which is subequal to the length of the oral cavity. In *Mitrodetus* the proboscis is broad basally, narrows rapidly to a slender tube which is about four times the length of the oral cavity and the apical labella is but slightly wider than the stem (Fig. 7). In *Opomydas* the stout stem plus the labella, which is about 1.5 times the width of the stem, is subequal to the length of the oral cavity. In *Nemomydas* and *Pseudonomoneura* the proboscis varies from obsolete (about one-half the length of oral cavity) to functional and as much as three times the length of the oral cavity (Figs. 8, 9, 11, 12).

The palpi. They are one-segmented and arise on each side at the base of the proboscis. In *Mydas, Phyllomydas* and *Messiasia* they are as broad as long and bear a few hairs. Peterson (1916) calls the palpi of *Mydas* a "mere bobe" and d'Andretta (1951) illustrates the palpi of *Mydas* and *Messiasia.* In *Mitrodetus, Midacritus, Opomydas* and *Heteromydas* they are slender and subequal to half the length of the oral cavity. In *Nemomydas* and *Pseudonomoneura* they are about two times as long as broad and at times with the apical half narrowed. In several groups the palpi have not been found and in many specimens they are hidden in the oral cavity.

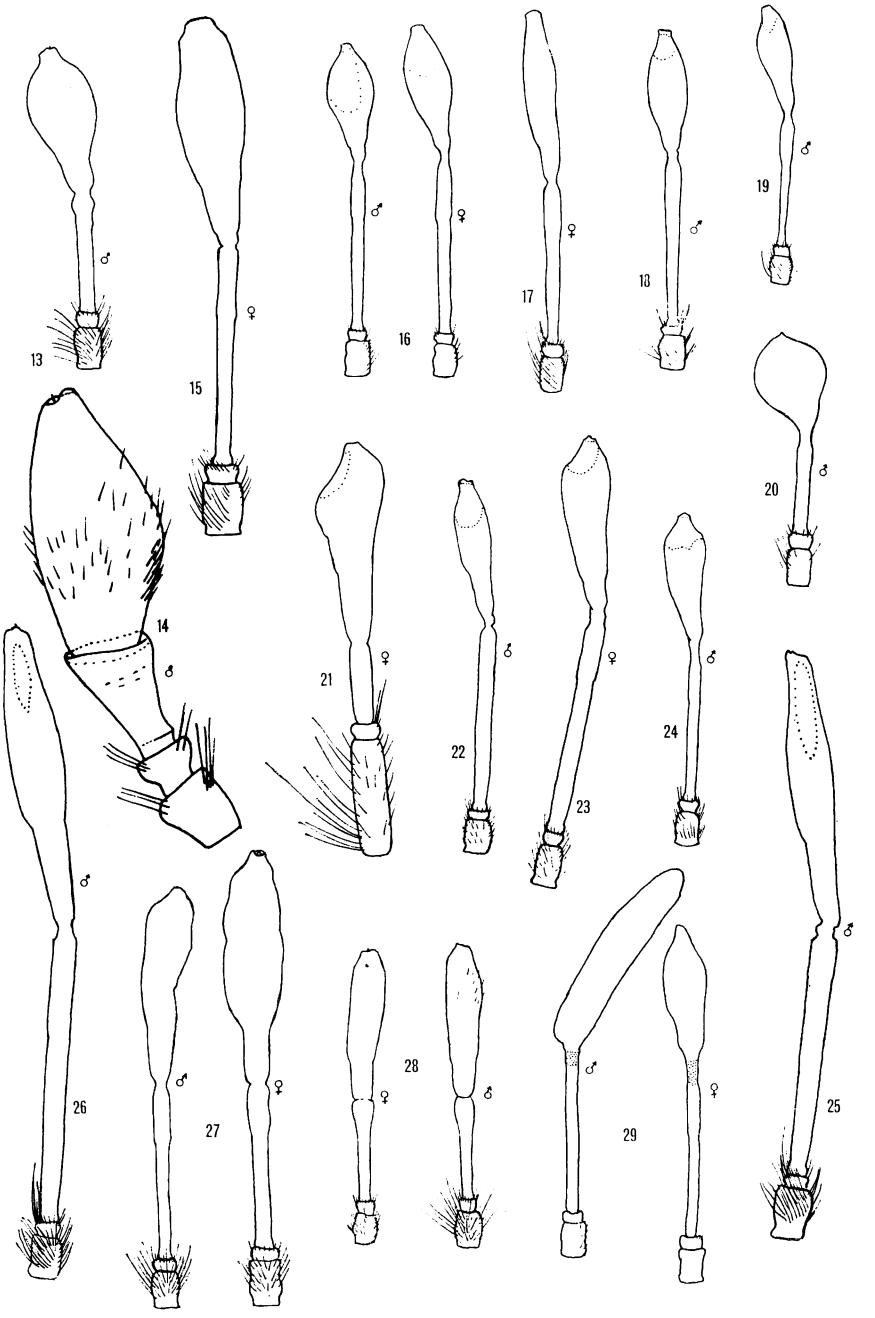
The base of the proboscis and the palpi arise slightly above the base of the oral cavity. When measurements of the palpi, proboscis and oral cavity are given, they are all measured from the base of the oral cavity.

The antennae (Figs. 13-42). The Mydidae are characterized by the swollen or clubbed fourth antennal segment. Segment 1 is cylindrical and usually from 1 to 2 times as long as broad but in *Mitrodetus* (Fig. 21) it is 3 to 4 times as long as broad. Segment 2 is always short, half or less than the length of segment 1 and usually broader than long. Segment 3 is usually slender and 1 to 4 times as long as segments 1 and 2; in *Dolichogaster* (Fig. 14), it is subequal in length to 1-2 but is nearly twice as wide at the apex as at the base. Between the apex of 3 and the base of 4 there is usually a membranous area which apparently allows for the movement of segment 4. Segment 4, the club, is always swollen, usually widest beyond the middle, but in some it is widest at the middle, and in a few males it is widest near the base and tapers slightly apically. On the inner anterior side of the club near the apex there is a sunken area which is quite definite in some groups but in others it is indefinite; it is called the sensory area but its function has not been determined; M. Bequaert (1961) says it probably has some sensory significance.

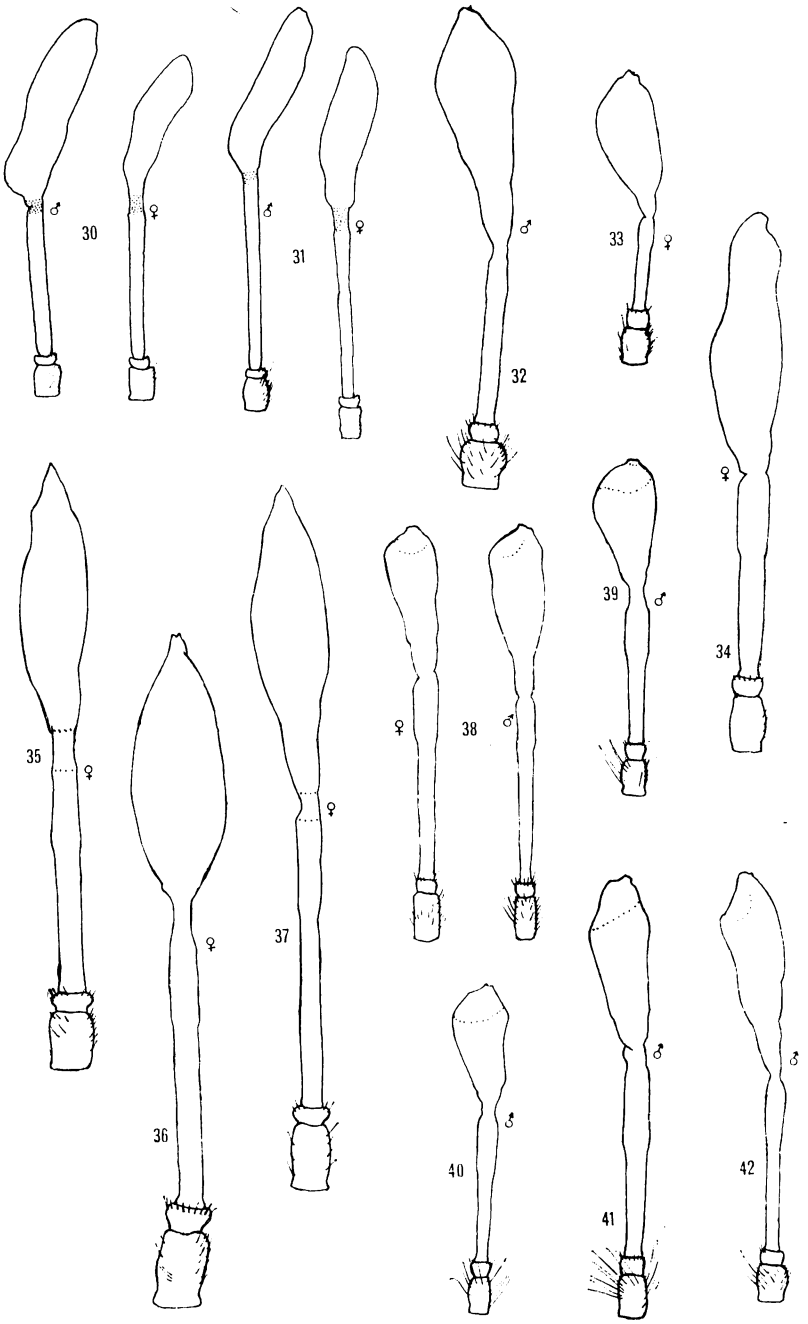
THE THORAX

The thorax of the Mydidae (Fig. 43) is made up largely of the mesothorax, as in most flies, and the prothorax and metathorax are much smaller.

The notum of the *prothorax* is divided into two parts, according to Crampton (1942), the antepronotum (neck), which is usually pilose, and the postpronotum (humerus), which is pilose in various degrees and is



Antennae: 13, *Apiophora paulseni* Philippi; 14, *Dolichogaster brevicornis* (Wiedemann); 15, *Eumydas corupas*, gen. n., sp. n.; 16, *Heteromydas bicolor* Hardy; 17, *Messiasia decor* (Osten Sacken); 18, *Messiasia polita* (Wiedemann); 19, *Messiasia pertenuis* (Johnson); 20, *Midacritus stuardoanus* Séguy; 21, *Mitrodetus dentitarsis* (Macquart); 22, *Mydas clavatus* (Drury); 23, *Mydas xanthopterus* Loew; 24, *Mydas luteipennis*, Loew; 25, *Mydas dives* Westwood; 26, *Mydas rubidapex* Wiedemann; 27, *Nemomydas pantherinus* (Gerstaecker); 28, *Nemomydas melanopogon* Steyskal; 29, *Opomydas athamus* (Séguy).



Antennae: 30, *Opomydas limbatus* (Williston); 31, *Opomydas townsendi* (Williston); 32, *Paramydas igniticornis* (Bigot); 33, *Plyomydas peruviensis*, gen. n., sp. n.; 34, *Plyllomydas scitulus* (Williston); 35, *Phyllomydas phyllocerus* Bigot; 36, *Phyllomydas bruesii* Johnson; 37, *Phyllomydas currani* Hardy; 38, *Pseudonomoneura californica* (Hardy); 39, *Pseudonomoneura tinkhami* (Hardy); 40, *Pseudonomoneura micheneri* (James); 41, *Pseudonomoneura hirta* (Coquillett); 42, *Nemomydas lamia* (Séguy).

frequently all or largely pollinose. The humerus is distinctly elevated and the posterior surface is concave truncate. The pleural area posterior to and partly above the fore coxae is epimeron-1 (m_1) and is usually bare of hairs but at times it is pollinose. The area above and partly anterior to the fore coxae is episternum-1 (eps-1) and is usually sparsely pilose but at times it bears conspicuous tufts of hairs.

The notum of the mesothorax is divided into a number of parts according to Crampton (1942) which in order from front to back are: the prescutum (*anterior mesonotum*), scutum (*posterior mesonotum*), *scutellum,* and the postnotum, of which the larger part is the mediotergite of which the larger part is the mediotergite (*postscutellum*), and the lower part the inferior pleurotergite (*laterotergite* or *"hipopleuron"*). Young (1921), Bonhag (1949) and Cole & Pritchard (1964) use somewhat different terms for these areas.

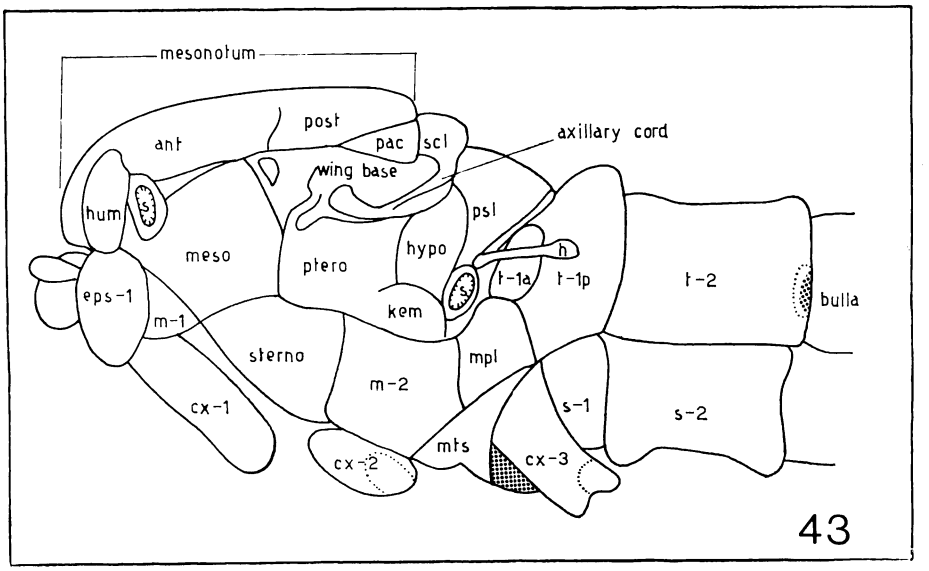


Fig. 43, Thorax of a Mydidae; *ant*: anterior mesonotum (prescutum); *cx-1*: coxa 1; *cx-2*: coxa 2; *cx-3*: coxa 3; *eps-1*: episternum 1; *h*: halter; *hum*: humerus; *hypo*: laterotergite ("hypopleuron"); *kem;* katepimeron; *m-1*: epimeron 1; *m-2*: epimeron 2; *meso*: mesopleuron; *mpl*: metapleura; *mts*: metasternum; *post*: posterior mesonotum (scutum); *psl*: postscutellum (mediotergite); *ptero*: pteropleuron; *s*: spiracle; *s-1*: sternite 1; *s-2*: sternite 2; *scl*: scutellum; *sterno*: sternopleuron; *t-1a*: tergite 1 (anterior); *t-1p*: tergite 1 (posterior); *t-2*: tergite 2.

The *mesonotum* as referred to here is the dorsal area (prescutum and scutum) which is divided into about equal parts by the transverse suture into anterior and posterior parts. Longitudinally there is a broad central stripe, bordered on each side by the dorsocentral stripes which are broad anteriorly and gradually narrowed posteriorly, next the intermediate stripes or spots (anterior and posterior), and then the lateral

margins. Usually only the dorsocentral stripes and the lateral margins are pilose and these hairs are very dense at times, especially on the lateral margins and posteriorly before the scutellum. Frequently the lateral margins and dorsocentral stripes are densely pollinose and cases where the entire mesonotum is pollinose, the pollen is denser on the lateral margins and dorsocentral stripes; and there are many species with the mesonotum entirely bare of pollen and shining. There are no bristles on the thorax.

The *scutellum* is rather small but the *lateral arms* (axillary cords) are quite prominent. The scutellum may be all or in part pollinose or bare of pollen and the arms are always bare of pollen; the hairs are usually short and sparse but the scutellum can be entirely bare of hairs, in either case there are usually a few short hairs on the arms.

The *postscutellum* is usually rugose but can be smooth and is usually all or in part pollinose; in most genera it is bare of hairs but in several genera it is pilose laterally (*Mitrodetus* Gerstaecker, *Opomydas* Curran, *Heteromydas* Hardy, and in some of the species of *Pseudonomoneura* M. Bequaert). The term *postscutellum* is preferred to "metanotum" (Paramonov, 1950; Hesse, 1969) as the area is part of the mesothorax and not the metathorax. M. Bequaert (1961) refers to it as the "postscutellum ou mesophragme (meditergite de Young)", but usually uses mesophragme. The morphologists (Young, 1921; Crampton, 1942; Bonhag, 1949) seem to prefer mediotergite but also use postscutellum of postnotum, or mediotergite of postnotum. The postscutellum and laterotergite are both areas of the postnotum.

The *laterotergite* is an oval, slightly elevated area anterior to and slightly above the halter, it is usually bare of hairs, but in several genera it is densely to sparsely pilose (*Nemomydas* Curran, and *Pseudonomoneura* M. Bequaert).

The term *laterotergite* is preferred to "metapleura" (Paramonov, 1950; M. Bequaert, 1961; Hesse, 1969) as the area is on the mesothorax and not on the metathorax; M. Bequaert (1961) qualifies his term by "(pleurotergite de Young, 1921, p. 264)". Laterotergite (Bonhag, 1949) is preferred to pleurotergite (Young, 1921; Crampton, 1942), because although the area is on the sides of the mesothorax, it is a mesonotal and not a mesopleural area. The term hypopleura has been applied to this area for the North American Asilidae beginning with Coquillett (1904) and Back (1909, Fig. 2, Pl. II). The term hypopleura was proposed by Osten Sacken (1884) and according to Crampton (1942) is a complex area including the mesothoracic mesopleurite and the metathoracic episternum and epimeron which does not include the area figured by Back (1909). Vockeroth (1969, Fig. 1) in the Syrphidae uses the hypopleura as designated by Osten Sacken (1884). Martin (1970) proposed the term metepimeron for this area but he confused metepimeron with laterotergite of Bonhag (1949).

The *pteropleuron* is the area below the base of the wing and anterior to the laterotergite; it is pilose and at times pollinose. The *katepimeron* is a smaller area below and between the laterotergite and pte-

ropleuron; it is usually bare of hairs, but in some genera and in some species of other genera, it is pilose. The *mesopleuron, sternopleuron,* and *epimeron-2* (m-2) are almost always bare of hairs but frequently are entirely or in part pollinose; hairs are found at times on the poste rior and dorsal margins of the mesopleura.

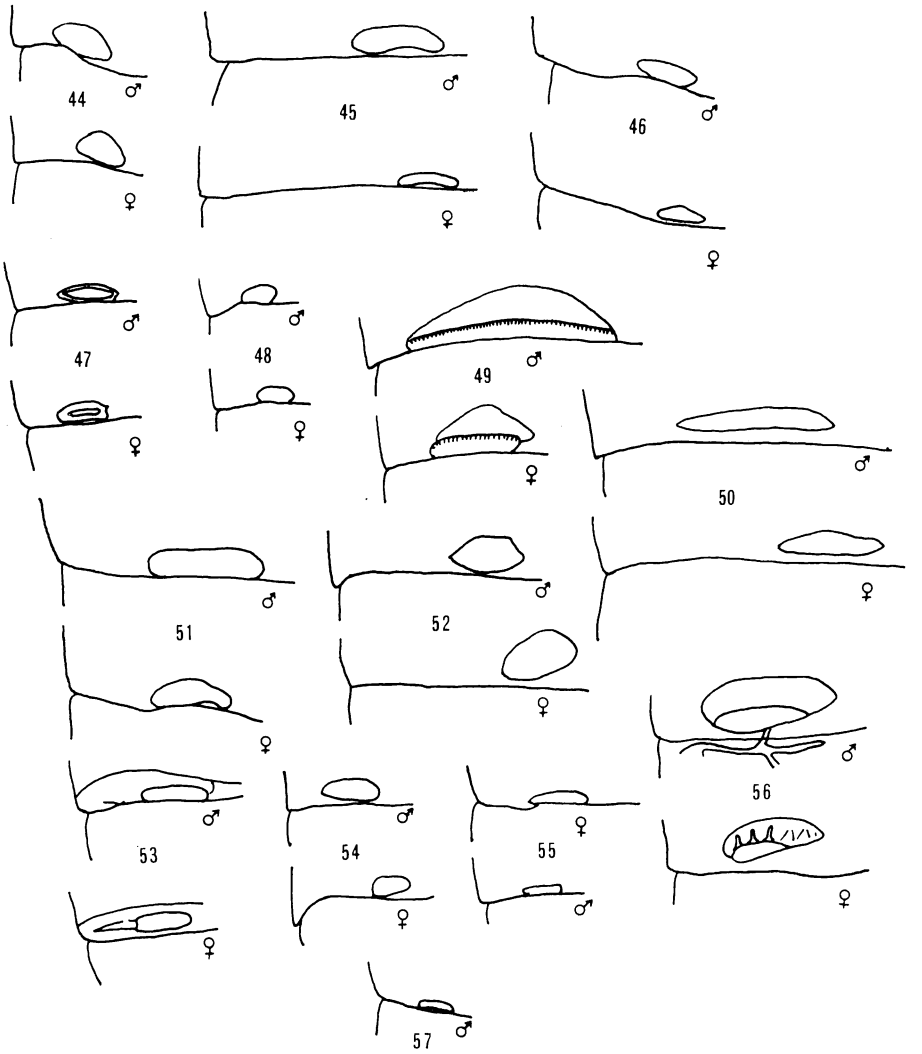
The *metathorax,* for our purposes, is divided into three areas. The *metanotum* is a slender band, bare of hairs and pollen, which extends from halter to halter and separates the postscutellum from tergite 1. The *metapleuron* is the area between the base of the halteres and the hind coxae, it is usually bare of hairs but may be pollinose. The *metasternum* is the area anterior to the hind coxae, it is usually pilose and at times pollinose.

THE ABDOMEN

Tergite 1 of the Mydidae is divided into two parts by a suture which is unusual in the Diptera (Young, 1921). The oval area just posterior to the halteres is tergite-1a (anterior) and the remaining larger part is tergite-1p (posterior). Tergite-1a in *Mydas* Fabricius and *Dolichogaster* Macquart is tuberculate and bare of hairs; in most of the other genera it is flat or gently rounded and may be bare of hairs or densely pilose; it is frequently densely pollinose but also is bare and shining. Tergite-1p is usually long pilose or at least with longer pile than the remaining tergites in most genera and the anterior corners frequently have tufts of long hairs above the hind coxae; it can be bare of pollen or all or in part pollinose.

Other characters of the Mydidae are the tubercles on the lateral posterior border of tergite 2. These spots have been mentioned by various authors for many years but Bezzi (1924) was the first to call attention to them and said: "A peculiar and very conspicuous feature of the *Mydaidae* is the presence of two prominent callosities or *bullae* at the sides of the hind border of the second abdominal segment; these bullae are equally developed in both sexes and have a different colouration from the surrounding parts; they are often described by the authors as an interruption of the yellowish or whitish hind border of the second segment of the abdomen". These bullae occur in all Mydidae in so far as known (Paramonov, 1950, does not mention them for the Australian species. A number of species of Australian Mydidae have since been examined through the courtesy of the South Australian Museum. Prominent bullae were found on several species, they were indistinct in others, and in a few species they could not be identified with certainty). They are not always of a different color from the posterior margin of tergite 2 and in these cases it is difficult to determine their size and shape. They may be nearly rounded, oval or oblong. They may be minute, but in a few species they occupy most of the posterior border of tergite 2. In most of the species examined they are somewhat larger in the males than in the females (Figs. 44-57). Bequaert (1961) says their purpose has not been determined, but that they are probably a "surface sensorielle". In one specimen of *Pseudonomoneura hirta* (Co-

quillett) in UCR, the anterior margin of tergite 3 is transparent, several structures being visible running to the bullae, which can be interpreted as tracheal endings (Fig. 56, ♂). An anatomical study of the bullae would probably reveal a new organ in the Diptera, and perhaps reveal



Bullae: 44, *Apiophora paulseni* Philippi; 45, *Dolichogaster brevicornis* (Wiedemann); 46, *Eumydas corupas*, gen. n., sp. n.; 47, *Messiasia pertenuis* (Johnson); 48, *Midacritus stuardoanus* Séguy; 49, *Mitrodetus dentitarsis* (Macquart); 50, *Opomydas athamus* Séguy; 51, *Mydas lividus* Curran; 52, *Nemomydas venosus* (Loew); 53, *Paramydas igniticornis* (Bigot); 54, *Phyllomydas scitulus* (Williston); 55, *Plyomydas peruviensis*, gen. n., sp. n.; 56, *Pseudonomoneura hirta* (Coquillett); 57, *Pseudorhopalia mirandai* (d'Andretta & Carrera).

its significance. Bullae are not an exclusive feature of the Mydidae as similar bullae have been found in the asilid genus *Dizonias* Loew, and several other genera of Stenopogonini related to *Prolepsis* Walker. No extensive search has been made for their presence in the Asilidae or other families.

In general the abdomen is cylindrical with eight segments exclusive of the genitalia and gradually tapers from base to apex in males; in the females the basal four segments are usually parallel sided, in some slightly to strongly pedunculate, from which they narrow to the apex. In most groups, tergite-1p has long hairs or longer hairs than on the remaining segments, but in some groups there are long hairs on tergites 1-2, 1-3, 1-4 or 1-7, especially in the males (tergite 8 is usually hidden by 7 in the males); in the females the hairs are usually shorter on all segments than in the males except in a few groups which have erect or retrorse hairs on the apical segments as outlined below.

Sternite 1 is membranous and sternite 2 is divided into two parts (Young, 1921). Sternite-2a (anterior) is slightly more elevated than sternite-2p (posterior) and occupies about the basal one-fourth of the sternite (the basal one-fourth of tergite 2 is usually bare of hairs and margined with a double row of sensory pits from the posterior part). Sternites 1 and 2a are usually bare of hairs, sternites 2p-7 usually have short sparse recumbent hairs which become more numerous apically; in the males of some groups there are dense erect hairs on these sternites. Male sternite 8 varies from short to long and usually has longer more dense hairs than the basal sternites.

FEMALE TERMINALIA

The female terminalia are of three forms as outlined below.

A. Tergite 9 with a terminal circlet of strong spines:

Apiophora, Eumydas, Heteromydas, Midacritus, Mitrodetus, Nemomydas (Fig. 59), *Opomydas, Pseudonomoneura* (Fig. 58), *Pseudorhopalia.*

AA. Tergite 9 with hairs only:

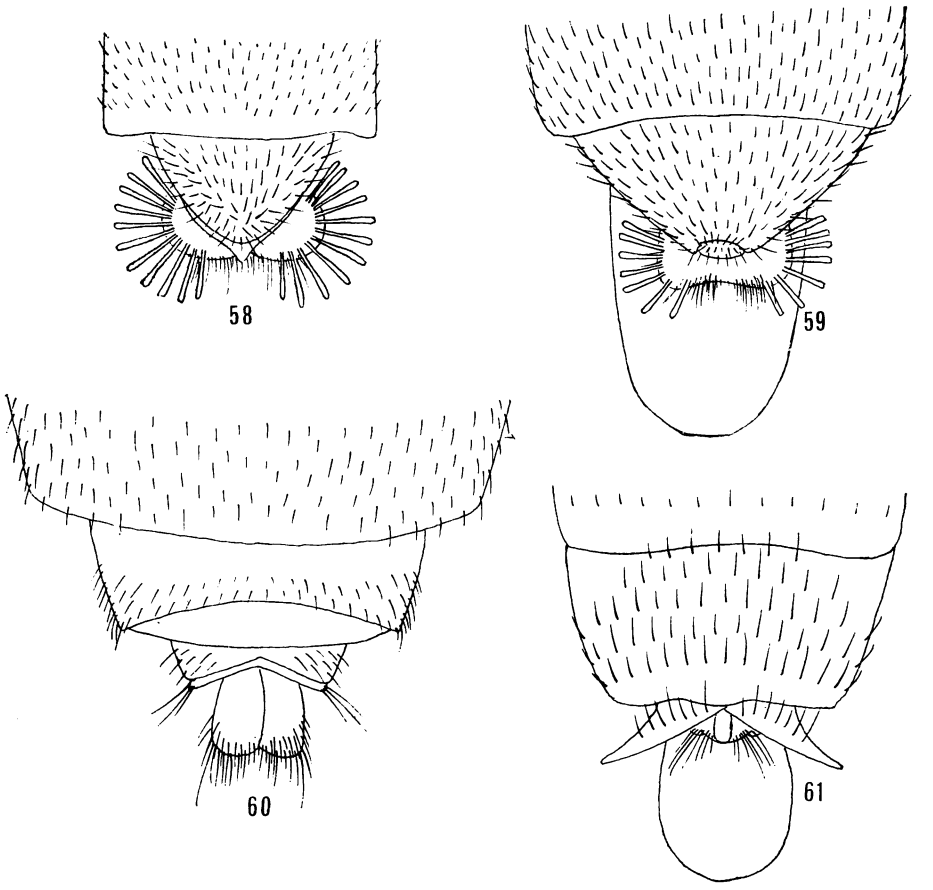
B. Tergite 9 narrower at the apex than at the base, with short hairs directed posteriorly: *Mydas, Ceriomydas, Dolichogaster, Messiasia* (Fig. 60), *Paramydas, Plyomydas.*

BB. Tergite 9 wider at the apex than at the base, fluted, with quite long, dense erect or retrorse hairs: *Phyllomydas* (Fig. 61).

The genera which have a terminal circlet of spines at the apex of the abdomen, and *Phyllomydas* Bigot, have numerous erect or retrorse hairs on segments 8 and 9 and in some species these hairs occur in

segments 7 and 6. These combinations indicate that the eggs are buried in the soil. The genera related to *Mydas* Fabricius have sparse recumbent hairs directed posteriorly on these segments.

M. Bequaert (1961) and Hesse (1969, Pl. 1, fig. 1) report a further form in *Mydaselpis* Bezzi from southern Africa, which has a row of strong erect bristles on tergite 9; this genus has the abdomen punctate and strongly pedunculate in both sexes.



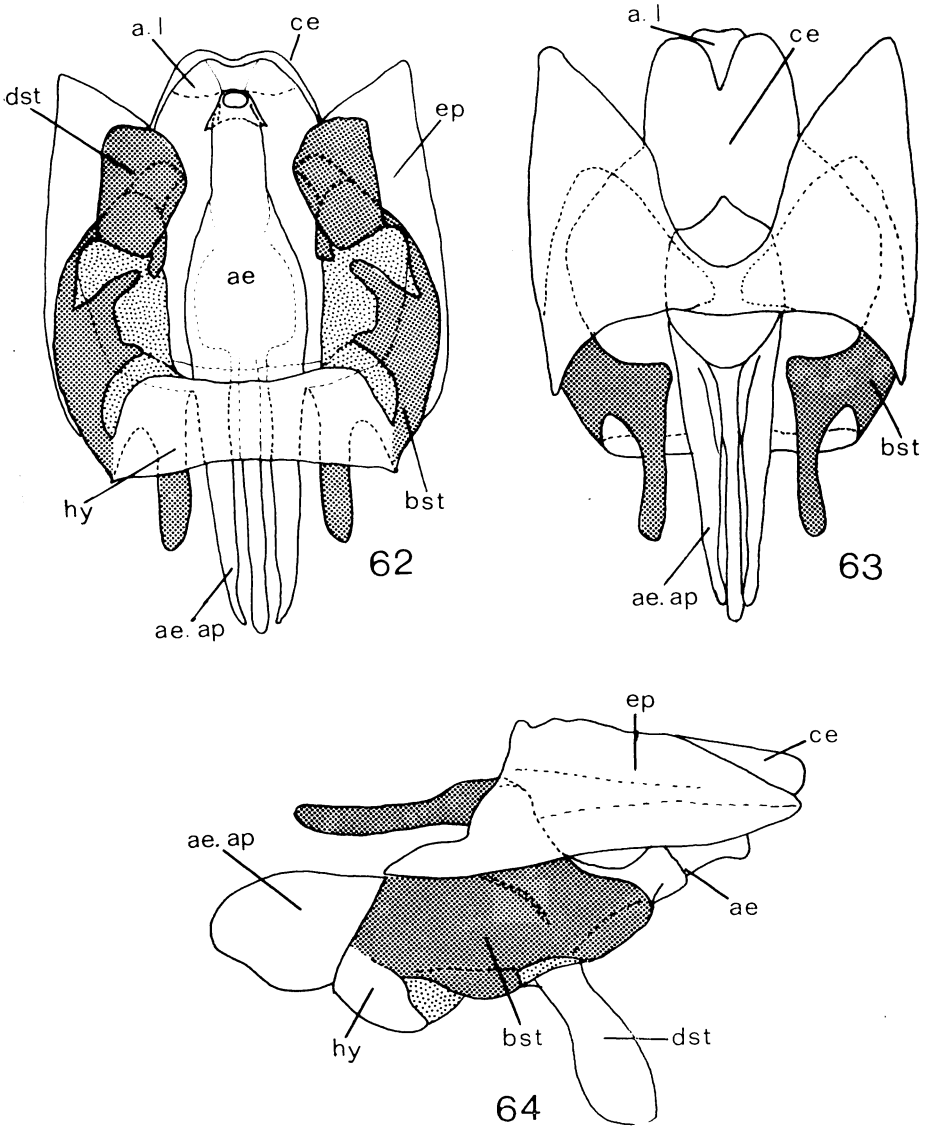
Female terminalia: 58, *Pseudonomoneura californica* (Hardy); 59, *Nemomydas* sp.; 60, *Messiasia pertenuis* (Johnson); 61, *Phyllomydas bruesii* Johnson.

MALE GENITALIA

The terminology of the parts of the male genitalia is very confusing as used by various authors. Karl (1959), whose work has been followed in this paper, also seems to use two terms for the same part. The following explanation of the terms used together with the labelled illus-

trations (Figs. 62-64, 65-67) should help to make the parts clear. Fortunately the genitalia are non-rotate or but slightly rotate so that the tergal parts of the genitalia will be found on the dorsum and the sternal parts on the venter.

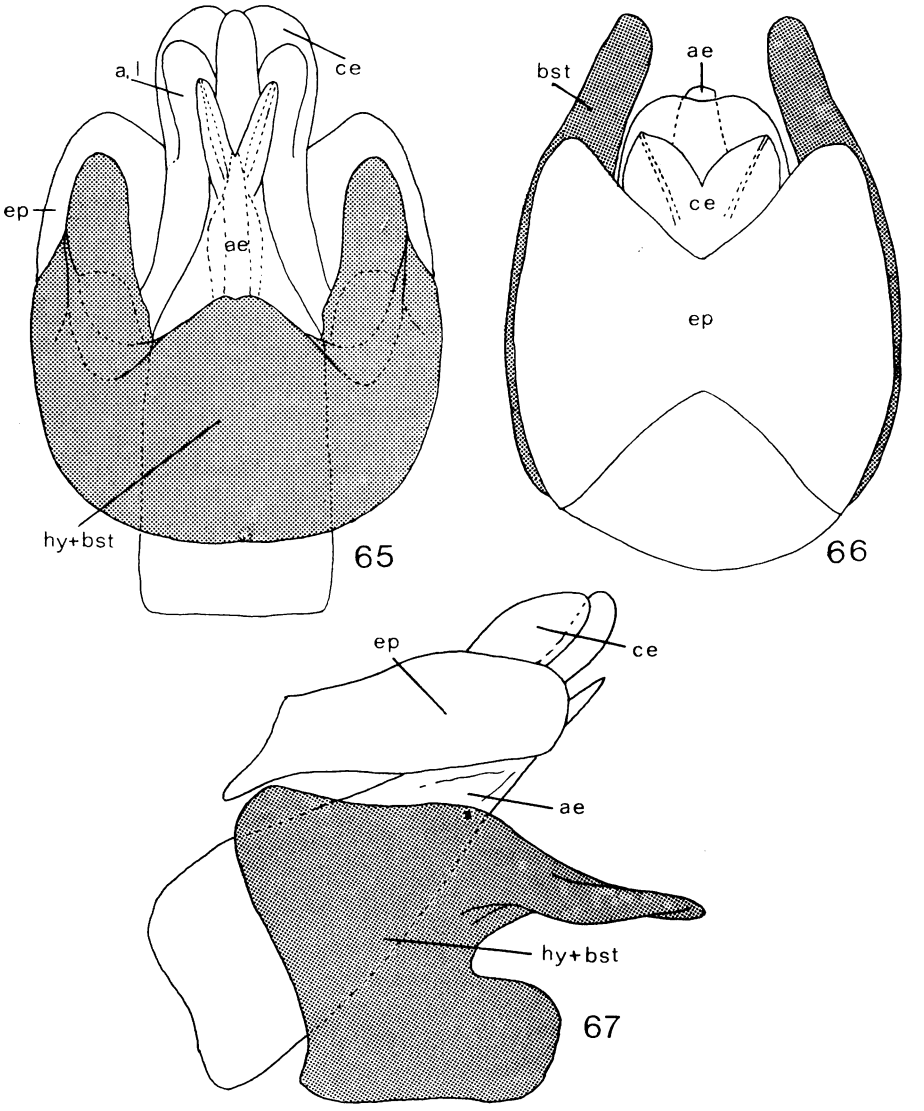
The *epandrium* (*ep*) (tergite 9) equals the upper forceps of numerous authors. It is divided into two parts (epandrial halves) which are broad basally and narrowly connected at the base. The two halves



Ectyphus armipes Bezzi, male genitalia: 62, ventral view; 63, dorsal view; 64, lateral view; *a. l*: anal lamellae; *ae*: aedeagus; *ae. ap*: aedeagal apodemes; *bst*: basistylus; *ce*: cerci; *dst*: dististylus; *ep*: epandrium; *hy*: hypandrium.

usually narrow to a point apically and are separated wide enough at or near the middle to expose the cerci-anal lamellae (*ce, a. l*) complex which usually extends posteriorly but at times extends up between the halves.

The ***hypandrium*** (***hy***) (sternite 9) is an undivided plate on the venter (at times concealed by sternite 8) that is wide at the base and



Syllegomydas daltoni Séguy, male genitalia: 65, ventral view; 66, dorsal view; 67, lateral view; *a. l*: anal lamellae; *ae*: aedeagus; *bst*: apical processes of basistylus; *ce*: cerci; *ep*: epandrium; *hy* + *bst*: fusion of hypandrium with basistyli.

usually narrows to a broad point apically. It has been found as a more or less separate sternite (sometimes connected to the basistyli by a membrane as in *Opomydas* Curran, (Figs. 116-118), or partially fused to them, but always easily distinguished) in the genera *Ectyphus* Bezzi (Figs. 62-64), *Heteromydas* Hardy (Figs. 82-84), and *Opomydas* Curran (Figs. 116-118); also an undescribed genus from the Oriental region presents a free hypandrium. In all the other genera examined, it is fused to the gonopods, and is not evident as a separate part.

The *gonopods* (lower forceps) are broad basally and extend posteriorly or upwards beyond the hypandrium-gonopod complex on each side as separate arms. The term *gonopod* is used for the broad base and the term *basistyli* (bst) for the lateral arms; other authors seem to use these terms interchangeably. The *gonopods* are connected basally and are also fused to the base of the *aedeagus* (ae).

The *basistyli* are the lateral arms of the gonopods and extend apically or upward. They may be broad or slender with the apex obtuse or acute. They may be undivided but frequently there is a subapical inner arm. The genera *Ectyphus* Gerstaecker (Figs. 62-64), *Heteromydas* Hardy (Figs. 82-84), and *Opomydas* Curran (Figs. 116-118) have on the outer side of the basistyli a finger-like pilose projection termed the *dististylus* (dst). Dististyli were not found in any of the other genera examined.

The *aedeagus* (ae) of the Mydidae is simple (undivided) in most of the American, Eurasian, and Australian genera, and bifid in the genera occurring in the Ethiopian region (see *Syllegomydas daltoni* Séguy, Figs. 65-67).

THE LEGS

The *coxae* are pilose, in some genera quite densely pilose; in a few groups they are densely pollinose but they are usually bare of pollen. The *trochanters* are shining, bare of pollen and with a few short hairs, but in *Opomydas* Curran and *Heteromydas* Hardy the hind trochanters have from 2-5 short strong spines. The fore and middle femora and tibiae are usually short and slender and their tarsi are short; in *Dolichogaster* Macquart the fore and middle femora are swollen and in one species of *Phyllomydas* Bigot the fore and middle tibiae are swollen and as wide as their femora; the hairs are short and inconspicuous but in a few species there are distinctive fringes of long hairs or bristles.

The hind legs show the most varied characters. The femora vary from long and slender with a few sharp spines on the venter, to greatly swollen with as many as 20 stout, tuberculate spines on the venter. The hairs are usually short and inconspicuous; in some males of *Nemomydas* Curran and *Pseudonomoneura* M. Bequaert there are long erect hairs on the dorsum; in some species of *Mydas* Fabricius the dense hairs on the venter obscure the spines; and in *Mitrodetus* Gerstaecker and *Plyomydas,* gen. n., there are conspicuous long hairs on the venter. The hind tibiae are short and stout with a ventral keel; varying to quite long, slender and cylindrical. The apex may have a long, curved spur at least

two times the diameter of the hind metatarsus, varying to groups with a small straight spur, with a short spur and an apical bristle or two, or to others with apical bristles only. The hairs and bristles are usually short and inconspicuous but in some groups or species they can be long, numerous, and of value in classification.

The hind metatarsi are short, about three times as long as wide and subequal to or less than the length of segments 2-3; in a few genera they are about five times as long as wide and as long or longer than segments 2-4 (*Mitrodetus* Gerstaecker, *Opomydas* Curran and *Heteromydas* Hardy). The claws are rather short and the pulvilli are about three-fourths as long as the claws. M. Bequaert (1961) has noted that the pulvilli of the Mydidae have only one dorsal carina or rib which he calls the "arête" (ridge); in the Asilidae he noted that there are two ridges.

THE WINGS

Friend (1942) gives a summary of the two systems of nomenclature for the wing veins and cells in general use, i.e., the Loew system and the Comstock-Needham system. The Loew system uses numbers for most of the veins and names for the cells; this system is illustrated by Back (1909), Curran (1934) and Friend (1942). The Loew system for the names of the cells (Fig. 68) and the Comstock-Needham system for the designation of the veins (Fig. 69) are used here with two modifications: the Media is considered to be four branched as proposed by Tillyard (1926) and Radius branches 3 and 4 are considered fused as proposed by Shannon & Bromley (1924) rather than a fusion of Radius branches 2 and 3 as illustrated by Comstock (1918). The stump vein near the base of the second submarginal cell in most Mydidae and in a number of related families represents R_3 rather than R_4 as illustrated by other authors (Séguy, 1928).

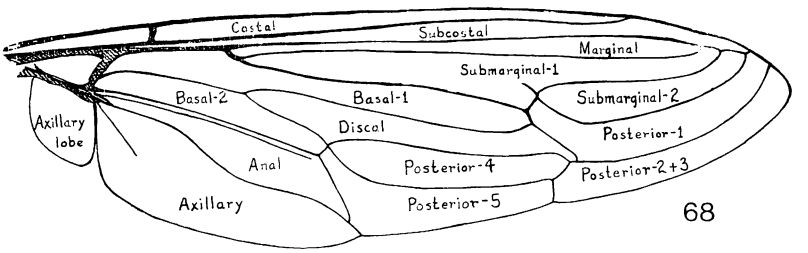
In the Mydidae, Apioceridae, and a few other flies, Radius branches 2 to 5 terminate in the antero-apical portion of the wing instead of in the apical or apico-posterior part of the wing. Also the Media, $M_1 + M_2$, terminate at or above the apex of the wing instead of in the posterior apical part. Cazier (1941) has illustrated the movement of the Radius and the Media in several families of flies. His illustrations in order are as follows; Asilidae *(Echthopoda, Ceraturgus, Laphystia),* Apioceridae, North American *(Apiocera, Rhaphiomidas),* Mydidae, American *(Mydas, Nemomydas*), Apioceridae, Chile (*Megascelus*) and Apioceridae, Australian *(Neorhaphiomidas, Apiocera).*

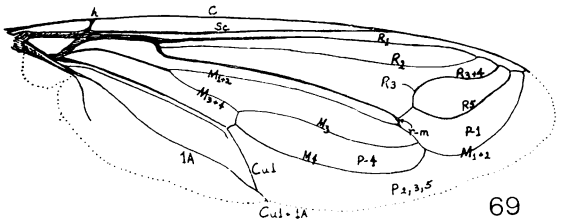
Paramonov (1950) summarizes the venation of the Mydidae as follows:

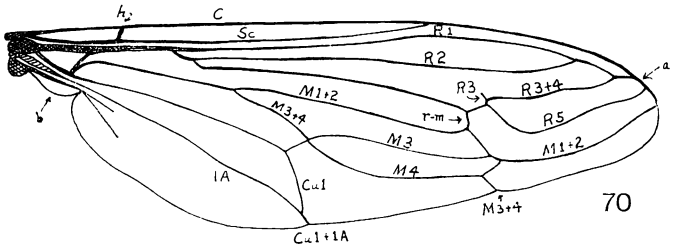
"(1) Subcostal vein longer than in any Diptera except Nemestrinidae; (2) Radial vein r_1, also very long, in length approached by Nemestrinidae, Apioceridae, and some Asilidae; (3) All radial and median branches end, as a rule, in the costa before the apex of the wing; (4) Prefurca extremely short; (5) The upper basal cell extremely long; (6) The position of cross-vein r-m rather similar to that in the Nemestrini-

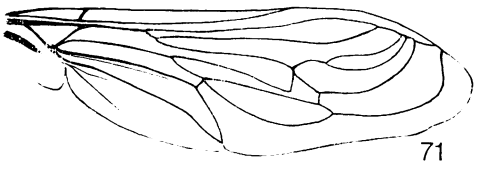
dae; (7) From the cell below discal cell there is usually no vein running to the hind margin of wing, or if there is it is weak or very short; this cell is very elongate and runs parallel to the discal cell and the hind margin of wing".

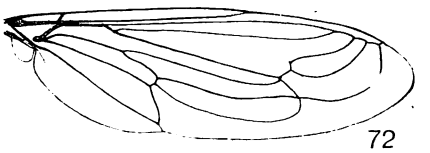
The cell below and adjoining the discal cell here is posterior cell 4; Bezzi (1924) calls this the third posterior cell.











Wings: 68, Loew system for wing cells (*Mydas lividus* Curran); 69, Comstock-Needham system for wing veins (*Nemomydas pantherinus* Gerstaecker); 70, *Apiophora paulseni* Philippi, *a*: open 2nd submarginal cell; *b*: reduced size of axillary lobe; 71, *Mitrodetus* sp.; 72 *Pseudonomoneura* sp.

Two submarginal cells are present in all of the Mydidae examined. R_3 never connects with R_2 to form the third submarginal cell as found in a number of Asilidae (*Promachus* Loew, *Efferia* Coquillett, etc.). In *Mydas* Fabricius and other genera, when vein R_5 terminates in vein R_1, the second submarginal cell is termed closed (Fig. 68). In *Apiophora* Philippi and other genera, when vein R_5 terminates in the costa, the second submarginal cell is termed open (Fig. 70, a). This is consistent character but is not entirely reliable as occasionally a specimen of *Mydas* Fabricius is found with the second submarginal cell narrowly open, and in the genera in which this cell is normally open specimens will be found with it closed at the junction of R_1 and the Costa. In *Mitrodetus* Gerstaecker and some species of *Nemomydas* Curran, the veins forming the second submarginal cell frequently coalesce before reaching vein R_1 so that the apex is petiolate; this is not a consistent character for this genus, as in many cases these veins do not join and specimens have been seen in which these veins were coalesced in one wing and separated in the other wing.

Three posterior cells are found in most Mydidae (*Nemomydas* Curran, etc.), posterior cells 1 and 4 are separated and cells 2, 3 and 5 are combined. Four posterior cells are found in other Mydidae (*Mydas* Fabricius, etc.), the venation is similar to the above except that the posterior crossvein is present ($M_3 + M_4$) and extends to the posterior border of the wing; posterior cells 1, 3 and 5 are separated and 2 and 3 are combined. Four posterior cells are present in *Mitrodetus* Gerstaecker (Fig. 71) but they are formed by M_1 and M_2 being separate; posterior cells 1, 2 and 4 are separate and 3 and 5 are combined, the posterior crossvein is absent. Five posterior cells are found in the Australian genus *Diochlistus* Gerstaecker, which is similar to *Mitrodetus* with the addition of the posterior crossvein.

Norris (1938) was of the opinion that M_2 does not combine with M_1 as illustrated here and by other authors, but disappears in the wing membrane, as he found a stump of M_2 in six of 28 specimens of *Miltinus minutus* Mackerras.

The axillary lobe is about as broad as long in most of the American genera but in *Apiophora* Philippi it is about one-third as broad as long (Fig. 70). The alulae (squamae) offer several characters; in *Mydas* Fabricius they are usually all brown or blackish but in several groups the margin is white or yellowish; also in *Mydas* and other genera, the fringe on the border is composed of dense squamose hairs while in *Pseudonomoneura* M. Bequaert (Fig. 72) and other genera, the fringe consists of short fine hairs. The halters are all brown or black except in one group of *Mydas,* where the knob is white or yellow.

CLASSIFICATION IN SUBFAMILIES

Generic concepts with regard to the Mydidae have undergone in this century a series of radical changes, which are not considered here. M. Bequaert (1961, 1963) was the first to employ the male genitalia in the classification of mydids, and proposed a division of the family into

subfamilies, based mainly on the structure of the aedeagus. The names he proposed in 1961 did not conform to the Code of Zoological Nomenclature and were changed in 1963; his 1961 names are given in parentheses in the key below:

1. Aedeagus with two tubes (Type-genus, *Syllegomydas* Becker) (Heteromydainae) ..... Syllegomydinae
   Aedeagus with a single tube 2

2. Veins M_1 and M_2 combined (Type-genus, *Mydas* Fabricius) (Orthomydainae Oligoneurinae) ..... Mydainae
   Veins M_1 and M_2 separated (Type-genus, *Diochlistus* Gerstaecker) (Orthomydainae Polyneurinae) ..... Diochlistinae

This scheme was followed in Hesse's recent paper (1969). In the course of our studies we have discovered several new facts which have resulted in a modification of this classification.

Thus, as already said above, we have found that the genera *Heteromydas* Hardy, *Opomydas* Curran, and *Ectyphus* Gerstaecker have a more or less free hypandrium, fused only partially to the gonopods; the aedeagus is a single tube. Several other characters (see key below) also separate these genera from the other known representatives of the family. All the remaining genera of Mydidae in the world that have been examined have the hypandrium completely coalesced with the gonopods, so as to render the identification of the former almost impossible. This has led us to consider *Heteromydas, Opomydas* and *Ectyphus* as members of a distinct subfamily.

The Syllegomydinae differ from all other members of the family by the aedeagus with two tubes.

Therefore, we accept four subfamilies, mainly separated by male genitalic characters. Subfamily divisions, according to our point of view, should be as follows:

1. Aedeagus with two tubes (phallus) (Ethiopian, Oriental, Palearctic) (Type-genus, *Syllegomydas* Becker) ..... Syllegomydinae
   Aedeagus with a single tube 2

2. Veins M_1 and M_2 separated (Chilean and Australian regions) (Type-genus, *Diochlistus* Gerstaecker) ..... Diochlistinae
   Veins M_1 and M_2 combined 3

3. Male hypandrium fused to the gonopods; hind trochanters with fine hairs; hind metatarsi usually three times as long as broad and subequal in length to segments 2-3; ♀ with or without apical circlet of strong spines; ♂ genitalia without dististyli; palpi usually one or two times as long as wide (Worldwide; absent in Ethiopian region) (Type-genus, *Mydas* Fabricius). Mydinae

Male hypandrium more or less free, only partially fused to the basistyli, but always distinct; hind trochanters with 2-5 short spines; hind metatarsi about five times as long as broad and subequal in length to segments 2-4; ♀ with apical circlet of strong spines; ♂ genitalia with dististyli; palpi about five times as long as wide and about one-half the length of oral cavity (Southwestern United States, Northern Mexico, Southern Africa, Oriental Region) (Type-genus, *Ectyphus* Gerstaecker) ... . Ectyphinae, subfam. n.

GEOGRAPHICAL DISTRIBUTION

Three subfamilies are represented in the Americas: Diochlistinae, Ectyphinae, and Mydinae.

The Diochlistinae are represented by the sole genus *Mitrodetus* Gerstaecker, which ranges from Tarapacá to Aisén in Chile, and also penetrates in Argentina down to Chubut (Puerto Madryn) (Map 3).

The Ectyphinae are represented by the genera *Opomydas* Curran and *Heteromydas* Hardy. The former has a limited distribution, ranging across central and southern California to the northern part of Baja California. The latter occupies southern California, Nevada, Utah, Arizona, New Mexico, western Texas, and enters Mexico in Baja California, Sonora, and Chihuahua (Map 1).

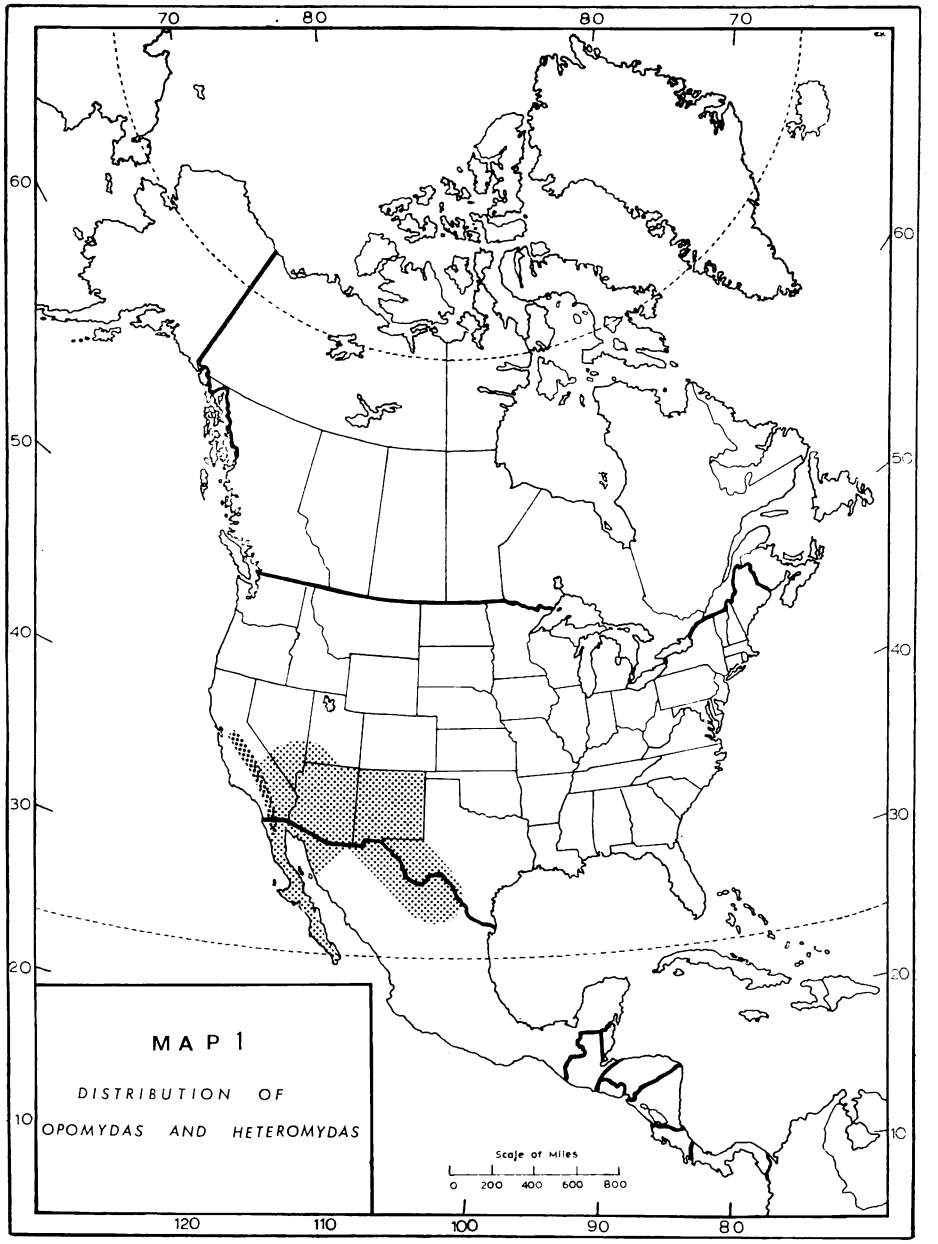
The Mydinae include two genera with broad distribution and several others with more or less limited ranges.

(i) *Genera with broad distribution.* *Mydas* Fabricius (Map 2) ranges from Utah and Ontario in North America to Buenos Aires and Montevideo in South America. The genus occurs in the West Indies (Bahamas, Cuba), but is not found in Chile. *Messiasia* d'Andretta (Map 3) occupies much the same territory as *Mydas* in South and Central America, but does not extend much beyond the United States-Mexican border, except into Arizona and California. It enters neither the West Indies nor Chile.

(ii) *North American genera with more or less limited ranges.* In North America there are three other genera of Mydinae: *Nemomydas* Curran, ranging from British Columbia, Wyoming, Kansas and the southeastern United States south to Panama (Map 4); *Phyllomydas* Bigot, extending through central and southeastern United States to northern and western Mexico (Map 5); and *Pseudonomoneura* M. Bequaert, occupying the southwestern corner of the United States (California, southern Nevada, southern Utah, Arizona) and also entering Mexico in Baja California and Chihuahua (Map 6).

(iii). *South American genera with more or less limited ranges.* The South American genera of Mydinae may be considered in two groups:

a. Cisandean group: *Pseudorhopalia,* gen. n., is known from a single locality, Icó, in the State of Ceará, Brazil; *Ceriomydas* Williston,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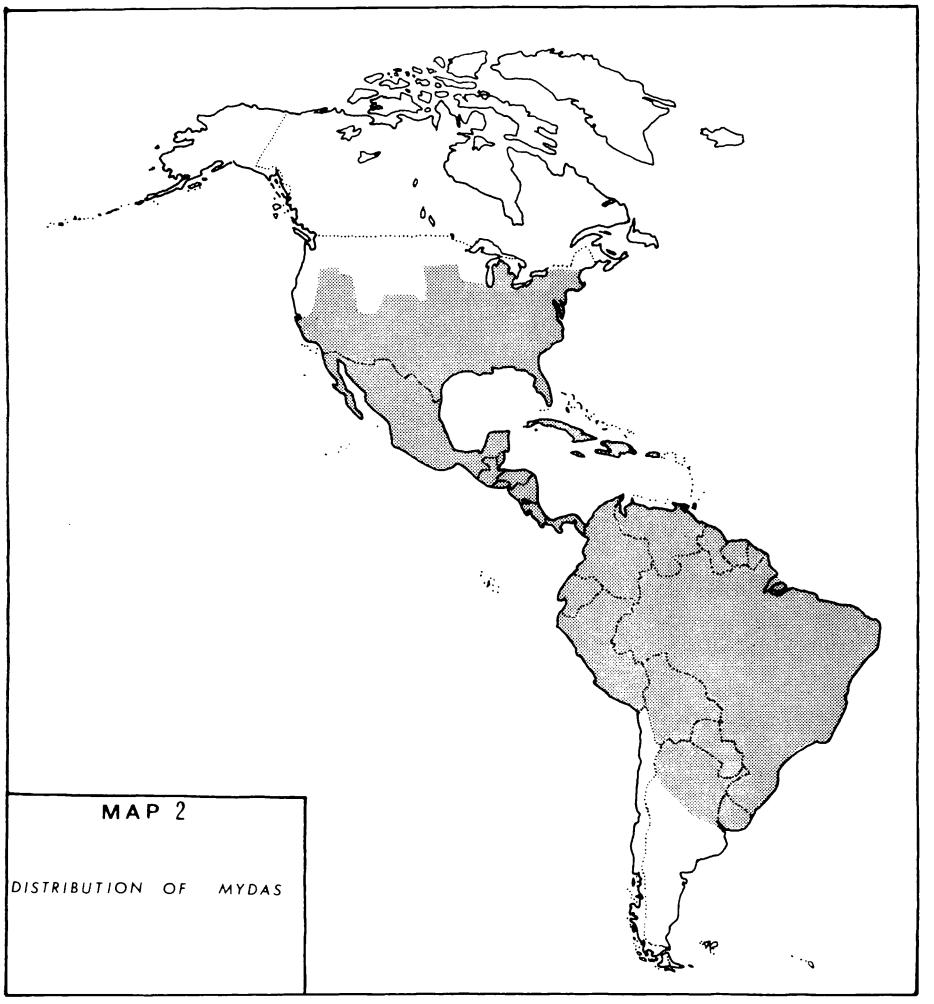
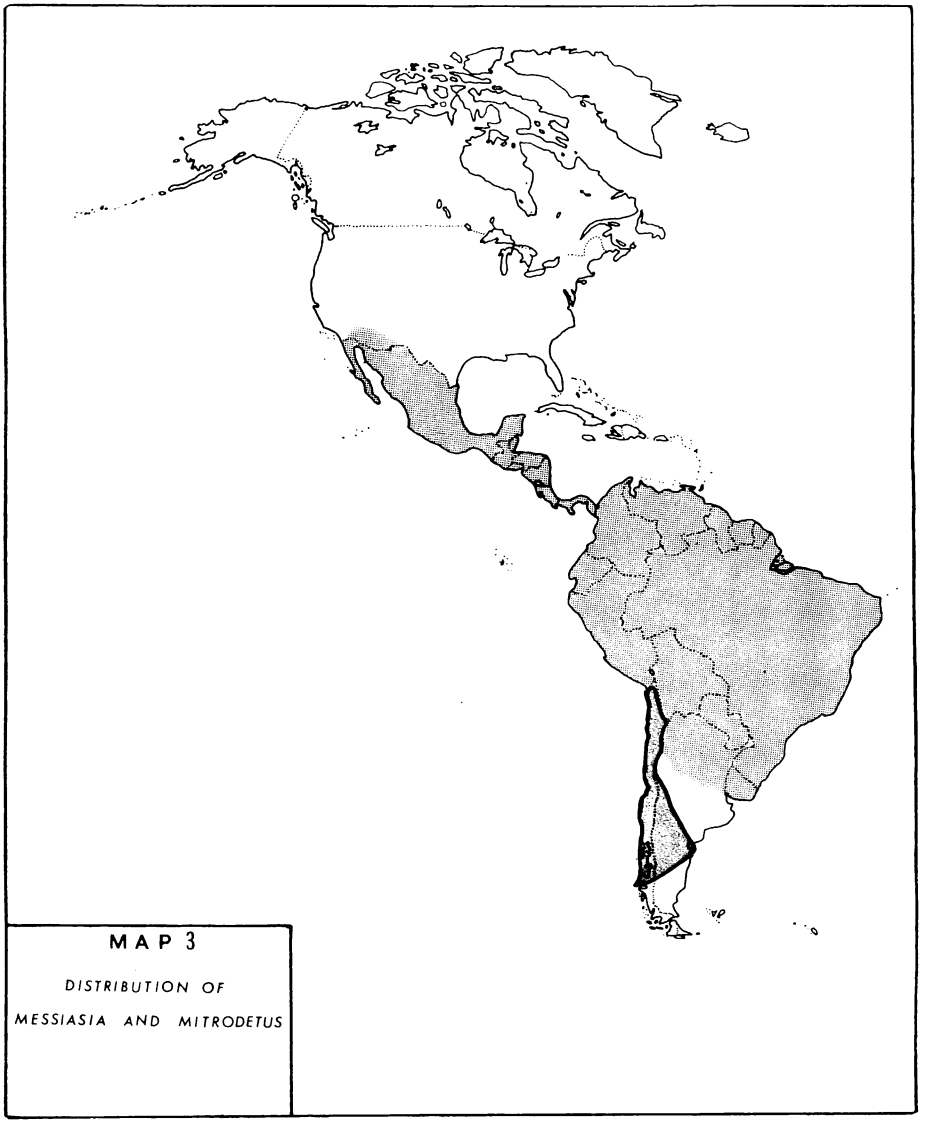
MAP 1
DISTRIBUTION OF
OPOMYDAS AND HETEROMYDAS
Scale of Miles
0 200 400 600 800

only from the type-locality, Chapada, in the State of Mato Grosso, Brazil (Map 7, n.º 2); *Eumydas,* gen. n., from Corupá, in the State of Santa Catarina, Brazil (Map 7, n.º 4); *Dolichogaster* Macquart occupies the States of Pará, Mato Grosso, Bahia, Goiás, Minas Gerais, São Paulo and Rio de Janeiro in Brazil and is also known from Paraguay (Map 7, n.º 3).



b. Transandean group. *Plyomydas,* gen. n., is known only from the Peruvian coast (Lambayeque to Lima) (Map 7, n.º 6). In Chile, *Apiophora* Philippi ranges from O'Higgins to Malleco (Map 7, n.º 1); *Midacritus* Séguy from Antofagasta to Coquimbo (Map 7, n.º 5); *Paramydas* Carrera & d'Andretta occupies much the same area as *Apiophora,* extending from Valparaiso to Malleco. It is to be noted that, as far as known, *Midacritus* and *Apiophora* are completely allopatric.

Limits of distribution. American Mydidae reach farther north than south. *Nemomydas pantherinus* (Gerstaecker) occurs in British Columbia, slightly north of 50°N, and *Mydas clavatus* (Drury) reaches Ontario, nearly at 43°N (J. Bequaert, 1944).

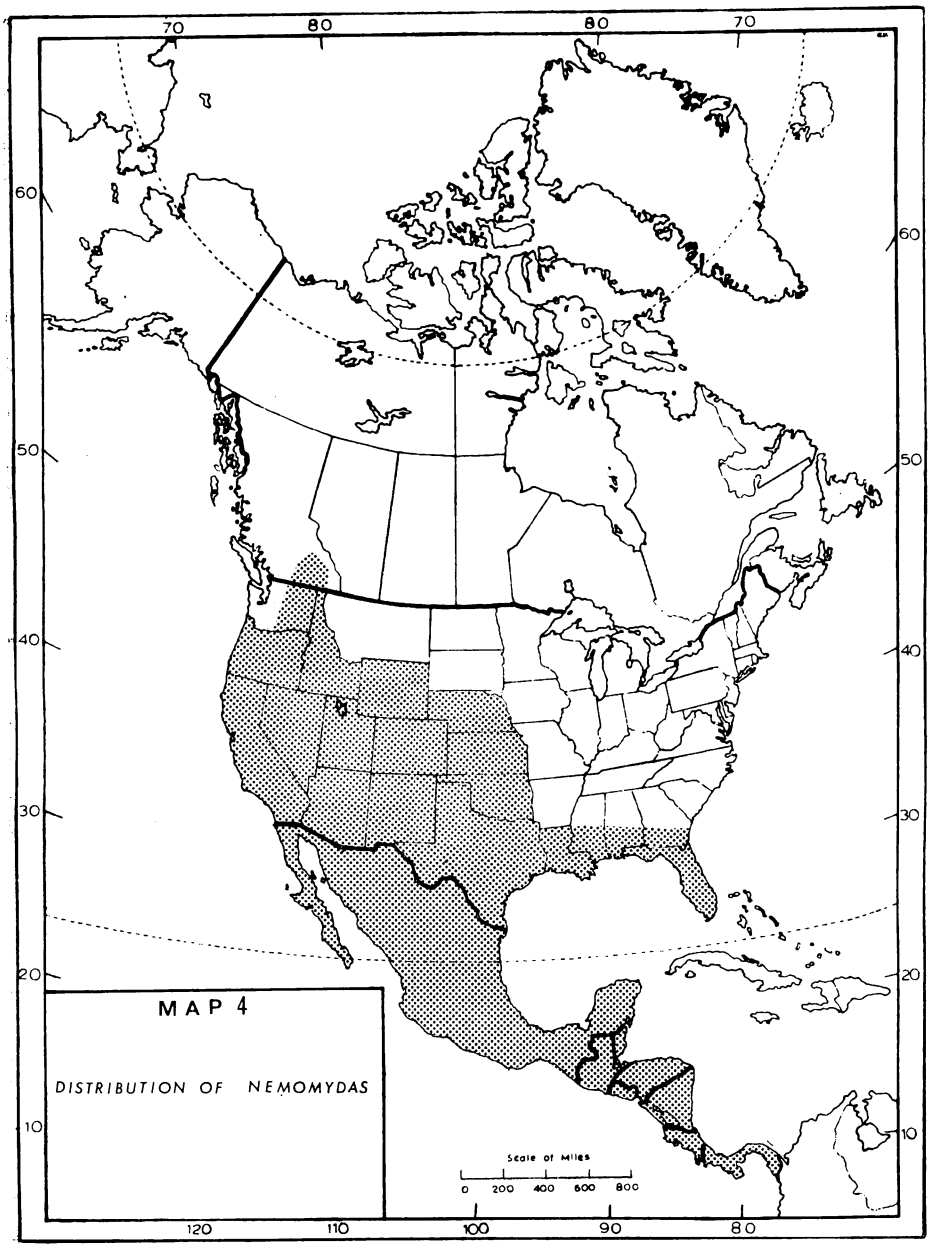


MAP 3

DISTRIBUTION OF

MESSIASIA AND MITRODETUS

In the south, the genera *Mydas* and *Messiasia* reach the Río de la Plata (between 34° and 35°S). *Messiasia notospila* (Wiedemann) and *Mydas autuorii* d'Andretta occur in Montevideo; *Mydas testaceiventris* Macquart in Maldonado, and *Mydas apicalis* Wiedemann in Buenos Ai-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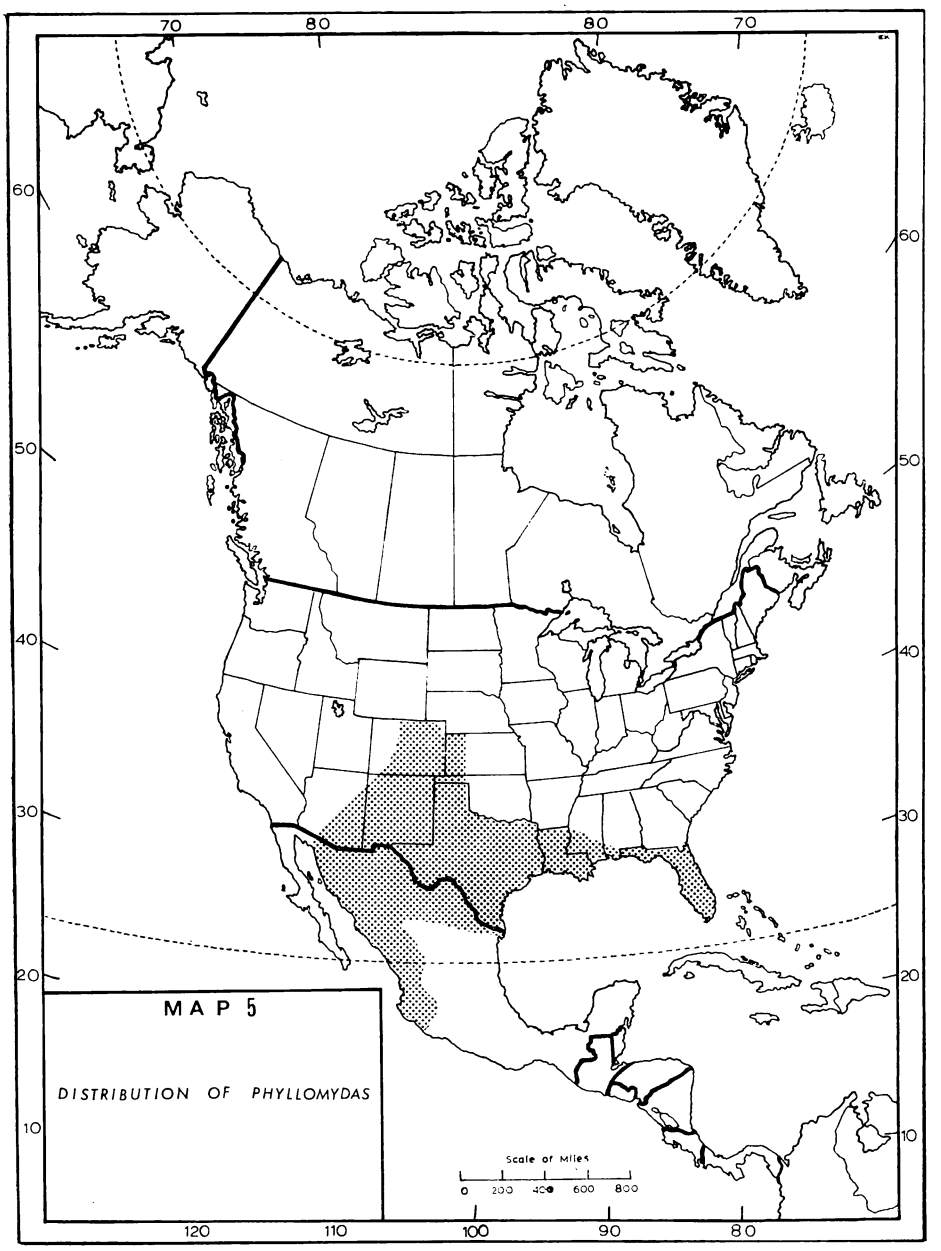
MAP 4
DISTRIBUTION OF NEMOMYDAS
Scale of Miles
0 200 400 600 800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MAP 5
DISTRIBUTION OF PHYLLOMYDAS
Scale of Miles
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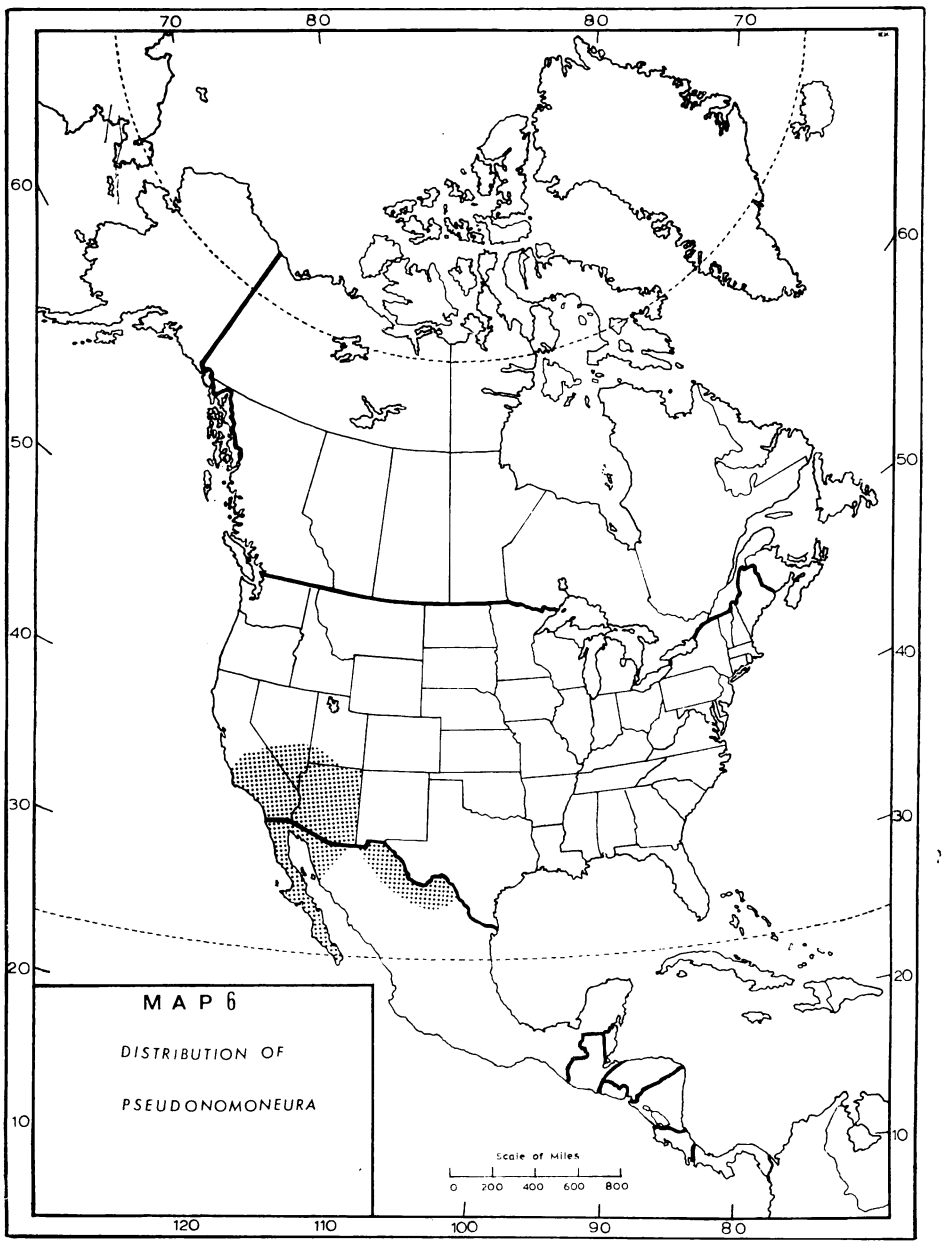
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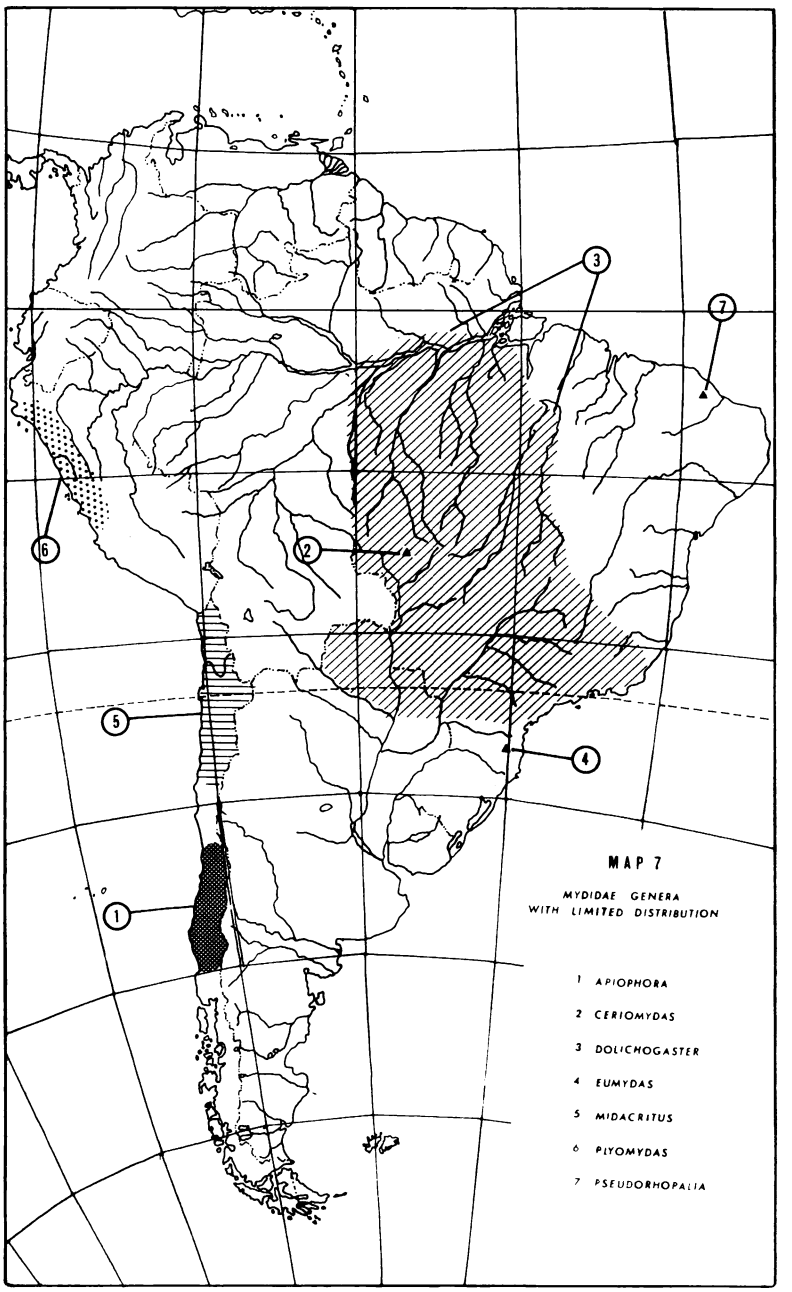
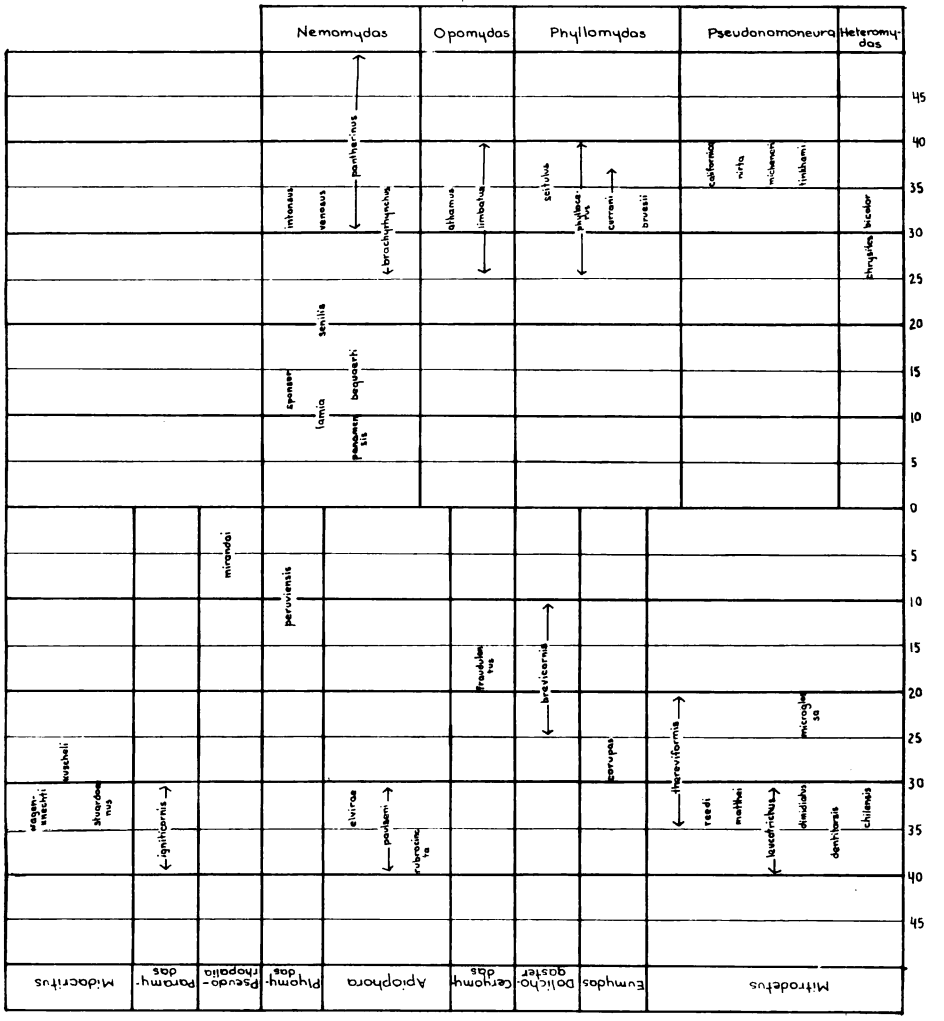
MAP 6
DISTRIBUTION OF
PSEUDONOMONEURA
Scale of Miles
0 200 400 600 800


MAP 7
MYDIDAE GENERA
WITH LIMITED DISTRIBUTION
1 APIOPHORA
2 CERIOMYDAS
3 DOLICHOGASTER
4 EUMYDAS
5 MIDACRITUS
6 PLYOMYDAS
7 PSEUDORHOPALIA

res. More to the west, still in cisandean South America, the limit is given by *Messiasia punicea* (Séguy), which is recorded from Santiago del Estero.

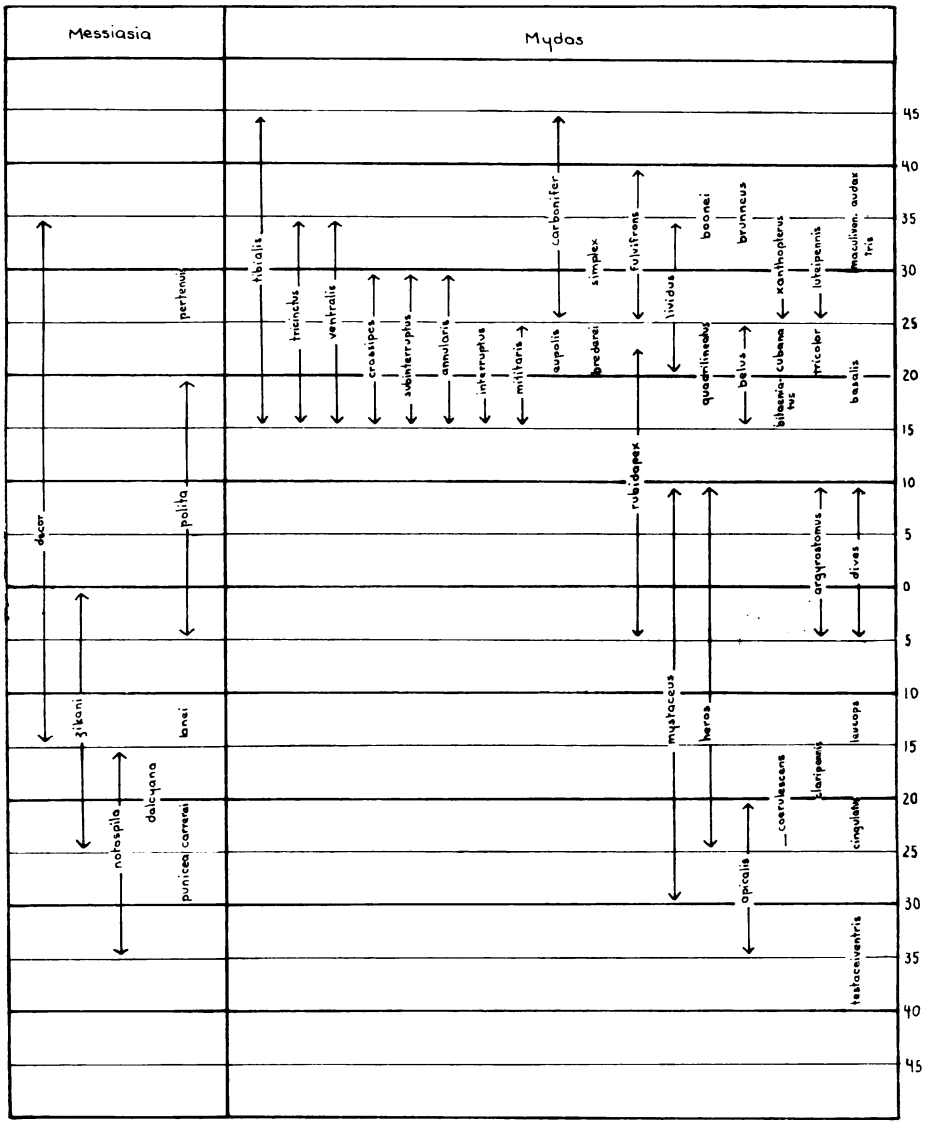
The southernmost limits of the family are in Chile — *Apiophora paulseni* Philippi and *Mitrodetus leucotrichus* (Philippi) extend down to Malleco (approximately 38°S) and *Mitrodetus dentitarsis* (Macquart) reaches Villarrica, Province of Cautín (nearly 40°S). Unidentified specimens of *Mitrodetus* were recorded from the Chilean province of Aisén, from Caleta Olivia (46°26'S, 67°32'W) and Monte Fitzroy (or Cerro Chaltel; 49°17'S, 73°05'W), and also from the Argentinian province of Chubut, in Puerto Madryn (42°46'S, 65°03'W).

Table 1. Latitudinal zonation of some Mydidae genera.



Latitudinal zonation. As can be deduced from the examination of Tables 1 and 2, mydids in the New World are predominantly subtropical and subtemperate. The largest number of species is concentrated between latitudes 15° and 40°, both in the North and in the South; the group seems to be rather uncommon in the tropics. 27 species of *Mydas*

Table 2. Latitudinal zonation of *Mydas* and *Messiasia*.



Fabricius occur in North America, between latitudes 40°N and 15°N, 5 are known from the zone between latitudes 15°N and 15°S, and 7 species exist in South America south of latitude 15°S. The distribution of the

genus *Messiasia* d'Andretta is similar, but the progressive subtraction of species is towards the Northern Hemisphere. The same pattern obtains for the assemblage of the remaining American genera (Table 3).

Table 3
Zonal distribution of the Mydidae in the Americas

	40°N-15°N	15°N-15°S	15°S-40°S
Mydas	27	5	7
Messiasia	3	4	5
Other genera	18	7	18
Total	48	16	30

KEY TO THE AMERICAN GENERA OF MYDIDAE

1. Hind metatarsus about five times as long as broad and subequal in length to segments 2-4; postscutellar slopes pilose; palpi slender and about one-half length of oral cavity; ♀ with apical circlet of strong spines 2

   Hind metatarsus about three times as long as wide and subequal in length to segments 2-3 4

2. Proboscis long and slender, about four times length of oral cavity; veins M_1 and M_2 separated, M_1 ends in R_1 closing posterior cell 1, M_2 usually ends in Costa; posterior crossvein absent; antennal segment 1 about four times length of 2; katepimeron pilose; hind femora about eight times as long as wide, hind tibiae cylindrical, with apical bristles; hind trochanters with fine hairs; length 11-19 mm (Chile, Argentina) .... *Mitrodetus* Gerstaecker

   Proboscis subequal to length of oral cavity; veins M_1 and M_2 combined and ending in Costa with posterior cell 1 open; posterior crossvein present; antennal segment 1 about two times length of 2; katepimeron bare; hind femora six to seven times as long as broad, hind tibiae with ventral keel and usually a spur and bristles; hind trochanters with two to five short strong spines 3

3. Stem of proboscis subequal to length of oral cavity, labella short and slightly wider than stem; submarginal cell 2 usually closed and short petiolate; hind tibiae with small apical spur and usually several bristles, spur very small or absent in some ♀♀; length 18-25 mm (USA, Mexico) ..... *Opomydas* Curran

Stem of proboscis about one-half length of oral cavity, attached at middle of labella which is subequal to length of oral cavity; submarginal cell 2 usually broadly open; hind tibiae with apical spur and a bristle at base; length 22-29 mm (USA, Mexico) ..... *Heteromydas* Hardy

4. Second submarginal cell of wings closed, i.e., vein R_5 ends in vein R_1 5

Submarginal cell 2 of wings open, i.e., vein R_5 ends in the costa; stem of proboscis about one-half length of oral cavity, attached to middle of labella which is subequal to length of oral cavity 12

5. Hind femora usually strongly swollen; hind tibiae usually with an apical spur; ♀ abdomen with fine hairs at apex 6

Hind femora rather slender, six to ten times as long as wide; hind tibiae cylindrical with apical bristles 10

6. Abdomen pedunculate, segment 3 narrow and one and one-half times as long as broad; length 27 mm (Brazil) .... *Ceriomydas* Williston

Abdominal segment 3 broader than long in dorsal view 7

7. Stem of proboscis subequal to length of oral cavity, labella attached to apical one-half or more and extending out at about a 90° angle; oral margin opposite the lower eye margin 8

Stem of proboscis about one-half length of oral cavity, attached at middle of labella which is subequal to length of oral cavity; oral margin situated at about two-fifths distance from lower eye margin to antennae 9

8. Facial gibbosity about as broad as high; ♀ tergite 9 narrower apically than basally; length 15-60 mm (N. and S. America) ..... *Mydas* Fabricius

Facial gibbosity about one and one-half times as broad as high; ♀ tergite wider apically than basally, fluted; length 12-21 mm (USA, Mexico) ..... *Phyllomydas* Bigot

9. Antennae short, segment 3 widened apically and subequal in length to segments 1-2, club as long as segments 1-3; posterior crossvein absent; length 20-27 mm (Brazil, Paraguay) .... *Dolichogaster* Macquart

Antennal segment 3 slender and at least two times as long as segments 1-2, club shorter than segment 3; posterior crossvein present; length 15-29 mm (N. and S. America) .... *Messiasia* d'Andretta

10. Laterotergite bare; posterior crossvein present; stem of proboscis attached to middle of labella, labella slightly shorter than oral cavity; antennal club longer than segment 3; hind femora about 10 times as long as broad, venter with long hairs and 2-3 subapical spines; ♀ with apical hairs; length 12-18 mm (Peru) ..... *Plyomydas,* gen. n.

Laterotergite pilose, hairs short and inconspicuous in some ♀♀; posterior crossvein absent; proboscis obsolete to functional, varying from about one-half to three times the length of the oral cavity; ♀ with apical circlet of spines 11

11. Antennal club shorter than to subequal in length to segment 3; basistylus divided apically, each arm with a single prong; length 9-20 mm (USA, Mexico) .... *Pseudonomoneura* M. Bequaert

Antennal club longer than segment 3; ♂ sternite 9 divided basally, each arm with two apical prongs; length 12-23 mm (British Columbia to Panama) ..... *Nemomydas* Curran

12. Hind femora slender, seven to ten times as long as wide; hind tibiae cylindrical, with apical bristles 13

Hind femora swollen, four to seven times as long as broad; hind tibiae with ventral keel and with apical spur; posterior crossvein present 15

13. Posterior crossvein absent; hind femora with short hairs and seven spines on venter; ♀ abdomen with apical circlet of spines; length 10-14 mm (Brazil) ..... *Pseudorhopalia,* gen. n.

Posterior crossvein present 14

14. Submarginal cell 2 open; palpi slender and two-fifths length of oral cavity; hind femora with short hairs and about 15 spines on venter; club of antennae globular, three-fourths as wide as long; ♀ with apical circlet of spines; length 14-20 mm (Chile) ..... *Midacritus* Séguy

Submarginal cell 2 open or closed; palpi short; hind femora with fringe of long hairs on venter and 2-3 subapical spines; club of antennae less than one-half as broad as long; ♀ with apical hairs; length 12-18 mm (Peru) ..... *Plyomydas,* gen. n.

15. Abdomen deeply and densely punctate, ♀ with apical hairs; katepimeron pilose; alulae with squamose fringe; axillary lobe as broad as long; length 18-23 mm (Chile) .... *Paramydas* Carrera & d'Andretta

Abdomen smooth, ♀ with apical circlet of spines; katepimeron bare 16

16. Axillary lobe less than one-half as broad as long; alulae with fringe of very short fine hairs; hind femora strongly swollen, ♂ four to four and one-half, ♀ four and one-half to five, times as long as broad; length 14-19 mm (Chile) .. *Apiophora* Philippi

Axillary lobe as broad as long; alulae with dense fringe of long squamose hairs; hind femora moderately swollen, ♂ six, ♀ seven, times as long as broad; length 21-28 mm (Brazil) .... *Eumydas,* gen. n.

DESCRIPTIONS OF THE GENERA

Genus **Apiophora** Philippi

Apiophora Philippi, 1865: 682. Type-species, *paulseni* Philippi (orig. des.).

Head in anterior view one and one-third times as wide as high; face at antennae about one-third width of head; oral margin at two-fifths distance from lower eye margin to antennae. Proboscis similar to *Messiasia,* labella subequal to length of oral cavity; palpi slender and about one-half length of oral cavity. Antennal segment 1 cylindrical and about one and one-half times as long as broad; 2 about one-half length of 1; 3 slender and about two times as long as 1-2; club slightly longer than 3 and one-half as broad as long (Fig. 13).

Mesonotum with sparse hairs, short recumbent to long erect, on lateral margins and in dorsocentral rows. Scutellum with sparse long hairs. Postscutellum bare. Pleura with sparse long hairs on episternum-1, pteropleura and metasternum.

Abdomen smooth; tergite-1a rounded and bare of hairs; 1p with sparse long hairs; remainder with very short sparse recumbent hairs; bullae oval and about two times as long as broad (Fig. 44). Sternite 1 bare, 2-7 with very short sparse recumbent hairs; ♂ 8 about one-half length of 7 and with sparse long hairs. Male genitalia (Figs. 73-75): hypandrium completely coalesced to the basistyli; apical processes of gonopods comparatively long, straight, in the apex with a beak pointed towards the interior of the genitalia; laterally to the apical processes, there is a wing-like expansion, less sclerotized; external margin of apical processes more sclerotized than internal margin; aedeagus a very thick tube, with well-developed wing-like apodemes on its dorsal side; cerci elongate, oblongate, coalesced in their bases for a distance half their length, in dorsal view; epandrial halves triangular, free; the projections almost touch one another. Female with apical circlet of strong spines and sparse erect hairs on segment 8.

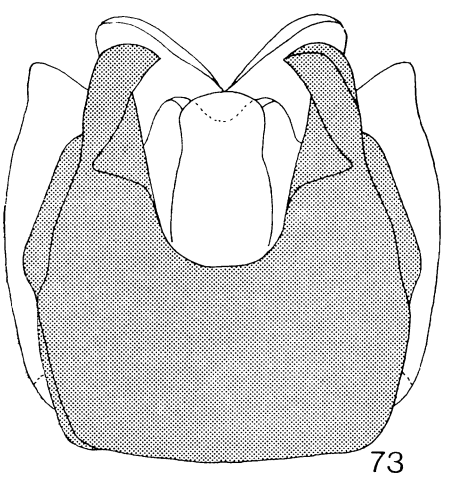
Fore and middle legs slender; femora nearly two times as wide as tibiae; hind femora swollen, four to five times as long as broad, venter with about 16 tuberculate spines, hairs short recumbent with a few longer erect hairs on dorsum. Hind tibiae with ventral keel, apical

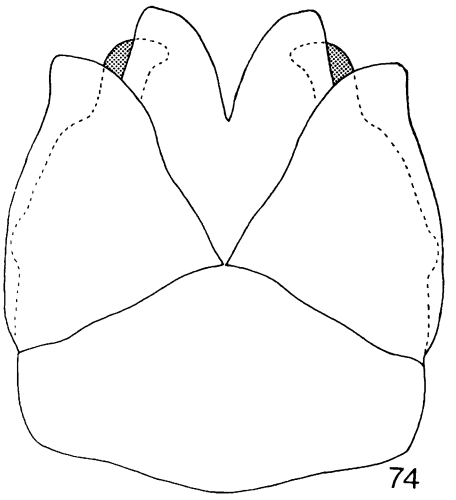
spur subequal to width of metatarsus and usually a bristle at base. Hind metatarsus about three times as long as wide and subequal in length to segments 2-3.

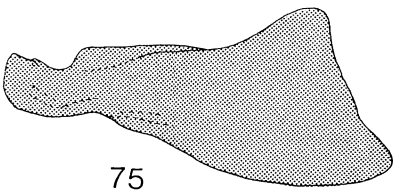
Alulae with a fringe of short fine hairs. Wings narrow, about three and eight-tenths times as long as wide; second submarginal cell broadly open; posterior crossvein present; ambient vein complete; axillary lobe less than one-half as broad as long (Fig. 70).

Length, 14-19 mm.

Geographic range: Chile.







Apiophora paulseni Philippi, male genitalia: 73, ventral view; 74, dorsal view; 75, fused hypandrium and gonopods, lateral view.

Genus **Ceriomydas** Williston

Ceriomydas Williston, 1898: 58. Type-species, *fraudulentus* Williston (orig. des.).

The original description is as follows:

"Like *Mydas,* but the abdomen as in *Ceria* or *Conops.* The abdomen is pedunculate, much narrower at the base, broadly expanded and

acuminate distally; the first two segments are tapering, the third cylindrical, with parallel sides, and nearly twice as long as wide; the fifth segment is as broad as the thorax, whence the abdomen tapers to a point. The face is more produced downwards than in *Mydas,* and the labella are larger. There is a marginal cross-vein in the wings, and the hind tibiae are spurred".

In the description of *fraudulentus* Williston stated "lamella (antennal club) altogether about three-fourths the length of the third joint. — Length 27 mm.".

"One specimen (♀), Chapada, Brazil (H. H. Smith). This specimen shows a remarkable mimicry of certain ones of *Conops* occurring in the same region".

The female abdomen is narrowed basally in a few species of *Mydas.* This is probably most evident in *Mydas tricinctus* Bellardi; in dorsal view tergite 3 is one and one-half times as broad as long.

A photograph of *Ceriomydas fraudulentus* Williston was published by Williston (1908: 18, fig. 3), and Curran (1934: 480). The genus is known only from the type, which could not be located.

Genus **Dolichogaster** Macquart

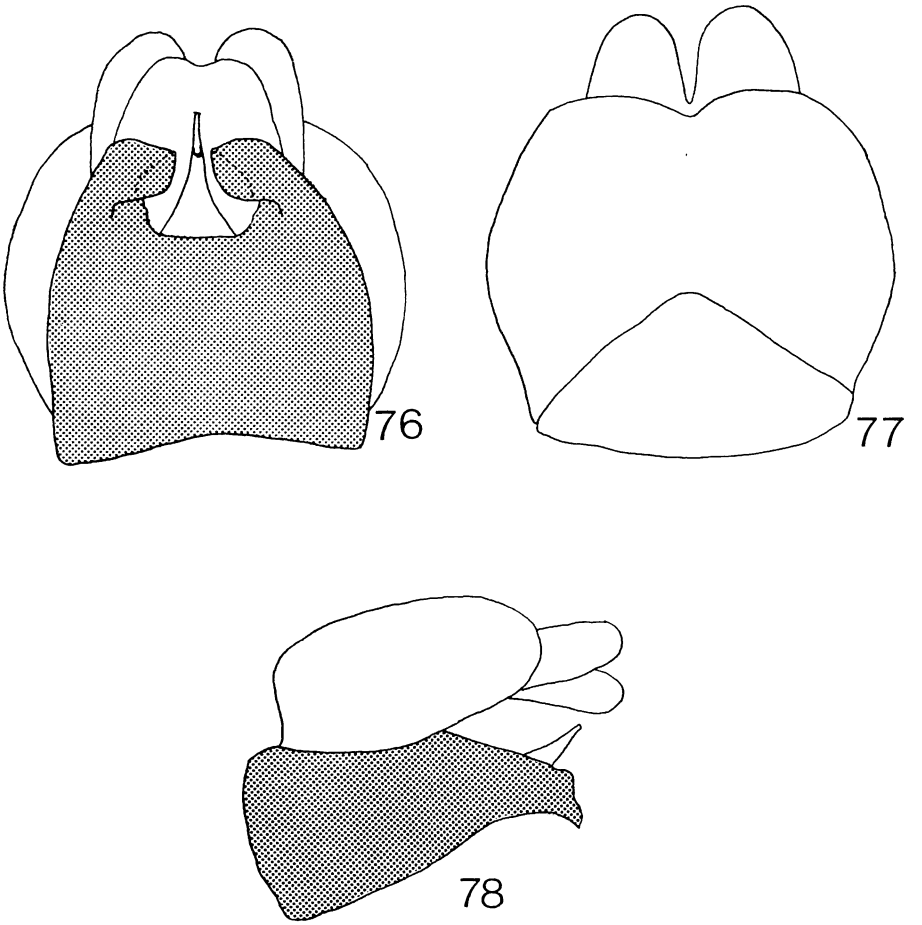
Dolichogaster Macquart, 1848: 178 (sep., p. 18). Type-species, *Mydas brevicornis* Wiedemann (mon.).

Head in anterior view one and six-tenths as broad as high; face at the antennae slightly less than one-half width of the head; oral margin at about one-third distance from lower eye margin to the antennae. Proboscis similar to *Messiasia,* labella about three-fourths length of oral cavity; palpi very small. Antennal segment 1 slightly broader at apex than at base, its length subequal to width at apex; 2 about one-half length of 1 and one and one-half times as broad as long; 3 subequal in length to 1-2, apex about two times as broad as base; club slightly longer than 1-3, at basal one-fourth about three-fifths as wide as long (Fig. 14).

Mesonotum with short sparse semierect hairs on lateral margins and on dorsocentral stripes, mostly anteriorly. Scutellum bare of hairs, a few short erect on arms. Postscutellum rugose, bare of hairs. Pleura with hairs on episternum-1, pteropleura and metasternum.

Abdominal tergite-1a tuberculate, bare; 1p with sparse long erect hairs; remainder with quite numerous short recumbent hairs which on the apical segments arise from tiny punctures; bullae about three times as long as broad (Fig. 45). Sternites with quite numerous short recumbent hairs; ♂ sternite 8 about one-half as long as 7 with dense longer hairs. Female with apical hairs. Male genitalia (Figs. 76-78): hypandrium completely coalesced with basistyli, the resulting structure short, trapezoidal; apical processes of gonopods very short, bent inwards, well sclerotized, black, and pointed apically; this beak is especially distinct in lateral view; aedeagus with a basal triangular bulb, and a long,

slender neck [see d'Andretta & Carrera, 1951: figs. 19, 20, 18 (lateral view of aedeagus), 21 (apical processes of gonopod)]; anal lamellae and cerci long, oblongate, with very long bristle-like hairs; the cerci not coalesced; epandrial halves evenly rounded in their outer side, placed together, their inner sides straight, and the halves coalesced only for a short distance at the base; outer margin of epandrium with strong bristle-like hairs; wing-like expansions of aedeagus short, limited to the ventral bulb.



Dolichogaster brevicornis (Macquart), male genitalia: 76, ventral view; 77, dorsal view; 78, lateral view.

Fore and middle femora swollen and about two times as wide as their tibiae. Hind femora strongly swollen, about four times as long as wide; about 20 tuberculate spines on venter; hairs short, numerous, semierect. Hind tibiae with ventral keel; apex with sharp spur sub-

equal in length to width of metatarsus, one bristle arising at middle of spur, one at base of spur and two or three more at apex of tibiae. Hind metatarsus nearly three times as long as wide and subequal in length to segments 2-3.

Alulae with fringe of dense squamose hairs. Wings about two and one-half times as long as broad; second submarginal cell closed and petiolate; first posterior cell at times closed and petiolate, or narrowly open; posterior cross-vein absent; ambient vein weak; axillary lobe about one and one-half times as long as broad.

Length: 20-27 mm.

Geographic range: Brazil, Paraguay.

Eumydas, gen. n.

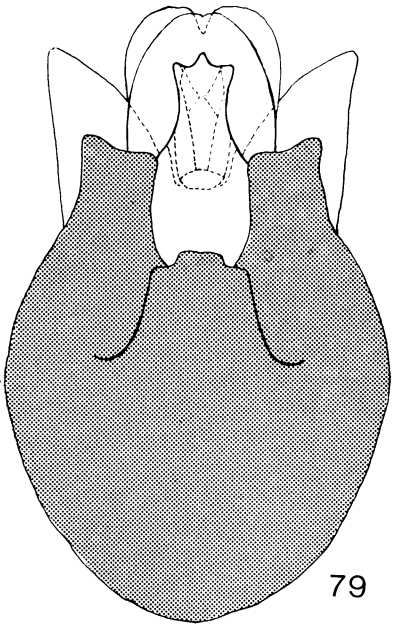
Head in anterior view one and one-half times as wide as high; face at the antennae three-sevenths width of head; oral margin at two-fifths distance from lower eye margin to the antennae. Proboscis similar to *Messiasia,* labella subequal to length of oral cavity; palpi?. Antennal segment 1 cylindrical and slightly longer than wide; 2 one-half length of 1 and nearly two times as wide as long; 3 slender and nearly four times as long as 1-2; club subequal in length to 3, at two-thirds its length about one-fourth as wide as long (Fig. 15).

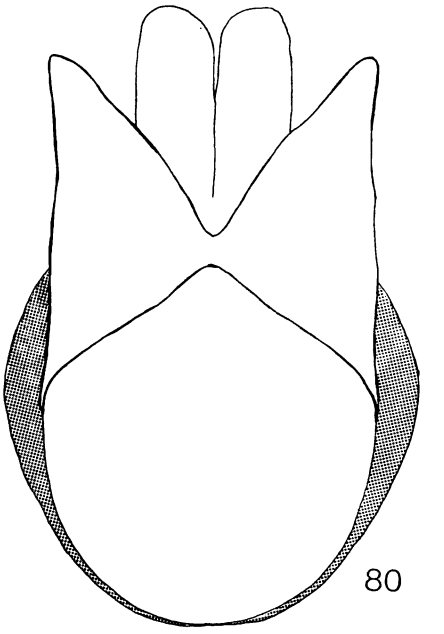
Mesonotum with sparse short recumbent hairs on lateral margins and dorsocentral stripes and these areas apparently densely pollinose. Scutellum bare of hairs but a few erect on arms. Postscutellum shallow rugose on dorsum, deeper laterally, bare of hairs. Pleura with long sparse hairs on episternum-1, pteropleura and metasternum.

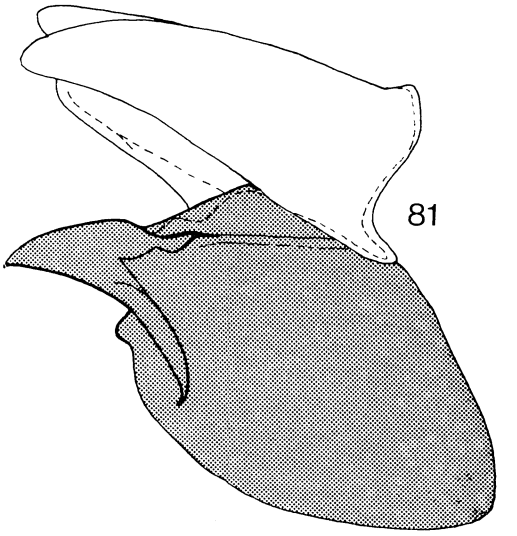
Abdominal tergite-1a hemispherical, bare of hairs; 1p with sparse long hairs, recumbent on dorsum, erect laterally; 2-7 with very sparse short recumbent hairs; bullae (Fig. 46) about three times as long as wide. Sternites 2-7 with short sparse recumbent hairs; sternum 8 of male about one-third length of 7 and with quite dense long hairs. Female with a terminal circlet of strong spines. Male genitalia (Figs. 79-81): hypandrium completely coalesced with the basistyli, the resulting structure being elongate, ovoid, with a projection between the apical processes; the latter dorsoventrally compressed, well sclerotized, subrectangular, with the outer side prolonged into a beak (especially distinct in lateral view); aedeagus more or less similar to *Apiophora;* ventral lamellae and cerci longer than aedeagus; epandrial halves triangular, long and slender, with moderately long hairs; cerci coalesced only at immediate base; halves of epandrium fused only in a small extension at their base.

Fore and middle legs slender. Hind femora long, slightly swollen, about seven times as long as wide; venter with about 16 tuberculate spines; hairs short, sparse, semi-erect. Hind tibiae with ventral keel,

apex with a sharp spur subequal to width of metatarsus and a bristle at base. Hind metatarsus about three times as long as wide and subequal in length to 2-3.







Eumydas corupas, gen. n., sp. n., male genitalia: 79, ventral view; 80, dorsal view; 81, lateral view.

Alulae with a fringe of squamose hairs. Wings about three and one-third times as long as wide; second submarginal cell broadly open; posterior crossvein present; ambient vein complete; axillary lobe slightly longer than wide.

Length: 21-28 mm.

Geographic range: Brazil.

Type-species, *Eumydas corupas,* sp. n.

Eumydas corupas, sp. n.

Male — Length: 21 mm.

Head black; face, gibbosity except sides below and frons except ocellar area densely golden pollinose; occiput grayish pollinose. Hairs golden; long dense recumbent in mystax and a dense clump to the sides and above antennae. Proboscis black. Face at lower eye margin 15, at antennae 29, at vertex 26, and on eye 22, in width. Antennae black, apical half of club dark reddish; hairs below on segment 1 golden, otherwise black; segments 14-5-58-62(20) in length (width).

Mesonotum black (greasy), right lateral margin densely yellowish pollinose. Hairs short black, sparse, dorsocentral rows yellowish anteriorly. Scutellum black, a few golden hairs laterally. Postscutellum black, densely grayish pollinose (partly greasy). Pleura and coxae black, densely grayish pollinose (partly greasy); hairs on fore and middle coxae and at apices of hind coxae short black; on hind coxae and pleura long sparse golden.

Abdominal tergite-1a black, gray pollinose; 1p (dorsum apparently gray pollinose), basal third of 2 and broad sides of 2-7, black; remainder yellowish red with the posterior margins of 2-7 yellowish; bullae black, 18 long, 5 wide. Hairs on tergite 1-p fairly long sparse golden, on remainder very sparse, short, recumbent, black. Sternite 1 brownish black, remainder yellowish red with yellowish posterior margins; hairs on 2-7 sparse, short, recumbent, black; 8 with long dense golden hairs. Genitalia yellowish red, apical processes of gonopods (basistyli) blackish apically; epandria narrow, V-shaped with quite dense, short, black hairs; remainder mostly golden haired.

Fore and middle legs black; hairs short, black, golden below tarsi. Hind femora reddish-brown; the base, apex and dorsum blackish; moderately swollen, length 110, greatest width 18; hairs short, black, a few long golden hairs on posterior ventral surface; ventral spines reddish. Hind tibiae reddish brown; hairs short, black; apical spur straight, acute, 9 in length, with black bristles at base. Tarsi black, hairs short, dense, black, golden below; segments 33 (11), 20, 13, 10, 23, in length (width). Claws reddish, tips black; pulvilli pale brown.

Halteres black. Alulae black, margin and fringe yellowish-white. Wings very light brown; veins brown, reddish anteriorly; second submarginal cell broadly open.

Female — Length: 28 mm.

Antennae black, segments 16-8-63-72 (20) in length (width) (Fig. 15). Humeri, broad sides of mesonotum and dorsocentral stripes densely yellowish pollinose; dorsocentral stripes taper apically and end at four-fifths length of mesonotum. Abdomen black; broad dorsum of 2, about dorsal half of 3 and a small spot on 4, dark red and not conspicuous; posterior margins reddish and indistinct on 5-8; tergite 1 and basal fifth of 2 gray pollinose, sides of 1-p and 2 bare; bullae black, 20 long, 8 wide; hairs yellowish, on 1-p short and recumbent with a few longer erect hairs on sides; very short and sparse on 2-7, many short and erect hairs on 8-9; sternites black, posterior margins reddish, 1 bare, otherwise as tergites; terminalia with circlet of strong reddish spines (all but two broken off). Hind femora 140 long, 20 wide; spur on hind tibiae 9 long; tarsi 43 (12), 23, 17, 11, 27, in length (width).

Holotype ♂, Corupá, Santa Catarina, Brazil, III. 1956 (A. Mahler), and paratype ♀, same data, II.1952, in MZUSP.

Genus **Heteromydas** Hardy

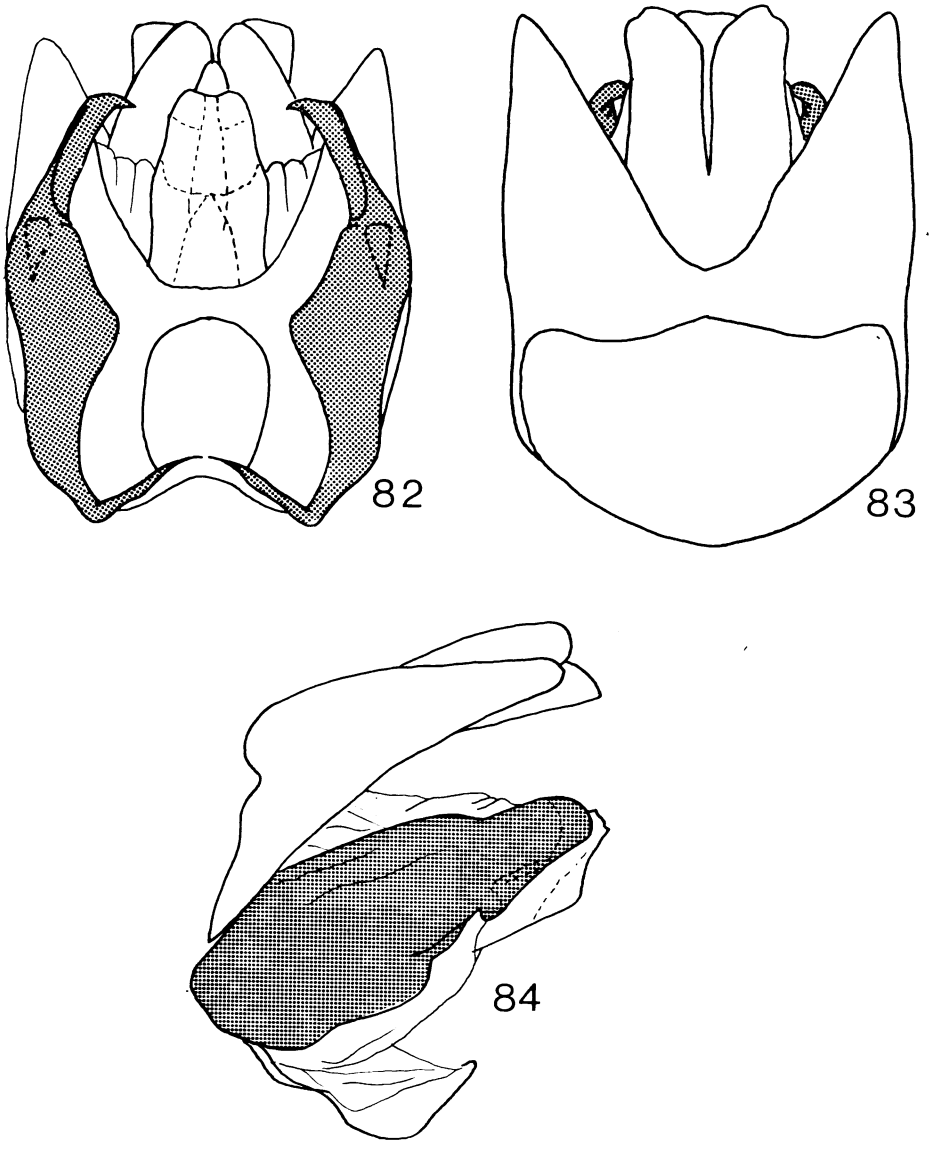
Heteromydas Hardy, 1944: 227, figs. 3a-f. Type-species, *bicolor* Hardy (orig. des.).

Head in anterior view one and four-tenths times as broad as high; face at antennae nearly one-half width of head. Oral margin at about one-third distance from lower eye margin to antennae; gibbosity with a central vertical groove. Proboscis similar to *Messiasia,* the labella as long as oral cavity; palpi slender and one-half the length of the oral cavity or more. Antennal segment 1 cylindrical, about one and one-half times as long as broad; 2 one-half length of 1 and slightly wider than long; 3 long and slender, about three times as long as 1-2; club about three-fourths length of 3, fusiform and at middle about one-third as wide as long (Fig. 16).

Mesonotum with lateral margins and dorsocentral stripes at times pollinose, including the central stripe and intermediate area anteriorly; hairs short. Scutellum with sparse long hairs on posterior margin. Postscutellum smooth, lateral slopes pilose. Pleura pilose on episternum-1, posterior margin of mesopleura, pteropleura and metasternum.

Abdominal tergite-1a slightly rounded, bare; 1-p with quite dense, short, erect, pilosity; remaining segments with sparse recumbent hairs; bullae slender and about five times as long as broad. Sternites with sparse semi-recumbent hairs becoming numerous on 7-8; ♂ 8 nearly as long as 7; ♀ segment 8 with dense erect hairs. Female with terminal circlet of strong spines. Male genitalia (Figs. 82-84): hypandrium free, small, bowl-shaped in lateral view, coalesced with the basal portions of the basistyli for a short distance; gonopods with apical processes slender, pointed to the interior of the genitalia; aedeagus long and very thick; anal lamellae and cerci slightly longer than aedeagus,

cerci coalesced basally; epandrial halves triangular, free; postero-lateral margins of epandrium prolonged into a pair of elongated lobes; cerci and epandrium with moderately long hairs. The male genitalia of *Heteromydas* was also described and figured by Hardy [1944: figs. 3C (lateral view), 3E (ventral view), 3F (dorsal view)].



Heteromydas bicolor Hardy, male genitalia: 82, ventral view; 83, dorsal view; 84, lateral view.

Hind trochanters with 2-5 short strong spines. Fore and middle legs slender. Hind femora moderately swollen, ♂ about six and ♀ about seven, times as long as wide; venter with 16 spines slightly tuberculate; hairs recumbent, short and erect on dorsum. Hind tibiae with a ventral keel, apical spur slightly longer than width of metatarsus and with a basal bristle. Hind metatarsus about five times as long as broad and as long or longer than segments 2-4.

Alulae with a dense fringe of squamose hairs. Wings about three and one-half times as long as broad; second submarginal cell open; posterior crossvein present; axillary lobe nearly as broad as long; ambient vein complete.

Length, 22-29 mm.

Geographic range: U.S.A. (California), Mexico (Baja California).

Papavero & Wilcox (1968) placed *Mydas chrysites* Osten Sacken in *Heteromydas* Hardy, based on the identification and figures of Séguy (1928). This species was described from Northern Sonora (Mexico) and Johnson (1926) identified a specimen from Southern Arizona; Dr. Howard Evans, MCZ, confirmed that it belonged in *Mydas* Fabricius. The type was examined by the junior author in the BMNH, and proved to be a real *Mydas*. Specimens of both sexes have since been examined (from Southern Arizona) and they agree so well with the description, that it appears that Séguy (1928) was incorrect in his identification; he gave no locality for his specimens, but they probably represent an undescribed species of *Heteromydas* from Baja California.

Genus **Messiasia** d'Andretta

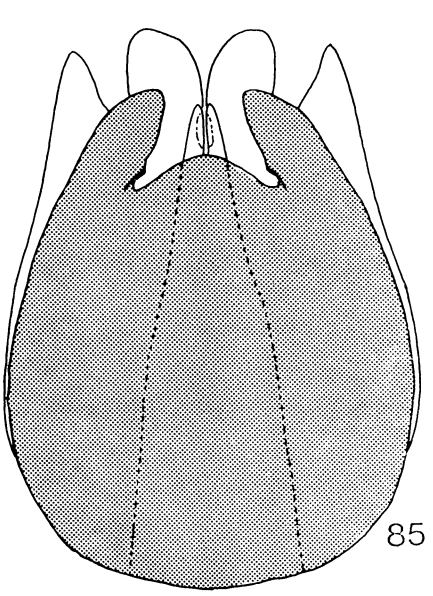
Messiasia d'Andretta, 1951: 52. Type-species, *carrerai* d'Andretta (orig. des.).

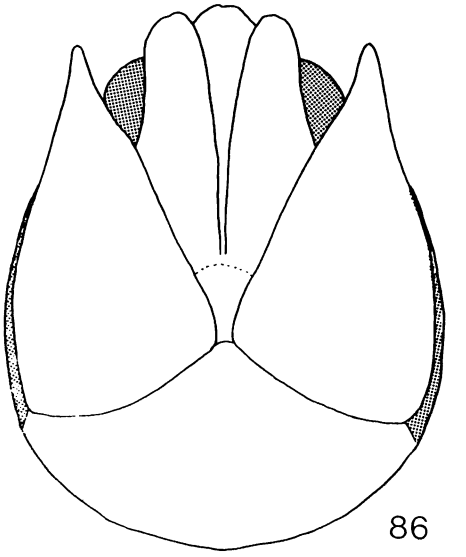
Head in anterior view one and one-half times as broad as high; face at the antennae about three-eights width of head; oral margin at about two-fifths distance from lower eye margin to antennae. Stem of proboscis about one-half length of oral cavity and attached to middle of labella; labella semicircular and subequal to length of oral cavity; palpi short, about as broad as long. Antennal segment 1 cylindrical and one and one-half times as long as wide; 2 about one-third the length of 1 and slightly wider than long; 3 slender and about three times as long as 1-2; club subequal in length to 3, at two-thirds length about one-third as wide as long (Figs. 17-19).

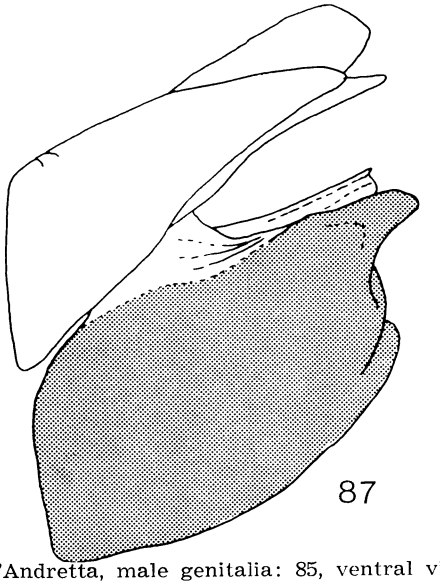
Mesonotum bare of pollen, hairs short recumbent. Scutellum with short, sparse, marginal hairs. Postscutellum rugose, bare. Pleura pilose on episternum-1, pteropleura, and metasternum.

Abdominal tergite-1a slightly rounded, bare; 1p with quite dense, erect hairs; remaining segments with quite numerous, recumbent hairs; bullae (Fig. 47) about five times as long as wide. Sternites with sparse recumbent hairs becoming numerous on 7-8; ♂ 8 one-fourth length of

7 and with longer hairs. Female terminalia with apical hairs, tergite 8 with an apical semicircular membranous area (Fig. 60). Male genitalia (Figs. 85-87): hypandrium completely coalesced with basistyli, resulting structure roughly hemispherical in most species, subrectangular in *Messiasia notospila* (Wiedemann), but always in the form of a

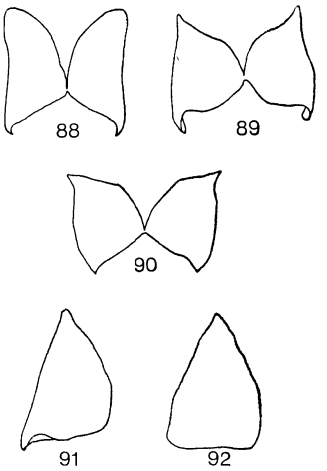






Messiasia dalcyana d'Andretta, male genitalia: 85, ventral view; 86, dorsal view; 87, lateral view.

more or less cupshaped capsule; apical processes of the gonopod short and thick, triangular, pointed inwards; in *Messiasia decor* (Osten Sacken) the apical processes are longer and more slender; the aedeagus is a conical tube, and in *Messiasia decor* (Osten Sacken) the lateral apodemes are strongly developed, and dorsally bent (see d'Andretta, 1951: figs. 177-183, p. 61); epandrial halves triangular in all known species (Figs. 88-92), differing in this from the majority of the species of *Mydas* Fabricius, where the epandrial halves are subtrapezoidal; in *Messiasia* the epandrial halves are fused basally for a short distance; cerci united at base. The genitalia of the several species of *Messiasia* have been figured by d'Andretta (1951: pl. 13, p. 49; pl. 14, p. 53; pl. 15, p. 57; pl. 16, p. 61).



Epandrial halves of *Messiasia*: 88, *carrerai* d'Andretta; 89, *dalcyana* d'Andretta; 90, *notospila* (Wiedemann); 91, *polita* (Wiedemann), 92 *zikani* d'Andretta.

Fore and middle legs slender. Hind femora quite strongly to moderately swollen, varying from about four to seven times as long as broad; venter with about 16 short, tuberculate spines; hairs variable but usually some long erect ones on dorsum. Hind tibiae with ventral keel, apex with a spur which is not quite as long as the width of the metatarsus. Hind metatarsus about three times as long as wide and subequal in length to segments 2-3.

Alulae with dense fringe of squamose hairs. Wings about two and one-half times as long as broad; second submarginal cell and first posterior cell open; posterior crossvein present; axillary lobe as broad as long; ambient vein complete.

Length, 15-29 mm.

Geographic range: U.S.A. (Arizona and California) to southern South America (but not reported from Chile).

Genus **Midacritus** Séguy

Midacritus Séguy, 1938: 269. Type-species, *stuardoanus* Séguy (orig. des.).

Head in anterior view about one and one-third times as broad as high; face at antennae about one-third width of head; oral margin at about one-third distance from lower eye margin to antennae. Proboscis similar to *Messiasia,* labella slightly shorter than oral cavity; palpi slender and about one-half length of oral cavity. Antennal segment 1 cylindrical and about two times as long as broad; 2 about one-half length of 1 and slightly broader than long; 3 slender and about two times as long as 1-2; club subequal in length to 3, spherical and about two-thirds as broad as long (Fig. 20).

Mesonotum pollinose, denser on lateral margins and dorsocentral stripes, hairs short recumbent, longer anteriorly. Scutellum with short, sparse, recumbent hairs. Postscutellum slightly rugose, densely pollinose, bare. Pleura pilose on episternum-1, pteropleura and metasternum.

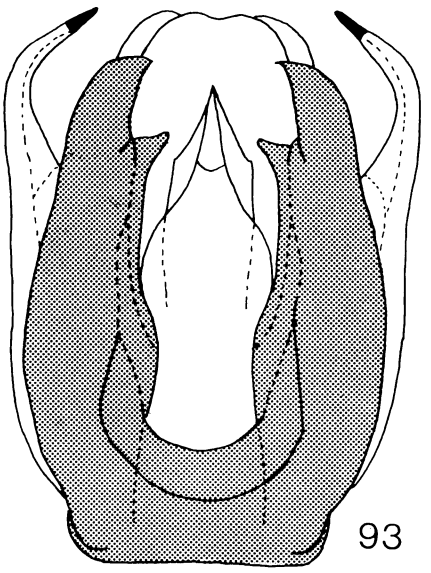
Abdominal tergite-1a rounded, densely pollinose, bare; 1p with long, dense hairs parted at middle and directed laterally; remainder with sparse recumbent hairs; bullae (Fig. 48) small, oval, about one and one-half times as long as broad. Sternites with sparse recumbent hairs; ♂ sternite 8 about one-half length of 7 and with a few apical hairs. Female with apical circlet of strong spines, numerous retrorse hairs on segments 7-8, longer on 8. Male genitalia (Figs. 93-95): hypandrium completely coalesced with basistyli; inferior region of the resulting structure very short, the apical processes very long, in such a manner that most of the aedeagus is left uncovered; apical processes of gonopods with a subapical tooth directed inwards; aedeagus voluminous, laterally compressed; epandrial halves completely free, and remarkably elongate, ending in a pointed beak, with a short spine; cerci elongated, almost parallel-sided, completely free. This type of genitalia suggests a strong modification of that of *Apiophora* Philippi — all the parts have become elongated, and the epandria have undergone a strong modification, reminding one of the genitalia of a Culicidae.

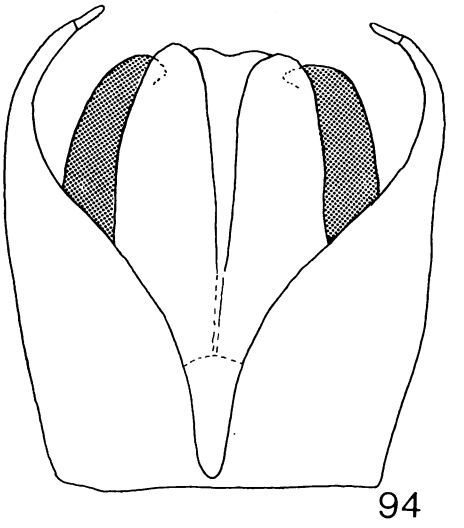
Legs slender; hind femora about seven times as long as broad, venter with about 15 sharp spines; hairs short recumbent, semi-erect on dorsum. Hind tibiae cylindrical, with one strong and one weak apical bristle. Hind metatarsus about three times as long as broad and slightly longer than segments 2-3.

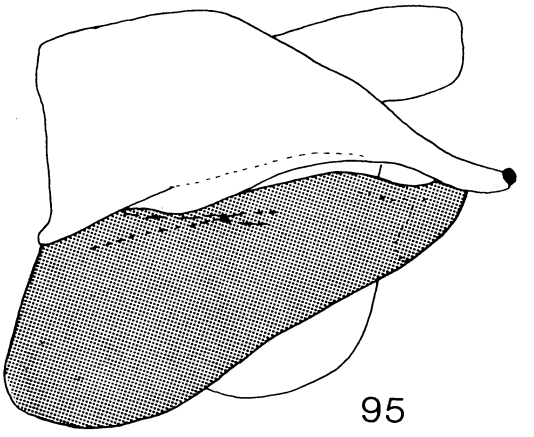
Alulae with fringe of very short, squamose hairs. Wings about three times as long as broad; second submarginal cell broadly open; posterior crossvein present; axillary lobe as broad as long; ambient vein complete.

Length: 14-20 mm.

Geographic range: Chile.







Midacritus stuardoanus Séguy, male genitalia: 93, ventral view; 94, dorsal view; 95, lateral view.

Genus **Mitrodetus** Gerstaecker

Mitrodetus Gerstaecker, 1868: 67. Type-species, *Cephalocera dentitarsis* Macquart (orig. des.).

Head in anterior view about one and one-half times as broad as high; face at antennae nearly one-half width of head; oral margin at about one-third distance from lower eye margin to antennae. Proboscis very slender and three to four times length of oral cavity, labella slightly wider than stem (Fig. 7), palpi slender and about one-third length of oral cavity. Antennal segment 1 cylindrical and about four times as long as broad; 2 about one-fourth length of 1 and about as broad as long; 3 cylindrical and from one-half to two-thirds as long as 1; club slightly longer than 1-2, about one-third as wide as long at two-thirds its length, usually collapsed and distorted so that its form is uncertain (Fig. 21).

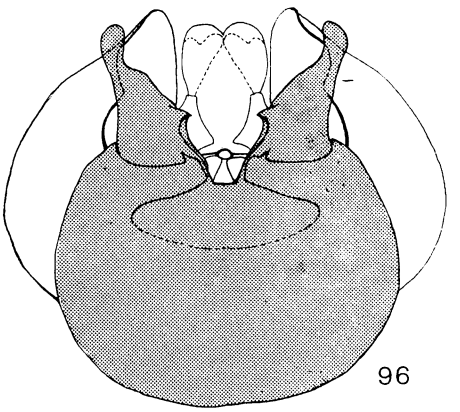
Mesonotum dense semierect to erect pilose and with only the narrow intermediate stripes bare at times, lateral margins and humeri at times with very dense recumbent hairs directed outward; bare of pollen, varying to the lateral margins, dorsocentral stripes and central stripes densely pollinose. Scutellum with many long hairs. Postscutellum slightly rugose, with dense clumps of long hairs on lateral slopes. Pleura pilose on episternum-1, pteropleura, katepimeron, and episternum with dense clumps at times on episternum-1 and pteropleura; the hairs are long and at times extend over the bare laterotergite.

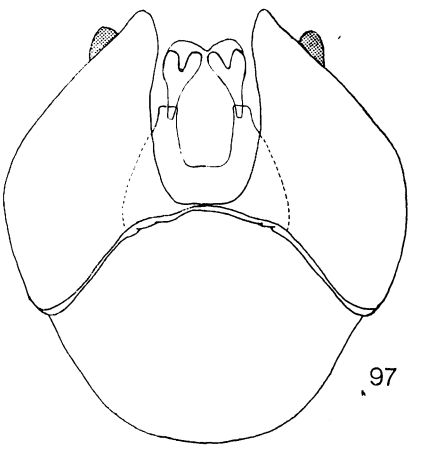
Abdominal tergite-1a nearly flat with dense clump of erect hairs; 1p with quite dense and erect hairs, dense and erect hairs occur on 1 and basal side of 2, 1 and all of 2, 1 and all of 3, and 1 and all of 4; remaining hairs fairly long and semierect in males, almost bare in females except for short, erect hairs on 8; bullae (Fig. 49) large, three to four times as long as broad in males and about two times as long as broad in females. Male sternites 1-4 with long and erect hairs, sparse to dense, usually dense on 5-8 but short or long; sternite 8 hidden to nearly as long as 7, which is short; female sternites 1-2 with very sparse and long hairs, 3-7 practically bare of hairs, 8 with short retrorse hairs, with circlet of strong spines. The male genitalia (Figs. 96-98) has been illustrated and described by Karl (1959: 670-671, fig. 50), as follows:

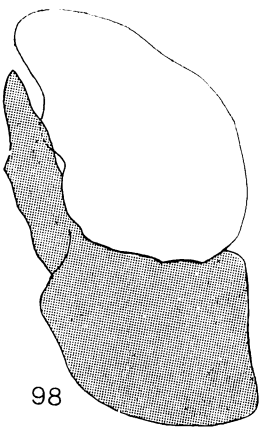
"The hypopygium of this species is not rotated around the longitudinal axis of the abdomen and the eighth segment of the abdomen is fully preserved. The genital complex is dorsally bent, and as in the asilid *Erax aestuans,* the gonopods effect this "backward arching". The two halves of the epandrium are still connected basally. The hypandrium is no longer to be detected as an independent sclerite. It is much more probable that it is coalesced with the gonopods, as in the asilid *Obelophorus landbecki,* rather than reduced, as in *Laphria* and other asilids".

"It may be mentioned that not only certain Asilidae (*Obelophorus*), but also several Rhagionidae (*Chrysopilus, Symphoromyia*), have a hypandrium rather strongly coalesced with the basistyli".

"The gonopods are also very apomorphic, in that they are bent up and especially, no longer posses a dististylus. The absence of a dististylus I have elsewhere noted only in the asilid *Atomosia dispar*. Each basistylus is distally divided. Dorsally (under the epandrium) the gonopods are connected by a bridge-like sclerite, which is also coalesced with the aedeagus".







Mitrodetus sp., male genitalia: 96, ventral view; 97, dorsal view; 98. lateral view.

"The aedeagus is short and bulky, as well as drawn out at the sides like a wing, its opening relatively large. 'Cross-apodemes' are present as in the Dasypogoninae and Leptogastrini. The ejaculatory apodeme has considerable size. The cerci show their original character, in that they are not coalesced with each other; they surround the anal papilla together with the ventral lamella".

Legs slender; hind femora about eight times as long as wide, venter with about 15 sharp spines and a rather dense fringe of long, erect hairs. Hind tibiae cylindrical, with three or more long apical bristles. Hind metatarsus about five times as long as broad and as long or longer than segments 2-4.

Alulae with a fringe of short fine hairs. Wings about three times as long as broad; veins M_1 and M_2 separate, vein M_1 ending in R_1 so first posterior cell is closed, vein M_2 usually ending in costa so second posterior cell is usually open; the veins forming the second submarginal cell frequently coalesced before they reach R_1 but usually they are separated; posterior crossvein absent; ambient vein very weak; axillary lobe about one and one-half times as long as wide (Fig. 71).

Length, 11-19 mm.

Geographic range: Chile, Argentina.

Genus **Mydas** Fabricius

Mydas Fabricius, 1794: 252. Type-species, *Musca clavata* Drury (Latreille, 1810: 443).

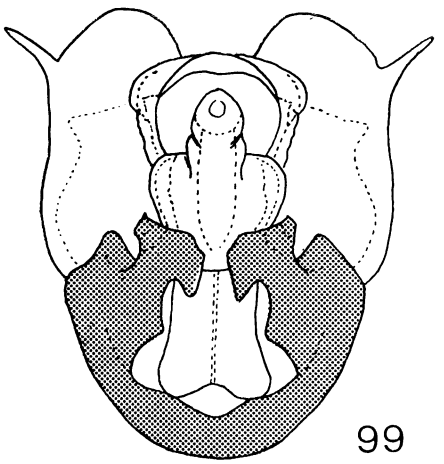
Head in anterior view about one and one-half times as broad as high; face at the antennae about three-eighths to nearly one-half width of head; oral margin located opposite lower eye margin; gibbosity about as broad as long. Stem of proboscis subequal to length of oral cavity, labella attached to apical one-half or more and extending out at about a 90° angle (Fig. 10), palpi short, about as broad as long. Antennal segment 1 cylindrical and about two times as long as broad; 2 about as long as broad; 3 slender and about four times as long as 1-2; club about four-fifths as long as 3 but in some species less swollen and subequal in length to 3 (Figs. 22-26).

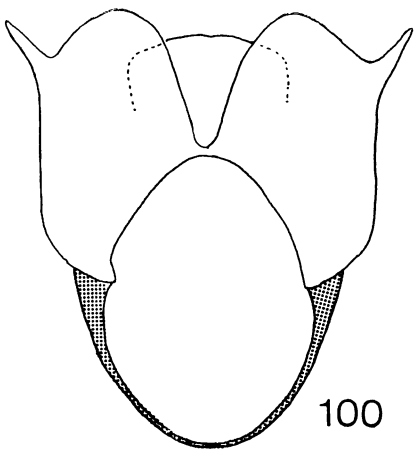
Mesonotum usually with short hairs on lateral margins and dorsocentral stripes; usually bare of pollen but at times these areas densely pollinose. Scutellum usually bare but with a few hairs on the arms. Postscutellum rugose, bare to densely pollinose, without hairs. Pleura pilose on the episternum-1, pteropleura, and metasternum.

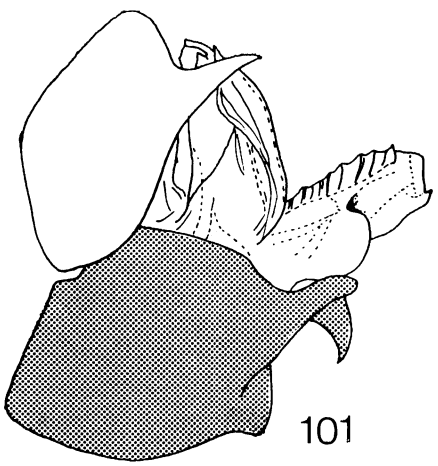
Abdominal tergite-1a tuberculate and bare; 1p usually long pilose; remaining segments with short recumbent hairs usually sparse but at times dense; bullae (Fig. 50) variable, usually narrow and from two to four times as long as broad. Sternites 2-7 with recumbent hairs, sparse to quite numerous, usually more numerous on apical segments; more numerous and semi-erect on sternite 8, ♂ 8 about one-half length of 7. Female segments 7 to 9 becoming progressively narrower, with short recumbent hairs directed posteriorly, tergite 8 narrower at apex than at base and posterior margin with a semicircular sunken or membraneous area; apex with a few long hairs. Male genitalia (Figs. 99-101): hypandrium completely coalescent with the basistyli, the resulting structure capsule-like as in *Messiasia,* but the lateral apodemes undergo a

series of transformations, leading to increasing degrees of complexity in their structures; the epandrial halves are united at base and subtrapezoidal in most species, with a lateral beak pointed outwards in some species; the cerci are comparatively short and are coalescent at the base (Figs. 102-112). (See also d'Andretta, 1951: pl. 9, p. 35; pl. 10, p. 39; pl. 11, p. 41; pl. 12, p. 45).

Fore and middle legs usually slender. Hind femora usually strongly swollen but quite slender in a few species; venter with 12 or more short tuberculate spines; hairs variable. Hind tibiae usually with a strong

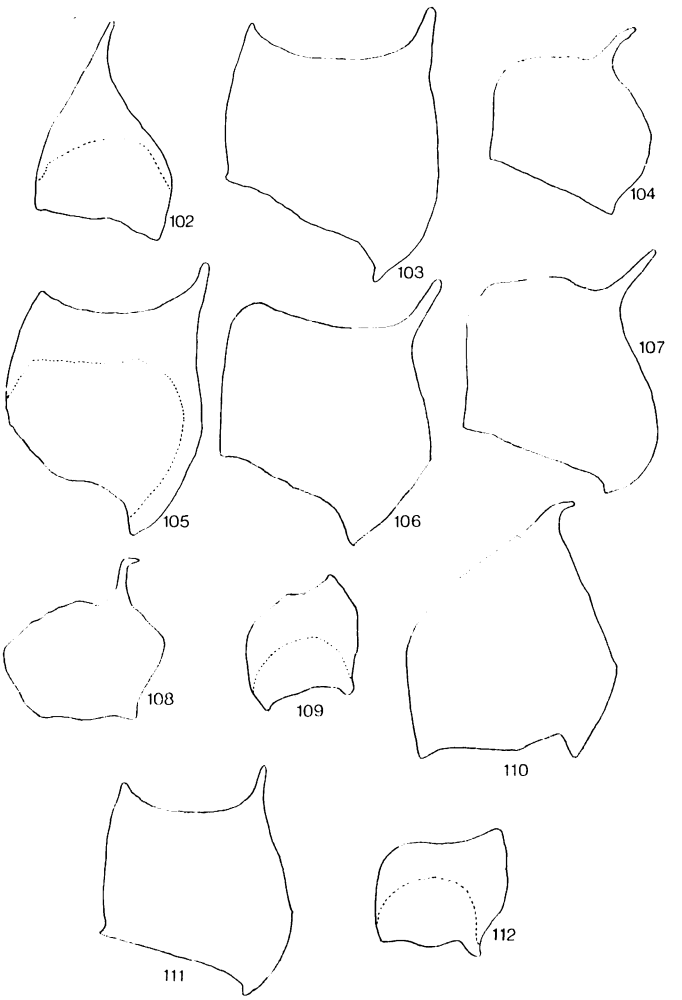






Mydas heros Perty, male genitalia: 99, ventral view; 100, dorsal view; 101, lateral view.

apical spur, at times curved and two times width of hind metatarsus, usually longer than width of the metatarsus but in a few females it is reduced in size and d'Andretta (1951) reported one species without a spur; there is usually a wide ventral keel but in a few species it is very narrow. Hind metatarsus from two to three times as long as broad and shorter than to subequal to the length of 2-3.



Epandrial halves of *Mydas*: 102, *apicalis* Wiedemann; 103, *argyrostomus* Gerstaecker; 104, *clavatus* (Drury); 105, *coerulescens* Olivier; 106, *dives* Westwood; 107, *heros* Perty; 108, *gracilis* Macquart; 109, *militaris* Gerstaecker; 110, *mystaceus* Wiedemann; 111, *rubidapex* Wiedemann; 112, *rufiventris* Macquart.

Alulae with a dense fringe of squamose hairs. Wings narrow to quite broad; second submarginal cell closed and short petiolate; first posterior cell broadly open; posterior crossvein usually present, atrophied or absent in a few species; axillary lobe about as broad as long; ambient vein complete.

Length, 15-60 mm.

Geographic range: Canada to southern South America (but not found in Chile).

An extremely varied genus. The most consistent characters are the form of the proboscis and the location of the oral margin opposite the lower eye margin. These are also characters of *Phyllomydas* Bigot, but its broad face and gibbosity, and its unique female terminalia, separates it quite readily from *Mydas*.

Genus **Nemomydas** Curran

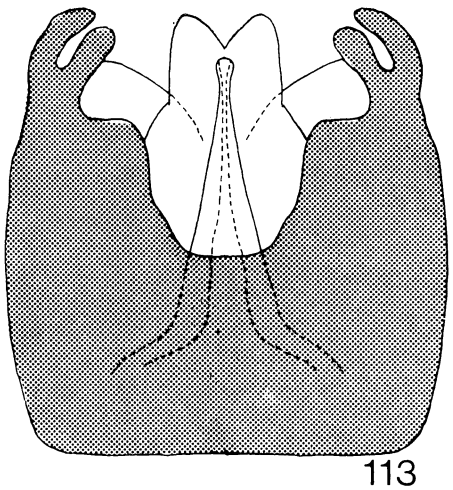
Nemomydas Curran, 1934: 165 (in key). Type-species, *Leptomydas pantherinus* Gerstaecker (orig. des.).

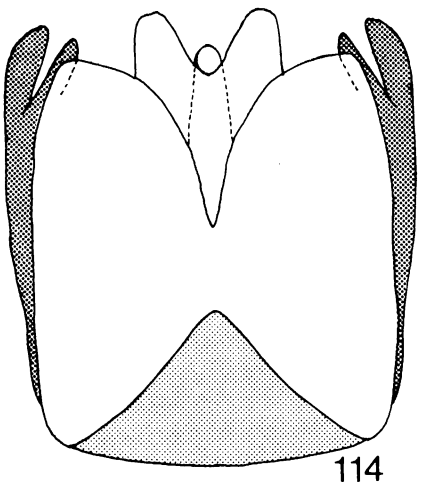
Head in anterior view one and one-half times as broad as high; face at antennae about one-half width of head; oral margin at about three-sevenths distance from lower eye margin to antennae. Stem of proboscis usually slender, labella attached at the apex, length of proboscis including labella varies from about one-half length (obsolete) to about two and one-half times the length of oral cavity (Figs. 8-9, 11); palpi short, about two times as long as wide, apical half narrowed in some species. Antennal segment 1 cylindrical and about one and one-half times as long as wide; 2 about one-third length of 1 and about two times as broad as long; 3 slender and varies from two to four times as long as 1-2; club usually widens from the base to the apical three-fourths where it is about one-fourth as wide as long, it is longer than segment 3 but does not always appear to be longer (Figs. 27-28).

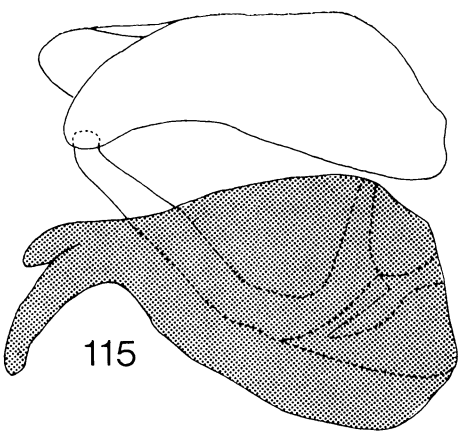
Mesonotum with dense semi-erect hairs on lateral and posterior margins and in the dorsocentral rows varying to sparse short recumbent hairs especially in the females; these areas varying from bare to densely pollinose. Scutellum and arms bare. Postscutellum smooth, sparsely or densely pollinose, bare. Epimeron-1, pteropleura, laterotergite, and metasternum pilose, katepimeron pilose in a few species; usually dense on pteropleura and laterotergite but very short and sparse in some females.

Abdominal tergite-1a slightly rounded, densely pilose; 1p with dense, long, erect pilosity in males, pilosity very short and sparse in some females; anterior lateral margin of 2 with long hairs, dorsum of 2 and remaining tergites with dense, semi-erect hairs in males but a few species with long hairs on all tergites; females with short, sparse, recumbent hairs on 1-4, 5-8 with short and erect or retrorse hairs, becoming more numerous apically; bullae (Fig. 52) oval and from two to four times as

long as broad. Male sternites with sparse, semi-erect hairs becoming more numerous apically, a few long hairs on 8, which is about one-eighth the length of 7; females with sparse erect hairs on 2-4, more numerous retrorse hairs on 5-8; 9 with circlet of strong, blunt spines. Male genitalia (Figs. 113-115): hypandrium completely coalescent with basistyli, the resulting structure roughly subrectangular, apical processes of gonopods thick, bifid apically, ventral tooth longer than dorsal tooth, when seen in lateral view; aedeagus usually long and slender, dorsally bent; cerci and epandrial halves coalescent at base, the latter for almost half their length; epandrial halves triangular; entire genitalia with many moderately long hairs, especially on the gonopods. (See also Hardy, 1950: pl. 2, fig. 23, for good illustrations).







Nemomydas pantherinus (Gerstaecker), male genitalia: 113, ventral view; 114, dorsal view; 115, lateral view.

Fore and middle legs short and slender. Hind femora slender, about eight times as long as wide; venter with 12 or more sharp spines; hairs usually short, long and erect on dorsum of some males. Hind tibiae cylindrical, apex with three or more long bristles. Hind metatarsus about three times as long as broad and subequal in length to segments 2-3.

Alulae with sparse fringe of short, fine hairs. Wings about three times as long as broad; second submarginal cell closed; first posterior cell open or closed; posterior crossvein absent; ambient vein weak; axillary lobe about two times as long as broad.

Length: 12-23 mm.

Geographic range: Canada (British Columbia) to Panama.

Genus **Opomydas** Curran

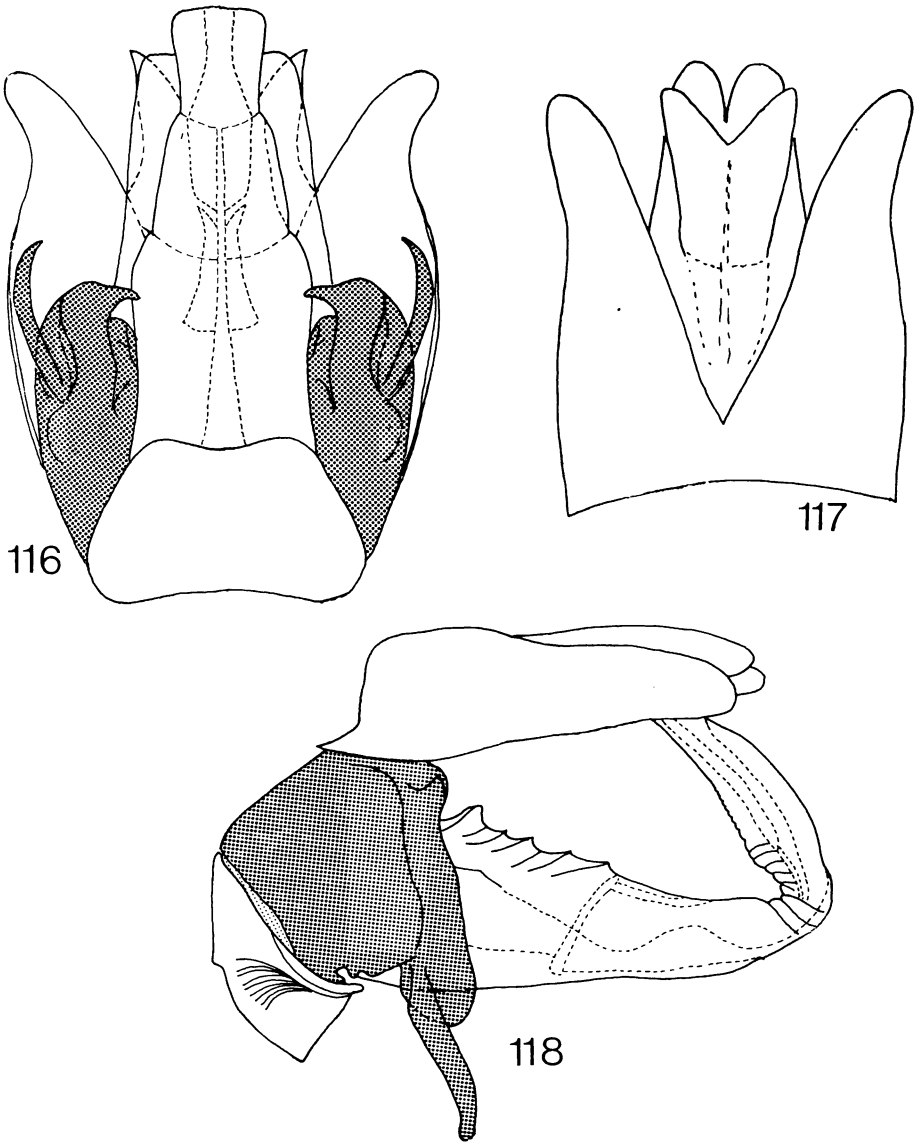
Opomydas Curran, 1934:165 (in key), figs. 4, 12 (p. 164). Type-species, *Ectyphus limbatus* Williston (orig. des.).

Head in anterior view nearly two times as wide as high; face at antennae about one-half width of head; oral margin at about one-sixth distance from lower eye margin to antennae; gibbosity largely pollinose in males, bare in females, a suggestion of a central vertical groove in some specimens. Stem of proboscis subequal to length of oral cavity, labella attached at apex and extending down on anterior side for about one-third length of stem; palpi slender, about one-half length of oral cavity. Antennal segment 1 cylindrical and about one and one-third times as long as broad; 2 about one-fourth length of 1 and about two times as broad as long; 3 slender and about three times as long as 1-2; club variable, in some males parallel-sided and as long or longer than 3, in others fusiform and shorter than 3, which is also the usual form for the female club (Figs. 29-31).

Mesonotum pollinose, usually denser on lateral margins and dorsocentral stripes; hairs short recumbent to quite long and erect in some males. Scutellum with short discal and marginal hairs. Post-scutellum rugose, entirely or partly pollinose, lateral slopes pilose. Pleura with hairs on episternum-1, dorsal posterior margin of mesopleura, pteropleura, and metasternum. Pollen usually dense above on sternopleura and mesopleura and on metapleura and metasternum.

Abdominal tergite-1a slightly rounded, bare, and occasionally densely pollinose; 1p with short and quite dense erect hairs; remaining tergites with numerous short and recumbent hairs in ♂; bullae (Fig. 50) slender and about four times as long as wide. Sternites with very sparse and short hairs except on 7-8, ♂ 8 as long or longer than 7. Female tergites and sternites 2-7 with very short sparse, recumbent hairs, hairs long, numerous and erect on 8, apex with circlet of strong spines. Male genitalia (Figs. 116-118) very peculiarly and characteristically built, and presenting many primitive characters. Hypandrium distinct, only

fused to the basistyli by a membrane, otherwise free; trapezoidal in ventral view and bowl-shaped in lateral view. Gonopods very primitively built, as they still possess a dististylus, which is laterally placed, very slender and elongate; basistyli short and thick, beaked apical processes bent inwards. Aedeagus a very long conical tube (almost twice as long as the genitalia), dorsally bent; its basal portion is thicker and



Opomydas limbatus (Williston), male genitalia: 116, ventral view; 117, dorsal view; 118, lateral view.

has many ridges; dorsal portion of the gonopods united by a bridge behind (dorsad of) basal portion of aedeagus, this bridge also coalesced with basal portion of aedeagus; cerci long and slender, united at base; epandrial halves triangular, apex oblongate, both halves united at base.

Fore and middle legs short and slender. Hind femora quite slender, about seven times as long as wide; hairs usually short and recumbent, but may be long and erect; venter with about 16 slightly tuberculate spines. Hind tibiae with slight ventral keel; apex with slender spur plus one or more apical bristles, in some females spur absent or reduced in size but apical bristles present. Hind metatarsus slender, about six times as long as wide, as long or longer than segments 2-4.

Alulae with dense fringe of squamose hairs. Wings about three times as long as broad; second submarginal cell usually closed, at times narrowly open; posterior crossvein present; ambient vein complete; axillary lobe about as broad as long.

Length: 18-25 mm.

Geographic range: U.S.A. (California to Texas), Mexico (Baja California to Chihuahua).

Genus **Paramydas** Carrera & d'Andretta

Paramydas Carrera & d'Andratta, 1948: 490. Type-species, *Mydas igniticornis* Bigot (orig. des.).

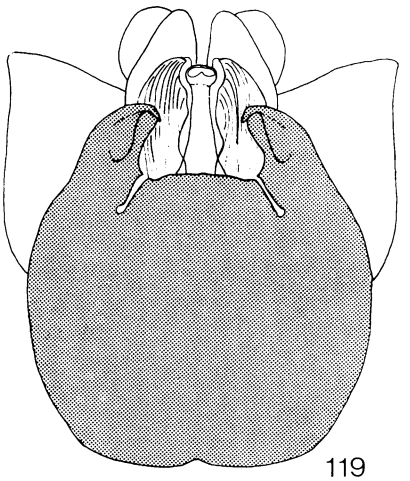
Head in anterior view one and one-third times as broad as high; face at antennae one-third width of head; oral margin at one-third distance from lower eye margin to antennae. Proboscis similar to *Messiasia,* labella subequal to length of oral cavity; palpi very small. Antennal segment 1 cylindrical, about as broad as long; 2 one-half length of 1 and slightly wider than long; 3 slender and about three times as long as 1-2; club one and one-fifth times as long as 3 and about one-third as broad as long (Fig. 32).

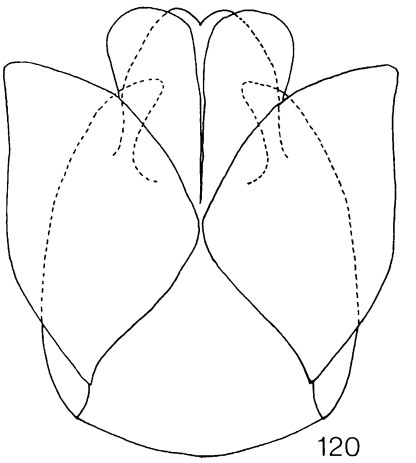
Mesonotum with short hairs on lateral margins and dorsocentral stripes. Scutellum with short hairs. Postscutellum slightly rugose, bare. Pleura with long hairs on episternum-1, mesopleura (dorsal and posterior margins), pteropleura, katepimeron, and metasternum.

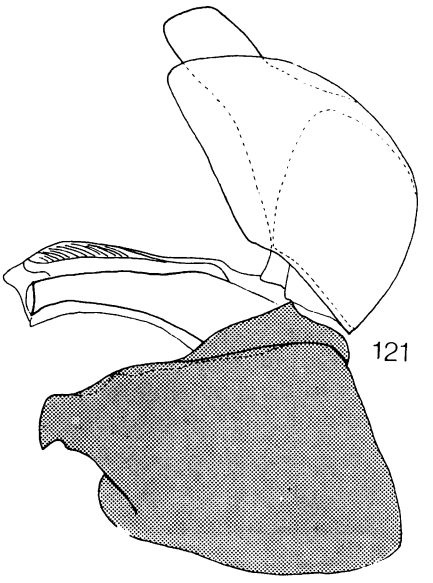
Abdominal tergite-1a rounded, a few hairs below; 1p with sparse, fairly long hairs; remainder with sparse, recumbent hairs; tergites 1, basal one-fourth of 2, and narrow posterior margins of 2-7, smooth; remainder of 2-7 with many deep, large punctures; bullae (Fig. 53) small, about twice as long as wide. Sternites 2-7 with deep numerous punctures, hairs sparse, recumbent, becoming numerous apically; ♂ 8 rugose and about one-half length of 7, hairs short, dense, semi-erect. Female terminalia with apical hairs, similar to *Mydas*. Male genitalia (Figs. 119-121): hypandrium coalescent with basistyli, capsule-like, as in *Mydas* and *Messiasia,* hemispherical in outline; apical processes with

a beak directed inwards; aedeagus conical, with well-developed lateral apodemes, in the shape of a large wing; epandrial halves triangular, completely separated; cerci separated.

Fore and middle legs slender, fore femora one and one-half times as wide as their tibiae. Hind femora swollen, about five times as long as broad; venter with about 16 tuberculate spines; hairs sparse and re-







Paramydas igniticornis (Bigot), male genitalia: 119, ventral view; 120, dorsal view; 121, lateral view.

cumbent, a few short, erect hairs on dorsum. Hind tibiae with ventral keel, apical spur subequal in length to width of hind metatarsus and with small bristle at base. Hind metatarsus about two and one-half times as long as wide and subequal in length to segments 2-3.

Alulae with dense fringe of squamose hairs. Wings about three times as long as broad; second submarginal cell open, nearly closed in a few specimens; posterior crossvein present; axillary lobe as broad as long; ambient vein complete.

Length: 18-23 mm.

Geographic range: Chile.

Genus **Phyllomydas** Bigot

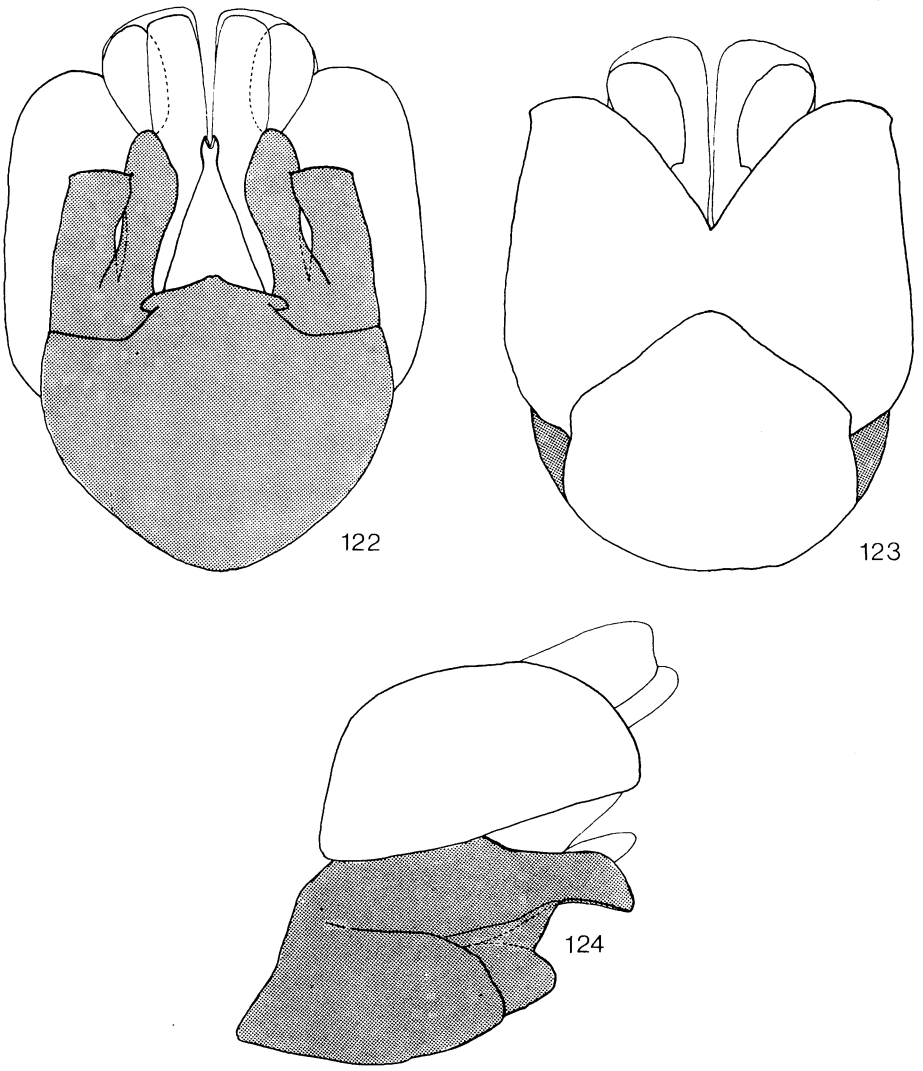
Phyllomydas Bigot, 1880: xlvi. Type-species, *phyllocerus* Bigot (mon.).

Head in anterior view one and six-tenths times as broad as high; face at antennae one-half width of head; oral margin situated opposite lower eye margin; gibbosity broad, one and one-half times as broad as high. Probocis and palpi similar to *Mydas*. Antennal segment 1 cylindrical and nearly as broad as long; 2 about one-third as long as 1 and about three times as broad as long; 3 slender, varying from two and one-half to four and one-half times as long as 1-2; club of some males broadest near base and tapering slightly to apex and two and one-half times as long as 3, fusiform in other males and subequal in length to 3, which is also the usual form of the female club (Figs. 34-37).

Mesonotum with short hairs on lateral margins and dorsocentral stripes. Scutellum bare, usually a few hairs on arms. Postscutellum rugose laterally, bare. Pleura pilose on episternum-1, pteropleura, and metasternum.

Abdominal tergite-1a slightly rounded, bare; 1p with numerous short, erect hairs, especially laterally; rather dense, short, recumbent on remaining tergites; bullae (Fig. 54) about three times as long as broad. Sternites with sparse and recumbent hairs, more numerous on 6-8; ♂ 8 about one-third lenght of 7. Females with sparse and recumbent hairs on segments 2-7, numerous erect to slightly retrorse hairs on 8 and a few on 9; tergite 9 fluted and one and one-half times as wide at the apex as at the base; apex with short hairs (Fig. 61). Some species with fine punctures on segments 2-8 and female segment 8 shallowly rugose. Male genitalia (Figs. 122-124): hypandrium completely coalesced with basistyli, resulting structure subquadrate; apical processes of gonopods subrectangular, their apical margin straight; superomedian part of the fused gonopods projected ventrally; aedeagus a conical tube, with lateral apodemes dorsally bent, pointed; epandrial halves and cerci coalescent for a short distance at base; epandrial halves wide, bent in their apical margin, bent part fused to epandrial wall.

Fore and middle legs short and slender. Hind femora moderately swollen, about six times as long as broad; venter with about 14 short tuberculate spines; hairs short. Hind tibiae with a slight ventral keel; apex with a short spur, about one-half width of hind metatarsus, with a long bristle at base and at times a second shorter one. Hind metatarsus about two and one-half times as long as wide and subequal in length to segments 2-3.



Phyllomydas brusii Johnson, male genitalia: 122, ventral view; 123, dorsal view; 124, lateral view.

Alulae with dense fringe of squamose hairs. Wings about three times as long as broad; second submarginal cell usually closed and petiolate, occasionally narrowly open; posterior crossvein present; ambient vein complete; axillary lobe about as broad as long.

Length: 12-21 mm.

Geographic range: U.S.A. (Arizona and Colorado to Florida), Mexico (Sonora east to Coahuila and south to Jalisco).

Mydas eupolis Séguy (1928: 142) belongs in *Phyllomydas* Bigot and this discovery extends the range of the genus much farther south in Mexico than reported previously (Papavero & Wilcox, 1968: 8). The fore and middle tibiae of *eupolis* are as wide as their femora, the spur on the hind tibiae is slightly curved and one and one-half times the width of hind metatarsus.

Plyomydas, gen. n.

Head in anterior view one and one-half times as broad as high; face at antennae one-half width of head. Oral margin at one-fourth distance from lower eye margin to antennae. Proboscis similar to *Messiasia,* labella about two-thirds length of oral cavity; palpi apparently very small (not visible). Antennal segment 1 cylindrical, nearly as broad as long; 2 one-half length of 1 and one and one-half times as long; 3 slender and one and six-tenths as long as 1-2; club one and four tenths as long as 3, at two-thirds its length about one-half as wide as long (Fig. 33).

Mesonotum pollinose, dense on humeri, lateral margins and dorsocentral stripes, hairs short and sparse on these areas. Scutellum pollinose with sparse hairs laterally and on arms. Postscutellum pollinose, rugose laterally, bare. Pleura thinly pollinose; sparse long hairs on episternum-1, pteropleura, and metasternum.

Abdominal tergite-1a oval, rounded, densely pollinose and bare; sides and base of 1p pollinose with sparse, semi-erect hairs, posterior margin bare; remaining segments with sparse, long, recumbent hairs; bullae (Fig. 55) small, about three times as long as broad. Sternites 2-7 with sparse, long, recumbent hairs, 8 about one-fourth length of 7 and with sparse, long hairs at apex. Male genitalia (Figs. 125-127): hypandrium completely coalesced with basistyli, resulting structure also capsular, with rounded lateral margins; a depression towards the aedeagus is seen in the middle of the fused gonopods; apical processes divided into 4 outgrowths, one ventral, which is the largest, and other three dorsal; outer ones intimately related; aedeagus with a dorsal spur which is the result of fusion of the dorsally bent lateral apodemes; epandrial halves triangular, united basally; cerci long, oblongate, united at base. Female terminalia similar to *Mydas.*

Fore and middle legs slender, femora slightly wider than their tibiae. Hind femora slender, about ten times as long as wide; venter with 2-3 sharp spines near apex and a fringe of long erect hairs; hairs otherwise

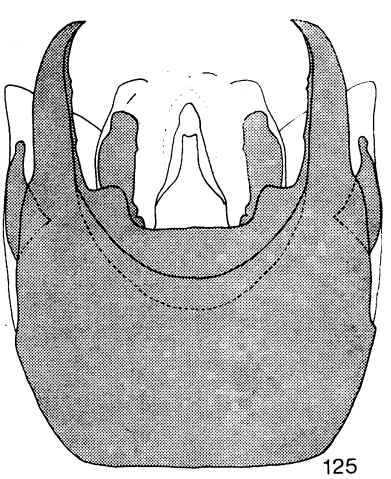
short, sparse, semi-erect. Hind tibiae cylindrical with one or two apical bristles. Hind metatarsus about three times as long as broad and subequal in length to segments 2-3.

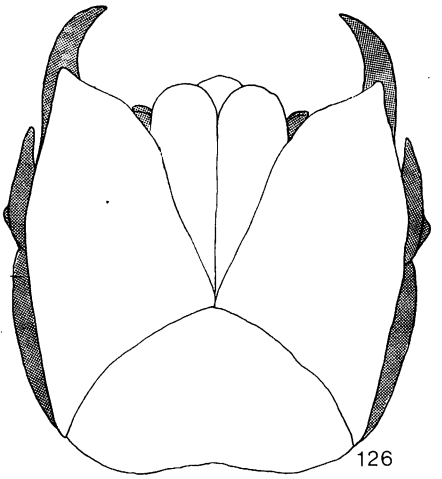
Alulae with dense fringe of squamose hairs. Wings about three and four-tenths as long as broad; second submarginal cell closed to narrowly open; posterior crossvein present; ambient vein complete; axillary lobe nearly as broad as long.

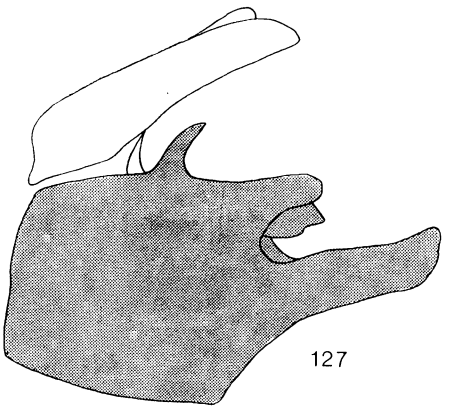
Length, 12-18 mm.

Geographic range: Peru.

Type-species, *Plyomydas peruviensis,* sp. n.







Plyomydas peruviensis, gen. n., sp. n., male genitalia: 125, ventral view; 126, dorsal view; 127, lateral view.

Plyomydas peruviensis, sp. n.
(Fig. 128)

Male: Length 12 mm.

Head black, gibbosity brown; broad sides of face, frons, a small spot above at middle of gibbosity, and the occiput densely white pollinose. Hairs yellowish, sparse, semi-erect on gibbosity, long and dense to sides of antennae, quite long and erect on frons, upper occiput and below proboscis; short, erect, whitish hairs on lower occiput. Proboscis brown. Face at lower eye margin 15, at antennae 25, at vertex 17, and one eye 17, in width. Antennae black, apical two-thirds of club reddish; hairs below on segments 1-2 short yellowish, above black; segments 12-5-35-40 (16) in length (width) (Fig. 33).

Mesonotum dull black, humeri, lateral margins and postalar calli brown. Humeri, lateral margins, and dorsocentral stripes extending to

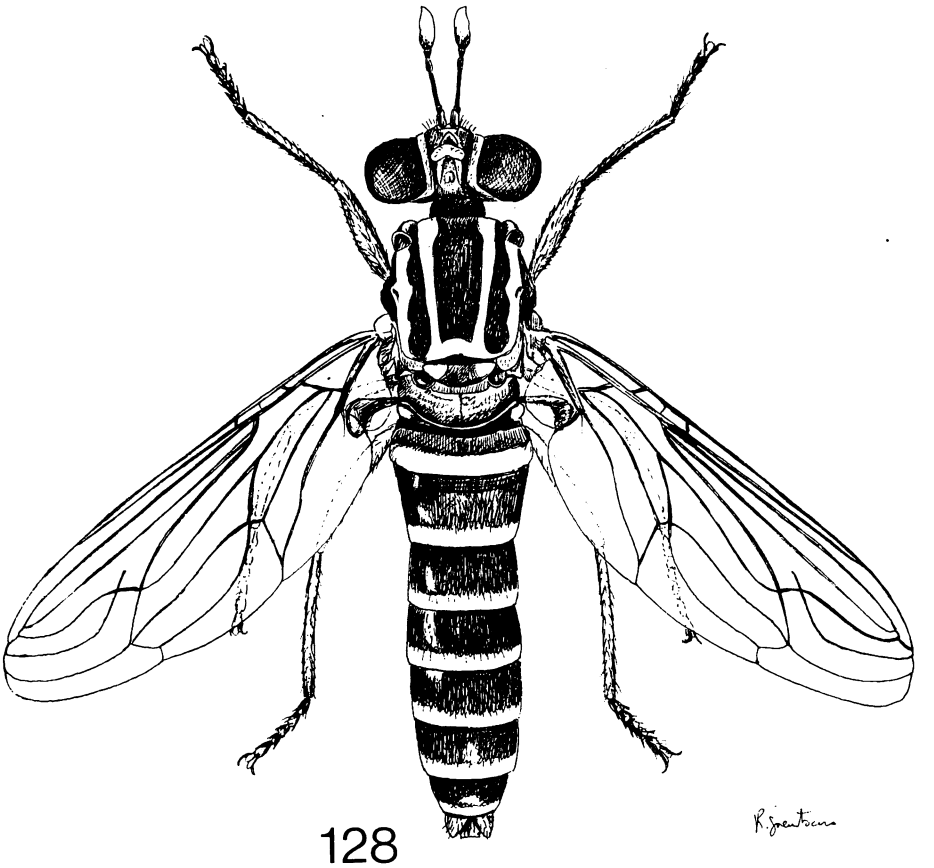


Fig. 128, *Plyomydas peruviensis,* gen. n., sp. n., whole insect (note: head upside down).

and connecting before scutellum, densely white pollinose. Hairs short, sparse, brown to black, a few longer yellowish hairs anteriorly in dorsocentral rows. Scutellum dull brown, anterior corners densely white pollinose, arms shining; short sparse hairs yellowish. Postscutellum brown, shallowly rugose, antero-median two-thirds white pollinose, sparse laterally. Pleura and coxae brown; pleura sparsely white pollinose with two small dense spots on mesopleura and one on metapleura; hairs on coxae brown to black; on pleura long, sparse, golden.

Abdomen reddish-brown; tergite-1a and basal one-half of 1p densely white pollinose; posterior one-half of 1p not reaching lateral margins, and posterior one-fourth of 2-7, yellowish white; bullae small brown, 10 long, 4 wide; hairs short, sparse, semi-erect and yellowish on 1p, recumbent black on remainder. Sternites shining reddish brown, posterior margins 2-7 yellowish; sparse, recumbent, black hairs on 2-7 originating from tiny punctures, apex of 8 with a few longer hairs. Epandria and proctiger yellowish, sparse hairs brown to yellowish. Hypandrium brown, hairs brown.

Legs brown, hairs short, sparse, semi-erect, brown to black. Hind femora 61 long, 6 wide; hairs short, semi-erect, black, on venter long, erect and brown plus two sharp spines near apex. Hind tibiae with two black apical bristles. Hind tarsi 16 (6), 11, 8, 6, 16, in length (width). Claws brown, tips black; pulvilli yellowish.

Halteres brown. Alulae light brown, broad margin whitish, fringe whitish. Wings very pale brown, nearly hyaline; veins light brown; second submarginal cell closed and very short petiolate.

Female: Length 18 mm. Gibbosity dark brown without pollen at middle above, mystax very sparse; face opposite lower eye margin 19, at antennae 31, at vertex 23, one eye 22, in width. Antennal segments 15-5-31-58 (19) in length (width). Coxae brown, pleura light brown, with narrow margin of mesopleura and metapleura densely white pollinose posteriorly. Abdomen broad, segments 1-5 nearly four times as broad as long; yellow posterior margin of tergite 1 broad, on 2-7 about one-fifth length of segments; posterior margins of tergite 8 whitish; apex with fine black hairs directed apically; bullae black, 16 long, 4 wide; sternites brown, posterior margins of 2-5 yellowish. Hind femora 90 long, 10 wide; five weak black spines on apical one-fourth of venter; fringe of long hairs confined to apical one-half of venter. Margin and fringe of alulae slightly lighter brown than base.

Holotype ♂, Peru, Lima, II.1939 (Weyrauch) (♂ genitalia in vial), MZUSP.

Paratypes: 1 ♀, Peru, Cartavio, XII.1935 (E. G. Smyth), UK; 2 ♂, Peru, Cartavio (E. G. Smyth), AMNH; 2 ♂, Peru, 6 mi. S. Chiclayo, Lambayeque, 20 m, I.1955 (E. I. Schlinger, E. S. Ross), CAS; 2 ♂, Peru, Lima, 15.I.1968, 8.III.1969 (H. Picho) (1 ♂ MZUSP, 1 ♂ MEUA); 1 ♂, Peru, Lima, 11.II.1969 (V. Rázuri), MZUSP; 1 ♂, Peru, Chanchamayo (doubtful procedence; probably Lima), 23.VI.1968 (M. Picho), MEUA.

Genus **Pseudonomoneura** M. Bequaert

Pseudonomoneura M. Bequaert, 1961: 13. Type-species, *Leptomydas hirtus* Coquillett (orig. des.).

Head in anterior view about one and one-half times as broad as high; face at antennae about five-thirteenths width of head; oral margin at about three-fifths distance from lower eye margin to antennae. Stem of proboscis usually slender, labella attached at apex, length including labella ranges from about one-half length (obsolete) to two and one-half times length of oral cavity; palpi short and about two times as long as wide. Antennal segment 1 cylindrical, one and one-half to two times as long as wide; 2 one-third to one-half as long as 1, and about one and one-half times as broad as long; 3 usually two to three times as long as 1-2, in species with obsolete proboscis it may be slender or stout and subequal in length to 1-2; club usually shorter than segment 3 and widest at three-fourths its length, in species with obsolete proboscis it is usually longer than 3 (Figs. 38-41).

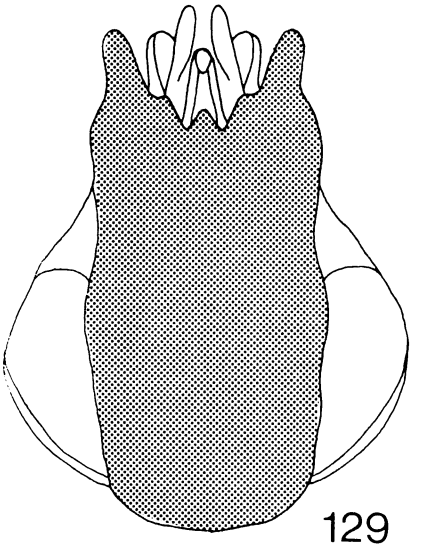
Mesonotum with dense, semi-erect hairs on lateral and posterior margins and in dorsocentral rows and without pollen, varying to species with sparse pile and dense pollen on these areas. Scutellum and arms bare. Postscutellum smooth, lateral slopes bare, varying to species with dense clumps of long hairs, and varying from densely pollinose to bare of pollen. Pleura with dense clump of hairs on episternum-1, pteropleura, laterotergite, and metasternum; katepimeron long pilose in a few species; in a few females these hairs and also those on the postscutellum are very short and sparse.

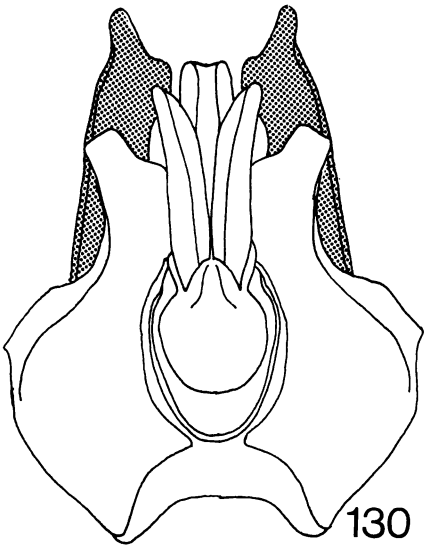
Abdominal tergite-1a slightly rounded, usually long pilose but with very short hairs in some females, pollinose in some species but usually without pollen; 1p similar; tergite 2 and at times 3 with long hairs basally, apical one-half or less of 3-6 or 3-7 with dense recumbent hairs in some males, sparse and recumbent in other males; bullae (Fig. 56) oval, two to three times as long as broad, minute in some females. Some females have dense, long hairs on tergite 1 and base of 2 but usually they are long and sparse and recumbent on 2-6; 7-8 with many retrorse hairs. Male sternites 2-7 with many short, recumbent hairs, 8 one-fifth length of 7 and usually with long hairs. Female sternites 2-6 with short recumbent hairs, 7-8 with retrorse hairs; apex with circlets of strong spines. Male genitalia (Figs. 129-131): hypandrium completely coalescent with basistyli, the resulting structure remarkably elongate and subrectangular; apical processes of gonopods reduced, short, ventrally bent; aedeagus with a thick ventral bulb, the neck ventrally bent (a unique character among American Mydidae); epandrial halves united at base, very well-developed, bowl-shaped, with an apical prolongation also ventrally bent; cerci fused at base forming with anal lamellae an erect tube arising from middle of epandrial halves.

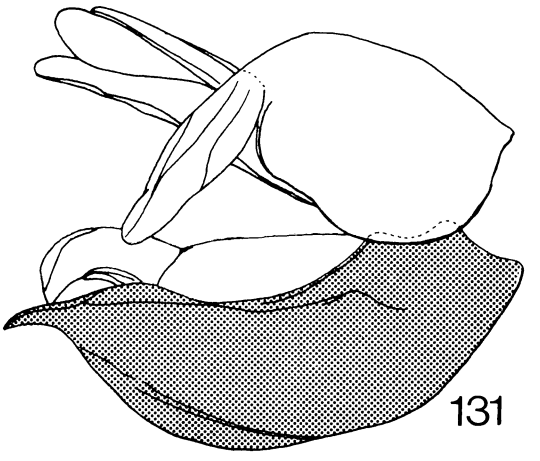
Fore and middle femora slightly swollen, about one and one-half times as wide as their tibiae. Hind femora slightly swollen, six or se-

ven times as long as broad; about 12 sharp, slightly tuberculate spines on venter; hairs short, recumbent to long erect. Hind tibiae cylindrical with three or more apical bristles. Hind metatarsus about three times as long as wide and subequal in length to 2-3.

Alulae with a fringe of short, sparse, fine hairs. Wings about three and one-third times as long as wide; second submarginal cell closed, stump vein R_3 near base absent or short; first posterior cell open or







Pseudonomoneura hirta (Coquillett), male genitalia: 129, ventral view; 130, dorsal view; 131, lateral view.

closed; posterior crossvein absent; ambient vein weak; axillary lobe one and one-half to two times as long as broad.

Length: 9-20 mm.

Geographic range: U.S.A. (Arizona, California, Nevada, Utah), Mexico (Baja California, Coahuila).

Pseudorhopalia, gen. n.

Rhopalia Macquart of d'Andretta & Carrera, 1951: 7, pl. 1, figs. 1-8 (misident.).

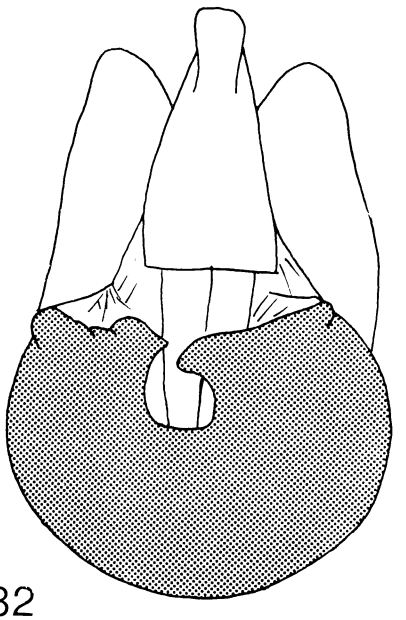
Head in anterior view one and one-third times as broad as high; face at antennae one-half width of head; oral margin at about one-fourth distance from lower eye margin to antennae. Gibbosity densely pollinose. Proboscis similar to *Messiasia,* labella about two-thirds length of oral cavity; palpi atrophied. Antennal segment 1 cylindrical and about two times as long as broad; 2 one-half length of 1 and about as broad as long; 3 slender and about two times as long as 1-2; club subequal in length to 3, at three-fourths its length about one-half as wide as long.

Mesonotum densely pollinose, narrow margins of central stripe anteriorly and narrow intermediate stripes bare of pollen; hairs short, sparse, semi-erect on lateral margins and dorsocentral stripes. Scutellum densely pollinose with central basal bare spot; without hairs. Postscutellum densely pollinose, slightly rugose laterally, bare. Pleura and coxae densely pollinose; sparse, short hairs on episternum-1, pteropleura, and metasternum.

Abdominal tergite 1 and base of 2 densely pollinose; 1a slightly rounded, bare; 1p with short, sparse, erect hairs; hairs on 2-7 short, sparse, recumbent; bullae narrow, about three times as long as wide (Fig. 57). Sternites with short, sparse, recumbent hairs, 7-8 with sparse, long hairs, ♂ 8 about one-seventh as long as 7. Female with apical circlet of spines. Male genitalia (Figs. 132-134): hypandrium completely fused to basistyli, resulting structure hemispherical, rounded in ventral view; the whole structure presents a great development, and is also fused by means of a well developed bridge with the aedeagus; the latter is a thick cone, slightly pointed backwards (dorsally). The combined volumes of these structures render the genitalia quite open, and the cerci and anal lamellae are bent backwards; cerci and triangular epandrial halves coalescent on their bases. (See also d'Andretta & Carrera, 1951: pl. 1, figs. 5-8).

Fore femora swollen and about two times width of curved tibiae; hind femora slender, about ten times as long as wide; venter with about eight sharp spines; hairs short and recumbent. Hind tibiae cylindrical with three long apical bristles. Hind metatarsus about three times as long as wide, subequal in length to segments 2-3.

Alulae with fringe of sparse, short, fine hairs. Wings about three times as long as broad; second submarginal cell open; first posterior cell



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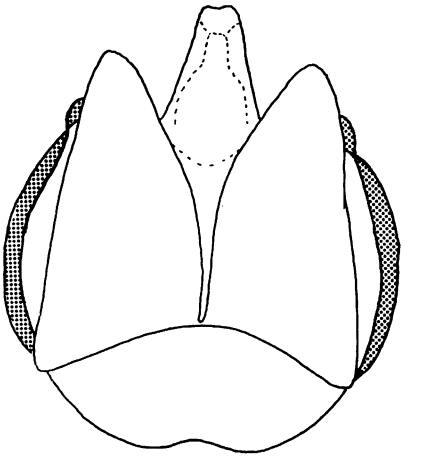

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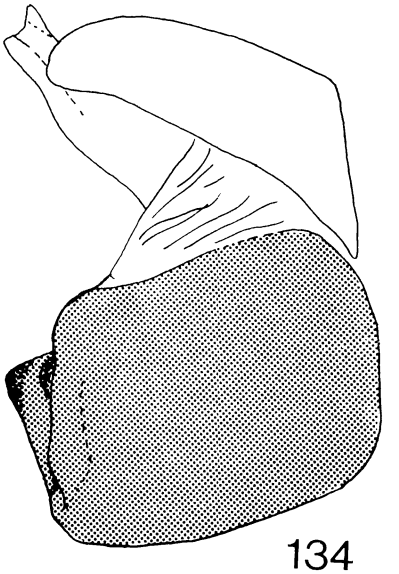

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Pseudorhopalia mirandai (d'Andretta & Carrera), male genitalia: 132, ventral view; 133, dorsal view; 134, lateral view.

broadly open and vein M_1 and 2 faint; ambient vein faint; axillary lobe two times as long as broad.

Length: 10-14 mm.

Geographic range: Brazil (Ceará).

Type-species, *Pseudorhopalia mirandai* (d'Andretta & Carrera, 1951), *N. comb.*

Pseudorhopalia, gen. n., can be easily differentiated from the African *Rhopalia* by the prolongation of cell M_3, which forms a pointed beak. However, the most essential difference is seen in the structure of the male genitalia. In *Pseudorhopalia* the combined hypandrium and gonopods are hemispherical and very well-developed, while in *Rhopalia* Macquart, 1838, the structure is a shallow capsule. The aedeagus in *Pseudorhopalia* is a thick cone, whose strong development leaves the genitalia open, while in *Rhopalia* the aedeagus is a poorly developed tube hidden in the interior of the genitalia. We have examined specimens of *Rhopalia tristis* Séguy, kindly sent us for study by Dr. P. Wygodzinsky (AMNH). Drawings of the genitalia of *Rhopalia efflatouni* M. Bequaert are given by M. Bequaert (1961: pl. 6, figs. 5A, 5B). A comparison between the illustrations given by M. Bequaert and ours immediately shows the differences between the two genera, especially when the genitalia are examined in lateral view.

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